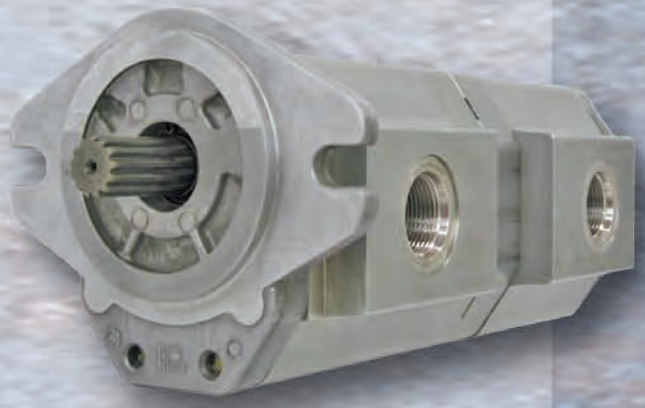
CYLINDERS, VALVES, PUMPS & MOTORS



Prince

Prince Manufacturing Corporation
North Sioux City, South Dakota

Standard Product Index

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Electronic Catalog available Online at www.princehyd.com

CYLINDERS & ACCESSORIES

Prince Manufacturing Corporation
North Sioux City, South Dakota

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HYDRAULIC CYLINDERS

Welded Cylinders

BORE SIZE	NAME	MODEL	PAGE
1 1/2”	Wizard	F150	C3-C4
1 1/2”	Sword	PMC-19400	C5
1 3/4”	Wizard	F175	C3-C4
2”	Wizard	F200	C3-C4
2”	Sword	PMC-42000	C5
2 1/4”	Wizard	F225	C3-C4
1 1/2”	Wizard	F250	C3-C4
2 1/2”	Sword	PMC-42500	C5
2 1/2”	Royal	PMC-5400	C6
2 3/4”	Wizard	F275	C3-C4
3”	Sword	PMC-43000	C5
3”	Royal	PMC-8300	C6
3 1/2”	Sword	PMC-43500	C5
3 1/2”	Royal	PMC-5500	C6
4”	Sword	PMC-44000	C5
4”	Royal	PMC-5600	C6
4”	Fortress	SAE-64000	C7
4 1/2”	Fortress	SAE-64500	C7
5”	Gladiator	PMC-21000	C8
6”	Gladiator	PMC-22000	C8
3”	Top Link	BD-0228	C16

Tie-Rod Cylinders

BORE SIZE	NAME	MODEL	PAGE
2”	Majestic	SAE-8400	C9
2”	3000 PSI	B200000	C10-C13
2 1/2”	Majestic	SAE-7000	C9
2 1/2”	3000 PSI	B250000	C10-C13
3”	Majestic	SAE-7100	C9
3”	3000 PSI	B300000	C10-C13
3 1/2”	Majestic	SAE-7200A	C9
3 1/2”	3000 PSI	B350000	C10-C13
4”	Majestic	SAE-8600	C9
4”	3000 PSI Heavy Duty	C400000	C9
4”	3000 PSI	B400000	C10-C13
4 1/2”	3000 PSI	B450000	C10-C13
5”	Majestic	SAE-8200	C9
5”	3000 PSI	B500000	C10-C13
	Series Cylinders		C14

Telescopic Cylinders

Custom	C25
Single Acting	C26
Double Acting	C27-C29

Accessories

Accessories	C15-C22	Filters - Up to 20 GPM	C21	Pins - 1” Dia.	C18
Bushing - Pin Hole	C18	Filters - Up to 45 GPM	C22	Pins 1 1/4” Dia.	C18
Breathers	C18	Valve - Holding	C16	Stroke Control - Collars	C17
Clips - Cotters	C18	Gauges	C18	Stroke Control - Sleeve	C17
Filters - Return Line 3/4”	C20	Hand Pump	C19	Valve - Restrictor	C17
Filters - Return Line 1 1/4”	C20	Remote Stroke Control Valve	C15		

PLEASE NOTE: Pressure ratings as listed in the sales catalog charts provide a minimum safety factor of 2:1 based on burst strength of the cylinder body. Rod column loading limitations (rod bending) can greatly reduce the safe operating pressure, especially on heavy loads and long strokes. Any references to intermittent pressure ratings in our literature no longer apply. Please contact our engineering department for help.

PRINCE FOR SERVICE, HIGH QUALITY AND FAIR PRICE

Pride in individual work and accomplishment is the trade. It means more than just getting the order out. All cylinders or components, whatever the size or type get individual skilled attention. You will find that Prince cylinders meet all of your highest requirements and that you receive years of maintenance-free dependable usage. Prince builds most of their own tools, jigs and fixtures with a fully staffed and equipped tool room. Modern precision equipment is utilized to produce and maintain these high production tools. Prince maintains a vast assortment of tubing, bars, casting and packing to give customers the best possible service available. Prince Manufacturing is relieved of any liability due to typographical errors in specifications. If you have any questions regarding any product specifications, please contact your representative.

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CATC 2-09-04-01

THE WIZARD LINE

3000 PSI EXTENDED DUTY

THE "WIZARD" Welded–DA–37⁰ JIC Male Ports

FEATURES:

- Honed tubing
- Chromed, ground & polished rod
- Ductile iron piston & gland
- Optional end fittings available
- Urethane u-cup and wiper
- Crown seal standard, "T" seal optional
- Wear ring on piston
- Thread in gland with o-ring to protect threads
- Standard color is gloss black

Model No.	Style	Wt.	PSI	Column Load (Lbs)	Ret (B)	Rod Dia.	A	C	D (Dia.)	E (45°)	Crosstube Adder (F)	Tang Adder (G)	Clevis Adder (G)	Ports
F150040	1 1/2 X 4	7	3000	FULL PSI	9 1/2	3/4	3/16	1	.760	.22	3/4	1 3/4	1 3/4	9/16-37°
F150060	1 1/2 X 6	8	3000	FULL PSI	11 1/2	3/4	3/16	1	.760	.22	3/4	1 3/4	1 3/4	9/16-37°
F150080	1 1/2 X 8	8	3000	FULL PSI	13 1/2	3/4	3/16	1	.760	.22	3/4	1 3/4	1 3/4	9/16-37°
F150100	1 1/2 X 10	9	3000	4,770 LBS	15 1/2	3/4	3/16	1	.760	.22	3/4	1 3/4	1 3/4	9/16-37°
F150120	1 1/2 X 12	10	3000	3,640 LBS	17 1/2	3/4	3/16	1	.760	.22	3/4	1 3/4	1 3/4	9/16-37°
F150160	1 1/2 X 16	10	3000	2,315 LBS	21 1/2	3/4	3/16	1	.760	.22	3/4	1 3/4	1 3/4	9/16-37°
F150200	1 1/2 X 20	12	3000	1,600 LBS	25 1/2	3/4	3/16	1	.760	.22	3/4	1 3/4	1 3/4	9/16-37°
F150240	1 1/2 X 24	14	3000	1,175 LBS	29 1/2	3/4	3/16	1	.760	.22	3/4	1 3/4	1 3/4	9/16-37°
F175040	1 3/4 X 4	9	3000	FULL PSI	9 1/2	1	3/16	1	.760	.22	3/4	1 3/4	1 3/4	9/16-37°
F175060	1 3/4 X 6	10	3000	FULL PSI	11 1/2	1	3/16	1	.760	.22	3/4	1 3/4	1 3/4	9/16-37°
F175080	1 3/4 X 8	11	3000	FULL PSI	13 1/2	1	3/16	1	.760	.22	3/4	1 3/4	1 3/4	9/16-37°
F175100	1 3/4 X 10	12	3000	FULL PSI	15 1/2	1	3/16	1	.760	.22	3/4	1 3/4	1 3/4	9/16-37°
F175120	1 3/4 X 12	13	3000	FULL PSI	17 1/2	1	3/16	1	.760	.22	3/4	1 3/4	1 3/4	9/16-37°
F175160	1 3/4 X 16	15	3000	7,120 LBS	21 1/2	1	3/16	1	.760	.22	3/4	1 3/4	1 3/4	9/16-37°
F175200	1 3/4 X 20	17	3000	4,935 LBS	25 1/2	1	3/16	1	.760	.22	3/4	1 3/4	1 3/4	9/16-37°
F175240	1 3/4 X 24	20	3000	3,620 LBS	29 1/2	1	3/16	1	.760	.22	3/4	1 3/4	1 3/4	9/16-37°
F200040	2 X 4	12	3000	FULL PSI	9 1/2	1 1/8	3/16	1	.760	.25	3/4	1 3/4	1 3/4	9/16-37°
F200060	2 X 6	13	3000	FULL PSI	11 1/2	1 1/8	3/16	1	.760	.25	3/4	1 3/4	1 3/4	9/16-37°
F200080	2 X 8	14	3000	FULL PSI	13 1/2	1 1/8	3/16	1	.760	.25	3/4	1 3/4	1 3/4	9/16-37°
F200100	2 X 10	15	3000	FULL PSI	15 1/2	1 1/8	3/16	1	.760	.25	3/4	1 3/4	1 3/4	9/16-37°
F200120	2 X 12	17	3000	FULL PSI	17 1/2	1 1/8	3/16	1	.760	.25	3/4	1 3/4	1 3/4	9/16-37°
F200160	2 X 16	18	3000	FULL PSI	21 1/2	1 1/8	3/16	1	.760	.25	3/4	1 3/4	1 3/4	9/16-37°
F200200	2 X 20	22	3000	7,855 LBS	25 1/2	1 1/8	3/16	1	.760	.25	3/4	1 3/4	1 3/4	9/16-37°
F200240	2 X 24	24	3000	5,760 LBS	29 1/2	1 1/8	3/16	1	.760	.25	3/4	1 3/4	1 3/4	9/16-37°
F200300	2 X 30	28	3000	3,900 LBS	35 1/2	1 1/8	3/16	1	.760	.25	3/4	1 3/4	1 3/4	9/16-37°
F225040	2 1/4 X 4	14	3000	FULL PSI	9 1/2	1 1/4	3/16	1	.760	.25	3/4	1 3/4	1 3/4	9/16-37°
F225060	2 1/4 X 6	15	3000	FULL PSI	11 1/2	1 1/4	3/16	1	.760	.25	3/4	1 3/4	1 3/4	9/16-37°
F225080	2 1/4 X 8	16	3000	FULL PSI	13 1/2	1 1/4	3/16	1	.760	.25	3/4	1 3/4	1 3/4	9/16-37°
F225100	2 1/4 X 10	18	3000	FULL PSI	15 1/2	1 1/4	3/16	1	.760	.25	3/4	1 3/4	1 3/4	9/16-37°
F225120	2 1/4 X 12	19	3000	FULL PSI	17 1/2	1 1/4	3/16	1	.760	.25	3/4	1 3/4	1 3/4	9/16-37°
F225160	2 1/4 X 16	22	3000	FULL PSI	21 1/2	1 1/4	3/16	1	.760	.25	3/4	1 3/4	1 3/4	9/16-37°
F225200	2 1/4 X 20	25	3000	11,900 LBS	25 1/2	1 1/4	3/16	1	.760	.25	3/4	1 3/4	1 3/4	9/16-37°
F225240	2 1/4 X 24	28	3000	8,730 LBS	29 1/2	1 1/4	3/16	1	.760	.25	3/4	1 3/4	1 3/4	9/16-37°
F225300	2 1/4 X 30	33	3000	5,912 LBS	35 1/2	1 1/4	3/16	1	.760	.25	3/4	1 3/4	1 3/4	9/16-37°
F250040	2 1/2 X 4	15	3000	FULL PSI	9 1/2	1 3/8	3/16	1	.760	.31	3/4	1 3/4	1 3/4	9/16-37°
F250060	2 1/2 X 6	17	3000	FULL PSI	11 1/2	1 3/8	3/16	1	.760	.31	3/4	1 3/4	1 3/4	9/16-37°
F250080	2 1/2 X 8	18	3000	FULL PSI	13 1/2	1 3/8	3/16	1	.760	.31	3/4	1 3/4	1 3/4	9/16-37°
F250100	2 1/2 X 10	20	3000	FULL PSI	15 1/2	1 3/8	3/16	1	.760	.31	3/4	1 3/4	1 3/4	9/16-37°
F250120	2 1/2 X 12	21	3000	FULL PSI	17 1/2	1 3/8	3/16	1	.760	.31	3/4	1 3/4	1 3/4	9/16-37°
F250160	2 1/2 X 16	25	3000	FULL PSI	21 1/2	1 3/8	3/16	1	.760	.31	3/4	1 3/4	1 3/4	9/16-37°
F250200	2 1/2 X 20	29	3000	FULL PSI	25 1/2	1 3/8	3/16	1	.760	.31	3/4	1 3/4	1 3/4	9/16-37°
F250240	2 1/2 X 24	32	3000	12,705 LBS	29 1/2	1 3/8	3/16	1	.760	.31	3/4	1 3/4	1 3/4	9/16-37°
F250300	2 1/2 X 30	37	3000	8,605 LBS	35 1/2	1 3/8	3/16	1	.760	.31	3/4	1 3/4	1 3/4	9/16-37°
F250360	2 1/2 X 36	43	3000	6,212 LBS	41 1/2	1 3/8	3/16	1	.760	.31	3/4	1 3/4	1 3/4	9/16-37°
F275040	2 3/4 X 4	16	3000	FULL PSI	9 1/2	1 1/2	3/16	1	.760	.38	3/4	1 3/4	1 3/4	9/16-37°
F275060	2 3/4 X 6	18	3000	FULL PSI	11 1/2	1 1/2	3/16	1	.760	.38	3/4	1 3/4	1 3/4	9/16-37°
F275080	2 3/4 X 8	20	3000	FULL PSI	13 1/2	1 1/2	3/16	1	.760	.38	3/4	1 3/4	1 3/4	9/16-37°
F275100	2 3/4 X 10	22	3000	FULL PSI	15 1/2	1 1/2	3/16	1	.760	.38	3/4	1 3/4	1 3/4	9/16-37°
F275120	2 3/4 X 12	24	3000	FULL PSI	17 1/2	1 1/2	3/16	1	.760	.38	3/4	1 3/4	1 3/4	9/16-37°
F275160	2 3/4 X 16	28	3000	FULL PSI	21 1/2	1 1/2	3/16	1	.760	.38	3/4	1 3/4	1 3/4	9/16-37°
F275200	2 3/4 X 20	32	3000	FULL PSI	25 1/2	1 1/2	3/16	1	.760	.38	3/4	1 3/4	1 3/4	9/16-37°
F275240	2 3/4 X 24	36	3000	FULL PSI	29 1/2	1 1/2	3/16	1	.760	.38	3/4	1 3/4	1 3/4	9/16-37°
F275300	2 3/4 X 30	42	3000	12,120 LBS	35 1/2	1 1/2	3/16	1	.760	.38	3/4	1 3/4	1 3/4	9/16-37°
F275360	2 3/4 X 36	48	3000	8,750 LBS	41 1/2	1 1/2	3/16	1	.760	.38	3/4	1 3/4	1 3/4	9/16-37°

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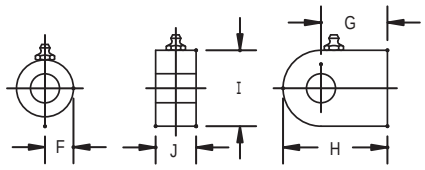
THE WIZARD LINE

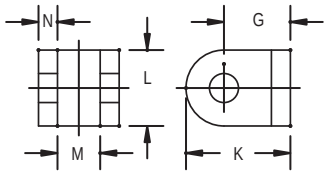
3000 PSI EXTENDED DUTY

BASE END FITTINGS

BASE END CROSSTUBE			
MODEL	F	LENGTH	CROSSTUBE
F150	3/4	2 1/4	210300217
F175	3/4	2 1/2	210300216
F200	3/4	2 3/4	210300215
F225	3/4	3	210300214
F250	3/4	3 1/4	210300213
F275	3/4	3 1/2	210300210

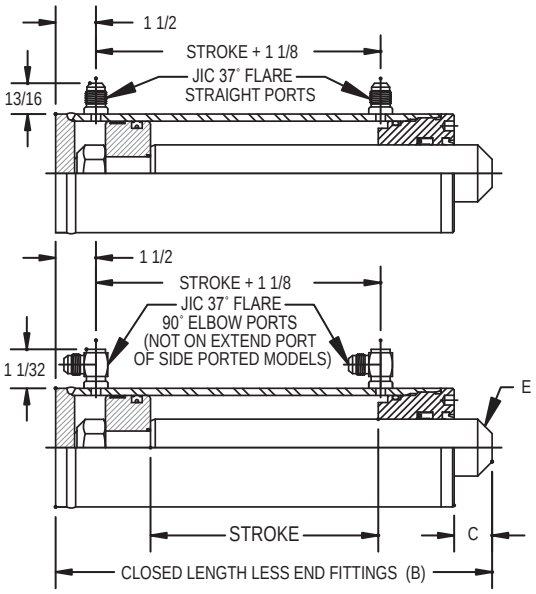


BASE END TANG DIMENSIONS					
MODEL	G	H	I	J	TANG
F150	1 3/4	2 5/8	1 1/2	3/4	130400245
F175	1 3/4	2 5/8	1 1/2	3/4	130400245
F200	1 3/4	2 3/4	2	1	130400244
F225	1 3/4	2 3/4	2	1	130400244
F250	1 3/4	2 7/8	2 1/4	1	130400243
F275	1 3/4	2 7/8	2 1/4	1	130400243



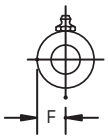
BASE END CLEVIS DIMENSIONS						
MODEL	G	K	L	M	N	CLEVIS
F150	1 3/4	2 5/8	1 1/2	7/8	3/8	110000073
F175	1 3/4	2 5/8	1 1/2	7/8	3/8	110000073
F200	1 3/4	2 3/4	2	1 1/8	1/2	110000071
F225	1 3/4	2 3/4	2	1 1/8	1/2	110000071
F250	1 3/4	2 3/4	2	1 1/8	1/2	110000071
F275	1 3/4	2 3/4	2	1 1/8	1/2	110000071

BASIC "WIZARD" CYLINDER

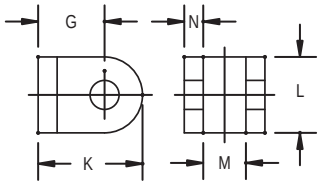


IMPORTANT: EXTEND ROD BEFORE WELDING ON END FITTINGS. SEAL DAMAGE WILL OCCUR FROM EXCESSIVE HEAT

ROD END FITTINGS



ROD END CROSSTUBE			
MODEL	F	LENGTH	CROSSTUBE
F150	3/4	1 1/2	210300218
F175	3/4	1 1/2	210300218
F200	3/4	1 1/2	210300218
F225	3/4	2	210300211
F250	3/4	2	210300211
F275	3/4	2	210300211



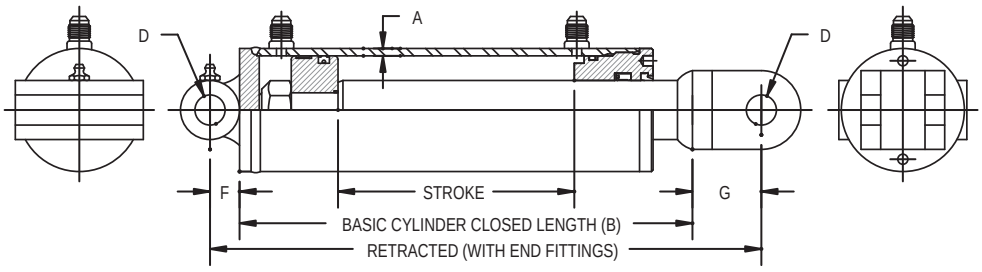
ROD END CLEVIS DIMENSIONS						
MODEL	G	K	L	M	N	CLEVIS
F150	1 3/4	2 5/8	1 1/2	7/8	3/8	110000073
F175	1 3/4	2 5/8	1 1/2	7/8	3/8	110000073
F200	1 3/4	2 3/4	2	1 1/8	1/2	110000073
F225	1 3/4	2 3/4	2	1 1/8	1/2	110000071
F250	1 3/4	2 3/4	2	1 1/8	1/2	110000071
F275	1 3/4	2 3/4	2	1 1/8	1/2	110000071

MODEL NUMBER SYSTEM

F 2 2 5 2 4 3 C S S T X C

- ALL PORTS ARE JIC 37° FLARE #6 MALE THREADS ARE STANDARD
- BASE MODEL NUMBER IDENTIFIES BORE SIZE EXAMPLE: 225 IS 2 1/4 BORE
- STROKE. THE FIRST TWO DIGITS ARE INCHES. THE LAST DIGIT IS 1/8'S OF AN INCH (CUSTOM MODELS ONLY) *. EXAMPLE: 243 IS 24 3/8" STROKE
- PISTON SEAL: C=CROWN SEAL; H=HIGH PSI TEFLON SEAL; T="T" SEAL
- EXTEND PORT: S=STRAIGHT; E=90° ELBOW - AVAILABLE ON TOP PORTED MODELS ONLY
- RETRACT PORT: S=STRAIGHT; E=90° ELBOW - AVAILABLE ON TOP AND SIDE PORTED MODELS
- PORT LOCATION: T=TOP PORT - PERPENDICULAR TO PIN HOLE; S=SIDE PORT - IN LINE WITH PIN HOLE
- BASE END FITTING: C=CLEVIS; X=CROSSTUBE; T=TANG; N=BLANK
- ROD END FITTING: C=CLEVIS; X=CROSSTUBE; N=BLANK

WIZARD LIINE BASE MODELS
F150040CSSTNN
F150060CSSTNN
F150080CSSTNN
F150100CSSTNN
F150120CSSTNN
F150160CSSTNN
F150200CSSTNN
F175060CSSTNN
F175080CSSTNN
F200040CSSTNN
F200060CSSTNN
F200300CSSTNN
F250040CSSTNN
F250060CSSTNN
F250160CSSTNN
F250200CSSTNN
F275040CSSTNN
F275060CSSTNN
F275100CSSTNN
F275300CSSTNN



* CUSTOM STROKE LENGTHS ARE AVAILABLE. MINIMUM ORDER MAY BE REQUIRED. CONTACT YOUR SALES REPRESESTATIVE WITH YOUR REQUIREMENTS

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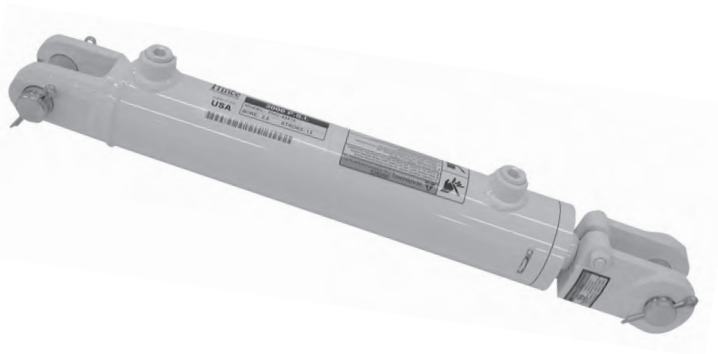
CATC 4-09-04-01

SEE PAGE 2 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

THE SWORD LINE

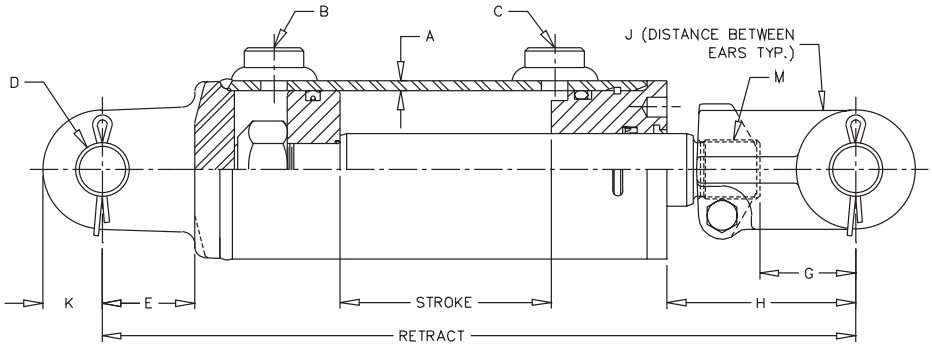
ALL PURPOSE LINE

THE "SWORD" Welded–DA–Heavy Duty–3000 PSI



FEATURES:

- Skived/honed tubing
- Heavy duty welded construction
- Chromed, ground & polished piston rod
- Ductile iron piston, gland & clevis, cast steel base end
- Urethane u-cup & urethane wiper in gland, crown seal on piston
- Square ring gland retainer provides positive lock
- Pins, clips & cotters included
- Standard color is white
- Stroke control may be installed on 8" strokes



Rods are sized for a maximum safe push load (2:1 safety factor) given in the table. This is based on the pin configuration shown with no center support.

Model No.	Style	Wt.	PSI	Column Load (Lbs.)	Retract	Rod Dia.	A	B NPTF	C NPTF	D	E	G	H	J	K	M
PMC-19408*	1 1/2 x 8	13	3000	FULL PSI	20 1/4	3/4	3/16	3/8	3/8	.765	2 5/8	2 5/8	5 1/4	5/8	3/4	-
PMC-19410*	1 1/2 x 10	14	3000	4,600 LBS	20 1/4	3/4	3/16	3/8	3/8	.765	2 5/8	2 5/8	3 1/4	5/8	3/4	-
PMC-19412*	1 1/2 x 12	16	3000	3,525 LBS	22 1/4	3/4	3/16	3/8	3/8	.765	2 5/8	2 5/8	3 1/4	5/8	3/4	-
PMC-19416*	1 1/2 x 16	20	3000	1,525 LBS	31 1/2	3/4	3/16	3/8	3/8	.765	2 5/8	2 5/8	8 1/2	5/8	3/4	-
PMC-42008	2 x 8	19	3000	FULL PSI	20 1/4	1 1/8	3/16	1/2	1/2	1.015	1 3/4	1 13/16	5 9/16	1 1/16	1	1 1/8-12
PMC-42010	2 x 10	20	3000	FULL PSI	20 1/4	1 1/8	3/16	1/2	1/2	1.015	1 3/4	1 13/16	3 9/16	1 1/16	1	1 1/8-12
PMC-42012	2 x 12	22	3000	FULL PSI	22 1/4	1 1/8	3/16	1/2	1/2	1.015	1 3/4	1 13/16	3 9/16	1 1/16	1	1 1/8-12
PMC-42016	2 x 16	25	3000	FULL PSI	31 1/2	1 1/8	3/16	1/2	1/2	1.015	1 3/4	1 13/16	8 13/16	1 1/16	1	1 1/8-12
PMC-42020	2 x 20	28	3000	7,575 LBS	30 1/4	1 1/8	3/16	1/2	1/2	1.015	1 3/4	1 13/16	3 9/16	1 1/16	1	1 1/8-12
PMC-42024	2 x 24	31	3000	5,600 LBS	34 1/4	1 1/8	3/16	1/2	1/2	1.015	1 3/4	1 13/16	3 9/16	1 1/16	1	1 1/8-12
PMC-42508	2 1/2 x 8	21	3000	FULL PSI	20 1/4	1 1/4	3/16	1/2	1/2	1.015	1 3/4	1 13/16	5 9/16	1 1/16	1	1 1/8-12
PMC-42510	2 1/2 x 10	22	3000	FULL PSI	20 1/4	1 1/4	3/16	1/2	1/2	1.015	1 3/4	1 13/16	3 9/16	1 1/16	1	1 1/8-12
PMC-42512	2 1/2 x 12	23	3000	FULL PSI	22 1/4	1 1/4	3/16	1/2	1/2	1.015	1 3/4	1 13/16	3 9/16	1 1/16	1	1 1/8-12
PMC-42516	2 1/2 x 16	27	3000	10,800 LBS	31 1/2	1 1/4	3/16	1/2	1/2	1.015	1 3/4	1 13/16	8 13/16	1 1/16	1	1 1/8-12
PMC-42520	2 1/2 x 20	31	3000	11,700 LBS	30 1/4	1 1/4	3/16	1/2	1/2	1.015	1 3/4	1 13/16	3 9/16	1 1/16	1	1 1/8-12
PMC-42524	2 1/2 x 24	35	3000	8,600 LBS	34 1/4	1 1/4	3/16	1/2	1/2	1.015	1 3/4	1 13/16	3 9 /16	1 1/16	1	1 1/8-12
PMC-43008	3 x 8	23	3000	FULL PSI	20 1/4	1 3/8	3/16	1/2	1/2	1.015	1 3/4	1 13/16	5 9/16	1 1/16	1 1/8	1 1/8-12
PMC-43010	3 x 10	26	3000	FULL PSI	20 1/4	1 3/8	3/16	1/2	1/2	1.015	1 3/4	1 13/16	3 9/16	1 1/16	1 1/8	1 1/8-12
PMC-43012	3 x 12	28	3000	FULL PSI	22 1/4	1 3/8	3/16	1/2	1/2	1.015	1 3/4	1 13/16	3 9/16	1 1/16	1 1/8	1 1/8-12
PMC-43016	3 x 16	33	3000	16,900 LBS	31 1/2	1 3/8	3/16	1/2	1/2	1.015	1 3/4	1 13/16	8 13/16	1 1/16	1 1/8	1 1/8-12
PMC-43020	3 x 20	39	3000	17,300 LBS	30 1/4	1 3/8	3/16	1/2	1/2	1.015	1 3/4	1 13/16	3 9/16	1 1/16	1 1/8	1 1/8-12
PMC-43024	3 x 24	43	3000	12,800 LBS	34 1/4	1 3/8	3/16	1/2	1/2	1.015	1 3/4	1 13/16	3 9/16	1 1/16	1 1/8	1 1/8-12
PMC-43508	3 1/2 x 8	29	3000	FULL PSI	20 1/4	1 1/2	3/16	1/2	1/2	1.015	1 3/4	1 13/16	5 3/8	1 1/8	1 1/4	1 1/2-12
PMC-43510	3 1/2 x 10	31	3000	FULL PSI	20 1/4	1 1/2	3/16	1/2	1/2	1.015	1 3/4	1 13/16	3 3/8	1 1/8	1 1/4	1 1/2-12
PMC-43512	3 1/2 x 12	33	3000	FULL PSI	22 1/4	1 1/2	3/16	1/2	1/2	1.015	1 3/4	1 13/16	3 3/8	1 1/8	1 1/4	1 1/2-12
PMC-43516	3 1/2 x 16	38	3000	24,200 LBS	31 1/2	1 1/2	3/16	1/2	1/2	1.015	1 3/4	1 13/16	8 3/8	1 1/8	1 1/4	1 1/2-12
PMC-43520	3 1/2 x 20	43	3000	24,700 LBS	30 1/4	1 1/2	3/16	1/2	1/2	1.015	1 3/4	1 13/16	3 3/8	1 1/8	1 1/4	1 1/2-12
PMC-43524	3 1/2 x 24	48	3000	18,250 LBS	34 1/4	1 1/2	3/16	1/2	1/2	1.015	1 3/4	1 13/16	3 3/8	1 1/8	1 1/4	1 1/2-12
PMC-44008	4 x 8	40	3000	FULL PSI	20 1/4	1 3/4	3/16	1/2	1/2	1.015	1 3/4	1 13/16	5 3/8	1 1/8	1 1/4	1 1/2-12
PMC-44010	4 x 10	43	3000	FULL PSI	20 1/4	1 3/4	3/16	1/2	1/2	1.015	1 3/4	1 13/16	3 3/8	1 1/8	1 1/4	1 1/2-12
PMC-44012	4 x 12	45	3000	FULL PSI	22 1/4	1 3/4	3/16	1/2	1/2	1.015	1 3/4	1 13/16	3 3/8	1 1/8	1 1/4	1 1/2-12
PMC-44016	4 x 16	54	3000	FULL PSI	31 1/2	1 3/4	3/16	1/2	1/2	1.015	1 3/4	1 13/16	8 3/8	1 1/8	1 1/4	1 1/2-12
PMC-44020	4 x 20	58	3000	FULL PSI	30 1/4	1 3/4	3/16	1/2	1/2	1.015	1 3/4	1 13/16	3 3/8	1 1/8	1 1/4	1 1/2-12
PMC-44024	4 x 24	60	3000	33,525 LBS	34 1/4	1 3/4	3/16	1/2	1/2	1.015	1 3/4	1 13/16	3 3/8	1 1/8	1 1/4	1 1/2-12
PMC-44030	4 x 30	65	3000	22,900 LBS	40 1/4	1 3/4	3/16	1/2	1/2	1.015	1 3/4	1 13/16	3 3/8	1 1/8	1 1/4	1 1/2-12

*Uses formed clevis & 3/4" pin.

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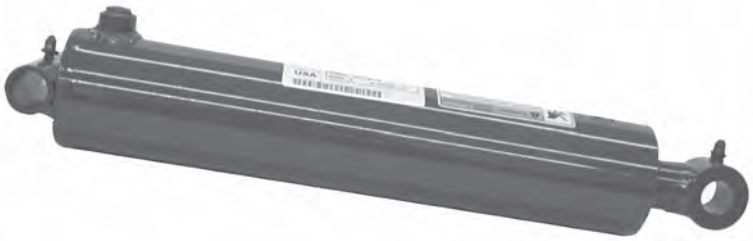
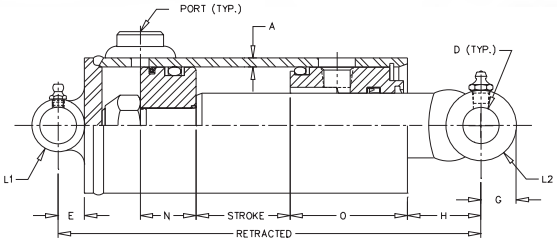
SEE PAGE 3 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

THE ROYAL LINE

2500 PSI

THE "ROYAL" Welded–DA–Heavy Duty–Universal Mountings





FEATURES:

- Double Acting
- Honed tubing
- Welded construction
- Chromed, ground & polished rod
- Ductile iron piston & gland
- Crosstube end fittings with grease zerks
- Urethane u-cup and urethane wiper in gland
- O-ring with backup washers & cast iron ring piston seals
- Truarc snap ring gland retainer
- Standard color is red
- Rod seal is a urethane u-cup

Model No.	Style	Wt.	PSI	Column Load (Lbs)	Ret	Rod Dia.	A	PORTS NPTF	D	E	G	H	L1	L 2	N	O
PMC-5408	2 1/2 X 8	17	2500	FULL PSI	16	1 3/8	3/16	3/8	.760	9/16	3/4	2 9/16	3	1 3/8	1 1/4	2 1/2
PMC-5412	2 1/2 X 12	20	2500	FULL PSI	20	1 3/8	3/16	3/8	.760	9/16	3/4	2 9/16	3	1 3/8	1 1/4	2 1/2
PMC-5414	2 1/2 X 14	22	2500	FULL PSI	22	1 3/8	3/16	3/8	.760	7/16	3/4	2 9/16	3	1 3/8	1 1/4	2 1/2
PMC-5416	2 1/2 X 16	23	2500	FULL PSI	24	1 3/8	3/16	3/8	.760	9/16	3/4	2 9/16	3	1 3/8	1 1/4	2 1/2
PMC-5420	2 1/2 X 20	27	2500	FULL PSI	28	1 3/8	3/16	3/8	.760	9/16	3/4	2 9/16	3	1 3/8	1 1/4	2 1/2
PMC-5424	2 1/2 X 24	30	2500	FULL PSI	32	1 3/8	3/16	3/8	.760	9/16	3/4	2 9/16	3	1 3/8	1 1/4	2 1/2
PMC-5430	2 1/2 X 30	35	2500	8,975 LBS	38	1 3/8	3/16	3/8	.760	9/16	3/4	2 9/16	3	1 3/8	1 1/4	2 1/2
PMC-5432	2 1/2 X 32	41	2500	8,000 LBS	40	1 3/8	3/16	3/8	.760	9/16	3/4	2 9/16	3	1 3/8	1 1/4	2 1/2
PMC-5436	2 1/2 X 36	44	2500	6,475 LBS	44	1 3/8	3/16	3/8	.760	9/16	3/4	2 9/16	3	1 3/8	1 1/4	2 1/2
PMC-5442	2 1/2 X 42	47	2500	4,870 LBS	50	1 3/8	3/16	3/8	.760	9/16	3/4	2 9/16	3	1 3/8	1 1/4	2 1/2
PMC-8308	3 X 8	22	2500	FULL PSI	16	1 1/2	3/16	1/2	1.015	11/16	1	2 5/16	3 1/2	1 1/2	1 1/4	2 5/8
PMC-8312	3 X 12	26	2500	FULL PSI	20	1 1/2	3/16	1/2	1.015	11/16	1	2 5/16	3 1/2	1 1/2	1 1/4	2 5/8
PMC-8314	3 X 14	29	2500	FULL PSI	22	1 1/2	3/16	1/2	1.015	11/16	1	2 5/16	3 1/2	1 1/2	1 1/4	2 5/8
PMC-8316	3 X 16	31	2500	FULL PSI	24	1 1/2	3/16	1/2	1.015	11/16	1	2 5/16	3 1/2	1 1/2	1 1/4	2 5/8
PMC-8320	3 X 20	35	2500	FULL PSI	28	1 1/2	3/16	1/2	1.015	11/16	1	2 5/16	3 1/2	1 1/2	1 1/4	2 5/8
PMC-8324	3 X 24	41	2500	FULL PSI	32	1 1/2	3/16	1/2	1.015	11/16	1	2 5/16	3 1/2	1 1/2	1 1/4	2 5/8
PMC-8330	3 X 30	46	2500	13,000 LBS	38	1 1/2	3/16	1/2	1.015	11/16	1	2 5/16	3 1/2	1 1/2	1 1/4	2 5/8
PMC-8332	3 X 32	48	2500	11,540 LBS	40	1 1/2	3/16	1/2	1.015	11/16	1	2 5/16	3 1/2	1 1/2	1 1/4	2 5/8
PMC-8336	3 X 36	52	2500	9,320 LBS	44	1 1/2	3/16	1/2	1.015	11/16	1	2 5/16	3 1/2	1 1/2	1 1/4	2 5/8
PMC-8340	3 X 40	56	2500	7,660 LBS	48	1 1/2	3/16	1/2	1.015	11/16	1	2 5/16	3 1/2	1 1/2	1 1/4	2 5/8
PMC-8342	3 X 42	59	2500	7,020 LBS	50	1 1/2	3/16	1/2	1.015	11/16	1	2 5/16	3 1/2	1 1/2	1 1/4	2 5/8
PMC-8348	3 X 48	65	2500	5,460 LBS	56	1 1/2	3/16	1/2	1.015	11/16	1	2 5/16	3 1/2	1 1/2	1 1/4	2 5/8
PMC-5508	3 1/2 X 8	26	2500	FULL PSI	16	1 1/2	3/16	1/2	1.015	11/16	1	1 11/16	4	1 1/2	1 1/2	2 5/8
PMC-5512	3 1/2 X 12	29	2500	FULL PSI	20	1 1/2	3/16	1/2	1.015	11/16	1	1 11/16	4	1 1/2	1 1/2	2 5/8
PMC-5514	3 1/2 X 14	32	2500	FULL PSI	22	1 1/2	3/16	1/2	1.015	11/16	1	1 11/16	4	1 1/2	1 1/2	2 5/8
PMC-5516	3 1/2 X 16	34	2500	FULL PSI	24	1 1/2	3/16	1/2	1.015	11/16	1	1 11/16	4	1 1/2	1 1/2	2 5/8
PMC-5520	3 1/2 X 20	38	2500	FULL PSI	28	1 1/2	3/16	1/2	1.015	11/16	1	1 11/16	4	1 1/2	1 1/2	2 5/8
PMC-5524	3 1/2 X 24	44	2500	20,210 LBS	32	1 1/2	3/16	1/2	1.015	11/16	1	1 11/16	4	1 1/2	1 1/2	2 5/8
PMC-5530	3 1/2 X 30	48	2500	13,540 LBS	38	1 1/2	3/16	1/2	1.015	11/16	1	1 11/16	4	1 1/2	1 1/2	2 5/8
PMC-5532	3 1/2 X 32	52	2500	12,040 LBS	40	1 1/2	3/16	1/2	1.015	11/16	1	1 11/16	4	1 1/2	1 1/2	2 5/8
PMC-5536	3 1/2 X 36	56	2500	9,700 LBS	44	1 1/2	3/16	1/2	1.015	11/16	1	1 11/16	4	1 1/2	1 1/2	2 5/8
PMC-5540	3 1/2 X 40	60	2500	7,975 LBS	48	1 1/2	3/16	1/2	1.015	11/16	1	1 11/16	4	1 1/2	1 1/2	2 5/8
PMC-5542	3 1/2 X 42	64	2500	7,300 LBS	50	1 1/2	3/16	1/2	1.015	11/16	1	1 11/16	4	1 1/2	1 1/2	2 5/8
PMC-5548	3 1/2 X 48	70	2500	5,680 LBS	56	1 1/2	3/16	1/2	1.015	11/16	1	1 11/16	4	1 1/2	1 1/2	2 5/8
PMC-5608	4 X 8	35	2500	FULL PSI	17	2	3/16	1/2	1.265	15/16	1 1/8	2 1/8	4 1/2	2	1 5/16	2 7/8
PMC-5612	4 X 12	41	2500	FULL PSI	21	2	3/16	1/2	1.265	15/16	1 1/8	2 1/8	4 1/2	2	1 5/16	2 7/8
PMC-5614	4 X 14	45	2500	FULL PSI	23	2	3/16	1/2	1.265	15/16	1 1/8	2 1/8	4 1/2	2	1 5/16	2 7/8
PMC-5616	4 X 16	48	2500	FULL PSI	25	2	3/16	1/2	1.265	15/16	1 1/8	2 1/8	4 1/2	2	1 5/16	2 7/8
PMC-5620	4 X 20	56	2500	FULL PSI	29	2	3/16	1/2	1.265	15/16	1 1/8	2 1/8	4 1/2	2	1 5/16	2 7/8
PMC-5624	4 X 24	62	2500	FULL PSI	33	2	3/16	1/2	1.265	15/16	1 1/8	2 1/8	4 1/2	2	1 5/16	2 7/8
PMC-5630	4 X 30	72	2500	FULL PSI	39	2	3/16	1/2	1.265	15/16	1 1/8	2 1/8	4 1/2	2	1 5/16	2 7/8
PMC-5632	4 X 32	74	2500	FULL PSI	41	2	3/16	1/2	1.265	15/16	1 1/8	2 1/8	4 1/2	2	1 5/16	2 7/8
PMC-5636	4 X 36	80	2500	28,710 LBS	45	2	3/16	1/2	1.265	15/16	1 1/8	2 1/8	4 1/2	2	1 5/16	2 7/8
PMC-5640	4 X 40	85	2500	23,700 LBS	49	2	3/16	1/2	1.265	15/16	1 1/8	2 1/8	4 1/2	2	1 5/16	2 7/8
PMC-5642	4 X 42	92	2500	21,680 LBS	51	2	3/16	1/2	1.265	15/16	1 1/8	2 1/8	4 1/2	2	1 5/16	2 7/8
PMC-5648	4 X 48	100	2500	16,930 LBS	57	2	3/16	1/2	1.265	15/16	1 1/8	2 1/8	4 1/2	2	1 5/16	2 7/8
PMC-5660	4 X 60	120	2500	11,160 LBS	69	2	3/16	1/2	1.265	15/16	1 1/8	2 1/8	4 1/2	2	1 5/16	2 7/8

NOTE: If disassembly is necessary - Be sure to put a wire or "0" Ring in snap ring groove so when the piston is pulled out - The cast iron ring will not catch in groove

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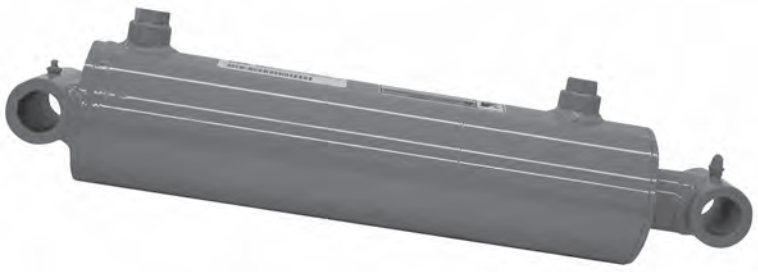
SEE PAGE 3 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

THE FORTRESS LINE

3000 PSI EXTENDED DUTY

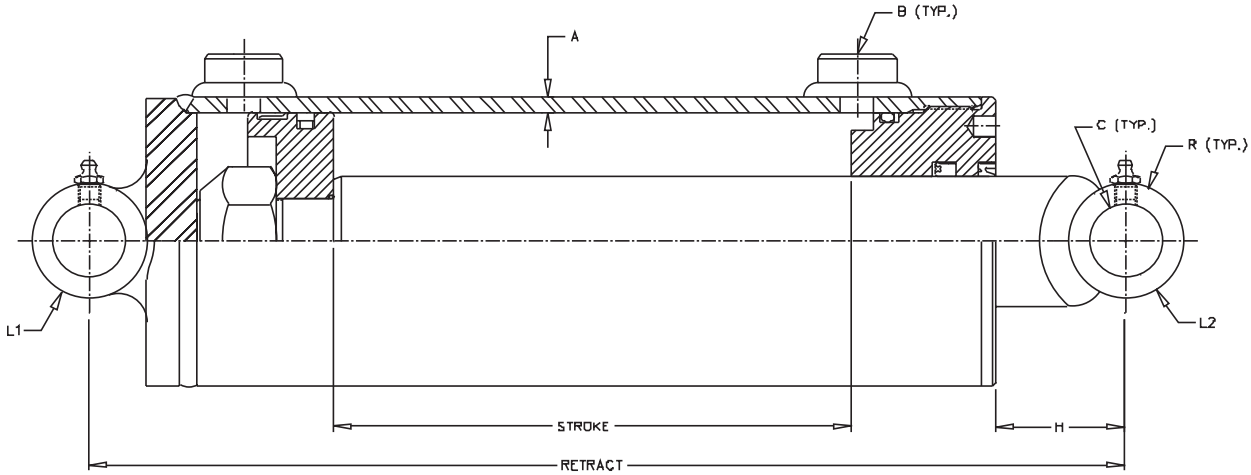
THE "FORTRESS" Welded-DA-Heavy Duty-3000 PSI



FEATURES:

- Heavy duty welded construction
- Chromed, ground, and polished piston rod
- Skived tubing
- Ductile iron piston
- Thread-in ductile iron gland
- Urethane u-cup, metal encased wiper, teflon cap seal and wear ring
- Crosstube end fittings with grease zerks
- Painted: highway yellow
- Matches closed length of Royal line cylinders (up to 42" stroke)

* Spacers included in these models



Rods are sized for a maximum safe push load (2:1 safety factor) given in the table. This is based on the pin configuration shown with no center support.

Model No.	Style	Wt	PSI	Column Load (Lbs)	Ret	Rod Dia.	A	B	C	R	H	L1	L2
SAE-64008	4 X 8	42	3000	FULL PSI	17	2	7/32	#10 SAE	1.265	1	2 1/4	4 3/4	3 1/4
SAE-64012	4 X 12	48	3000	FULL PSI	21	2	7/32	#10 SAE	1.265	1	2 1/4	4 3/4	3 1/4
SAE-64016	4 X 16	55	3000	FULL PSI	25	2	7/32	#10 SAE	1.265	1	2 1/4	4 3/4	3 1/4
SAE-64020	4 X 20	62	3000	FULL PSI	29	2	7/32	#10 SAE	1.265	1	2 1/4	4 3/4	3 1/4
SAE-64024	4 X 24	69	3000	FULL PSI	33	2	7/32	#10 SAE	1.265	1	2 1/4	4 3/4	3 1/4
SAE-64030	4 X 30	79	3000	FULL PSI	39	2	7/32	#10 SAE	1.265	1	2 1/4	4 3/4	3 1/4
SAE-64032	4 X 32	83	3000	FULL PSI	41	2	7/32	#10 SAE	1.265	1	2 1/4	4 3/4	3 1/4
SAE-64036	4 X 36	90	3000	28,710 LBS	45	2	7/32	#10 SAE	1.265	1	2 1/4	4 3/4	3 1/4
SAE-64040	4 X 40	96	3000	23,700 LBS	49	2	7/32	#10 SAE	1.265	1	2 1/4	4 3/4	3 1/4
SAE-64042	4 X 42	100	3000	21,680 LBS	51	2	7/32	#10 SAE	1.265	1	2 1/4	4 3/4	3 1/4
SAE-64048*	4 X 48	115	3000	16,640 LBS	59	2	7/32	#10 SAE	1.265	1	2 1/4	4 3/4	3 1/4
SAE-64060*	4 X 60	138	3000	10,890 LBS	73	2	7/32	#10 SAE	1.265	1	2 1/4	4 3/4	3 1/4
SAE-64508	4 1/2 X 8	54	3000	FULL PSI	17	2 1/4	1/4	#10 SAE	1.265	1	2 1/4	5 1/4	3 1/4
SAE-64512	4 1/2 X 12	62	3000	FULL PSI	21	2 1/4	1/4	#10 SAE	1.265	1	2 1/4	5 1/4	3 1/4
SAE-64516	4 1/2 X 16	71	3000	FULL PSI	25	2 1/4	1/4	#10 SAE	1.265	1	2 1/4	5 1/4	3 1/4
SAE-64520	4 1/2 X 20	80	3000	FULL PSI	29	2 1/4	1/4	#10 SAE	1.265	1	2 1/4	5 1/4	3 1/4
SAE-64524	4 1/2 X 24	89	3000	FULL PSI	33	2 1/4	1/4	#10 SAE	1.265	1	2 1/4	5 1/4	3 1/4
SAE-64530	4 1/2 X 30	104	3000	FULL PSI	39	2 1/4	1/4	#10 SAE	1.265	1	2 1/4	5 1/4	3 1/4
SAE-64532	4 1/2 X 32	106	3000	FULL PSI	41	2 1/4	1/4	#10 SAE	1.265	1	2 1/4	5 1/4	3 1/4
SAE-64536	4 1/2 X 36	115	3000	48,860 LBS	45	2 1/4	1/4	#10 SAE	1.265	1	2 1/4	5 1/4	3 1/4
SAE-64540	4 1/2 X 40	124	3000	38,650 LBS	49	2 1/4	1/4	#10 SAE	1.265	1	2 1/4	5 1/4	3 1/4
SAE-64542	4 1/2 X 42	128	3000	35,330 LBS	51	2 1/4	1/4	#10 SAE	1.265	1	2 1/4	5 1/4	3 1/4
SAE-64548*	4 1/2 X 48	147	3000	26,690 LBS	59	2 1/4	1/4	#10 SAE	1.265	1	2 1/4	5 1/4	3 1/4
SAE-64560*	4 1/2 X 60	177	3000	17,210 LBS	73	2 1/4	1/4	#10 SAE	1.265	1	2 1/4	5 1/4	3 1/4

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SEE PAGE 4 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

THE GLADIATOR LINE

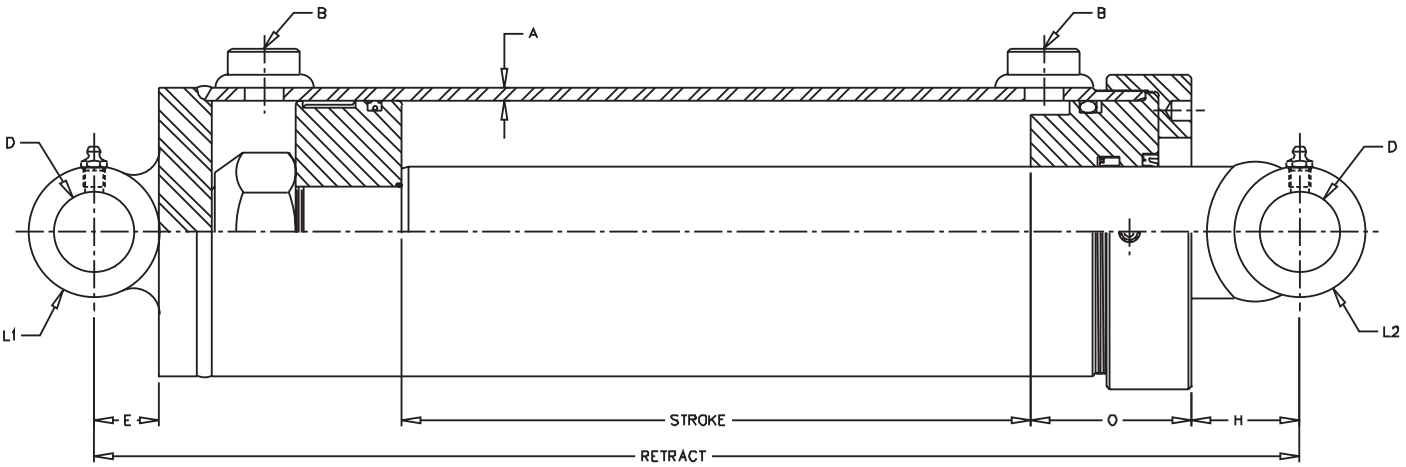
3000 PSI EXTENDED DUTY

THE "GLADIATOR" Welded-DA-Heavy Duty-3000 PSI

FEATURES:

- Heavy duty welded construction
- Externally threaded gland cap
- Chromed, ground, and polished piston rod
- Skived tubing
- Ductile iron piston
- Urethane u-cup, metal encased wiper, polyurethane crown seal and wear ring
- Crosstube end fittings with grease zerks
- Painted: highway yellow
- Matches closed length of Royal line cylinders (up to 42" stroke)

* Spacer included in these models



Rods are sized for a maximum safe push load (2:1 safety factor) given in the table. This is based on the pin configuration shown with no center support.

Model No.	Style	Wt.	PSI	Column Load (Lbs.)	Retract	Rod Dia.	A	B NPTF	D	E	H	L1	O	L2
PMC-21008	5 x 8	75	3000	FULL PSI	19"	2 1/2	1/4	3/4"	1.515	1 1/4	2 1/16	5 3/4	3 1/8	4"
PMC-21012	5 x 12	85	3000	FULL PSI	23"	2 1/2	1/4	3/4"	1.515	1 1/4	2 1/16	5 3/4	3 1/8	4"
PMC-21016	5 x 16	90	3000	FULL PSI	27"	2 1/2	1/4	3/4"	1.515	1 1/4	2 1/16	5 3/4	3 1/8	4"
PMC-21020	5 x 20	105	3000	FULL PSI	31"	2 1/2	1/4	3/4"	1.515	1 1/4	2 1/16	5 3/4	3 1/8	4"
PMC-21024	5 x 24	115	3000	FULL PSI	35"	2 1/2	1/4	3/4"	1.515	1 1/4	2 1/16	5 3/4	3 1/8	4"
PMC-21030	5 x 30	130	3000	FULL PSI	41"	2 1/2	1/4	3/4"	1.515	1 1/4	2 1/16	5 3/4	3 1/8	4"
PMC-21036	5 x 36	145	3000	FULL PSI	47"	2 1/2	1/4	3/4"	1.515	1 1/4	2 1/16	5 3/4	3 1/8	4"
PMC-21048*	5 x 48	180	3000	39,125 LBS	61"	2 1/2	1/4	3/4"	1.515	1 1/4	2 1/16	5 3/4	3 1/8	4"
PMC-21054*	5 x 54	195	3000	31,150 LBS	68"	2 1/2	1/4	3/4"	1.515	1 1/4	2 1/16	5 3/4	3 1/8	4"
PMC-21060*	5 x 60	215	3000	25,360 LBS	75"	2 1/2	1/4	3/4"	1.515	1 1/4	2 1/16	5 3/4	3 1/8	4"
PMC-22008	6 x 8	100	3000	FULL PSI	19"	3	1/4	3/4"	1.515	1 1/4	2 1/16	6 3/4	3 1/16	4"
PMC-22012	6 x 12	110	3000	FULL PSI	23"	3	1/4	3/4"	1.515	1 1/4	2 1/16	6 3/4	3 1/16	4"
PMC-22016	6 x 16	125	3000	FULL PSI	27"	3	1/4	3/4"	1.515	1 1/4	2 1/16	6 3/4	3 1/16	4"
PMC-22024	6 x 24	150	3000	FULL PSI	35"	3	1/4	3/4"	1.515	1 1/4	2 1/16	6 3/4	3 1/16	4"
PMC-22030	6 x 30	170	3000	FULL PSI	41"	3	1/4	3/4"	1.515	1 1/4	2 1/16	6 3/4	3 1/16	4"
PMC-22036	6 x 36	190	3000	FULL PSI	47"	3	1/4	3/4"	1.515	1 1/4	2 1/16	6 3/4	3 1/16	4"
PMC-22048*	6 x 48	240	3000	79,700 LBS	61"	3	1/4	3/4"	1.515	1 1/4	2 1/16	6 3/4	3 1/16	4"
PMC-22054*	6 x 54	265	3000	63,400 LBS	68	3	1/4	3/4"	1.515	1 1/4	2 1/16	6 3/4	3 1/16	4"
PMC-22060*	6 x 60	290	3000	51,700 LBS	75"	3	1/4	3/4"	1.515	1 1/4	2 1/16	6 3/4	3 1/16	4"

CATC 8-09-04-01

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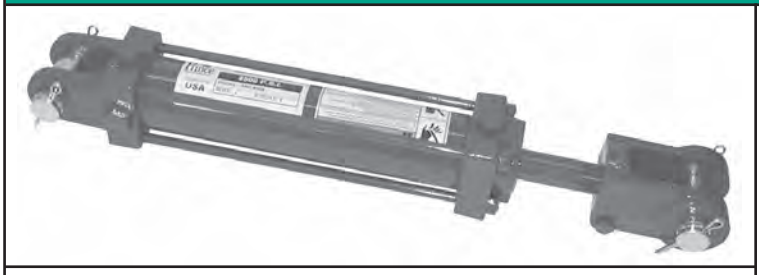
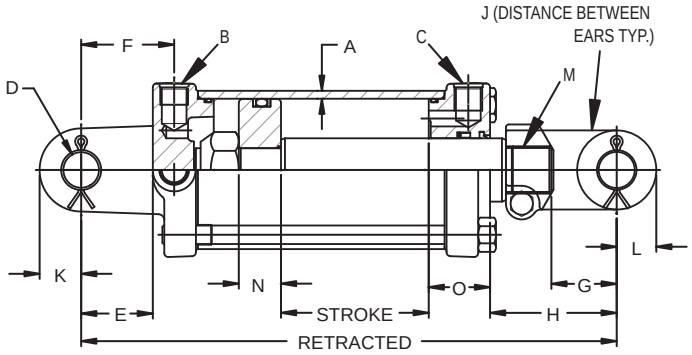
SEE PAGE 4 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

THE MAJESTIC LINE

2500 PSI TIE-ROD DOUBLE ACTING

THE "MAJESTIC LINE" Tie-Rod–DA–Medium Duty Rods





FEATURES:

- Honed tubing
- Chromed, ground & polished piston rod will operate at full pressure through 16" stroke
- Ductile iron piston, butt, gland & clevis
- Urethane u-cup & urethane wiper in gland
- Pins, clips & cotters included
- Standard color is red
- Stroke control may be installed on 8" strokes
- Side ports available on request at no additional cost

CYLINDER DIMENSIONAL FEATURES: **For dimensional data of configured cylinders, please refer to the Standard Dimensions column of the standard cylinder tables on page C12-C13. For outside cylinder dimensions and clevis widths for both A & B models, see table below.**

	Outside Sq. Dim		Clevis Width	
Bore Size	Butt	Gland	Butt	Rod
2"	2.875"	2.875"	2.375"	2.500"
2.5"	3.375"	3.375"	2.344"	2.500"
3"	3.875"	3.875"	2.375"	2.500"
3.5"	4.313"	4.313"	2.625"	2.875"
4"	5.063"	5.063"	2.750"	2.875"
4.5"	5.500"	5.500"	2.938"	2.875"
5"	5.875"	5.875"	2.938"	2.875"

Rods are sized for a maximum safe push load (2:1 safety factor) given in the table. This is based on the pin configuration shown with no center support.

Model No.	Style	Wt.	PSI	Column Load (Lbs.)	Re-tract	Rod Dia.	A SAE	B SAE	C SAE	D	E	F	G	H	J	K	L	M	N	O
SAE-8404	2 x 4	18	2500	FULL PSI	14 1/4	1	1/8	3/4-16	3/4-16	1.015	1 13/16	2 3/8	1 13/16	3 1/2	1.06	15/16	1 1/8	1-14	7/8	2 1/4
SAE-8406	2 x 6	19	2500	FULL PSI	16 1/4	1	1/8	3/4-16	3/4-16	1.015	1 13/16	2 3/8	1 13/16	3 1/2	1.06	15/16	1 1/8	1-14	7/8	2 1/4
SAE-8408	2 x 8	20	2500	FULL PSI	20 1/4	1	1/8	3/4-16	3/4-16	1.015	1 13/16	2 3/8	1 13/16	5 1/2	1.06	15/16	1 1/8	1-14	7/8	2 1/4
SAE-8410	2 x 10	21	2500	FULL PSI	20 1/4	1	1/8	3/4-16	3/4-16	1.015	1 13/16	2 3/8	1 13/16	3 1/2	1.06	15/16	1 1/8	1-14	7/8	2 1/4
SAE-7006	2 1/2 x 6	22	2500	FULL PSI	16 1/4	1 1/8	1/8	3/4-16	3/4-16	1.015	1 7/8	2 13/32	1 13/16	3 1/2	1.06	15/16	1 1/8	1 1/8-12	1	2 3/8
SAE-7008	2 1/2 x 8	23	2500	FULL PSI	20 1/4	1 1/8	1/8	3/4-16	3/4-16	1.015	1 7/8	2 13/32	1 13/16	5 1/2	1.06	15/16	1 1/8	1 1/8-12	1	2 3/8
SAE-7106	3 x 6	24	2500	FULL PSI	16 1/4	1 1/8	3/16	3/4-16	3/4-16	1.015	1 7/8	2 7/16	1 3/16	3 3/4	1.06	15/16	1 1/8	1 1/8-12	1	1 15/16
SAE-7108	3 x 8	26	2500	FULL PSI	20 1/4	1 1/8	3/16	3/4-16	3/4-16	1.015	1 7/8	2 7/16	1 3/16	5 3/4	1.06	15/16	1 1/8	1 1/8-12	1	1 15/16
SAE-7208A	3 1/2 x 8	31	2500	FULL PSI	20 1/4	1 1/8	3/16	3/4-16	3/4-16	1.015	1 7/8	2 7/16	1 13/16	5 7/8	1.06	1 1/4	1 1/4	1 1/8-12	1	1 13/16
SAE-8608	4 x 8	42	2500	FULL PSI	20 1/4	1 1/2	3/16	3/4-16	3/4-16	1.015	1 3/4	2 7/16	1 7/8	5 1/4	1.06	1 1/4	1 1/4	1 1/2-12	1	1 13/16
SAE-8610	4 x 10	45	2500	FULL PSI	20 1/4	1 1/2	3/16	3/4-16	3/4-16	1.015	1 3/4	2 7/16	1 7/8	3 1/4	1.06	1 1/4	1 1/4	1 1/2-12	1	1 13/16
SAE-8208	5 x 8	64	2500	FULL PSI	20 1/4	1 3/4	1/4	7/8-14	7/8-14	1.265	1 3/4	2 5/8	2	4	1.06	1 1/4	1 1/4	1 1/2-12	1	2 1/2
SAE-8210	5 x 10	67	2500	FULL PSI	22 1/4	1 3/4	1/4	7/8-14	7/8-14	1.265	1 3/4	2 5/8	2	4	1.06	1 1/4	1 1/4	1 1/2-12	1	2 1/2

3000 PSI Tie-Rod-DA-With 2" Rod

Model No.	Style	Wt.	PSI	Column Load (Lbs.)	Re-tract	Rod Dia.	A	B SAE	C SAE	D	E	F	G	H	J	K, L	M	N	O
C400080ABDDA03B	4 x 8	50	3000PSI	Full PSI	20 1/4	2	3/16	3/4 - 16	3/4 - 16	1.265	1 3/4	2 7/16	1.875	5 1/4	1.06	1 1/4	1 1/2-12	1.25	1 13/16
C400160ABDDA03B	4 x 16	68	3000PSI	Full PSI	31 1/2	2	3/16	3/4 - 16	3/4 - 16	1.265	1 3/4	2 7/16	1.875	8 1/2	1.06	1 1/4	1 1/2-12	1.25	1 13/16
C400240ABDDA03B	4 x 24	81	3000PSI	Full PSI	36 1/4	2	3/16	3/4 - 16	3/4 - 16	1.265	1 3/4	2 7/16	1.875	5 1/4	1.06	1 1/4	1 1/2-12	1.25	1 13/16
C400260ABDDA03B	4 x 26	84	3000PSI	Full PSI	38 1/4	2	3/16	3/4 - 16	3/4 - 16	1.265	1 3/4	2 7/16	1.875	5 1/4	1.06	1 1/4	1 1/2-12	1.25	1 13/16

ALSO AVAILABLE FROM STOCK

A complete line of Hydraulic Directional Control Valves,
Gear Pumps, LSHT Motors as well as Custom Designed Products to fit your needs.

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SEE PAGE 5 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

3 / 7 Warranty

3 year warranty on standard products means you can confidently utilize equipment year after year. RoyalPlate Plus® rods are warranted against rust and corrosion for 7 years.

RoyalPlate Plus® Plating

Prevents rust and corrosion more than twice as long as hard chrome plating and gas nitride treated steel bar.

Flexible Configurations

Cylinders are easily configured by available options such as port size and location, stroke length, pin size and paint color.

Exceptional Paint Performance

Aircraft quality two-part chemical cure polyester urethane paint will not fade and will outperform powder coating for the life of the cylinder.

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Standard Tie-Rod Options

TIE-ROD MODEL CODE IDENTIFICATION MATRIX

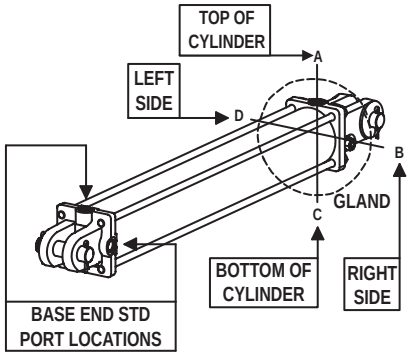
MODEL CODE SYSTEM
B 35O 160 ABAAA07B

MODELS:
B=B SERIES-3000 PSI
A=ASAE VERSION OF B SERIES
(8" & 16" Strokes only,
8" stroke not available
in 4.5" & 5" bore size.)

BORE SIZE:
200=2.00" Bore 400=4.00" Bore
250=2.50" Bore 450=4.50" Bore
300=3.00" Bore 500=5.00" Bore
350=3.50" Bore

STROKE: (Inches)
First two digits are in inches
Third digit is 0-7 representing
1/8's of an inch for custom strokes.
Consult Prince for over 48"

GLAND PORT LOCATIONS: (See Pictorial Below)
A=(Top Port, STD)
B=(R. Side Port)
C=(Bottom Port)
D=(L. Side Port)



PORT LOCATION DETERMINED FROM VIEWING CYLINDER FROM BASE END.

(See Table Below) **PORT STYLE & SIZE:**

		CYLINDER BORE SIZE (Inch)						
CODE	PORT TYPE & SIZE	2.00	2.50	3.00	3.50	4.00	4.50	5.00
A	#6 SAE ORB (9/16-18)	O	O	O	O	O	O	O
B	#8 SAE ORB (3/4-16)	S	S	S	S	S	O	O
C	#10 SAE ORB (7/8-14)						S	S
D	NPTF 3/8	O	O	O	O	O	O	O
E	NPTF 1/2	O	O	O	O	O	O	O
F	NPTF 3/4							O

Table Identifiers: (For Tables Above)

S-STANDARD 0-OPTIONAL BLANK-NOT AVAILABLE

CARTON & DECAL CODE
A=No carton-Std decals, Installed
B=Carton-Std decals, Installed (STD)
C=No carton-Std decals, Loose
D=Carton-Std decals, Loose
E=No carton-Std decals, customer I.D. decal, Installed
F=Carton-Std decals, customer I.D. decal, Installed
G=No carton-Std decals, customer I.D. decal, Loose
H=Carton-Std decals, customer I.D. decal, Loose
J=No carton-Customer I.D. decal, Installed
K=Carton-Customer I.D. decal, Installed
L=No carton-Customer I.D. decal, Loose
M=Carton-Customer I.D. decal, Loose
N=No carton-Warning decals, Installed
P=Carton-Warning decals, Installed
Q=No carton-Warning decal, Loose
R=Carton-Warning decals, Loose
S=No carton-Warning, Customer I.D. decal, Installed
T =Carton-Warning, Customer I.D. decal Installed
U=No carton-Warning, Customer I.D. decal, Loose
V=Carton-Warning, Customer I.D. decal, Loose

PAINT:

00=No Paint	14=Gloss White
01=Gloss Red	20=Red Primer
03=Highway Yellow	30=Black Primer
04=Canary Yellow	35=Naval Gray
05=Green	50=Yellow Primer
06=Blue	53=Gray Primer
07=Gloss Black (STD)	55=Silver Gray
	58=Gray

CLEVIS PIN INSTALLATION & RETAINER OPTIONS:
A=Cotter Pins & Clevis Pin(s) Shipped Loose (STD)
B=Cotter Pins & Clevis Pin(s) Installed
C=No Retainers, Clevis Pin(s) Shipped Loose if Selected

AVAILABLE CLEVIS PIN OPTIONS	CYLINDER BORE SIZE (Inch)						
	2.00	2.50	3.00	3.50	4.00	4.50	5.00
1.00"ø PIN	S	S	S	S			
1.00"ø HARDENED PIN	O	O	O	O	S		
1.25"ø HARDENED PIN					O	S	S

CLEVIS PIN OPTIONS & AVAILABILITY: (See Table Above)

A=2-1.00"ø Pins	E=1-1.00"ø Pin
B=Reserved	F=Reserved
C=2-1.00"ø Hardened Pins	G=1-1.00"ø Hardened Pin
D=2-1.25"ø Hardened Pins	H=1-1.25"ø Hardened Pin
	J= No Pins

END FITTING OPTIONS: (See Table Above)
A=ø1.00" Pin Holes, Both Ends
B=ø1.00" Base End Pin Hole, No Rod Clevis
C=ø1.00" Pin Holes, Both Ends, Stroke Control Assy *
D=ø1.25" Pin Holes, Both Ends
E=ø1.25" Base End Pin Hole, No Rod Clevis
*(ASAE Version 2.0-3.5" Bore with 8" stroke only)

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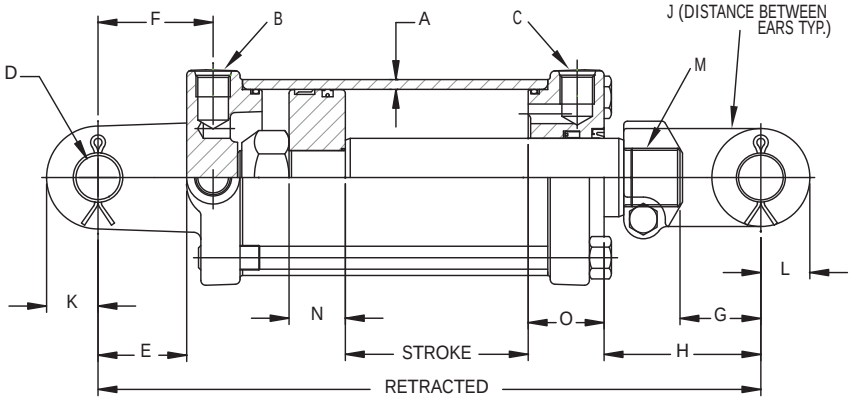

FEATURES:

- Honed tubing
- Heavy duty, high strength tie-rods
- Induction hardened piston rods plated with RoyalPlate Plus® (piston rods on 2" bore not hardened)
- Ductile iron piston, butt, gland & clevis
- Urethane u-cup & metal encased wiper 2 1/2" bore & larger models
- Crown seal on piston
- Pins & cotter pins (Hardened pins on 4", 4 1/2" & 5" models)
- Standard color is gloss black
- Stroke control may be installed on 8" strokes (2" - 3.5" bore, A models only)
- Side ports available on request
- Nylon bearing ring on 4", 4 1/2" & 5" bore models
- 3000 PSI continuous operating pressure

2 INCH BORE CYLINDERS

New Standard Model No.	Old Standard Model No. 2500 PSI / 3000 PSI	Stroke	Wt	Column Load (lbs)	Retract	Tare Dist. (H)
B200040ABAAA07B	none /SAE-32004	4"	17	9425 lbs	14 1/4	3 1/2
B200060ABAAA07B	none /SAE-32006	6"	19	9425 lbs	16 1/4	3 1/2
A200080ABAAA07B	none /SAE-32008	8"	21	9425 lbs	20 1/4	5 1/2
B200100ABAAA07B	none /SAE-32010	10"	22	9425 lbs	20 1/4	3 1/2
B200120ABAAA07B	SAE-9012 /SAE-32012	12"	23	9425 lbs	22 1/4	3 1/2
B200140ABAAA07B	SAE-9014 /SAE-32014	14"	25	9425 lbs	24 1/4	3 1/2
A200160ABAAA07B	SAE-9016 /SAE-32016	16"	28	7630 lbs	31 1/2	8 3/4
B200180ABAAA07B	SAE-9018 /SAE-32018	18"	28	9200 lbs	28 1/4	3 1/2
B200200ABAAA07B	SAE-9020 /SAE-32020	20"	30	7760 lbs	30 1/4	3 1/2
B200240ABAAA07B	SAE-9024 /SAE-32024	24"	33	5730 lbs	34 1/4	3 1/2
B200300ABAAA07B	SAE-9030 /SAE-32030	30"	37	3910 lbs	40 1/4	3 1/2

Standard Dimensions of 2 Inch Bore Cylinders

Note: 1 1/8" rod diameter
Outside Sq. Dim. Butt - 2.875, Gland 2.875
A 3/16" cylinder tube wall thickness
B, C SAE 3/4 -16 extend & retract ports
D 1.015" clevis pin hole size
E, F 1 13/16" base clevis throat depth with 2 3/8" from pin center to port center
G 1 13/16" rod clevis throat depth
J 1.06" min. distance between ears at pin center line
K 15/16" base clevis ear radius
L 1 1/8" rod clevis ear radius
M 1 1/8" – 12 UNF-3 piston rod clevis thread size
N 7/8" piston width
O 2 3/16" gland width

2.5 INCH BORE CYLINDERS

New Standard Model No.	Old Standard Model No. 2500 PSI / 3000 PSI	Stroke	Wt	Column Load (lbs)	Retract	Tare Dist. (H)
B250060ABAAA07B	none /SAE-32506	6"	22	14730 lbs	16 1/4	3 5/16
A250080ABAAA07B	SAE-9108 /SAE-32508	8"	25	14730 lbs	20 1/4	5 5/16
B250100ABAAA07B	SAE-9110 /SAE-32510	10"	26	14730 lbs	20 1/4	3 5/16
B250120ABAAA07B	SAE-9112 /SAE-32512	12"	28	14730 lbs	22 1/4	3 5/16
B250140ABAAA07B	SAE-9114 /SAE-32514	14"	30	14730 lbs	24 1/4	3 5/16
A250160ABAAA07B	SAE-9116 /SAE-32516	16"	34	11520 lbs	31 1/2	8 9/16
B250180ABAAA07B	SAE-9118 /SAE-32518	18"	34	13880 lbs	28 1/4	3 5/16
B250200ABAAA07B	SAE-9120 /SAE-32520	20"	36	11720 lbs	30 1/4	3 5/16
B250240ABAAA07B	SAE-9124 /SAE-32524	24"	41	8670 lbs	34 1/4	3 5/16
B250300ABAAA07B	SAE-9130 /SAE-32530	30"	47	5930 lbs	40 1/4	3 5/16

Standard Dimensions of 2.5 Inch Bore Cylinders

Note: 1 1/4" rod diameter
Outside Sq. Dim. Butt - 3.375, Gland 3.375
A 3/16" cylinder tube wall thickness
B, C SAE 3/4 -16 extend & retract ports
D 1.015" clevis pin hole size
E, F 1 7/8" base clevis throat depth with 2 13/16" from pin center to port center
G 1 13/16" rod clevis throat depth
J 1.06" min. distance between ears at pin center line
K 15/16" base clevis ear radius
L 1 1/8" rod clevis ear radius
M 1 1/8" – 12 UNF-3 piston rod clevis thread size
N 1" piston width
O 2 3/8" gland width

3 INCH BORE CYLINDERS

New Standard Model No.	Old Standard Model No. 2500 PSI / 3000 PSI	Stroke	Wt	Column Load (lbs)	Retract	Tare Dist. (H)
B300060ABAAA07B	none /SAE-33006	6"	26	21210 lbs	16 1/4	3 3/4
A300080ABAAA07B	SAE-9208 /SAE-33008	8"	29	21210 lbs	20 1/4	5 3/4
B300100ABAAA07B	SAE-9210 /SAE-33010	10"	30	21210 lbs	20 1/4	3 3/4
B300120ABAAA07B	SAE-9212 /SAE-33012	12"	33	21210 lbs	22 1/4	3 3/4
B300140ABAAA07B	SAE-9214 /SAE-33014	14"	35	21210 lbs	24 1/4	3 3/4
A300160ABAAA07B	SAE-9216 /SAE-33016	16"	40	16730 lbs	31 1/2	9
B300180ABAAA07B	SAE-9218 /SAE-33018	18"	40	20120 lbs	28 1/4	3 3/4
B300200ABAAA07B	SAE-9220 /SAE-33020	20"	42	17010 lbs	30 1/4	3 3/4
B300240ABAAA07B	SAE-9224 /SAE-33024	24"	47	12620 lbs	34 1/4	3 3/4
B300300ABAAA07B	SAE-9230 /SAE-33030	30"	54	8640 lbs	40 1/4	3 3/4
B300360ABAAA07B	SAE-9236 /SAE-33036	36"	61	6290 lbs	46 1/4	3 3/4
B300480ABAAA07B	SAE-9248 /SAE-33048	48"	75	3760 lbs	58 1/4	3 7/8

Standard Dimensions of 3 Inch Bore Cylinders

Note: 1 3/8" rod diameter
Outside Sq. Dim. Butt - 3.875, Gland 3.875
A 3/16" cylinder tube wall thickness
B, C SAE 3/4 -16 extend & retract ports
D 1.015" clevis pin hole size
E, F 1 7/8" base clevis throat depth with 2 7/16" from pin center to port center
G 1 13/16" rod clevis throat depth
J 1.06" min. distance between ears at pin center line
K 1 1/16" base clevis ear radius
L 1 1/8" rod clevis ear radius
M 1 1/8" – 12 UNF-3 piston rod clevis thread size
N 1" piston width
O 1 15/16" gland width

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3.5 INCH BORE CYLINDERS

New Standard Model No.	Old Standard Model No. 2500 PSI / 3000 PSI	Stroke	Wt	Column Load (lbs)	Retract	Tare Dist. (H)
A350080ABAAA07B	SAE-9308A /SAE-33508	8”	35	28860 lbs	20 ¼	5 ¾
B350100ABAAA07B	SAE-9310A /SAE-33510	10”	37	28860 lbs	20 ¼	3 ¾
B350120ABAAA07B	SAE-9312A /SAE-33512	12”	39	28860 lbs	22 ¼	3 ¾
B350140ABAAA07B	SAE-9314A /SAE-33514	14”	42	28860 lbs	24 ¼	3 ¾
A350160ABAAA07B	SAE-9316A /SAE-33516	16”	46	16900 lbs	31 ½	9
B350180ABAAA07B	SAE-9318A /SAE-33518	18”	47	20400 lbs	28 ¼	3 ¾
B350200ABAAA07B	SAE-9320A /SAE-33520	20”	49	17240 lbs	30 ¼	3 ¾
B350240ABAAA07B	SAE-9324A /SAE-33524	24”	54	12780 lbs	34 ¼	3 ¾
B350300ABAAA07B	SAE-9330A /SAE-33530	30”	62	8760 lbs	40 ¼	3 ¾
B350360ABAAA07B	SAE-9336A /SAE-33536	36”	69	6370 lbs	46 ¼	3 ¾
B350480ABAAA07B	SAE-9348A /SAE-33548	48”	85	3800 lbs	58 ¼	3 ¾

Standard Dimensions of 3.5 Inch Bore Cylinders

Note: 1 3/8” rod diameter
Outside Sq. Dim. Butt - 4.313, Gland 4.313
A 3/16” cylinder tube wall thickness
B, C SAE ¾ -16 extend & retract ports
D 1.015” clevis pin hole size
E, F 1 7/8” base clevis throat depth with 2 7/16” from pin center to port center
G 1 13/16” rod clevis throat depth
J 1.06” min. distance between ears at pin center line
K 1 1/4” base clevis ear radius
L 1 1/4” rod clevis ear radius
M 1 5/16” – 12 UNF-3 piston rod clevis thread size
N 1” piston width
O 1 15/16” gland width

4 INCH BORE CYLINDERS

New Standard Model No.	Old Standard Model No. 2500 PSI / 3000 PSI	Stroke	Wt	Column Load (lbs)	Retract	Tare Dist. (H)
A400080ABACA07B	SAE-9408 /SAE-34008	8”	48	37700 lbs	20 ¼	5 ¼
B400100ABACA07B	SAE-9410 /SAE-34010	10”	50	37700 lbs	20 ¼	3 ¼
B400120ABACA07B	SAE-9412 /SAE-34012	12”	54	37700 lbs	22 ¼	3 ¼
B400140ABACA07B	SAE-9414 /SAE-34014	14”	57	37700 lbs	24 ¼	3 ¼
A400160ABACA07B	SAE-9416 /SAE-34016	16”	64	37700 lbs	31 ½	8 ½
B400180ABACA07B	SAE-9418 /SAE-34018	18”	64	37700 lbs	28 ¼	3 ¼
B400200ABACA07B	SAE-9420 /SAE-34020	20”	68	37700 lbs	30 ¼	3 ¼
B400240ABACA07B	SAE-9424 /SAE-34024	24”	75	33710 lbs	34 ¼	3 ¼
B400300ABACA07B	SAE-9430 /SAE-34030	30”	85	22990 lbs	40 ¼	3 ¼
B400360ABACA07B	SAE-9436 /SAE-34036	36”	95	16680 lbs	46 ¼	3 ¼
B400480ABACA07B	SAE-9448 /SAE-34048	48”	116	9920 lbs	58 ¼	3 ¼

Standard Dimensions of 4 Inch Bore Cylinders

Note: 1 3/4” rod diameter
Outside Sq. Dim. Butt - 5.063, Gland 5.063
A 3/16” cylinder tube wall thickness
B, C SAE 3/4 -16 extend & retract ports
D 1.015” clevis pin hole size
E, F 1 3/4” base clevis throat depth with 2 7/16” from pin center to port center
G 1 7/8” rod clevis throat depth
J 1.06” min. distance between ears at pin center line
K 1 1/4” base clevis ear radius
L 1 1/4” rod clevis ear radius
M 1 1/2” – 12 UNF-3 piston rod clevis thread size
N 1 1/4” piston width
O 1 13/16” gland width

4.5 INCH BORE CYLINDERS

New Standard Model No.	Old Standard Model No. 2500 PSI / 3000 PSI	Stroke	Wt	Column Load (lbs)	Retract	Tare Dist. (H)
B450080ACDDA07B	none /SAE-34508	8”	60	47710 lbs	20 ¼	4
B450120ACDDA07B	none /SAE-34512	12”	69	47710 lbs	24 ¼	4
B450140ACDDA07B	none /SAE-34514	14”	74	47710 lbs	26 ¼	4
A450160ACDDA07B	none /SAE-34516	16”	81	47710 lbs	31 ½	7 ¼
B450180ACDDA07B	none /SAE-34518	18”	83	47710 lbs	30 ¼	4
B450200ACDDA07B	none /SAE-34520	20”	87	47710 lbs	32 ¼	4
B450240ACDDA07B	none /SAE-34524	24”	97	44710 lbs	36 ¼	4
B450300ACDDA07B	none /SAE-34530	30”	110	37530 lbs	42 ¼	4
B450360ACDDA07B	none /SAE-34536	36”	124	27430 lbs	48 ¼	4
B450480ACDDA07B	none /SAE-34548	48”	152	16470 lbs	60 ¼	4

Standard Dimensions of 4.5 Inch Bore Cylinders

Note: 2” rod diameter
Outside Sq. Dim. Butt - 5.5, Gland 5.5
A 1/4” cylinder tube wall thickness
B, C SAE 7/8 -14 extend & retract ports
D 1.265” clevis pin hole size
E, F 2 1/4” base clevis throat depth with 2 15/16” from pin center to port center
G 2” rod clevis throat depth
J 1.13” min. distance between ears at pin center line
K 1 15/16” base clevis ear radius
L 1 1/4” rod clevis ear radius
M 1 1/2” – 12 UNF-3 piston rod clevis thread size
N 1 7/16” piston width
O 1 15/16” gland width

5 INCH BORE CYLINDERS

New Standard Model No.	Old Standard Model No. 2500 PSI / 3000 PSI	Stroke	Wt	Column Load (lbs)	Retract	Tare Dist. (H)
B500080ACDDA07B	SAE-9508 /SAE-35008	8”	72	58900 lbs	20 ¼	4
B500120ACDDA07B	SAE-9512 /SAE-35012	12”	83	58900 lbs	24 ¼	4
B500140ACDDA07B	SAE-9514 /SAE-35014	14”	88	58900 lbs	26 ¼	4
A500160ACDDA07B	SAE-9516 /SAE-35016	16”	96	58900 lbs	31 ½	7 ¼
B500180ACDDA07B	SAE-9518 /SAE-35018	18”	98	58900 lbs	30 ¼	4
B500200ACDDA07B	SAE-9520 /SAE-35020	20”	103	58900 lbs	32 ¼	4
B500240ACDDA07B	SAE-9524 /SAE-35024	24”	113	54510 lbs	36 ¼	4
B500300ACDDA07B	SAE-9530 /SAE-35030	30”	129	37620 lbs	42 ¼	4
B500360ACDDA07B	SAE-9536 /SAE-35036	36”	144	27520 lbs	48 ¼	4
B500480ACDDA07B	SAE-9548 /SAE-35048	48”	175	16550 lbs	60 ¼	4

Standard Dimensions of 5 Inch Bore Cylinders

Note: 2” rod diameter
Outside Sq. Dim. Butt - 5.875, Gland 5.875
A 1/4” cylinder tube wall thickness
B, C SAE 7/8 -14 extend & retract ports
D 1.265” clevis pin hole size
E, F 1 3/4” base clevis throat depth with 2 5/8” from pin center to port center
G 2” rod clevis throat depth
J 1.13” min. distance between ears at pin center line
K 1 3/8” base clevis ear radius
L 1 1/4” rod clevis ear radius
M 1 1/2” – 12 UNF-3 piston rod clevis thread size
N 1 7/16” piston width
O 2 1/2” gland width

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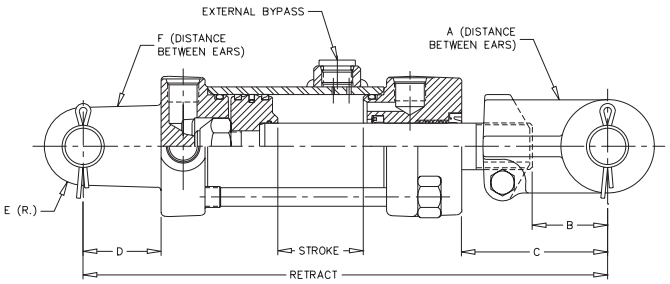
Prince SERIES CYLINDER SYSTEMS

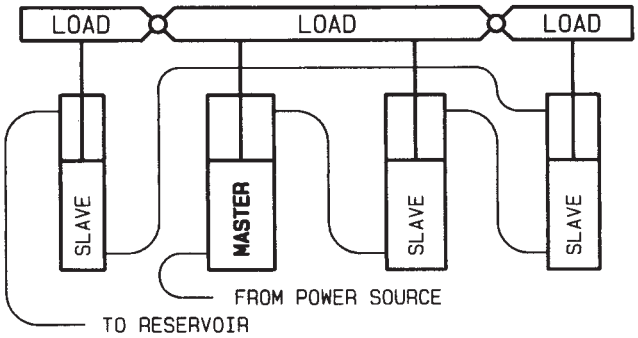
TIE ROD CONSTRUCTION - EXTERNAL STYLE BYPASS



FEATURES:

- Heavy duty tie-rod construction
- Induction hardened piston rods plated with RoyalPlate Plus®
- "DU" bushing
- #8 S.A.E.(3/4-16 ORB) ports
- For use with 1" pins
- Pins, clips & cotters included
- ORB to pipe adaptors are included
- Standard color is red
- Same high quality features found in all Prince Tie-rod Cylinders with the addition of an external bypass (rephase)

TO RAISE LOADS EQUALLY



NOTES:

- Master cylinder provides power for the entire system
- Each cylinder in series has less pressure in proportion to the load on it
- Designed for use in a series cylinder circuit at a maximum of 3000 PSI, cylinder not to be used at 3000 PSI in push or pull as a single cylinder
- Stroke control assemblies may be installed on 8" stroke models
- Can be used with remote stroke control valve PM-SC-10
- Can be used with holding valves HC-V-AA21 and HC-V-AA22
- Master cylinder equipped with series/rephase and stroke control are available. Contact Prince Sales Department.
- Custom designs in welded or tie-rod style for larger or smaller bore sizes
- Exact matched sets available
- Contact Prince Engineering Department for special applications

Bore	Rod Dia.	8" Stroke 20 1/4" Retract	10" Stroke 22 1/4" Retract	12" Stroke 24 1/4" Retract	16" Stroke 28 1/4" Retract	A	B	C	D	E	F
2 1/2	1 1/8	PMS-AM-2586	PMS-AM-2629	Consult Factory		1 1/16	1 13/16	5 9/32	1 7/8	15/16	1 1/16
2 3/4	1 1/8	PMS-AM-2580	PMS-AM-2627	For Availability		1 1/16	1 13/16	5 23/32	1 7/8	15/16	1 1/16
3	1 1/4	PMS-AM-2574	PMS-AM-2625	PMS-AM-2576	PMS-AM-2578	1 1/16	1 13/16	5 27/32	1 7/8	15/16	1 1/16
3 1/4	1 1/4	PMS-AM-2568	PMS-AM-2623	PMS-AM-2570	PMS-AM-2572	1 1/16	1 13/16	5 27/32	1 7/8	1 1/4	1 1/16
3 1/2	1 1/4	PMS-AM-2562	PMS-AM-2621	PMS-AM-2564	PMS-AM-2566	1 1/16	1 13/16	5 27/32	1 7/8	1 1/4	1 1/16
3 3/4	1 3/8	PMS-AM-2556A	PMS-AM-2619A	PMS-AM-2558A	PMS-AM-2560A	1 1/8	1 7/8	5 11/32	1 3/4	1 1/4	1 1/16
4	1 3/8	PMS-AM-2550A	PMS-AM-2617A	PMS-AM-2552A	PMS-AM-2554A	1 1/8	1 7/8	5 11/32	1 3/4	1 1/4	1 1/16
4 1/2	2	PMS-AM-2544	PMS-AM-2615	PMS-AM-2546	PMS-AM-2548	1 1/8	1 7/8	4 1/32	1 3/4	1 1/4	1 1/8
4 3/4	1 1/2	PMS-AM-2538	PMS-AM-2613	PMS-AM-2540	PMS-AM-2542	1 1/8	1 13/16	4 1/32	1 3/4	1 1/4	1 1/8
5	1 1/2	PMS-AM-2532	PMS-AM-2611	PMS-AM-2534	PMS-AM-2536	1 1/8	1 13/16	4 1/32	1 3/4	1 1/4	1 1/8

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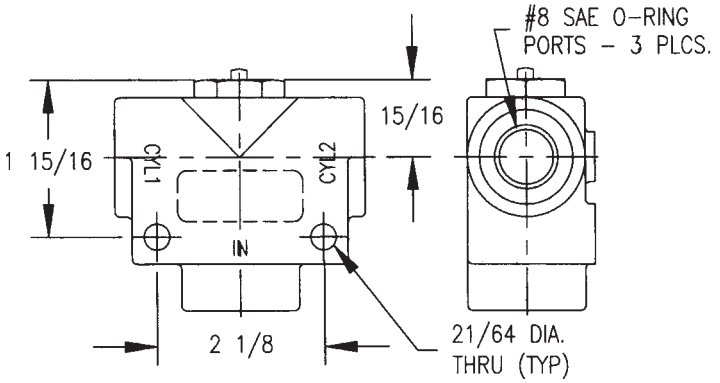
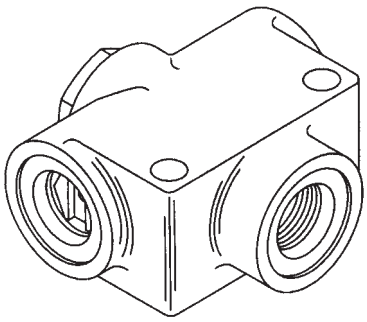
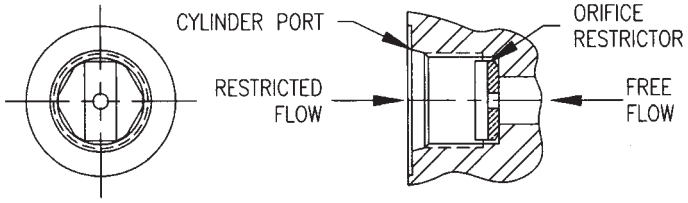
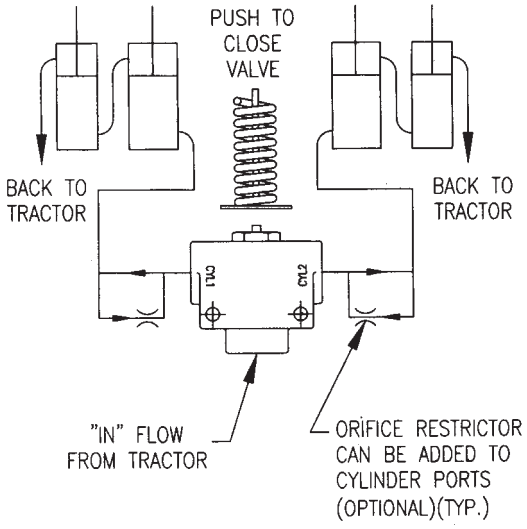
REMOTE STROKE CONTROL VALVE

MODEL PM-SC-10 (with optional orifice restrictor)







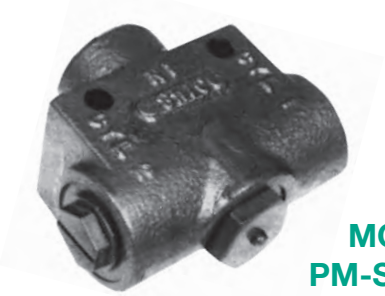


ORIFICE RESTRICTORS AVAILABLE FOR CYLINDER PORTS (OPTIONAL):

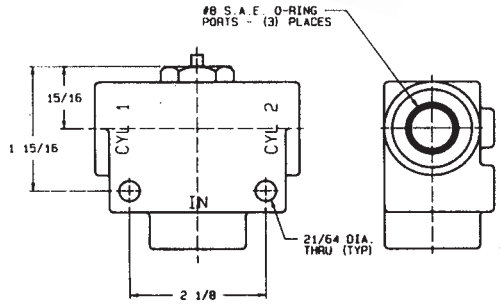
- 670805062 .062 ORIFICE
- 670805125 .125 ORIFICE
- 670805000 NO ORIFICE (CUSTOMER DRILL)

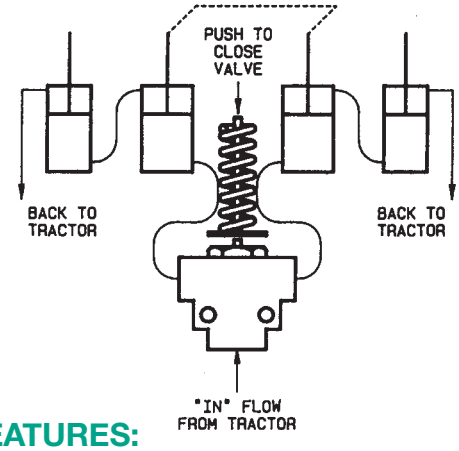
IF ANOTHER SIZE ORIFICE IS REQUIRED,
PLEASE LET US KNOW.

REMOTE STROKE CONTROL VALVE



MODEL PM-SC-10





FEATURES:

- (1) piece cast iron body
- Unitized stroke control valve cartridge
- Valve stem treated for corrosion resistance
- Valve closes to prevent return flow to tractor

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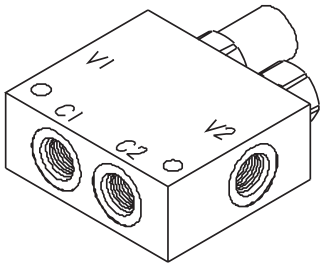
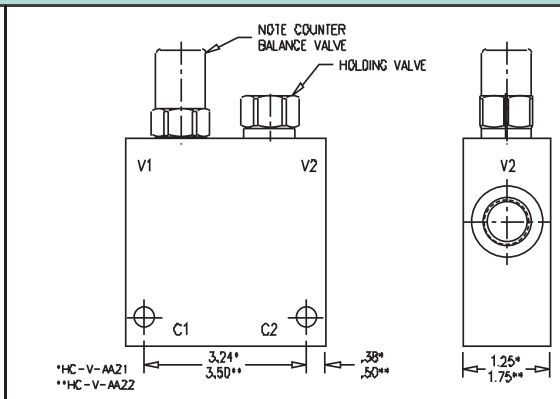
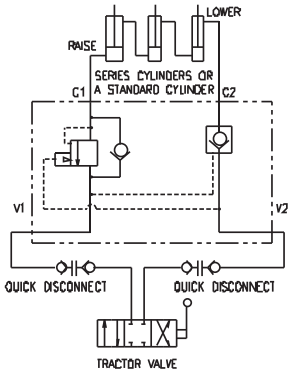
CYLINDER HOLDING VALVE

Model: HC-V-AA21

Model: HC-V-AA22







FEATURES:

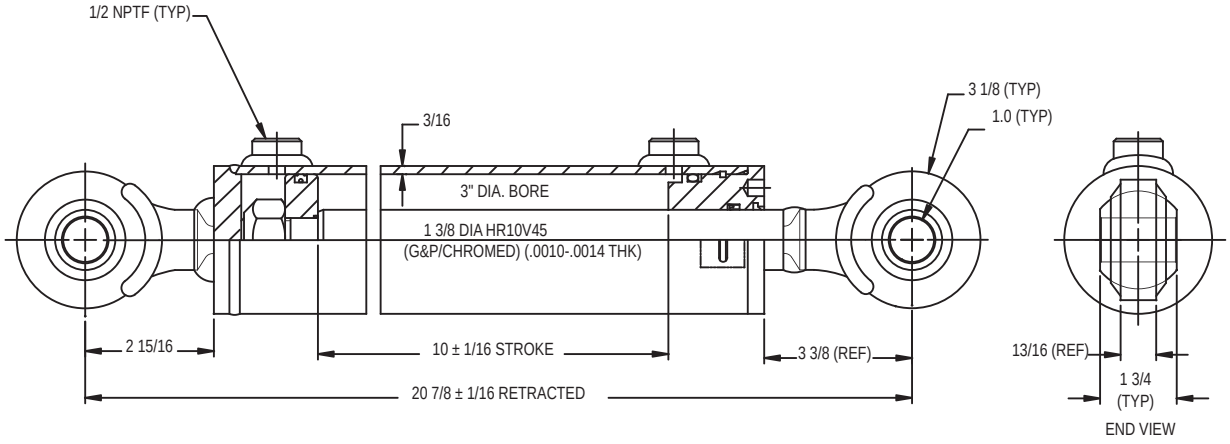
- Helps eliminate drifting and/or raising of implement wings.
- Counterbalance valve prevents free fall of cylinders thus preventing cavitation, air ingestion, and jerking.
- Prevents chatter when all air is completely bled.
- Locks ports to give a stiff hydraulic system and prevent lurching from side to side.
- Two cartridge valve block prevents bleed down seen in 3 cartridge valve systems.
- Can be used with single non-rephase cylinders. Hookup may vary from circuit above.
- Contact Prince Engineering Department for assistance.
- Valves available:
  - HC-V-AA21: use with lower flows, smaller tractors, and smaller hoses (typically up to 15 GPM)
  - HC-V-AA22: use with larger flows, larger tractors, and larger hoses (typically over 12-15 GPM and up to 30 GPM)

TOP LINK CYLINDER

Model Number BD-0228 - Category II

FEATURES:

- 3000 PSI Working Pressure
- 3” Bore x 10” Stroke
- Double Acting
- 1/2” NPTF Ports
- 1 3/8” Hard Chrome Plated Rod
- 20 7/8” Closed Length (Pin Center to Pin Center)
- Swivel End Fittings At Both Ends For 1” Diameter Pins



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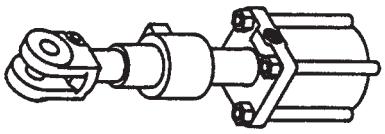
SEE PAGE 1 & 3 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

CATC 16-09-04-01

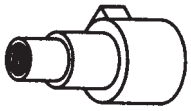
OTHER PRINCE ACCESSORIES

STROKE CONTROL ASSEMBLY



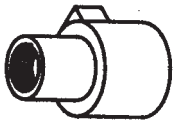
All components plated (including the base casting) to retard rust.

THREE-SLEEVE STROKE CONTROL ASSEMBLY



Practical, efficient and easily adapted to Prince Standard Series Cylinders. Positive stroke control adjustment
Open 5 5/8" Closed 2 1/2"
MODEL: PM-SC-1— Adapting Sleeve Thread size 1"- 14 and will accept shaft size thru 1 1/8" Dia. Wt. 3 lbs. Will fit models: SAE-8408.
MODEL: PM-SC-8—Adapting Sleeve Thread size - 1 1/8"-12. Wt. 3 lbs. Will accept shaft size thru 1 3/8" Dia. Will fit models: SAE-7008, SAE-7108, SAE-7208A, PMC-42008, PMC-42508 PMC-43008, A200080, A250080, A300080.
MODEL: PMC-SC-11—Adapting Sleeve Thread size 1 5/16"-12. Will fit models: A350080.

TWO-SLEEVE STROKE CONTROL ASSEMBLY



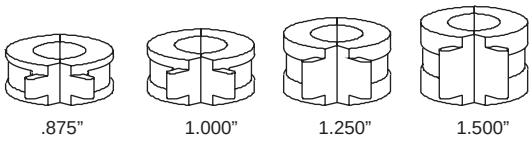
Open 3 1/2" Closed 2 5/16"
MODEL: PM-SC-3—Wt. 3 lbs. Adapting Sleeve Thread size 1 1/2"-12. Accepts 1 1/2" shaft size. Will fit model SAE-8608, PMC-43508.

REMOTE HYDRAULIC STROKE CONTROL

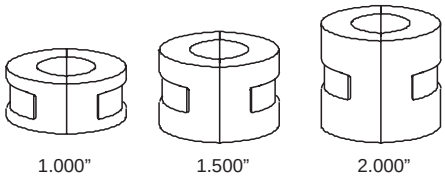
A remote hydraulic stroke control is available. This stroke control makes use of the same reliable cartridge used in the internal stroke control cylinder. But it can be mounted remotely to control 2 cylinders. (See pg. C15)

Collars are made of die cast aluminum in split halves. Flat steel springs are easy to open and snap onto the cylinder rod.

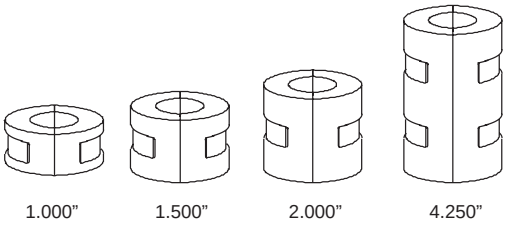
- Light Weight
- Durable
- Non-Abrasive



PM-SLCS-10: For 1.125 THRU 1.500 DIA RODS
(THIS SET HAS FINGER TABS, WITH RELIEF NOTCHES)



PM-SLCS-14: For 1.750 THRU 2.000 DIA RODS
(THIS SET HAS NO FINGER TABS)



PM-SLCS-15: For 1.750 THRU 2.000 DIA RODS
(THIS SET HAS NO FINGER TABS)

RESTRICTORS

Full-flow in one direction, with restriction of flow on return. Simple design permits complete reversible mounting for restricting either output or return. Interchangeable discs of various sizes for different flow metering can be quickly changed in the field. Use with pumps up to 12 GPM. 5,000 psi. 1/2" NPTF, inlet and outlet.

MODEL	SIZE	WT.
PM-R-10	BLANK	3 oz.
PM-R-12	1/16"	3 oz.
PM-R-13	3/32"	3 oz.
PM-R-14	1/8"	3 oz.
PM-R-15	5/32"	3 oz.
PM-R-16	3/16"	3 oz.
PM-R-17	7/32"	3 oz.
PM-R-18	1/4"	3 oz.
PM-R-19	.041"	3 oz.
PM-R-20	1/64"	3 oz.
PM-R-21	.031"	3 oz.
PM-R-22	.078"	3 oz.

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SEE PAGE 1 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

Prince OTHER PRINCE ACCESSORIES

BREATHER FILTERS

MODEL	NPT	WT.
PM-BHF-1	1/2"	8 oz.
PM-BHF-2	3/8"	8 oz.

Primarily for use on a double acting unit being used as single action. Filters dirt out of cylinder end displacing air. Used often on oil reservoirs, or any part of hydraulic circuit where air is displaced. Filter material can be removed easily and cleaned for re-use. 1/2" or 3/8" NPT.

BRONZE BREATHERS

LOW-PROFILE BRONZE BREATHERS

1/8 NPTF - 270003001 - PM-BHF-7
1/4 NPTF - 270003015 - PM-BHF-8
3/8 NPTF - 270003019 - PM-BHF-9
1/2 NPTF - 270003016 - PM-BHF-10
3/4 NPTF - 270003017 - PM-BHF-11

SMALL BREATHERS

MODEL	THREAD SIZE	WT.
PM-BHF-3	1/2" NPT	3 oz.
PM-BHF-4	3/8" NPT	3 oz.
PM-BHF-5	7/8" ORB. (with "0" Ring)	3 oz.
PM-BHF-6	3/4" ORB. (with "0" Ring)	3 oz.

Plug-type breather/filter for converting double action unit to single action. Aluminum body contains two fine filter screens retained by star washer. A low-cost, non-reusable, "throw-away" unit.

HYDRAULIC PRESSURE GAUGE

MODEL	WT.	PSI
PM-HG-1	8 oz.	2000
PM-HG-2	8 oz.	5000

- 2-1/2" Round Face
- 1/4" NPT Bottom Mount with snubber
- Clear Front for Easy Reading
- Individually packaged

HARDENED PIN HOLE BUSHING

MODEL	SIZE
210400140	1 1/4 OD x 1" ID x 7/8" Long
210400084	1 1/4 OD x 1" ID x 1" Long

Now you can easily install a bushing in a 1 1 /4" hole (such as the pin hole size on the PMC-8200) and reduce the size to accommodate a 1" pin.

SPECIFICATIONS

Material: High carbon spring steel hardened, tempered and oiled; hardness: Rockwell C 45-50.

1" DIA. CLEVIS PINS

Part #190400005 (PSP-1376) 1" x 2 1/8" Between Retainer grooves which use #220001504 Cotter Pins

Part #190400001 (PSP-1377) 1" x 2 3/4" Between Retainer grooves which use #220001504 Cotter Pins

Part #190400004 1" x 3 1/4" Between Retainer grooves which use #220001504 Cotter Pins

1" DIA. SWAGED WASHER ONE END CLEVIS PINS WITH HOLE

Part #190400012 1" x 2-1/8" Between Retainers with 13/64" hole drilled in one end to use #220001504 Cotter Pins

Part #190400013 1" x 2-3/4" Between Retainer with 13/64" hole drilled in one end to use #220001504 Cotter Pins

Part #220001504 Cotter Pin for above.

1 1/4 " DIA. CLEVIS PINS

Part #190600016 1 1/4" x 3-3/16" Between Retainers with 13/64" hole drilled in BOTH ends to use #220001504 Cotter Pins shown above.

1" DIA. HARDENED PINS

Part #190400035 1" x 3 1 /4" Between Retainer grooves which use #220001504 Cotter Pins

1 1/4" DIA. HARDENED PINS

Part #190600024 1 1/4" x 3 3/16" Between Retainer grooves which use #220001504 Cotter Pins

Part #190600025 1 1/4" x 3" Between Retainer grooves which use #220001504 Cotter Pins

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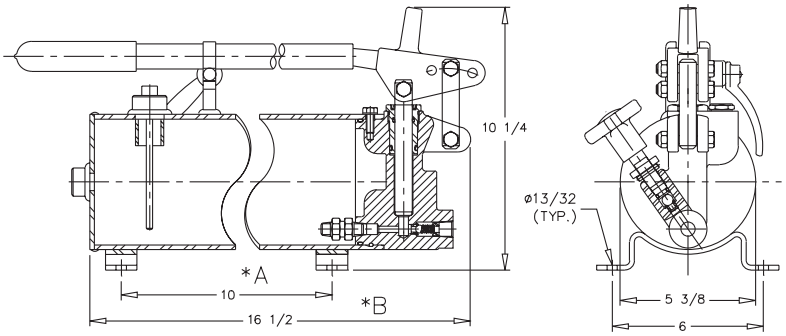
CATC 18-09-04-01

SEE PAGE 1 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

PRINCE HAND PUMP



MODEL	WT.	RESERVOIR SIZE
PM-HP-10-B	30lbs.	1 Gallon
PM-HP- 5-B	27lbs.	1/2 Gallon

Used for 1000-3000 PSI

	A	B
PM-HP-10-B	10	16 1/2
PM-HP-5-B	3 7/16	9 15/16

FEATURES

The Prince Hand Pump offers definite advantages over similar components of higher cost. The pump has unique design features which insure versatility. The handle can be used in (2) positions. The pump can be mounted vertically and horizontally. There are (3) different volume and pressure settings.

Position 1: 1.25 cu. in. per stroke—1500 psi*
Position 2: .95 cu. in. per stroke—2000 psi*
Position 3: .60 cu. in. per stroke—3000 psi*

*At applied force of 60-65 lbs. on handle. (Pressure to 6,000 psi can be developed with more force)

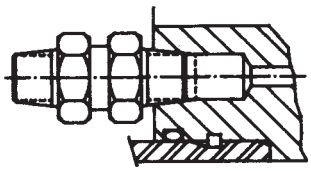
APPLICATIONS

This hand pump is designed for use wherever hydraulic pressure is needed without large flow requirements. Its sturdy design and positive sealing features will provide excellent service with a minimum of care. Uses range from mobile equipment to shop presses. Recommended temperatures may range from -40°F to 300°F. Most general purpose hydraulic oils can be used.

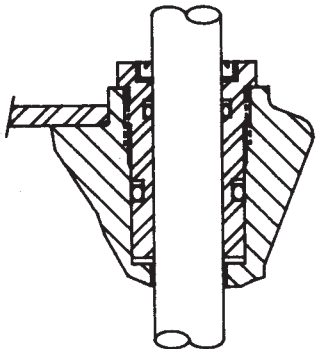
HYDRAULIC CYLINDER APPLICATIONS

This pump is designed for use with single acting cylinders. It may be used with double acting cylinders provided a two-way hand valve is used to direct the flow and a return port is installed on the reservoir.

FEATURES



REPLACEABLE INLET CHECK VALVE
Zero leakage check valve assembly can be easily replaced when necessary.



REMOVABLE PACKING GLAND
Packing gland seals can be easily replaced when necessary. Gland is removable with standard tools. New seals are readily available.

SPECIFICATIONS

PISTON ..... 11/16" dia. Chromed & Ground Steel
PRESSURE SEALS ... O-ring & Hytrel Back-up Washers
HANDLE .....Extra—heavy Pipe, 14 3/4" long
HANDLE POSITION..... Selective — two-position
PORT SIZE.....3/8 NPTF
RESERVOIR ..... Steel Tubing
MOUNTING FIXTURES .....4-Bolt Foot Mount for 3/8 Bolts
MOUNTING.....Horizontal or vertical
FLOAT CHECK..... Prevent oil from sloshing out
DIPSTICK ..... To check oil level
HANDLE CARRIER..... To prevent losing handle

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SEE PAGE 1 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

FA & FB SERIES LINE TYPE HYDRAULIC OIL FILTER

FA SERIES

FEATURES:

- Spin-on filter type element interchangeable with Cross and Gresen. See page C21 for additional interchange information.
- Standard elements available with 10 Micron Phenol Coated Paper. 100 mesh suction strainer elements also available.
- Filter condition indicator available.
- Compatible with all petroleum base fluids.
- The Prince FA Series Line Type Hydraulic Filter is a high quality, low cost filtration device for use on systems with flows up to 20 GPM. A built in bypass valve is incorporated in the rugged aluminum housing.
- Four return line application, a 15 PSI bypass spring is standard, with a 5 PSI spring available for suction line applications.

(optional accessory)

FB SERIES

FEATURES:

- Compatible with all petroleum base fluids.
- Spin-on type filter element interchangeable with Cross and Gresen. See page C22 for additional information.
- Standard elements available with 10 Micron Phenol Coated Paper. 100 mesh suction strainer elements also available.
- The Prince FB series line type hydraulic filter is intended for systems with flows up to 45 GPM.
- The spin-on feature enables element changes to be made quickly and easily. An optional condition indicator enables element changes to be made as they are needed.
- A bypass valve is incorporated in the filter housing to serve as a safety feature in the event of a clogged filter. Various bypass springs are available for suction or return line applications.

MODEL CODING INFORMATION

FA 1 2 0 0 - 0 0

PORT OPTION
1—3/4" NPTF

BY PASS SPRING
0—NONE
1— 5 PSI
2—15 PSI
3—25 PSI

INDICATOR PORT LOCATION
0-NONE
1-SUCTION LINE (Std.)
2-RETURN LINE (Std.)
3-SUCTION LINE
4-RETURN LINE
A-PORTS 1, 2, 3 and 4 DRILLED AND TAPPED.
INCLUDES (3) 1/8" PIPE PLUGS, NOT INSTALLED

00-NO ELEMENT
ELEMENT SOLD SEPARATELY BELOW CASE LOTS OF 12

INDICATOR GAGE
0-NONE
1-RETURN LINE (0-200 PSI)
2-SUCTION LINE (0-30" Vacuum)

SERVICE COMPONENTS

PART NUMBER	DESCRIPTION
FA10	10 MICRON ELEMENT (FA10 ELEMENT REPLACES PREVIOUS FA25 ELEMENT)
FA150	150 MICRON ELEMENT
FA	CANISTER THREAD SIZE 1-12 UNF-2A THREAD
270018001	NO BYPASS KIT
270018002	.5 PSI BYPASS KIT
270018003	.15 PSI BYPASS KIT
270018004	.25 PSI BYPASS KIT
180900669	0-200 PSI RETURN LINE GAGE
180900778	.0-30" VACUUM GAGE

SEE PAGE C21

MODEL CODING INFORMATION

FB 1 2 0 0 - 0 0

PORT OPTION
1—1 1/4" NPTF

BY PASS SPRING
0 — NONE
1 — 5 PSI
2 — 15 PSI
3 — 25 PSI

INDICATOR PORT LOCATION
0 — NONE
1 — SUCTION LINE (Std.)
2 — RETURN LINE (Std.)
3 — SUCTION LINE
4 — RETURN LINE
A — PORTS 1, 2, 3 and 4 DRILLED AND TAPPED.
INCLUDES (3) 1/8" PIPE PLUGS, NOT INSTALLED

00-NO ELEMENT
ELEMENT SOLD SEPARATELY BELOW CASE LOTS OF 6

INDICATOR GAGE
0 — NONE
1 — RETURN LINE (0-200 PSI)
2 — SUCTION LINE (0-30" Vacuum)

SERVICE COMPONENTS

PART NUMBER	DESCRIPTION
FB10	10 MICRON ELEMENT (FB10 ELEMENT REPLACES PREVIOUS FB25 ELEMENT)
FB150	150 MICRON ELEMENT
FB	CANISTER THREAD SIZE 1 1/2-16 UN-2A THREAD
270018021	NO BYPASS KIT
270018022	.5 PSI BYPASS KIT
270018023	.15 PSI BYPASS KIT
270018024	.25 PSI BYPASS KIT
180900669	0-200 PSI RETURN LINE GAGE
180900778	.0-30" VACUUM GAGE

SEE PAGE C22

CATC 20-09-04-01

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FA SERIES LINE TYPE HYDRAULIC OIL FILTER

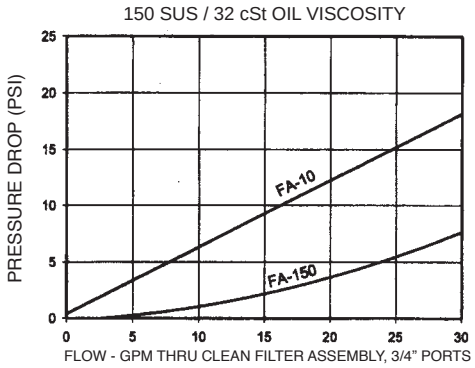
SPECIFICATIONS

Max. Working Pressure .....150 PSI
Flow .....Up to 20 GPM
Operating Temperature.....-65°F to 250°F
Filter Head Material ..... Cast Aluminum
Gasket Material .....Buna N
Shipping Wt. .....2 lbs.

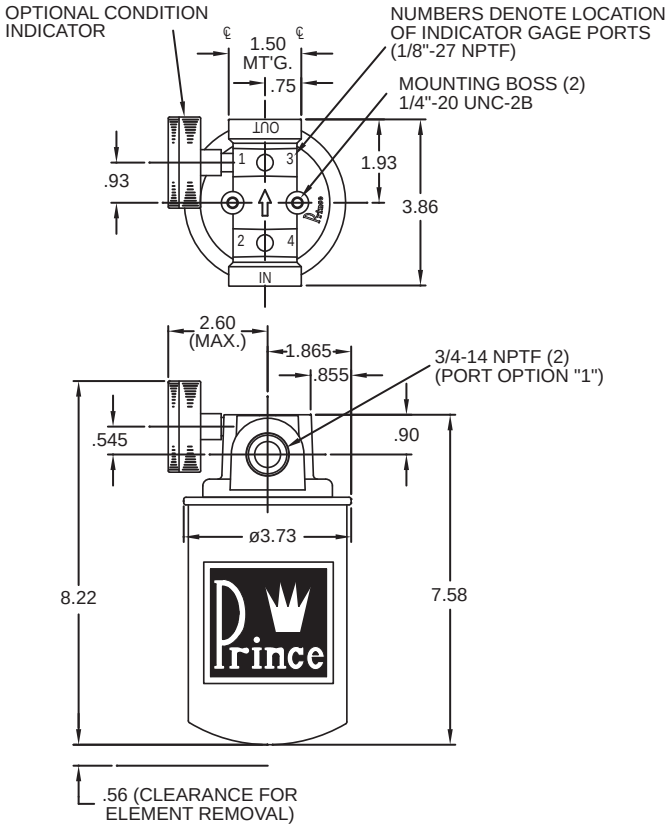
INTERCHANGE INFORMATION

MANUFACTURER	PART NUMBER	PRINCE PART NUMBER
CAN-FLO	RSE-30-10 RSE-30-25	FA10
CASE	S62427	FA10
CLARK/MICHIGAN 6516722	6515541	FA10
CROSS	1A9021 1A9023	FA10
DAVIS	H217307	FA10
DITCH WITCH	155910	FA10
ELGIN SWEEPER	71052	FA10
FIAT-ALLIS	70248399 702483998 72532042	FA10
FORD	193509 CONN6708A CONNB951B CONNB951C	FA10
FORD FRAM	SFD18502	FA10
GMC	6436232 6437228	FA10
GRESEN	1551, 1551001 K22001 1553, 1553003 K22002	FA10
HYSTER	180595	FA10
IHC	201021 C1 528250R1	FA10
JOHN DEERE	3080020 AT38431	FA10
JOY	1228371 1228372	FA10
KRALINATOR	L37, L54	FA10
LENZ	CP75210 CP75230	FA10
LHA	SPE1510 SPE1525	FA10
MASSEY FERGUSON	1033356M1	FA10
MICHIGAN FLUID POWER	S28 S29	FA10
PARKER HANNIFIN	92199 925023	FA10
RIPLEY	DP75210 DP75230	FA10
RYCO	Z42, Z53 Z136	FA10
SUNSTRAND	93220010	FA10
TENNANT	52582	FA10
TORO	239740	FA10
TOWMOTOR	665934	FA10
ZINGA	AE10 AE25	FA10

PRESSURE DROP



DIMENSIONAL INFORMATION



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FB SERIES LINE TYPE HYDRAULIC OIL FILTER

SPECIFICATIONS

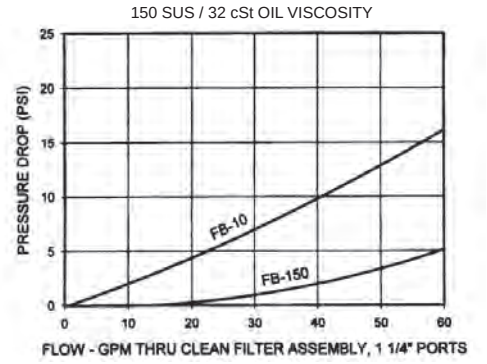
Max. Working Pressure .....150 PSI
Flow .....Up to 45 GPM
Operating Temperature.....-65°F to 250°F
Filter Head Material ..... Cast Aluminum
Gasket Material .....Buna N
Shipping Wt. .....4 1/2 lbs.

INTERCHANGE INFORMATION

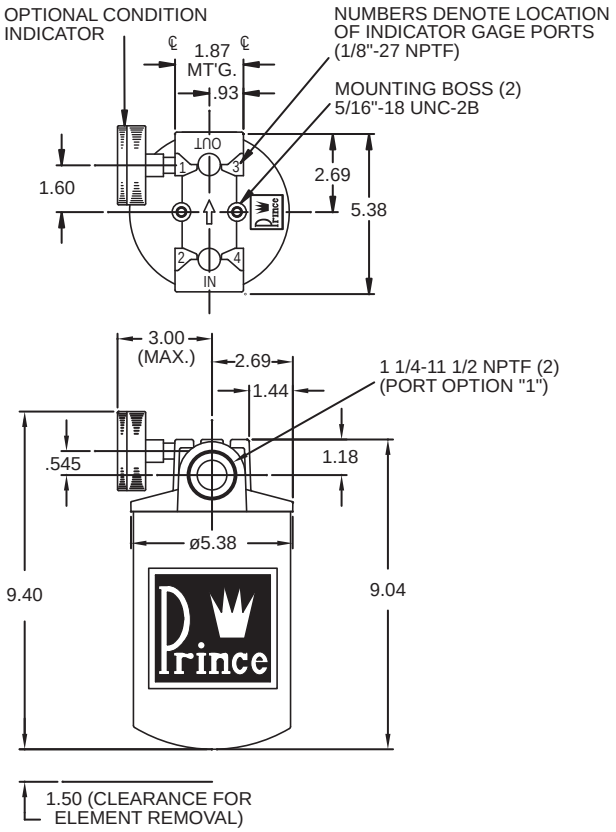
* INDICATED APPLICATIONS REQUIRE GASKET #180900772
PLEASE ORDER SEPARATELY.

MANUFACTURER	PART NUMBER	PRINCE PART NUMBER
CAN-FLO	CF50E10 RSE5010 RSE5025N	FB10*
CASE	H341974 R25844	FB10*
CATERPILLAR	342449 8J1600	FB10*
CLARK/MICHIGAN	6511280	FB10*
	6519239 6591038 6552507	FB10*
CROSS	1A9251 1A9253	FB10*
GMC	25011184	FB10*
GRESEN	K23018 K23019	FB10*
HYDRA-MAC	3401303	FB10*
IHC	69149C1	FB10*
JOHN DEERE	AT44696 AT58368 R16943 AR43261 AR43634	FB10*
KRALINATOR	L194	FB10*
LENZ	CP128255	FB10*
LHA	SPE5010 SPE5025	FB10*
MICHIGAN FLUID POWER	2020600 3800004 3800077 S58	FB10*
	2020030 S59	FB10*
NEW HOLLAND	262546	FB10*
OWATONNA	17032375	FB10*
PALL	HC7500SUJ4H HC9500SUJ4H	FB10*
PARKER HANNIFIN	926163B	FB10*
SULLAIR	408242	FB10*
SUNSTRAND	97006553	FB10*
TORO	8076001 445340	FB10*
TOWMOTOR	342449	FB10*
VERSATILE	15801	FB10*
VICKERS	575942 575943	FB10*
ZINGA	GCE10 GCE25	FB10*
	SE10 SE25	FB10*

PRESSURE DROP



DIMENSIONAL INFORMATION



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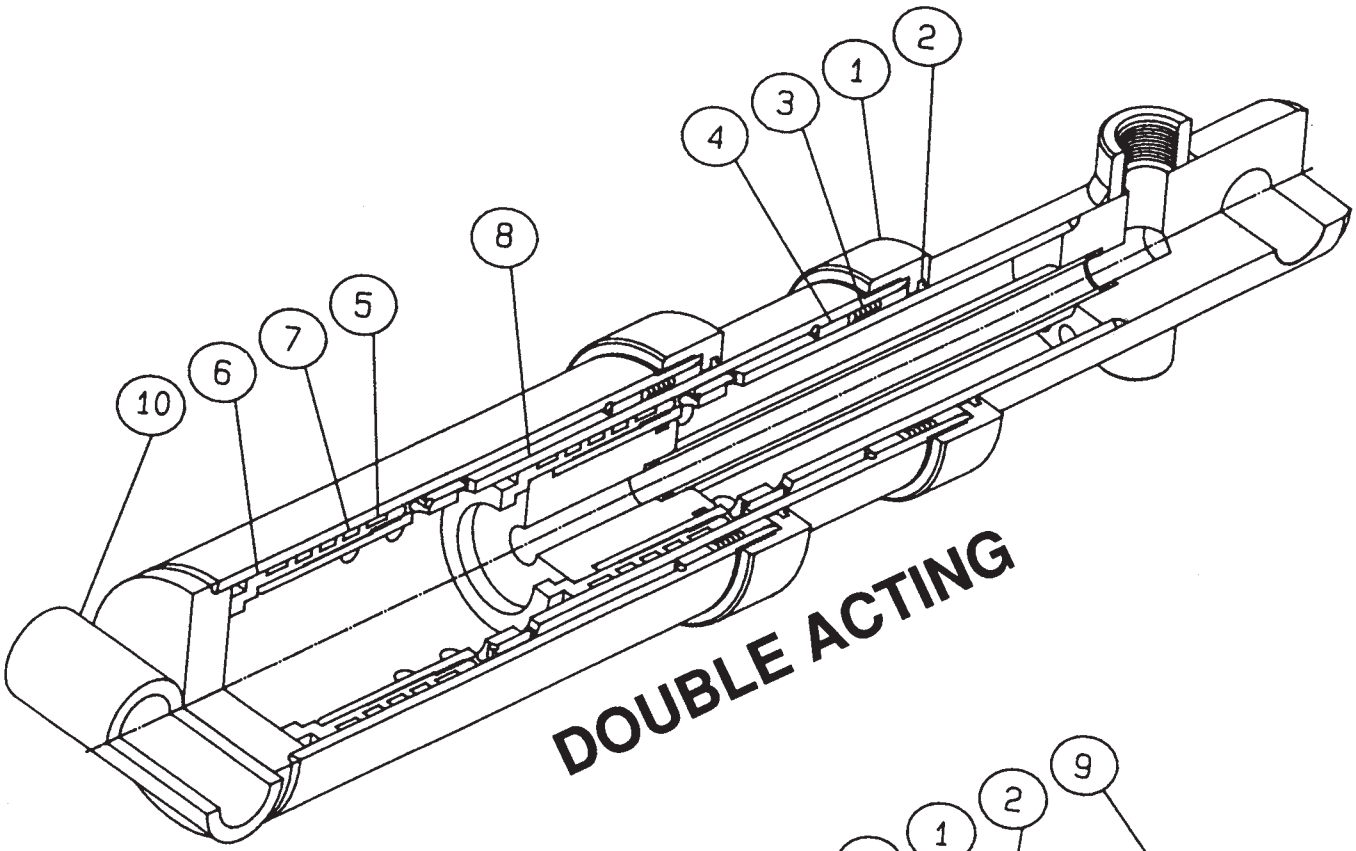
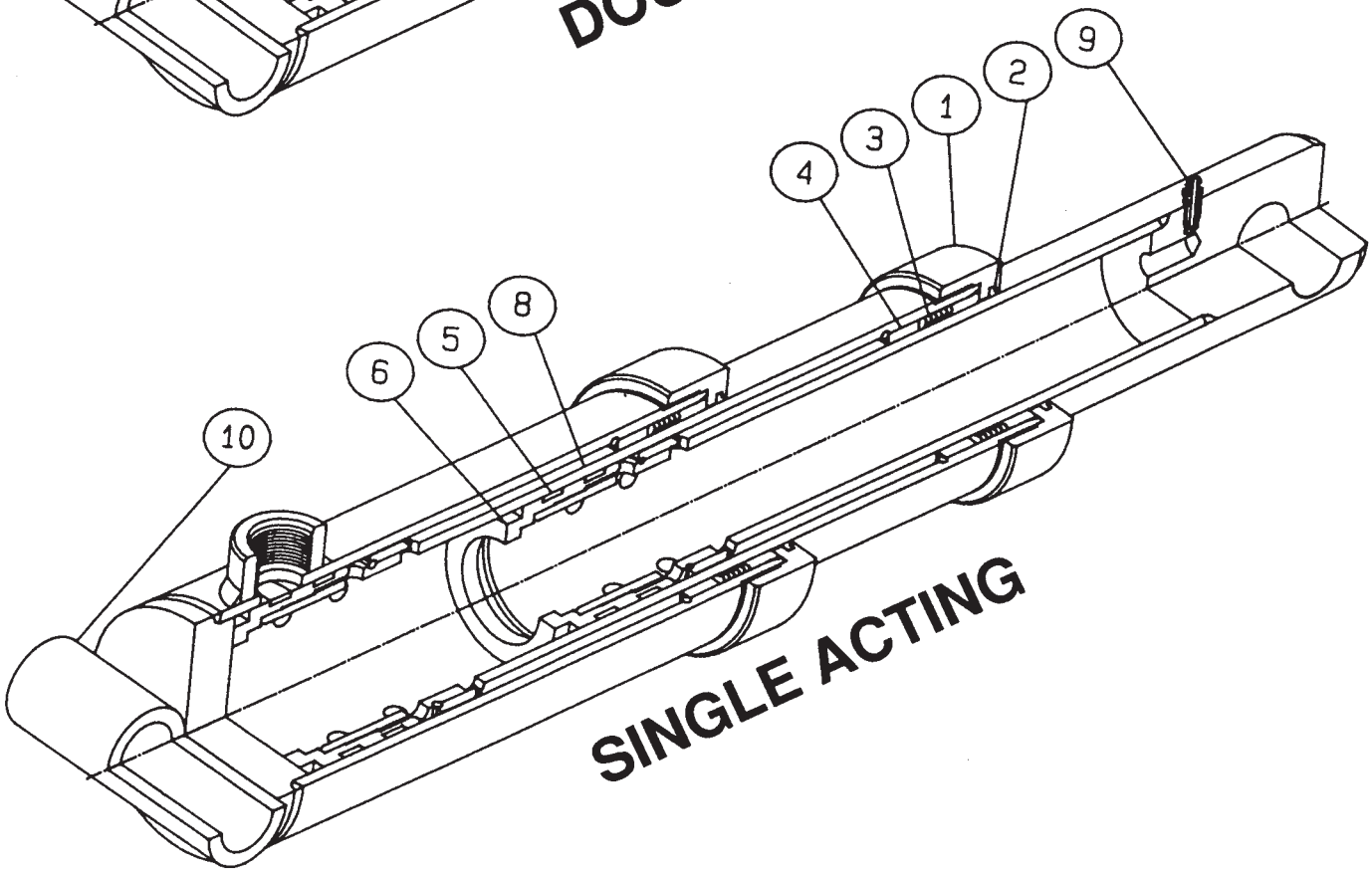
CATC 22-09-04-01

TELESCOPIC CYLINDERS FROM PRINCE

Double & Single Acting





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FEATURES OF THE PRINCE TELESCOPIC CYLINDER

1. GLAND CAP	All steel, externally threaded gland caps provide adjustment of the vee packing.
2. WIPER	Urethane wiper in gland cap to help keep dirt from getting to the seals.
3. ROD SEALS	Homogenous vee sets made of alternating hytrel and nylon.
4. GLAND BEARINGS	Glass-filled nylon bearing rings are used on both sides of the vee seals to eliminate metal-to-metal contact of the chromed stages.
5. PISTON BEARINGS	Glass-filled nylon bearing rings are used at each end of the steel piston to eliminate metal-to-metal contact in the precision tube bores.
6. PISTONS	One-piece threaded construction. The pistons are grooved to contain the bearing rings and the sealing piston rings (double acting only). Each piston also serves to catch the next smaller stage when the cylinder is retracted.
7. PISTON SEALS	Interlocking step-cut cast iron rings provide port passing capability for the cross holes that feed the retracting oil to each stage.
8. TUBE STAGES	Stage construction is of C-1026 carbon steel, precision skived and burnished or honed for control of roundness and surface finish. Tube outside diameters are ground and chromed to provide close control of tolerance, reduce friction and improve wear resistance.
9. BLEEDER	Provided in the small stage of the single acting models to remove trapped air. Bleeders are not usually needed in the double acting since the cylinder fills with oil on both ends.
10. END FITTINGS	An assortment of end fittings are provided for both ends of the cylinder to fit various applications.
11. CUSTOM DESIGN	Special designs are also manufactured. One of our plants specializes the manufacture of telescopic's of all types. Extra short closed lengths, special chrome, no-drift designs, both ports on the main tube, and load holding checks are examples of special telescopic's made by Prince. Variations to the standard models will require additional documentation. Please contact your Prince Sales Representative.

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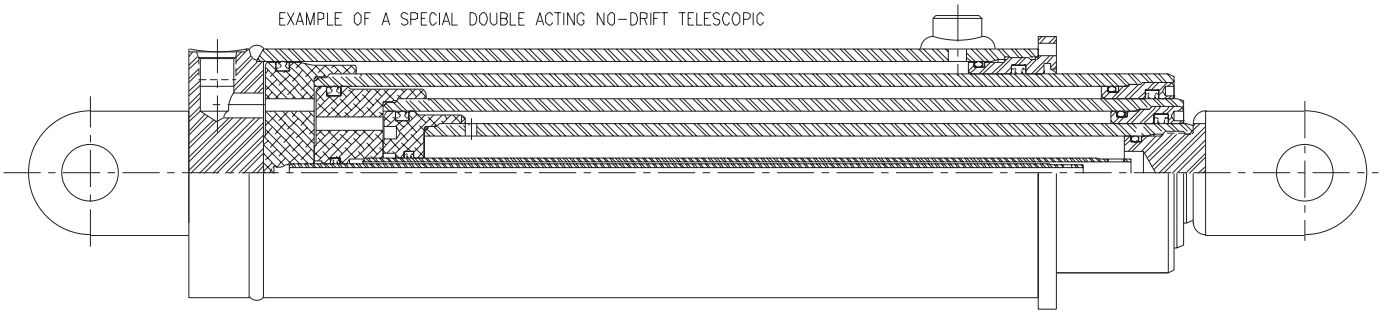
CUSTOM TELESCOPIC CYLINDERS

For some applications, the standard cylinders may not meet all requirements. When this happens, Prince has a staff of engineering personnel to create the special design that is required.

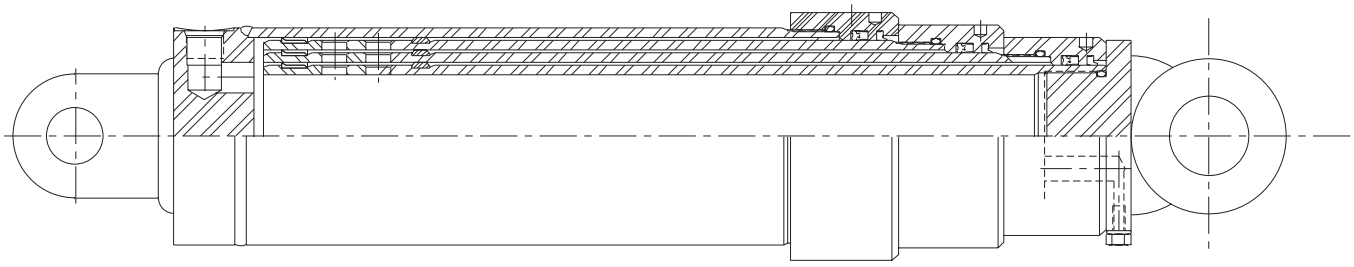
Examples of items a custom telescopic cylinder may require:

- Extra short retracted length.
- Special end fittings.
- Higher pressures.
- Special plating for the stages.
- Holding valves.
- Special seals.
- No-drift piston seals. This is a different design concept where the cross-holes in the stages are eliminated. This design allows the use of soft (urethane, teflon, etc.) piston seals which in turn will allow no drift to take place.

EXAMPLE OF A SPECIAL DOUBLE ACTING NO-DRIFT TELESCOPIC



EXAMPLE OF A SPECIAL SINGLE ACTING, COMPACT DESIGN, CHROME STAGED TELESCOPIC



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CODE NO.	D.DIA.	L	T	W	MAX PIN LOAD (SEE NOTE 6 & 9)
CT-1	1.015	.75	4.50	.25	30,000 lbs
CT2	1.265	.94	5.50	.31	50,000 lbs
CT-3	1.515	1.13	6.5	.38	71,000 lbs
CT-4	2.015	1.38	8	.38	110,000 lbs
CT-5	2.515	1.75	10	.50	161,000 lbs
CT-6	3.031	2.00	12	.50	225,000 lbs

CODE NO.	D.DIA.	L	T	R	MAX PIN LOAD (SEE NOTE 6 & 9)
TG-1	1.015	1.75	1.00	1.00	30,000 lbs
TG-2	1.265	2.00	1.50	1.25	50,000 lbs
TG-3	1.515	2.25	1.75	1.50	71,000 lbs
TG-4	2.015	2.75	2.00	2.00	110,000 lbs
TG-5	2.515	3.00	2.50	2.25	161,000 lbs
TG-6	3.031	3.25	3.00	2.50	225,000 lbs

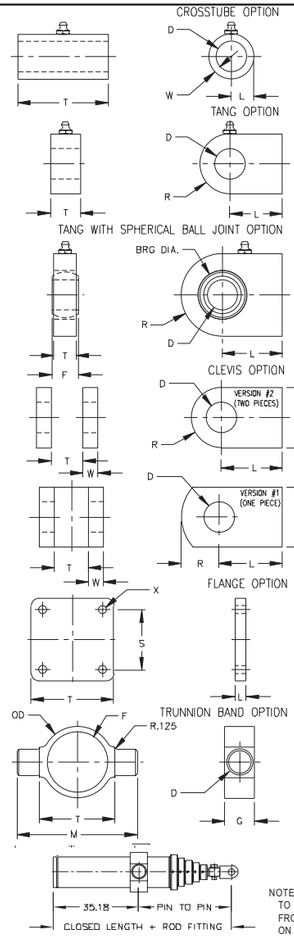
CODE NO	D DIA.	L	T	F	R	BRG. DIA.	MAX PIN LOAD (SEE NOTE 6 & 9)
BJ-1	1.00	2.00	.75	.88	1.38	1.625	30,000 lbs
BJ-2	1.25	2.50	1.00	1.09	1.88	2.000	50,000 lbs
BJ-3	1.50	3.00	1.13	1.31	2.38	2.437	71,000 lbs
BJ-4	2.00	3.50	1.50	1.75	2.88	3.187	110,000 lbs
BJ-5	2.50	4.25	1.88	2.19	3.31	3.937	161,000 lbs
BJ-6	3.00	4.50	2.25	2.63	3.75	4.751	225,000 lbs

CODE NO.	D.DIA.	L	T	W	R	H	VERSION	MAX PIN LOAD (SEE NOTE 6 & 9)
CL-1	1.015	2.38	1.13	.50	1.25	2.00	VER. 1	30,000 lbs
CL-2	1.265	2.50	1.38	.63	1.25	2.50	VER. 1	50,000 lbs
CL-3	1.515	2.75	1.63	.75	1.50	3.00	VER. 2	71,000 lbs
CL-4	2.015	3.00	2.13	1.00	2.00	4.00	VER. 2	110,000 lbs
CL-5	2.515	3.25	2.38	1.25	2.25	4.50	VER. 2	161,000 lbs
CL-6	3.031	3.50	2.63	1.50	2.50	5.00	VER. 2	225,000 lbs

NOTE:
FLANGE OPTION TO BE WELDED DIRECTLY TO CYLINDER BASE END, IN PLACE OF THE STANDARD BUTT PLATE.

CODE NO.	X.DIA.	L	T SQ.	S SQ.	MAX PIN LOAD (SEE NOTE 6 & 9)
FL-1	.53	.75	5.50	4.00	30,000 lbs
FL-2	.66	1.00	7.00	5.25	50,000 lbs
FL-3	.78	1.25	8.00	6.00	71,000 lbs
FL-4	1.03	1.50	9.50	7.25	110,000 lbs
FL-5	1.28	1.75	11.25	8.50	161,000 lbs
FL-6	1.53	2.00	13.50	10.00	225,000 lbs

CODE NO.	MATL	D DIA.	G	T	M	F	0D	MAX PIN LOAD (SEE NOTE 6 & 9)
TR-1-(*)	A-36	1.75	2.00	5.00	8.00	4.00	4.75	30,000 lbs
TR-2-(*)	A-36	2.25	2.50	6.00	10.00	5.00	5.75	50,000 lbs
TR-3-(*)	A-36	2.50	3.00	7.00	11.00	6.00	6.75	71,000 lbs
TR-4-(*)	A-36	3.00	3.50	9.00	14.00	7.50	8.50	110,000 lbs
TR-5-(*)	T-1	3.00	3.50	10.50	15.50	9.00	10.00	161,000 lbs
TR-6-(*)	T-1	3.50	4.00	12.50	18.50	10.75	12.00	225,000 lbs

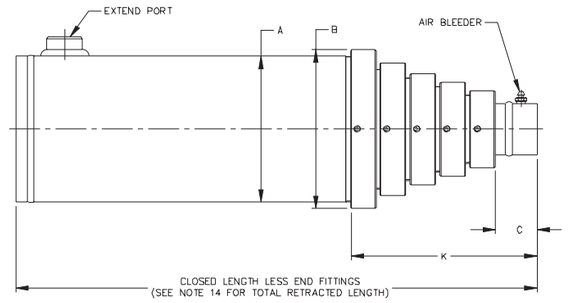


THIS IS A 4 STAGE CYLINDER WITH 6 X 5 X 4 X 3 RODS, 75 3/8 INCHES TOTAL STROKE, TANG END OPTION ON ROD END, AND TRUNNION OPTION 35.18 INCHES FROM BASE END.

NOTE:
TO DESIGNATE THE TRUNNION LOCATION, ENTER THE DISTANCE, IN INCHES, FROM THE BASE END OF THE CYLINDER TO THE CENTER LINE OF THE PIN ON THE TRUNNION BAND.
EXAMPLE: TRO3518 THIS TRUNNION WILL BE 35.18 INCHES FROM THE BASE END OF THE CYLINDER.

STANDARD SINGLE ACTING TELESCOPIC CYLINDER SPECIFICATIONS

BASE END FITTING OPTIONS



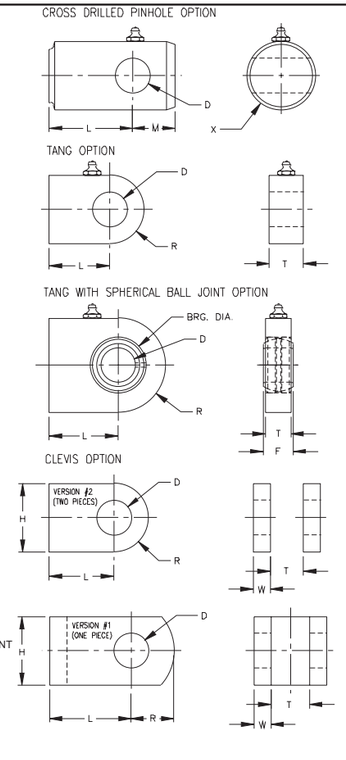
* MODEL NUMBER STEM

TO SPECIFY YOUR CYLINDER CHOOSE THE SIZES AND NUMBER OF STAGES REQUIRED, THEN ADD THE STROKE AND END FITTING OPTIONS. EXAMPLE:

PMC 32 - 0753 TG TR 03518

- PORT
  - PMC - NPTF PORT
  - SAE - O-RING PORT
- MODEL NUMBER
  - INDENTIFIES STAGE SIZES
- STROKE
  - FIRST THREE DIGITS ARE INCHES
  - LAST DIGIT IS 1/8'S OF AN INCH
  - EXAMPLE: 0753 IS 75 3/8 INCHES
- TRUNNION LOCATION (SEE TRUNNION OPTION TO DERIVE LOCATION)
- BASE END FITTING OPTION
  - BL - BLANK
  - CT - CROSSTUBE
  - TG - TANG
  - BJ - TANG WITH BALL JOINT
  - CL - CLEVIS
  - FL - FLANGE
  - TR - TRUNNION
- ROD END FITTING OPTION
  - BL - BLANK
  - PH - PINHOLE
  - TG - TANG
  - BJ - TANG WITH BALL JOINT
  - CL - CLEVIS

ROD END FITTING OPTIONS



CODE NO.	D.DIA.	L	M	X DIA.	MAX PIN LOAD (SEE NOTE 6 & 9)
PH-1	1.015	.50	1.25	2	30,000 lbs
PH-2	1.265	.75	1.38	3	50,000 lbs
PH-3	1.515	1.25	1.50	4	71,000 lbs
PH-4	2.015	2.00	1.75	5	110,000 lbs
PH-5	2.515	2.75	2.00	6	161,000 lbs
PH-6	3.031	3.00	2.50	7.5	225,000 lbs

CODE NO.	D.DIA.	L	T	R	MAX PIN LOAD (SEE NOTE 6 & 9)
TG-1	1.015	1.75	1.00	1.00	30,000 lbs
TG-2	1.265	2.00	1.50	1.25	50,000 lbs
TG-3	1.515	2.25	1.75	1.50	71,000 lbs
TG-4	2.015	2.75	2.00	2.00	110,000 lbs
TG-5	2.515	3.00	2.50	2.25	161,000 lbs
TG-6	3.031	3.25	3.00	2.50	225,000 lbs

CODE NO.	D DIA.	L	T	F	R	BRG. DIA.	MAX PIN LOAD (SEE NOTE 6 7 9)
BJ-1	1.00	2.00	.75	.88	1.38	1.625	30,000 lbs
BJ-2	1.25	2.50	1.00	1.09	1.88	2.000	50,000 lbs
BJ-3	1.50	3.00	1.13	1.31	2.38	2.437	71,000 lbs
BJ-4	2.00	3.50	1.50	1.75	2.88	3.187	110,000 lbs
BJ-5	2.50	4.25	1.88	2.19	3.31	3.937	161,000 lbs
BJ-6	3.00	4.50	2.25	2.63	3.75	4.751	225,000 lbs

CODE NO.	D.DIA.	L	T	W	R	H	VERSION	MAX PIN LOAD (SEE NOTE 6 & 9)
CL-1	1.015	2.38	1.13	.50	1.25	2.00	VER. 1	30,000 lbs
CL-2	1.265	2.50	1.38	.63	1.25	2.50	VER. 1	50,000 lbs
CL-3	1.515	2.75	1.63	.75	1.50	3.00	VER. 2	71,000 lbs
CL-4	2.015	3.00	2.13	1.00	2.00	4.00	VER. 2	110,000 lbs
CL-5	2.515	3.25	2.38	1.25	2.25	4.50	VER. 2	161,000 lbs
CL-6	3.031	3.50	2.63	1.50	2.50	5.00	VER. 2	225,000 lbs

NOTES:
1. MAXIMUM DESIGN AND TEST PRESSURE: 3000 P.S.I.
2. NORMAL OPERATING PRESSURE: 3000 P.S.I. (EXCEPT AS NOTED IN SPECIFICATIONS)
3. PAINT INSTRUCTIONS: PRIME PER: PMS-00120
4. MOVING STAGES ARE HARD CHROME PLATED .0010 MIN.
5. DO NOT REDUCE PORT SIZE. RESTRICTION OF FLOW IN ANY WAY MAY NOT ALLOW THE CYLINDER TO CYCLE SMOOTHLY.
6. PIN SIZE IS BASED ON PIN MATERIAL OF 120,000 P.S.I. MIN. TENSILE STRENGTH, RATING CAN BE INCREASED BY USING CORRESPONDINGLY STRONGER MATERIAL.
7. IF THE CYLINDER IS TO BE USED WITH THE ROD END UP, USE THE AIR BLEEDER TO REMOVE AIR FROM THE CYLINDER PRIOR TO USE.
8. MAXIMUM STROKE LENGTHS ARE BASED ON A SAFETY FACTOR OF 2 TO 1 RELATIVE TO LOAD FOR LONG COLUMNS SUBJECT TO BUCKLING. CONTACT STRESS ON THE PISTON WEAR RINGS ALSO LIMITS MAXIMUM LENGTH IN SOME CASES.

NOTES:
9. MAXIMUM LOAD SHOULD NOT EXCEED THE RATING FOR THE ROD END PIN. (IN SOME CASES IT IS SMALLER THAN THE BASE END PIN. - REF: LOAD LIMITS ON END FITTINGS.)
10. MAXIMUM EXTEND LOADS ARE BASED ON MAXIMUM PIN LOADS FOR THE ROD END FITTINGS. SEE ALSO COLUMN DATA.
11. THIS PRODUCT IS DESIGNED WITH A MINIMUM FACTOR OF SAFETY OF 2:1 BASED ON THE YIELD STRENGTH OF THE MATERIALS.
12. UNLESS OTHERWISE SPECIFIED THIS PRODUCT IS DESIGNED FOR USE WITH A GOOD QUALITY PETROLEUM BASE HYDRAULIC FLUID.
13. THIS DRAWING IS THE PROPERTY OF PRINCE MFG. CORP. AND USE IN ANY MANNER DETRIMENTAL TO THE INTEREST OF PRINCE MFG. CORP. IS PROHIBITED.
14. TOTAL RETRACT EQUALS CLOSED LENGTH PLUS DIMENSION "L" OF THE END FITTINGS WITH A TOLERANCE OF +/- 1/8 FOR EACH STAGE.

MODEL NO.	SPECIFICATION								COLUMN DATA					EXTEND AREA					PORT INFO. (SEE NOTE 5)	ROD END FITTING OPTIONS (SEE NOTE9)						BASE END FITTING OPTIONS (SEE NOTE 9)						
2-STAGE	ROD SIZES	BORE SIZES	MAX EXTEND LOAD	CLOSED LENGTH	A	B	C	K	MAX STROKE AT OPER. P.S.I. 3000	2500	2000	1500	1000	FIRST STAGE	SECOND STAGE	THIRD STAGE	FOURTH STAGE	FIFTH STAGE	EXTEND PORT	BLANK	PH	TG	BJ	CL	BLANK	CT	TG	BJ	CL	FL	TR
PMC/SAE-11	3 X 2	3.5 X 2.5	30,000 lbs.	(STROKE ÷ 2) + 10.38	4	4.5	1.50	4.75	75 in.	84 in.	95 in.	111 in.	120 in.	7.07 SQ.IN.	3.14 SQ.IN.				1/2 NPTF - 7/8 SAE	BL	PH-1	TG-1	BJ-1	CL-1	BL	CT-1	TG-1	BJ-1	CL-1	FL-1	TR-1-( )
PMC/SAE-12	4 X 3	4.5 X 3.5	50,000 lbs.	(STROKE ÷ 2) + 10.88	5	5.5	1.75	5.00	94 in.	104 in.	118 in.	138 in.	165 in.	12.57 SQ.IN.	7.07 SQ.IN.				1 NPTF - 1 5/16 SAE	BL	PH-2	TG-2	BJ-2	CL-2	BL	CT-2	TG-2	BJ-2	CL-2	FL-2	TR-2-( )
PMC/SAE-13	5 X 4	5.5 X 4.5	71,000 lbs.	(STROKE ÷ 2) + 11.13	6	6.75	2.00	5.25	107 in.	118 in.	134 in.	158 in.	195 in.	19.63 SQ.IN.	12.57 SQ.IN.				1 1/4 NPTF - 1 5/8 SAE	BL	PH-3	TG-3	BJ-3	CL-3	BL	CT-3	TG-3	BJ-3	CL-3	FL-3	TR-3-( )
PMC/SAE-14	6 X 5	6.75 X 5.5	110,000 lbs.	(STROKE ÷ 2) + 11.63	7.5	8.25	2.25	5.50	119 in.	134 in.	150 in.	175 in.	196 in.	28.27 SQ.IN.	19.63 SQ.IN.				1 1/2 NPTF - 1 7/8 SAE	BL	PH-4	TG-4	BJ-4	CL-4	BL	CT-4	TG-4	BJ-4	CL-4	FL-4	TR-4-( )
PMC/SAE-15	7.5 X 6	8.25 X 6.75	161,000 lbs.	(STROKE ÷ 2) + 11.88	9	9.75	2.25	5.50	140 in.	158 in.	164 in.	164 in.	164 in.	44.18 SQ.IN.	28.27 SQ.IN.				1 1/2 NPTF - 1 7/8 SAE	BL	PH-5	TG-5	BJ-5	CL-5	BL	CT-5	TG-5	BJ-5	CL-5	FL-5	TR-5-( )
PMC/SAE-16	9 X 7.5	9.75 X 8.25	225,000 lbs.	(STROKE ÷ 2) + 12.38	10.75	11.38	2.50	5.75	170 in.	170 in.	170 in.	170 in.	170 in.	63.61 SQ.IN..	44.18 SQ.IN.				1 1/2 NPTF - 1 7/8 SAE	BL	PH-6	TG-6	BJ-6	CL-6	BL	CT-6	TG-6	BJ-6	CL-6	FL-6	TR-6-( )
3-STAGE	ROD SIZES	BORE SIZES	MAX EXTEND LOAD (SEE NOTES 6 & 10)	CLOSED LENGTH	A	B	C	K	MAX STROKE AT OPER. P.S.I. 3000	2500	2000	1500	1000	FIRST STAGE	SECOND STAGE	THIRD STAGE	FOURTH STAGE	FIFTH STAGE	EXTEND PORT	BLANK	PH	TG	BJ	BJ	BLANK	CT	TG	BJ	CL	FL	TR
PMC/SAE-21	4 X 3 X 2	4.5 X 3.5 X 2.5	30,000 lbs.	(STROKE ÷ 3) + 11.50	5	5.5	1.50	6.50	99 in.	109 in.	124 in.	145 in.	145 in.	12.57 SQ.IN.	7.07 SQ.IN.	3.14 SQ.IN.			1 NPTF - 1 5/16 SAE	BL	PH-1	TG-1	BJ-1	CL-1	BL	CT-2	TG-2	BJ-2	CL-2	FL-2	TR-2-( )
PMC/SAE-22	5 X 4 X 3	5.5 X 4.5 X 3.5	50,000 lbs.	(STROKE ÷ 3) + 11.75	6	6.75	1.75	6.75	120 in.	132 in.	150 in.	166 in.	195 in.	19.63 SQ.IN.	12.57 SQ.IN.	7.07 SQ.IN.			1 1/4 NPTF - 1 5/8 SAE	BL	PH-2	TG-2	BJ-2	CL-2	BL	CT-3	TG-3	BJ-3	CL-3	FL-3	TR-3-( )
PMC/SAE-23	6 X 5 X 4	6.75 X 5.5 X 4.5	71,000 lbs.	(STROKE ÷ 3) + 12.25	7.5	8.25	2.00	7.00	132 in.	146 in.	167 in.	196 in.	220 in.	28.27 SQ.IN.	19.63 SQ.IN.	12.57 SQ.IN.			1 1/2 NPTF - 1 7/8 SAE	BL	PH-3	TG-3	BJ-3	CL-3	BL	CT-4	TG-4	BJ-4	CL-4	FL-4	TR-4-( )
PMC/SAE-24	7.5 X 6 X 5	8.25 X 6.75 X 5.5	110,000 lbs.	(STROKE ÷ 3) + 12.75	9	9.75	2.25	7.25	149 in.	167 in.	188 in.	195 in.	195 in.	44.18 SQ.IN.	28.27 SQ.IN.	19.63 SQ.IN.			1 1/2 NPTF - 1 7/8 SAE	BL	PH-4	TG-4	BJ-4	CL-4	BL	CT-5	TG-5	BJ-5	CL-5	FL-5	TR-5-( )
PMC/SAE-25	9 X 7.5 X 6	9.75 X 8.25 X 6.75	161,000 lbs.	(STROKE ÷ 3) + 13.00	10.75	11.38	2.25	7.25	176 in.	185 in.	185 in.	185 in.	185 in.	63.61 SQ.IN.	44.18 SQ.IN.	28.27 SQ.IN.			1 1/2 NPTF - 1 7/8 SAE	BL	PH-5	TG-5	BJ-5	CL-5	BL	CT-6	TG-6	BJ-6	CL-6	FL-6	TR-6-( )
4-STAGE	ROD SIZES	BORE SIZES	MAX EXTEND LOAD (SEE NOTES 6 & 10)	CLOSED LENGTH	A	B	C	K	MAX STROKE AT OPER. P.S.I. 3000	2500	2000	1500	1000	FIRST STAGE	SECOND STAGE	THIRD STAGE	FOURTH STAGE	FIFTH STAGE	EXTEND PORT	BLANK	PH	TG	BJ	BJ	BLANK	CT	TG	BJ	CL	FL	TR
PMC/SAE-31	5 X 4 X 3 X 2	5.5 X 4.5 X 3.5 X 2.5	30,000 lbs.	(STROKE ÷ 4) + 12.38	6	6.75	1.50	8.25	118 in.	132 in.	150 in.	155 in.	155 in.	19.63 SQ.IN.	12.57 SQ.IN.	7.07 SQ.IN.	3.14 SQ.IN.		1 1/4 NPTF - 1 5/8 SAE	BL	PH-1	TG-1	BJ-1	CL-1	BL	CT-3	TG-3	BJ-3	CL-3	FL-3	TR-3-( )
PMC/SAE-32	6 X 5 X 4 X 3	6.75 X 5.5 X 4.5 X 3.5	50,000 lbs.	(STROKE ÷ 4) + 12.88	7.5	8.25	1.75	8.50	140 in.	156 in.	177 in.	190 in.	190 in.	28.27 SQ.IN.	19.63 SQ.IN.	12.57 SQ.IN.	7.07 SQ.IN.		1 /12 NPTF - 1 7/8 SAE	BL	PH-2	TG-2	BJ-2	CL-2	BL	CT-4	TG-4	BJ-4	CL-4	FL-4	TR-4-( )
PMC/SAE-33	7.5 X 6 X 5 X 4	8.25 X 6.75 X 5.5 X 4.5	71,000 lbs.	(STROKE ÷ 4) + 13.38	9	9.75	2.00	8.75	155 in.	172 in.	196 in.	210 in.	210 in.	44.18 SQ.IN.	28.27 SQ.IN.	19.63 SQ.IN.	12.57 SQ.IN.		1 1/2 NPTF - 1 7/8 SAE	BL	PH-3	TG-3	BJ-3	CL-3	BL	CT-5	TG-5	BJ-5	CL-5	FL-5	TR-5-( )
PMC/SAE-34	9 X 7.5 X 6 X 5	9.75 X 8.25 X 6.75 X 5.5	110,000 lbs.	(STROKE ÷ 4) + 13.88	10.75	11.38	2.25	9.00	175 in.	190 in.	190 in.	190 in.	190 in.	63.61 SQ.IN.	44.18 SQ.IN.	28.27 SQ.IN.	19.63 SQ.IN.		1 1/2 NPTF - 1 7/8 SAE	BL	PH-4	TG-4	BJ-4	CL4	BL	CT-6	TG-6	BJ-6	CL-6	FL-6	TR-6-( )
5-STAGE	ROD SIZES	BORE SIZES	MAX EXTEND LOAD (SEE NOTES 6 & 10)	CLOSED LENGTH	A	B	C	K	MAX STROKE AT OPER. P.S.I. 3000	2500	2000	1500	1000	FIRST STAGE	SECOND STAGE	THIRD STAGE	FOURTH STAGE	FIFTH STAGE	EXTEND PORT	BLANK	PH	TG	BJ	BJ	BLANK	CT	TG	BJ	CL	FL	TR
PMC/SAE-41	6 X 5 X 4 X 3 X 2	6.75 X 5.5 X 4.5 X 3.5 X 2.5	30,000 lbs.	(STROKE ÷ 5) + 13.50	7.5	8.25	1.50	10.00	134 in.	148 in.	150 in.	150 in.	150 in.	28.27 SQ.IN.	19.63 SQ.IN.	12.57 SQ.IN.	7.07 SQ.IN.	3.14 SQ.IN.	1 1/2 NPTF - 1 7/8 SAE	BL	PH-1	TG-1	BJ-1	CL-1	BL	CT-4	TG-1	BJ-4	CL-4	FL-4	TR-4-(_)
PMC/SAE-42	7.5 X 6 X 5 X 4 X 3	8.25 X 6.75 X 5.5 X 4.5 X 3.5	50,000 lbs.	(STROKE ÷ 5) + 14.00	9	9.75	1.75	10.25	158 in.	176 in.	180 in.	180 in.	180 in.	44.18 SQ.IN.	28.27 SQ.IN.	19.63 SQ.IN.	12.57 SQ.IN.	7.07 SQ.IN.	1 1/2 NPTF - 1 7/8 SAE	BL	PH-2	TG-2	BJ-2	CL-2	BL	CT-2	TG-5	BJ-5	CL-5	FL-5	TR-5-(_)
PMC/SAE-43	9 X 7.5 X 6 X 5 X 4	9.75 X 8.25 X 6.75 X 5.5 X 4.5	71,000 lbs.	(STROKE ÷ 5) + 14.50	10.75	11.38	2.00	10.50	173 in.	199 in.	200 in.	220 in.	200 in.	63.61 SQ.IN.	28.27 SQ.IN.	19.63 SQ.IN.	12.57 SQ.IN.	12.57 SQ.IN	1 1/2 NPTF - 1 7/8 SAE	BL	PH-3	TG-3	BJ-3	CL-3	BL	CT-3	TG-6	BJ-6	CL-6	FL-6	TR-6-(_)

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SEE PAGE 8, 9 & 10 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

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STANDARD DOUBLE ACTING TELESCOPIC CYLINDER SPECIFICATIONS

CODE NO.	D.DIA.	L	T	W	MAX PIN LOAD (SEE NOTE 6 & 9)
CT-1	1.015	.75	4.50	.25	30,000 lbs
CT2	1.265	.94	5.50	.31	50,000 lbs
CT-3	1.515	1.13	6.5	.38	71,000 lbs
CT-4	2.015	1.38	8	.38	110,000 lbs
CT-5	2.515	1.75	10	.50	161,000 lbs
CT-6	3.031	2.00	123	.50	225,000 lbs

CODE NO.	D.DIA.	L	T	R	MAX PIN LOAD (SEE NOTE 6 & 9)
TG-1	1.015	1.75	1.00	1.00	30,000 lbs
TG-2	1.265	2.00	1.50	1.25	50,000 lbs
TG-3	1.515	2.25	1.75	1.50	71,000 lbs
TG-4	2.015	2.75	2.00	2.00	110,000 lbs
TG-5	2.515	3.00	2.50	2.25	161,000 lbs
TG-6	3.031	3.25	3.00	2.50	225,000 lbs

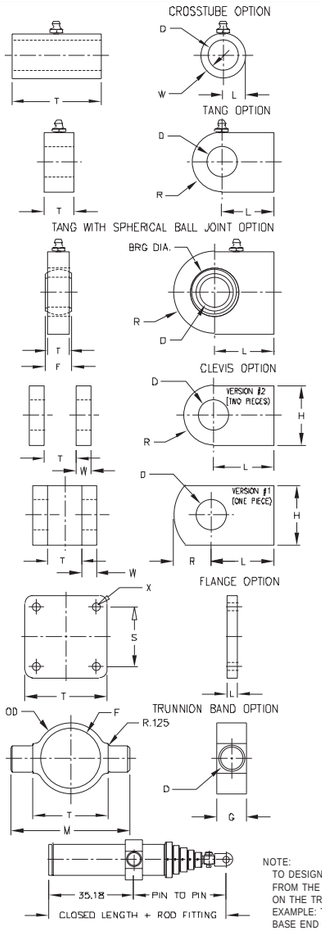
CODE NO	D DIA.	L	T	F	R	BRG. DIA.	MAX PIN LOAD (SEE NOTE 6 & 9)
BJ-1	1.00	2.00	.75	.88	1.38	1.625	30,000 lbs
BJ-2	1.25	2.50	1.00	1.09	1.88	2.000	50,000 lbs
BJ-3	1.50	3.00	1.125	1.31	2.38	2.437	71,000 lbs
BJ-4	2.00	3.50	1.50	1.75	2.88	3.187	110,000 lbs
BJ-5	2.50	4.25	1.875	2.19	3.31	3.937	161,000 lbs
BJ-6	3.00	4.50	2.250	2.63	3.75	4.751	225,000 lbs

CODE NO.	D.DIA.	L	T	W	R	H	VERSION	MAX PIN LOAD (SEE NOTE 6 & 9)
CL-1	1.015	2.38	1.13	.50	1.25	2.00	VER. 1	30,000 lbs
CL-2	1.265	2.50	1.38	.63	1.25	2.50	VER. 1	50,000 lbs
CL-3	1.515	2.75	1.63	.75	1.50	3.00	VER. 2	71,000 lbs
CL-4	2.015	3.00	2.13	1.00	2.00	4.00	VER. 2	110,000 lbs
CL-5	2.515	3.25	2.38	1.25	2.25	4.50	VER. 2	161,000 lbs
CL-6	3.031	3.50	2.63	1.50	2.50	5.00	VER. 2	225,000 lbs

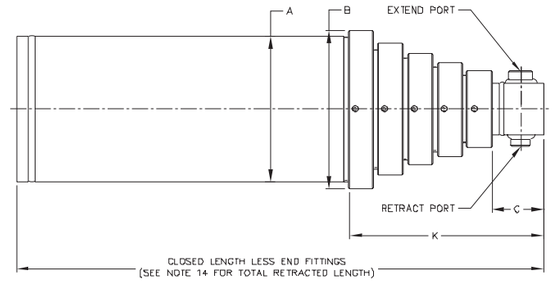
NOTE:
FLANGE OPTION TO BE WELDED DIRECTLY TO CYLINDER BASE END, IN PLACE OF THE STANDARD BUTT PLATE.

CODE NO.	X.DIA.	L	T SQ.	S SQ.	MAX PIN LOAD (SEE NOTE 6 & 9)
FL-1	.53	.75	5.50	4.00	30,000 lbs
FL-2	.66	1.00	7.00	5.25	50,000 lbs
FL-3	.78	1.25	8.00	6.00	71,000 lbs
FL-4	1.03	1.50	9.50	7.25	110,000 lbs
FL-5	1.28	1.75	11.25	8.50	161,000 lbs
FL-6	1.53	2.00	13.50	10.00	225,000 lbs

CODE NO.	MAT'L	D DIA.	G	T	M	F	0D	MAX PIN LOAD (SEE NOTE 6 & 9)
TR-1-(*)	A-36	1.75	2.00	5.00	8.00	4.00	4.75	30,000 lbs
TR-2-(*)	A-36	2.25	2.50	6.00	10.00	5.00	5.75	50,000 lbs
TR-3-(*)	A-36	2.50	3.00	7.00	11.00	6.00	6.75	71,000 lbs
TR-4-(*)	A-36	3.00	3.50	9.00	14.00	7.50	8.50	110,000 lbs
TR-5-(*)	T-1	3.00	3.50	10.50	15.50	9.00	10.00	161,000 lbs
TR-6-(*)	T-1	3.50	4.00	12.50	18.50	10.75	12.00	225,000 lbs



BASE END FITTING OPTIONS



* MODEL NUMBER STEM

TO SPECIFY YOUR CYLINDER CHOOSE THE SIZES AND NUMBER OF STAGES REQUIRED, THEN ADD THE STROKE AND END FITTING OPTIONS. EXAMPLE:

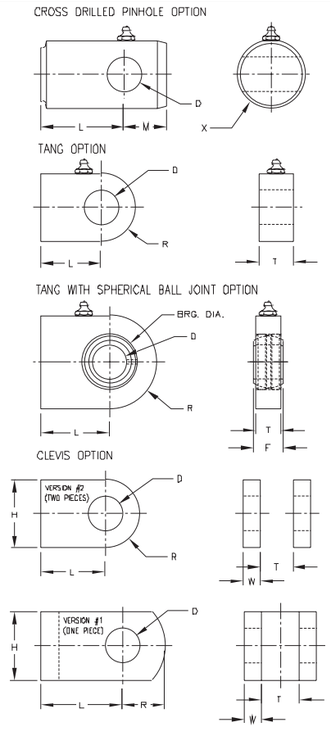
PMC 72 - 0753 TG TR 03518

- PORT — PMC - NPTF PORTS; SAE - O-RING PORTS
- MODEL NUMBER — INDENTIFIES STAGE SIZES
- STROKE — FIRST THREE DIGITS ARE INCHES; LAST DIGIT IS 1/8'S OF AN INCH; EXAMPLE: 0753 IS 75 3/8 INCHES
- TRUNNION LOCATION (SEE TRUNNION OPTION TO DERIVE LOCATION)
- BASE END FITTING OPTION — BL - BLANK; CT - CROSSTUBE; TG - TANG; BJ - TANG WITH BALL JOINT; CL - CLEVIS; FL - FLANGE; TR - TRUNNION
- ROD END FITTING OPTION — BL - BLANK; PH - PINHOLE; TG - TANG; BJ - TANG WITH BALL JOINT; CL - CLEVIS

THIS IS A 4 STAGE CYLINDER WITH 6.75 X 5.5 X 4.5 X 3.5 BORES 75 3/8 INCHES TOTAL STROKE, TANG OPTION ON ROD END TRUNNION OPTION 35.18 INCHES FROM BASE END.

NOTE:
TO DESIGNATE THE TRUNNION LOCATION, ENTER THE DISTANCE, IN INCHES, FROM THE BASE END OF THE CYLINDER TO THE CENTER LINE OF THE PIN ON THE TRUNNION BAND.
EXAMPLE: TRO3518 THIS TRUNNION WILL BE 35.18 INCHES FROM THE BASE END OF THE CYLINDER.

ROD END FITTING OPTIONS



CODE NO.	D.DIA.	L	M	X DIA.	MAX PIN LOAD (SEE NOTE 6 & 9)
PH-1	1.015	.50	1.25	2	30,000 lbs
PH-2	1.265	.75	1.38	3	50,000 lbs
PH-3	1.515	1.25	1.50	4	71,000 lbs
PH-4	2.015	2.00	1.75	5	110,000 lbs
PH-5	2.515	2.75	2.00	6	161,000 lbs
PH-6	3.031	3.00	2.50	7.5	225,000 lbs

CODE NO.	D.DIA.	L	T	F	MAX PIN LOAD (SEE NOTE 6 & 9)
TG-1	1.015	1.75	1.00	1.00	30,000 lbs
TG-2	1.265	2.00	1.50	1.25	50,000 lbs
TG-3	1.515	2.25	1.75	1.50	71,000 lbs
TG-4	2.015	2.75	2.00	2.00	110,000 lbs
TG-5	2.515	3.00	2.50	2.25	161,000 lbs
TG-6	3.031	3.25	3.00	2.50	225,000 lbs

CODE NO.	D DIA.	L	T	F	R	BRG. DIA.	MAX PIN LOAD (SEE NOTE 6 7 9)
BJ-1	1.00	2.00	.75	.88	1.38	1.625	30,000 lbs
BJ-2	1.25	2.50	1.00	1.09	1.88	2.000	50,000 lbs
BJ-3	1.50	3.00	1.13	1.31	2.38	2.437	71,000 lbs
BJ-4	2.00	3.50	1.50	1.75	2.88	3.187	110,000 lbs
BJ-5	2.50	4.25	1.88	2.19	3.31	3.937	161,000 lbs
BJ-6	3.00	4.50	2.25	2.63	3.75	4.751	225,000 lbs

CODE NO.	D.DIA.	L	T	W	R	H	VERSION	MAX PIN LOAD (SEE NOTE 6 & 9)
CL-1	1.015	2.38	1.13	.50	1.25	2.00	VER. 1	130,000 lbs
CL-2	1.265	2.50	1.38	.63	1.25	2.50	VER. 1	50,000 lbs
CL-3	1.515	2.75	1.63	.75	1.50	3.00	VER. 2	71,000 lbs
CL-4	2.015	3.00	2.13	1.00	2.00	4.00	VER. 2	110,000 lbs
CL-5	2.515	3.25	2.38	1.25	2.25	4.50	VER. 2	161,000 lbs
CL-6	3.031	3.50	2.63	1.50	2.50	5.00	VER. 2	225,000 lbs

NOTES:
1. MAXIMUM DESIGN AND TEST PRESSURE: 3000 P.S.I.
2. NORMAL OPERATING PRESSURE: 3000 P.S.I. (EXCEPT AS NOTED IN SPECIFICATIONS)
3. PAINT INSTRUCTIONS: PRIME PER: PMS-00120
4. MOVING STAGES ARE HARD CHROME PLATED .0010 MIN.
5. MAXIMUM FLOW RATE IS BASED ON THE MAXIMUM ALLOWABLE FLOW INTO THE RETRACT PORT, LIMITED BY BACK PRESSURE ON FLOW EXITING THE EXTEND PORT.
6. PIN SIZE IS BASED ON PIN MATERIAL OF 120,000 P.S.I. MIN. TENSILE STRENGTH, RATING CAN BE INCREASED BY USING CORRESPONDINGLY STRONGER MATERIAL.
7. IF QUICK DISCONNECTS ARE USED ON THE PORTS, FAILURE TO COMPLETELY FASTEN THE DISCONNECT ON THE RETRACT PORT MAY RESULT IN INTERNAL FAILURE WHEN THE CYLINDER IS EXTENDED.
8. MAXIMUM STROKE LENGTHS ARE BASED ON A SAFETY FACTOR OF 2 TO 1 RELATIVE TO LOAD FOR LONG COLUMNS SUBJECT TO BUCKLING. CONTACT STRESS ON THE PISTON WEAR RINGS ALSO LIMITS MAXIMUM LENGTH IN SOME CASES.
9. MAXIMUM LOAD SHOULD NOT EXCEED THE RATING FOR THE ROD END PIN. (IN SOME CASES IT IS SMALLER THAN THE BASE END PIN. - REF: LOAD LIMITS ON END FITTINGS.)
10. MAXIMUM EXTEND LOADS ARE BASED ON MAXIMUM PIN LOADS FOR THE ROD END FITTINGS. SEE ALSO COLUMN DATA.
11. THIS PRODUCT IS DESIGNED WITH A MINIMUM FACTOR OF SAFETY OF 2:1 BASED ON THE YIELD STRENGTH OF THE MATERIALS.
12. UNLESS OTHERWISE SPECIFIED THIS PRODUCT IS DESIGNED FOR USE WITH A GOOD QUALITY PETROLEUM BASE HYDRAULIC FLUID.
13. THIS DRAWING IS THE PROPERTY OF PRINCE MFG. CORP. AND USE IN ANY MANNER DETRIMENTAL TO THE INTEREST OF PRINCE MFG. CORP. IS PROHIBITED.
14. TOTAL RETRACT EQUALS CLOSED+/- LENGTH PLUS DIMENSION +/- OF THE END BOXES FITTINGS WITH A TOLERANCE OF ' ? 1/8 FOR EACH STAGE.

MODEL NO.*	SPECIFICATIONS								COLUMN DATA					LARGEST STAGE			PORTING INFORMATION				ROD END FITTING OPTIONS (SEE NOTE 9)						BASE END FITTING OPTIONS (SEE NOTE 9)						
2-STAGE	BORE SIZES	ROD SIZES	MAX EXTEND LOAD (SEE NOTES 6 & 10)	CLOSED LENGTH	A	B	C	K	MAX STROKE AT OPER. P.S.I. 3000	2500	2000	1500	1000	EXTEND AREA	EFFECTIVE RETRACT AREA FOR ALL STAGES	VOLUME OR AREA RATIO	RETRACT PORT	EXTEND PORT	MANIFOLD I.D.	MAX FLOW RATE (SEE NOTE 5)	BLANK	PH	TG	BJ	CL	BLANK	CT	TG	BJ	CL	FL	TR
PMC/SAE-51	3.5 X 2.5	3 X 2	30,000 lbs.	(STROKE ÷ 2) + 13.38	4	4.5	3.00	6.25	55 in.	61 in.	70 in.	84 in.	106 in.	9.62 SQ.IN.	1.77 SQ. IN.	3.77	3/8 NPTF-3/4 SAE	1/2 NPTF-7/8 SAE	.50	17 G.P.M.	BL	PH-1	TG-1	BJ-1	CL-1	BL	CT-1	TG-1	BJ-1	CL-1	FL-1	TR-1-( )
PMC/SAE-52	4.5 X 3.5	4 X 3	50,000 lbs.	(STROKE ÷ 2) + 14.38	5	5.5	3.75	7.00	74 in.	83 in.	95 in.	113 in.	140 in.	15.90 SQ.IN.	2.55 SQ. IN.	4.77	3/4 NPTF-1 1/16 SAE	1 NPTF-1 5/16 SAE	.75	31 G.P.M.	BL	PH-2	TG-2	BJ-2	CL-2	BL	CT-2	TG-2	BJ-2	CL-2	FL-2	TR-2-( )
PMC/SAE-53	5.5 X 4.5	5 X 4	71,000 lbs.	(STROKE ÷ 2) + 14.88	6	6.75	4.25	7.50	86 in.	98 in.	113 in.	133 in.	167 in.	23.76 SQ.IN.	3.34 SQ. IN.	5.76	1 NPTF-1 5/16 SAE	1 1/4 NPTF-1 5/8 SAE	1.25	38 G.P.M.	BL	PH-3	TG-3	BJ-3	CL-3	BL	CT-3	TG-3	BJ-2	CL-3	FL-3	TR-3-( )
PMC/SAE-54	6.75 X 5.5	6 X 5	110,000 lbs.	(STROKE ÷ 2) + 15.38	7.5	8.25	4.50	7.75	100 in.	114 in.	131 in.	154 in.	192 in.	35.79 SQ.IN.	4.12 SQ. IN.	4.77	1 1/4 NPTF-1 5/8 SAE	1 1/2 NPTF-1 7/8 SAE	1.50	41 G.P.M.	BL	PH-4	TG-4	BJ-4	CL-4	BL	CT-4	TG-4	BJ-4	CL-4	FL-4	TR-4-( )
PMC/SAE-55	8.25 X 6.75	7.5 X 6	161,000 lbs.	(STROKE ÷ 2) + 15.63	9	9.75	4.50	7.75	90 in.	132 in.	155 in.	184 in.	210 in.	53.46 SQ.IN.	7.51 SQ. IN.	5.76	1 1/4 NPTF-1 5/8 SAE	1 1/2 NPTF-1 7/8 SAE	1.50	41 G.P.M.	BL	PH-5	TG-5	BJ-5	CL-5	BL	CT-5	TG-5	BJ-5	CL-5	FL-5	TR-5-( )
PMC/SAE-56	9.75 X 8.25	9 X 7.5	225,000 lbs.	(STROKE ÷ 2) + 15.88	10.75	11.38	4.50	7.75	128 in.	168 in.	190 in.	190 in.	190 in.	74.66 SQ.IN.	9.28 SQ. IN.	6.76	1/1/4 NPTF-1 5/8 SAE	1 1/2 NPTF-1 7/8 SAE	1.50	41 G.P.M	BL	PH-6	TG-6	BJ-6	CL-6	BL	CT-6	TG-6	BJ-6	CL-6	FL-6	TR-6-( )
3-STAGE	BORE SIZES	ROD SIZES	MAX EXTEND LOAD (SEE NOTES 6 & 10)	CLOSED LENGTH	A	B	C	K	MAX STROKE AT OPER. P.S.I. 3000	2500	2000	1500	1000	EXTEND AREA	EFFECTIVE RETRACT AREA FOR ALL STAGES	VOLUME OR AREA RATIO	RETRACT PORT	EXTEND PORT	MANIFOLD I.D.	MAX FLOW RATE (SEE NOTE 5)	BLANK	PH	TG	BJ	CL	BLANK	CT	TG	BJ	CL	FL	TR
PMC/SAE-61	4.5 X 3.5 X 2.5	4 X 3 X 2	30,000 lbs.	(STROKE ÷ 3) + 14.50	5	5.5	3.00	8.00	84 in.	93 in.	106 in.	126 in.	157 in.	15.90 SQ.IN.	1.77 SQ. IN.	4.77	3/8 NPTF-3/4 SAE	1/2 NPTF-7/8 SAE	.50	13 G.P.M.	BL	PH-1	TG-1	BJ-1	CL-1	BL	CT-2	TG-2	BJ-2	CL-2	FL-2	TR-2( )
PMC/SAE-62	5.5 X 4.5 X 3.5	5 X 4 X 3	50,000 lbs.	(STROKE ÷ 3) + 15.25	6	6.75	3.75	8.75	93 in.	105 in.	121 in.	143 in.	179 in.	23.76 SQ.IN.	2.55 SQ. IN.	5.76	3/4 NPTF-1 1/6 SAE	1 NPTF-1 5/16 SAE	.75	26 G.P.M	BL	PH-2	TG-2	BJ-2	CL-2	BL	CT-3	TG-3	BJ-3	CL-3	FL-3	TR-3-( )
PMC/SAE-63	6.75 X 5.5 X 4.5	6 X 5 X 4	161,000 lbs.	(STROKE ÷ 3) + 16.00	7.5	8.25	4.25	9.25	106 in.	122 in.	142 in.	167 in.	208 in.	35.79 SQ.IN.	3.34 SQ. IN.	4.77	NPTF-1 5/16 SAE	1 1/4 NPTF-1 5/8 SAE	1.25	38 G.P.M	BL	PH-3	TG-3	BJ-3	CL-3	BL	CT-4	TG-4	BJ-4	CL-4	FL-4	TR-4-( )
PMC/SAE-64	8.25 X 6.75 X 5.5	7.5 X 6 X 5	110,000 lbs.	(STROKE ÷ 3) + 16.50	9	9.75	4.50	9.50	125 in.	144 in.	165 in.	195 in.	225 in.	53.46 SQ.IN.	4.12 SQ. IN.	5.76	1 1/4 NPTF-1 5/8 SAE	1 1/2 NPTF-1 7/8 SAE	1.50	41 G.P.M.	BL	PH-4	TG-4	BJ-4	CL-4	BL	CT-5	TG-5	BJ-5	CL-5	FL-5	TR-5-( )
PMC/SAE-65	9.75 X 8.25 X 6.75	9 X 7.5 X 6	161,000 lbs.	(STROKE ÷ 3) + 16.75	10.75	11.38	4.50	9.50	108 in.	165 in.	196 in.	215 in.	215 in.	74.66 SQ.IN.	7.51 SQ. IN.	6.76	1 1/4 NPTF-1 5/8 SAE	1 1/2 NPTF-1 7/8 SAE	1.50	41 G.P.M.	BL	PH-5	TG-5	BJ-5	CL-5	BL	CT-6	TG-6	BJ-6	CL-6	FL-6	TR-6-( )
4-STAGE	BORE SIZES	ROD SIZES	MAX EXTEND LOAD (SEE NOTES 6 & 10)	CLOSED LENGTH	A	B	C	K	MAX STROKE AT OPER. P.S.I. 3000	2500	2000	1500	1000	EXTEND AREA	EFFECTIVE RETRACT AREA FOR ALL STAGES	VOLUME OR AREA RATIO	RETRACT PORT	EXTEND PORT	MANIFOLD I.D.	MAX FLOW RATE (SEE NOTE 5)	BLANK	PH	TG	BJ	CL	BLANK	CT	TG	BJ	CL	FL	TR
PMC/SAE-71	5.5 X 4.5 X 3.5 X 2.5	5 X 4 X 3 X 2	30,000 lbs.	(STROKE ÷ 4) + 15.38	6	6.75	3.00	9.75	82 in.	94 in.	108 in.	130 in.	164 in.	23.76 SQ.IN.	1.77 SQ. IN.	5.76	3/8 NPTF-3/4 SAE	1/2 NPTF-7/8 SAE	.50	13 G.P.M.	BL	PH-1	TG-1	BJ-1	CL-1	BL	CT-3	TG-3	BJ-3	CL-3	FL-3	TR-3( )
PMC/SAE-72	6.75 X 5.5 X 4.5 X 3.5	6 X 5 X 4 X 3	50,000 lbs.	(STROKE ÷ 4) + 16.38	7.5	8.25	3.75	10.5	108 in.	123 in.	142 in.	168 in.	205 in.	35.79 SQ.IN.	2.55 SQ. IN.	4.77	3/4 NPTF-1 1/16 SAE	1 NPTF-1 5/16 SAE	.75	31 G.P.M.	BL	PH-2	TG-2	BJ-2	CL-2	BL	CT-4	TG-4	BJ-4	CL-4	FL-4	TR-4-( )
PMC/SAE-73	8.25 X 6.75 X 5.5 X 4.5	7.5 X 6 X 5 X 4	71,000 lbs.	(STROKE ÷ 4) + 17.13	9	9.75	4.25	11.00	123 in.	142 in.	164 in.	194 in.	225 in.	53.46 SQ.IN.	3.34 SQ. IN.	5.76	1 NPTF-1 5/16 SAE	1 1/4 NPTF-1 5/8 SAE	1.25	38 G.P.M.	BL	PH-3	TG-3	BJ-3	CL-3	BL	CT-5	TG-5	BJ-5	CL-5	FL-5	TR-5-( )
PMC/SAE-74	9.75 X 8.25 X 6.75 X 5.5	9 X 7.5 X 6 X 5	110,000 lbs.	(STROKE ÷ 4) + 17.63	10.75	11.38	4.50	11.25	148 in.	168 in.	195 in.	225 in.	225 in.	74.66 SQ.IN.	4.12 SQ. IN.	6.76	1 1/4 NPTF-1 5/8 SAE	1 1/2 NPTF-1 7/8 SAE	1.50	41 G.P.M.	BL	PH-4	TG-4	BJ-4	CL-4	BL	CT-6	TG-6	BJ-6	CL-6	FL-6	TR-6-( )
5-STAGE	BORE SIZES	ROD SIZES	MAX EXTEND LOAD (SEE NOTES 6 & 10)	CLOSED LENGTH	A	B	C	K	MAX STROKE AT OPER. P.S.I. 3000	2500	2000	1500	1000	EXTEND AREA	EFFECTIVE RETRACT AREA FOR ALL STAGES	VOLUME OR AREA RATIO	RETRACT PORT	EXTEND PORT	MANIFOLD I.D.	MAX FLOW RATE (SEE NOTE 5)	BLANK	PH	TG	BJ	CL	BLANK	CT	TG	BJ	CL	FL	TR
PMC/SAE-81	6.75 X 5.5 X 4.5 X 3.5 X 2.5	6 X 5 X 4 X 3 X 2	30,000 lbs.	(STROKE ÷ 5) + 16.50	7.5	8.25	3.00	11.50	92 in.	104 in.	121 in.	147 in.	170 in.	35.79 SQ.IN.	1.77 SQ. IN.	4.77	3/8 NPTF-3/4 SAE	1/2 NPTF-7/8 SAE	.50	13 G.P.M.	BL	PH-1	TG-1	BJ-1	CL-1	BL	CT-4	TG-4	BJ-4	CL-4	FL-4	TR-4-( )
PMC/SAE-82	8.25 X 6.75 X 5.5 X 4.5 X 3.5	7.5 X 6 X 5 X 4 X 3	50,000 lbs.	(STROKE ÷ 5) + 17.50	9	9.75	3.75	12.25	116 in.	138 in.	158 in.	188 in.	200 in.	53.46 SQ.IN.	2.55 SQ. IN.	4.77	3/4 NPTF-1 1/16 SAE	1 NPTF-1 5/16 SAE	.75	26 G.P.M.	BL	PH-2	TG-2	BJ-2	CL-2	BL	CT-5	TG-5	BJ-5	CL-5	FL-5	TR-5-( )
PMC/SAE-83	9.75 X 8.25 X 6.75 X 5.5 X 4.5	9 X 7.5 X 6 X 5 X 4	71,000 lbs.	(STROKE ÷ 5) + 18.25	10.75	11.38	4.25	12.75	135 in.	160 in.	185 in.	220 in.	225 in.	74.66 SQ.IN.	3.34 SQ. IN.	6.76	1 NPTF-1 5/16 SAE	1 1/4 NPTF-1 5/8 SAE	1.25	33 G.P.M.	BL	PH-3	TG-3	BJ-3	CL-3	BL	CT-6	TG-6	BJ-6	CL-6	FL-6	TR-6-( )

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Additional Data for Standard Prince Double Acting Telescopic Cylinders

Stage Size bore dia /rod dia	Effective extend area of stage (square inches)	Effective retract area of stage (square inches)	Extend volume of stage per foot stroke (gallon / ft)	Retract volume of stage per foot stroke (gallon / ft)	Volume or Area Ratio
2.50 / 2.00	4.91	1.77	.255	.092	2.77
3.50 / 3.00	9.62	2.55	.500	.133	3.77
4.50 / 4.00	15.90	3.34	.826	.173	4.77
5.50 / 5.00	23.76	4.12	1.234	.214	5.76
6.75 / 6.00	35.78	7.51	1.859	.390	4.77
8.25 / 7.50	53.46	9.28	2.777	.482	5.76
9.75 / 9.00	74.66	11.04	3.878	.574	6.76

Basic Hydraulic cylinder formula: Force (pounds) = Pressure (psi) x Area (square inches)

Effective Extend Area: The chart above gives the extend area for each stage size used in the standard Prince Double Acting Telescopic cylinders. These can be used to determine the maximum extend force a cylinder can produce as it extends through each stage. For example we can look at a PMC-71 four stage cylinder in an application that has a maximum system pressure of 1250 psi. The stages are in order 5.50, 4.50, 3.50, and 2.5 inches in diameter. The maximum extend forces will be 29,700 lbs, 19,875 lbs, 12,025 lbs, and 6,137 lbs respectively. As you can see, the maximum extend force is reduced as each stage becomes active.

Effective Retract Area: The chart above gives the retract area for each stage size used in the standard Prince Double acting Telescopic cylinders. These can be used to determine the maximum retract force a cylinder can produce as it retracts through each stage. However, it is the area of the smallest stage that is used to determine the maximum retract force. For example we can look at a PMC-71 four stage cylinder in an application that has a maximum system pressure of 1250 psi. The stages are in order 5.50, 4.50, 3.50, and 2.50 inches in diameter. The smallest stage is 2.50 inches and has a corresponding retract area of 1.77 square inches. The maximum retract force throughout the entire retract stroke of the 4 stage telescopic cylinder in this example will be 2,212 lbs.

Extend and Retract Volume: This information can be used to determine two things, first, how much oil it will take to extend and retract each stage of the cylinder, and second, how much time it will take to extend and retract the cylinder. For example we can look at a PMC-61 three stage cylinder with 72 inches (or 6 feet) of stroke in an application that has 10 gpm of flow available. The stages are in order 4.50, 3.50, and 2.50 inches and, in this example, each will have 24 inches of stroke. It will take 1.652 gallons to extend the first stage 24 inches, 1.00 gallon to extend the second stage 24 inches, and .51 gallon to extend the third stage 24 inches. The total needed to extend the cylinder 72 inches is 3.16 gallons. To calculate the extend time of the cylinder divide this total by the system gpm to get 0.316 minutes (or 18.97 sec) to fully extend this cylinder 72 inches at 10 gpm. For retract it will take .184 gallon to retract the third stage 24 inches, .266 gallon to retract the second stage 24 inches, and .346 gallon to retract the first stage 24 inches. The total needed to retract the cylinder 72 inches is .80 gallon. To calculate the retract time of the cylinder, divide this total by the system gpm to get .08 minutes (or 4.8 sec) to fully retract this cylinder 72 inches at 10 gpm.

Volume ratio: Because of the unique design of a telescopic cylinder, the total extend volume of each stage is considerably larger than the total retract volume. This creates an oil flow amplification out of the extend port during the retract stroke. The volume ratio in the chart above can be used to determine this. Using the previous example of a PMC-61 three stage cylinder the flow out of the extend port will be 27.7 gpm as the 2.50 / 2.00 dia stage retracts, 37.7 gpm as the 3.50 / 3.00 stage retracts, and 47.7 gpm as the 4.50 / 4.00 stage retracts when 10 gpm is pumped into the retract port. This needs to be taken into account when designing a system using a double acting telescopic cylinder.

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Standard Prince PMC/SAE-50, -60, -70 & 80 Series Double Acting Telescopic Design Considerations

The successful application of a standard Prince double acting telescopic cylinder requires an understanding of the distinctive way in which this type of cylinder functions. The information contained herein is not intended to cover all aspects of designing a hydraulic powered machine using telescopic cylinders. It is just intended to outline some basic design considerations that make these cylinders unique. Failure to take these considerations into account will affect the safe and effective use of the product. Consult your sales representative if you have questions about your application.

A double acting telescopic cylinder can be hydraulically powered in both extend and retract. It is used in applications where a single acting telescopic cylinder will not work because either an external load is not present or it is not large enough to retract the cylinder. The standard Prince double acting telescopic cylinder is best suited for non-critical applications that require a high force on the extend or push out cycle and a low force on the retract or pull back cycle. Examples would be truck hoists and packer ejectors.

A telescopic cylinder should not be considered to be the structural member in the design of a machine. It is not rigid enough to provide stable structural support and should only be considered as the device that generates force. As with all types of hydraulic cylinders, high side load conditions should be avoided whenever possible. There must be enough swing clearance at the end fitting to prevent binding. Also, the cylinder must not come in contact with anything as it moves though its range of stroke. In addition two telescopic cylinders cannot normally be synchronized using a hydraulic flow divider. The standard Prince telescopic cylinder should not be expected to hold a load in place for an extended period of time during the extend stroke. Further, it should never be used where it is necessary to hold a load during the retract stroke. The standard Prince telescopic cylinder design uses cast iron rings to seal the piston. There will be some leakage flow across these cast iron piston rings that will allow the load to drift. The best application for a standard telescopic is one where the normal cycle of operation is to extend the cylinder as needed to perform the required function then retract the cylinder. Generally speaking, the standard Prince double acting telescopic cylinder should be fully retracted at the end of each hydraulic cycle. The standard Prince double acting telescopic cylinder should never be used in a personnel lift application. It is not advisable to use the cylinder when an over-center load reversal takes place part way through the extend cycle. Further, impact forces created by external loads should be avoided at the full extend position.

A telescopic cylinder is made up of a group of nested telescoping tubes called stages. During the extend cycle the largest stage should completely extend first then each progressively smaller stage should in turn completely extend. For a constant input flow the cylinder extend speed will get progressively faster as each smaller stage becomes active. It is normally best to have a minimum system flow of 8 to 12 gpm for proper operation. For a constant load condition the extend pressure will increase as each smaller stage becomes active. However, it should be noted that it is common for the load to decrease as the cylinder extends due to changes in mechanical advantage or a reduction in the load. This will affect the extend pressure needed. Because of their design, double acting telescopic cylinders act as pressure intensifiers while extending and flow intensifiers while retracting. This is caused by the relatively large difference between the extend and retract area/volume. If, during the extend cycle of the cylinder, the retract port is restricted or blocked the potential exists for the pressure to be intensified by the extend to retract area ratio. This area ratio can be as much as 7 to 1. If the system pressure is 2,000 psi this could potentially result in a pressure intensification up to 14,000 psi. Permanent and potentially hazardous damage will occur to the cylinder well before a pressure of this magnitude is reached. The system must be designed to prevent this from occurring. During the retract cycle of a double acting telescopic cylinder, oil is pumped into the retract port and the oil contained on the extend side of the cylinder is forced out the extend port. Again, because of the area or volume ratio of the cylinder, the flow out of the extend port will be amplified. If the system flow is 15 gpm this could potentially result in a flow amplification up to 105 gpm. This needs to be considered when sizing the other components in the system. If these components are sized too small they could potentially fail to operate properly and restrict the flow exiting the extend port.

In summary, telescopic cylinders have their own unique performance characteristics and it is the responsibility of the user to take them into account when selecting one for their specific application.

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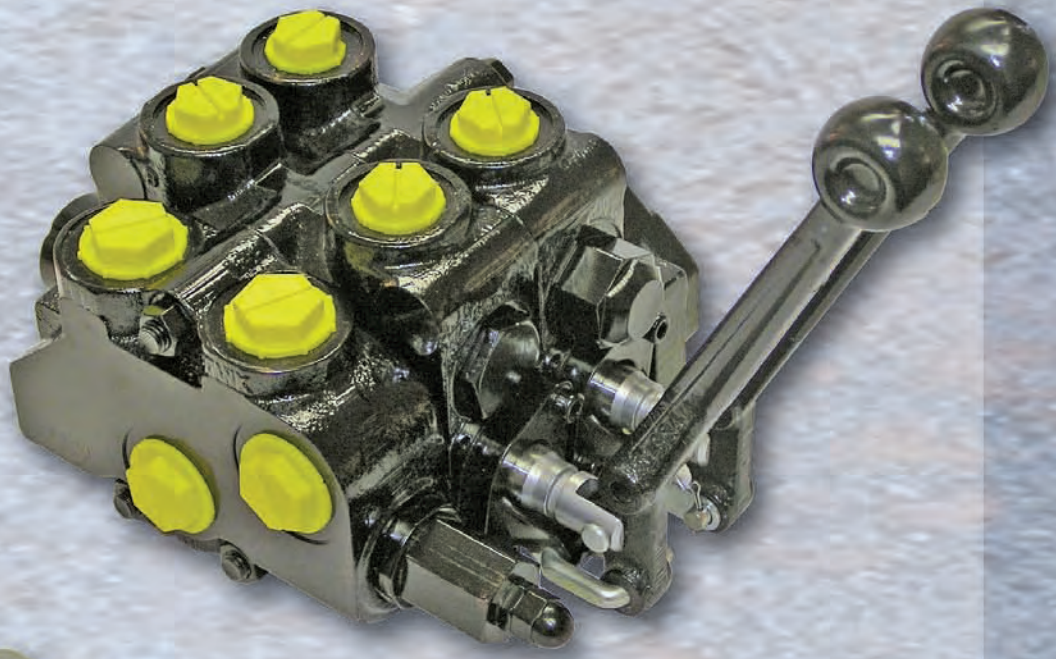
VALVES



Prince Manufacturing Corporation
North Sioux City, South Dakota

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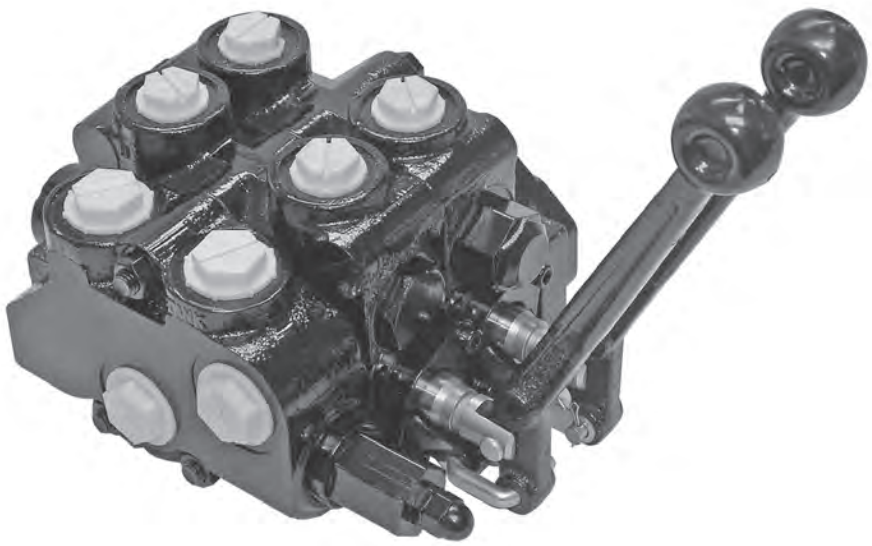
CATV 2-09-04-01

SECTIONAL BODY



Series "20"

STANDARD FEATURES

- 1 -10 Work Sections
- Power Beyond Capability
- Load Checks on Each Work Port
- Extra Fine Spool Metering
- Reversible Handle
- Hard Chrome Plated Spools
- A Float Section can be Installed in any Location in Valve Assembly
- Interchangeable Mounting With Other Popular "20" gpm Stack Valves
- Optional Work Section with Pilot Operated Checks

SPECIFICATIONS

Parallel or Tandem Circuit
Pressure Rating
Maximum Operating Pressure ..... 3500 psi
Maximum Tank Pressure ..... 500 psi

Nominal Flow Rating ..... 20 gpm
Please Refer to Pressure Drop Charts.
Allowable Pressure Loss thru Valve
Determines the Maximum flow.

Foot Mounting
Weight
Inlet Cover ..... Approx 6 lbs
Outlet Cover ..... Approx 3.5 lbs
Work Section ..... Approx 9 lbs

Maximum Operating Temp .....180°F

Filtration: For general purpose valves, fluid cleanliness should meet the ISO 4406 19/17/14 level . For extended life or for pilot operated valves, the 18/16/13 fluid cleanliness level is recommended.

ORDERING INFORMATION:
The following is a listing of valve sections available from stock on a standard basis.
STANDARD SECTIONS AVAILABLE:

STANDARD INLET SECTIONS

ALL SECTIONS HAVE BOTH TOP AND SIDE INLET AND TANK PORTS

PART NO.	RELIEF TYPE AND SETTING	PORT SIZE
20I2A	NO RELIEF	#12 SAE ORB
20I2C	SHIM ADJUSTABLE 1351-1750 PSI, SET AT 1750 PSI @ 10 GPM	#12 SAE ORB
20I2D	SHIM ADJUSTABLE 1751-2200 PSI, SET AT 2200 PSI @ 10 GPM	#12 SAE ORB
20I2E	SHIM ADJUSTABLE 2201-3000 PSI, SET AT 2500 PSI @ 10 GPM	#12 SAE ORB
20I2G	ADJUSTABLE 1351-1750 PSI, SET AT 1750 PSI @ 10 GPM	#12 SAE ORB
20I2H	ADJUSTABLE 1750-2200 PSI, SET AT 2200 PSI @ 10 GPM	#12 SAE ORB
20I2J	ADJUSTABLE 2201-3000 PSI, SET AT 2500 PSI @ 10 GPM	#12 SAE ORB

STANDARD PARALLEL CIRCUIT WORK SECTIONS

ALL WORK SECTIONS HAVE #10 SAE ORB PORTS, LOAD CHECKS, AND STANDARD LEVER HANDLES.
MODELS WITH PORT RELIEFS ARE SHIM ADJUSTABLE.

PART NO.	SPOOL TYPE AND ACTION	PORT RELIEFS
20P1AA1AA	3-WAY SINGLE ACTING W/SPRING CENTER	PLUGGED
20P1BA1AA	4-WAY DOUBLE ACTING W/SPRING CENTER (WORK PORTS BLOCKED IN NEUTRAL)	PLUGGED
20P1BA5AA-S12Q	4-WAY DOUBLE ACTING W/SPRING CENTER, 12VDC SOLENOID OPERATED	PLUGGED
20P1BA6AA-S12Q	4-WAY DOUBLE ACTING W/SPRING CENTER, 12VDC SOLENOID OPERATED W/LEVER HANDLE	PLUGGED
20P1BB1AA	4-WAY DOUBLE ACTING W/3 POSITION DETENT (WORK PORTS BLOCKED IN NEUTRAL)	PLUGGED
20P1CA1AA	4-WAY FREE FLOW MOTOR W/SPRING CENTER (WORK PORTS OPEN TO TANK IN NEUTRAL)	PLUGGED
20P1CB1AA	4-WAY FREE FLOW MOTOR W/3 POSITION DETENT (WORK PORTS OPEN TO TANK IN NEUTRAL)	PLUGGED
20P1DD1AA	4-WAY 4 POSITION FLOAT W/SPRING CENTER AND FLOAT DETENT	PLUGGED
20P1BA1DD	4-WAY DOUBLE ACTING W/SPRING CENTER (WORK PORTS BLOCKED IN NEUTRAL)	2200 PSI
20P1DD1DD	4-WAY 4 POSITION FLOAT W/SPRING CENTER AND FLOAT DETENT	2200 PSI
20L1CA1	4-WAY 3 POSITION W/SPRING CENTER AND P.O. CHECKS	NONE
20LP1JA1AA	LOAD SENSE 4-WAY DOUBLE ACTING WITH SPRING CENTER	PLUGGED

STANDARD TANDEM CIRCUIT WORK SECTIONS

PART NO.	SPOOL TYPE AND ACTION	PORT RELIEFS
20T1BA1AA	4-WAY DOUBLE ACTING W/ SPRING CENTER (WORK PORTS BLOCKED IN NEUTRAL)	PLUGGED
20T1BA1DD	4-WAY DOUBLE ACTING W/ SPRING CENTER (WORK PORTS BLOCKED IN NEUTRAL)	2200 PSI
20T1CA1AA	4-WAY FREE FLOW MOTOR W/ SPRING CENTER (WORK PORTS OPEN TO TANK IN NEUTRAL)	PLUGGED

STANDARD OUTLET SECTIONS

ALL SECTIONS HAVE SIDE OUTLET

PART NO.	EXHAUST OPTION	PORT SIZE
20E21	OPEN CENTER OUTLET W/ CONVERSION PLUG	#12 SAE ORB
20E22	POWER BEYOND OUTLET W/ #10 SAE POWER BEYOND PORT	#12 SAE ORB
20E23	CLOSED CENTER OUTLET	#12 SAE ORB
20LE21	LOAD SENSE OUTLET WITH #4 LOAD SENSE PORT AND BLEED ORIFICE	#12 SAE ORB

TIE-ROD KITS

TIE-ROD TORQUE 30-32 ft-lbs

PART NO.	WORK SECTIONS	PART NO.	WORK SECTIONS
660402001	1 SECTION	660402006	6 SECTION
660402002	2 SECTION	660402007	7 SECTION
660402003	3 SECTION	660402008	8 SECTION
660402004	4 SECTION	660402009	9 SECTION
660402005	5 SECTION	660402010	10 SECTION

SERIES 20 HARDWARE AND SEAL KITS

660190003	SPRING CENTER KIT
660190004	3 POSITION DETENT KIT
660190005	FRICTION DETENT KIT
660190028	SPRING CTR PNEUMATIC ACTUATOR KIT
660190001	VERTICAL HANDLE, LINK & PINS
660190002	STD. HANDLE, LINK & PINS
660190006	COMPLETE VERT. HANDLE KIT
660190007	COMPLETE STD. HANDLE KIT
660190025	SEAL RETAINER PLATE
660190026	HANDLE CLEVIS
660290004	POWER BEYOND PLUG #10 SAE
660290017	POWER BEYOND PLUG 3/4" NPTF
660290005	CLOSED CENTER PLUG
660290006	OPEN CENTER OUTLET PLUG
660585001	WORK SECTION SEAL KIT
660585008	LOCK SECTION SEAL KIT
660590030	SOLENOID OPERATED SECTION SEAL KIT
660585002	INLET SECTION SEAL KIT
660585003	OUTLET SECTION SEAL KIT
660585004	SEAL KIT 0-RINGS BETWEEN SECTION ONLY
660585006	SOLENOID PILOT PASSAGE SEAL KIT
660390103	20 WORK SECT COIL & CART ASSY 12VDC/LEADS
660390107	20 WORK SECT COIL & CART ASSY 24VDC/LEADS
660290010	20 UTIL SECT CONTINUOUS ON PBU CART
660390153	20 UTIL SECT PBU COIL & CART ASSY 12VDC/LEADS
660390157	20 UTIL SECT PBU COIL & CART ASSY 24VDC/LEADS
270006092	20 UTIL SECT PRESSURE REDUCING CART
660290012	20 UTIL SECT POWER BEYOND PLUG #10 SAE

PORT RELIEF KITS

660290002	NO RELIEF LOAD CHECK PLUG
660290301	SHIM ADJ. 500 - 1350 PSI
660290303	SHIM ADJ. 1351 - 1750 PSI
660290305	SHIM ADJ. 1751 - 2200 PSI
660290307	SHIM ADJ. 2201 - 3000 PSI
660290401	ADJUSTABLE 500 - 1350 PSI
660290403	ADJUSTABLE 1351 - 1750 PSI
660290405	ADJUSTABLE 1751 - 2200 PSI
660290407	ADJUSTABLE 2201 - 3000 PSI
660290003	ANTI-CAVITATION CARTRIDGE

RELIEF CARTRIDGES ARE ALSO AVAILABLE WITH STAINLESS STEEL RELIEF SPRINGS.

INLET RELIEF KITS

660290001	NO RELIEF PLUG
660290101	SHIM ADJ. 500 - 1350 PSI
660290103	SHIM ADJ. 1351 - 1750 PSI
660290105	SHIM ADJ. 1751 - 2200 PSI
660290107	SHIM ADJ. 2201 - 3000 PSI
660290201	ADJUSTABLE 500 - 1350 PSI
660290203	ADJUSTABLE 1351 - 1750 PSI
660290205	ADJUSTABLE 1751 - 2200 PSI
660290207	ADJUSTABLE 2201 - 3000 PSI

RELIEF HARDWARE KITS

660190024	SHIM STYLE TO ADJ STYLE CONVERSION KIT
672000201	.006 SHIM FOR RELIEF
672000202	.010 SHIM FOR RELIEF
672000203	.018 SHIM FOR RELIEF
672000205	.041 SHIM FOR RELIEF

LOAD SENSE KITS

660290018	LOAD SENSE PLUG W/DRAIN ORIFICE
660290019	LOAD SENSE PLUG W/O DRAIN ORIFICE

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SEE PAGE 11 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

SPECIAL SECTIONS AVAILABLE:

Valves other than standard models listed can be made to order. Use order code Matrix below to generate a model number that meets your requirements. If you prefer, contact your Sales Representative with your specific requirements and a model number will be assigned for you. This model number can then be used for future orders. A minimum order quantity will apply to special valves. Please consult Sales Representative.

WORK SECTION

2 0 X X X X X X X

WORK SECTION TYPE
P-STANDARD PARALLEL
T-TANDEM CENTER
L-PARALLEL WITH BUILT IN
PILOT OPERATED CHECKS**

PORT SIZE
1. #10 SAE (7/8-14 THREAD)
2. #8 SAE (3/4-16 THREAD)
3. #12 SAE (1 1/16-12 THREAD)
4. 1/2 NPTF (2000 PSI MAX)
5. 3/8 NPTF (2000 PSI MAX)

SPOOL TYPE
A - 3 WAY 3 POSITION
B - 4 WAY 3 POSITION
C - 4 WAY 3 POSITION FREE FLOW MOTOR
D - 4 WAY 4 POSITION FLOAT
E - 3 WAY 3 POSITION FREE FLOW MOTOR

SPOOL ACTIONS
A - SPRING CENTER TO NEUTRAL
B - 3 POSITION DETENT
C - FRICTION DETENT
D - FLOAT DETENT
E - SPRING CENTER PNEUMATIC ACTUATOR
F - 2 POSITION DETENT NEUTRAL & OUT (NO IN POSITION)
J - SPRING CENTER W/ MICROSWITCH (SWITCHES ON IN OR OUT)***
K - SPRING CENTER W/ MICROSWITCH (SWTCHES ON SPOOL IN ONLY)***
M - SPRING CENTER DETENT IN
N - SPRING CENTER DETENT OUT
P - 2 POSITION DETENT NEUTRAL & IN (NO OUT POSITION)

HANDLE OPTIONS
1 - STANDARD LEVER HANDLE*
2 - LESS HANDLE ONLY
3 - LESS COMPLETE HANDLE
4 - VERTICAL LEVER HANDLE*
7 - BLANK FOR OPTIONAL JOYSTICK HANDLE

PORT RELIEF "B"

PORT RELIEF "A"
A - NO RELIEF
B - SHIM ADJUSTABLE RELIEF 500-1350 PSI SET AT 1350
C - SHIM ADJUSTABLE RELIEF 1351-1750 PSI SET AT 1750
D - SHIM ADJUSTABLE RELIEF 1751-2200 PSI SET AT 2200
E - SHIM ADJUSTABLE RELIEF 2201-3000 PSI SET AT 2500
F - ADJUSTABLE RELIEF 500-1350 PSI SET AT 1350*
G - ADJUSTABLE RELIEF 1351-1750 PSI SET AT 1750*
H - ADJUSTABLE RELIEF 1751-2200 PSI SET AT 2200*
J - ADJUSTABLE RELIEF 2201-3000 PSI SET AT 2500*
K - ANTI-CAVITATION CHECK
L - PORT RELIEF/ANTI-CAV SHIM ADJ 500-1350 PSI SET AT 1350
M - PORT RELIEF/ANTI-CAV SHIM ADJ 1351-1750 PSI SET AT 1750
N - PORT RELIEF/ANTI-CAV SHIM ADJ 1751-2200 PSI SET AT 2200
R - PORT RELIEF/ANTI-CAV SHIM ADJ 2201-3000 PSI SET AT 2500
S - PORT RELIEF/ANTI-CAV ADJUSTABLE 500-1350 PSI SET AT 1350*
T - PORT RELIEF/ANTI-CAV ADJUSTABLE 1351-1750 PSI SET AT 1750*
W - PORT RELIEF/ANTI-CAV ADJUSTABLE 1751-2200 PSI SET AT 2200*
Y - PORT RELIEF/ANTI-CAV ADJUSTABLE 2201-3000 PSI SET AT 2500*

*ADJUSTABLE PORT RELIEF CARTRIDGES CANNOT BE USED ON THE "A" PORT END OF WORK SECTION WHEN THE STANDARD LEVER HANDLE IS USED BECAUSE OF INTERFERENCE

FOR WORK PORT RELIEF SETTING OTHER THAN STANDARD

20P1BA1DH-18-20
- "B" PORT RELIEF PRESSURE IN HUNDREDS EXAMPLE: 20=2000 PSI
- "A" PORT RELIEF PRESSURE IN HUNDREDS EXAMPLE: 18=1800 PSI

* LEVERS ARE COATED WITH BLACK RUBBER
** L WORK SECTION REQUIRES SPOOL TYPE C & PORT RELIEFS NOT AVAILABLE
*** MICROSWITCH INCLUDED.

INLET SECTION

2 0 I X X - X X X X

INLET TYPE
I - STANDARD INLET

PORT SIZE
1. #10 SAE (7/8-14 THREAD)
2. #12 SAE (1 1/16-12 THREAD)
3. 3/4 NPTF (2000 PSI MAX)

RELIEF OPTION
Blank - LEAVE BLANK FOR INLET WITHOUT RELIEF OR RELIEF PLUG
A - NO RELIEF PLUG
B - SHIM ADJUSTABLE RELIEF 500-1350 PSI
C - SHIM ADJUSTABLE RELIEF 1351-1750 PSI
D - SHIM ADJUSTABLE RELIEF 1751-2200 PSI
E - SHIM ADJUSTABLE RELIEF 2201-3000 PSI
F - ADJUSTABLE RELIEF 500-1350 PSI
G - ADJUSTABLE RELIEF 1351-1750 PSI
H - ADJUSTABLE RELIEF 1751-2200 PSI
J - ADJUSTABLE RELIEF 2201-3000 PSI
K - ADJUSTABLE RELIEF 3001-3500

RELIEF SETTINGS: THE LAST FOUR DIGITS REPRESENT THE RELIEF SETTING IN PSI

OUTLET SECTION

2 0 E X X

OUTLET TYPE
E - STANDARD OUTLET

PORT SIZE
1. #10 SAE (7/8-14 THREAD)
2. #12 SAE (1 1/16-12 THREAD)
3. 3/4 NPTF (2000 PSI MAX)

EXHAUST OPTIONS
1-STANDARD OPEN CENTER OUTLET WITH CONVERSION PLUG
2-POWER BEYOND OUTLET WITH #10 SAE POWER BEYOND PORT
3-CLOSED CENTER OUTLET °

° Often used with no relief. Review application

VALVE ASSEMBLIES

The Series 20 sectional body directional control valve can be ordered as separate sections as outlined or as a complete factory tested assembly. This will need to be specified with each order. An assembly model number will be assigned at the time of the order. This assembly number can then be used for future orders.

ASSEMBLY MODEL NUMBER 20A - X X X X

XXXX = Sequence of Numbers. This number will be assigned to final valve to be assembled and tested at the factory. Each new order or quote will be assigned a new assembly model number.

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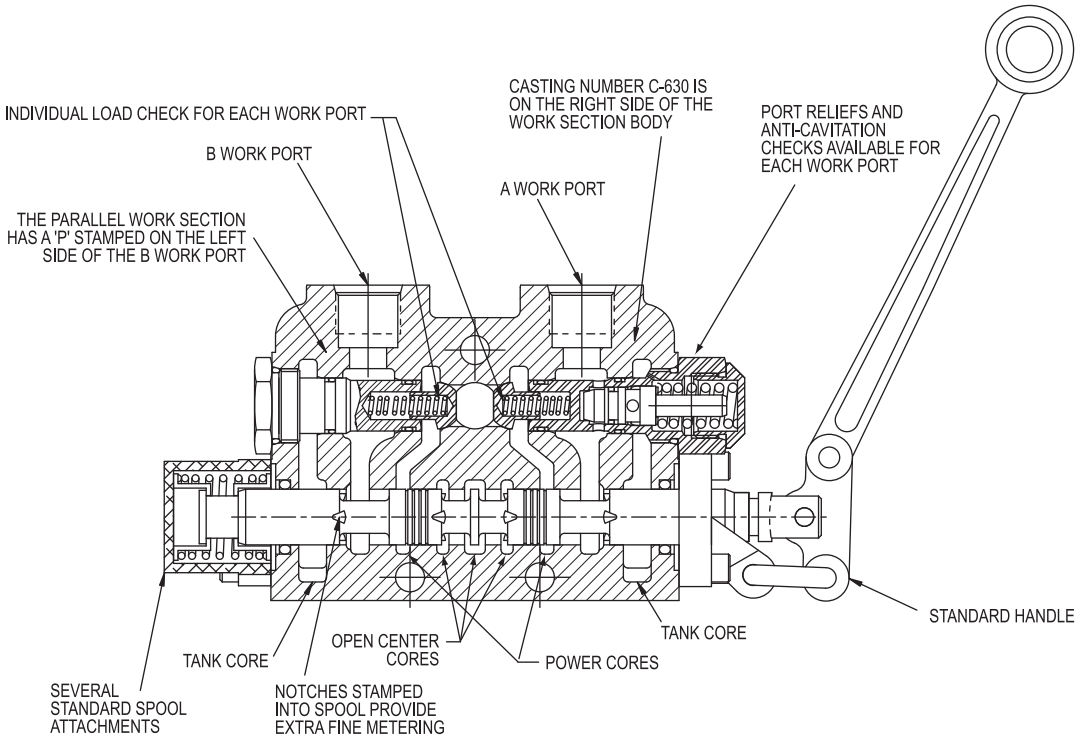
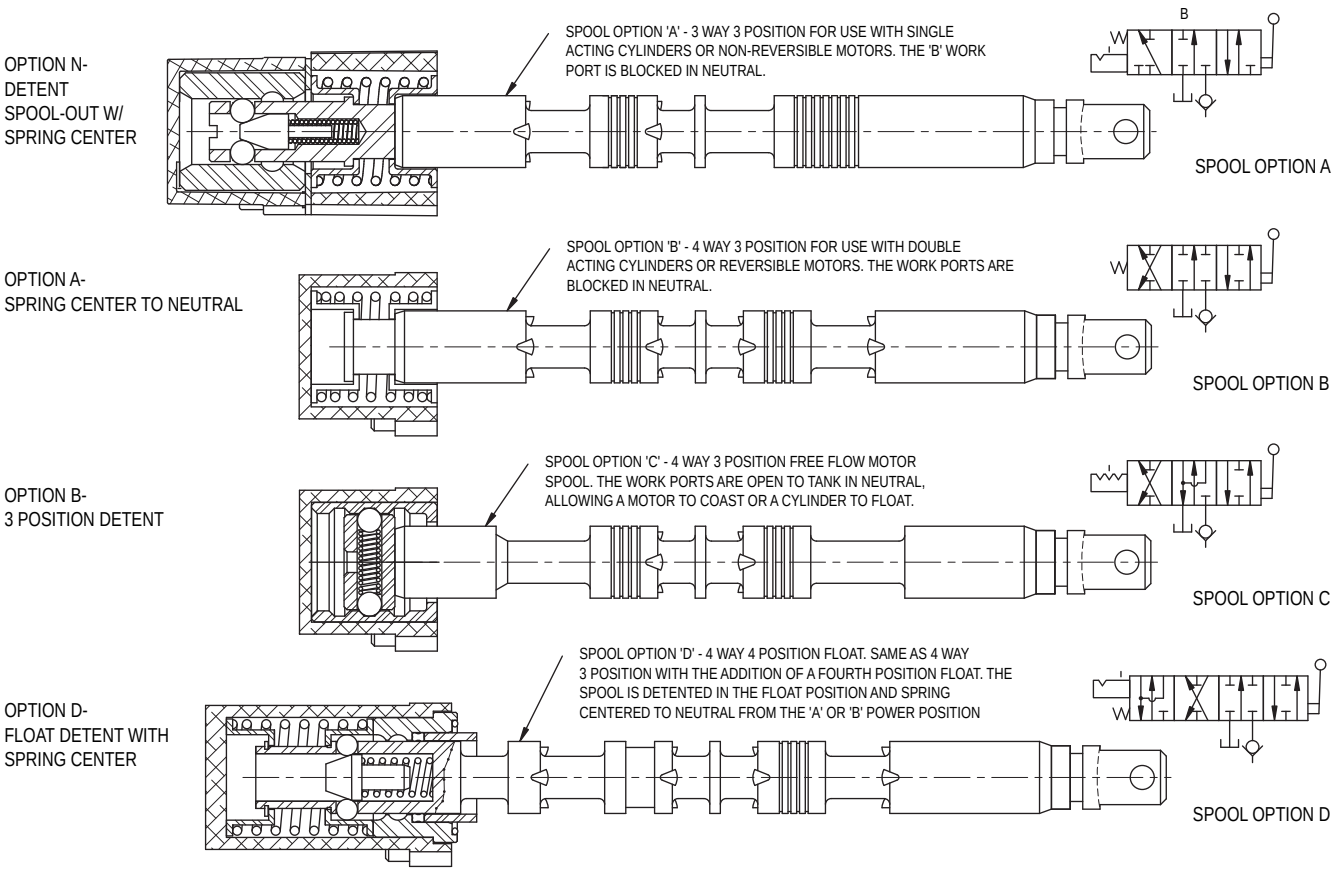
SEE PAGE 11 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

CROSS SECTION OF 20P1BA1DA PARALLEL WORK SECTION



SPOOLS AND SPOOL ATTACHMENTS



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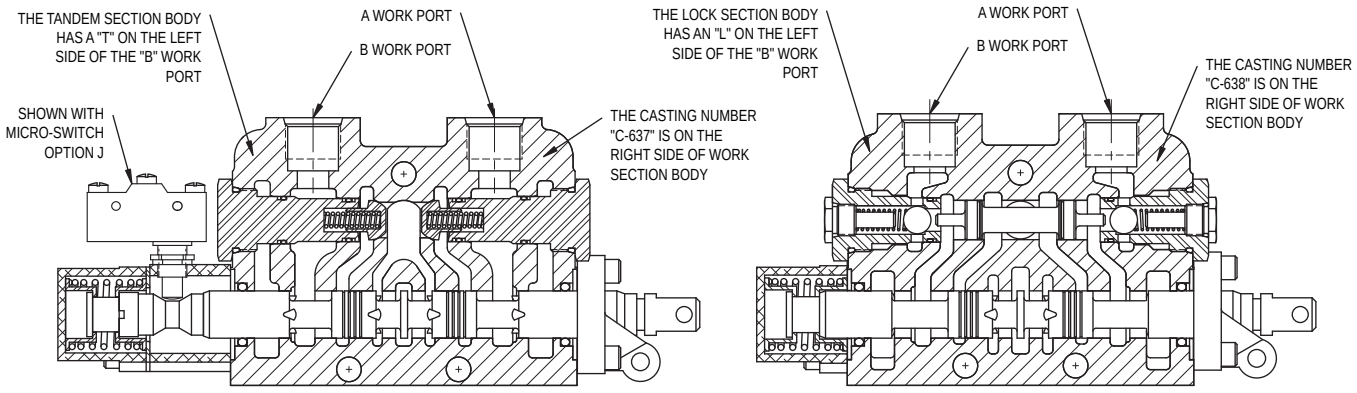
CROSS SECTION OF TANDEM WORK SECTION AND LOCK SECTION



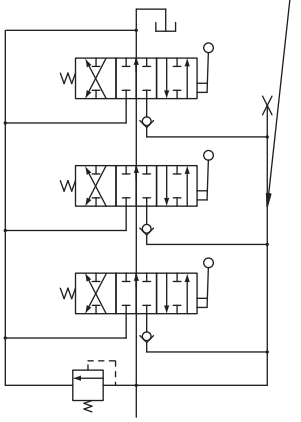
TANDEM SECTION

LOCK SECTION

MODEL 20P PARALLEL CIRCUIT

Parallel circuit construction is the most common. When any one of the spools in a valve bank is shifted it blocks off the open center passage. The oil then flows into the parallel circuit core making oil available to all spools. If more than one spool is fully shifted then oil will go to the section with the lowest pressure requirements. It is possible, however, to meter flow to the spool with the least load and power two unequal loads. The schematic below shows a three section parallel circuit stack valve.

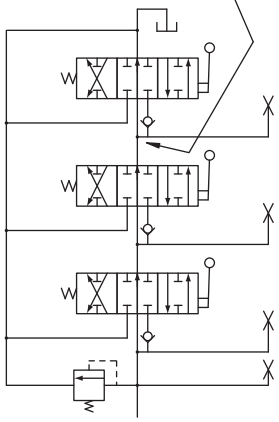
THE POWER CORE OF ALL SECTIONS IN THE VALVE STACK ARE CONNECTED TOGETHER BY THE PARALLEL CORE THAT RUNS THROUGH THE LENGTH OF THE VALVE



MODEL 20T TANDEM CIRCUITS

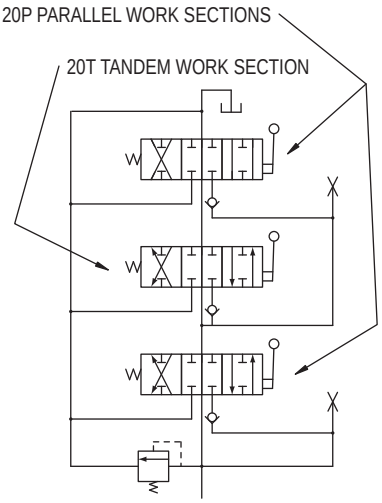
Tandem circuit construction is also referred to as priority circuit. When the spool of a section is shifted, oil is cut off to all downstream sections. Thus the section nearest to the inlet has priority over the other sections in the valve bank. If more than one spool is fully shifted all the oil will go to the section nearest to the inlet. Metering the up stream section will allow two sections to operate at the same time. The schematic below shows a three section tandem circuit stack valve.

THE POWER CORE OF A WORK SECTION IS FED BY THE OIL EXITING THE OPEN CENTER OF THE ADJACENT UPSTREAM WORK SECTION



COMBINED PARALLEL/ TANDEM CIRCUITS

Parallel and tandem circuit work sections can be combined in the same valve bank. Below the 1st and last sections are parallel and the 2nd is tandem. The 1st parallel section has priority over the other two. The 2nd and 3rd sections are in parallel with each other. If the spool of the 1st section is shifted it will cut off oil to the other two. If the spools of the 2nd and 3rd section are both shifted oil will go to the one with the least resistance. It should be noted that it is the section just prior to the tandem section that has priority, not the tandem section. Further if a parallel section is placed just after a tandem, the two sections will be in a parallel.



LOAD CHECK

Each work port of the Series 20 stack valve has a separate load check. The load check prevents the fall of a cylinder as the spool is shifted. It also prevents the back-flow of oil from the work port to the inlet. The pump must build up enough pressure to overcome the pressure on the work port caused by the weight of the load before the cylinder can move.

PLEASE NOTE that the load check has nothing to do with how well the valve will hold up a cylinder with the spool in neutral. The load check is functional only when the spool is shifted.

OPEN CENTER APPLICATIONS

The standard Series 20 stack valve is open center. When the spools are in neutral hydraulic oil is directed from the inlet to the outlet (or power beyond) through the open center core. Moving one or more spools closes off the open center core and directs oil to the work ports. Open center systems most often contain fixed displacement pumps like The Prince SP series gear pumps.

PLEASE NOTE that the maximum pressure in an open center system is controlled by a relief valve. The Series 20 inlet sections are available with a built in inlet relief for this purpose.

CLOSED CENTER APPLICATIONS

The Series 20 stack valve can be converted to closed center by adding the closed center plug to the outlet section. This blocks off the open center core when the spools are in neutral. These systems often use a variable displacement pressure compensated pump that limits the maximum pressure. When spools are in neutral system pressure is maintained at inlet of the valve. A relief is normally not required or must be set at a higher pressure than the pump compensator.

PLEASE NOTE that this closed center option does not provide for the drain off of standby spool leakage. This can allow a very small amount of oil to enter the work ports when in neutral.

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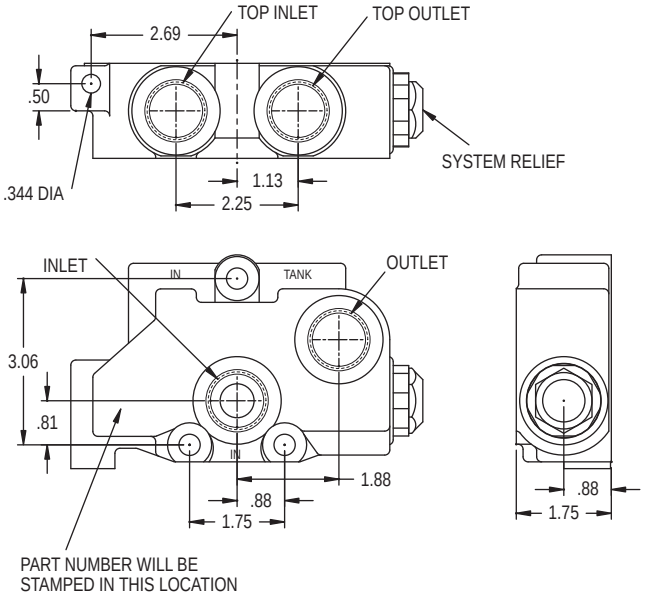
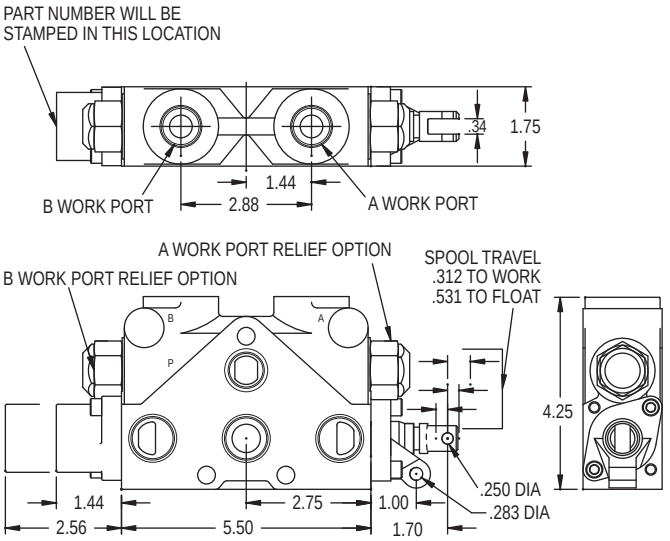
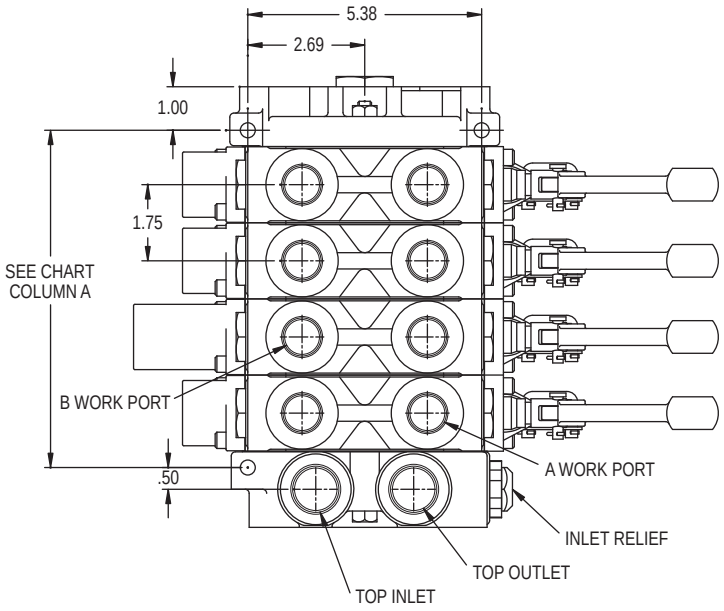
INLET COVER DIMENSIONS



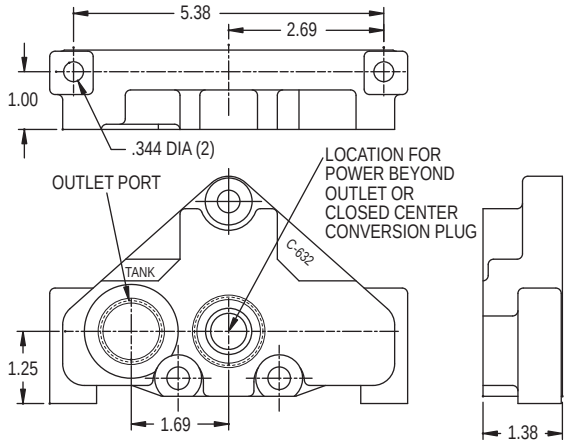
WORK SECTIONS DIMENSIONS



DIMENSIONAL DATA

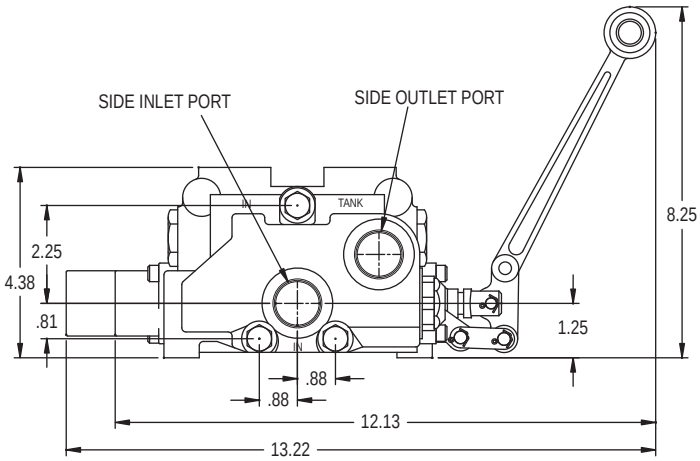


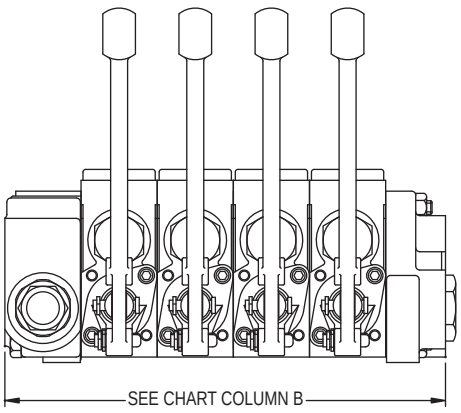
OUTLET COVER DIMENSIONS



NUMBER OF WORK SECTIONS

	1	2	3	4	5	6	7	8	9	10
A	2.50	4.25	6.00	7.75	9.50	11.25	13.00	14.75	16.50	18.25
B	4.88	6.63	8.38	10.13	11.88	13.63	15.38	17.13	18.88	20.63





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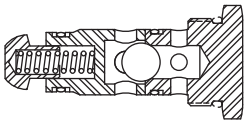
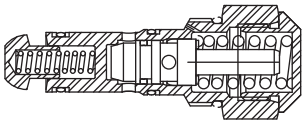
WORK PORT RELIEF CARTRIDGES



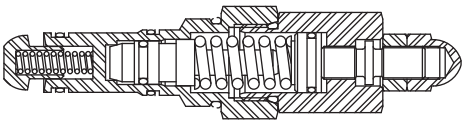
OPTION K ANTI-CAVITATION CHECK
This option allows oil to be drawn from the tank core into the work port if there is a vacuum on the work port. This vacuum would be caused by a overrunning motor or cylinder. The check will be open whenever the pressure in the tank core is higher than that in the work port.

OPTIONS B, C, D, AND E, SHIM ADJUSTABLE PORT RELIEF



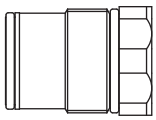
A port relief can be installed to limit the pressure at the work port to less than the system pressure. Also, it can be installed to provide spike pressure protection when the spool is in the neutral position. The pressure of these reliefs can be changed by changing shims.

OPTIONS F, G, H, AND J, ADJUSTABLE PORT RELIEF



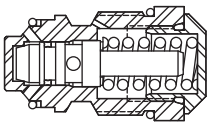
This is the same differential poppet type relief as above but externally adjustable within the specified range.

INLET RELIEF CARTRIDGES



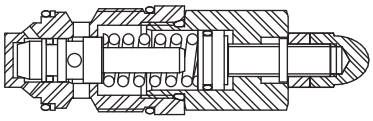
OPTION A NO RELIEF
When no main inlet relief is required the no relief plug is installed. All inlet sections have the relief cavity machined so a inlet relief can be installed in the field.

OPTIONS B, C, D, AND E, SHIM ADJUSTABLE INLET RELIEF



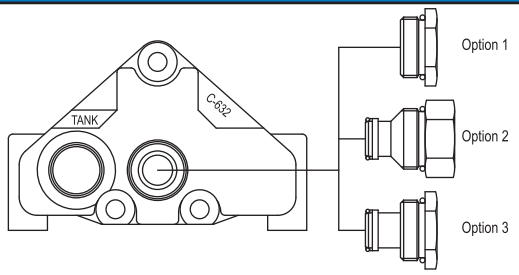
These options provide for an internally shim adjustable main inlet relief. The relief is a hydraulically dampened differential poppet design. This provides for smooth quiet operation in a relief that is moderately tolerant to contamination. The pressure of these reliefs can be changed, within the specified range, by changing shims. This relief is also available with stainless steel relief springs, consult factory.

OPTIONS F, G, H, AND J, ADJUSTABLE RELIEF



This is the same relief as above except it is externally adjustable, within the specified range.

OUTLET SECTION OPTIONS



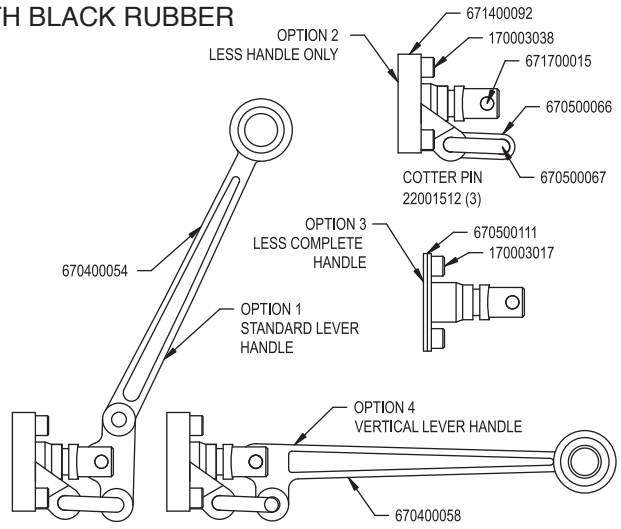
OPTION 1 STANDARD OPEN CENTER WITH CONVERSION PLUG
This is the standard outlet option. This option allows for conversion in the field for power beyond or closed center applications. When the spools are in neutral the inlet is unloaded to tank.

OPTION 3 CLOSED CENTER OUTLET
This option provides for closed center operation. This is typically used with a variable displacement pressure compensated pump or in a system with an unloading valve. When the spools are in neutral the inlet port is blocked.

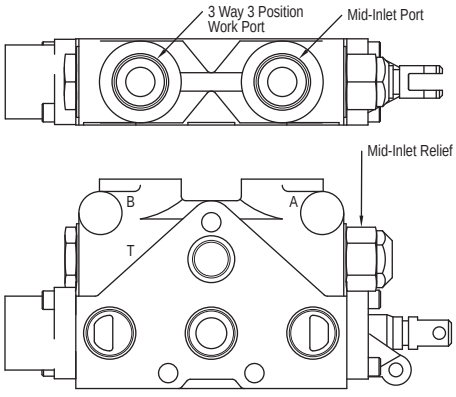
OPTION 2 POWER BEYOND WITH #10 SAE BEYOND PORT
This option provides for a high pressure power beyond port. This would be used if a valve is to be added downstream. The outlet must be connected to tank. When the spools are in neutral the inlet is connected to power beyond port.

HANDLE OPTIONS

NOTE: HANDLES ARE COATED WITH BLACK RUBBER



SERIES 20 COMBINATION 3 WAY AND COMBINED FLOW MID-INLET SECTION



*See Series 20 Tandem Center work section for dimensional data.

20TM 3 A A 1 E A - X X X X

- PORT SIZE*
- SPOOL ACTION*
- HANDLE OPTIONS *
- WORK PORT RELIEF *
- DIGITS SPECIFY A NON-STANDARD RELIEF PRESSURE IN PSI. LEAVE BLANK FOR STANDARD SETTING.

MID-INLET RELIEF		
RELIEF TYPE	STANDARD SETTING	OPTION NO.
NO RELIEF		A
SHIM ADJUSTABLE	1350 PSI @ 10 GPM	B
	1750 PSI @ 10 GPM	C
	2200 PSI @ 10 GPM	D
	2500 PSI @ 10 GPM	E
ADJUSTABLE (not available with handle option 1)	1350 PSI @ 10 GPM	F
	1750 PSI @ 10 GPM	G
	2200 PSI @ 10 GPM	H
	2500 PSI @ 10 GPM	J

*See Series 20 Tandem Center work section order code for additional options.

Description: This section acts as a combination mid-inlet and 3 way 3 position section. The mid-inlet provides an inlet port for a second pump mid stream in the stack valve. The A port is the mid-inlet port and provides combined flow for this section and any downstream sections. The B port and the rest of the section function the same as a 3 way 3 position section. When shifted any upstream sections take priority of the main inlet flow over downstream sections. Both an inlet relief and a mid-inlet relief are required to provide relief protection when both upstream and downstream sections are shifted.

VALVES

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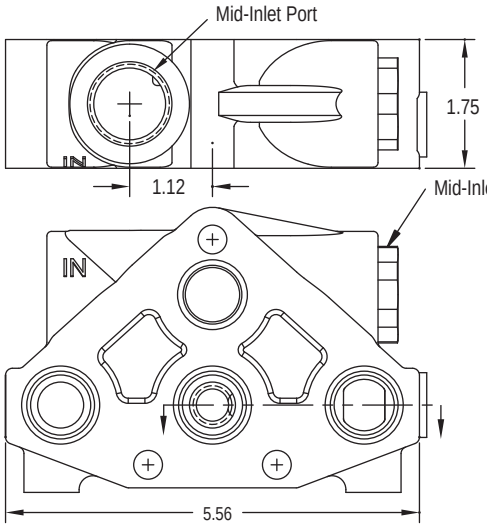
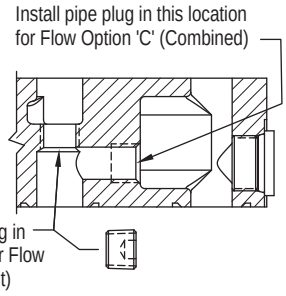
SERIES 20 MID-INLET SECTION



Section can be converted from C to S, or S to C, prior to installing section in the stack valve assy.



20IM X X X X -XXXX

FLOW OPTION
C - COMBINED FLOW
S - SPLIT FLOW

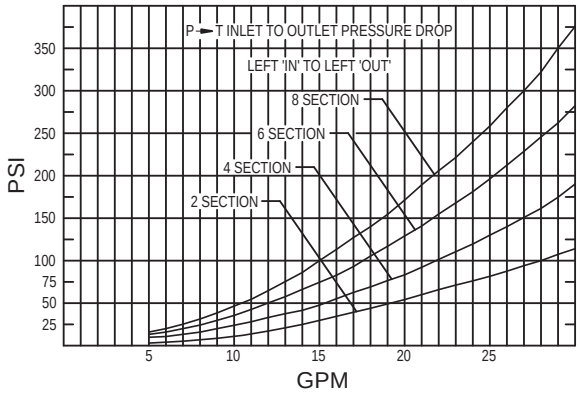
PORT SIZE
10 - #10 SAE (7/8-14 THREAD)
20 - #12 SAE (1 1/16-12 THREAD)
30 - 1/2-NPTF
40 - 3/4-NPTF

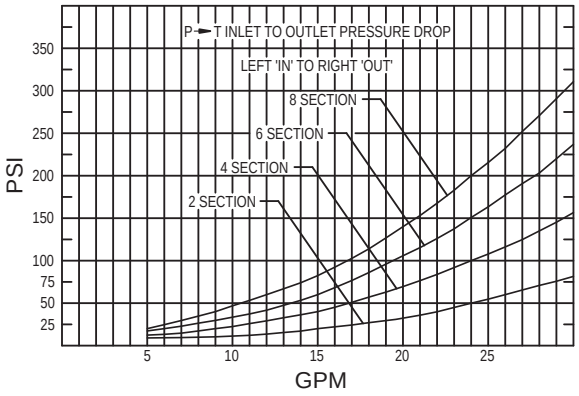
LAST FOUR DIGITS SPECIFY A NON-STANDARD RELIEF PRESSURE IN PSI. LEAVE BLANK FOR STANDARD SETTING.

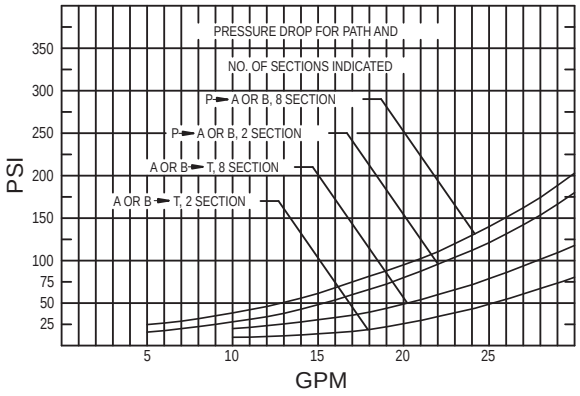
MID-INLET RELIEF OPTIONS:

OPTION NO.	RELIEF TYPE	STD. SETTING @ 10 GPM
"BLANK"	BODY LESS RELIEF CARTRIDGE/PLUG	--
A	NO-RELIEF PLUG	--
B	SHIM ADJUSTABLE 500-1350 PSI	1350 PSI
C	SHIM ADJUSTABLE 1350-1750 PSI	1750 PSI
D	SHIM ADJUSTABLE 1750-2200 PSI	2200 PSI
E	SHIM ADJUSTABLE 2200-3000 PSI	2500 PSI
F	ADJUSTABLE 500-1350 PSI	1350 PSI
G	ADJUSTABLE 1350-1750 PSI	1750 PSI
H	ADJUSTABLE 1750-2200 PSI	2200 PSI
J	ADJUSTABLE 2200-3000 PSI	2500 PSI
K	ADJUSTABLE 3000-3500 PSI	3250 PSI

TEST DATA



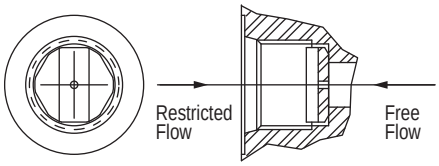




Oil 140 SUS at 110 degrees F. The pressure drop curves are representative, but the actual pressure drop will vary some from valve to valve. More detailed test data is available upon request.

ONE WAY WORK PORT RESTRICTOR FOR 20 SERIES SECTIONS

This restrictor will restrict oil in one direction and allow free flow in the opposite direction. This restrictor consists of an orifice plate that simply drops into the #8 SAE or #10 SAE work port of a 20P, 20T, or 20L work section.



ORDERING INFORMATION

HEX BRASS RESTRICTOR #8 **670805XXX**

HEX BRASS RESTRICTOR #10 **670811000**

The last three digits of part number are the orifice size in thousandths of an inch.

EXAMPLE: 670805062 .62 ORIFICE
670805125 .125 ORIFICE
670805000 NO ORIFICE

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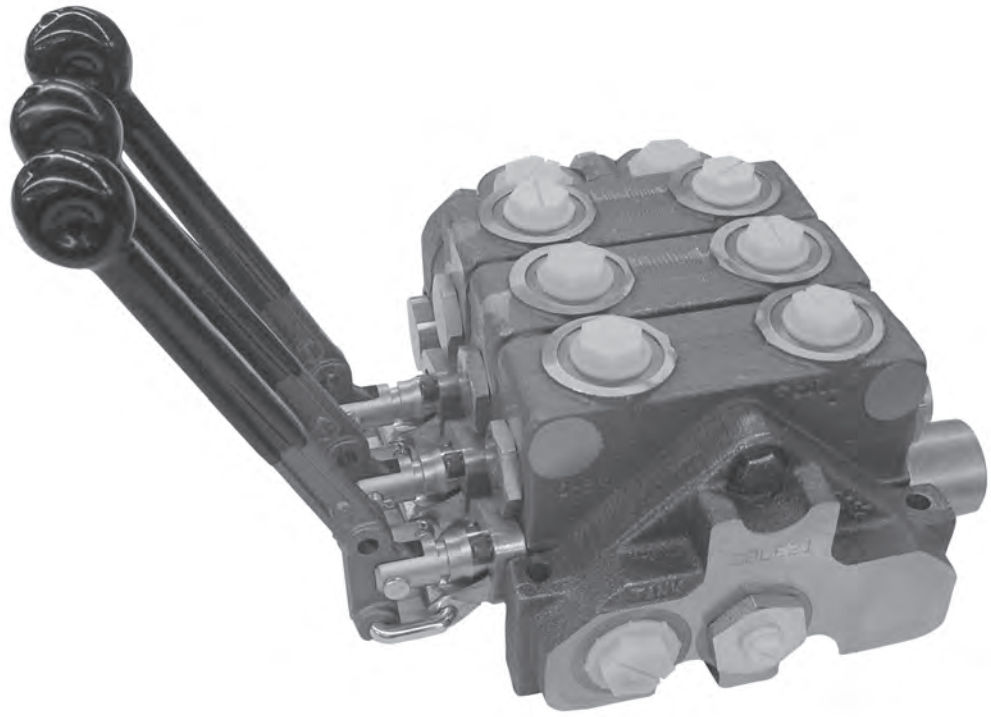
LOAD SENSE SECTIONS



Series "20"

STANDARD FEATURES

- **Extended Length Notches for Very Fine Metering**
- **Machined Internal Lands for Precise Control and reduced Dead Band**
- **Low Standby Pressures**
- **Spool Design for reduced Flow Forces**
- **Low Spool Actuating Forces**
- **Use of Standard Series 20 Inlet Sections (20I) and Tie Rod Kits**
- **Same Mounting Pattern and Envelope as Standard Series 20 Valve**

SPECIFICATIONS

Pressure Rating
Maximum Operating Pressure 3500 psi
Maximum Tank Pressure..... 500 psi
Nominal Flow Rating .....20 GPM
Please Refer to Pressure Drop and Flow Charts for Your Application

Foot Mounting
Maximum Operating Temp......180°F

20LP Section Weight .....Approx 10.1 lbs.
20LE Section Weight .....Approx 4.3 lbs.

SPECIAL SECTIONS AVAILABLE:

Valves other than standard models listed can be made to order. Use order code Matrix below to generate a model number that meets your requirements. If you prefer, contact your Sales Representative with your specific requirements and a model number will be assigned for you. This model number can then be used for future orders. A minimum order quantity will apply to special valves. Please consult Sales Representative.

WORK SECTION

2 0 XX X X X X X X

WORK SECTION TYPE
LP-STANDARD LOAD SENSE SECTION

PORT SIZE
1. #10 SAE (7/8-14 THREAD)
2. #8 SAE (3/4-16 THREAD)
3. #12 SAE (1 1/16-12 THREAD)
4. 1/2 NPTF (2000 PSI MAX)
5. 3/8 NPTF (2000 PSI MAX)

SPOOL TYPE
H - 3 WAY 3 POSITION
J - 4 WAY 3 POSITION
K - 4 WAY 3 POSITION FREE FLOW MOTOR
M - 4 WAY 4 POSITION FLOAT (USE W/D SPOOL ACTION)

SPOOL ACTIONS
A - SPRING CENTER TO NEUTRAL
B - 3 POSITION DETENT
C - FRICTION DETENT
D - FLOAT DETENT
E - SPRING CENTER PNEUMATIC ACTUATOR
F - 2 POSITION DETENT NEUTRAL & OUT (NO IN POSITION)
J - SPRING CENTER W/MICROSWITCH (SWITCHES ON IN OR OUT)***
K - SPRING CENTER W/MICROSWITCH (SWTCHES ON SPOOL IN ONLY)***
M - SPRING CENTER DETENT IN
N - SPRING CENTER DETENT OUT
P - 2 POSITION DETENT NEUTRAL & IN (NO OUT POSITION)

HANDLE OPTIONS
1 - STANDARD LEVER HANDLE*
2 - LESS HANDLE ONLY
3 - LESS COMPLETE HANDLE
4 - VERTICAL LEVER HANDLE*
7 - BLANK FOR OPTIONAL JOYSTICK HANDLE

PORT RELIEF "B"
PORT RELIEF "A"
A - NO RELIEF
B - SHIM ADJUSTABLE RELIEF 500-1350 PSI SET AT 1350
C - SHIM ADJUSTABLE RELIEF 1351-1750 PSI SET AT 1750
D - SHIM ADJUSTABLE RELIEF 1751-2200 PSI SET AT 2200
E - SHIM ADJUSTABLE RELIEF 2201-3000 PSI SET AT 2500
F - ADJUSTABLE RELIEF 500-1350 PSI SET AT 1350*
G - ADJUSTABLE RELIEF 1351-1750 PSI SET AT 1750*
H - ADJUSTABLE RELIEF 1751-2200 PSI SET AT 2200*
J - ADJUSTABLE RELIEF 2201-3000 PSI SET AT 2500*
K - ANTI-CAVITATION CHECK
L - PORT RELIEF/ANTI-CAV SHIM ADJ 500-1350 PSI SET AT 1350
M - PORT RELIEF/ANTI-CAV SHIM ADJ 1351-1750 PSI SET AT 1750
N - PORT RELIEF/ANTI-CAV SHIM ADJ 1751-2200 PSI SET AT 2200
R - PORT RELIEF/ANTI-CAV SHIM ADJ 2201-3000 PSI SET AT 2500
S - PORT RELIEF/ANTI-CAV ADJUSTABLE 500-1350 PSI SET AT 1350*
T - PORT RELIEF/ANTI-CAV ADJUSTABLE 1351-1750 PSI SET AT 1750*
W - PORT RELIEF/ANTI-CAV ADJUSTABLE 1751-2200 PSI SET AT 2200*
Y - PORT RELIEF/ANTI-CAV ADJUSTABLE 2201-3000 PSI SET AT 2500*

*ADJUSTABLE PORT RELIEF CARTRIDGES CANNOT BE USED ON THE "A" PORT END OF WORK SECTION WHEN THE STANDARD LEVER HANDLE IS USED BECAUSE OF INTERFERENCE

FOR WORK PORT RELIEF SETTING OTHER THAN STANDARD

20P1BA1DH-18-20
- "B" PORT RELIEF PRESSURE IN HUNDREDS EXAMPLE: 20=2000 PSI
- "A" PORT RELIEF PRESSURE IN HUNDREDS EXAMPLE: 18=1800 PSI

* LEVERS ARE COATED WITH BLACK RUBBER
***MICROSWITCH INCLUDED.

SEE PAGE 11 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

LOAD SENSE OUTLET SECTION

2 0 LE X X

OUTLET TYPE
LE - STANDARD LOAD SENSE OUTLET

PORT SIZE
1. #10 SAE (7/8-14 THREAD)
2. #12 SAE (1 1/16-12 THREAD)
3. 3/4 NPTF (2000 PSI MAX)

LOAD SENSE PORT OPTIONS
1. #4 SAE WITH DRAIN ORIFICE
2. #4 SAE WITHOUT DRAIN ORIFICE

The Prince LE outlet includes a load sense port in a cartridge that is installed in the section. There are two versions of the cartridge, one with a load sense line drain orifice and one without a drain orifice. There is normally a drain orifice in either the valve or the pump controls. Cartridges can be changed in the field to change the configuration. Power beyond is not available in a load sense system.

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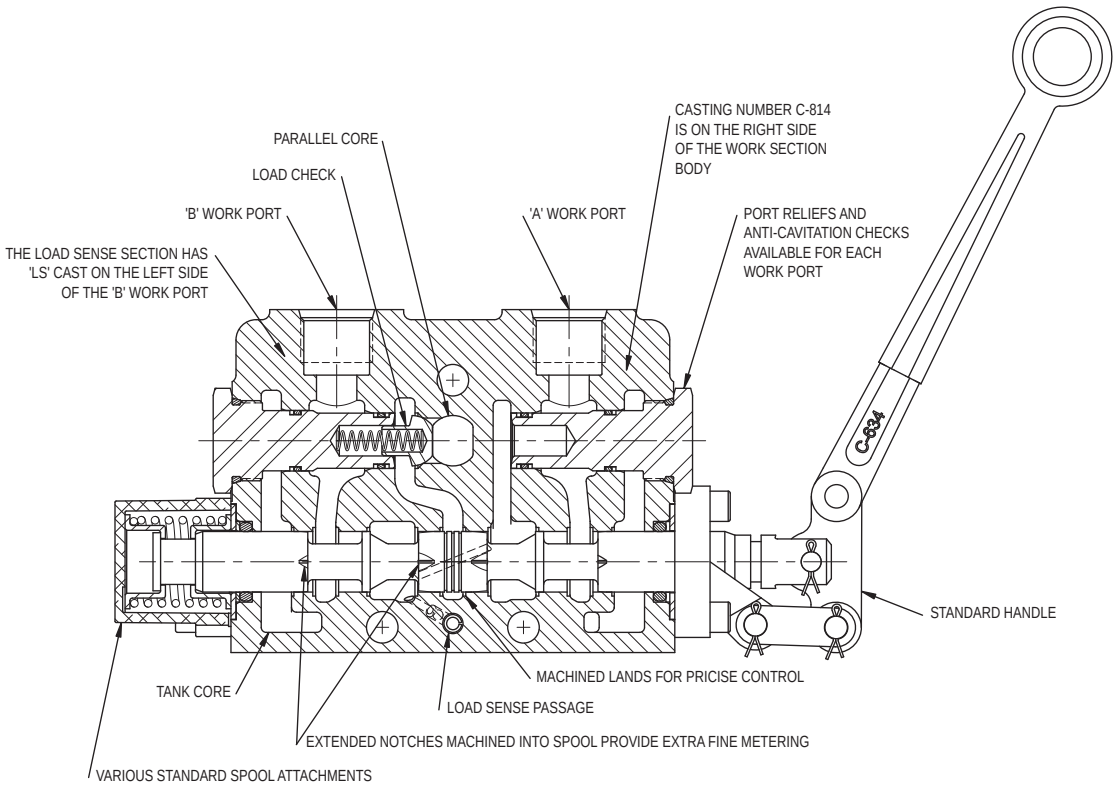
CATV 12-09-04-01

SEE PAGE 13 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

CROSS SECTION OF 20LP1JA1AA LOAD SENSE WORK SECTION

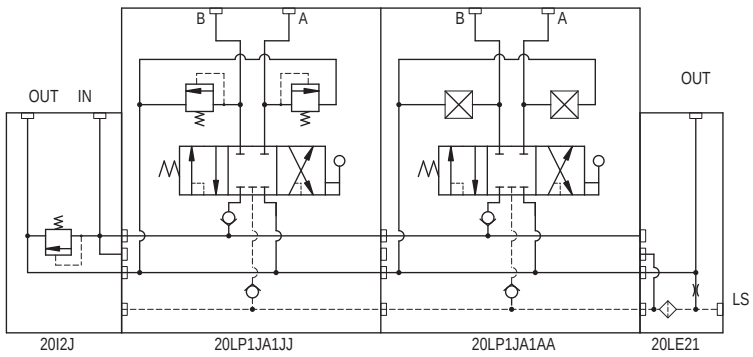


LOAD SENSE CIRCUITS

MODEL 20LP LOAD SENSE CIRCUIT

The Series 20LP work sections are specifically designed to be used with a pressure-flow compensated pump, commonly known as a load sense pump. The valve is a parallel circuit, closed center design, where flow does not flow through the valve when the spools are centered. A load sense signal line must be connected to the load sense port on the pump and to the load sense port on the 20LE outlet section of the valve. The pressure-flow compensator portion of a load sense pump will maintain (within its flow and pressure limitations) an output pressure equal to the pressure at the load sense port plus the load sense differential pressure. The differential pressure is typically between 150 and 350 psi. The valve is designed so that when a spool is shifted, the pressure at the out flow work port is presented to the valve's load sense port. The valve incorporates logic and load sense check valves so that when multiple spools are shifted, the highest pressure of any of the work ports is directed to the load sense port. A load sense line bleed orifice needs to be present in either the Prince load sense outlet or the load sense pump controls. The bleed orifice will prevent high pressure from being trapped in the load sense line and sending false signals to the pump.

There are a number of benefits to load sense systems, one of the primary ones being in the metering of the flow to the work ports. Metering is typically accomplished when the flow passes through metering notches in the spool. In a load sense valve, the pressure that drives the flow through the notches is typically limited to the relatively low and nearly constant differential pressure. This relatively low differential pressure makes the notches more effective and gives more resolution in regard to spool travel versus flow out of the work port. Also this "resolution" remains relatively the same regardless of the pressure required at the work port. The metering notches in the Prince load sense valve have been optimized to give excellent metering characteristics over an extended portion of the spool travel and over the full flow rating of the valve. The internal lands of the casting have also been machined to give repeatable, precise control to the metering characteristics. Another benefit to load sense valves is that, in the minimum flow standby mode, the pump only has to generate the rather low differential pressure thus saving energy as compared to typical open center or standard closed center systems. In summary, the Prince load sense valve provides more precise control, conserves energy and reduces heat generation.



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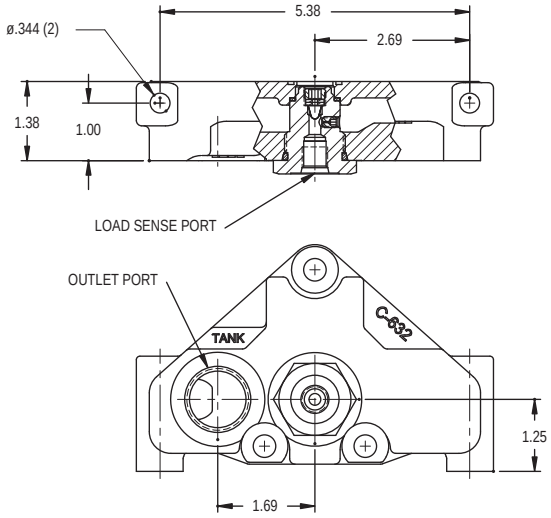
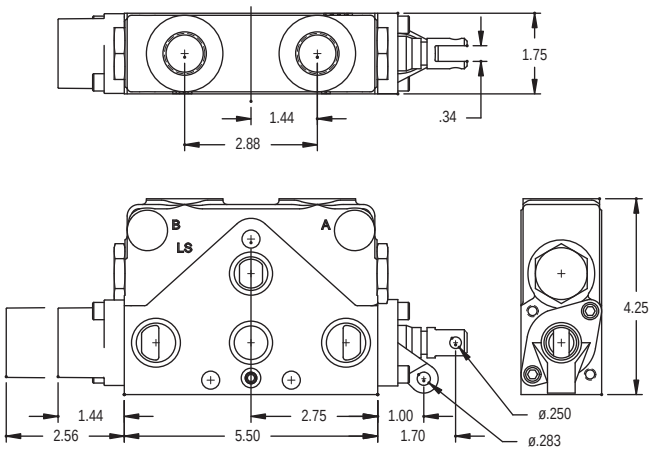
LOAD SENSE OUTLET DIMENTIONS

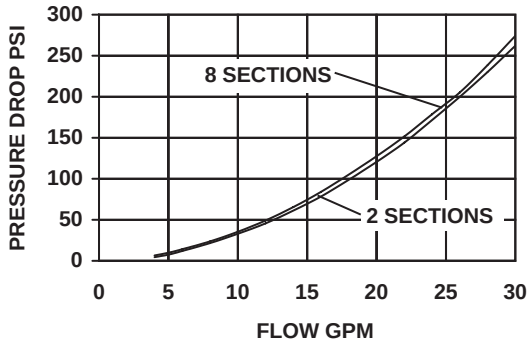


LOAD SENSE WORK SECTION DIMENSIONS

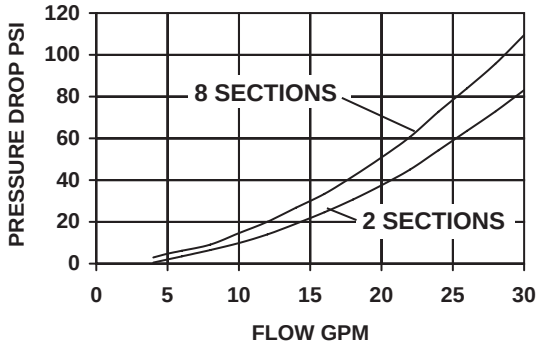


TEST DATA

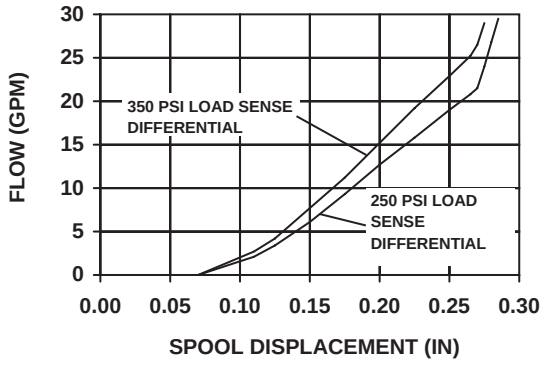
PRESSURE DROP - INLET TO WORK PORT



PRESSURE DROP - WORK PORT TO TANK



WORK PORT FLOW VS. SPOOL POSITION



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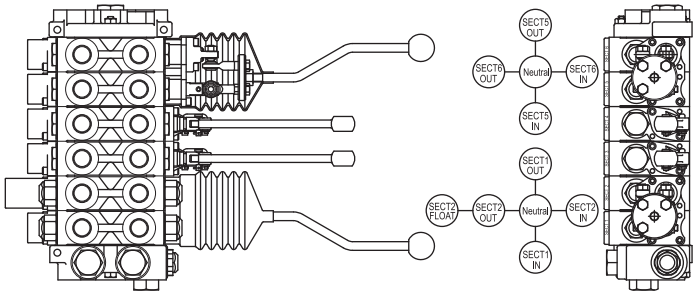
JOYSTICK HANDLES FOR SERIES “20”



This is a special handle for the SERIES 20 stack valve that allows the spools of two adjacent sections to be operated by one common handle. The spools can be operated independently or simultaneously depending on handle movement. The option is typically used on spring center to neutral sections. Normally, the handle is installed at the factory on sections ordered with handle option 7. However, the handle can also be installed in the field on valves originally equipped with standard handles (handle options 1 through 4). This drawing shows two joysticks with offset handles installed on a six section valve.

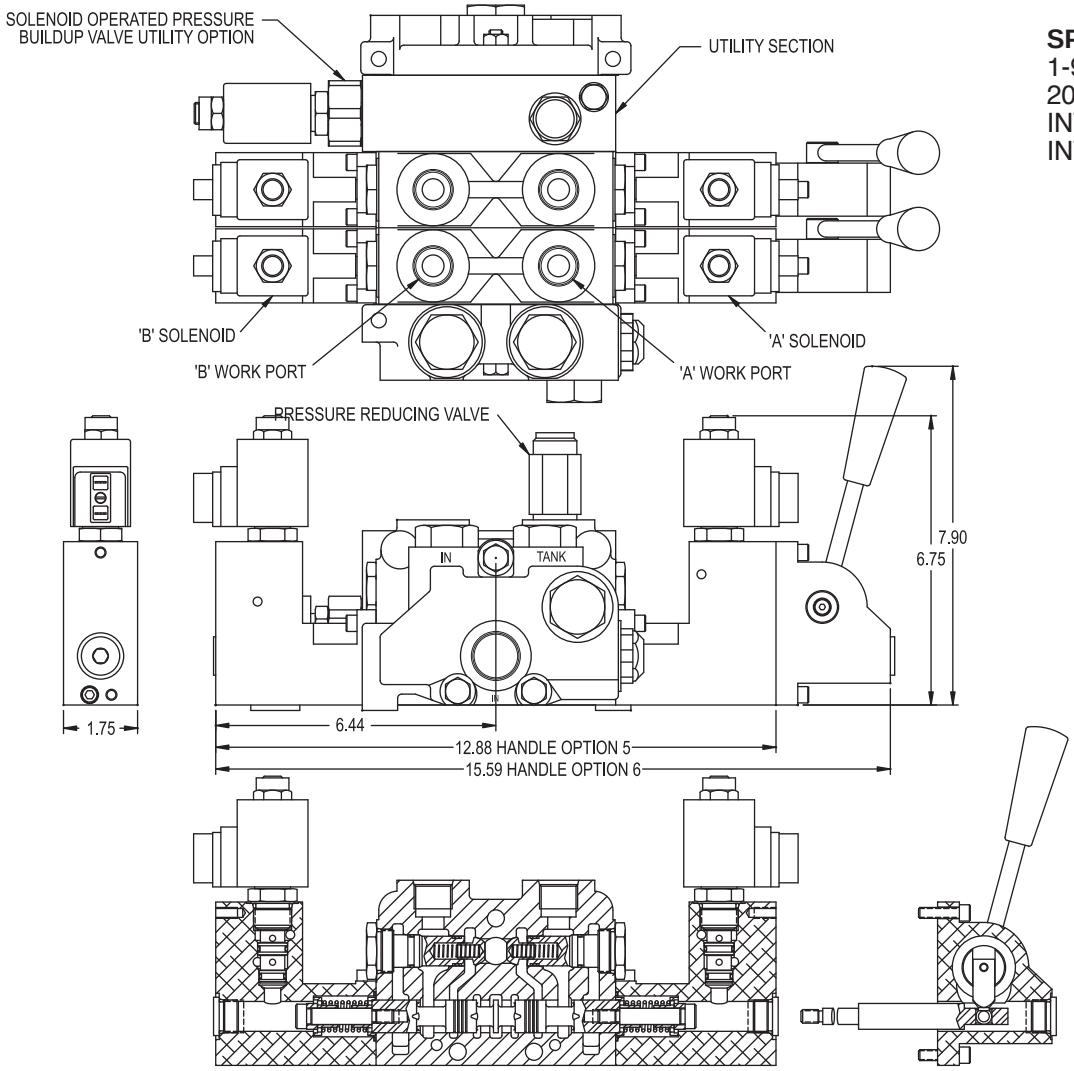
A typical handle to spool movement pattern is shown. Different patterns are also available. The Joystick handle can be used with standard three position spools or with four position float spools. If work port reliefs are required on the joystick end of a section, the relief cartridges must be the shim adjustable type. When two joysticks are installed on the same valve assembly, it is recommended that there be two standard section between them to prevent handle interference.

When ordering a valve assembly, please refer to the following part numbers and indicate which sections the handle is to be installed on. The part numbers refer to the complete joystick assembly required to control two valve sections. Use the same part numbers to order kits for field installation.

JOYSTICK ASSEMBLY W/ STRAIGHT HANDLE:
ASSEMBLED ON VALVE 20JS
KIT 660190016

JOYSTICK ASSEMBLY W/ OFFSET HANDLE:
ASSEMBLED ON VALVE 20JO
KIT 660190017

SERIES “20” SPLIT SOLENOID OPERATORS (SOLENOID OPERATORS ON BOTH ENDS)



SPECIFICATIONS:
1-9 SECTIONS
20 GPM
INTERNAL PILOT
INTERNAL DRAIN

VALVES

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SERIES “20” SOLENOID OPERATED WORK SECTION

The Solenoid Operated Series 20 Work Section allows remote electrical on-off or manual control. The Solenoid Operated Section contains two, 3 way-2 position solenoid cartridge valves and a pilot operated piston attached to the main control spool. When both solenoids are de-energized both sides of the pilot piston are open to tank pressure and the spool remains spring centered. When solenoid “A” is energized, pilot pressure is applied to one side of the pilot piston causing the spool to shift from the neutral position to work port “A”. When solenoid “B” is energized, pilot pressure is applied to the other side of the pilot piston causing the spool to shift to work port “B”. Internal pilot lines provide pilot pressure to the solenoid actuator. Pilot pressure to initiate spool shift is generated by a “Pressure Build-Up Valve” that is installed in the Utility Section, which must be installed between the last section and the outlet cover, (see Order Code). Two versions of the Pressure Build-up Valve are offered. Options 1 & 2 supply approximately 300 PSI pilot pressure to the solenoid actuator. Load induced pressure is required to complete the spool shift and hold the spool in the shifted position. For over center or light load applications a restrictor installed in the work port or line may be required. Any manual sections must be upstream of any solenoid sections in the stack valve assembly. Consult your sales representative for your application.

SOLENOID OPERATED WORK SECTION

20PXXXXXX-SXXX

WORK SECTION TYPE
P - Standard Parallel

PORT SIZE
1. #10 SAE (7/8-14 THREAD)
2. #8 SAE (3/4-16 THREAD)
3. #12 SAE (1 1/16-12 THREAD)
4. 1/2 NPTF (2000 PSI MAX)

SPOOL TYPE
A - 3 - Way 3-Position
B - 4 - Way 3-Position
C - 4 - Way 3-Position Free Flow Motor

SPOOL ACTION
A - Spring Center

HANDLE OPTION
5. Solenoid Operated Only (No Lever)
6. Solenoid Operated With Manual Lever

COIL VOLTAGE & TERMINATION *
S12Q, 12 VDC Double Spade
S12L, 12 VDC Double Wire
S12H, 12 VDC DIN 43650
S12W, 12VDC Weather Pack®
S24Q, 24 VDC Double Spade
S24L, 24 VDC Double Wire
S24H, 24 VDC DIN 43650
S11C, 120 VAC Conduit
S11H, 120 VAC DIN 43650

PORT RELIEF “B” OPTION
A - Relief Cavity Plugged
B - Shim Adjustable Relief 500-1350 PSI Set at 1350
C - Shim Adjustable Relief 1351-1750 PSI Set at 1750
D - Shim Adjustable Relief 1751-2200 PSI Set at 2200
E - Shim Adjustable Relief 2201-3000 PSI Set at 2500

PORT RELIEF “A” OPTION
A - Relief Cavity Plugged
B - Shim Adjustable Relief 500-1350 PSI Set at 1350
C - Shim Adjustable Relief 1351-1750 PSI Set at 1750
D - Shim Adjustable Relief 1751-2200 PSI Set at 2200
E - Shim Adjustable Relief 2201-3000 PSI Set at 2500

*See page V34 for coil details.

UTILITY SECTION

20UX - XXX

UTILITY TYPE
U - Standard Utility

UTILITY OPTION
1. Solenoid On-Off Press. Build-Up Valve
2. Mechanical Continuous On Press. Build-up Valve
3. Closed Center Utility Section
4. Power Beyond Utility with #10 SAE Power Beyond Port *
5. External Pilot Supply Utility

* **Note:** With Series 20 solenoid operator assemblies, the power beyond line is connected to the utility section and **not** to a power beyond port in the outlet section.

COIL VOLTAGE & TERMINATION*
Omit For Options 2 thru 5
12Q, 12 VDC Double Spade
12L, 12 VDC Double Wire
12H, 12 VDC DIN 43650
12W, 12VDC Weather Pack ®
24Q, 24 VDC Double Spade
24L, 24 VDC Double Wire
24H, VDC DIN 43650
11C, 120 VAC Conduit
11H, 120 VAC DIN 43650

PRESET INLET RELIEF CARTRIDGE

20IR - OX - XXXX

Setting in PSI - Leave Blank for Standard

CARTRIDGE CODE / STYLE	STD SETTING
B - SHIM ADJ 500-1350 PSI	1350 PSI @ 10 GPM
C - SHIM ADJ 1351-1750 PSI	1750 PSI @ 10 GPM
D - SHIM ADJ 1751-2200 PSI	2200 PSI @ 10 GPM
E - SHIM ADJ 2201-3000 PSI	2500 PSI @ 10 GPM
F - SCREW ADJ 500-1350 PSI	1350 PSI @ 10 GPM
G - SCREW ADJ 1351-1750 PSI	1750 PSI @ 10 GPM
H - SCREW ADJ 1751-2200 PSI	2200 PSI @ 10 GPM
J - SCREW ADJ 2201-3000 PSI	2500 PSI @ 10 GPM
K - SCREW ADJ 3001-3500 PSI	3250 PSI @ 10 GPM

PRESET WORK PORT RELIEF CARTRIDGE

20PR - OX - XXXX

Setting in PSI - Leave Blank for Standard

CARTRIDGE CODE / STYLE	STD SETTING
B - SHIM ADJ 500-1350 PSI	1350 PSI @ 3 GPM
C - SHIM ADJ 1351-1750 PSI	1750 PSI @ 3 GPM
D - SHIM ADJ 1751-2200 PSI	2200 PSI @ 3 GPM
E - SHIM ADJ 2201-3000 PSI	2500 PSI @ 3 GPM
F - SCREW ADJ 500-1350 PSI	1350 PSI @ 3 GPM
G - SCREW ADJ 1351-1750 PSI	1750 PSI @ 3 GPM
H - SCREW ADJ 1751-2200 PSI	2200 PSI @ 3 GPM
J - SCREW ADJ 2201-3000 PSI	2500 PSI @ 3 GPM
L - ANTI-CAV/SHIM RELIEF 500-1350 PSI	1350 PSI @ 3 GPM
M - ANTI-CAV/SHIM RELIEF 1351-1750 PSI	1750 PSI @ 3 GPM
N - ANTI-CAV/SHIM RELIEF 1751-2200 PSI	2200 PSI @ 3 GPM
R - ANTI-CAV/SHIM RELIEF 2201-3000 PSI	2500 PSI @ 3 GPM
S - ANTI-CAV/SCREW RELIEF 500-1350 PSI	1350 PSI @ 3 GPM
T - ANTI-CAV/SCREW RELIEF 1351-1750 PSI	1750 PSI @ 3 GPM
W - ANTI-CAV/SCREW RELIEF 1751-2200 PSI	2000 PSI @ 3 GPM
Y - ANTI-CAV/SCREW RELIEF 2201-3000 PSI	2500 PSI @ 3 GPM

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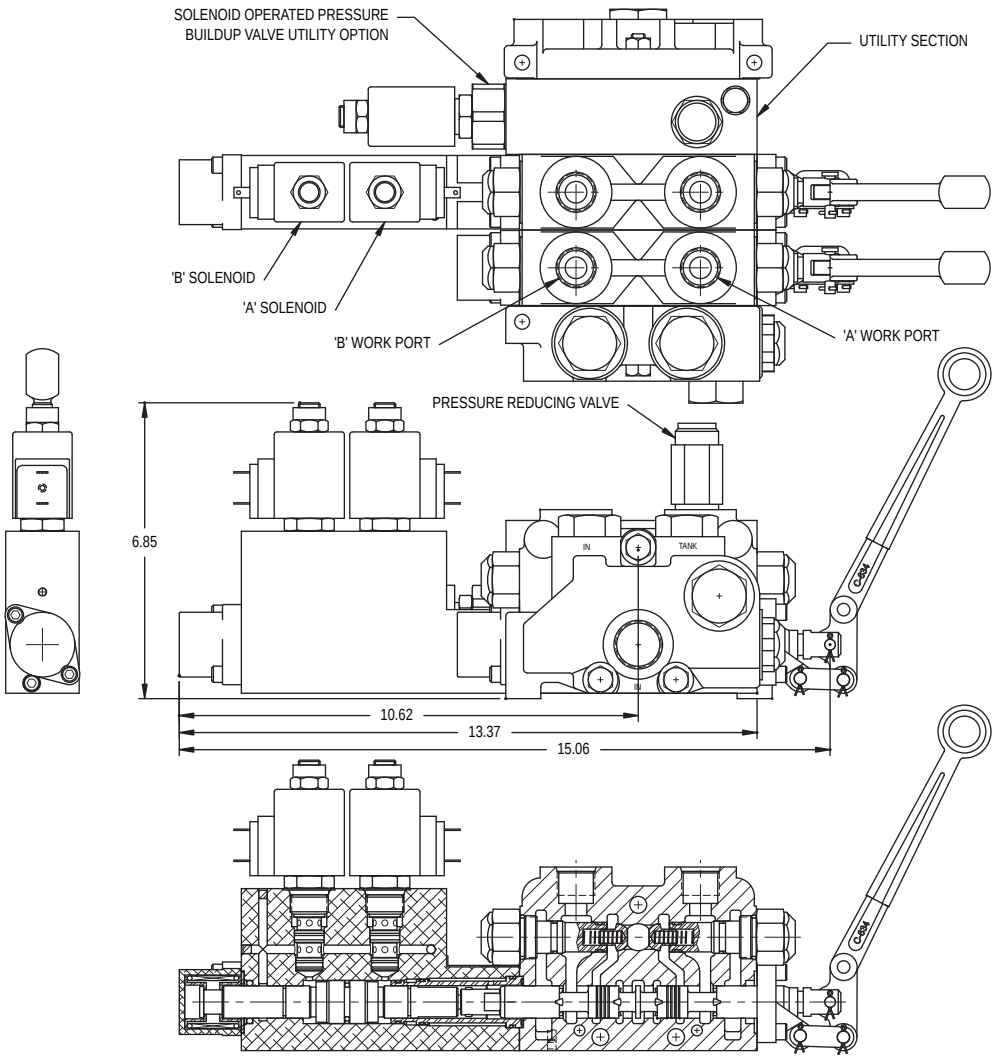
SEE PAGE 13 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

SERIES “20” DUAL SOLENOID OPERATORS (BOTH SOLENOID OPERATORS ON ONE END)

The Series “20” Dual Solenoid Operators offer a work section with solenoid operators and the same handle configurations as the standard manual sections. The work sections operate on the same principal as the Series “20” Split Solenoid Operators. When a solenoid is energized, pilot pressure is applied to a piston which causes the spool to shift. The work sections have internal pilot passage ways and internal pilot drains. The work sections must be used in conjunction with a utility section, as shown in the 20U catalog section, and this section must be installed between the last section and the outlet. The Dual Solenoid work section can be used with split solenoid sections or with manual sections, but the manual sections must be upstream of the solenoid sections. A minimum of approximately 300 psi load induced pressure is required to complete the spool shift and hold the spool in the shifted position. For over running or light load applications, a restrictor installed in the work port or line may be required.



SOLENOID OPERATED WORK SECTION

20PXXXXXXX-SXXX

WORK SECTION TYPE
P - Standard Parallel

PORT SIZE
1. #10 SAE (7/8-14 THREAD)
2. #8 SAE (3/4-16 THREAD)
3. #12 SAE (1 1/16-12 THREAD)
4. 1/2 NPTF (2000 PSI MAX)

SPOOL TYPE
A - 3 - Way 3-Position
B - 4 - Way 3-Position
C - 4 - Way 3-Position Free Flow Motor
E - 3 - Way 3-Position Free Flow Motor

SPOOL ACTION
A - Spring Center

HANDLE OPTION
1. Standard Lever Handle
2. Less Handle Only
3. Less Complete Handle
4. Vertical Lever Handle

COIL VOLTAGE & TERMINATION *
S12Q, 12 VDC Double Spade
S12L, 12 VDC Double Wire
S12H, 12 VDC DIN 43650
S12W, 12VDC Weather Pack®
S24Q, 24 VDC Double Spade
S24L, 24 VDC Double Wire
S24H, 24 VDC DIN 43650
S11C, 120 VAC Conduit
S11H, 120 VAC DIN 43650

PORT RELIEF “B” OPTION
A - Relief Cavity Plugged
B - Shim Adjustable Relief 500-1350 PSI Set at 1350
C - Shim Adjustable Relief 1351-1750 PSI Set at 1750
D - Shim Adjustable Relief 1751-2200 PSI Set at 2200
E - Shim Adjustable Relief 2201-3000 PSI Set at 2500

PORT RELIEF “A” OPTION
A - Relief Cavity Plugged
B - Shim Adjustable Relief 500-1350 PSI Set at 1350
C - Shim Adjustable Relief 1351-1750 PSI Set at 1750
D - Shim Adjustable Relief 1751-2200 PSI Set at 2200
E - Shim Adjustable Relief 2201-3000 PSI Set at 2500

*See page V34 for coil details.

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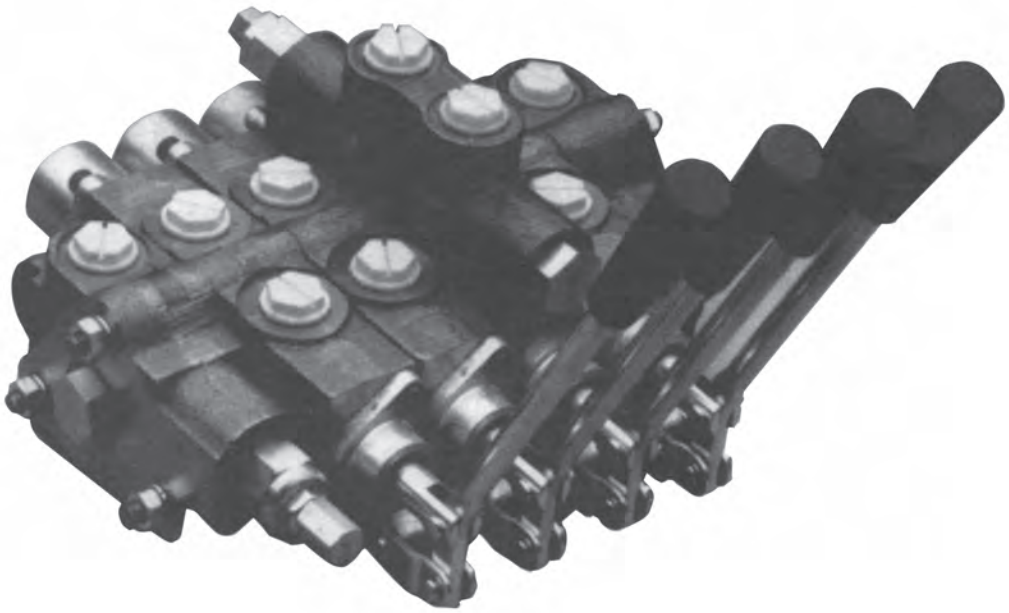
SECTIONAL BODY



Model SV

STANDARD FEATURES

- **1-10 Sections Per Valve Bank**
- **Load Checks On Each Section**
- **Hard Chrome Plated Spools**
- **Compact Construction**
- **Enhanced Metering Section Available in both the High and Low Sections**
- **Differential Poppet Style Relief, Adjustable from 1500 to 3000 psi (Also available in Low Pressure Version Adjustable from 500 to 1500 psi)**
- **Power Beyond Capability**
- **Reversible Handle**
- **Mid-Inlet and Lock Valve Section available**
- **Flow Control Inlet**

SPECIFICATIONS

Parallel or Series Circuit Construction
Pressure Rating
Maximum Operating Pressure ..... 3000 psi
Maximum Tank Pressure..... 500 psi
Nominal Flow Rating .....12 GPM
Refer to Pressure Drop Curves.
Filtration: For general purpose valves, fluid cleanliness should meet the ISO 4406 19/17/14 level. For extended life or for pilot operated valves, the 18/16/13 fluid cleanliness level is recommended.

Foot Mounting
Maximum Operating Temp......180°F
Weight Per Section
Inlet Section ..... Approx 3.75 lbs
Outlet Section ..... Approx 3.75 lbs.
Work Section (Standard) ..... Approx 5.50 lbs.
Work Section (High) ..... Approx 8.00 lbs.

ORDERING INFORMATION:

The following is a listing of valve sections available from stock on a standard basis.

STANDARD SECTIONS AVAILABLE:

INLET SECTIONS ALL HAVE BOTH TOP AND SIDE INLET PORTS

PART NO.	RELIEF TYPE AND SETTING	PORT SIZE
SVI21	No Relief	#10 SAE ORB (7/8-14 THD)
SVI24	Adjustable Low Pressure Relief Set at 1000 PSI	#10 SAE ORB (7/8-14 THD)
SVI15	Adjustable High Pressure Relief Set At 2000 PSI	#8 SAE ORB (3/4-16 THD)
SVI25	Adjustable High Pressure Relief Set at 2000 PSI	#10 SAE ORB (7/8-14 THD)

WORK SECTIONS ALL HAVE #8 SAE ORB (3/4-16 THD) PORTS, LOAD CHECK AND STANDARD LEVER HANDLE

PART NO.	SPOOL TYPE AND ACTION
SVW1AA1	3-Way Single Acting w/ Spring Center
SVW1BA1	4-Way Double Acting w/ Spring Center (Work Ports Blocked in Neutral)
SVW1BB1	4-Way Double Acting w/ 3 Position Detent (Work Ports Blocked in Neutral)
SVW1CA1	4-Way Motor Spool w/ Spring Center (Work Ports Open to Tank in Neutral
SVW1CB1	4-Way Motor Spool w/ 3 Position Detent (Work Ports Open to Tank in Neutral)
SVW1DD1	4-Way 4 Position Float w/ Spring Center and Float Detent
SVL1CA1	4-Way Spool w/ Spring Center (with Pilot Operated Checks on Both Work Ports)
SVM1ES1	4-Way Meter Spool w/ Spring Center (Work Ports Blocked in Neutral)

PORT RELIEF WORK SECTIONS ALL HAVE #8 SAE ORB (3/4-16 THD) PORTS, LOAD CHECK AND STANDARD LEVER HANDLE. MODELS WITH RELIEF FACTORY SET AT 2000 PSI AT 3 GPM.

PART NO.	SPOOL TYPE AND ACTION	PORT RELIEFS
SVH1BA1AA	4-Way Double Acting w/ Spring Center	Port Relief Plugged
SVH1BA1GG	4-Way Double Acting w/ Spring Center	Adjustable 1500-3000 PSI
SVH1DD1AA	4-Way 4 Position Float w/ Spring Center and Float Detent	Port Relief Plugged
SVH1DD1BB	4-Way 4 Position Float w/ Spring Center and Float Detent	Shim Adjustable 1500-3000 PSI
SVR1ES1AA	4-Way Meter Spool w/ Spring Center	Port Relief Plugged
SVR1ES1GG	4-Way Meter Spool w/ Spring Center	Adjustable 1500-3000 PSI
SVS1GA1GG	4-Way Double Acting Series w/ Spring Center	Adjustable 1500-3000 PSI
SVS1GA1AA	4-Way Double Acting Series w/ Spring Center	Port Relief Plugged

OUTLET SECTIONS ALL HAVE BOTH TOP AND SIDE OUTLET PORTS

PART NO.	EXHAUST OPTIONS	PORT SIZE
SVE11	Open Center Outlet w/ Conversion Plug	#8 SAE ORB (3/4-16 THD)
SVE21	Open Center Outlet w/ Conversion Plug	#10 SAE ORB (7/8-14 THD)
SVE22	Power Beyond Outlet w/ #8 SAE Beyond Port	#10 SAE ORB (7/8-14 THD)
SVE23	Closed Center Outlet	#10 SAE ORB (7/8-14 THD)
SVE26	Open Center Outlet Pressure Build-up Valve	#10 SAE ORB (7/8-14 THD)
SVE27	Power Beyond Pressure Build-up Valve	#10 SAE ORB (7/8-14 THD)

TIE ROD KITS

TIE ROD TORQUE
150in-lbs ± 6in-lbs
(12 1/2 ft-lbs ±1/2)

PART NO.	PART NO.
660401001 1 Section*	660401006 6 Sections*
660401002 2 Sections*	660401007 7 Sections*
660401003 3 Sections*	660401008 8 Sections*
660401004 4 Sections*	660401009 9 Sections*
660401005 5 Sections*	660401010 10 Sections*

*Number of Work Sections

SPECIAL INLET AND OUTLET SECTIONS AVAILABLE:

Sections other than standard models listed can be made to order. Use order code Matrix below to generate a model number that meets your requirements. If you prefer, contact your Sales Representative with your specific requirements and a model number will be assigned for you. This model number can be used for future orders. A minimum order quantity will apply to special valves. Please consult Sales Representative.

INLET SECTIONS

All inlet sections have top and side inlets.

S V I X X - X X X X

PORT SIZE
1. #8 SAE ORB (3/4-16 THD)
2. #10 SAE ORB (7/8-14 THD)

RELIEF SETTING (in PSI)

RELIEF OPTION
1. No Relief Plug
4. Adj. Low Pressure 500-1500 PSI
5. Adj. High Pressure 1500-3000 PSI
6. Plastic Plug in relief cavity. Use only when cartridge is to be installed at a later date.

OUTLET SECTION

All outlet sections have top and side outlets.

S V E X X

PORT SIZE
1. #8 SAE ORB (3/4-16 THD)
2. #10 SAE ORB (7/8-14 THD)

EXHAUST OPTION
1. Std. Open Center Outlet w/Conversion Plug
2. Power Beyond Outlet w/#8 SAE Beyond Port
3. Closed Center Outlet [0]
6 Open Center Outlet Pressure Build-up
7. Power Beyond Pressure Build-up #8 SAE Beyond Port

[0] Often used with no relief. Review application

VALVE ASSEMBLIES

The Model SV sectional body directional control valve can be ordered as separate sections or as a complete factory tested assembly. This will need to be specified with each order. An assembly number will be assigned at the time of the order. This assembly number can then be used for future orders.

ASSEMBLY MODEL NUMBER SVA-XXXX

XXXX = Sequence of Numbers. This number will be assigned to final valve to be assembled and tested at the factory. Each new order or quote will be assigned a new assembly model number. Please use quotation sheet at the end of SV section.

SPECIAL WORK SECTIONS AVAILABLE:

Work Sections other than standard models listed can be made to order. Use order code Matrix below to generate a model number that meets your requirements. If you prefer, contact your Sales Representative with your specific requirements and a model number will be assigned for you. This model number can be used for future orders. A minimum order quantity will apply to special valves. Please consult Sales Representative.

WORK SECTIONS

S V X X X X X

SECTION TYPE
W-Std. Work Section
M-Metering Work Section[2]
L-Work Section with Double P.O. Checks[1]
F-Fine Metering[3]

PORT SIZE
1. #8 SAE ORB (3/4-16 THD)
2. #6 SAE ORB (9/16-18 THD)

SPOOL TYPE
A-3-Way 3-Position
B-4-Way 3-Position
C-4-Way 3 Position Motor
D-4-Way 4 Position Float
E-4-Way 3 Position Metering (SVM only)
F-3-Way 3 Position Metering (SVM only)
J-4-Way 3 Position Fine Metering (SVF only)
1. Lock Valve Section available only with Spool Option C.
2. Metering Section available only with Spool Options E or F.
3. Fine Metering available only with Spool Options J.

HANDLE OPTION
1. Standard Lever Handle
2. Less Handle Only
3. Less Complete Handle Assembly
4. Adjustable Handle
5. Tang Spool End Only
6. Clevis Spool End Only
7. Vertical Handle
8. Straight Handle
9. Blank for Optional Joystick Handle
11. Enclosed Handle
12. Extended Enclosed Handle

SPOOL ACTION
A-Spring Center (SVW & SVL only)
B-3 Position Detent
C-Friction Detent
D-Spring Center w/Float Detent (SVW only)
E-Light Spring Center
F-2 Position Detent Neutral and Out (No IN Position)
G-2 Position (Center and Spool Out) - Spring Loaded to Spool Out (Pressure to B Port) Position
H-2 Position (Center and Spool In)-Spring Loaded to Spool In (Pressure to A Port) Position
J-S/C with MicroSwitch Bracket 2-Position (MicroSwitch not provided)
K-S/C with MicroSwitch Bracket 1-Position (MicroSwitch not provided) (activates on spool out only)
M-Spring Center Detent In
N-Spring Center Detent Out
R-Spring Center Pneumatic Actuator
S-Spring Center (SVM & SVF)

PORT RELIEF WORK SECTIONS

S V X X X X X X X

SECTION TYPE
H-Port Relief Section
R-Port Relief Metering Section[2]
S-Series Circuit Port Relief Section
G-Port Relief Fine Metering Section[3]

PORT SIZE
1.#8 SAE ORB (3/4-16 THD)
2.#6 SAE ORB (9/16-18 THD)

SPOOL TYPE
A-3-Way 3-Position
B-4-Way 3-Position
C-4-Way 3 Position Motor
D-4-Way 4 Position Float
E-4-Way 3 Position Metering (SVR only)
F-3-Way 3 Position Metering (SVR only)
G-4-Way 3 Position Series (SVS only)
H-4-Way 3 Position Motor Series (SVS only)
J- 4-Way 3 Position Fine Metering (SVG only)

SPOOL ACTION
A-Spring Center (SVH & SVS only)
B- 3 Position Detent
C-Friction Detent
D- Spring Center w/ Float Detent (SVH only)
E-Light Spring Center
F-2 Position Detent Neutral and Out (No IN Position)
J-S/C with Micro Switch Bracket 2-Position*
K-S/C with MicroSwitch Bracket 1-Position*
M-Spring Center Detent In
N-Spring Center Detent Out
R-Spring Center Pneumatic Actuator
S-Spring Center (SVR & SVG)

*MicroSwitch not provided

HANDLE OPTION
1. Standard Lever Handle
2. Less Handle Only
3. Less Complete Handle Assembly
4. Adjustable Handle
5. Tang Spool End Only
6. Clevis Spool End Only
7. Vertical Handle
9. Blank for Optional Joystick Handle
12. Extended Enclosed Handle

PORT RELIEF "B" OPTION
A-Relief Cavity Plugged
B-Non-Adjustable Direct Acting Relief 1500-3000 PSI
C-Non-Adjustable Direct Acting Relief 500-1500 PSI
D-Anti-Cavitation Check
E-Adjustable Combination Port Relief/Anti-Cavitation Check 1000-2500 PSI***
F-Non-Adjustable Combination Port Relief/Anti-Cavitation Check 1000-2500 PSI***
G-Adjustable Direct Acting Relief 1500-3000 PSI
H-Adjustable Direct Acting Relief 500-1500 PSI

PORT RELIEF "A" OPTION
A-Relief Cavity Plugged
B-Non-Adjustable Direct Acting Relief 1500-3000 PSI
C-Non-Adjustable Direct Acting Relief 500-1500 PSI
D-Anti-Cavitation Check
E-Adjustable Combination Port Relief/Anti-Cavitation Check 1000-2500 PSI*
F-Non-Adjustable Combination Port Relief/Anti-Cavitation Check 1000-2500 PSI***
**G-Adjustable Direct Acting Relief 1500-3000 PSI
**H-Adjustable Direct Acting Relief 500-1500 PSI

** Cannot be used on work sections with float option due to interference with handle.
*** Do not use in applications that require low work port leakage. Max allowable leakage 5 in^3/min @1000 psi.

For Work Port Relief Settings Other Than Standard
SVH1BA1GG-18-25

B PORT RELIEF PRESSURE IN HUNDREDS
EXAMPLE: 25=2500 PSI at 3 GPM
All Port Reliefs set at 3 GPM

A PORT RELIEF PRESSURE IN HUNDREDS
EXAMPLE: 18=1800 PSI at 3 GPM
All Port Reliefs set at 3 GPM

CUSTOM SECTION: For OEM application custom sections can often be designed to meet your specifications. Special handles, spool, and spool actions are often easily made because of the SV valve's flexible design. Consult your sales representative with your specifications.

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SEE PAGE 15 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

FIELD CONVERSION KITS, REPAIR KITS AND RELIEF CARTRIDGES

SPOOL ATTACHMENT KITS

660180001 Spring Center Kit (except SVM)
660180002 3 Position Detent Kit
660180003 Friction Detent Kit
660180051 Float Detent Kit
660180036 Spring Center Detent In
660180037 Spring Center Detent Out
660180015 S/C w/Micro-Switch, 2 Position*
660180016 S/C w/Micro-Switch, 1 Position*

HANDLE KITS

660180011 Std. Handle Kit
660180032 Clevis Sub-Assy
660180005 Complete Handle Kit
660180031 Pin Kit
660180026 Vertical Handle Kit
660180028 Straight Handle Kit
660180007 Complete Adjustable Handle Kit

*Bracket only, Micro-Switch is not provided.

660180006 Adjustable Handle Kit
660180055 Joystick Handle Kit Less Handle
660180033 Bent Joystick Handle Kit
660180017 Straight Joystick Handle Kit
660180018 Offset Joystick Handle Kit

SEAL KITS

660580001 SVW/SVM Replacement Seal Kit
660580002 Inlet Seal Kit
660580003 Outlet Seal Kit
660580004 Between Section Seal Kit
660580010 SVH/SVR Replacement Seal Kit
660580009 SVL Replacement Seal Kit
660580011 SVS Replacement Seal Kit

PORT RELIEFS

660280004 Port Relief Plug
660280003 Shim Adj. Port Relief 1500-3000 PSI
660280010 Shim Adj. Port Relief 500-1500 PSI
660280012 Adj. Combination Port Relief/Anti-Cav Check 1000-2500 PSI
660280008 Shim Adj. Combination Port Relief/Anti-Cav Check 1000-2500 PSI
660280005 Anti-Cavitation Check
660280009 Adj. Port Relief 1500-3000 PSI
660280011 Adj. Port Relief 500-1500 PSI
672000101 .015 SHIM
672000102 .033 SHIM
672000103 .060 SHIM

INLET RELIEFS

660250006 Inlet Relief Plug
660250003 Low Pressure Inlet Relief
660250002 High Pressure Inlet Relief

OUTLET CARTRIDGES

200400030 Open Center Plug
660280001 #8 SAE Power Beyond Cart.
660280002 Closed Center Plug
660280018 Open Center Build-Up Cart.
660280019 Power Beyond Build-Up Cart.

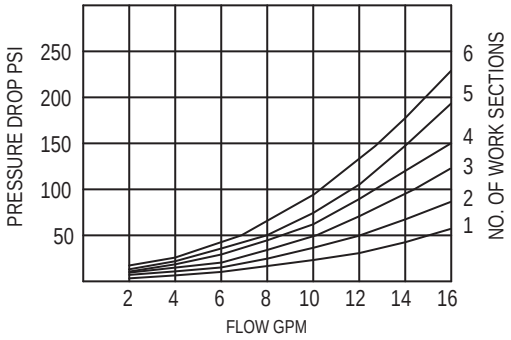
MISC. KITS

660180052 Load Check Kit

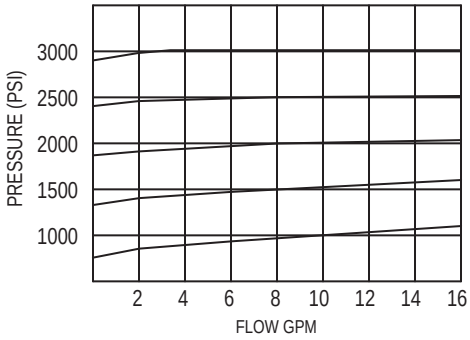
PERFORMANCE CURVES

120 SUS OIL AT 100˚F

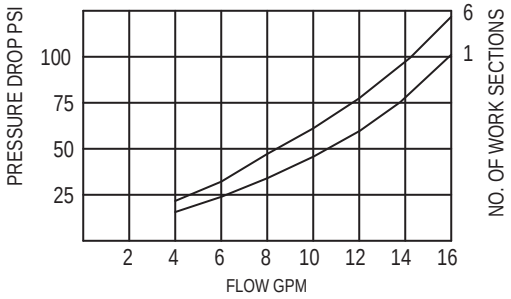
PRESSURE DROP P TO T



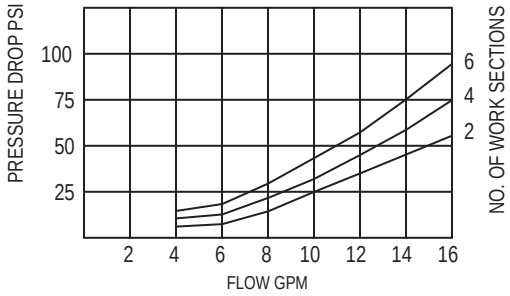
RELIEF VALVE CURVES



PRESSURE DROP P TO A OR B

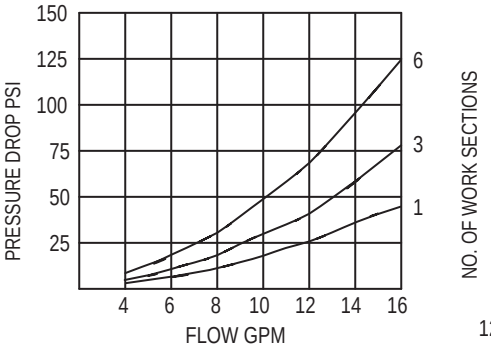


PRESSURE DROP A OR B TO T

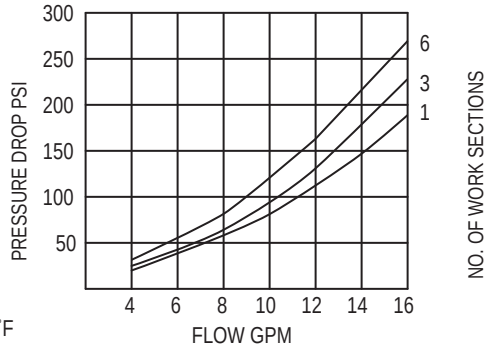


SVS SERIES SECTION TEST DATA

OPEN CENTER PRESSURE DROP P TO T



OPEN CENTER PRESSURE DROP P-A-B-T



120 SUS OIL AT 100˚F

VALVES

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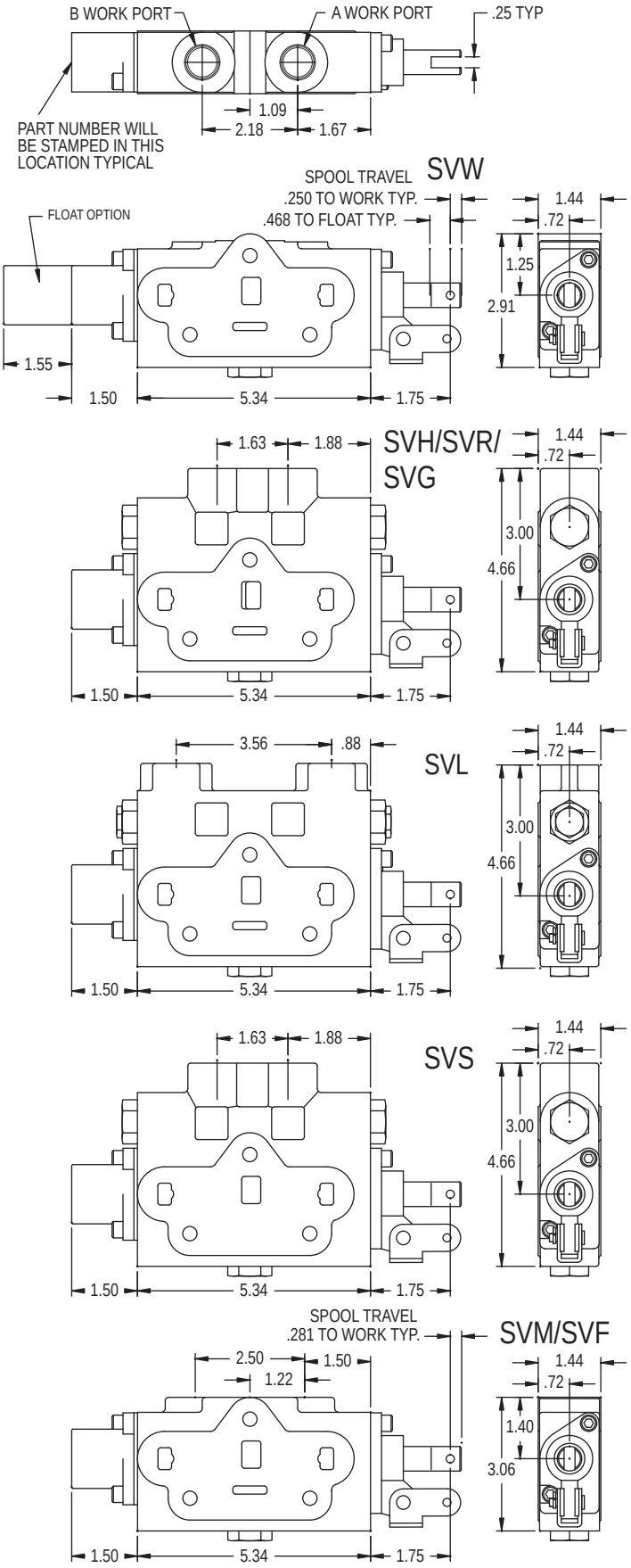
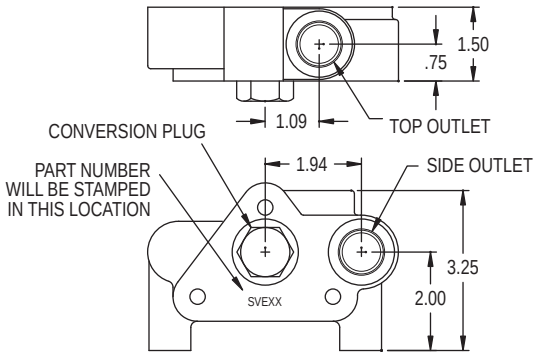
DIMENSIONAL DATA

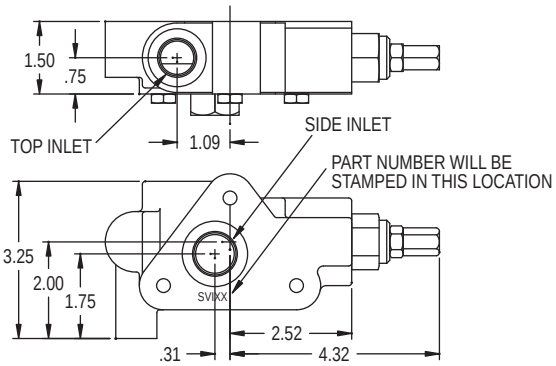
WORK SECTIONS



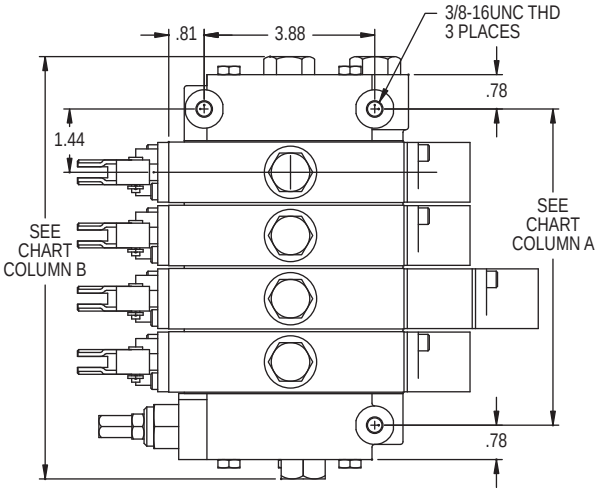
OUTLET COVER



INLET COVER



BOTTOM VIEW OF MOUNTING DIMENSIONS



Number of Work Sections	"A"	"B*"
1	2.875	5.875
2	4.312	7.312
3	5.750	8.750
4	7.187	10.187
5	8.625	11.625
6	10.062	13.062
7	11.500	14.500
8	12.937	15.937
9	14.375	17.375
10	15.812	18.812

*With #10 plug in inlet & power beyond in outlet.

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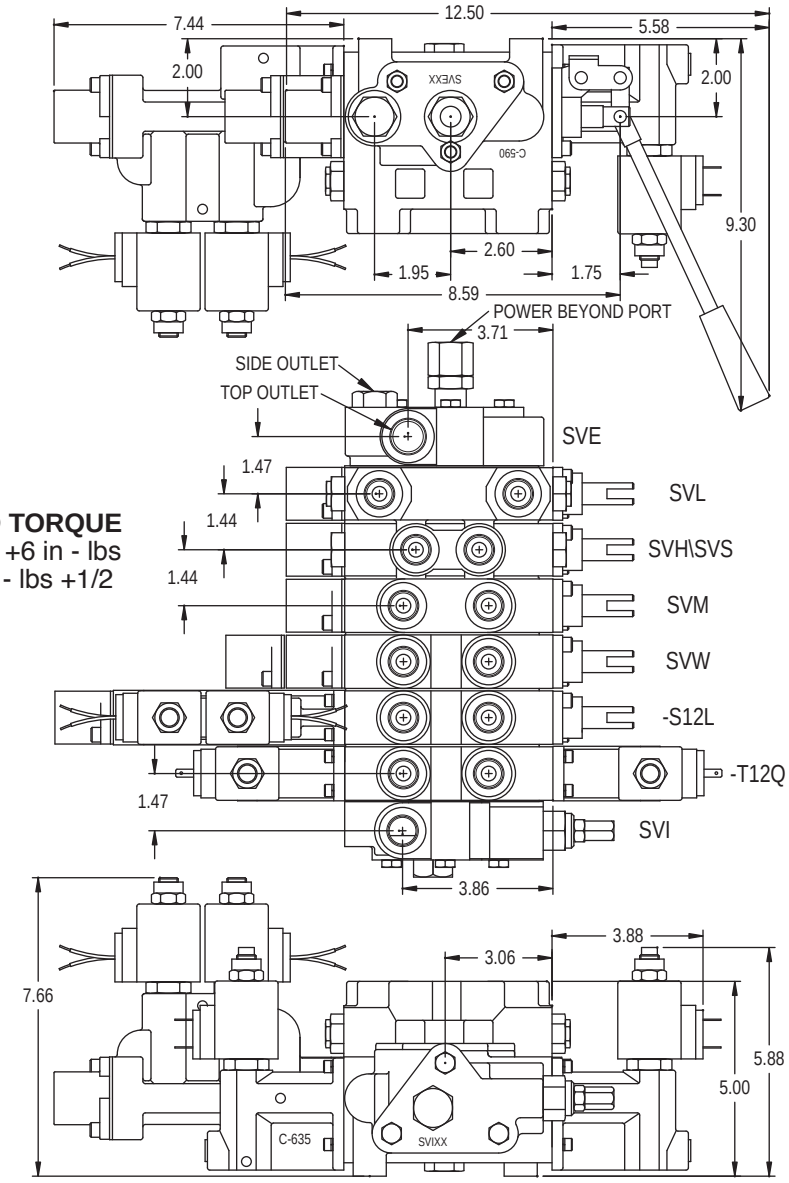
TYPICAL STACK DIMENSIONAL DATA



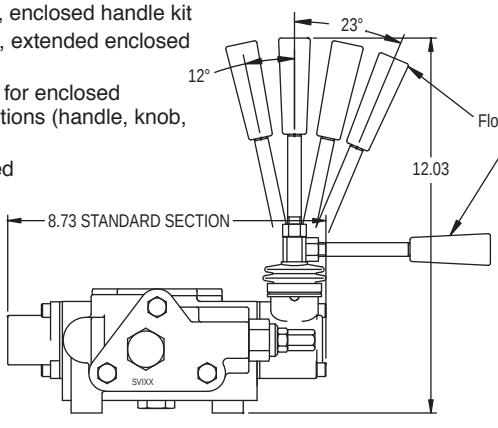
THE ROD TORQUE
150 in-lbs +6 in - lbs
(12 1/2 ft - lbs +1/2

ENCLOSED HANDLE, OPTIONS 11 AND 12

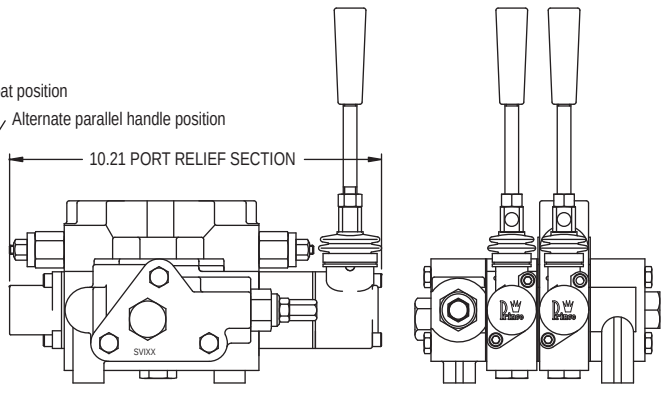
Durable die cast metal housing. Weather and oil resistant rubber boot. Reversible handle can be mounted in either a vertical or horizontal position. The extended handle option provides the necessary clearance for work port relief and lock cartridges. The extended handle option can also be used on the SVW and SVM, work sections when it is desired to keep handles aligned in an assembly with both low and high sections.

660180149 = Option 11, enclosed handle kit
660180151 = Option 12, extended enclosed handle kit
660180150 = handle kit for enclosed handle options (handle, knob, hex nut)

(handle kit is not included in the Option 11 or 12 kits above)



Handle option 11 (SVW & SVM)



Handle option 12 (SVH, SVL, SVS & SVR)

VALVES

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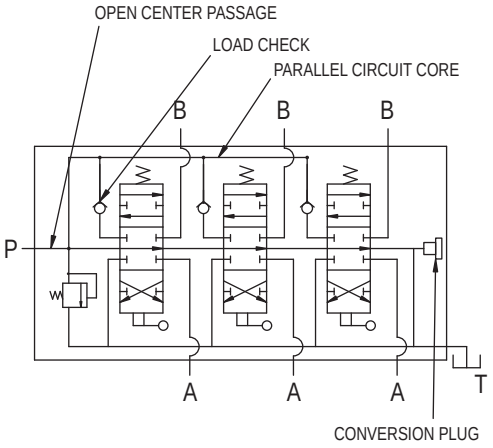
PARALLEL CIRCUIT SVW, SVM, SVF, SVH, SVR, SVG AND SVL WORK SECTIONS

Parallel circuit sections are by far the most common. The SVW, SVM, SVF, SVH, SVR, SVG and SVL are all of parallel circuit construction. They can be combined together in any order in an assembly. When any one of the spools is shifted, it blocks off the open center passage through the valve. The oil then flows into the parallel circuit core making oil available to all spools. If more than one spool is fully shifted, the oil will go to the spool with the lowest pressure requirements. However, it is possible to meter the flow to the spool with the lease load and provide flow to two unequal loads.



ENHANCED METERING SECTIONS

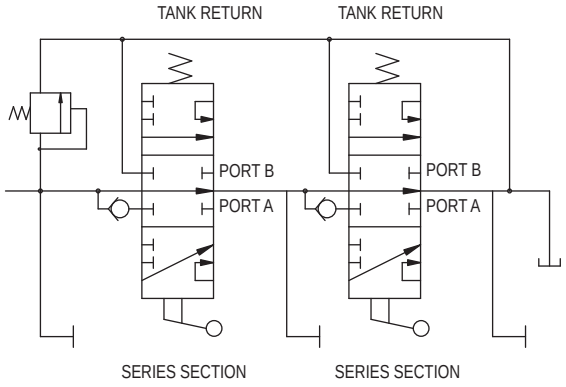
The SVM, SVF, SVR and SVG sections have metering notches machined into the spool to allow for better “feathering” of a load. The spool travel for these sections is also a little longer at .281” vs. .250” for the standard sections. In addition to the metering notches in the spool, the lands in the SVF and SVG bodies have been machined to give more precise control over the flow. The metering notches in the SVF and SVG have been optimized for flows of 10 gpm or less. For enhanced metering on higher flows, it is recommended that the SVM or SVR be used.

LOCK SECTIONS

The SVL section combines both a 4-way directional valve and a double pilot operated check valve. This provides very low leakage when the spool is in neutral. When the spool is shifted, oil is directed through a work port check to the cylinder. Pressure on the work port applies pressure to the shuttle spool, opening the opposite check valve and allowing oil to return into the valve. Depending on load pressures, the metering of the spool may be affected. In some cases a one way restrictor in a work port may be beneficial.

SERIES CIRCUIT SVS WORK SECTIONS

A series circuit valve is most commonly used to control more than one hydraulic component simultaneously. The entire circuit flow is available to each valve section that is actuated. In a two spool series valve with both spools actuated, the oil flows from the inlet to the work port of the first section. The return flow of the first section is directed to the open center core of the second section. (In a parallel valve the return oil from the work port is directed to the tank core.) From the open center core of the second section, the oil flows to the work port with the return oil going to the outlet. In a series circuit valve, the summation of the pressures required for each work section will equal the total pressure required for the circuit. The total pressure required must not exceed the system relief setting or the pump pressure rating. It is not required to have a SV Series section as the last section, unless series flow is required to a downstream valve. In this application, a power beyond plug must be used in the outlet section.



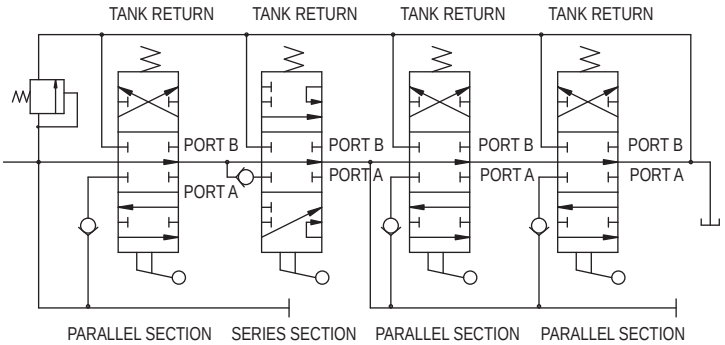
COMBINED SERIES / PARALLEL CIRCUITS

The SV Series circuit valve sections may be stacked with SV parallel circuit valve sections. This allows both series and parallel control in the same valve assembly.

In the valve assembly shown below, the first, third and fourth sections are parallel. The second section is series. The first parallel section has priority over all downstream valves. When the spool of the first parallel section is actuated, the return oil from the work port is directed to the tank core, thus oil flow to downstream sections is cut off. The second and third sections are in series with each other as is the second and fourth sections. The third and fourth sections are in parallel with each other.

SERIES MOTOR SPOOL

The SV Series Motor Spool provides control of reversible hydraulic motors. Both work ports are connected to the open center core in the neutral position. It should be noted that in the neutral position, the work ports will be equally pressurized to the same pressure that is required of any downstream valve sections and that a work port relief in the section will also limit the pressure of any other sections in the valve. The series motor spool should not be used to control a hydraulic cylinder as unwanted cylinder drift may occur in the neutral position.



CLOSED CENTER APPLICATIONS

The SV Series Circuit Valve sections cannot be used in a closed center valve assembly.

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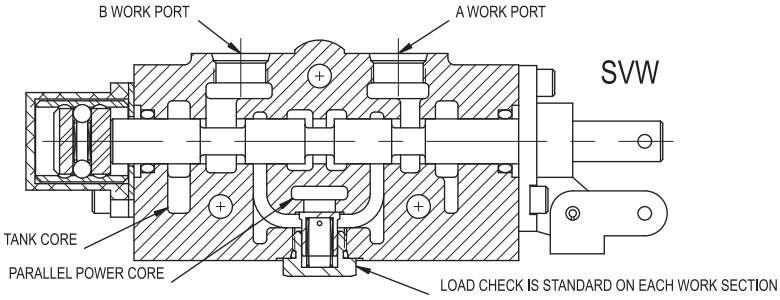
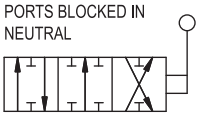
CATV 24-09-04-01

WORK SECTIONS

SPOOL ATTACHMENT OPTION B
3 POSITION DETENT

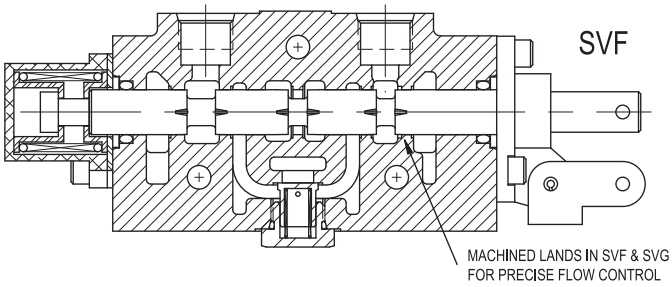


SPOOL OPTION B
DOUBLE ACTING WORK PORTS BLOCKED IN NEUTRAL

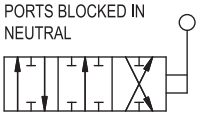


4 WAY 3 POSITION

SPOOL ATTACHMENT OPTION S
SPRING CENTER (FINE METERING)

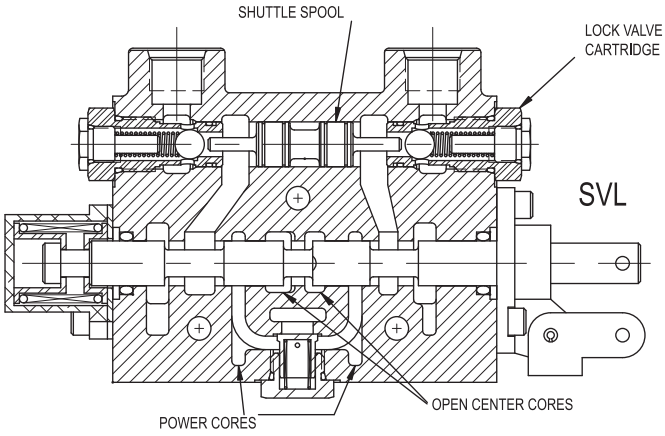


SPOOL OPTION J
DOUBLE ACTING WORK PORTS BLOCKED IN NEUTRAL

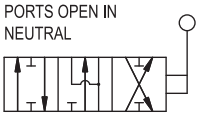


4 WAY 3 POSITION

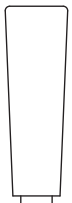
SPOOL ATTACHMENT OPTION A
SPRING CENTER



SPOOL OPTION C
DOUBLE ACTING WORK PORTS OPEN IN NEUTRAL

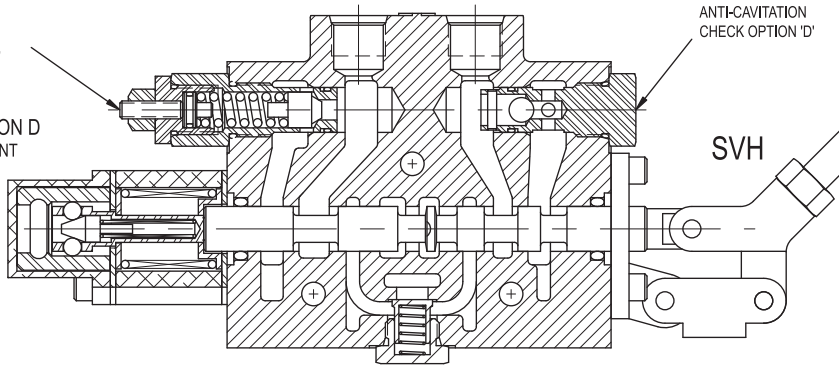


4 WAY 3 POSITION
MOTOR

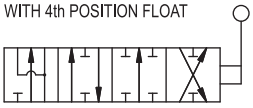


ADJUSTABLE HANDLE
OPTION 4

SPOOL ATTACHMENT OPTION D
SPRING CENTER W/FLOAT DETENT

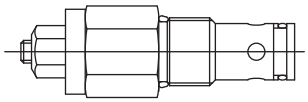


SPOOL OPTION D
4 WAY DOUBLE ACTING WITH 4th POSITION FLOAT



SV WORK PORT RELIEF

SV WORK PORT RELIEFS, OPTION B, C, G, & H CAN BE ORDERED PRETESTED. USE ORDER CODE AT RIGHT



PR	-	O		-	
MODEL NUMBER		PORT SIZE	RELIEF TYPE		PRESSURE SETTING
		0 CARTRIDGE ONLY	H- ADJUSTABLE 1500-3000 PSI L- ADJUSTABLE 500-1500 PSI NH- NON-ADJUSTABLE 1500-3000 PSI NL- NON-ADJUSTABLE 500-1500 PSI		SPECIFY RELIEF PRESSURE. LEAVE BLANK FOR STANDARD SETTINGS. STANDARD SETTING: 2000 PSI for H and NH 1000 PSI for L and NL

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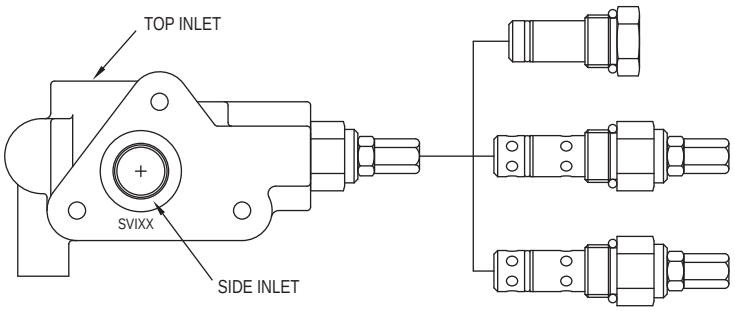
SV INLET RELIEF OPTIONS



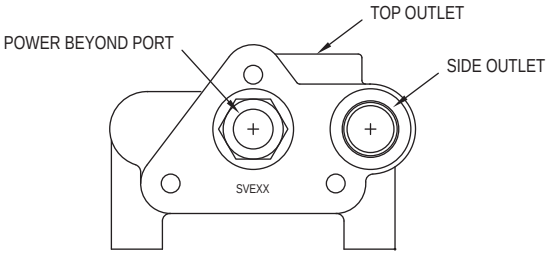
OPTION 1 NO RELIEF
This option provides no built in relief. This is used when a relief is provided elsewhere in the system or in a closed center application. This plug can be replaced with a relief cartridge at a later date.

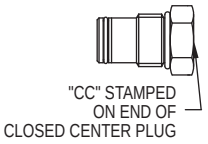
OPTION 4 LOW PRESSURE ADJUSTABLE RELIEF
This option provides for a differential poppet relief adjustable from 500-1500 PSI. Set at 1000 PSI @ 10 GPM.

OPTION 5 HIGH PRESSURE ADJUSTABLE RELIEF
This option provides for a differential poppet relief adjustable from 1500-3000 PSI. Set at 2000 PSI @ 10 GPM. The differential poppet relief provides smooth quiet operation with high cracking pressure.

RELIEF CARTRIDGES CAN BE ORDERED PRETESTED SEE RV-OX RELIEF, PAGE V65.

SV OUTLET COVER OPTIONS

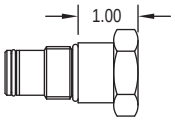




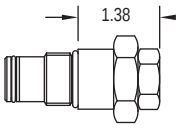
OPTION 3 CLOSED CENTER OUTLET
This option provides for closed center operation. This is typically used with a variable displacement pressure compensated pump or in a system with an unloading valve. When the spools are in neutral the inlet port is blocked. Closed center can also be accomplished by plugging the power beyond port of option 2.

PLEASE NOTE that this closed center option does not provide for the drain off of standby spool leakage. This can allow a very small amount of oil to enter the work ports when in neutral.

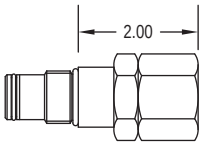
OPTION 1 STANDARD OPEN CENTER OUTLET WITH CONVERSION PLUG
This is the standard outlet option. This option allows for conversion in the field for power beyond or closed center applications. When spools are in neutral the inlet is unloaded to tank.



OPTION 2 POWER BEYOND OUTLET WITH #8 SAE BEYOND PORT
This option provides for a high pressure power beyond port. This would be used if a valve is to be added down stream. THE OUTLET PORT MUST STILL BE CONNECTED TO TANK. When spools are in neutral the inlet is connected to the power beyond port.

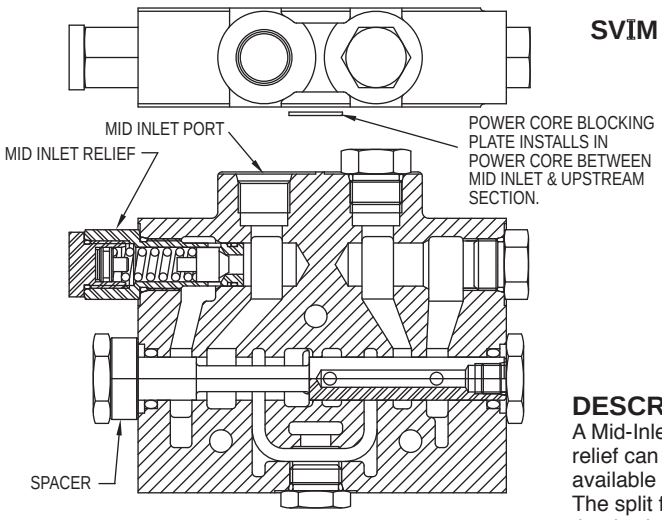


OPTION 6 OPEN CENTER OUTLET PRESSURE BUILD-UP VALVE FOR SOLENOID OPTION
This option directs oil from open center core thru pressure build-up valve and then to tank. See solenoid section for description of operation.



OPTION 7 POWER BEYOND PRESSURE BUILD-UP VALVE FOR SOLENOID OPTION
This option directs oil from inlet thru pressure build-up valve and then downstream. This pressure build-up valve provides a #8 SAE power beyond port. The outlet must be connected to tank.

SV MID-INLET SECTION



SPLIT MID-INLET SHOWN CAN BE CONVERTED TO COMBINED MID-INLET BY MOVING SPACER TO OPPOSITE END

SVIM 1 X X - X X X X

Last Four Digits Specify
A Non-Standard Relief Pressure.
When blank, refer to standard setting

1-No Relief
2-SHIM Adjustable 500-1500 PSI Std. Setting 1000 PSI @ 10GPM
3-SHIM Adjustable 1500-3000 PSI Std. Setting 2000 PSI @ 10 GPM
4-Adjustable 500-1500 PSI Std. Setting 1000 PSI @ 10 GPM
5-Adjustable 1500-3000 PSI Std. Setting 2000 PSI @ 10 GPM

C-Combined Flow Mid-Inlet
S-Split Flow Mid-Inlet (not available after a series section)
See Section View at left. Note
Location of Spacer, Part Number 671200035

1. Port Size #8 SAE ORB (3/4-16 THD)

DESCRIPTION:
A Mid-Inlet provides an inlet port for a second pump mid stream in the valve stack. A relief can be provided in this section. With the combined flow the flow from both pumps is available to the downstream sections when all the work sections upstream are in neutral. The split flow completely separates the two pump flows. The common tank passage is all that is shared between the two pump flows. **Note:** Split flow mid inlet is not available when used after a series section and the core block plate is not used after a series section.

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SV FLOW CONTROL INLET SECTION

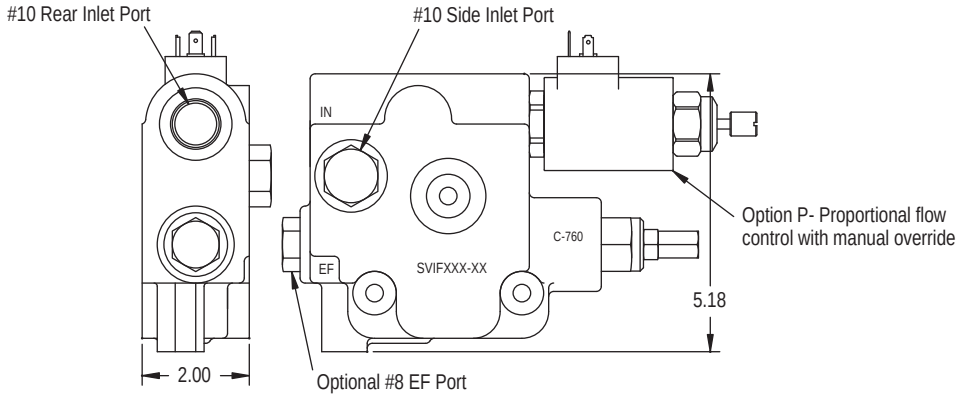
S V I F X X X X X X

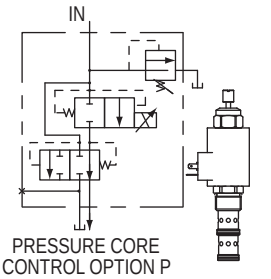
PORT SIZE
1- Side and End Inlet #10 SAE ORB
2- Side and End Inlet #10 SAE ORB, with #8 SAE ORB External EF Circuit

RELIEF VALVE
1- No Relief
2- Direct acting non-adjustable 500-1500 psi set at 1000 psi*
3- Direct acting non-adjustable 1500-3000 psi set at 2000 psi*
4- Direct acting adjustable 500-1500 psi set at 1000 psi*
5- Direct acting adjustable 1500-3000 psi set at 2000 psi*
*for other settings please specify, i.e. SVIF15P12Q-2700 is set at 2700 psi

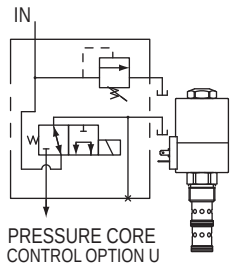
SOLENOID OPTION
Omit for Flow Control Option M
12Q-12VDC Double Spade Coil
24Q-24VDC Double Spade Coil
12H-12VDC DIN 43650 Coil
24H - 24VDC DIN 43650 Coil
12L-12VDC Double Lead Wire Coil
24L - 24VDC Double Lead Wire Coil
12W -12VDC Double Lead Wire w/ Weatherpak Connector Coil
24W - 24VDC Double Lead Wire w/ Weatherpak Connector Coil

FLOW CONTROL OPTION
M- Manual Flow Control
P- Electro-Proportional
U- Solenoid Unloading

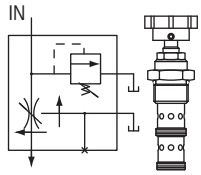




PRESSURE CORE CONTROL OPTION P CIRCUIT SCHEMATIC



PRESSURE CORE CONTROL OPTION U CIRCUIT SCHEMATIC



PRESSURE CORE CONTROL OPTION M CIRCUIT SCHEMATIC

The SVIF Flow Control Inlet is interchangeable with the standard SV inlet section.

FLOW CONTROL OPTIONS:
P OPTION incorporates a solenoid operated, electrically variable pressure-compensated flow control cartridge. With the solenoid de-energized, all of the inlet flow is diverted to the tank core/EF port. By increasing the current through the solenoid, the flow directed to the power core and downstream sections will be proportionally increased, (the maximum rating of the cartridge is 16 gpm at 1500 mA) Control current is normally provided via a controller card providing, a PWM signal.

U OPTION incorporates a solenoid operated, unloader cartridge. With the solenoid de-energized, all of the inlet flow is diverted to the tank core/EF port. With the solenoid energized all the inlet flow is directed to the power core and downstream sections.

M OPTION incorporates a manually operated pressure-compensated flow control cartridge. With the control knob turned fully in (clockwise), all of the inlet flow is diverted to the tank core/EF port. By turning the flow control knob counter clockwise, the inlet flow directed to the power core and downstream sections is proportionally increased. Approximately 5 revolutions varies flow from no flow to full flow,

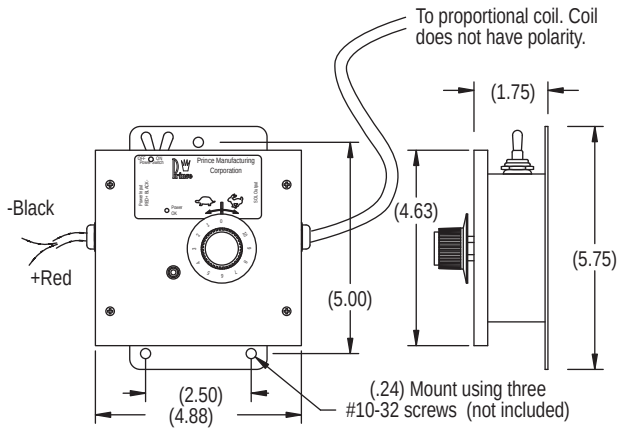
PORT OPTION 2 The flow being directed to the tank core/EF port may be utilized by a second circuit by inserting a 1/4 pipe plug into the tank core passage on the seal side of the casting and then connecting the EF port to the second circuit.

VALVES

PROPORTIONAL CONTROLLER BOX (for use with SVIFP flow control inlet), PART NO. 671300048

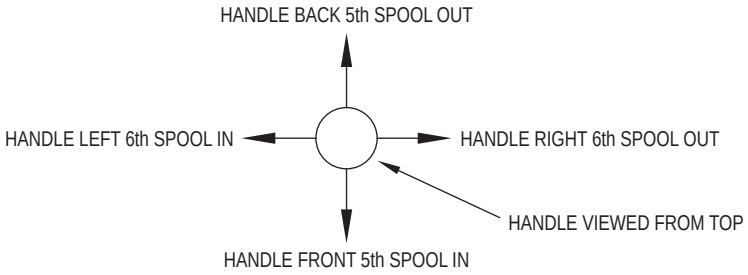
The proportional controller box is used to provide an adjustable electrical signal to a proportional solenoid on the SVIFP inlet. Once the dial is set, the regulated flow through the valve should remain approximately constant regardless of pressure. Within the operating range, flow varies approximately linearly with dial rotation.

CONNECTIONS AND OPERATION:
*Connect leads to the power supply and solenoid. Power supply should be between 9 and 32 VDC.
*With the power off, the inlet flow is directed to the tank (or excess flow port).
*To provide power to the control, move the power switch to ON. (Green LED is ON when control is powered).
*Minimum flow is directed into the valve when 0 on the dial is aligned with the center mark. Maximum flow is directed into the valve when 10 on the dial is aligned with the center mark.
*Clockwise rotation increases flow.
*Typically, no adjustments are needed for operation, (I-min and I-max pots are preset for the normal maximum and minimum flows)



Control comes with 6 ft of cable for power leads and 6 ft of cable for coil leads. Control box protection rating is IP67.

JOYSTICK HANDLE FOR MODEL SV STACK VALVE



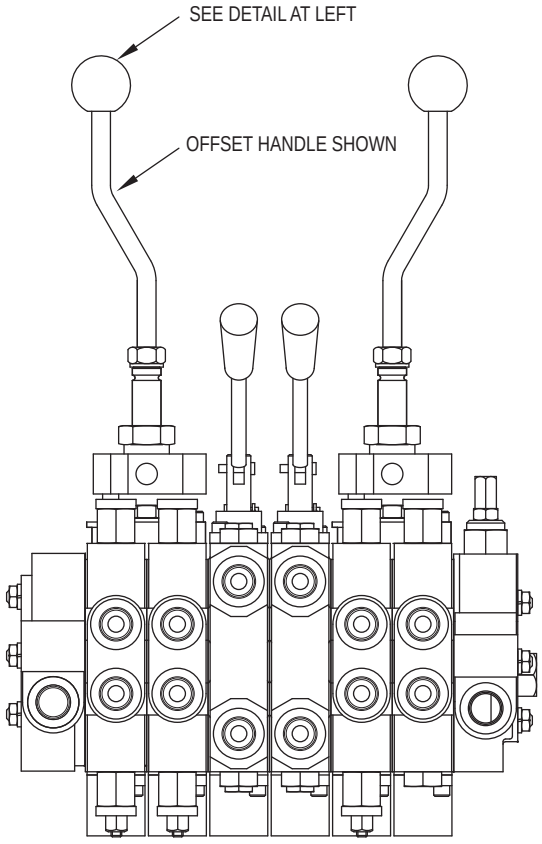
This is a special handle for the model SV stack valve that allows the spools of two adjacent sections to be operated by one common handle. The spools can be operated independently or simultaneously depending on handle movement. The option is normally used on spring center to neutral sections, but can also be used on other sections such as float sections. This handle is normally installed on valves assembled at the factory but can be installed on work sections that have handle option 3 or 9. The drawing at right shows two joysticks with offset handles installed on a six section valve. When two joysticks are installed on the same valve assembly it is recommended that there be two standard sections between them to prevent handle interference. A two section spacer is available, part no. 660380002.

Please refer to these part numbers and state which sections the handle is to be installed on when ordering a valve assembly. This handle can be installed in the field to work sections with handle option 3 (no handle).

JOYSTICK ASSEMBLY W/STRAIGHT HANDLE:
ASSEMBLED ON VALVE ..... SVJS
KIT 660180017

JOYSTICK ASSEMBLY W/OFFSET HANDLE:
ASSEMBLED ON VALVE ..... SVJO
KIT 660180018

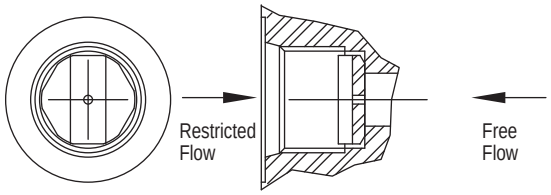
JOYSTICK ASSEMBLY W/BENT HANDLE:
ASSEMBLED ON VALVE ..... SVJB
KIT 660180033



A molded rubber boot (671300011) is available for the joystick.

ONE WAY WORK PORT RESTRICTOR FOR SVH, SVM, SVR, & SVL WORK SECTIONS

This restrictor will restrict oil in one direction and allow free flow in the opposite direction. This restrictor consists of an orifice plate that simply drops into the #8 SAE work port of a SVH, SVM, SVR, & SVL work section.



ORDERING INFORMATION

HEX BRASS RESTRICTOR

#6 SAE 9/16-18	#8 SAE 3/4-16
670806XXX	670805XXX

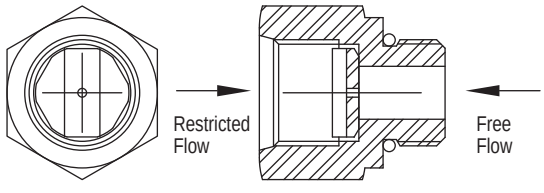
SQUARE STEEL RESTRICTOR CONICAL SPRING — 661181XXX

The last three digits of part number are the orifice size in thousandths of an inch. **EXAMPLE:**

#6 SAE 9/16-18THD	#8 SAE 3/4-16THD	
670806062	670805062	.062 ORIFICE
670806125	670805125	.125 ORIFICE
670806000	670805000	NO ORIFICE

ONE WAY WORK PORT RESTRICTOR FOR SVW WORK SECTIONS

This restrictor will restrict oil in one direction and allow free flow in the opposite direction. This restrictor consists of the orifice plate as described at left and an adapter fitting that allow use in the standard SVW #8 SAE work port.



ORDERING INFORMATION

ADAPTER W/HEX BRASS RESTRICTOR

#6 SAE 9/16-18	#8 SAE 3/4-16
661280XXX	661180XXX

ADAPTER WITH SQUARE STEEL RESTRICTOR AND CONICAL SPRING — 661182XXX

The last three digits of part number are the orifice size in thousandths of an inch. **EXAMPLE:**

#6 SAE 9/16-18THD	#8 SAE 3/4-16THD	
661280062	661180062	.062 ORIFICE
661280125	661180125	.125 ORIFICE
661280000	661180000	NO ORIFICE

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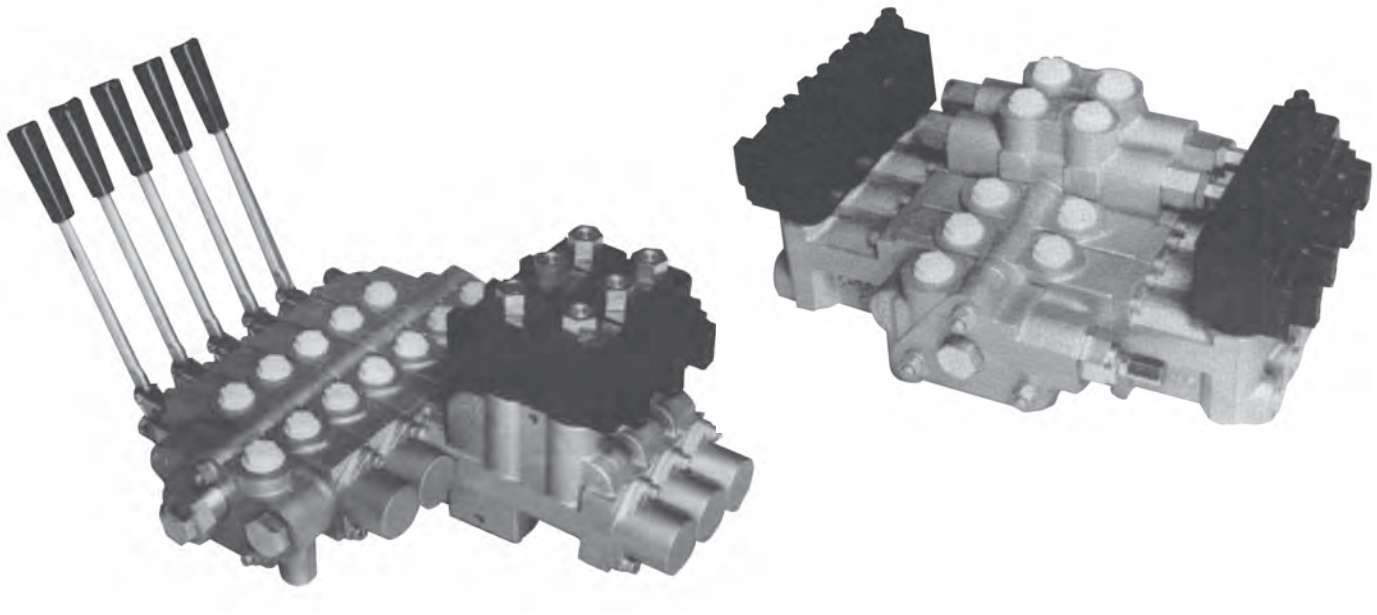
SV SOLENOID OPERATED

Work Sections

- **Type “-T” Solenoid Operated**
- **Type “-S” Solenoid and Manual Operation**



STANDARD FEATURES

- **Open center or closed center applications**
- **Port relief options available**
- **Internal pilot supply and drain**
- **12VDC, 24VDC and 120VAC**
- **Power beyond capability**
- **Load checks on each section**
- **May be stacked with Manual SV Sections**

SPECIFICATIONS

Parallel or Series Circuit Construction
Pressure Rating
Maximum Operating Pressure..... 3000 psi
Maximum Tank Pressure..... 150 psi
Nominal Flow Rating .....12 GPM
Differential Pressure
Required to Actuator .....Approx. 150 PSI
Filtration: For general purpose valves, fluid cleanliness should meet the ISO 4406 19/17/14 level. For extended life or for pilot operated valves, the 18/16/13 fluid cleanliness level is recommended.

Foot Mounting
Maximum Operating Temp......180°F
Weight Per Section
Inlet Section..... Approx. 3.75 lbs.
Outlet Section ..... Approx. 3.75 lbs.
Solenoid Operated
Type “-T” Work Section.....Approx. 11.0 lbs.
Type “-S” Work Section ..... Approx. 14.5 lbs.

TYPE "-T" SOLENOID DESCRIPTION OF OPERATION

The Type "-T" Solenoid Operated SV Work Section allows remote electrical on-off control. This solenoid operated SV section may be assembled with other standard SV manual sections, or type "-S" solenoid and manual sections.

The Type "-T" Solenoid Operated SV Section contains two 3-way 2-position solenoid cartridge valves, one at each end of the main valve body. When both solenoids are de-energized, both ends of the control valve spool are open to tank pressure and the spool remains spring centered. When solenoid "A" is energized, pilot pressure is applied to one end of the control valve spool causing the spool to shift from neutral to full stroke on "A" work port. When solenoid "B" is energized, pilot pressure is applied to the other end of the control valve spool causing the spool to shift to full stroke on "B" work port.

Internal pilot lines provide pilot pressure to the solenoid actuators. Pilot pressure is generated by a "Pressure Build-Up Valve" that is installed in the standard outlet section. Two versions of the pressure build-up valve are offered. The open center pressure build-up valve and the power beyond pressure build-up valve. Both versions supply 150-200 PSI pilot pressure to the solenoid actuators.

TYPE "-S" SOLENOID AND MANUAL DESCRIPTION OF OPERATION

The Type "-S" Solenoid and Manual Operated SV Work Section allows remote electrical on-off or manual control. This solenoid operated SV section may be assembled with other standard SV manual sections, or type "-T" solenoid sections.

The Type "-S" Solenoid and Manual Operated SV Section contains two, 3-way 2-position solenoid cartridge valves and a pilot operated piston attached to the main control spool. When both solenoids are de-energized both sides of the pilot piston are open to tank pressure and the spool remains spring centered. When solenoid "A" is energized, pilot pressure is applied to one side of the pilot piston causing the spool to shift from the neutral position to work port "A". When solenoid "B" is energized, pilot pressure is applied to the other side of the pilot piston causing the spool to shift to work port "B".

Internal pilot lines provide pilot pressure to the solenoid actuator. Pilot pressure is generated by a "Pressure Build-Up Valve" that is installed in the standard outlet section. Two versions of the pressure build-up valve are offered. The open center pressure build-up valve and the power beyond pressure build-up valve. Both versions supply 150-200 PSI pilot pressure to the solenoid actuator.

APPLICATION INFORMATION

For over center or light load applications if the required work port load pressure drops below 200 PSI, the pilot pressure to the spool will drop to the same pressure causing the spring to move the control spool back towards the neutral position. The spool will end up in an intermediate position between neutral and fully shifted. **A restrictor installed in the work port or line may be required for this type of application.**

For closed center applications the Pressure Build-Up Valve is not required. However, a system pressure of 200 PSI must be maintained in the closed center position to actuate the valve properly.

Proper operation of the solenoid actuators requires a pressure differential of 150-200 PSI above tank pressure. **The maximum tank port pressure should not exceed 150 PSI.** Excessive tank pressure will increase "Seal Drag" and may prohibit, the spool from shifting.

The solenoid operated SV section may be converted to accept an external hydraulic pilot supply to the solenoid actuators. Please consult a Sales Representative for information.

On Line Information Available

Additional valve information is available on line at www.princehyd.com
Information available includes:

- Parts manuals for many common Prince valves.
- CAD drawing files for many common Prince valves.
- Instruction sheets.
- Updated Prince catalog pages.
- Prince catalog in electronic format.

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O.E.M. CUSTOMER SERVICE: (605) 235-1220 • FAX (712) 233-2181 DISTRIBUTOR CUSTOMER SERVICE: PHONE (605) 235-1220 • FAX (712) 233-2181

CATV 30-09-04-01

ORDERING INFORMATION:

The following is a listing of valve sections available from stock on a standard basis.

STANDARD SECTIONS AVAILABLE:

SOLENOID OPERATED SVW WORK SECTIONS

ALL HAVE #8 SAE PORTS AND LOAD CHECK

PART NO.	SPOOL TYPE/VOLTAGE
SVW1BA-T12Q	4 WAY-3 POSITION/12 VDC
SVW1AA-T12Q	3 POSTION/12 VDC
SVW1CA-T12Q	4 WAY-3 POSITION MOTOR/12 VDC
SVW1BA-T11C	4 WAY-3 POSITION/120 VAC

For Inlets, Outlets and Tie-rod Kits, please refer to SV Section

SOLENOID OPERATED SVH WORK SECTIONS

ALL HAVE #8 SAE PORTS AND LOAD CHECK. MODELS WITH RELIEF, FACTORY SET AT 2000 PSI AT 3 GPM

PART NO.	SPOOL TYPE/VOLTAGE	PORT RELIEFS
SVH1BAGG-T12Q	4 WAY-3 POSITION/12 VDC	ADJUSTABLE 1500-3000 PSI
SVH1BAAA-T12Q	4 WAY-3 POSITION/12 VDC	PORT RELIEF PLUGGED
SVH1CAGG-T12Q	4 WAY-3 POSITION MOTOR/12 VDC	ADJUSTABLE 1500 - 3000 PSI

SPECIAL SECTIONS AVAILABLE:

Sections other than the standard models listed can be made to order. Use the orde code Matrix below to generate a model number that meets your requirements. If you prefer, contact your Sales Representative with your specific requirements and a model number will be assigned for you. This model number can then be used for future orders. A minimum order quantity will apply to special valves. Please contact your Sales Representative.

SOLENOID OPERATED PORT RELIEF WORK SECTION

S V H X X X X X — T X X X

SECTION TYPE
H-Port Relief Section
S-Series Section (Use G spool)

PORT SIZE
1. #8 SAE

SPOOL TYPE
A-3-Way 3-Position
B-4-Way 3-Position
C-4-Way 3-Position Motor
G-4-Way Series

SPOOL ACTIONS
A - Spring Center

PORT RELIEF "A" OPTION
A-Relief Cavity Plugged
B-Non-Adjustable Direct Acting Relief 1500-3000 PSI
C-Non-Adjustable Direct Acting Relief 500-1500 PSI
G-Adjustable Direct Acting Relief 1500-3000 PSI
H-Adjustable Direct Acting Relief 500-1500 PSI

PORT RELIEF "B" OPTION
A-Relief Cavity Plugged
B-Non-Adjustable Direct Acting Relief 1500-3000 PSI
C-Non-Adjustable Direct Acting Relief 500-1500 PSI
G-Adjustable Direct Acting Relief 1500-3000 PSI
H-Adjustable Direct Acting Relief 500-1500 PSI

SOLENOID OPERATION

COIL VOLTAGE & TERMINATION *
12Q, 12 VDC Double Spade
12L, 12 VDC Double Wire
12H, 12 VDC DIN 43650
12W, 12 VDC Weather Pack ®
24Q, 24 VDC Double Spade
24L, 24 VDC Double Wire
24H, 24 VDC DIN 43650
11C, 120 VAC Conduit
11H, 120 VAC DIN 43650

SOLENOID OPERATED SVW AND SVL WORK SECTIONS

S V W X X X — T X X X

SECTION TYPE
W-Standard Work Section
L-Lock Section (Use C Spool)

PORT SIZE
1. #8 SAE

SPOOL TYPE
A-3-Way 3-Position
B-4-Way 3-Position
C-4-Way 3-Position Motor

SPOOL ACTIONS
A - Spring Center

SOLENOID OPERATION

COIL VOLTAGE & TERMINATION *
12Q, 12 VDC Double Spade
12L, 12 VDC Double Wire
12H, 12 VDC DIN 43650
12W, 12 VDC Weather Pack ®
24Q, 24 VDC Double Spade
24 L, 24 VDC Double Wire
24H, 24 VDC DIN 43650
11C, 120 VAC Conduit
11H, 120 VAC Din 43650

* See page V34 for coil details

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SEE PAGE 15 & 16 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

ORDERING INFORMATION: "-S" SOLENOID AND MANUAL WORK SECTIONS

The following is a listing of valve sections available from stock on a standard basis.

STANDARD SECTIONS AVAILABLE:

SOLENOID OPERATED SVW WORK SECTIONS ALL HAVE #8 SAE PORTS, LOAD CHECK AND STANDARD LEVER HANDLE

PART NO.	SPOOL TYPE/VOLTAGE
SVW1AA1-S12Q	3 WAY-3 POSITION/12 VDC
SVW1BA1-S12Q	4 WAY-3 POSITION/12 VDC
SVW1CA1-S12Q	4 WAY-3 POSITION MOTOR/12 VDC
SVW1BA1-S24Q	4 WAY-3 POSITION/24 VDC

For Inlets, Outlets and Tie-rod Kits, please refer to SV Section

SOLENOID OPERATED SVH WORK SECTIONS ALL HAVE #8 SAE PORTS, LOAD CHECK AND STANDARD LEVER HANDLE MODELS WITH RELIEF, FACTORY SET AT 2000 PSI AT 3 GPM

PART NO.	SPOOL TYPE/VOLTAGE	PORT RELIEFS
SVH1BA1AA-S12Q	4 WAY DOUBLE ACTING/12 VDC	PORT RELIEF PLUGGED
SVH1BA1AA-S24Q	4 WAY DOUBLE ACTING/24 VDC	PORT RELIEF PLUGGED
SVH1BA1BB-S12Q	4 WAY DOUBLE ACTING/12 VDC	SHIM ADJ. 1500-3000 PSI
SVH1BA1BB-S24Q	4 WAY DOUBLE ACTING/24 VDC	SHIM ADJ. 1500-3000 PSI

SPECIAL SECTIONS AVAILABLE:

Sections other than the standard models listed can be made to order. Use the order code Matrix below to generate a model number that meets your requirements. If you prefer, contact your Sales Representative with your specific requirements and a model number will be assigned for you. This model number can then be used for future orders. A minimum order quantity will apply to special valves. Please contact your Sales Representative.

SOLENOID OPERATED SVW AND SVL SECTION

S V W X X X X – S X X X

SECTION TYPE
W-Standard Work Section
L-Lock Section (Use C Spool)

PORT SIZE
1. #8 SAE

SPOOL TYPE
A-3-Way 3-Position
B-4-Way 3-Position
C-4-Way 3-Position Motor

SPOOL ACTIONS
A - Spring Center

HANDLE OPTION
1. Std. Lever Handle
2. Less Handle Only
3. Less Complete Handle Assembly
4. Adjustable Handle
5. Tang Spool End Only
6. Clevis Spool End Only
7. Vertical Handle
8. Straight Handle
11. Enclosed Handle
12. Extended Enclosed Handle

COIL VOLTAGE & TERMINATION *
12Q, 12 VDC Double Spade
12L, 12 VDC Double Wire
12H, 12 VDC DIN 43650
12W, 12VDC Weather Pack®
24Q, 24 VDC Double Spade
24 L, 24 VDC Double Wire
24H, 24 VDC DIN 43650
11C, 120 VAC Conduit
11H, 120 VAC DIN 43650

SOLENOID AND MANUAL OPERATION

PORT RELIEF WORK SECTIONS

S V H X X X X X X – S X X X

SECTION TYPE
H-Port Relief Section
S-Series Section (Use G spool)

PORT SIZE
1. #8 SAE

SPOOL TYPE
A-3-Way 3-Position
B-4-Way 3-Position
C-4-Way 3-Position Motor
G-4-Way Series

SPOOL ACTIONS
A - Spring Center

HANDLE OPTION
1. Std. Lever Handle
2. Less Handle Only
3. Less Complete Handle Assembly
4. Adjustable Handle
5. Tang Spool End Only
6. Clevis Spool End Only
7. Vertical Handle
12. Extended Enclosed Handle

PORT RELIEF "A" OPTION
A-Relief Cavity Plugged
B-Non-Adjustable Direct Acting Relief 1500-3000 PSI
C-Non-Adjustable Direct Acting Relief 500-1500 PSI
G-Adjustable Direct Acting Relief 1500-3000
H-Adjustable Direct Acting Relief 500-1500 PSI

PORT RELIEF "B" OPTION
A-Relief Cavity Plugged
B-Non-Adjustable Direct Acting Relief 1500-3000 PSI
C-Non-Adjustable Direct Acting Relief 500-1500 PSI

SOLENOID AND MANUAL OPERATION

COIL VOLTAGE & TERMINATION*
12Q,12 VDC Double Spade
12L, 12 VDC Double Wire
12H, 12 VDC DIN 43650
12W, 12 VDC Weather Pack®
24Q, 24 VDC Double Spade
24 L, 24 VDC Double Wire
24H, 24 VDC DIN 43650
11C,120 VAC Conduit
11H, 120 VAC DIN 43650

***See page V34 for Coil details**

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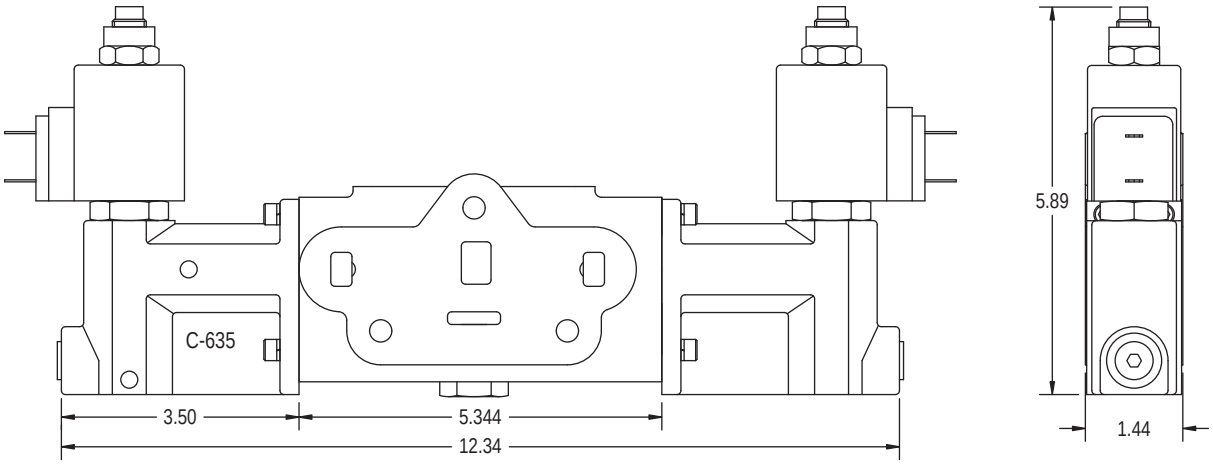
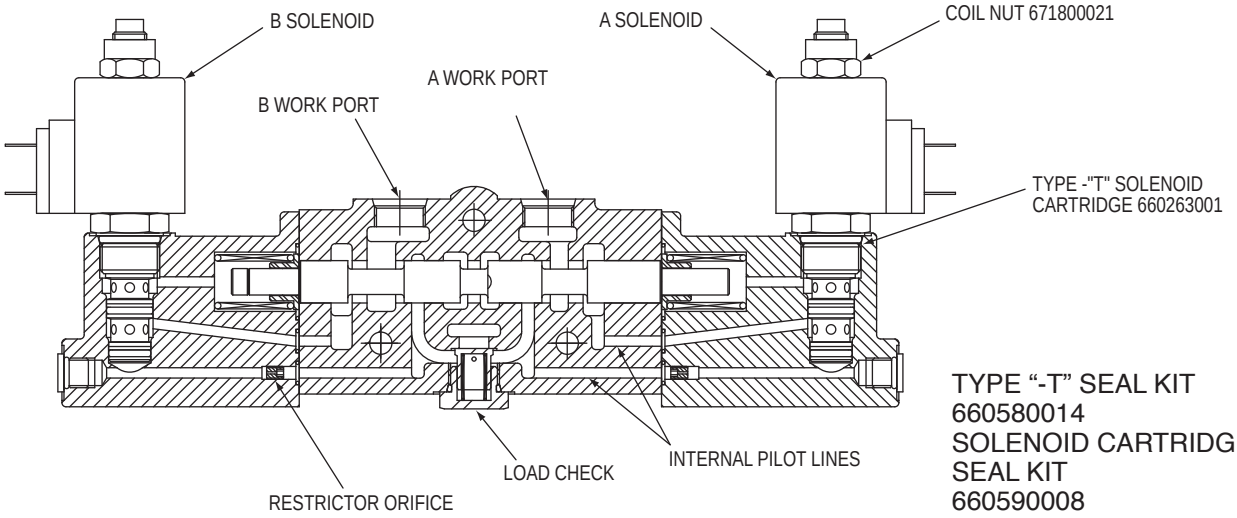
SEE PAGE 15 & 16 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

SOLENOID OPERATED TYPE "-T"
WORK SECTION DIMENSIONAL DATA

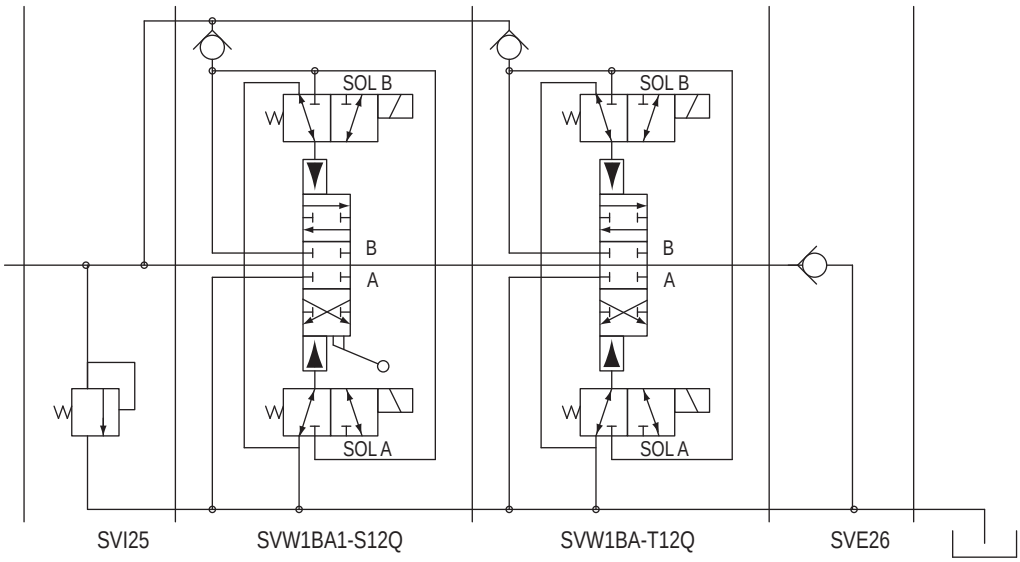




TYPE "-T" SEAL KIT
660580014
SOLENOID CARTRIDGES
SEAL KIT
660590008
NOTE: THIS OPTION CANNOT
BE ADDED IN THE FIELD.

NOTE: For additional data on inlet and outlet sections, valve assemblies, etc. Please refer SV information in this catalog.

SYMBOL
EXAMPLE TWO
SECTION STACK



VALVES

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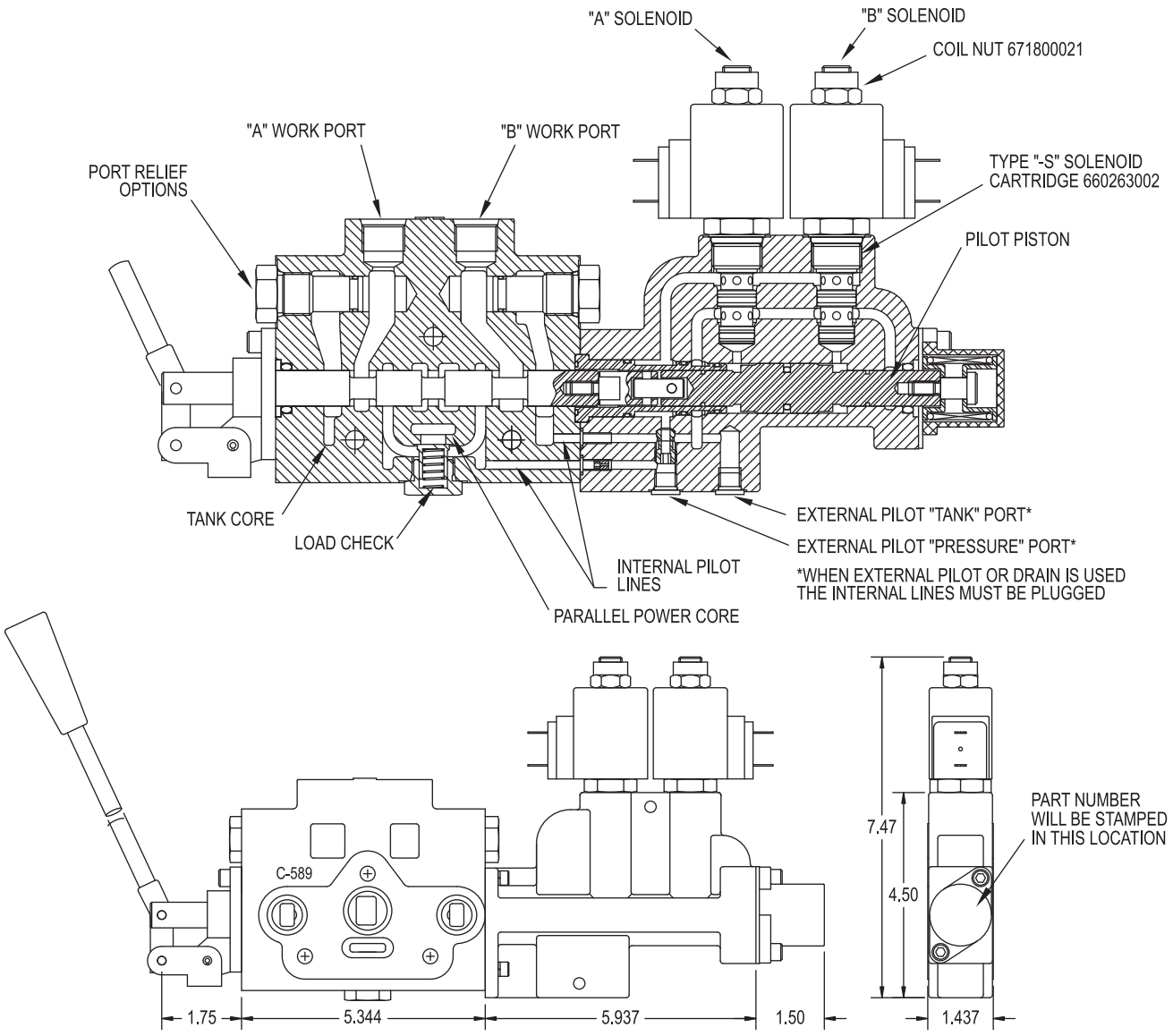
SOLENOID AND MANUAL OPERATED WORK SECTION TYPE "-S" DIMENSIONAL DATA



TYPE "-S" SEAL KIT 660580005
SOLENOID CARTRIDGES SEAL KIT 660590008

NOTE: THIS OPTION CANNOT BE ADDED IN THE FIELD

NOTE: For additional dimensional data on inlet and outlet sections, valve assemblies, etc. please refer SV information in this catalog.

SOLENOID COILS - ALL SOLENOID OPERATED SPOOLS

COIL PART NUMBERS

671302002 12 VDC H TYPE COIL DIN 43650
671302003 12 VDC L TYPE COIL DOUBLE WIRE
671322004 12 VDC Q TYPE COIL DOUBLE SPADE
671302013 12 VDC W TYPE COIL WEATHER PACK®
671302006 24 VDC H TYPE COIL DIN 43650
671302007 24 VDC L TYPE COIL DOUBLE WIRE
671322008 24 VDC Q TYPE COIL DOUBLE SPADE
671302009 120 VAC C TYPE COIL CONDUIT
671302010 120 VAC H TYPE COIL DIN 43650

COIL SPECIFICATIONS

DUTY RATING .....CONTINUOUS AT 100% VOLTAGE
INGRESS PROTECTION RATING IP65
WATTAGE .....20 WATTS
STABILIZED TEMPERATURE 217°F WITH 77°F AMBIENT
AMP DRAW AT 77°
12VOLT ..... 1.70 AMPS
24 VOLT ..... .83 AMPS
120 VOLT..... .18 AMPS
LEAD WIRE LENGTH ..... 18 GAUGE 12" LONG
AC COILS ARE INTERNALLY RECTIFIED WITH A FULL WAVE BRIDGE (NO IN RUSH CURRENT).
DIN STYLE COILS ARE DIN 43650 TYPE A.
USE WEATHER PACK ® TYPE COILS WITH MALE PACKARD CONNECTOR #12015792 "WEATHER PACK CONNECTORS".

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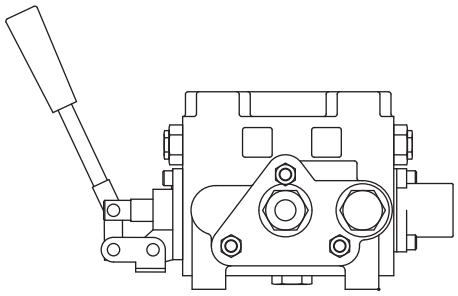
FAX (605) 235-1082



STACK VALVE ASSEMBLY QUOTATION REQUEST FORM

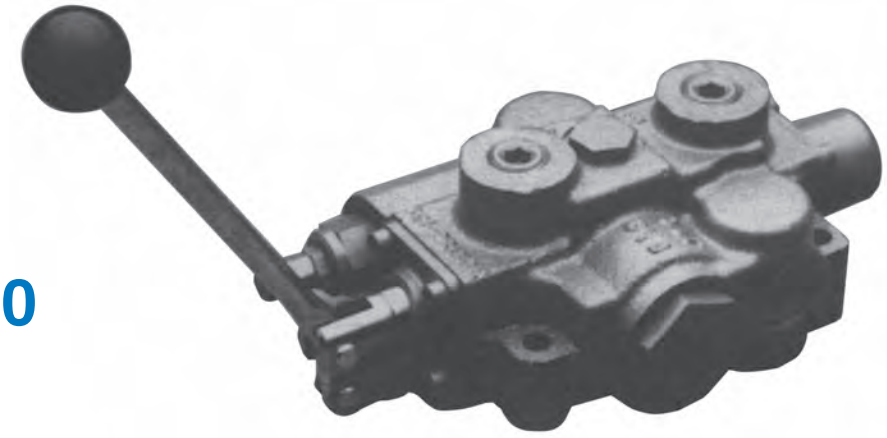
DATE _____
SUBMITTED BY _____
CUSTOMER _____
ADDRESS _____
_____
_____
PHONE _____
FAX _____
YEARLY REQUIREMENTS _____
CURRENT SUPPLIER _____

VALVE ASSEMBLY MODEL NUMBER. ASSIGNED UPON RECEIVING REQUEST.

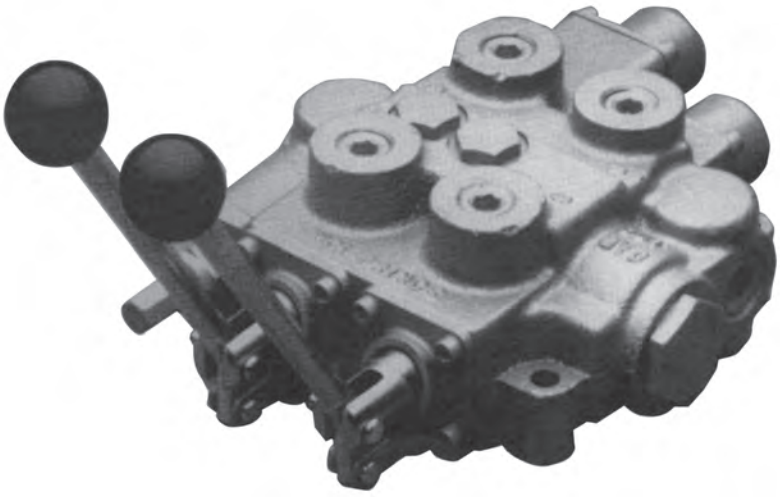
FILL IN THE CHART BELOW USING ORDER CODE FROM SERIES 20 OR MODEL SV SECTION NOTE ANY PORT RESTRICTORS, JOYSTICKS HANDLES, ETC. IN SPACE PROVIDED

ITEM	SECTION NUMBER	SECTION NOTES	LIST
INLET SECTION		RELIEF: PSI @ GPM	
WORK SECTION 1		A RELIEF: PSI @ GPM B RELIEF: PSI @ GPM	
WORK SECTION 2		A RELIEF: PSI @ GPM B RELIEF: PSI @ GPM	
WORK SECTION 3		A RELIEF: PSI @ GPM B RELIEF: PSI @ GPM	
WORK SECTION 4		A RELIEF: PSI @ GPM B RELIEF: PSI @ GPM	
WORK SECTION 5		A RELIEF: PSI @ GPM B RELIEF: PSI @ GPM	
WORK SECTION 6		A RELIEF: PSI @ GPM B RELIEF: PSI @ GPM	
WORK SECTION 7		A RELIEF: PSI @ GPM B RELIEF: PSI @ GPM	
WORK SECTION 8		A RELIEF: PSI @ GPM B RELIEF: PSI @ GPM	
WORK SECTION 9		A RELIEF: PSI @ GPM B RELIEF: PSI @ GPM	
WORK SECTION 10		A RELIEF: PSI @ GPM B RELIEF: PSI @ GPM	
OUTLET SECTION			
TIE ROD KIT			
SPECIAL INSTRUCTIONS		ASSEMBLY CHARGE (SV ONLY)	
		TOTAL	

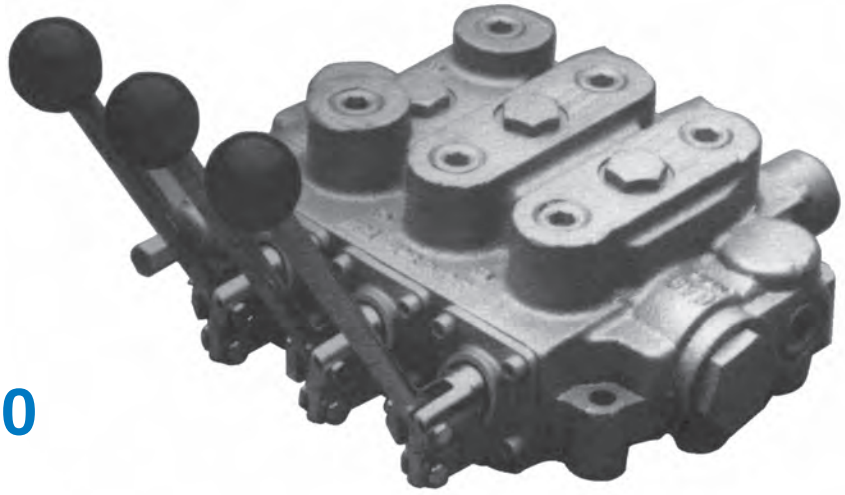
MODEL RD5000
MONO-BLOCK
Directional Control Valves
1, 2, 3 Spool



Model RD5100



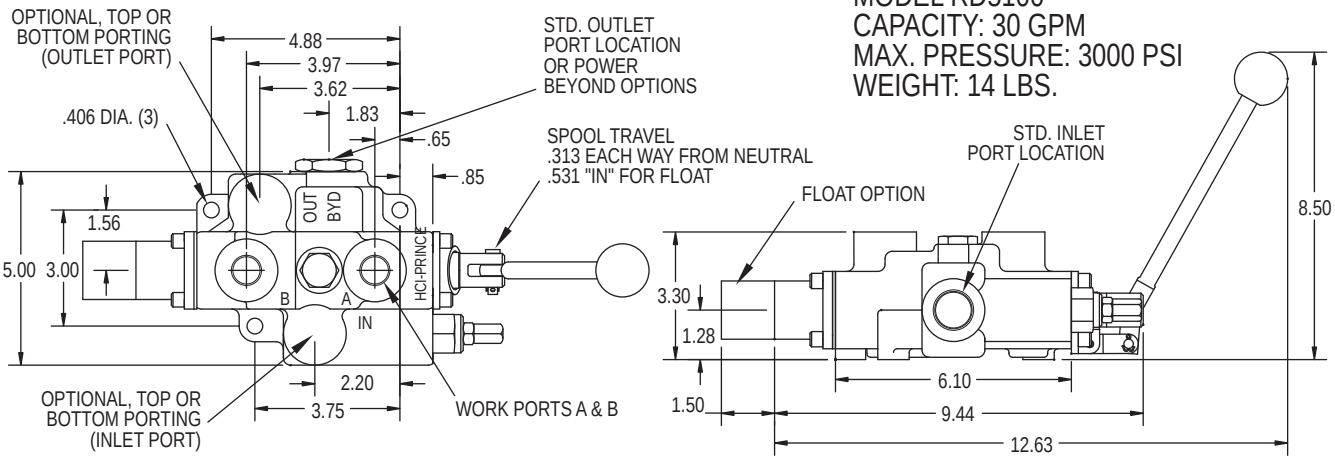
Model RD5200



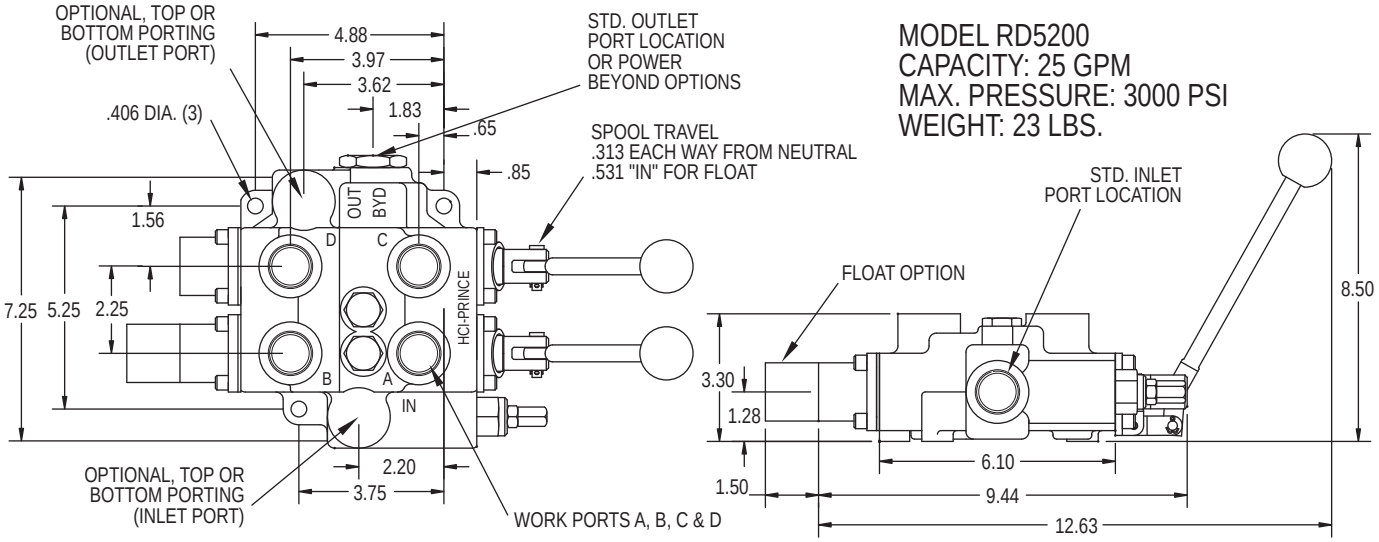
Model RD5300

MODEL RD5000 DIMENSIONAL DATA

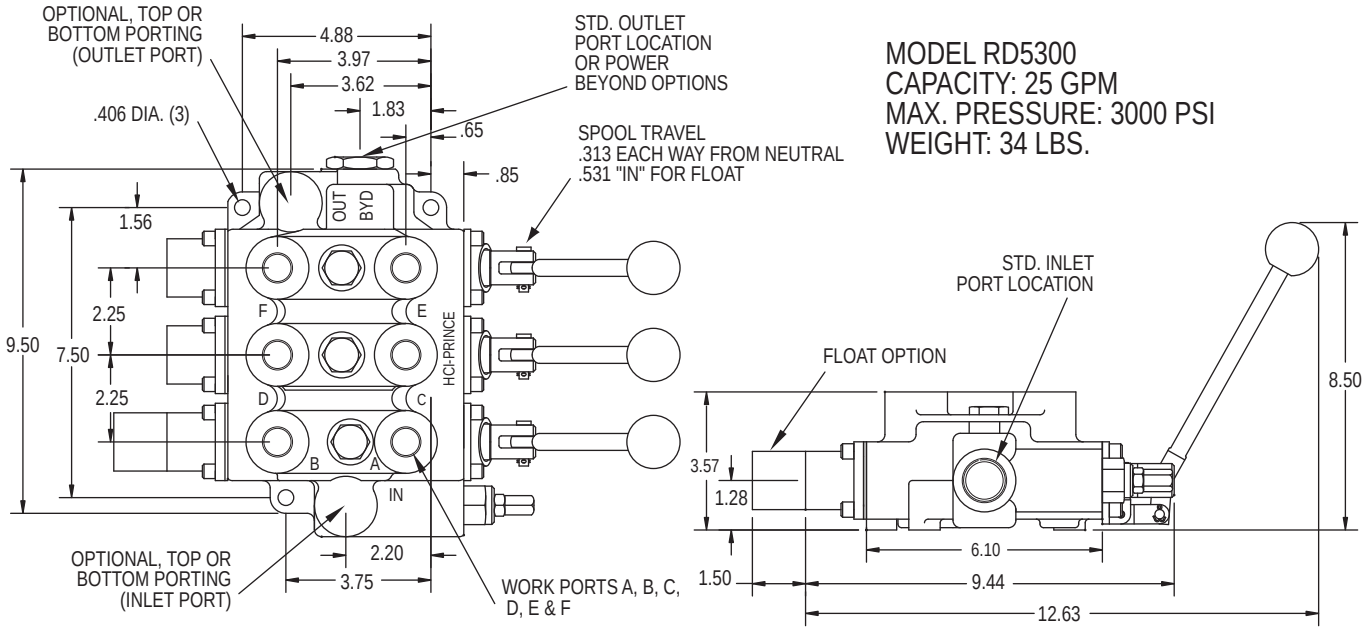
MODEL RD5100
CAPACITY: 30 GPM
MAX. PRESSURE: 3000 PSI
WEIGHT: 14 LBS.



MODEL RD5200
CAPACITY: 25 GPM
MAX. PRESSURE: 3000 PSI
WEIGHT: 23 LBS.



MODEL RD5300
CAPACITY: 25 GPM
MAX. PRESSURE: 3000 PSI
WEIGHT: 34 LBS.



VALVES

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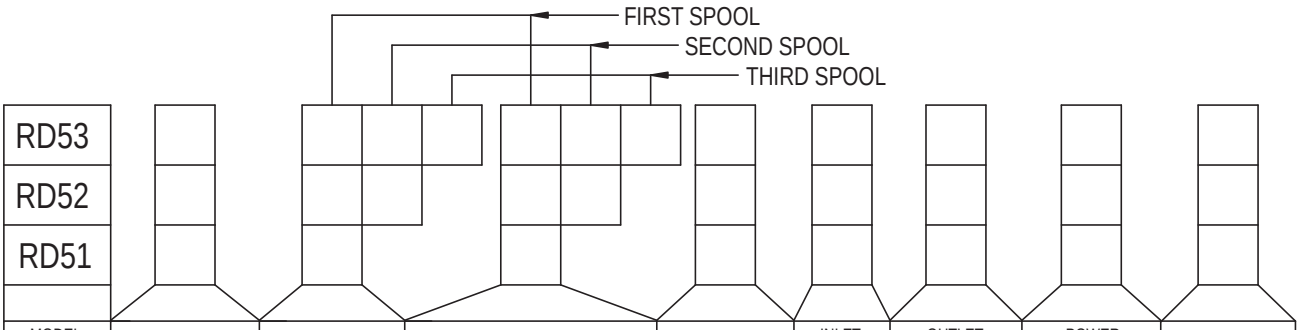
RD5000 ORDER CODE

SPECIAL VALVES AVAILABLE:

RD5000 Mono-block Valves other than the standard models listed can be made to order. Use the order code matrix below to generate a model number that meets your requirements. Special features not listed can often be made to your specifications. A minimum order quantity may apply to special valves. Please consult your sales representative.

MODEL RD5000 ORDER CODE MATRIX:

Fill each box with one letter or number from each column to generate a model number
Note that first all spools are listed then all spool attachments.



MODEL NUMBER	PORT SIZE	SPOOL TYPE	SPOOL ATTACHMENTS	RELIEF VALVE	INLET LOCATION	OUTLET LOCATION	POWER BEYOND	HANDLE
RD51 Single Spool RD52 Two Spool RD53 Three Spool	2 3/4 NPTF In/Out 1/2 NPTF Work 3 3/4 NPTF In/Out 3/4 NPTF Work 5 #12 SAE In/Out #12 SAE Work 6 #12 SAE In/Out #10 SAE Work Other Ports Please Specify	A 3 Way, 3 Position Open Center C 4 Way, 3 Position Tandem Center E 4 Way, 3 Position Open Center Motor Spool G** 4 Way, 4 Position Tandem Center Float Spool J 4 Way, 3 Position Tandem Center Rotary Acuator (Spool Attachment D Only)	A 3 Position Spring Center to Neutral B 3 Position Detent (No Centering Spring) C Friction Detent (Detented in Neutral Only) D Rotary Actuator w/Center Detent (only available w/Handle 3 and Spool J) E Pressure Release Detent 1 Position Detent, Spool "out" Only, Spring Center to Neutral F** Pressure Release Detent 2 Position Detent, Spool "in" and "out", Spring Center to Neutral Spool "C" or "E" Only G** 4 Position, Spring Center to Neutral, Detent Spool In for Float Position H Spring Center Pneumatic Actuator N 1 Position Detent Spool "out" Spring Center to Neutral P 2 Position Detent Spool "in and out", Spring Center to Neutral R 3 Position Spring Center with Micro-Switch and Boot (actuates with spool in or out movement) S 2 Position Detent "Neutral and out", No "in" Position	1 No Relief 2 Differential Poppet Non-Adjustable Set at 1000 PSI 3 Differential Poppet Non-Adjustable Set at 2000 PSI 4 Differential Poppet Adjustable 500-1500 PSI Set at 1000 PSI 5 Differential Poppet Adjustable 1500-3000 PSI Set at 2000 PSI * For other Relief Settings Please Specify	A End B Top	1 END (with Power Beyond Option A) 2 TOP 4 END (with Power Beyond Option B, C, D, F) Standard	A Not Provided (only available with outlet location 1) B Conversion Plug Installed C Power Beyond Plug Installed with 3/4 NPTF D [0] Closed Center Conversion Plug Installed F Power Beyond Plug Installed with #12 SAE	1 With Complete Handle Assembly 2 Less Handle Only 3 Without Handle Assembly RD5200 5*** Bent Joystick Handle 6*** Straight Joystick Handle Joystick can be installed on RD5300 on special order

**Spool option "G", and spool attachment "F", and "G" are available on the first spool only. Spool option "G" must be ordered with spool attachment option "G".

***RD532CCCAAA5A4B1-25**

The last two digits are Relief pressure in hundreds
Example: 25=2500 psi, all relief settings are at 10 GPM & 105°F.

*** Joystick handle will operate both spools using only one lever handle. The two spools can be operated either independently or simultaneously depending on handle movement.

[0] Often used with no relief. Review application.

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SEE PAGE 18 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

RD5000 PRESSURE DROP, RELIEF CURVE AND STANDARD FEATURES

STANDARD FEATURES

* Economical monoblock construction of high tensile strength gray cast iron.
* Load check on each spool,
* Hard chrome plated spool.
* Optional 4 Position Float on 1st spool.
* Differential poppet style relief, adjustable from 1500 to 3000 psi (also available in low pressure version adjustable from 500 to 1500 psi)
* Power beyond and closed center capability.
* Reversible handle.

SPECIFICATIONS

PARALLEL CIRCUIT (RD-5200 & RD-5300)
MAXIMUM OPERATING PRESSURE ..... 3000 PSI
MAXIMUM OPERATING TEMPERATURE ..... 180°F
MAXIMUM TANK PORT PRESSURE ..... 500 PSI
RECOMMENDED SYSTEM FILTRATION....ISO 4406 19/17/14
FLOW RATING.....30 GPM RD5100
25 GPM RD5200
25 GPM RD5300
WEIGHT ..... 14 LBS RD5100
23 LBS RD5200
34 LBS RD5300

RD5100 SINGLE SPOOL VALVE PRESSURE DROP VALUES

110 SUS OIL AT 115°F			
	Δ P-PSI		
FLOW (GPM)	INLET TO OUTLET	INLET TO A OR B	A OR B TO OUTLET
5	2	8	3
10	5	17	6
15	9	35	12
20	21	58	21
25	26	86	34

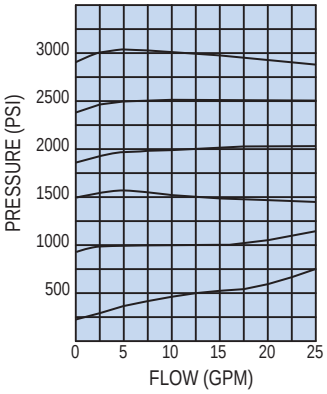
RD5200 TWO SPOOL VALVE PRESSURE DROP VALUES

110 SUS OIL AT 115°F				
	Δ P-PSI			
FLOW (GPM)	INLET TO OUTLET	INLET TO WORK PORTS	A OR B TO OUTLET	C OR D TO TO OUTLET
5	3	11	2	2
10	8	22	8	5
15	16	38	15	11
20	28	57	27	19
25	44	83	43	29

RD5300 THREE SPOOL VALVE PRESSURE DROP VALUES

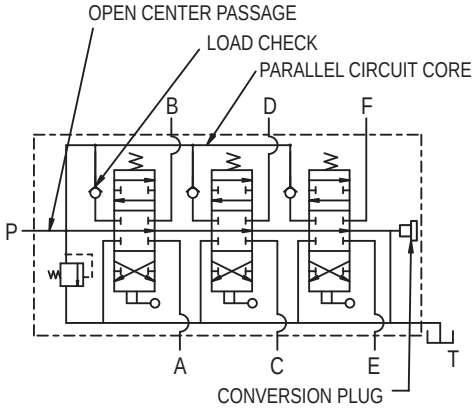
110 SUS OIL AT 115°F							
	Δ P-PSI						
FLOW (GPM)	INLET TO OUTLET	INLET TO A OR B	INLET TO C OR D	INLET TO E OR F	A OR B TO OUTLET	C OR D TO OUTLET	E OR F TO OUTLET
5	2	9	9	11	4	3	2
10	10	18	20	25	14	9	6
15	22	33	41	49	32	22	13
20	37	56	68	78	51	36	21
25	58	83	101	118	76	55	32

RD5000 RELIEF VALVE 110 SUS OIL AT 115°F



PARALLEL CIRCUIT VALVES:

Both the RD-5200 Two-Spool and RD-5300 Three-Spool Valves are parallel circuit valves. When any one of the spools is shifted it blocks off the open center passage thru the valve. The oil then flows into the parallel circuit core making oil available to all spools. If more than one spool is fully shifted then oil will go to the spool with the lowest pressure requirements. However, it is possible to meter the flow to the spool with the least load and power two unequal loads.



The above drawing shows a symbol for a Three-Spool Valve Model Number RD532CCCAAA5A4B1

VALVES

RD5000 ORDERING INFORMATION

STANDARD VALVES AVAILABLE: All standard valves have end inlet and outlet locations, power beyond conversion plug, complete handle assemblies, and adjustable differential poppet relief.

VALVE PART NUMBER	SPOOL TYPE					IN/OUT PORT SIZE	WORK PORT SIZE		
	1st SPOOL CONFIGURATION			2nd SPOOL CONFIG.	3rd SPOOL CONFIG.				
	FLOAT SPOOL[1]	3 POSITION 4 WAY[2]	3 POSITION 4 WAY DETENTED[3]	3 POSITION 4 WAY[2]	3 POSITION 4 WAY[2]	3/4 NPTF	1/2 NPTF	3/4 NPTF	RELIEF SETTING
RD512GG5A4B1	X					X	X		2000 PSI @ 10 GPM
RD512CA5A4B1		X				X	X		2000 PSI @ 10 GPM
RD513GG5A4B1	X					X		X	2000 PSI @ 10 GPM
RD513CA5A4B1		X				X		X	2000 PSI @ 10 GPM
RD513CB5A4B1			X			X		X	2000 PSI @ 10 GPM
RD522GCGA5A4B1	X			X		X	X		2000 PSI @ 10 GPM
RD522CCAA5A4B1		X		X		X	X		2000 PSI @ 10 GPM
RD532GCCGAA5A4B1	X			X	X	X	X		2000 PSI @ 10 GPM
RD532CCCAAA5A4B1		X		X	X	X	X		2000 PSI @ 10 GPM

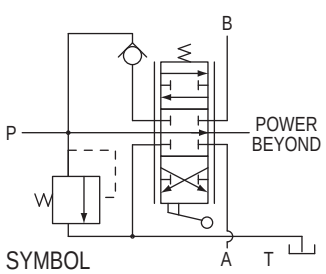
1. Four position, four way, tandem center, detented “in” the float position. Spring center to neutral from work positions. Work ports blocked in neutral.
2. Tandem center. Spring center to neutral from work positions. Work ports blocked in neutral.
3. Tandem center, 3 position detent. Work ports blocked in neutral.

MISC. AND FIELD CONVERSION KITS FOR MODEL RD-5000 VALVES

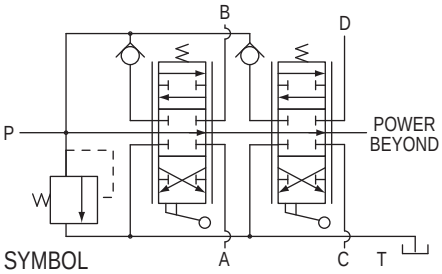
	MATRIX CODE	
660150001	A	SPRING CENTER KIT
660150002	B	3 POSITION DETENT KIT
660150003	C	FRICTION DETENT KIT
660150018	N	1 POSITION DETENT SPOOL OUT W/ SPRING CENTER
660150020	P	2 POSITION DETENT W/ SPRING CENTER KIT
660312003	B	CONVERSION PLUG
660312004	C	POWER BEYOND PLUG 3/4 NPTF
660312008	F	POWER BEYOND PLUG #12 SAE

	MATRIX CODE	
660250006	1	NO RELIEF PLUG
660250003	4	LOW PRESSURE ADJUSTABLE RELIEF CARTIDGE
660250002	5	HIGH PRESSURE ADJUSTABLE RELIEF CARTRIDGE
660312005	D	CLOSED CENTER CONVERSION PLUG
660150015		LOAD CHECK KIT
660150045	R	SPRING CENTER WITH MICRO-SWITCH KIT
660150004	1	HANDLE HARDWARE KIT

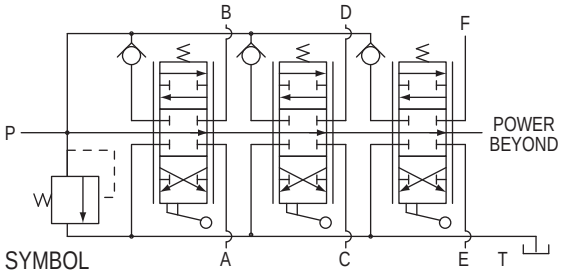
	MATRIX CODE	
660350001		HANDLE CLEVIS
660551001		RD5100 SEAL KIT
660552001		RD5200 SEAL KIT
660553001		RD5300 SEAL KIT
660150011	6	STRAIGHT JOYSTICK HANDLE KIT
660150012	5	45⁰ BENT JOYSTICK HANDLE PARTS
660150014	G	FLOAT HARDWARE KIT
660552002		AUTO CYCLE SEAL KIT



SYMBOL
RD512CA5A4C1



SYMBOL
RD522CCAA5A4C1



SYMBOL
RD532CCCAAA5A4C1

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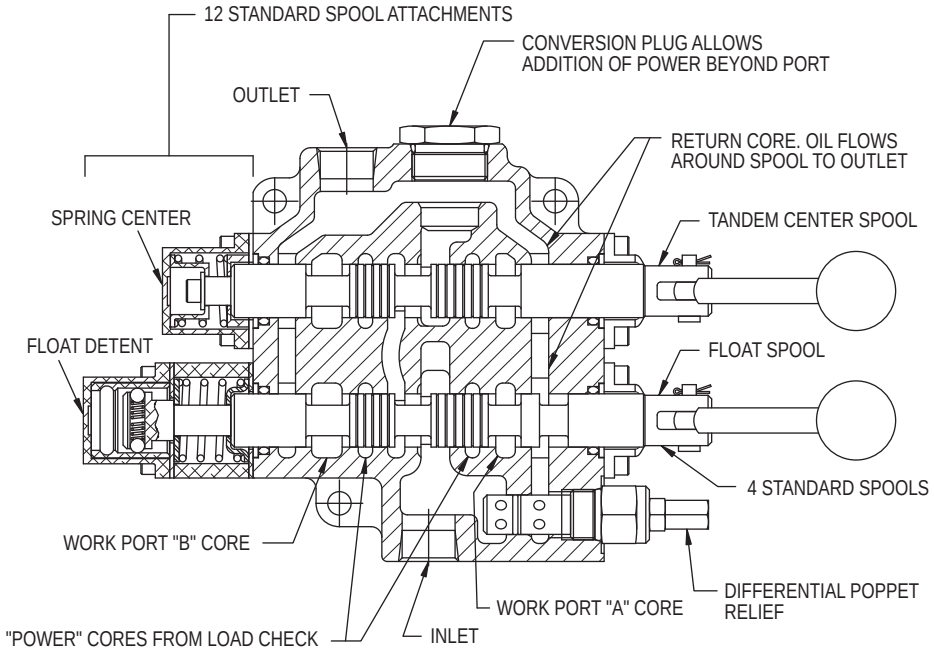
SEE PAGE 18 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING



The above drawing shows a section view of a 2-spool valve, Model RD522GCGA5A4B1. This is shown as a representative valve model. Other models will differ in appearance.

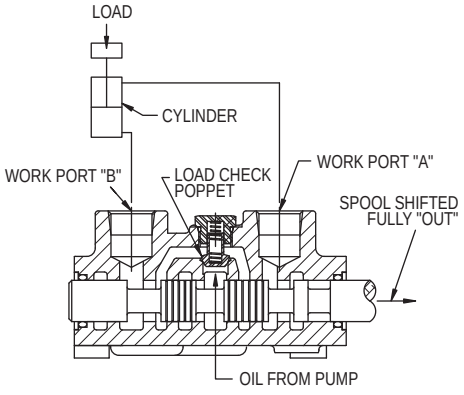
TWO SPOOL "JOYSTICK" HANDLE

This handle will operate both spools using only one lever handle. The two spools can be operated either independently or simultaneously depending on handle movement.

LOAD CHECK:

The load check feature is standard on all RD-5000 series valves. Each spool has a separate load check. The load check will prevent the fall of a cylinder as the spool is shifted. It also prevents the back-flow of oil from the work port to the inlet. As shown below the pump must build up enough pressure to overcome the pressure on the work port caused by the weight of the load before the cylinder can move.

Please note that the load check has nothing to do with how well the valve will hold up a cylinder with the spool in neutral. The load check is functional only when the spool is shifted.



The above drawing shows a section view thru work ports of a RD-5100 Single Spool Valve.

OPEN CENTER APPLICATIONS:

The Standard RD-5000 Series Valves are open center type valves. For open center valves the hydraulic oil is directed from the inlet to the outlet, or power beyond, through the open center passage when the spools are in neutral. Moving one or more spools closes off the open center passage and directs oil to the work ports.

Open center systems most often contain fixed displacement pumps. The PMC hydraulic PTO pumps are fixed displacement gear pumps. The maximum pressure in an open center system is controlled by a relief valve. The RD-5000 series valves have a built in relief valve for this purpose.

RD-5000 Series spool options A, C, E and G are all open center spools when used with power beyond options A, B, C and F.

CLOSED CENTER APPLICATIONS:

RD-5000 Series Valves are available as closed center type valves. For closed center valves the oil through the open center passage is blocked when the spools are in neutral.

Closed center systems often use a variable displacement pressure compensated pump. When this type of pump is used in a closed center system the system pressure is controlled by the pressure compensator. When the spools of RD-5000 series valve are in neutral, system pressure is maintained at the inlet of the valve. For this reason a relief is normally not required or must be set at a higher pressure than the pump compensator. RD-5000 Series spool options C, E and G are converted to closed center by installing a closed center conversion plug, power beyond option D.

PLEASE NOTE that this closed center option does not provide for the drain off of standby spool leakage. This can allow a very small amount of oil to enter the work ports when in neutral.

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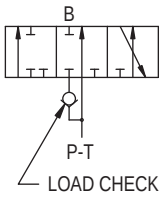
RD-5000 SERIES SPOOL OPTIONS

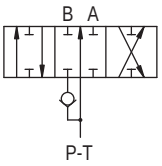
3 WAY 3 POSITION OPEN CENTER OPTION A

This spool option is used to control a single acting cylinder or a unidirectional motor. In neutral the work port is blocked and oil goes through the open center passage to the next spool of a multi-spool valve or the power beyond of a single spool valve. The “A” port is plugged for this option.



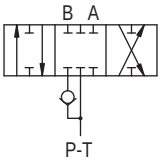
4 WAY 3 POSITION TANDEM CENTER OPTION C

This spool option is used to control a double acting cylinder or a reversible motor. In neutral both of the work ports are blocked and oil goes through the open center passage to the next spool of a multi-spool valve or the power beyond of a single spool valve. This is the most popular spool option and is used on most **Prince standard valves.**



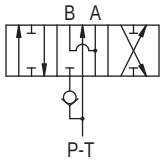
4 WAY 3 POSITION CLOSED CENTER

This spool option is similar to spool option C above except in neutral the open center passage is blocked. This function is achieved by using spool option C with a closed center conversion plug (Power beyond option D).



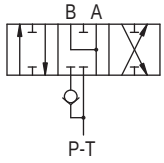
4 WAY 3 POSITION OPEN CENTER MOTOR SPOOL OPTION E

This spool option can be used to control a bi-rotational motor or a double acting cylinder. In neutral the work ports are open to the return. This allows a cylinder to drift or a motor to coast to a stop. In neutral the oil goes through the open center passage to the next spool of multi-spool valve or the power beyond of a single spool valve.



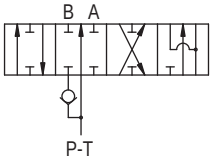
4 WAY 3 POSITION CLOSED CENTER MOTOR SPOOL

This option is similar to spool option E except in neutral the open center passage is blocked. This function is achieved by using spool option E with a closed center conversion plug (Power beyond option D).



4 WAY 4 POSITION OPEN CENTER FLOAT SPOOL OPTION G

This option is the same as spool option C, 4 way 3 position tandem center, with an added fourth “float” position. In neutral the work ports are blocked (this will hold up a cylinder) and the oil goes through the open center passage to the next spool or power beyond. In the float position the work ports are open to the return (this will allow a cylinder to drift or “float”) and the oil goes to next spool or power beyond. The float position is reached by pushing the spool as far as it will go and Is held in place by a detent. This option must be ordered with spool action option G.

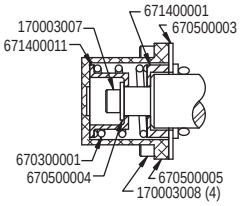


RD-5000 SERIES SPOOL ATTACHMENT OPTIONS

3 POSITION SPRING CENTER TO NEUTRAL OPTION A

This option has 3 positions and a spring that returns the spool to neutral when the handle is released. This option is considered standard on many Prince valve models.

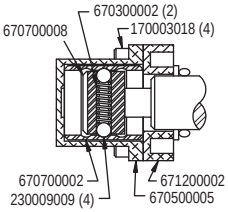
This option can be converted in the field to 3 position detent by ordering Kit 660150002. It can be converted to friction detent by ordering Kit 660150003.



3 POSITION DETENT OPTION B

This option provides three detented positions. The spool will remain in any of the three positions in which it is manually placed. No centering spring is provided. Note: This option does not positively lock the spool in place. Excessive vibration or shock loads may effect operation.

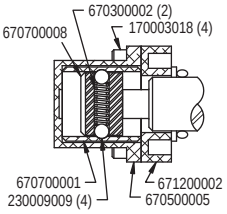
This option can be converted in the field to spring center by ordering Kit 660150001. It can be converted to friction detent by ordering Kit 660150003.



FRICTION DETENT OPTION C

This option provides for a detent in the neutral position only. As the spool is manually moved away from the neutral position it will be held in place by the friction of the detent balls on the detent sleeve. Note: Because the spool is held in place by friction only, excessive vibration may cause spool to move when not in the neutral detented position.

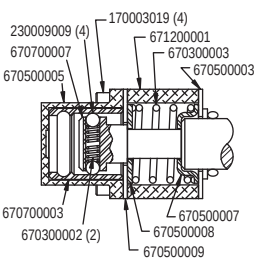
This option can be converted in the field to spring center by ordering Kit 660150001 and to 3 position detent by ordering Kit 660150002.



4 POSITION SPRING CENTER TO NEUTRAL DETENT SPOOL ‘IN’ FOR FLOAT POSITION OPTION G

This attachment Is used with spool option ‘G’. This option provides for spring center to neutral from either work position. It also provides a 4th position, float detent. The float detent is reached by pushing the spool in as far as it will go. In the float position both work ports are open to return. This allows a cylinder to drift or “float”.

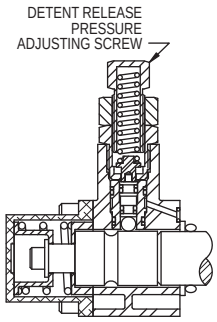
This option is available only with spool option ‘G’ and cannot be added to a valve in the field.



PRESSURE RELEASE DETENT, DETENT SPOOL ‘OUT ONLY, SPRING CENTER TO NEUTRAL OPTION E

This option provides a pressure release detent for the spool ‘Out’ position. When the spool is manually placed in the detent position oil is directed to the ‘B’ work port (the port away from the handle). When the pressure in the ‘B’ port reaches a preset level the detent will release and the spool will center. The detent release pressure is factory set at 1400 psi. This pressure is adjustable from 1000 to 2000 psi. The detent release pressure is adjusted by turning the adjusting screw clockwise to increase the pressure and counter-clockwise to decrease the pressure. The spool is spring centered to neutral from the spool ‘In’ position. This option can be used with spool options A, C or E.

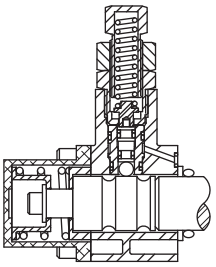
This option **can not** be added to a valve in the field.



PRESSURE RELEASE DETENT, DETENT SPOOL ‘IN’ AND ‘OUT’ SPRING CENTER TO NEUTRAL OPTION F

This option is similar to option ‘E’ above except the pressure release detent function is on both the spool ‘In’ and ‘Out’ positions. This option is available on RD-5100 valve and number 1 spool of RD-5200 and RD-5300 valves.

This option can be used with spool options C or E. This option **can not** be added to a valve in the field.



1 POSITION DETENT SPOOL ‘OUT’ SPRING CENTER TO NEUTRAL OPTION N

This option uses the same parts as option E above but is not pressure released. The handle must be manually removed from the detent position. The detent holding force is adjustable.

2 POSITION DETENT SPOOL ‘IN’ AND ‘OUT’ SPRING CENTER TO NEUTRAL OPTION P

This option uses the same parts as option F above but is not pressure released. The handle must be manually removed from the detent position. The detent holding force is adjustable.

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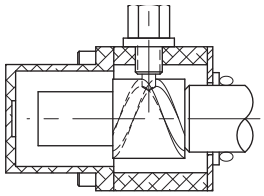
RD-5000 SERIES POWER BEYOND OPTIONS

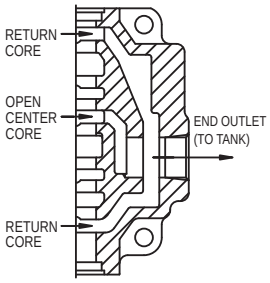
ROTARY ACTUATOR OPTION D

With this option, rotating the spool approximately 90° clockwise from neutral moves the spool to the full in position, 90° counter clockwise to full out. There is a detent in the neutral position, and in this position, the spool clevis opening is approximately vertical. A handle is not included. This option cannot be added in the field.



POWER BEYOND NOT PROVIDED OPTION A

This option provides an outlet only with no provision for power beyond. This option can be used with any open center spools where there is no need for a power beyond port. The end outlet, shown at right, is considered standard but a top or bottom outlet can also be specified.

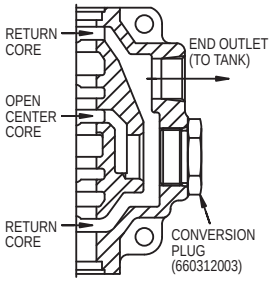


When all the valves spools are in neutral oil goes through the open center core to the outlet.

This option cannot be converted in the field to have power beyond. It also cannot be converted from open to closed center.

CONVERSION PLUG INSTALLED OPTION B

This option is similar in function to Option 'A' above except the conversion plug is installed in the power beyond location and the end outlet is relocated. This option should be used with the open center spool options and allows the valve to be converted to have power beyond function or be converted from open to closed center. This option is considered the **PMC Standard** power beyond option because of the flexibility it adds to the valve.

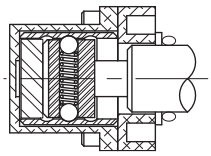


When all the valve spools are in neutral oil goes through open center core to return core and then to outlet.

To convert a valve in the field to have power beyond, remove the conversion plug and replace it with one of the power beyond plugs listed. To convert valve to closed center, replace conversion plug with closed center plug 660312005.

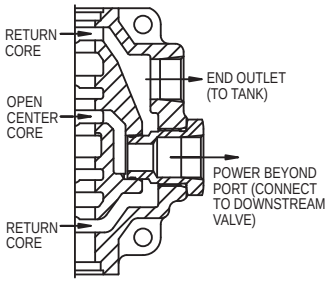
2 POSITION DETENT, NEUTRAL AND SPOOL OUT

This option provides 2 detented position, neutral and spool out. The spool is prevented from going into the "spool in" position. The spool will remain in the detented position in which it is manually placed. The option does not positively lock the spool in place and excessive vibration or shock loads may affect the operation. The three position detent kit can be converted into this option by ordering part No. 671200006.



POWER BEYOND PLUG INSTALLED OPTION C 3/4 NPTF POWER BEYOND PORT OPTION F #12 SAE POWER BEYOND PORT

This option provides both an outlet and a power beyond port (also referred to as a high pressure carry over port). This allows another valve to be connected downstream. When all the spools of a RD-5000 series valve are in neutral high pressure oil can go through the open center core and out the power beyond port to the inlet of downstream valve. The downstream valve only receives oil when all spools of the first valve are in neutral. This option must be used with open center spools and the outlet of valve must be connected to tank.



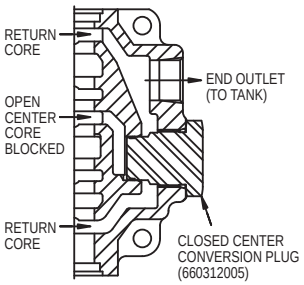
OPTION C Plug No. 660312004
OPTION F Plug No. 660312008

If the power beyond port is not used on a valve in an open center system the power beyond port must be connected to tank or the power beyond plug replaced with conversion plug 660312003.

A valve with power beyond can be converted to closed center by plugging the power beyond port or installing closed center plug 660312005.

CLOSED CENTER CONVERSION PLUG INSTALLED OPTION D

This option converts an otherwise open center valve to closed center operation. The open center core is blocked by the conversion plug. Oil cannot pass through the valve when the spools are in neutral. Closed center systems are normally associated with variable displacement pumps or any other system where the pump flow is unloaded when system pressure is reached.



Note: If the closed center plug is installed in a valve that has a relief it may be necessary to install the no relief plug or adjust the relief pressure above the compensator setting.

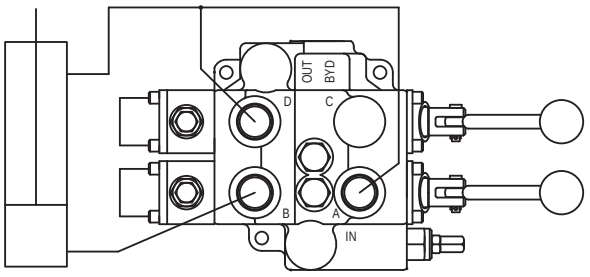
Also, this closed center option does not provide for the drain off of standby spool leakage. This can allow a very small amount of oil to enter the work ports when in neutral.

RD-5000 2 SPOOL SPECIAL APPLICATION VALVE

"AUTO-CYCLE" TWO SPOOL VALVE

Model Number RD523MMEE5A1A1

This valve is a modified RD-5200 two spool valve that can be used to automatically cycle a hydraulic cylinder. The spools and the valve body have been modified to provide this function. Both spools have the pressure release detent spool attachment. The valve is shown connected to a cylinder in the sketch below. The "B" port is connected to the base of the cylinder. The "A" and "D" ports are tied together and connected to the rod end of the cylinder. The "C" port is plugged. At the beginning of the cycle the cylinder is fully retracted. To begin the cycle both handles are pulled back. Oil is directed to the "B" port and the cylinder will extend until it reaches the end of its stroke. At this point the pressure will build to the detent release pressure and the first spool will center to neutral. Now the oil will go through the open center core to the second spool and is directed out the "D" port to retract the cylinder. When the cylinder reaches the full retract position the pressure will build to the detent release pressure and the second spool will center to neutral. This completes the cycle. To begin the next cycle both handles are again manually pulled back. Please note this valve does not have the loadcheck feature of the standard RD5200 valve. Also the "B" port is open to tank in neutral.



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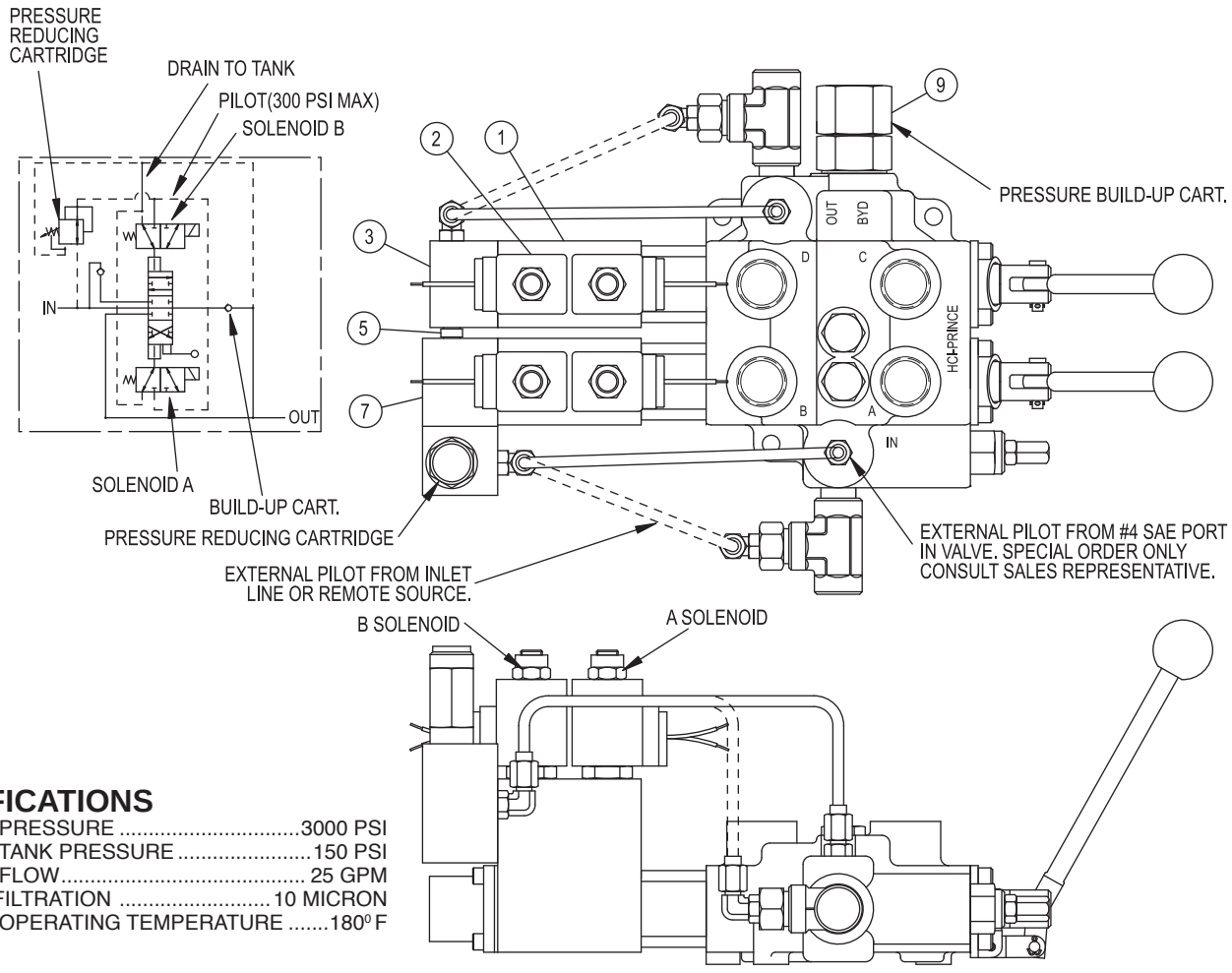
SOLENOID OPERATED RD5000 DIRECTIONAL CONTROL VALVE



SPECIFICATIONS

MAXIMUM PRESSURE .....3000 PSI
MAXIMUM TANK PRESSURE .....150 PSI
MAXIMUM FLOW..... 25 GPM
MINIMUM FILTRATION .....10 MICRON
MAXIMUM OPERATING TEMPERATURE .....180^0 F

The Solenoid Operated RD5000 Directional Control Valve allows remote electrical on-off or manual control. This feature can be installed on the RD5100, RD5200, or RD5300. It can be installed on one or all spools of the RD5200 or RD5300. This option can be purchased as kits and installed by customer. Complete valves are available special order only (min. qty. 25) Consult your sales representative.

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	660150030	BASE ACTUATOR KIT
2	2	SEE CHART	SOLENOID COIL
3	1	660150037	END MANIFOLD KIT
4	1	660150033	MID SECTION MANIFOLD KIT
5	1	660150035	MANIFOLD TUBE KIT (SHORT)
6	1	660150036	MANIFOLD TUBE KIT (LONG)
7	1	660150046	PRES. RED. MAN. KIT (MULTI-SPOOL)
8	1	660150047	PRES. RED. MAN. KIT (SINGLE-SPOOL)
9	1	SEE CHART	PRES. BUILD-UP CART.

DESCRIPTION	PART NUMBER
PRES, BUILD-UP CART. OPEN CENTER	660312012
PRES. BUILD-UP POWER BEYOND CART (#12 SAE)	660312014
12 VDC LEAD WIRE COIL	671302003
12 VDC DOUBLE SPADE COIL	671322004
12 VDC WEATHER PACK	671302013
12 VDC DIN 43650 COIL	671302002
24 VDC LEAD WIRE COIL	671302007
24 VDC DOUBLE SPADE COIL	671322008
24 VDC DIN 43650 COIL	671302006
120 VAC CONDUIT COIL	671302009
120 VAC DIN 43650 COIL	671302010

The Solenoid Operated RD5000 contains two, 3 way-2 position solenoid cartridge valves and a pilot operated piston attached to the main control spool. When both solenoids are de-energized both sides of the pilot piston are open to tank pressure and the spool remains spring centered. When solenoid A is energized, pilot pressure is applied to one side of the pilot piston causing the spool to shift from the neutral position to work port A. When solenoid “B” is energized, pilot pressure is applied to the other side of the pilot piston causing the spool to shift to work port “B”. In cases where the pilot pressure is provided by the inlet line or #4 SAE port on valve, a “Pressure Build-Up Valve” must be installed in the outlet port. Two versions of the pressure build-up valve are offered. The open center pressure build-up valve and the power beyond pressure build-up valve. Both versions supply 150-200 PSI pilot pressure to the solenoid actuator. When remote pilot is used, the pressure build-up is not required. Because the valve is internally piloted, overcenter or light loads can be a problem. The inlet pressure must be at least 200 psi during operation. Restrictors can be added to eliminate this problem.

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CATV 44-09-04-01

MODEL RD4100 SINGLE SPOOL MONO-BLOCK VALVE

RD4100 SPECIFICATIONS

MAXIMUM OPERATING PRESSURE ..... 3000 PSI
MAXIMUM OPERATING TEMPERATURE ..... 180°F

RECOMMENDED SYSTEM FILTRATION .....ISO 4406 19/17/14
FLOW RATING.....15 GPM

STANDARD FEATURES

- Economical monoblock construction of high tensile strength gray cast iron
- Load check
- Hard chrome plated spool
- Adjustable cartridge relief
- Open center, closed center, and power beyond available
- For use with system flows up to 15 gpm
- For use with system pressures up to 3000 PSI
- Optional top inlet & outlet port locations.

RD41

MODEL NUMBER	PORT SIZE	SPOOL TYPE	SPOOL ACTIONS	RELIEF VALVE	INLET LOCATION	OUTLET LOCATION	POWER BEYOND	HANDLE
RD41 Single Spool	2 #10 SAE in & out #8 SAE work	A 3 Way 3 Position Tandem Center B 4 Way 3 Position Tandem Center C 4 Way 3 Position Open Center Motor Spool D 4 Way 4 Position Tandem Center Float Spool	A Spring Center B 3 Position Detent C Friction Detent D Float Detent See SVW Section for Additional Spool Actions	1 No Relief 4 Direct Acting Adjustable 500-1500 PSI Set at 1000 PSI 5 Direct Acting Adjustable 1500-3000 PSI Set at 2000 PSI For other relief settings please specify*	A End B Top	1 End W/Power Beyond Option A 2 Top W/Power Beyond Options B, C & D	A Not Provided B Conversion Plug Installed C Power Beyond Plug Installed with #8 SAE D** Closed Center Conversion Plug Installed	1 Std. Lever Handle 2 Less Handle Only 3 Less Complete Handle Assembly 5 Tang Spool End Only 6 Clevis Spool End Only

***RD412BA5A1A1-25**

THE LAST TWO DIGITS ARE RELIEF PRESSURE IN HUNDREDS. EX: 25=2500 psi. ALL RELIEFS ARE SET AT 10 GPM & 105°F

** OFTEN USED WITH NO RELIEF. REVIEW APPLICATION.

STANDARD VALVES AVAILABLE:

All standard valves have a load check, a complete lever handle assembly, and an adjustable relief, see table below for settings. For other relief settings, please specify.

VALVE PART NUMBER	SPOOL TYPE			SPOOL ACTION			IN/OUT PORT SIZE	WORK PORT SIZE	RELIEF SETTING	CONVERTIBLE FROM OPEN CENTER TO CLOSED CENTER
	4 WAY 3 POSITION	4 WAY 3 POSITION MOTOR	4 WAY 4 POSITION FLOAT	SPRING CENTER TO NEUTRAL	3 POSITION DETENT	FLOAT DETENT				
RD412BA5A1A1	X			X			#10 SAE	#8 SAE	2000 PSI AT 10 GPM	NO
RD412BA5A2B1	X			X			#10 SAE	#8 SAE	2000 PSI AT 10 GPM	YES
RD412BB5A2B1	X				X		#10 SAE	#8 SAE	2000 PSI AT 10 GPM	YES
RD412CA5A2B1		X		X			#10 SAE	#8 SAE	2000 PSI AT 10 GPM	YES
RD412DD5A2B1			X	X		X	#10 SAE	#8 SAE	2000 PSI AT 10 GPM	YES

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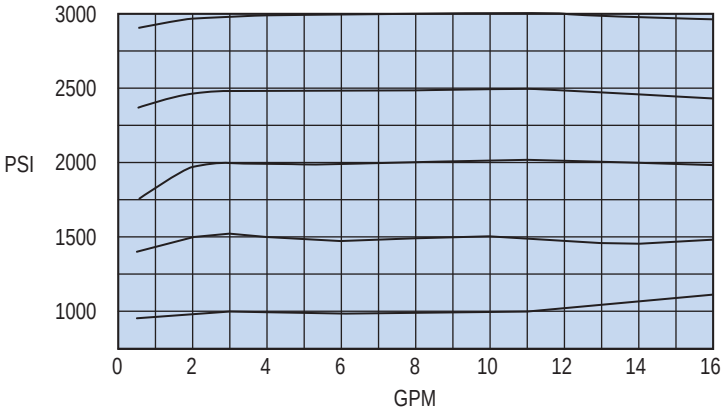
SEE PAGE 19 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

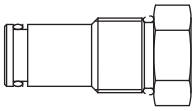
RD-4100 KITS, RELIEF CURVE, & PRESSURE DROP

RD-4100 SINGLE SPOOL PRESSURE DROP

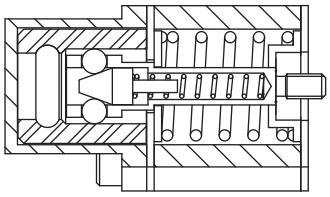
110 SUS OIL AT 115°F			
	Δ P-PSI		
FLOW (GPM)	INLET TO OUTLET	INLET TO A OR B	A OR B TO OUTLET
5	3	10	3
10	11	42	12
15	26	85	32

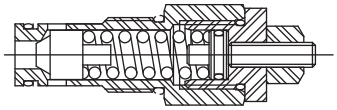
RD-4100 RELIEF VALVE CURVES

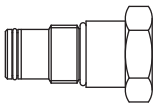


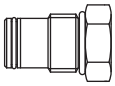

NO RELIEF PLUG


OPEN CENTER CONVERSION PLUG

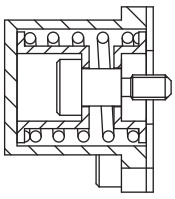

SPRING CENTER FLOAT DETENT

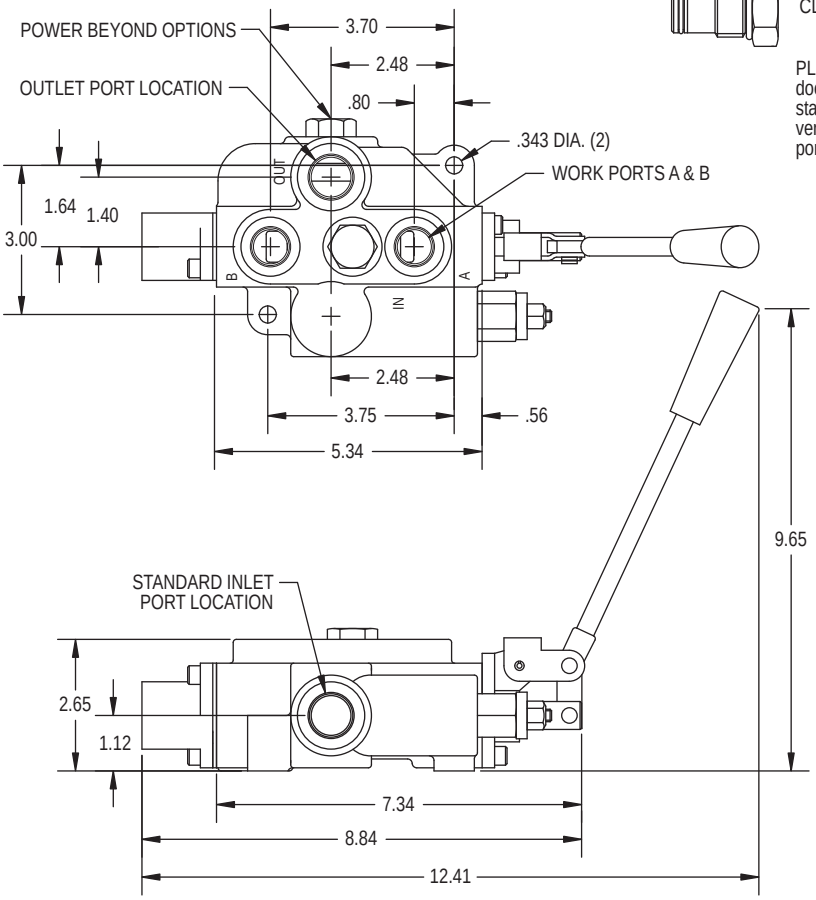

HIGH PRESSURE RELIEF CART.

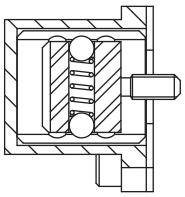

POWER BEYOND CART. (#8 SAE)


CLOSED CENTER PLUG

PLEASE NOTE: This closed center option does not provide for the drain off of standby spool leakage. This can allow a very small amount of oil to enter the work ports when in neutral.


SPRING CENTER




3 POSITION DETENT

PART NUMBER	DESCRIPTION
660541001	SEAL KIT
660150015	LOAD CHECK KIT
660580003	POWER BEYOND SEAL KIT
660180001	SPRING CENTER KIT
660180002	3 POSITION DETENT KIT
660180003	1 POSITION DETENT KIT
660180051	SPRING CENTER FLOAT KIT
660180005	COMPLETE HANDLE KIT
660180011	HANDLE KIT
660180032	CLEVIS SUB-ASSY
660180031	PIN KIT
660280004	RELIEF PLUG
660280009	RELIEF CART. 1500-3000 PSI
660280011	RELIEF CART. 500-1500 PSI
200400030	OPEN CENTER PLUG
660280001	POWER BEYOND CART. (#8 SAE)
660280002	CLOSED CENTER PLUG

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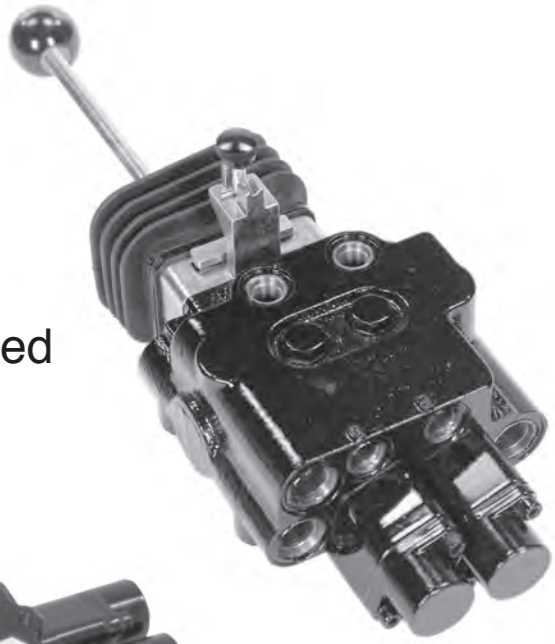
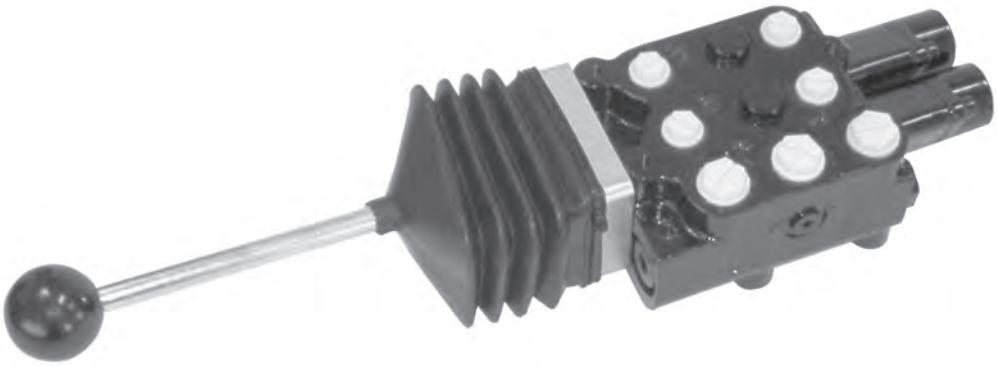
MODEL LV
MONO-BLOCK
Directional Control Valves
Especially Suited for Front Loader Market



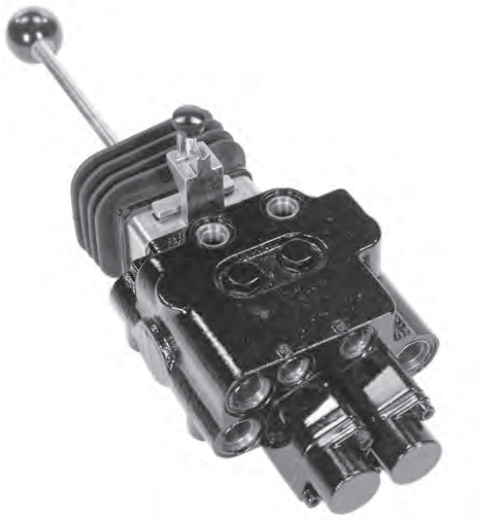
LVS Series Circuit
Top Ported or Semi-Rear Ported



LVT Parallel Circuit
Top Ported

LVR Parallel Circuit
Rear Ported

MODEL LVS SERIES LOADER VALVE



LVS SPECIFICATIONS

SERIES CIRCUIT (multifunction operation, simultaneous operation of both boom and bucket)
MAXIMUM OPERATING PRESSURE ..... 3000 PSI
MAXIMUM OPERATING TEMPERATURE ..... 180°F
RECOMMENDED SYSTEM FILTRATION ..... ISO 4406 19/17/14
NOMINAL FLOW RATING..... 11 GPM
WEIGHT 18.5lbs

STANDARD FEATURES

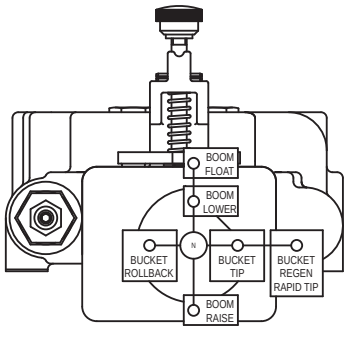
- Economical monoblock construction of high tensile strength gray cast iron
- Load check on each spool
- Hard chrome plated spools
- No face seals on spools
- Adjustable cartridge relief
- Power beyond available
- 4 Position Series Float Spool for loader boom
- 4 Position Regen Spool for loader bucket
- Molded rubber boot
- Patented dual spool lock joystick available

LVS

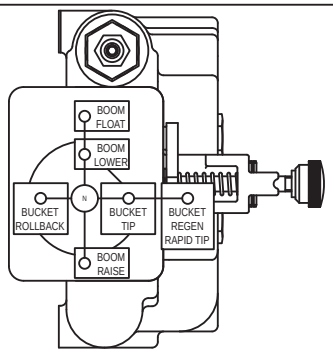
MODEL NUMBER	INLET & TANK PORT OPTION	WORK PORT OPTION	SPOOL & ACTION	RELIEF OPTIONS	POWER BEYOND OPTIONS	HANDLE OPTIONS
LVS Two spool loader valve Series circuit	1 Rear inlet & tank port #8 SAE ORB	A A & C work ports on top and B & D work ports on rear, #6 SAE ORB B Work ports on top, #6 SAE ORB C Work ports on top, #8 SAE ORB	GR Standard A-B 4 way 4 position float, spring center with float detent C-D 4 way 4 position selective regen, spring center with soft stop GB A-B 4 way 4 position float, spring center with float detent C-D 4 way 3 position spring center GF A-B 4 way 4 position float, spring center with float detent C-D 4 way 3 position (full time regen on bucket rollout) spring center	1 No Relief 4 Direct acting adjustable 500-1500 PSI set at 1000 PSI 5 Standard: Adjustable direct acting relief 1500-3000 PSI (set at 2000 PSI) 6 Pilot relief 500-3000 PSI (set at 2000 PSI) *For other relief settings please specify (see example on the left)	A Standard open center (field convertible to #8 SAE ORB top power beyond) B #8 SAE rear power beyond Note: Not for use with closed center sytems	1 Joystick & boot w/ dual spool lock, mounting feet down/to rear 2 Joystick & boot w/ dual spool lock, mounting feet to the left 3 Joystick & boot without spool lock, mounting feet down/to rear 4 Joystick & boot without spool lock, mounting feet to the left 8 No joystick or handle (tang ends on spool only)

***LVS1AGR5B1-25**

THE LAST TWO DIGITS ARE THE RELIEF SETTING IN HUNDREDS.
EX: 25=2500 PSI @ 10 GPM
ALL RELIEFS ARE SET AT 10 GPM.



JOYSTICK HANDLE OPERATION
LOOKING AT HANDLE KNOB
REF HANDLE OPTION 1



JOYSTICK HANDLE OPERATION
LOOKING AT HANDLE KNOB
REF HANDLE OPTION 2

LVS PRESSURE DROP

110 SUS OIL AT 115°F			
	Δ P-PSI		
FLOW (GPM)	INLET TO OUTLET	INLET TO WORK	WORK PORTS TO OUTLET
4	6	22	4
6	18	44	19
10	64	100	60

PART NUMBER	DESCRIPTION
660590029	SEAL KIT
660180170	SPRING CENTER FLOAT KIT
660180169	SPRING CENTER REGEN KIT
671400252	ROD END
660390016	ROD END W/STUD
671900084	SLIDING SPOOL STUD
660180154	SPOOL LOCK HARDWARE

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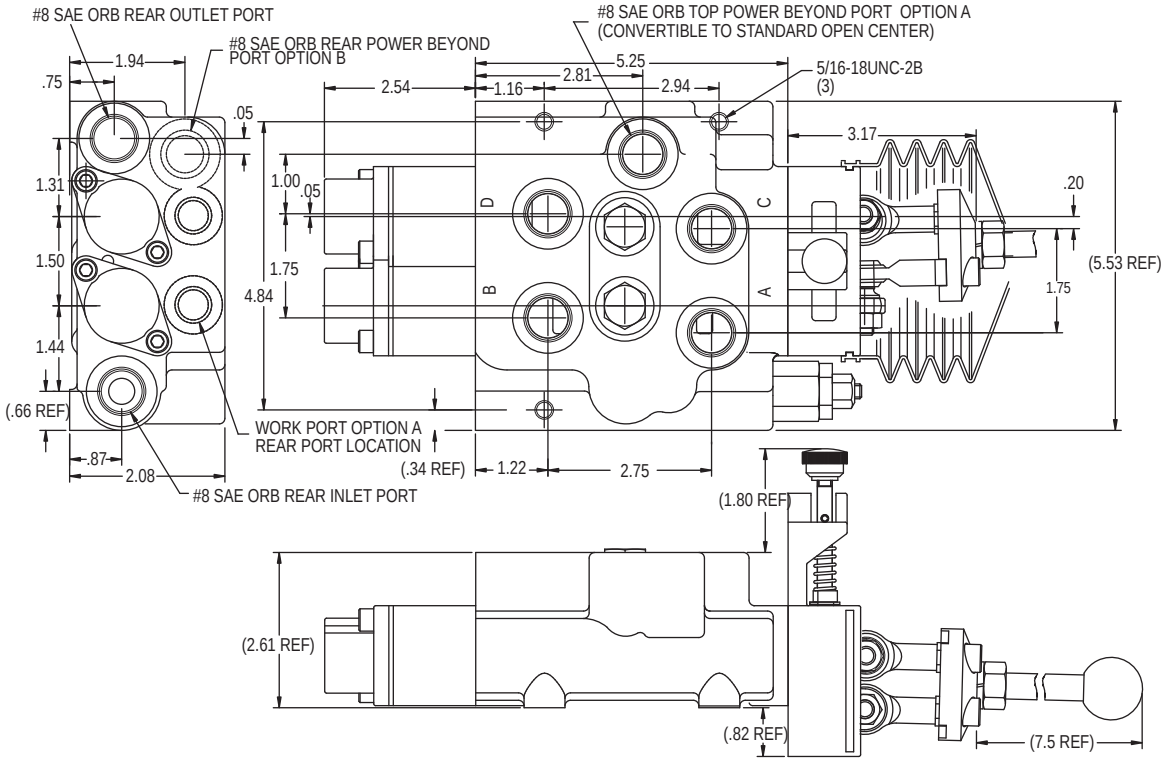
SEE PAGE 20 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

LVS SERIES LOADER VALVE DIMENSIONAL DATA



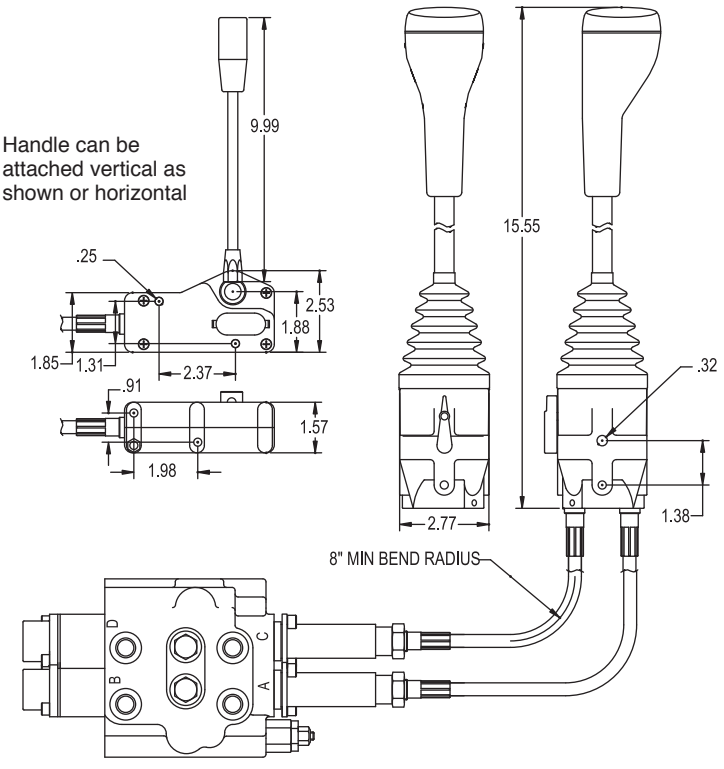
REMOTE CABLE CONTROLS FOR PRINCE VALVES

REMOTE CABLE CONTROL
Heavy duty remote cable controls are available for most Prince directional control valves. The compact controller bodies are of die-cast metal construction and are available in either dual axis or single axis configurations. Dual axis joysticks are constructed with steel swivels and anti-wear bushings. The high strength flexible control cables are jacketed and have quick attach connections.

REMOTE CONTROLLERS	Prince Part No.
Dual Axis Joystick with lock	660170038
Single Axis	660170039
CONTROL CABLES	
49 inches long (1.25 M)	660171125
59 inches long (1.5 M)	660171150
79 inches long (2.0 M)	660171200
89 inches long (2.25 M)	660171225
98 inches long (2.5 M)	660171250
VALVE CONNECTION KITS	
RD5000 series kit*	660170037
LVS, LVR or LVT, kit (loader valves)**	660170029
SV stack valve or RD4100 kit***	660170031
Series 20 stack valve kit****	660170035

SINGLE SPOOL CONTROL

DUAL AXIS CONTROLLER



Note: One control cable and one connection kit is required for each spool controlled. Order the remote controller, the control cables and the connection kits as necessary to complete the remote cable control assembly.

* Field convertible or order option 3, less handle assembly.

** Order loader valve handle option 8, tang end only.

*** Field convertible from standard handle or order option 6, clevis spool end only.

**** Field convertible or order option 3, less complete handle.

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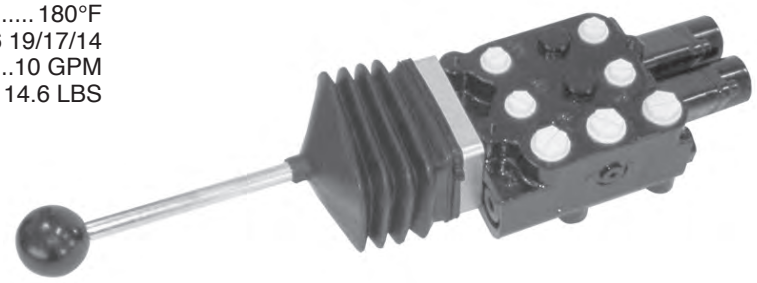
MODEL LVT TWO SPOOL MONO-BLOCK LOADER VALVE

LVT SPECIFICATIONS

PARALLEL CIRCUIT
MAXIMUM OPERATING PRESSURE .....3000 PSI
MAXIMUM TANK PRESSURE .....500 PSI
MAXIMUM OPERATING TEMPERATURE .....180°F
RECOMMENDED SYSTEM FILTRATION .....ISO 4406 19/17/14
FLOW RATING.....10 GPM
WEIGHT .....14.6 LBS

STANDARD FEATURES

- Economical monoblock construction of high tensile strength gray cast iron
- Load check on each spool
- Hard chrome plated spool
- Adjustable cartridge relief
- Open center, and power beyond available
- 4 Position Float Spool for loader boom
- 4 Position Regen Spool for loader bucket



5/16-18 UNC MOUNTING HOLES ON BOTH TOP AND BOTTOM OF VALVE

NOTE: NEUTRAL POSITION SPOOL LOCK AVAILABLE

LVT

MODEL NUMBER	PORT SIZE	SPOOL & ACTION	RELIEF VALVE	IN/OUT PORT	POWER BEYOND	HANDLE
LVT Top Ported Two Spool Loader Valve	1 #8 SAE In & Out #6 SAE work ports	GR Standard: A1-B1 4 Way 4 Position Float, Spring Center with Float Detent A2-B2 4 Way 4 Position Regen, Spring Center with Soft Stop RG A1-B1 4 Way 4 Position Regen, Spring Center with Soft Stop A2-B2 4 Way 4 Position Float, Spring Center with Float Detent GB A1-B1 4 Way 4 Position Float, Spring Center with Float Detent A2-B2 4 Way 3 Position Spring Centered BG A1-B1 4 Way 3 Position Spring Centered A2-B2 4 Way 4 Position Float, Spring Center with Float Detent BB A1-B1 4 Way 3 Position Spring Centered A2-B2 4 Way 3 Position Spring Centered	1 No Relief 4 Direct Acting Adjustable 500-1500 PSI Set at 1000 PSI 5 Standard: Direct Acting Adjustable 1500-3000 PSI Set at 2000 PSI 6 Pilot Operated Adjustable 500-3000 PSI Set at 2000 PSI *For other relief settings please specify (see example on the left)	A Standard: Top In, Out and Power Beyond B Side Inlet, Top Out & Power Beyond	B Standard: Open Center (Power Beyond Port Plugged) C #8 SAE Power D ** Closed Center (Often Used With No Relief. Review Application.) Note: Valve can be converted in the field.	1 Standard Handles 2 Clevis Spool End Only 3 Joystick for ports on bottom (Use with GR, GB, BG or BB) 4 Joystick for ports on left (Use with GR, GB or BB) 5 Joystick for ports on top (Use with RG, GB, BG or BB) 6 Joystick for ports on right (Use with RG, BG or BB) 7 Universal joystick contains parts and instructions for all mountings 8 Tang Spool End Only

***LVT1GR5AB7-25**

THE LAST TWO DIGITS ARE THE RELIEF SETTING IN HUNDREDS. EX: 25=2500 PSI @ 10 GPM. ALL RELIEFS ARE SET AT 10 GPM.

** PLEASE NOTE that this closed center option does not provide for the drain off of standby spool leakage. This can allow a very small amount of oil to enter the work ports when in neutral. Closed center option is often used with no relief. Review application.

STANDARD VALVES AVAILABLE:

All standard valves have a load check, a complete handle assembly, and an adjustable relief.

VALVE PART NUMBER	SPOOL TYPE			SPOOL ACTION	
	4 WAY 4 POSITION FLOAT SPOOL	4 WAY 3 POSITION SPOOL	4 WAY 4 POSITION REGEN SPOOL	A1-B1 SPOOL	A2-B2 SPOOL
LVT1BB5AB1		X		SPRING CENTER	SPRING CENTER
LVT1GB5AB1	X	X		FLOAT DETENT	SPRING CENTER
LVT1GB5AB3	X	X		FLOAT DETENT	SPRING CENTER
LVT1GR5AB3	X		X	FLOAT DETENT	REGEN POSITION
LVT1RG5AB5	X		X	REGEN POSITION	FLOAT DETENT
LVT1BG5AB5	X	X		SPRING CENTER	FLOAT DETENT

LVT PRESSURE DROP

110 SUS OIL AT 115°F

FLOW (GPM)	Δ P-PSI INLET TO OUTLET	Δ P-PSI INLET TO WORK PORTS	Δ P-PSI A OR B TO OUTLET
4	15	20	8
6	35	34	20
10	95	72	50

PART NUMBER	DESCRIPTION
660590017	SEAL KIT
660180078	SPRING CENTER KIT
660180076	SPRING CENTER FLOAT KIT
660180077	SPRING CENTER REGEN KIT
660180073	COMPLETE HANDLE KIT
660180011	HANDLE KIT
660180072	CLEVIS SUB-ASSY
660280004	RELIEF PLUG
660280009	RELIEF CART. OPTION 5
270006122	PILOT RELIEF CART. OPTION 6

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SEE PAGE 20 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

CATV 50-09-04-01

MODEL LVR TWO SPOOL MONO-BLOCK LOADER VALVE

5/16-18 UNC MOUNTING HOLES ON BOTH TOP AND BOTTOM OF VALVE

NOTE: NEUTRAL POSITION SPOOL LOCK AVAILABLE

LVR SPECIFICATIONS

PARALLEL CIRCUIT
MAXIMUM OPERATING PRESSURE .....3000 PSI
MAXIMUM TANK PRESSURE .....500 PSI
MAXIMUM OPERATING TEMPERATURE .....180°F
RECOMMENDED SYSTEM FILTRATION ....ISO 4406 19/17/14
FLOW RATING.....14 GPM
WEIGHT .....22.6 LBS

STANDARD FEATURES

- Economical monoblock construction of high tensile strength gray cast iron
- Load check on each spool
- Hard chrome plated spool
- Adjustable cartridge relief
- Open center, and power beyond available
- 4 Position Float Spool for loader boom
- 4 Position Regen Spool for loader bucket

LVR | | | | A | | |

MODEL NUMBER	PORT SIZE	SPOOL & ACTION	RELIEF VALVE	IN/OUT PORT	POWER BEYOND	HANDLE
LVR Rear Ported Two Spool Loader Valve	1 Standard: #10 SAE in/out #8 SAE work ports 2 #8 SAE in/out #6 SAE work ports	GR Standard: A-B 4 Way 4 Position Float, Spring Center with Float Detent C-D 4 Way 4 Position Regen, Spring Center with Soft Stop RG A-B 4 Way 4 Position Regen, Spring Center with Soft Stop C-D 4 Way 4 Position Float, Spring Center with Float Detent GB A-B 4 Way 4 Position Float, Spring Center with Float Detent C-D 4 Way 3 Position Spring Centered BG A-B 4 Way 3 Position Spring Centered C-D 4 Way 4 Position Float, Spring Center with Float Detent BB A-B 4 Way 3 Position Spring Centered C-D 4 Way 3 Position Spring Centered (no float, no regen)	1 No Relief 4 Direct Acting Adjustable 500-1500 PSI Set at 1000 PSI 5 Standard: Direct Acting Adjustable 1500-3000 PSI Set at 2000 PSI 6 Pilot Operated Adjustable 500-3000 PSI Set at 2000 PSI *For other relief settings please specify (see example on the left)	A All Ports On End of Valve	B Standard: Open Center (Power Beyond Port Plugged) C #8 SAE Power Beyond D ** Closed Center Note: Valve can be converted in the field.	1 Standard Handles 2 Clevis Spool End Only 3 Joystick for power beyond on Right (Use with GR, GB, BG or BB) 4 Joystick for power beyond on Bottom (Use with RG, BG or BB) 5 Joystick for power beyond on Left (Use with RG, BG, GB or BB) 6 Joystick for power beyond on Top (Use with GR, GB or BB) 7 Universal joystick contains parts and instructions for all mounting options 8 Tang Spool End Only

***LVR1GB5AB7-25**

THE LAST TWO DIGITS ARE THE RELIEF SETTING IN HUNDREDS.
EX: 25=2500 PSI @ 10 GPM
ALL RELIEFS ARE SET AT 10 GPM.

** PLEASE NOTE that this closed center option does not provide for the drain off of standby spool leakage. This can allow a very small amount of oil to enter the work ports when in neutral. Closed center option is often used with no relief. Review application.

LVR PRESSURE DROP

110 SUS OIL AT 115°F			
	Δ P-PSI		
FLOW (GPM)	INLET TO OUTLET	INLET TO A OR B	A OR B TO OUTLET
4	4	14	4
8	21	31	15
14	64	72	46

STANDARD VALVES AVAILABLE:

All standard valves have a load check, a complete handle assembly, and an adjustable relief.

VALVE PART NUMBER	SPOOL TYPE				SPOOL ACTION	
	4 WAY 4 POSITION FLOAT A-B SPOOL	4 WAY 3 POSITION A-B SPOOL	4 WAY 4 POSITION FLOAT C-D SPOOL	4 Way 3 POSITION C-D SPOOL	A-B SPOOL	C-D SPOOL
LVR1GB5AB6	X			X	FLOAT DETENT	SPRING CENTER
LVR1BG5AB4		X	X		SPRING CENTER	FLOAT DETENT

PART NUMBER	DESCRIPTION
660590018	SEAL KIT
660590016	POWER BEYOND SEAL KIT
660180079	SPRING CENTER KIT
660180074	SPRING CENTER FLOAT KIT
660180075	SPRING CENTER REGEN KIT
660180073	COMPLETE HANDLE KIT
660180011	HANDLE KIT
660180072	CLEVIS SUB-ASSY
660280004	RELIEF PLUG
660280009	RELIEF CART. OPTION 5
270006122	PILOT RELIEF CART. OPTION 6
660301001	OPEN CENTER PLUG
660390008	POWER BEYOND CART. (#8 SAE)

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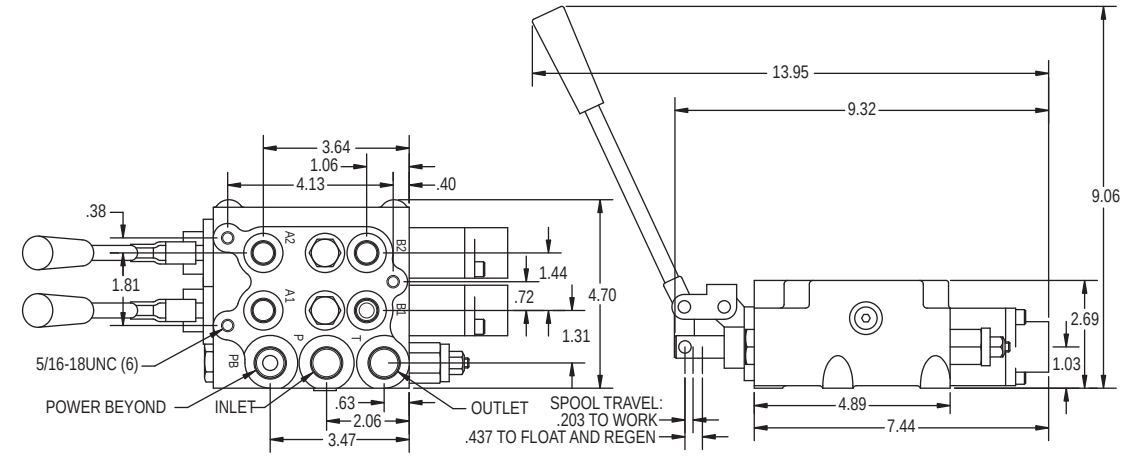
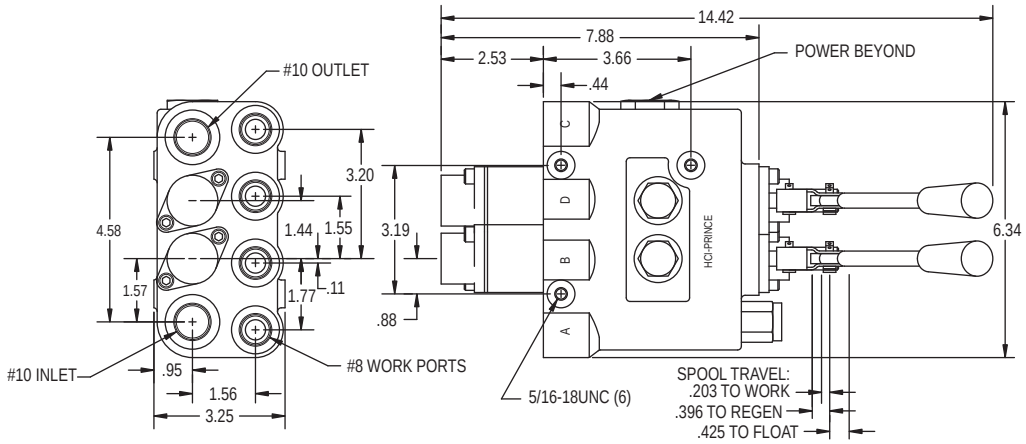
SEE PAGE 21 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

MODEL LVT/VR MOUNTING DIMENSIONS AND OPERATIONS



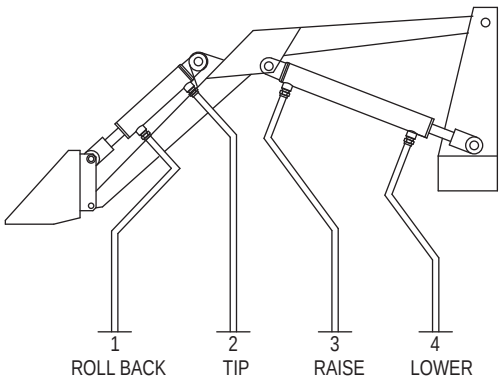


4 WAY 4 POSITION REGEN SPOOL OPERATION

This spool option allows for these four functions of the loader bucket cylinders: “NEUTRAL”, cylinder ports blocked to hold bucket in place; “BUCKET ROLLBACK” directs oil to hose 1 to retract bucket cylinder; “BUCKET TIP” directs oil to hose 2 to extend the bucket cylinder with full pressure (Please Note there is a soft stop at this handle position); “BUCKET REGEN” combines the oil from the tractor pump with the oil returning from hose 1 and it directs it to hose 2 to tip the bucket faster (referred to as REGENERATION or “REGEN”). It is necessary to push the handle past the soft stop at the normal bucket tip position to get to the regen position. Also Please Note that the cylinder force will be reduced when in the regen position.

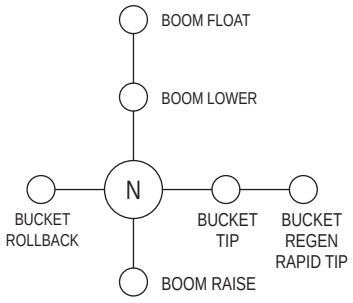
4 WAY 4 POSITION FLOAT SPOOL OPERATION

This spool option allows for these four functions of the loader boom cylinders: “NEUTRAL”, cylinder ports blocked to hold boom in place; “BOOM RAISE” directs oil to hose 3 to extend boom cylinders; “BOOM LOWER” directs oil to hose 4 to retract the boom cylinders with full pressure (Please Note there is a soft stop at this handle position); “BOOM FLOAT” connects all boom cylinder ports to tank allowing the boom to fall to the ground. It is necessary to push the handle past the soft stop at the normal boom down position. There is a detent that will hold handle in the float position. While in the float position the loader boom cylinders will move up and down or “FLOAT” to match the ground level as the tractor moves forward or backward.



Joystick Handle

The joystick handle will operate both spools using one lever handle. The two spools can be operated independently or at the same time depending upon handle movement. Because we allow for maximum mounting flexibility, we have 4 options for the LVT, 2 options for the LVS and 4 options for the LVR. The handle shift pattern for all is shown at right.



JOYSTICK HANDLE OPERATION LOOKING AT HANDLE KNOB

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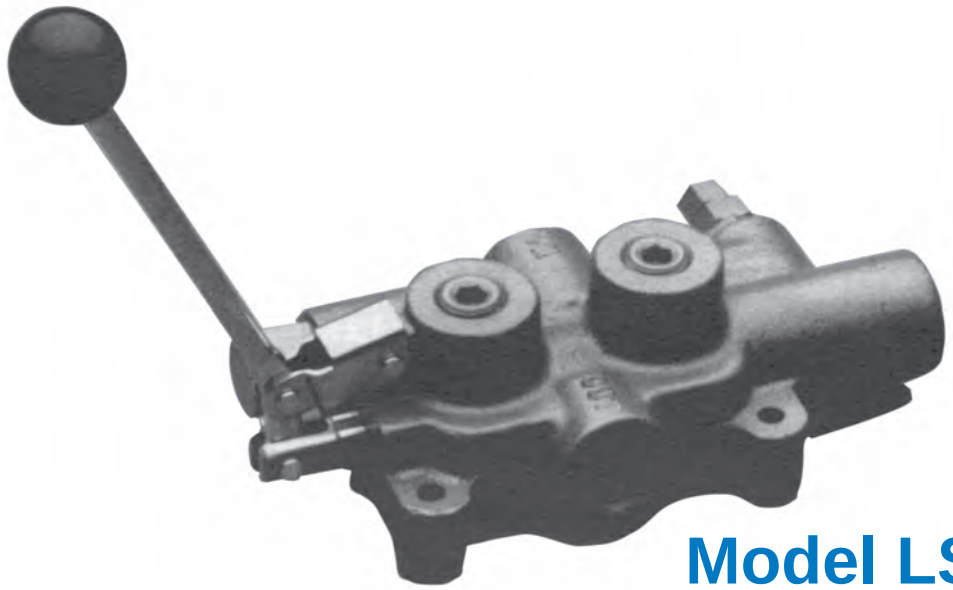
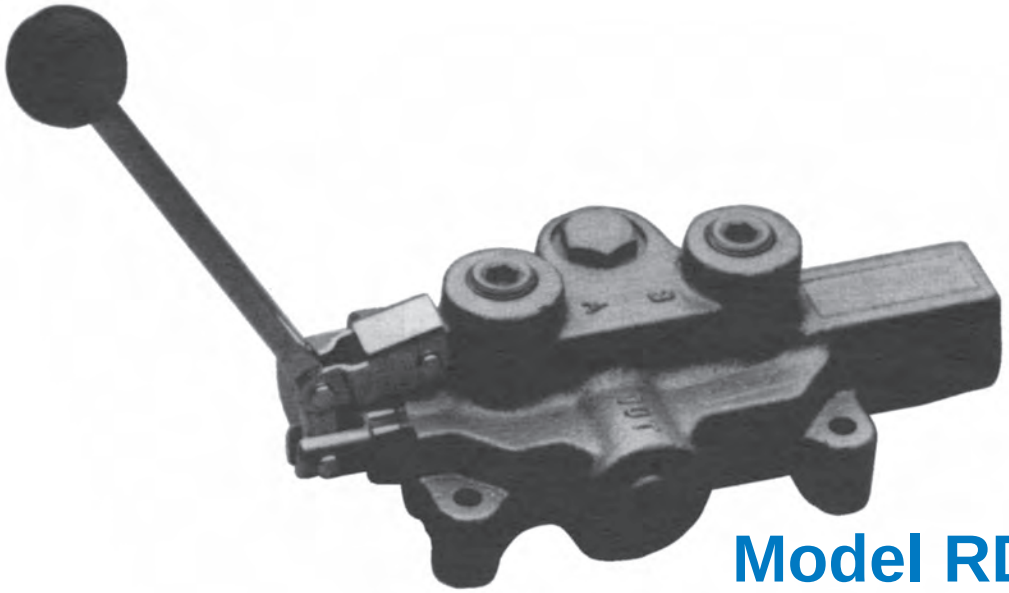
Directional Control Valves

LOG SPLITTER CONTROL VALVE



Model LS3000

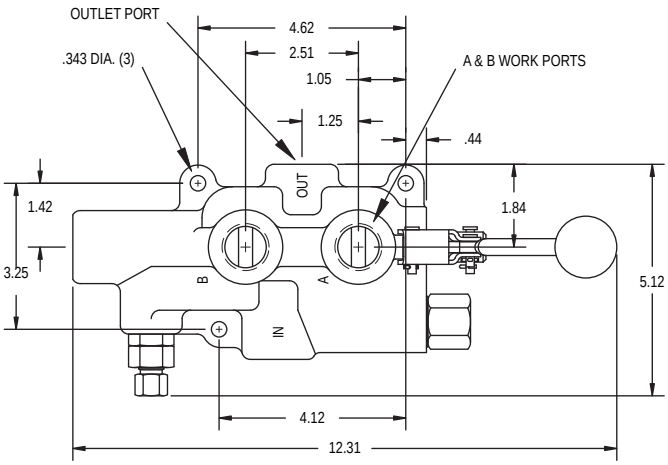
SINGLE SPOOL MONO-BLOCK 20GPM



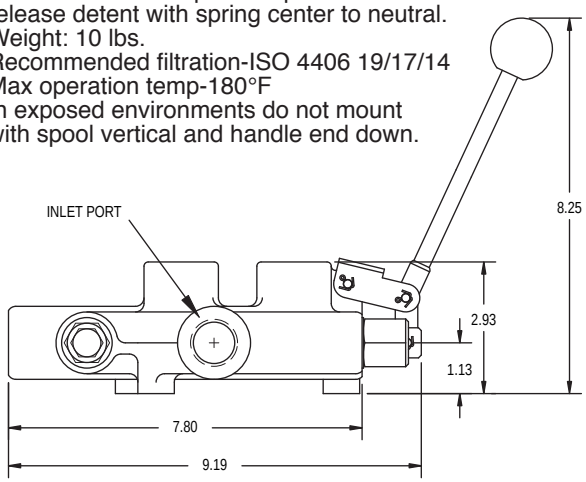
Model RD2500

MODEL LS3000 DIMENSIONAL DATA

On LS-3000 Models, pressure release detent is in the spool out position.
On LS-3060 Modesl, pressure release detent is in the spool in position.



SPECIFICATIONS:
1. Max design and test pressure 2750 PSI
2. Max tank port pressure-150 PSI
3. Flow rating-25 GPM max.
4. Relief valve setting-2250 PSI
5. This valve has one position pressure release detent with spring center to neutral.
6. Weight: 10 lbs.
7. Recommended filtration-ISO 4406 19/17/14
8. Max operation temp-180°F
9. In exposed environments do not mount with spool vertical and handle end down.



STANDARD FEATURES
- Hydraulically balanced, hard chrome plated spool
- Handle can be installed in “up” or “down” position
- Detent release pressure adjustable from 1000 to 2000 PSI
- For use with system flows up to 25 GPM
- Relief valve adjustable up to 2750 PSI
- Tandem center spool (in neutral position, both work ports blocked, pump unloaded to tank)
- Ideal for log-splitter applications. Available with 3/4” NPTF work ports for higher flow applications

PARTS LIST - LOG SPLITTER VALVES

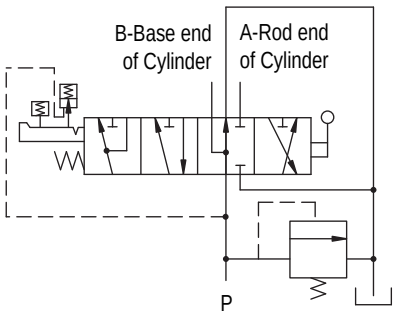
ITEM	PART NUMBER	DESCRIPTION
1	660130001	HANDLE KIT
2	660125004	RELIEF KIT
3	660130004	SPRING CENTER KIT
4	660330003	DETENT SLEEVE & PISON SUB-ASSY
5	660330002	DETENT ADJUSTING CARTRIDGE
6	660130007	COMPLETE PRESSURE RELEASE DETENT KIT
7	660530001	SEAL KIT (CONTAINS SEALS FOR SPOOL AND DETENT)

MODEL LSR-3060 RAPID EXTEND LOG SPLITTER VALVE

STANDARD FEATURES
- Hydraulically balanced, hard chrome plated spool
- Handle can be installed in “up” or “down” position
- Extend flows of up to 25 GPM with inlet flows of 4 GPM
- Relief valve adjustable up to 3500 PSI
- Tandem center spool
- Manual shift from high speed mode to high force mode
- Spring center 4 position spool with soft stop
- Pressure release detent on retract

FUNCTION:
The Prince LSR-3060-3 log splitter valve features an extremely fast “Rapid Extend” high speed mode. The LSR has been specifically designed to reduce system costs by allowing a single stage pump to be used in systems currently using two stage (hi-low) pumps. When extra splitting force is required, the LSR allows the user to manually shift form high speed mode to high force mode. A “soft stop” differentiates between high force and high speed modes. Laboratory testing has not shown a significant difference in working cycle times between single stage/rapid extend systems and two stage systems. (Working cycle is the average time between extending the cylinder to split the first log and extending to split the next log after the split wood has been removed and a new log has been placed on the log splitter.)

SPECIFICATIONS:
1. Max design and test pressure 3500 PSI
2. Max tank port pressure -150 PSI
3. Nominal inlet flow rating 4 gpm
4. Standard relief valve setting – 2250 psi
5. This valve has a pressure release detent from spool in w/ spring center to neutral
6. The valve has a 4 position spool with normal extend and retract positions and a 4th rapid extend position
7. Max operating temperature - 180°F.
8. In exposed environments, do not mount with spool in the vertical position
9. Dimensionally similar to the LS3000 valve



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CATV 54-09-04-01

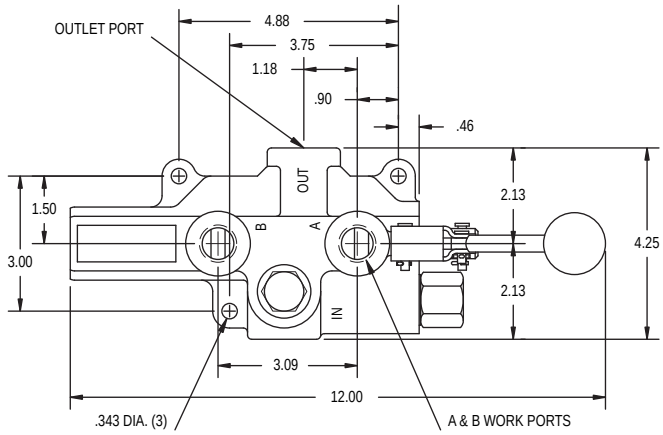
MODEL RD2500 DIMENSIONAL DATA

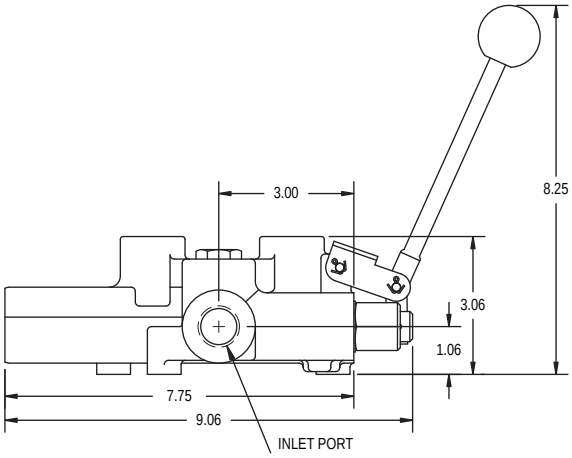
STANDARD FEATURES

- Economical monoblock construction of high tensile strength gray cast iron
- Load check
- Hard chrome plated spool
- Adjustable ball spring relief (1000 PSI to 3000 PSI)
- Open center to closed center conversion available on some models
- For use with system flows to 20 GPM
- For use with system pressures to 3000 PSI

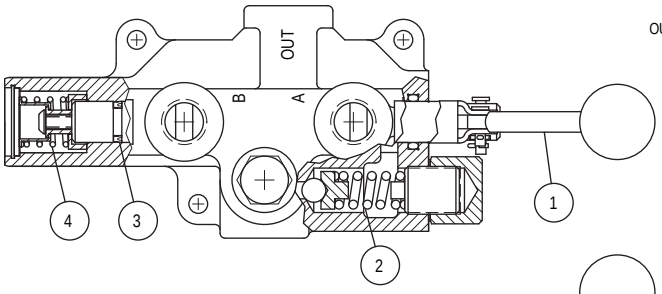
SPECIFICATIONS:

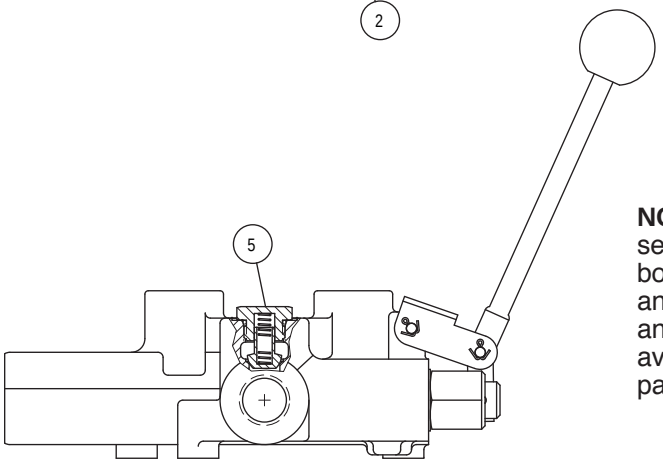
1. Max design and test pressure 3000 PSI
2. Max tank port pressure-150 PSI
3. Flow rating-20 GPM max.
4. Relief valve setting-1500 PSI
5. Weight: 9.5 lbs.
6. Recommended filtration-ISO 4406 19/17/14
7. Max operation temp-180°F
8. In exposed environments, do not mount with spool vertical and handle end down.

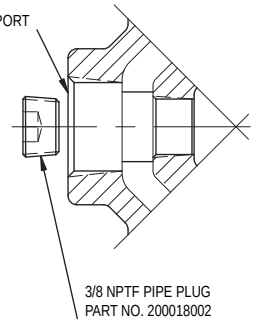




RD-2555-T4-ESA 1 PARTS BREAKDOWN

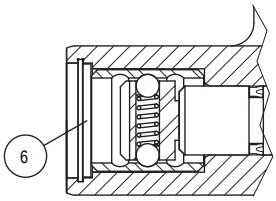






OPEN TO CLOSED CENTER CONVERSION This feature allows an otherwise open center valve to be converted to closed center operation. As shown, a 3/8 NPTF pipe plug is installed in the bottom of the outlet port to block open center passage. A pipe thread sealant should be used. This feature is standard on all valves with 3/4 NPTF inlet and outlet ports. The pipe plug is included with these models. Discard the pipe plug if the valve is used on an open center application. PLEASE NOTE that this closed center option does not provide for the drain off of standby spool leakage. This can allow a very small amount of oil to enter the work ports when in neutral.

NOTE: The Spool is select fit to the valve body at the factory and therefore body and spool are not available as repair parts.



3 POSITION DETENT

NON-STANDARD RELIEF SETTINGS
RD2575-T4-ESA1-25

THE LAST TWO DIGITS ARE THE RELIEF SETTING IN HUNDREDS. Ex: 25=2500 PSI @ 12 GPM. ALL RELIEFS ARE SET AT 12 GPM.

ITEM	PART NUMBER	DESCRIPTION
1	660130001	HANDLE KIT
2	660125004	RELIEF KIT
3	660525001	SEAL KIT
4	660125002	SPRING CENTER KIT
5	660150015	LOAD CHECK KIT
6	660125001	3 POSITION DETENT KIT

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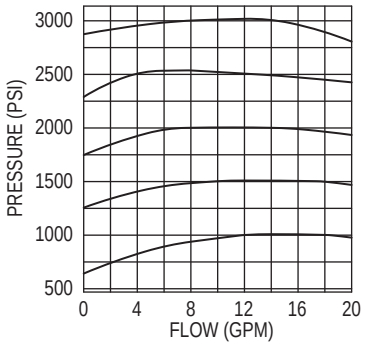
LS-3000, RD-2500 PRESSURE DROP, RELIEF CURVE AND STANDARD MODELS

PRESSURE DROP

110 SUS OIL AT 115° Δ P-PSI						
	RD-2500			LS-3000		
FLOW (GPM)	INLET TO OUTLET	INLET TO A OR B	A OR B TO OUTLET	INLET TO OUTLET	INLET TO A OR B	A OR B TO OUTLET
5	5	20	8	3	5	4
10	9	39	15	5	11	13
15	19	60	32	7	23	24
20	31	90	54	11	40	42

LS-3000/RD-2500 RELIEF VALVE CURVES AT VARIOUS SET POINTS 110 SUS OIL AT 115°F



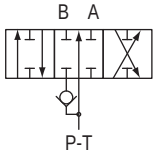
STANDARD VALVES AVAILABLE

All standard valves have a load check (except LS3000 models), a complete lever handle assembly, and an adjustable ball-spring relief, see below for settings. For other relief settings, please specify.

VALVE PART NUMBER	SPOOL TYPE			SPOOL ACTION			IN/OUT PORT SIZE	WORK PORT SIZE	RELIEF SETTING To Specify Other Settings See Next Page	CONVERTIBLE FROM OPEN CENTER TO CLOSED CENTER
	4 WAY 3 POSITION	4 WAY 3 POSITION MOTOR	3 WAY 3 POSITION	SPRING CENTER TO NEUTRAL	3 POSITION DETENT	PRESSURE RELEASE DETENT SPRING CENTER TO NEUTRAL				
RD-2555-T4-ESA1	X			X			1/2 NPTF	1/2 NPTF	1500 PSI @ 12 GPM	NO
RD-2575-T4-ESA1	X			X			3/4 NPTF	1/2 NPTF	1500 PSI @ 12 GPM	YES
RD-2575-T4-EDA1	X				X		3/4 NPTF	1/2 NPTF	1500 PSI @ 12 GPM	YES
RD-2575-T3-ESA1			X	X			3/4 NPTF	1/2 NPTF	1500 PSI @ 12 GPM	YES
RD-2575-M4-ESA1		X		X			3/4 NPTF	1/2 NPTF	1500 PSI @ 12 GPM	YES
RD-2508-T4-ESA1	X			X			#10 SAE	#8 SAE	1500 PSI @ 12 GPM	NO
RD-2575-M4-EDA1		X			X		3/4 NPTF	1/2 NPTF	1500 PSI @ 12 GPM	YES
LS-3000-1	X					X	3/4 NPTF	1/2 NPTF	2250 PSI @ 3 GPM	NO
LS-3000-2	X					X	3/4 NPTF	3/4 NPTF	2250 PSI @ 3 GPM	NO
LS-3060-1	X			X		X	3/4 NPTF	1/2 NPTF	2250 PSI @ 3 GPM	NO
LS-3040-1	X				X		3/4 NPTF	1/2 NPTF	2250 PSI @ 12 GPM	NO
LSR-3060-3	4 WAY 4 POSITION W/ MANUAL RAPID EXTEND					X	1/2 NPTF	3/4 NPTF	2250 PSI @ 3 GPM	NO

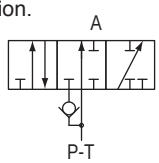
4 WAY SPOOL

This spool option is used to control a double acting cylinder. In neutral both of the work ports are blocked and oil goes through the open center passage to the outlet. This is the most popular spool option.



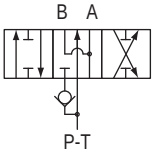
3 WAY SPOOL

This spool option is used to control a single acting cylinder or a uni-directional motor. In neutral the work port is blocked and oil goes through the open center passage to the outlet. The "B" work port is plugged for this option.



4 WAY MOTOR SPOOL

This spool option is used to control a reversing motor or a double acting cylinder. In neutral the work ports are connected to tank and oil goes through the open center passage to the outlet. This allows a motor to free-wheel or a cylinder to float in the neutral position.



LOAD CHECK

The load check feature is standard on all RD-2500 valve models. The load check will prevent the fall of a cylinder as the spool is shifted. It does this by preventing the back-flow of oil from work port to inlet. The pump must build up enough pressure to overcome the pressure on the work port and lift the load check poppet. The load check has nothing to do with holding a cylinder when the spool is in neutral.

CATV 56-09-04-01

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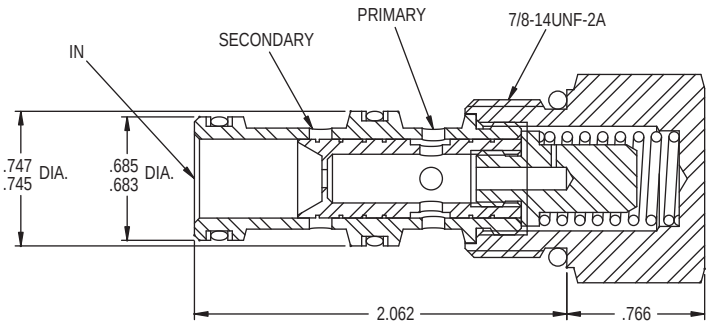
SEE PAGE 22 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

PRIORITY FLOW REGULATOR



DESCRIPTION:
This valve is a screw-in cartridge style, pressure compensated fixed-flow priority flow regulator. The valve delivers a constant flow to the priority port regardless of pressure on the secondary or primary circuit. All ports can be fully pressurized.

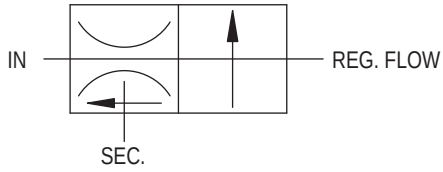
SPECIFICATIONS

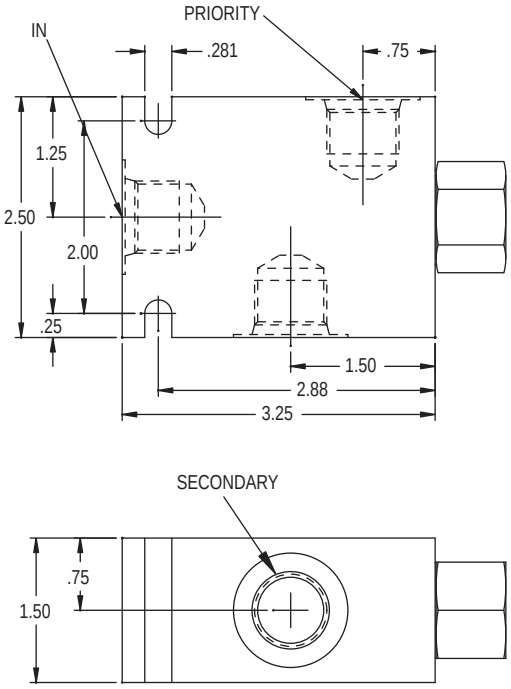
MAXIMUM PRESSURE .....3000 PSI
MAXIMUM INLET FLOW.....15 GPM
MAXIMUM CONTROL FLOW .....5 GPM
FLOW ACCURACY 1.5 to 5 GPM .....±10 %
MAXIMUM TEMPERATURE ..... 180°F
RECOMMENDED FILTRATION ...ISO 4406 17/14/19
THE CARTRIDGE IS ALL STEEL CONSTRUCTION
THE VALVE BODIES ARE HIGH STRENGTH ALUMINUM
INSTALLATION TORQUE 10-12 FT-LBS

FR10-3P - - -

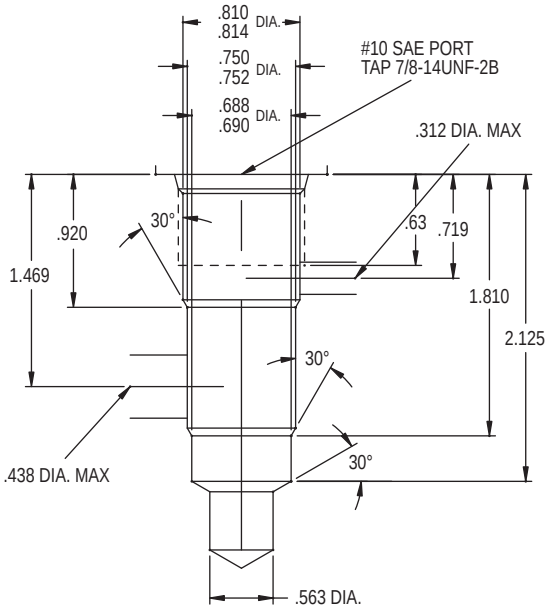
MODEL NUMBER	BASIC CARTRIDGE	PORTS	PRIORITY FLOW SETTING
	B BUNA-N V VITON	O CARTRIDGE ONLY 3P 3/8 NPTF 6S #6 SAE 8S #8 SAE	1.5 GPM PRIORITY FLOW 2.0 GPM PRIORITY FLOW 2.5 GPM PRIORITY FLOW 3.0 GPM PRIORITY FLOW 3.5 GPM PRIORITY FLOW 4.0 GPM PRIORITY FLOW 4.5 GPM PRIORITY FLOW 5.0 GPM PRIORITY FLOW

FOR PRIORITY FLOW SETTINGS OR PORT SIZES NOT LISTED, CONTACT YOUR SALES REPRESENTATIVE.





PMC CAVITY PMC10-3L



VALVES

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SEE PAGE 24 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

PRESSURE COMPENSATED ADJUSTABLE FLOW CONTROL VALVES

MODEL RD-100
TOP PORT FLOW CONTROL

MODEL RD-1900
SIDE PORT FLOW CONTROL

The PRINCE valve models RD-100 and RD-1900 are pressure compensated adjustable flow control valves. By rotating the handle, the flow out the "CF", or controlled flow port, can be varied from approximately 0 to the maximum controlled flow shown in the chart below. Any remaining flow is bypassed to the "EF" or excess flow port. This flow can be used to power another circuit or can be returned to tank. Once the controlled flow is set it will remain nearly constant with variations in pressure on either the controlled or excess flow ports.

Please note: If during operation the controlled flow port is blocked the valve will compensate in such a way as to shut off flow to the excess port.

These valves can also be used as a restrictive flow control by plugging the excess flow port.

The PRINCE valve models RDRS-100 and RDRS-1900 have a built in adjustable pressure relief. For these models the excess flow port **must** be connected to tank.

It should be noted that whenever these or any valve is used to bypass or restrict, flow heat will be generated. Steps may be required to keep oil temperature from becoming too high.

VALVE SPECIFICATIONS:

Capacity:	30 gpm max inlet flow
Pressure:	3000 psi max
Weight:	RD-100 8 lbs.
	RD-1900 9 lbs.

FIELD REPAIR KITS:

Handle hardware	660301002
Seal Kit	660501001

STANDARD MODELS AVAILABLE

MODEL NUMBER		PORT SIZES	CONTROLLED FLOW RANGE
RD-137-8	**RD-1937-8**	3/8 NPTF	0-8 GPM
RD-150-8	**RD-1950-8**	1/2 NPTF	0-8 GPM
RD-150-16	**RD-1950-16**	1/2 NPTF	0-16 GPM
RD-175-16	**RD-1975-16**	3/4 NPTF	0-16 GPM
RD-175-30	**RD-1975-30**	3/4 NPTF	0-30 GPM
RD-108-8	**RD-1908-8**	#8 SAE	0-8 GPM
RD-112-30	**RD-1912-30**	#12 SAE	0-30 GPM
RDRS-150-16	**RDRS-1950-16**	1/2 NPTF	0-16 GPM
RDRS-175-30	**RDRS-1975-30**	3/4 NPTF	0-30 GPM

For Other Relief Settings Please Specify:

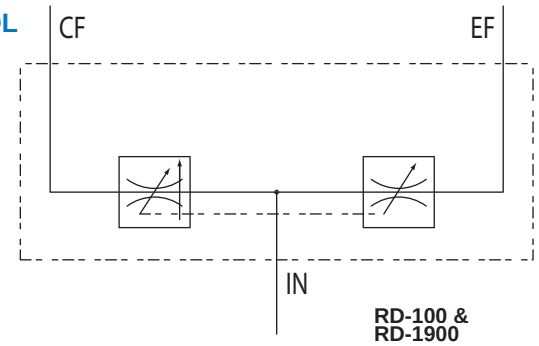
RDRS-150-16-20
Relief Pressure in Hundreds Example: 20=2000 PSI

RDRS-1950-16-20
Relief Pressure in Hundreds Example: 20=2000 PSI

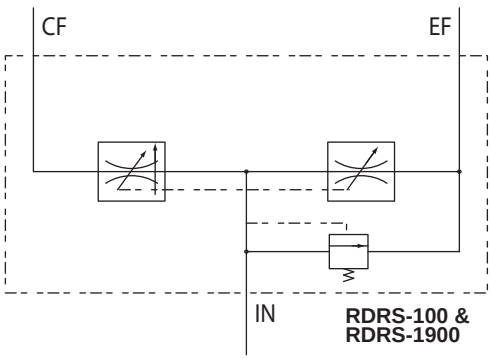
These models have built in relief set at 1500 psi @ 10 GPM.

Special combinations of port size and controlled flow range are available in O E M quantities.
Please consult your sales representative.

SYMBOL



RD-100 & RD-1900



RDRS-100 & RDRS-1900

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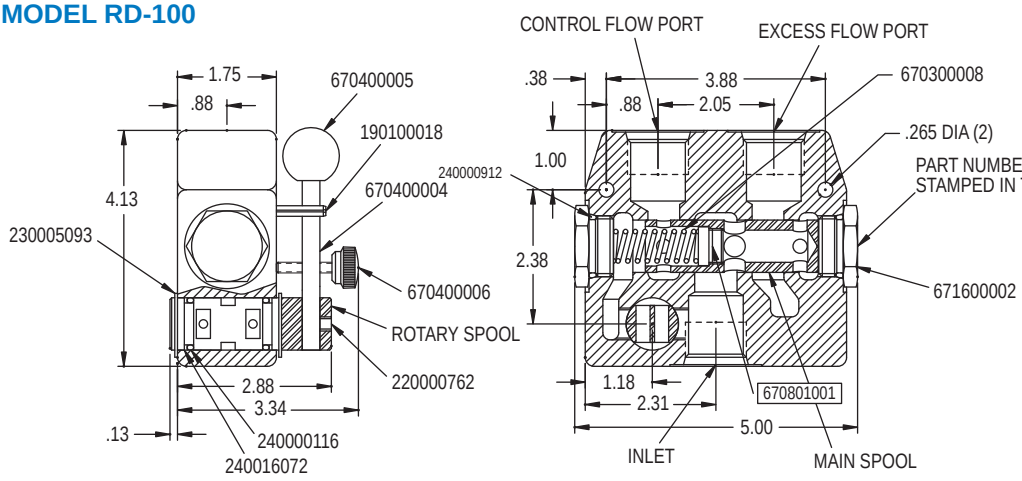
CATV 58-09-04-01

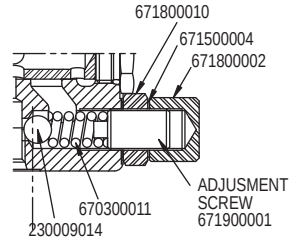
SEE PAGE 23 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

MODEL RD-100 AND RD-1900
PARTS BREAKDOWN AND DIMENSIONS

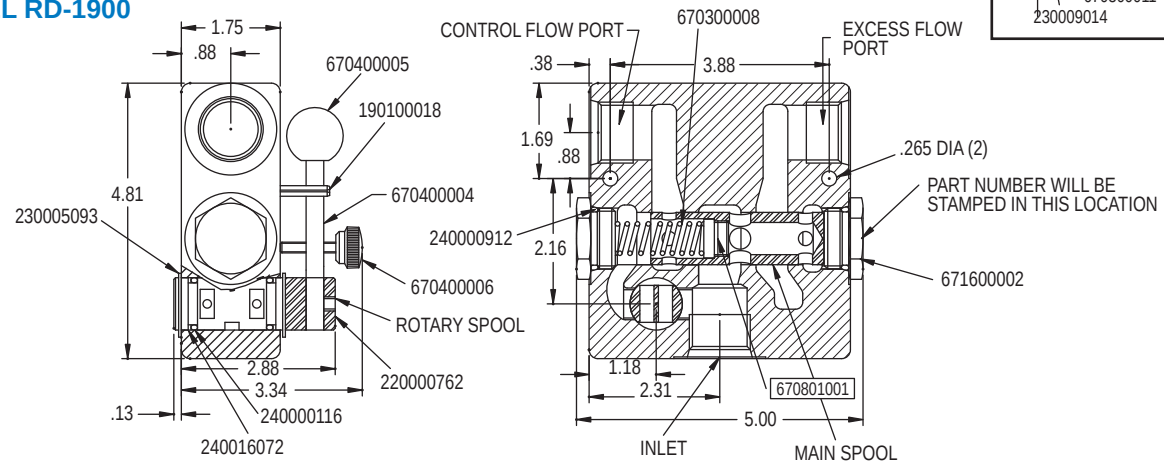
MODEL RD-100



RDRS MODEL RELIEF VALVE PARTS



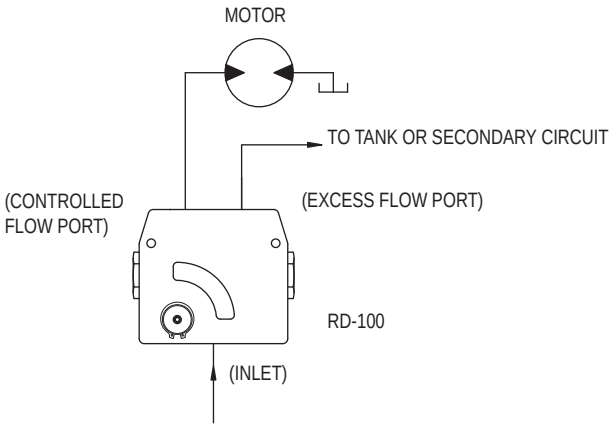
MODEL RD-1900



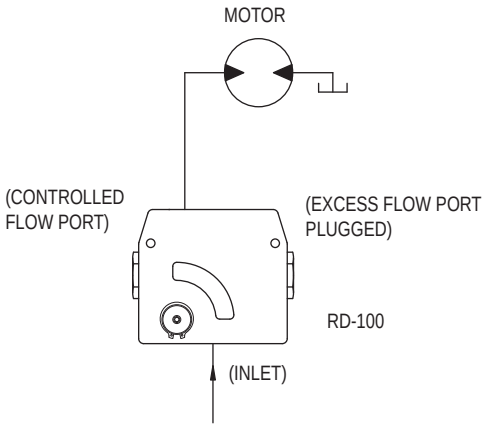
APPLICATIONS:

As illustrated in the circuit below the RD-100/RD-1900 adjustable flow control valves can be used to control the speed of a hydraulic motor. In this circuit oil from a source is directed into the inlet of the valve. By moving the handle the flow can be varied from approximately zero when handle is vertical to maximum when the handle is horizontal. Oil not going to the controlled flow port is bypassed to the excess flow port where it can be used to supply another circuit or returned to tank. Instead of the control flow directly supplying a motor it can be used as a adjustable priority divider and provide adjustable priority flow to a directional control valve bank. Also as illustrated the RD-100/RD-1900 can be used as a restrictive type flow control. In this circuit the excess flow port is blocked. This would normally be used with a pressure compensated pump or in a closed center system.

BYPASS FLOW CIRCUIT



RESTRICTIVE FLOW CIRCUIT



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CONSTANT VOLUME PRIORITY DIVIDERS

MODEL RD-400
FIXED FLOW PRIORITY DIVIDER

The PRINCE model RD-400 is a constant volume priority divider. It can be used in applications where two circuits are to be supplied by a single pump such as power steering systems. In operation the flow of oil supplied to the inlet is divided into two flows, the priority flow and the excess flow. The priority flow will remain nearly constant with variations in pressure on either the priority or excess flow port and will also remain nearly constant with variations in the inlet flow.

The priority flow GPM is determined by a fixed orifice inside the main spool. The desired priority GPM must be specified with model number, see below. The PRINCE model RD-400R provides the same function as described above with the addition of a built in pressure relief for the priority port only. This relief is internally adjustable and requires a separate line to tank. The relief is factory set at 1500 PSI.

VALVE SPECIFICATIONS:

Capacity: 30 gpm max inlet flow
Pressure: 3000 psi max

Weight: RD-400 7 lbs.
RD-400-R 7.5 lbs.

MODEL RD-400 R
FIXED FLOW PRIORITY DIVIDER WITH PRIORITY PRESSURE RELIEF

STANDARD MODELS AVAILABLE				PRIORITY GPM
VALVE MODEL NUMBER		PORT SIZE: INLET AND EXCESS PORT	PORT SIZE: PRIORITY PORT	
RD-400-___	**RD-400R- __**	3/4 NPTF	3/8 NPTF	1.5
RD-405-___	**RD-405R- __**	3/4 NPTF	1/2 NPTF	2
RD-412-___	**RD-412R- __**	#12 SAE	#8 SAE	3
RD-450-___	**RD-450R- __**	1/2 NPTF	3/8 NPTF	4
RD-455-___	**RD-455R- __**	1/2 NPTF	1/2 NPTF	5
RD-477-___	**RD-477R- __**	3/4 NPTF	3/4 NPTF	6
				7
				8
				9
				10
				12
				14

To complete the model number fill in the blank with the desired priority GPM from the list at right.
EX: RD-400-**3** for **3 GPM** priority flow; RD-405R-**6** for **6 GPM** priority flow.

MODEL RD-500
ADJUSTABLE FLOW PRIORITY DIVIDER

The PRINCE model RD-500 is an adjustable constant volume priority divider. This valve provides the same function as the PRINCE model RD-400 except the priority flow is adjustable from 2 GPM to 12 GPM. The priority flow is set using the adjusting screw and is then locked in place to maintain setting. This allows setting to be fine tuned in the field to the exact flow needed.

VALVE SPECIFICATIONS

Capacity: 30 gpm max inlet flow
Pressure: 3000 psi max
Weight: 7 lbs.

STANDARD MODELS AVAILABLE	
VALVE MODEL NUMBER	PORT SIZE
RD-537	3/8 NPTF
RD-550	1/2 NPTF
RD-575	3/4 NPTF

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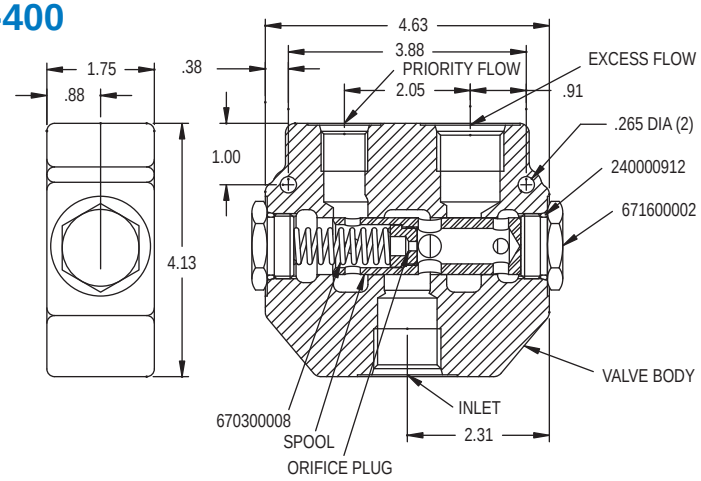
SEE PAGE 23 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

MODEL RD-400, RD-400R AND RD-500
PARTS BREAKDOWN AND DIMENSIONS

RD-400



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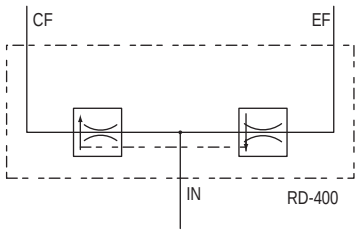
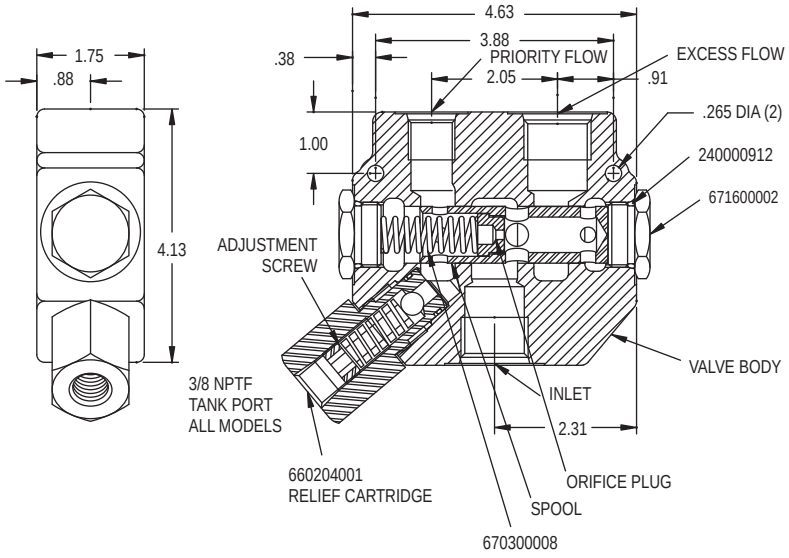


SEAL KIT NO. 660504001

RD-400R



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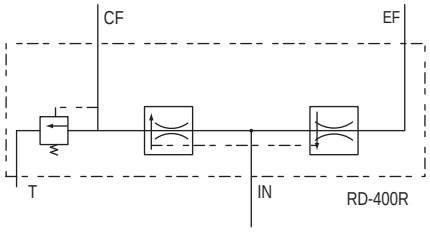
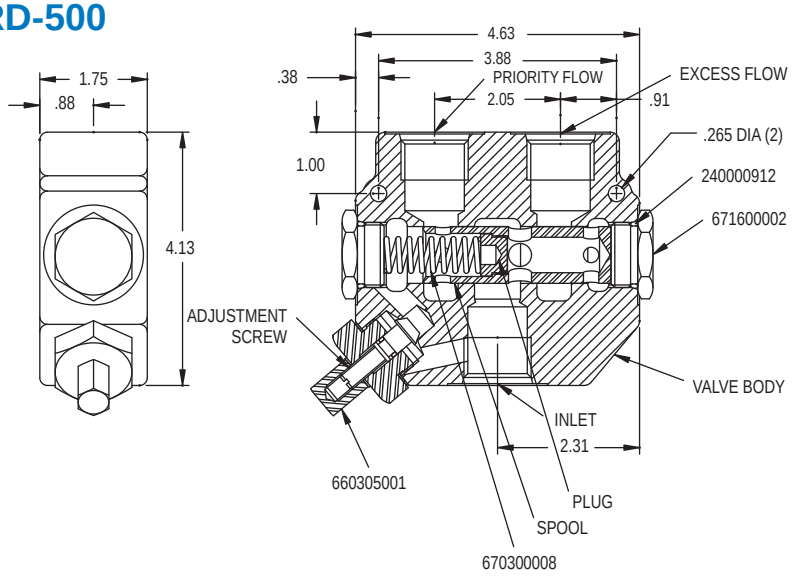


SEAL KIT NO. 660504002

RD-500



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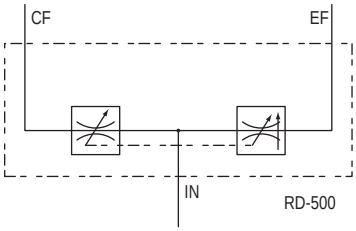

SEAL KIT NO. 660505001

NOTE: spools are not available separately

VALVES

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PRESSURE COMPENSATED PROPORTIONAL FLOW DIVIDERS

MODEL RD-200
PROPORTIONAL DIVIDER

MODEL RD-300
PROPORTIONAL DIVIDER
WITH FREE RETURN CHECKS

The PRINCE model RD-200 valve is a pressure compensated proportional flow divider. The standard models of this valve will take one inlet flow and split it into two nearly equal outlet flows. The valve is also available with special ratio spools which will split the flow into two flows proportional to the ratio specified. Because the valve is pressure compensated the valve will maintain the divider ratio with quite different loads on the outlet ports as long as the inlet flow is within the range given in the chart below. **Flow through the RD-200 cannot be reversed.**

The PRINCE model RD-300 provides the same function as the RD-200 with the added feature of free reverse checks. This allows the reverse flow of oil from the outlet ports to the inlet port. **The reverse flow is not pressure compensated.**

VALVE SPECIFICATIONS:

Capacity: 30 gpm max inlet flow
Pressure: 3000 psi max

Weight: RD-200 7 lbs.
RD-300 7 lbs.

STANDARD MODELS AVAILABLE

MODEL NUMBER			DIVIDER RATIO	PORT SIZE	INLET FLOW RANGE
RD-237-8	**RD-337-8**		50:50	3/8 NPTF	4-8 GPM
RD-250-16	**RD-350-16**	**RD-350-AB-16**	50:50	1/2 NPTF	8-19 GPM
RD-275-30	**RD-375-30**	**RD-375-AB-30**	50:50	3/4 NPTF	16-30 GPM
RD-208-8	**RD-308-8**		50:50	3/4 16 SAE	4-8 GPM
RD-212-30	**RD-312-30**		50:50	1-1/16-12 SAE	16-30 GPM

In OEM quantities the RD-200 and RD-300 valves are available with special divider ratios. Ratios available are: 2:1, 80:20, 70:30, 60:40, and others as required. When ordering specify the divider ratio after the model number. EXAMPLE: RD-250-16 (70:30)

MODEL RD-500P
PROPORTIONAL DIVIDER
WITH ADJUSTABLE ORIFICE

The PRINCE model RD-500P is a pressure compensated proportional flow divider valve with one fixed and one adjustable orifice. This valve provides the same function as the RD-200 except the divider ratio can be changed in the field.

VALVE SPECIFICATIONS:

Capacity: 30 gpm max inlet flow
Pressure: 3000 psi max

Weight: RD-500P 7 lbs.

STANDARD MODELS AVAILABLE

MODEL NUMBER	PORT SIZE	INLET FLOW RANGE
RD-537P-8	3/8 NPTF	4-8 GPM
RD-550P-16	1/2 NPTF	8-16 GPM
RD-575P-30	3/4 NPTF	16-30 GPM

MODEL RD-1000S
INTERNALLY PILOTED
SEQUENCE VALVE WITH
EXTERNAL DRAIN

The PRINCE valve model RD-1000S is an internally piloted adjustable sequence valve. This valve will prevent the flow of oil from going to the sequence port until the pressure on the inlet port reaches the sequence pressure. The sequence pressure is adjustable within the range given in chart below. A built in check valve allows flow from sequence port to inlet. To operate properly the **drain port must be connected to tank.** This valve is a spool type sequence valve and will provide smooth operation but should not be used in applications that require low leakage.

VALVE SPECIFICATIONS:

Capacity: 30 gpm max inlet flow
Pressure: 3000 psi max

Weight: 7 lbs.

STANDARD MODELS AVAILABLE

MODEL NUMBER	PORT SIZE INLET AND SEQUENCE	DRAIN PORT
RD-1050S___	1/2 NPTF	3/8 NPTF
RD-1075S___	3/4 NPTF	3/8 NPTF

SPRING	SEQUENCE PRESSURE
L	40-350 PSI
M	350-1700 PSI
H	1400-2500 PSI

To complete the model number fill in the blank with the spring letter that corresponds to desired counter balance pressure range. **EXAMPLE:** RD-1050SM for 350-1700 psi spring range.
Standard settings are 300 psi, 1500 psi and 1500 psi for ranges L, M and H respectively.

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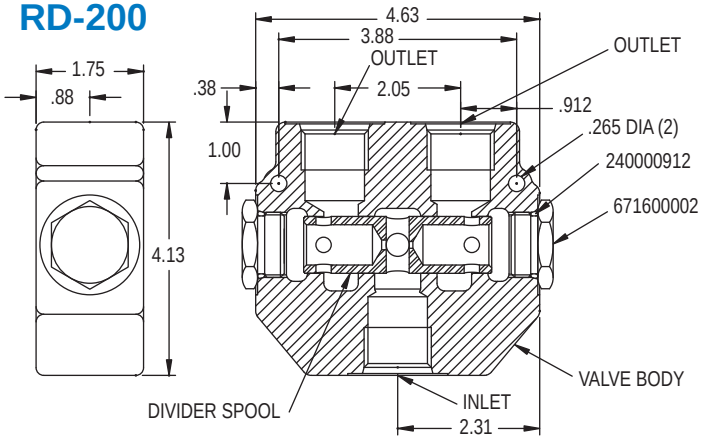
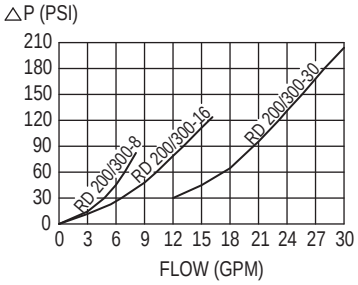
SEE PAGE 23 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

MODEL RD-200, RD-300, RD-300AB, RD-500P, AND RD-1000S PARTS BREAKDOWN AND DIMENSIONS

RD-200





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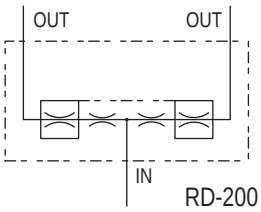
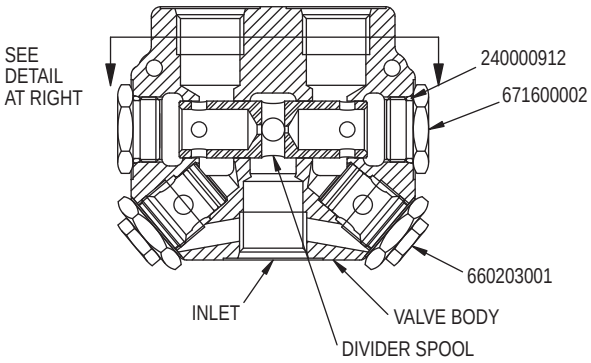
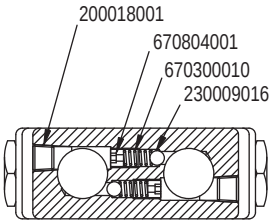


RD-200

SEAL KIT NO. 660502001

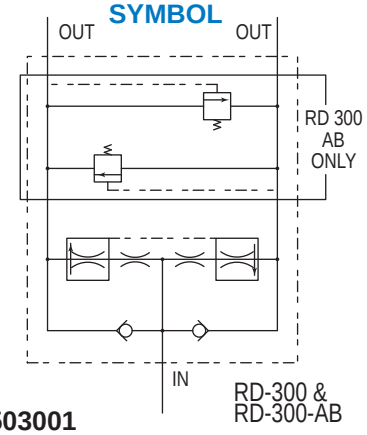
RD-300





The RD-300AB valve has a built-in automatic bypass. This allows oil to crossover from one outlet to the other when the pressure difference between the two outlet reaches 750 PSI.

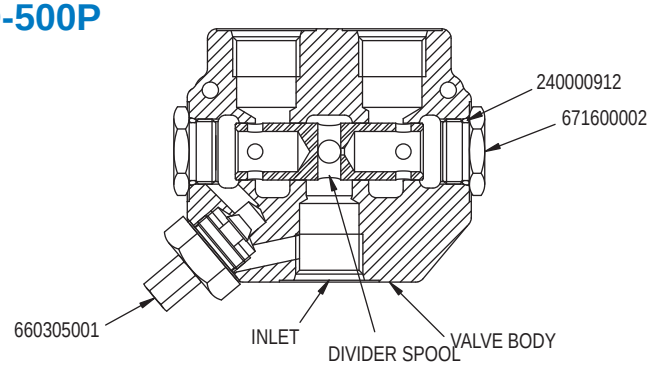
SYMBOL



RD-300 &
RD-300-AB

SEAL KIT NO. 660503001

RD-500P



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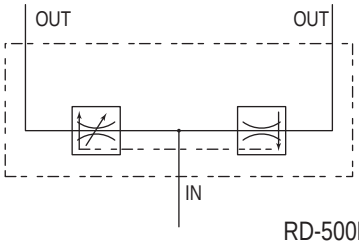
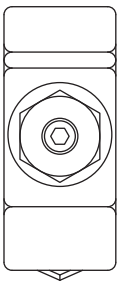
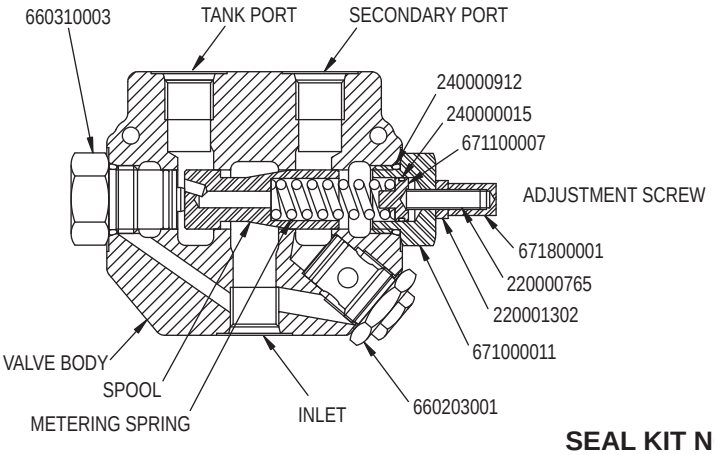


RD-500P

SEAL KIT NO. 660505001

RD-1000S





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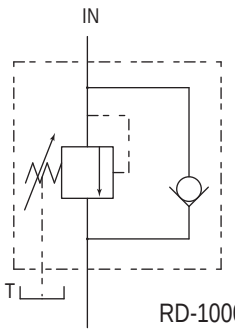

RD-1000S

SEAL KIT NO. 660510001

VALVES

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DIFFERENTIAL POPPET STYLE RELIEF VALVES - RV AND DRV SERIES

MODEL RV
DIFFERENTIAL POPPET
INLINE RELIEF

The PRINCE valve model RV is a differential poppet type inline relief. The valve is made up of a relief cartridge and a cast iron valve body. The differential poppet type relief provides smooth quiet performance with a minimum variation between cracking and full flow pressures. This type relief is also less sensitive to system contamination. The model RV is well suited as a system relief up to 30 GPM and 3000 psi. It is available in two pressure ranges and both an externally adjustable and shim adjustable version.

VALVE SPECIFICATIONS:
Capacity: 30 gpm max inlet flow Weight: 3 lbs.
Pressure: 3000 psi max

MODEL DRV
DIFFERENTIAL POPPET
DOUBLE RELIEF

The PRINCE valve model DRV is a differential poppet type double relief. This valve uses the same relief cartridge as the model RV. The double relief is used in systems that require cross over relief protection such a reversible hydraulic motor, or systems that require a cushion valve such as double acting cylinders.

VALVE SPECIFICATIONS:
Capacity: 30 gpm max inlet flow Weight: 5.5 lbs.
Pressure: 3000 psi max

MODEL RV-O
DIFFERENTIAL POPPET
RELIEF CARTRIDGE

The PRINCE valve model RV-0 is the differential poppet relief cartridge used in many valve models. It is available preset to install into RV valves in the field or into a custom application. This relief cartridge can also be used in the RD5100, RD5200, RD5300 and SV stack valve inlet section.

VALVE SPECIFICATIONS:
Capacity: 30 gpm max inlet flow
Pressure: 3000 psi max

STANDARD MODELS AVAILABLE

MODEL NUMBER	MODEL NUMBER	VALVE TYPE	RELIEF SETTING	PORT SIZE
RV-1H	**DRV-1HH**	ADJUSTABLE 1500-3000 PSI	2000 PSI @ 10 GPM	#12 SAE
RV-2H	**DRV-2HH**	ADJUSTABLE 1500-3000 PSI	2000 PSI @ 10 GPM	3/4” NPTF
RV-4H	**DRV-4HH**	ADJUSTABLE 1500-3000 PSI	2000 PSI @ 10 GPM	1/2” NPTF
RV-2L	**DRV-2LL**	ADJUSTABLE 500-1500 PSI	1000 PSI @ 10 GPM	3/4” NPTF

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SEE PAGE 23 & 24 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

MODEL RV AND DRV SPECIAL MODELS AND MOUNTING DIMENSIONS

SPECIAL MODEL RV RELIEF VALVES

Other relief valve models not listed on previous page are available in OEM quantities. To select a model number use the order code matrix shown at right. Consult a sales representative if options other than those listed are required.

RV — ____ ____ — ____

MODEL NUMBER	PORT SIZE	RELIEF TYPE	PRESSURE SETTING
RV	1 - #12 SAE 2 - 3/4 NPTF 3 - #10 SAE 4 - 1/2 NPTF 5 - #8 SAE O - Cartridge Only. No Body.	H- Adjustable 1500-3000 PSI L- Adjustable 500-1500 PSI NH- Non-Adjustable 1500-3000 PSI NL- Non-Adjustable 500-1500 PSI	Specify Relief Pressure in PSI. Leave Blank for Standard Setting STANDARD SETTING 2000 PSI for H and NH 1000 PSI for L and NL

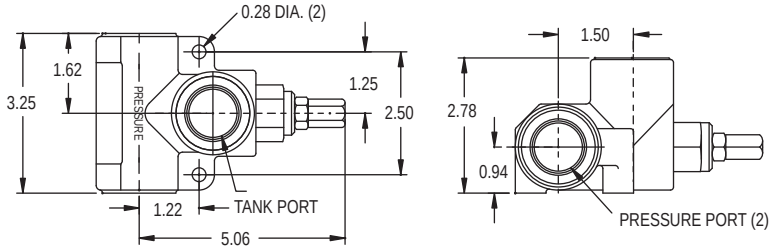
SPECIAL MODEL DRV RELIEF VALVES

Other relief valve models not listed on previous page are available in OEM quantities. To select a model number using the order code matrix at right. Consult a sales representative if options other than those listed are required.

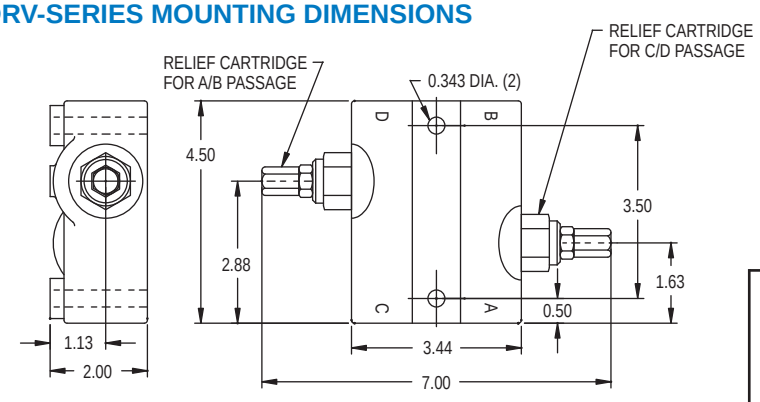
DRV — ____ ____ — XX XX

MODEL NUMBER	PORT SIZE	RELIEF TYPE Port A/B #1	RELIEF TYPE Port C/D #2	RELIEF SETTINGS (PSI) Port A/B Port C/D
DRV	1 - #12 SAE 2 - 3/4 NPTF 3 - #10 SAE 4 - 1/2 NPTF 5 - #8 SAE	H- Adjustable 1500-3000 PSI L- Adjustable 500-1500 PSI NH- Non-Adjustable 1500-3000 PSI NL- Non-Adjustable 500-1500 PSI	H- Adjustable 1500-3000 PSI L- Adjustable 500-1500 PSI NH- Non-Adjustable 1500-3000 PSI NL- Non-Adjustable 500-1500 PSI	Relief Settings: The two digits represent the relief settings in 100s to the nearest 100 PSI for the respective ports. EXAMPLE: 08 = 800 PSI 17 = 1700 PSI

RV-SERIES MOUNTING DIMENSIONS



DRV-SERIES MOUNTING DIMENSIONS



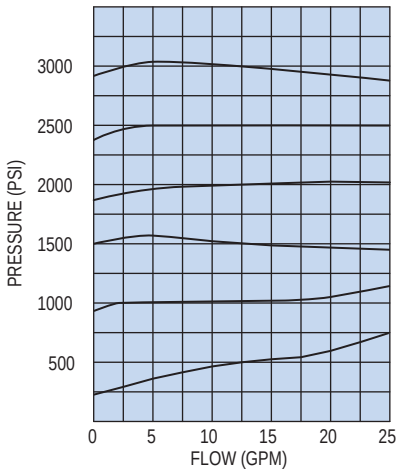
FIELD CONVERSION KITS:

660250002	ADJ. RELIEF CARTRIDGE 1500-3000 PSI RV ONLY
660250003	ADJ. RELIEF CARTRIDGE 500-1500 PSI*
660250004	NON-ADJUSTABLE RELIEF CARTRIDGE 1500-3000 PSI RV ONLY
660250005	NON-ADJUSTABLE RELIEF CARTRIDGE 500-1500 PSI*
660250011	ADJ. RELIEF CARTRIDGE 1500-3000 PSI DRV ONLY
660250012	NON-ADJUSTABLE RELIEF CARTRIDGE 1500-3000 DRV ONLY
660590001	RV SEAL KIT
660590004	DRV SEAL KIT
670300005	1500-3000 PSI RELIEF SPRING
670300006	500-1500 PSI RELIEF SPRING

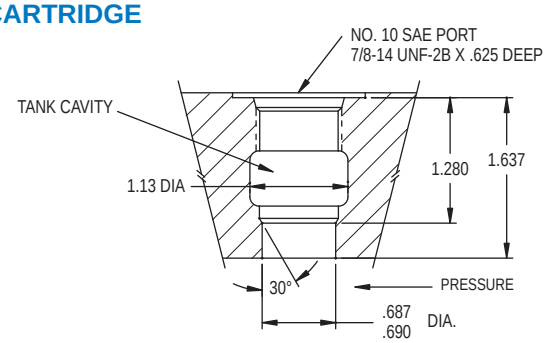
* NOTE: THESE CARTRIDGES ARE THE SAME ON BOTH RV AND DRV VALVES

RV-SERIES RELIEF CURVES

AT VARIOUS SET POINTS.
110 SUS OIL AT 115°F.



MACHINING DIMENSIONS FOR RELIEF VALVE CARTRIDGE



VALVES

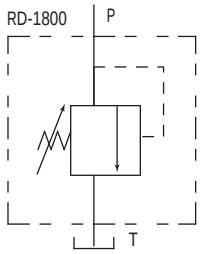
MODEL RD-1800 PRESSURE RELIEF
MODEL RD-900 SELECTOR VALVE

MODEL RD-1800
BALL/SPRING TYPE
DIRECT ACTING RELIEF

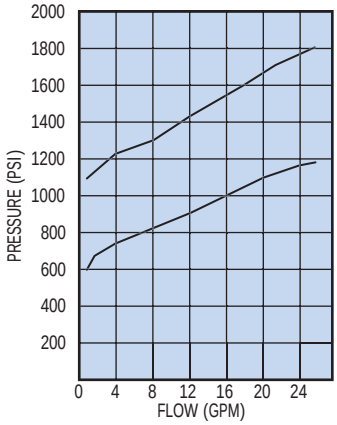
The PRINCE valve model RD-1800 is a direct acting ball/spring type pressure relief. The valve is compact and simple in design. This type relief is fast opening and is well suited for pressure spike protection. The performance curves below indicate the low cracking pressure typical to ball/spring reliefs. Please refer to the model RV relief for a system pressure relief. The valve is available with a standard steel seat, model RD-1800S, or with a hardened seat, model RD-1800H. Both models are externally adjustable.

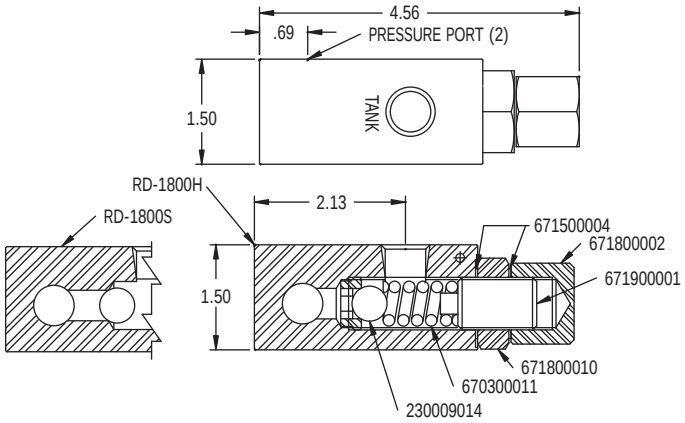
VALVE SPECIFICATIONS:
Capacity: 20 gpm max inlet flow
Pressure: 2500 psi max
Weight: 2 lb.
Adjustment Range: 1000 PSI to 2500 PSI

SYMBOL



RELIEF VALVE CURVE
AT VARIOUS SET POINTS
110 SUS OIL AT 115°F.





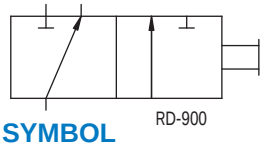
STANDARD MODELS AVAILABLE		
MODEL #	PORT SIZES	MAX FLOW
RD-1837S	3/8 NPTF	8 GPM
RD-1850H	1/2 NPTF	16 GPM
RD-1850S	1/2 NPTF	16 GPM
RD-1875S	3/4 NPTF	20 GPM

NOTE: Relief settings are 1500 PSI @ 12 GPM. For non-standard relief settings specify PSI in hundreds and GPM after model number.
EX: RD-1850S-**12-10** for **1200 PSI @ 10 GPM**

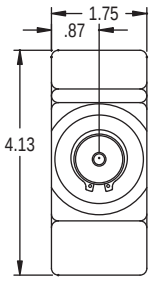
MODEL RD-900
SELECTOR VALVE

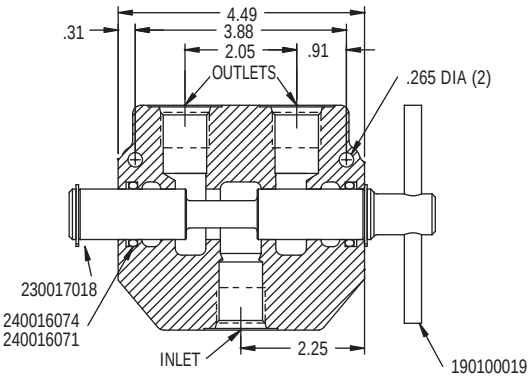
The PRINCE valve model RD-900 is a manual 3-way 2-position selector valve. This valve will allow one pump source to supply two separate circuits. Pushing the handle in diverts oil flow to port away from handle. Pulling the handle out diverts oil flow to port nearest handle.

SYMBOL



VALVE SPECIFICATIONS
Capacity: 30 gpm max inlet flow
Pressure: 3000 psi max
Weight: 7 lbs.





STANDARD MODELS	
MODEL #	PORT SIZES
RD-950 RD-975	1/2 NPTF 3/4 NPTF

SEAL KIT 660590025

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SINGLE SELECTOR VALVE

MODEL SS SELECTOR

The PRINCE valve model SS is a manual 3-way 2 position selector valve. This valve will allow one pump source to supply two circuits. With the standard selector spool pulling the spool out diverts oil to port nearest handle, pushing the spool in diverts oil to the port away from the handle. The valve has an inlet on both the bottom and front of the valve body. Special options include lever handle and a float spool. The float spool connects the inlet to both outlets when the spool is pushed in and block both outlets when spool is pulled out.

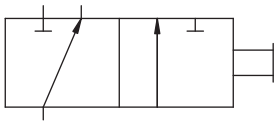
VALVE SPECIFICATIONS:

Capacity: 20 gpm max inlet flow
Pressure: 2500 psi max
Weight: 4 lbs.

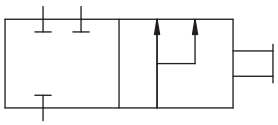
KITS:

END CAP KIT	660170009
LEVER HANDLE KIT	660170007
SEAL KIT	660590006
KNOB PART NO.	670400031
SNAPPING PART NO.	230017021
CLEVIS PART NO.	671900011
SPRING OFFSET	660170008

SYMBOL



SS SELECTOR SPOOL



SS FLOAT SPOOL

STANDARD MODELS AVAILABLE		
MODEL NUMBER	**PORT SIZE**	**DESCRIPTION**
SS-2A1D	1/2 NPTF	SELECTOR WITH KNOB HANDLE
SS-3A1D	#8 SAE	SELECTOR WITH KNOB HANDLE
SS-2A1A	1/2 NPTF	SELECTOR WITHOUT ATTACHMENTS
SS-2A1E	1/2 NPTF	SELECTOR WITH LEVER HANDLE
SS-2A1B	1/2 NPTF	SELECTOR WITH CLEVIS

SPECIAL MODEL SS SELECTOR VALVES

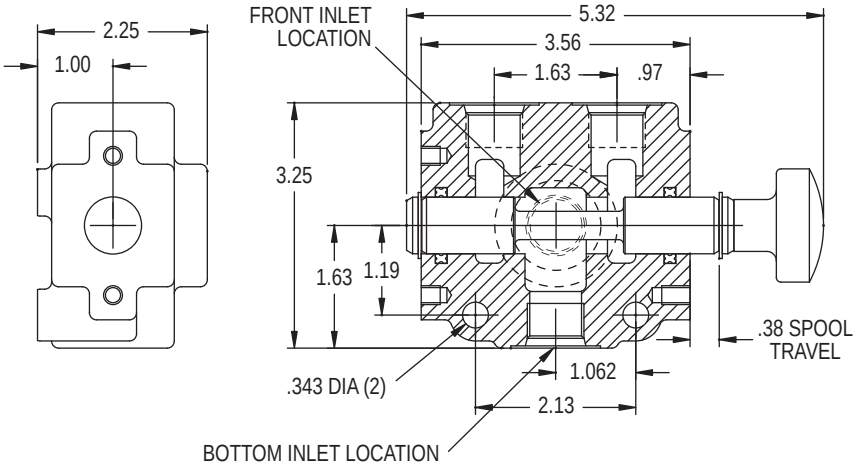
Other selector valves not listed as standard above are available in **OEM quantities**. To select a model number use the order code matrix at right. Consult a sales representative if options other than those listed are required.

SS —

MODEL	PORT SIZE	SPOOL	SPOOL ATTACHMENTS	HANDLE
SS	1-3/8 NPTF 2-1/2 NPTF (standard) 3-#8 SAE 4-#10 SAE	A SELECTOR (standard) B FLOAT	1-NONE (standard) 2-END CAP ONLY 3-SPRING OFFSET SPOOL OUT	A-NONE B-CLEVIS ONLY C-CLEVIS W/ PINS AND LINK D-KNOB (standard) E-LEVER HANDLE

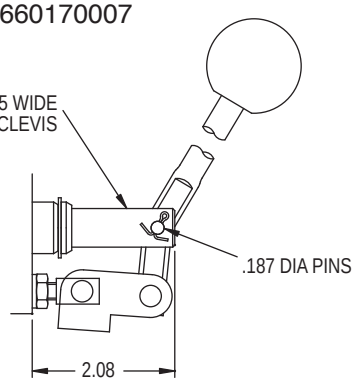
PARTS BREAKDOWN AND DIMENSIONS

MODEL SS



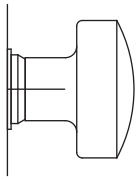
LEVER HANDLE OPTION E

KIT NO. 660170007



KNOB OPTION D

PART NO. 670400031



VALVES

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MODEL DS DOUBLE SELECTOR VALVE

The PRINCE valve model DS is a manual 6-way 2 position double selector valve. This valve will divert the flow going to two separate hydraulic circuits. For example two double acting cylinders or two reversible hydraulic motors can be operated by one four-way valve. When the double selector spool is pushed in, the C and D ports (top ports) are connected to the A and E ports (right ports). When the selector spool is pulled out, the C and D ports are connected to the B and F ports (left ports). An optional series/parallel spool is also available. This spool will run two reversible hydraulic motors in series when the spool is out and in parallel when the spool is pushed in.

VALVE SPECIFICATIONS:

Capacity:	40 GPM max inlet flow
Pressure:	2500 psi
Weight:	9 lbs.

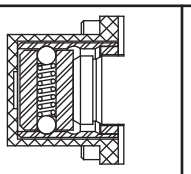
KITS:

LEVER HANDLE	660170001
SPRING OFFSET KIT	660170003
2 POSITION DETENT KIT	660170004
END CAP KIT	660170010
SEAL KIT	660590005
KNOB PART NO.	670400029
SNAP RING PART NO.	230017018
CLEVIS PART NO.	671400059

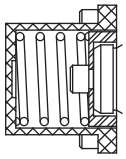
STANDARD MODELS AVAILABLE

MODEL #	PORT SIZE	DESCRIPTION
DS-4A1E	3/4 NPTF	DOUBLE SELECTOR WITH LEVER HANDLE
DS-5A1E	#12 SAE	DOUBLE SELECTOR WITH LEVER HANDLE
DS-4A1D	3/4 NPTF	DOUBLE SELECTOR WITH KNOB HANDLE
DS-4A1A	3/4 NPTF	DOUBLE SELECTOR WITHOUT ATTACHMENTS
DS-1A1E	1/2 NPTF	DOUBLE SELECTOR WITH LEVER HANDLE

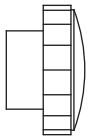
SPECIAL MODEL DS SELECTOR VALVES Other double selector valves not listed as standard are available in OEM quantities. To select a model number use the order code matrix below. Consult a sales representative if options other than those listed are required.



2 POSITION DETENT OPTION 4

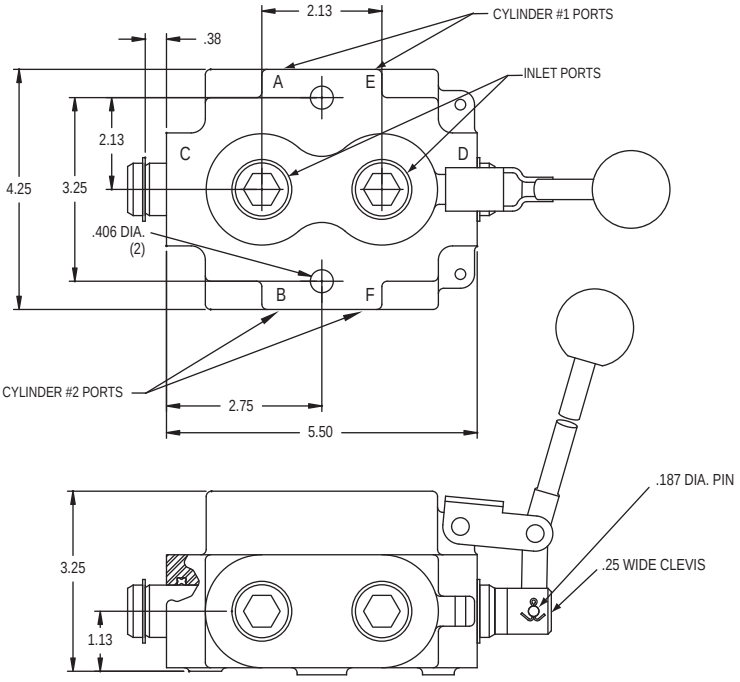


SPRING OFFSET (SPOOL OUT) OPTION 3

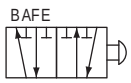


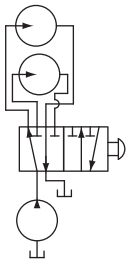
KNOB OPTION D

DS				
MODEL	PORT SIZE	SPOOL TYPE	SPOOL ATTACHMENTS	HANDLE
DS	1 - 1/2 NPTF 3 - #10 SAE 4 - 3/4 NPTF (standard) 5 - #12 SAE 6 - 1 NPTF	A SELECTOR (standard) B SERIES/ PARALLEL	1 - NONE (standard) 2 - END CAP ONLY 3 - SPRING OFFSET SPOOL OUT 4 - 2 POSITION DETENT	A - NONE B - CLEVIS ONLY C - CLEVIS W/ PINS AND LINK D - KNOB E - LEVER HANDLE (standard)

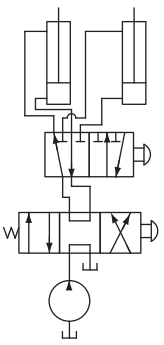


SYMBOL SELECTOR SPOOL

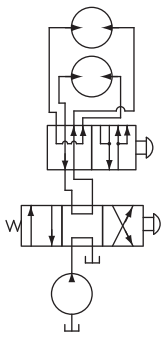




CIRCUIT SELECTOR



CIRCUIT SELECTOR



SERIES/PARALLEL

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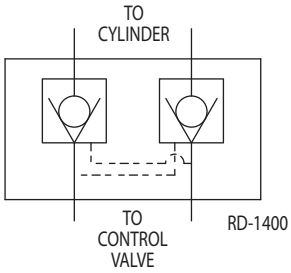
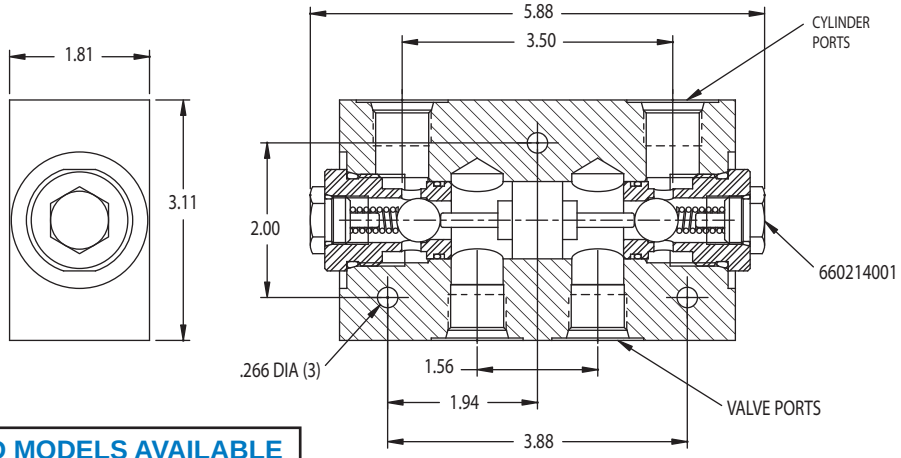
CATV 68-09-04-01

MODEL RD-1400
LOCK VALVE DOUBLE PILOT-OPERATED



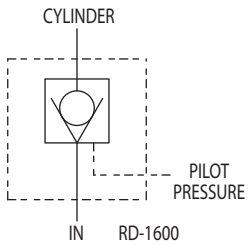
The PRINCE valve model RD-1400 is a double pilot-operated lock valve. This valve will lock a cylinder in place when a directional control valve is in the neutral position. In operation oil is directed to one of the valve ports and oil can free flow to the corresponding cylinder port. The pressure on this valve port will shift the pilot spool opening the opposite check valve. This will allow oil to return through the opposite check valve. This valve has a hardened steel seat and steel ball and therefore should not be used in applications requiring absolutely zero leakage. When using a pilot operated check to lower a heavy load the valve may chatter. An orifice in the line in some cases may be beneficial.



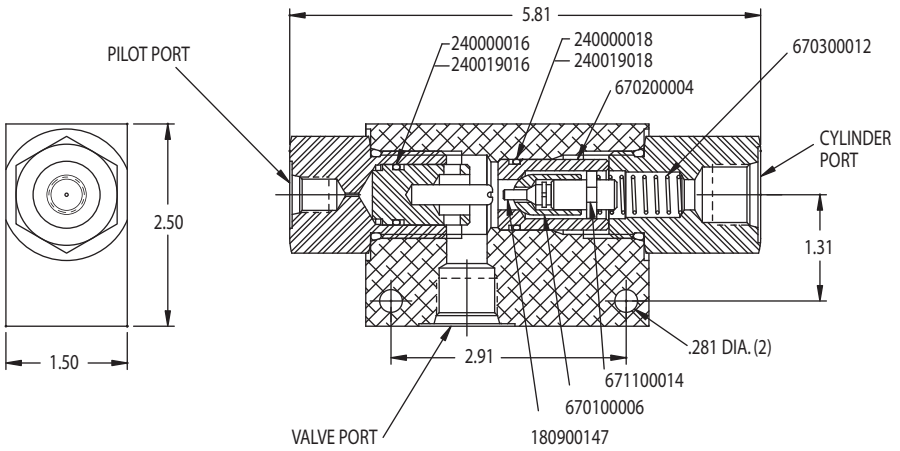
STANDARD MODELS AVAILABLE	
MODEL NUMBER	**PORT SIZE**
RD-1450 **RD-1475**	1/2 NPTF 3/4 NPTF

VALVE SPECIFICATIONS:
Capacity: 30 gpm max inlet flow
Pressure: 3000 psi max
Weight: 7 lbs.
Pilot Ratio: 4:1

MODEL RD-1600
PILOT OPERATED CHECK VALVE



The PRINCE valve model RD-1600 is a pilot operated check valve. This valve blocks oil from flowing from the cylinder port to the valve port until sufficient pressure is applied to the pilot port. Oil can free flow from the valve port to the cylinder port. The valve has a two stage poppet allowing smooth chatter free operation.



STANDARD MODELS AVAILABLE		
MODEL NUMBER	**VALVE AND CYL. PORT**	**PILOT PORT**
RD-1637	3/8 NPTF	1/4 NPTF
RD-1650	1/2 NPTF	1/4 NPTF
RD-1608	#8 SAE (3/4-16)	#4 SAE (7/16-20)

VALVE SPECIFICATIONS:
Capacity: 20 gpm max inlet flow
Pressure: 3000 psi max
Weight: 2 lbs.
Pilot Ratio: 4:1
Decompression Ratio: 16:1

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MISCELLANEOUS INFORMATION

Hydraulic Fluid – A good quality mineral based hydraulic fluid is recommended. Any fluid used must be compatible with the BUNA -N Seals typically used in the standard valves.
Filtration – For general purpose valves, fluid cleanliness should meet the ISO 4406 19/17/14 level. For extended life or for pilot operated valves, the 18/16/13 fluid cleanliness is recommended.
Thread Sealant – Use of a quality non-Teflon thread sealant is recommended for tapered pipe threads. (use of Teflon tape is not recommended.)

MISC. HYDRAULIC FORMULA AND DESIGN INFORMATION

cylinder area (sq. in.) = cylinder dia.^{2} (inches) x .7854
cylinder force (lbs.) = cylinder area (sq. in.) x psi
cylinder speed (in/sec) = 3.85 x gpm / cylinder area
hydraulic horse power = psi x gpm / 1714
hp to drive a pump = psi x gpm / (1714 x pump efficiency)
hydraulic motor hp = torque (in.-lbs.) x rpm / 63025
hydraulic motor torque = horse power x 63025 / rpm
hydraulic motor speed (rpm) = 231 x gpm / cubic in. per rev.
1 horsepower is equivalent to:
746 watts or .746 kilowatts
2545 BTU/hour or 42.2 BTU/min.
550 ft.-lbs./sec. or 33000 ft.-lbs./min.

PRESSURE DROP ACROSS AN ORIFICE

In the chart below gives the approximate pressure drop, in psi, across an orifice. This chart can be used for hydraulic oil only.

GPM	Orifice Size										
	.047	.062	.078	.093	.109	.125	.140	.156	.187	.218	.250
1	432	143	57	28	15	–	–	–	–	–	–
2	1729	571	228	113	60	35	22	14	–	–	–
3	3890	1285	513	254	134	78	49	32	16	–	–
4	–	2284	912	451	239	138	88	57	28	15	–
5	–	3569	1425	705	374	216	137	89	43	23	13
6	–	–	2051	1015	538	311	198	128	62	34	19
8	–	–	3647	1805	956	553	351	228	110	60	35
10	–	–	–	2820	1494	884	549	356	173	93	54
12	–	–	–	–	2152	1244	791	513	248	134	78
15	–	–	–	–	3362	1944	1235	801	388	210	121
20	–	–	–	–	–	3456	2196	1425	690	374	216
25	–	–	–	–	–	–	3432	2226	1078	584	337
30	–	–	–	–	–	–	–	3205	1552	841	486

To convert	into	multiply by
meters	inches	39.37
centimeters	inches	.3937
millimeters	inches	.03937
inches	meters	.0254
inches	centimeters	2.54
inches	millimeters	25.4
liters	gallons	.2642
gallons	liters	3.785
kg/cm^2	psi	14.22
kg/cm^2	bar	.9807
kg/cm^2	atm	.9678
psi	kg/cm^2	.0703
psi	bar	.0690
psi	atm	.0680
psi	in.-hg.	2.0360
bar	psi	14.50
bar	kg/cm^2	1.020
bar	atm	.9869
gallons	cubic inches	231
cubic inches	gallons	.0043
ft.-lbs.	kg-m	.1383
kg-m	ft.-lbs.	7.233

HYDRAULIC CYLINDER FORCE (lbs.)

force (lbs) = cylinder area (sq. in.) x pressure (psi)
To determine force developed by a cylinder in extension use chart below. To determine force developed in retract subtract the force that corresponds to cylinder piston rod diameter.

CYL. DIA	CYL. AREA	500 PSI	1000 PSI	1500 PSI	2000 PSI	2500 PSI	3000 PSI
.50	.20	98	196	295	393	491	589
.75	.44	221	442	663	884	1104	1325
.88	.60	301	601	902	1203	1503	1804
1.00	.79	393	785	1178	1571	1964	2356
1.13	.99	497	994	1491	1988	2485	2982
1.25	1.23	614	1227	1841	2454	3068	3682
1.38	1.48	742	1485	2227	2970	3712	4455
1.50	1.77	884	1767	2651	3534	4418	5301
1.75	2.41	1203	2405	3608	4811	6013	7216
2.00	3.14	1571	3142	4712	6283	7854	9425
2.50	4.91	2454	4909	7363	9817	12272	14726
3.00	7.07	3534	7069	10603	14137	17672	21206
3.50	9.62	4811	9621	14432	19242	24053	28863
4.00	12.57	6283	12566	18850	25133	31416	37699
4.50	15.90	7952	15904	23857	31809	39761	47713
5.00	19.64	9817	19635	29453	39270	49087	58905
6.00	28.27	14137	28274	42412	56549	70686	84823
8.00	50.27	25133	50266	75398	100531	125664	150797

MOTOR HORSEPOWER TO DRIVE A HYDRAULIC PUMP

Pump Efficiency 90%, Formula: HP=GPM x PSI/(1714 x Efficiency)

GPM	PSI 100	PSI 200	PSI 250	PSI 300	PSI 400	PSI 500	PSI 750	PSI 1000	PSI 1250	PSI 1500	PSI 2000	PSI 2500	PSI 3000	PSI 4000
0.5	0.03	0.06	0.08	0.10	0.13	0.16	0.24	0.32	0.41	0.49	0.65	0.81	0.97	1.30
1.0	0.06	0.13	0.16	0.19	0.26	0.32	0.49	0.65	0.81	0.97	1.30	1.62	1.94	2.59
1.5	0.10	0.19	0.24	0.29	0.39	0.49	0.73	0.97	1.22	1.46	1.94	2.43	2.92	3.89
2.0	0.13	0.26	0.32	0.39	0.52	0.65	0.97	1.30	1.62	1.94	2.59	3.24	3.89	5.19
2.5	0.16	0.32	0.41	0.49	0.65	0.81	1.22	1.62	1.03	2.43	3.24	4.05	4.86	6.48
3.0	0.19	0.39	0.49	0.58	0.78	0.97	1.46	1.94	2.43	2.92	3.89	4.86	5.83	7.78
3.5	0.23	0.45	0.57	0.68	0.91	1.13	1.70	2.27	2.84	3.40	4.54	5.67	6.81	9.08
4.0	0.26	0.52	0.65	0.78	1.04	1.30	1.94	2.59	3.24	3.89	5.19	6.48	7.78	10.37
5.0	0.32	0.65	0.81	0.97	1.30	1.62	2.43	3.24	4.05	4.86	6.48	8.10	9.72	12.97
6.0	0.39	0.78	0.97	1.17	1.56	1.94	2.92	3.89	4.86	5.83	7.78	9.72	11.67	15.56
7.0	0.45	0.91	1.13	1.36	1.82	2.27	3.40	4.54	5.67	6.81	9.08	11.34	13.61	18.15
8.0	0.52	1.04	1.30	1.56	2.07	2.59	3.89	5.19	6.48	7.78	10.37	12.97	15.56	20.74
9.0	0.58	1.17	1.46	1.75	2.33	2.92	4.38	5.83	7.29	8.75	11.67	14.59	17.50	23.34
10.0	0.65	1.30	1.63	1.96	2.59	3.24	4.86	6.48	8.10	9.72	12.97	16.21	19.45	25.93
11.0	0.71	1.43	1.78	2.14	2.85	3.57	5.35	7.13	8.91	10.70	14.26	17.83	21.39	28.52
12.0	0.78	1.56	1.94	2.33	3.11	3.89	5.83	7.78	9.72	11.67	15.56	19.45	23.34	31.12
13.0	0.84	1.69	2.11	2.53	3.37	4.21	6.32	8.43	10.53	12.64	16.85	21.07	25.28	33.71
14.0	0.91	1.82	2.27	2.72	3.63	4.54	6.81	9.08	11.34	13.61	18.15	22.69	27.23	36.30
15.0	0.97	1.94	2.43	2.92	3.89	4.86	7.29	9.72	12.15	14.59	19.45	24.31	29.17	38.90
16.0	1.04	2.07	2.59	3.11	4.15	5.19	7.78	10.37	12.97	15.56	20.74	25.93	31.12	41.49
17.0	1.10	2.20	2.76	3.31	4.41	5.51	8.27	11.02	13.78	16.53	22.04	27.55	33.06	44.08
18.0	1.17	2.33	2.92	3.50	4.67	5.83	8.75	11.67	14.59	17.50	23.34	29.17	35.01	46.67
19.0	1.23	2.46	3.08	3.70	4.93	6.16	9.24	12.32	15.40	18.48	24.63	30.79	36.95	49.27
20.0	1.30	2.59	3.24	3.89	5.19	6.48	9.72	12.97	16.21	19.45	25.93	32.41	38.90	51.86
25.0	1.62	3.24	4.05	4.86	6.48	8.10	12.15	16.21	20.26	24.31	32.41	40.52	48.62	64.83
30.0	1.94	3.89	4.86	5.83	7.78	9.72	14.59	19.45	24.31	29.17	38.90	48.62	58.34	77.79
35.0	2.27	4.54	5.67	6.81	9.08	11.34	17.02	22.69	28.36	34.03	45.38	56.72	68.07	90.76
40.0	2.59	5.19	6.48	7.78	10.37	12.97	19.45	25.93	32.41	38.90	51.86	64.83	77.79	103.72
45.0	2.92	5.83	7.29	8.75	11.67	14.59	21.88	29.17	36.46	43.76	58.34	73.93	87.51	116.69
50.0	3.24	6.48	8.10	9.72	12.97	16.21	24.31	32.41	40.52	48.62	64.83	81.03	97.24	129.65
55.0	3.57	7.13	8.91	10.70	14.26	17.83	26.74	35.65	44.57	53.48	71.31	89.14	106.96	142.62
60.0	3.89	7.78	9.72	11.67	15.56	19.45	29.17	38.90	48.62	58.34	77.79	97.24	116.69	155.58
65.0	4.21	8.43	10.53	12.64	16.85	21.07	31.60	42.14	52.67	63.20	84.27	105.34	126.41	168.55

HYDRAULIC CYLINDER SPEED (inches/second)

cylinder speed (inches/second) = 3.85 x GPM/cylinder area (sq. in.)
The chart below gives cylinder speed in inches per second for extend and retract (for a given rod diameter). To determine the number of seconds it will take to extend or retract the cylinder divide the stroke length (inches) by the cylinder speed. EX: for a 4 x 16 cylinder with 10 gpm speed is 3.06 inches/sec. The time to extend 16 inches will be 5.23 seconds.

GPM	1 DIA		1 1/2 DIA		2 DIA		2 1/2 DIA		3 DIA		3 1/2 DIA		4 DIA		5 DIA		6 DIA		8 DIA	
	EXT	RET 1/2 ROD	EXT	RET 3/4 ROD	EXT	RET 1 1/8 ROD	EXT	RET 1 1/4 ROD	EXT	RET 1 3/8 ROD	EXT	RET 1 1/2 ROD	EXT	RET 1 3/4 ROD	EXT	RET 2 ROD	EXT	RET 2 1/2 ROD	EXT	RET 3 ROD
1	4.90	6.54	2.18	2.90	1.23	1.79	.78	1.05	.54	.68	.40	.47	.31	.38	.20	.23	.14	.16	.08	.09
2	9.80	13.07	4.36	5.81	2.45	3.59	1.57	2.09	1.09	1.38	.80	.95	.61	.76	.39	.47	.27	.33	.15	.18
4	19.61	26.14	8.71	11.62	4.90	7.17	3.14	4.18	2.18	2.76	1.80	1.89	1.23	1.52	.78	.93	.54	.66	.31	.38
6	29.41	39.22	13.07	17.43	7.35	10.75	4.71	6.27	3.27	4.14	2.40	2.84	1.84	2.27	1.18	1.40	.82	.99	.46	.53
8	39.22	52.29	17.43	23.24	9.80	14.34	6.27	8.37	4.36	5.52	3.20	3.79	2.45	3.03	1.57	1.87	1.09	1.32	.61	.71
10	49.02	65.36	21.79	29.05	12.25	17.93	7.84	10.46	5.45	6.90	4.00	4.72	3.06	3.79	1.96	2.33	1.36	1.65	.77	.89
12	58.82	78.43	26.14	34.86	14.71	12.51	9.41	12.55	6.54	8.27	4.82	5.68	3.68	4.55	2.35	2.80	1.63	1.98	.92	1.07
15	–	–	32.68	43.57	18.38	26.89	11.76	15.69	8.17	10.34	6.00	7.10	4.60	5.68	2.94	3.50	2.04	2.47	1.15	1.34
20	–	–	43.57	58.10	24.51	35.85	15.69	20.92	10.89	13.79	8.00	9.46	6.13	7.58	3.92	4.67	2.72	3.30	1.53	1.78
25	–	–	–	–	30.64	44.82	19.61	26.14	13.62	17.24	10.00	11.83	7.66	9.47	4.90	5.84	3.40	4.14	1.91	2.23
30	–	–	–	–	–	–	23.53	31.37	16.24	20.66	12.00	14.20	9.19	11.37	5.88	7.00	4.08	4.94	2.30	2.87
35	–	–	–	–	–	–	27.45	36.60	19.06	24.13	14.01	16.56	10.72	13.26	6.86	8.17	4.77	5.77	2.68	3.12

PRINCE MANUFACTURING CORPORATION • P.O. BOX 7000 • NORTH SIOUX CITY, SOUTH DAKOTA 57049-7000
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PUMPS & MOTORS

Prince Manufacturing Corporation
North Sioux City, South Dakota

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The Hand Pumps, PMHP-10-B and PMHP-5-B, Are In The Cylinder Section On Page C19.

PLEASE NOTE: Parts Manuals For All Standard Prince Pumps Are Available On The Prince Web Site At www.princehyd.com

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PRINCE PTO HYDRAULIC PUMPS
Up to 40 gallons per minute and up to 2250 psi

UNIQUE FEATURES:
- Self-adjusting wear plates on both sides of the gears.
- Proper size hose adapters are provided for inlet ports.
- Two outlet ports are provided with a NPT adapter for one port and a plug to seal unused port.
- Center section available in high strength aluminum alloy for std. duty cycle or in high strength cast iron for high duty cycle use.

IDEAL FOR USE WITH.....
- Tractor front end loaders
- Pull-type cotton pickers
- Cotton balers (module builders)

- Tractors imported without integral hydraulics
- Landscape equipment

PLUS STANDARD FEATURES:
- Reliable
- Efficient
- Roller Bearings
- Run fitted body
- Internally splined drive shaft.
- High-tensile cast iron end plates.
- Slips onto tractor PTO shaft (no gear box required).
- Two-bolt installation on farm tractors of all sizes.

- Rotary mowers
- Street Sweepers
- Back hoes

MODEL FEATURES

ALUMINUM CENTER HOUSING
- Standard duty cycle
- Reduced weight
- Smaller housing

CAST IRON CENTER HOUSING
- High duty cycle
- Use in circuits with motors
- Better at higher temperatures
- Increased wear resistance

REAR PORTED
- Higher flows
- Simplified hose connections
- Higher flows at reduced engine rpm as compared to other PTO pumps

Prince PTO pumps are specifically designed for PTO drive operation on all sizes of farm tractors. No additional gear box is required. Pumps are mounted by sliding the internally splined pump onto the PTO splined shaft and restraining rotation with a torque arm. See page P6 for the PTO pump torque arm kit.

- **SELF ADJUSTING WEAR PLATES**
  Prince PTO pumps have self-adjusting wear plates that seal around the two unequal size gears. These plates, activated by internal fluid pressure, offset wear or expansion.

- **FILTRATION**
  The pump must be used in a clean system with clean oil. The fluid cleanliness should meet the ISO 4406 17/14 level. As a minimum, 10 micron filtration is recommended.

- **HYDRAULIC FLUID**
  A good quality mineral base hydraulic fluid with a viscosity in the 70-250 SUS range at operating temperature is recommended.

- **OPERATING TEMPERATURE**
  Oil operating temperature should not exceed 180°F. If it does, the reservoir may be too small or a heat exchanger may be needed.

- **SHAFT SPEEDS**
  Prince PTO pumps are designed to operate at up to 110% of standard PTO shaft speeds. Standard speeds are 540 rpm for the 6 tooth shaft and 1000 rpm for the 21 tooth shaft.

- **CLOSE RUNNING CLEARANCE FOR HIGH FLOW RATE**
  Another feature that contributes to the excellent and long-lived efficiency of the PTO-Series pump is the minimum clearance between the gears and the center housing. Each pump is assembled with zero clearance between the housing and the tips of the gear teeth, then test run until the teeth establish a proper wear path in the housing. The result is a much tighter clearance than found in traditional pumps.

- **PRESSURE RATING**
  Pumps are designed for 2250 PSI max. relief valve setting. A relief valve, external to the pump, must be provided in the system.

- **PORTS**
  All pumps are provided with an inlet port adapter (SAE O-ring boss to hose barb) and outlet port adapter (SAE O-ring boss to female pipe thread) sized appropriately for the ports and required line sizes. A steel plug is provided for the second outlet port.

- **RESERVOIR**
  As a guideline, a reservoir size in gallons should equal the pump output in gallons per minute. A larger reservoir and/or an oil cooler may be needed for high duty cycle applications.

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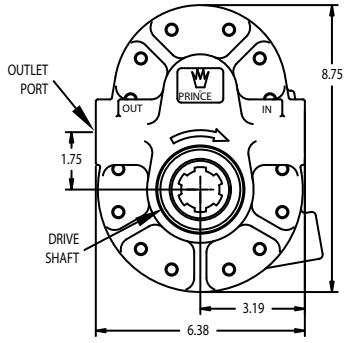
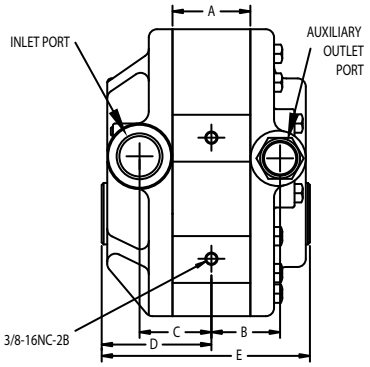
ALUMINUM CENTER HOUSING PTO PUMPS

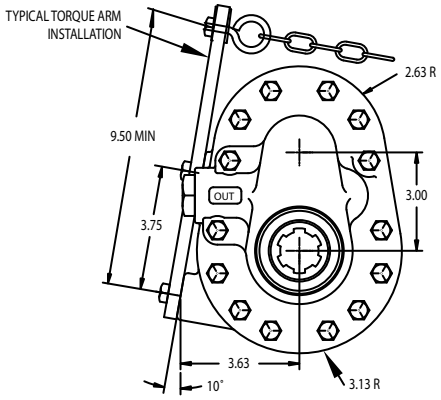
DIMENSIONAL DATA

PUMP MODEL	ACTUAL DISPLACEMENT	A	B	C	D	E	INLET PORTS	OUTLET PORTS [3]	RECOMMENDED HOSE SIZES	DRIVE SHAFT REQUIRED	SHIP WT. (LB)
HC-PTO-1A	9.9 CI/REV	2.37	2.09	2.19	3.35	6.35	#16 SAE [1]	#12 SAE	1 1/4" IN, 3/4 " OUT	1 3/8 DIA. 6 TOOTH	40
HC-PTO-9A	7.8 CI/REV	2.00	1.91	2.00	3.16	5.97	#16 SAE [1]	#12 SAE	1 1/4" IN, 3/4 " OUT	1 3/8 DIA. 6 TOOTH	38
HC-PTO-2A	5.7 CI/REV	1.62	1.72	1.81	2.97	5.60	#16 SAE [2]	#12 SAE	1" IN, 1/2 "OUT	1 3/8 DIA. 6 TOOTH	36
HC-PTO-3A	5.7 CI/REV	1.62	1.72	1.81	2.97	5.60	#16 SAE [1]	#12 SAE	1 1/4" IN, 3/4 " OUT	1 3/8 DIA. 21 TOOTH	36
HC-PTO-7A	3.6 CI/REV	1.26	1.54	1.63	2.78	5.23	#16 SAE [2]	#12 SAE	1" IN, 1/2 "OUT	1 3/8 DIA. 6 TOOTH	33
HC-PTO-8A	3.6 CI/REV	1.26	1.54	1.63	2.78	5.23	#16 SAE	#12 SAE	1 1/4" IN, 3/4" OUT	1 3/8 DIA. 21 TOOTH	33

1. Barbed adapter for 1 1/4" hose included. 270011014
2. Barbed adapter for 1 " hose included. 270011015
3. Female pipe adaptor for 3/4" NPT included. 500204011







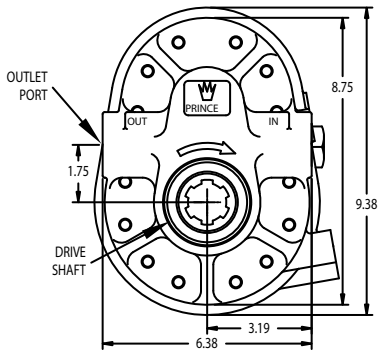
Seal kit No. for all models: PMCK-PTO-1A

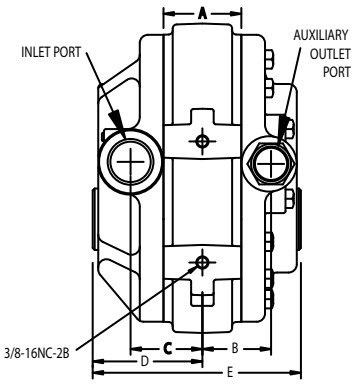
CAST IRON CENTER HOUSING PTO PUMPS

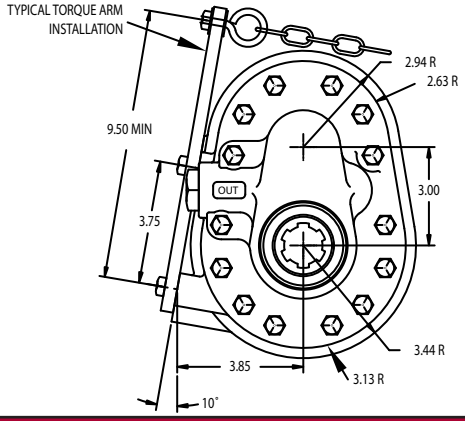
DIMENSIONAL DATA

PUMP MODEL	ACTUAL DISPLACEMENT	A	B	C	D	E	INLET PORTS	OUTLET PORTS [3]	RECOMMENDED HOSE SIZES	DRIVE SHAFT REQUIRED	SHIP WT. (LB)
HC-PTO-1AC	9.9 CI/REV	2.37	2.09	2.19	3.35	6.35	#16 SAE [1]	#12 SAE	1 1/4" IN, 3/4 " OUT	1 3/8 DIA. 6 TOOTH	54
HC-PTO-2AC	5.7 CI/REV	1.62	1.72	1.81	2.97	5.60	#16 SAE [2]	#12 SAE	1" IN, 1/2 "OUT	1 3/8 DIA. 6 TOOTH	44
HC-PTO-3AC	5.7 CI/REV	1.62	1.72	1.81	2.97	5.60	#16 SAE [1]	#12 SAE	1 1/4" IN, 3/4 " OUT	1 3/8 DIA. 21 TOOTH	44
HC-PTO-8AC	3.6 CI/REV	1.26	1.54	1.63	2.78	5.23	#16 SAE	#12 SAE	1 1/4" IN, 3/4 " OUT	1 3/8 DIA. 21 TOOTH	42

1. Barbed adapter for 1 1/4" hose included. 270011014
2. Barbed adapter for 1 " hose included. 270011015
3. Female pipe adaptor for 3/4" NPT included. 500204011







Seal kit No. for all models: PMCK-PTO-1A

PERFORMANCE DATA

		500 PSI		1000 PSI		1500 PSI		2000 PSI	
PUMP MODEL	RPM	INPUT HP	GPM OUTPUT	INPUT HP	GPM OUTPUT	INPUT HP	GPM OUTPUT	INPUT HP	GPM OUTPUT
HC-PTO-1A & HC-PTO-1AC	540	8.4	21.4	16.1	21.0	23.8	21.0	32.1	21.0
HC-PTO-9A	540	7.1	17.2	13.6	17.0	20.4	16.9	27.4	17.1
HC-PTO-2A & HC-PTO-2AC	540	4.9	12.2	9.3	11.9	13.8	11.6	18.1	11.4
HC-PTO-3A & HC-PTO-3AC	1000	9.3	23.4	17.4	23.0	25.9	22.6	34.3	22.4
HC-PTO-7A	540	2.9	7.6	5.9	7.2	8.8	7.2	11.9	7.1
HC-PTO-8A & HC-PTO-8AC	1000	5.5	14.4	11.0	13.8	16.5	13.5	22.6	13.5

NOTE: Performance values are average values. Individual pump performance may vary. Performance based on 140 SUS oil at 120° F.

CATP 4-09-04-01

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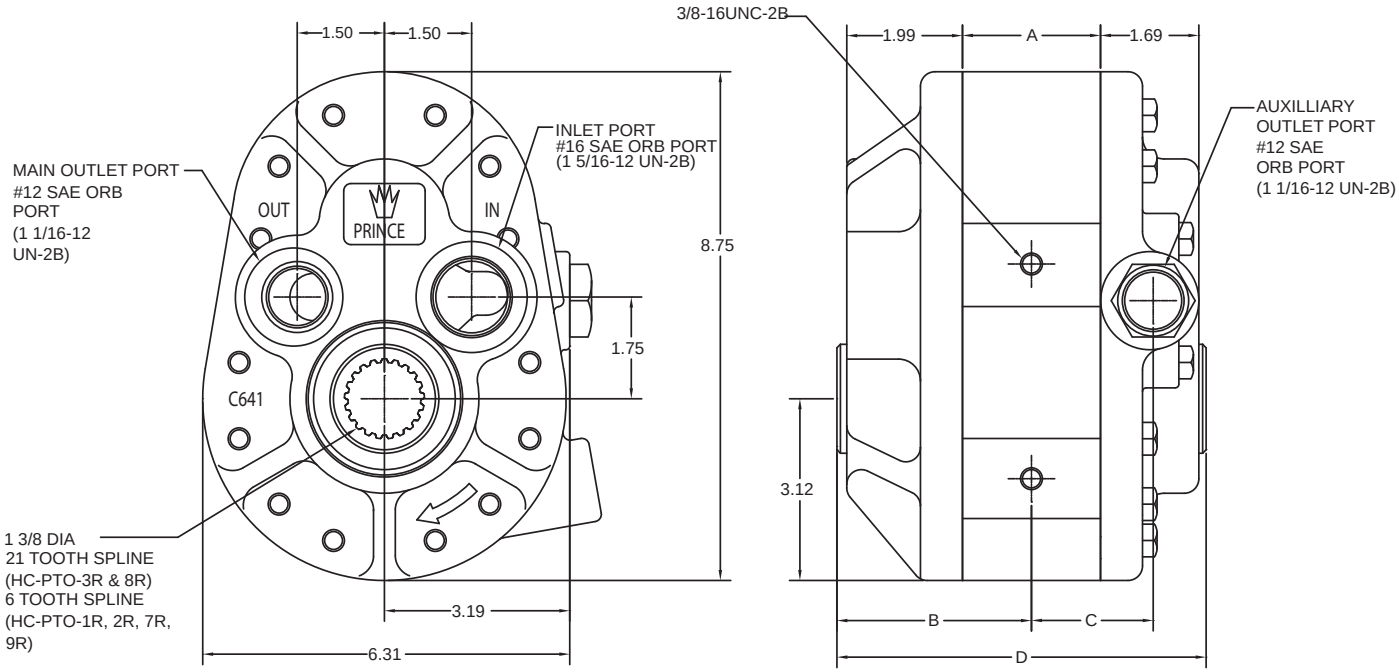
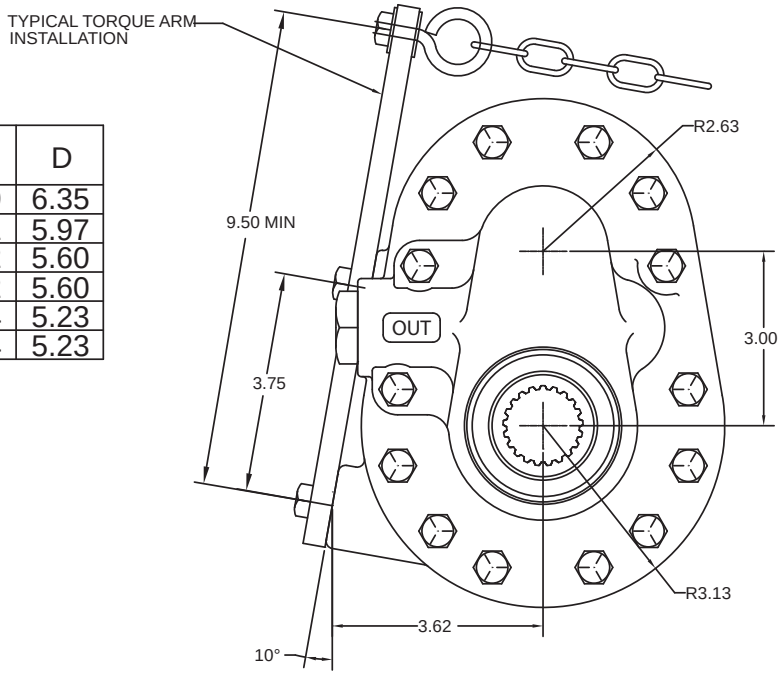
SEE PAGE 25 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

ALUMINUM CENTER HOUSING REAR PORT PTO PUMP



MODEL NUMBER	A	B	C	D
HC-PTO-1R	2.37	3.35	2.09	6.35
HC-PTO-9R	2.00	3.16	1.91	5.97
HC-PTO-2R	1.62	2.97	1.72	5.60
HC-PTO-3R	1.62	2.97	1.72	5.60
HC-PTO-7R	1.26	2.78	1.54	5.23
HC-PTO-8R	1.26	2.78	1.54	5.23



PUMPS AND MOTORS

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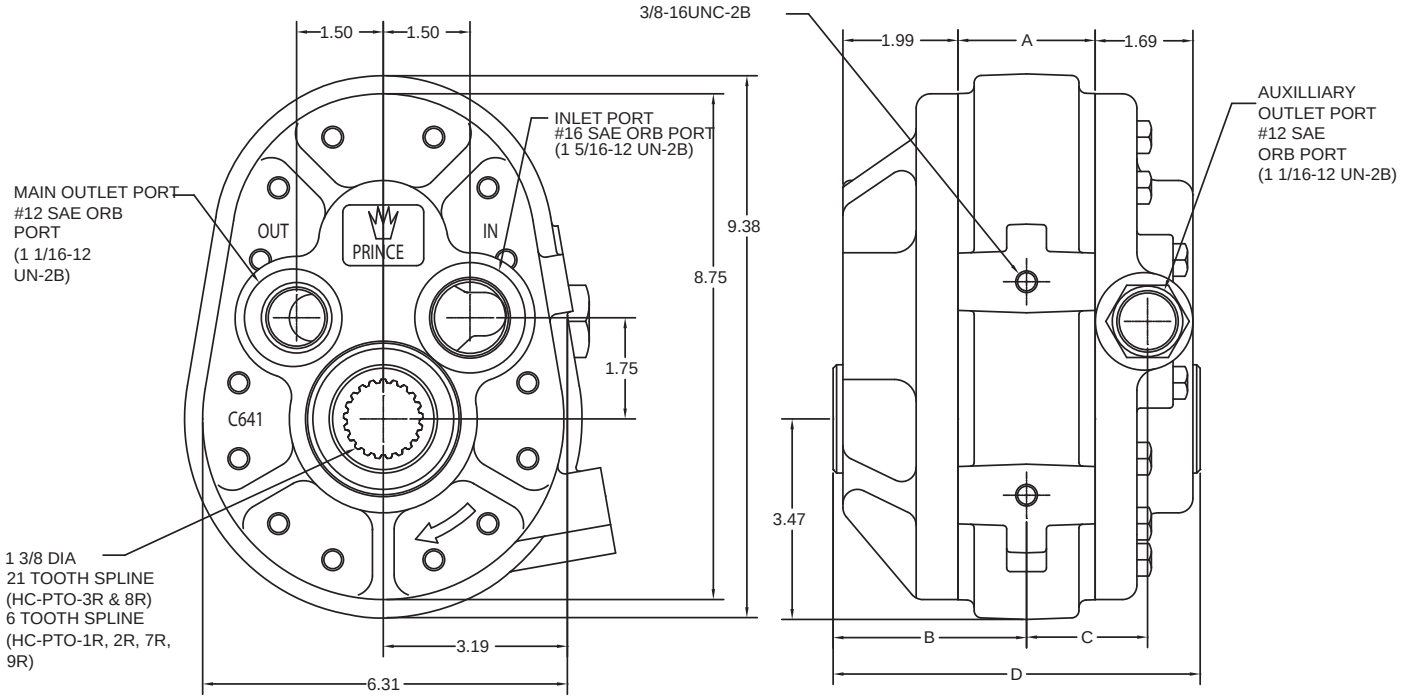
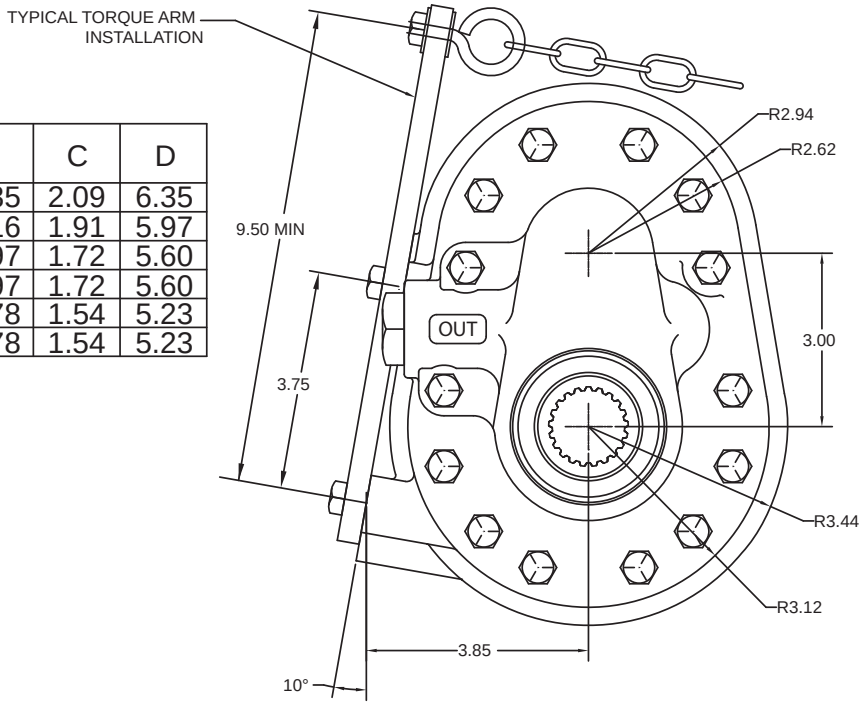
CAST IRON CENTER HOUSING REAR PORT PTO PUMP





MODEL NUMBER	A	B	C	D
HC-PTO-1R	2.37	3.35	2.09	6.35
HC-PTO-9R	2.00	3.16	1.91	5.97
HC-PTO-2R	1.62	2.97	1.72	5.60
HC-PTO-3R	1.62	2.97	1.72	5.60
HC-PTO-7R	1.26	2.78	1.54	5.23
HC-PTO-8R	1.26	2.78	1.54	5.23

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REAR PORTED PTO PUMPS

PERFORMANCE DATA

PUMP MODEL	RPM	500 PSI HP INPUT	500 PSI GPM OUTPUT	1000 PSI HP INPUT	1000 PSI GPM OUTPUT	1500 PSI HP INPUT	1500 PSI GPM OUTPUT	2000 PSI HP INPUT	2000 PSI GPM OUTPUT
HC-P-K11 OR HC-P-K11C	1000	15.5	40.7	29.4	40.1	43.4	40.0	58.8	40.0
	540	8.4	21.4	16.1	21.0	23.8	21.0	32.1	21.0

NOTE: Performance values are average values. Individual pump performance may vary. Performance based on 140 SUS oil at 120° F.

SPECIFICATIONS

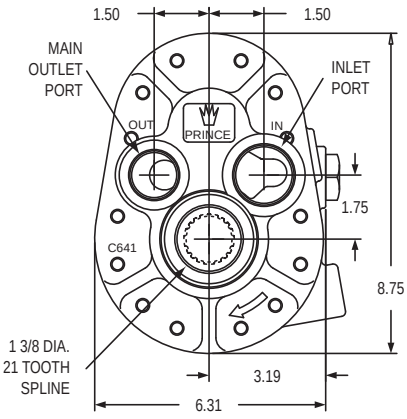
PUMP MODEL	ACTUAL DISP.	INLET PORT	MAIN OUTLET PORT	AUXILIARY OUTLET PORT	INLET ADAPTER	OUTLET ADAPTER	SHIP WT. (LB)
HC-P-K11 OR HC-P-K11C	9.9 CI/REV	#20 SAE O-RING (1 5/8-12UN-2B)	#16 SAE O-RING (1 5/16-12UN-2B)	#12 SAE O-RING (1 1/16-12UN-2B)	#20 SAE TO 2" HOSE BARB	#16 SAE TO 1" FEMALE PIPE	40 OR 54

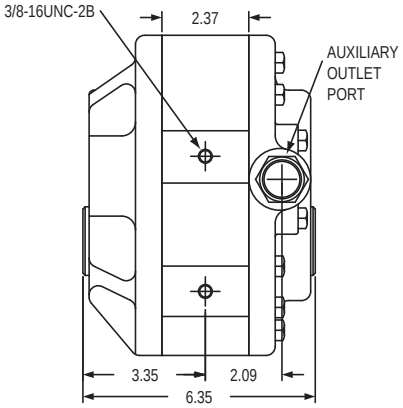
SPECIAL NOTE: Recommended hose sizes for the HC-P-K11 and HC-P-K11C are 2" for the inlet line and 1" for the outlet line.

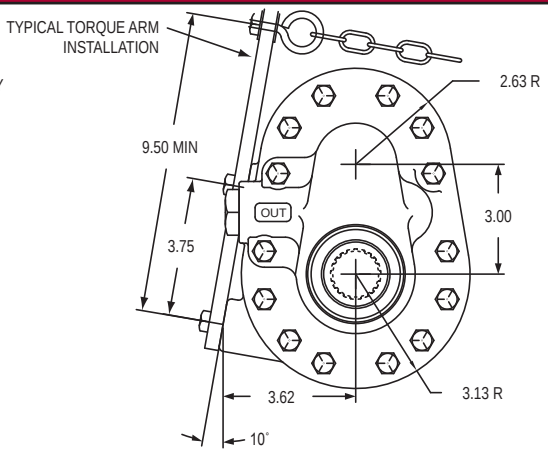
Seal kit No. for the HC-P-K11 and HC-P-K11C is: PMCK-PTO-1A.
HC-P-K11 and HC-P-K11C pumps available with 1 3/8 diameter 21 tooth spline drive only.

HC-P-K26 same as HC-P-K11 except 1 3/8"- dia. 6 tooth spline. HC-P-K26C same as HCP-K11C except 1 3/8" dia. 6 tooth spline.
For use at 540 RPM.

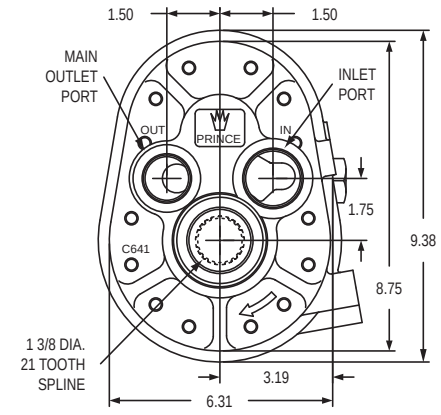
ALUMINUM CENTER HOUSING (HC-P-K11)

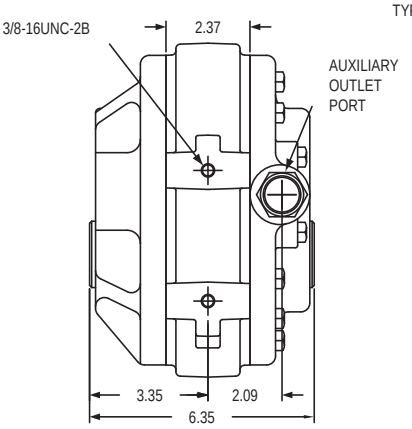


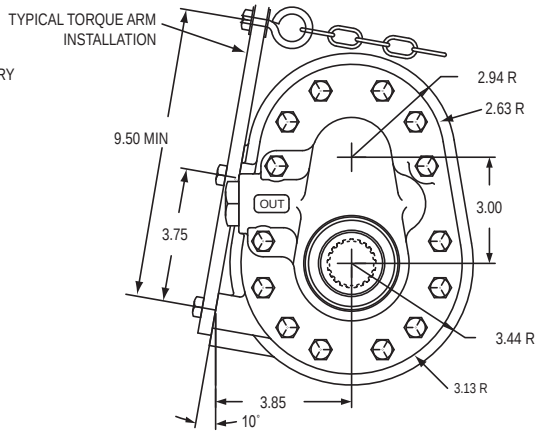




CAST IRON CENTER HOUSING (HC-P-K11C)







PUMPS AND MOTORS

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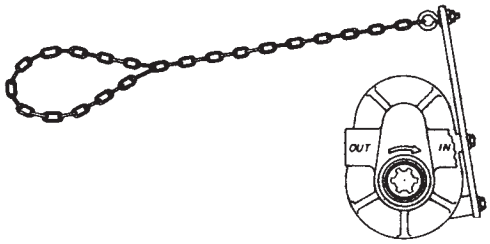
PUMP TORQUE ARM KIT

The 180900877 torque arm kit was designed to simplify Prince PTO pump installation by eliminating the need to fabricate a custom torque arm. Items included in the kit are:
1-Torque arm
2-3/8-16 mounting bolts
1-Eye bolt/chain assembly
NOTE THAT TORQUE ARM KIT NO. 180900877 FITS ALL MODEL PTO PUMPS



RETURN LINE FILTER-SPIN-ON TYPE

The Prince spin-on filter assemblies listed below all have 10 micron phenol coated paper elements and a 15 PSI bypass spring. FA Series have 3/4-NPTF ports and FB Series have 11/4-NPTF ports. See FA and FB Series product bulletins for additional models and information. **(See Filter Products Section of Price List).**

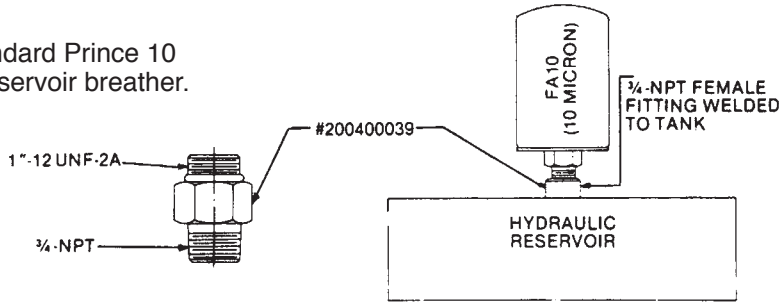
MODEL NUMBER	USAGE
FA 1200-10	PTO-2A, 7A, 8A Does not include indicator gauge or gauge ports
FA 1211-10	PTO-2A, 7A, 8A Includes 200 PSI indicator gauge
FB 1200-10	PTO-1A, 3A, 9A, HC-P-K11-Does not include indicator gauge or gauge ports
FB 1211-10	PTO-1A, 3A, 9A, HC-P-K11-Includes 200 PSI indicator gauge

SUCTION LINE FILTER-SPIN-ON TYPE

Model number FB 1100-150 suction strainer assembly is recommended for use with all Prince PTO pumps (except HC-P-K11). It has a spin-on element with 140 square inches of 100 mesh (150 micron) screen. A 5 PSI bypass is incorporated in the filter housing. Port size is 1 1/4-NPTF. Model Number FB 1112-150 with a 0-30 in. vac gauge is also available **(See Filter Products Section of Price List).**

RESERVOIR BREATHER ADAPTER

The 200400039 breather adapter enables a standard Prince 10 micron spin-on filter element* to be used as a reservoir breather.
*Part Number FA10



FITTINGS AND ADAPTERS

MODEL NUMBER	DESCRIPTION	CONFIGURATION
500204013	#16 SAE (1 5/16-12) Male, 1 1/4-NPTF Female	Fig. 1
500204011	#12 SAE (1 1/16-12) Male, 3/4-NPTF Female	Fig. 1
270011014	1 1/4-NPTF Male, 1 1/4 Hose Barb	Fig. 2
270011015	1" NPTF Male, 1" Hose Barb	Fig. 2
270011013	#16 SAE (1 5/16-12) Male, 1 1/4 Hose Barb	Fig. 3
270011017	#16 SAE (1 5/16-12) Male, 1 Hose Barb	Fig. 3
270011046	#20 SAE (1 5/8-12) Male, 2 Hose Barb	Fig. 3
500204012	#16 SAE (1 5/16-12) Male, 1-NPTF Female	Fig. 1

FIG. 1

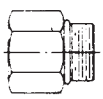


FIG. 2

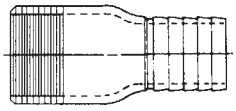
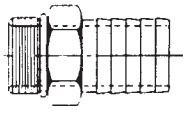


FIG. 3



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CATP 8-09-04-01

SP SERIES HYDRAULIC GEAR PUMP

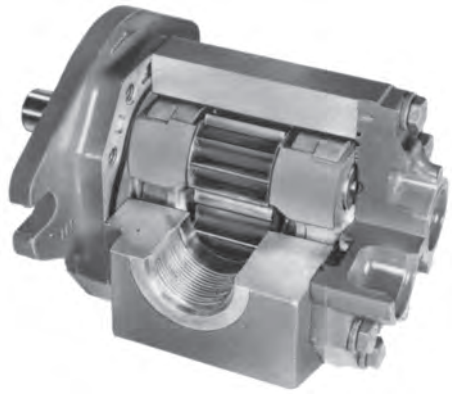
OUTSTANDING FEATURES

- **Patented Non-Symmetrical Gears** The adoption of non-symmetrical gears insures greater power per unit volume compared with pumps of conventional design. The compact gear compartment has enabled high-pressure operation. The increased number of gear teeth has reduced the flow pulsation and minimized the noise.

U.S.A.	Patent No.	3817117	
U.K.	Patent No.	1400577	
French	Patent No.	7230448	
German	Patent No.	7231801	Others: Pending

- **Bearings** PTFE composite bearings are used due to the ability to handle heavy loads, low shaft speeds, and high levels of contamination. Engineering tests on the PTFE bearings indicate they will withstand bearing loads over twice as high as conventional steel backed aluminum bearings used in many pumps. The PTFE resin layer will absorb a high degree of contamination with out damage to the pump. Also since the PTFE layer is self lubricating, contamination from bearing wear in high load situations (when no oil film is present) is reduced. The side benefit from reduced friction under all conditions is a reduced consumption of power.
- **Gears and drive shaft** are hardened alloy steel of one piece construction.
- **Special gear design:** Non-symmetrical gear insures low noise and compactness.
- **Highest Quality Workmanship.**
- **Pressures Up To 3000 P.S.I.**
- **Dependable service:** Balanced pressure loading insures small dispersion, good durability and maintains high performance.
- **Extremely Efficient.**
- **Perfect alignment:** "Through bore" design provides perfect alignment of pump element and assures even bearing load.
- **With the aluminum alloy casing,** the SP Series features light weight and easy handling.
- **Double pumps:** Available in SP20, SP25 and SP25/SP20 Combinations.
- **Maximum speed** from 3000 to 4000 RPM using SAE 10W oil.
- **Displacement covers** .400 in^3/rev. to 3.869 in^3/rev.
- **Inlet pressure:** Pump inlet should not exceed 5 in. of mercury vacuum or 14 P.S.I. positive pressure.
- **Ports:** SAE straight thread O-ring boss for SP20 & SP25. Other Ports available - consult factory. (Taper pipe threads not available.
- **Working oil:** A mineral based oil with additives to resist corrosion, oxidation, and foaming is recommended. Viscosity at any running condition should be 60 SUS minimum and 250 SUS maximum. 180° F is the maximum recommended system operating temperature.
- **Filtration:** Per ISO cleanliness code level 17/14. As a minimum, 10 micron filtration is recommended.

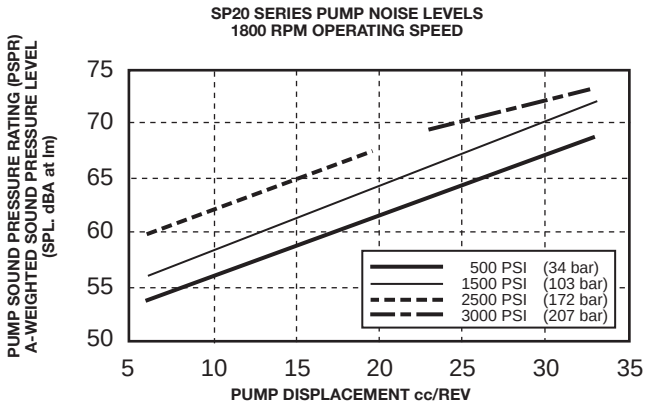
INTERNAL COMPONENTS BREAKDOWN

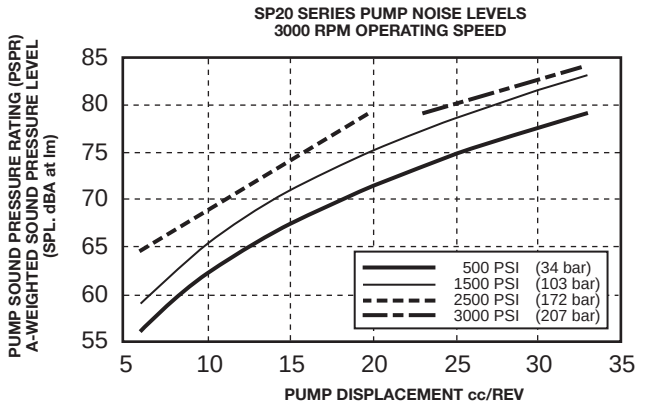


SP20 SERIES HYDRAULIC PUMPS AND NOISE GENERATION

The accompanying graphs show the typical Pump Sound Pressure Ratings (PSPR, A-weighted Sound Pressure Levels) for the SP20 Series Hydraulic Pumps. The Pump Sound Pressure Ratings (PSPR) shown below in the graphs were computed and determined using Sound Intensity Analysis Methods. Sound Intensity Analysis provides the most accurate and reliable data for predicting and comparing a Pump Sound Pressure Rating (A-weighted Sound Pressure Level), for a pump exposed to various operating and environmental conditions.

Pumps tested below in the graphs were tested as defined by **ANSI/B93.71M**, (Hydraulic fluid power-Pumps-Test code for the determination of airborne noise levels) in a semi-anechoic room. For free-field conditions (i.e. such as a noise source located above the ground in a open area), pump sound pressure ratings (A-weight Sound Pressure Levels) may be estimated by subtracting 3dB(A)from the values shown on the graphs.





Pump acoustical data was determined in accordance with ANSI/B93.71M. Hydraulic fluid power-Pumps-Test code for the determination of airborne noise levels

PUMPS AND MOTORS

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SP20 SERIES SAE "A" FLANGE PUMP

New Updated Design

- More Port Options
- More Shaft Options
- Lower Price
- Contact your sales representative for more information

The SP20B pump now utilizes self-lubricating thrust blocks that eliminate the need for separate wear plates. They are made from a high strength aluminum alloy with exceptional anti-galling properties. This new thrust block design also incorporates advanced bearings designed specifically for high pressure hydraulic pumps. This new bearing features a robust fluoropolymer PTFE wear surface that yields unsurpassed load carrying capabilities and cavitation resistance even at low speeds and moderate levels of contamination. Also, since the PTFE resin layer is self-lubricating, contamination from bearing wear in high load situations (when no oil film is present) is reduced. This new thrust block design combined with these advanced bearing results in lower friction and less internal oil loss resulting in higher pump efficiencies.

MODEL CODE

SP20B 14 A 9 H 2–R

SERIES NO

DISPLACEMENT CODE (CC/REV)

PORT LOCATION
A-SIDE INLET AND OUTLET
C-BOTH SIDE AND REAR W/STEEL PLUGS
D-REAR INLET AND OUTLET
E-BOTH SIDE AND REAR W/PLASTIC PLUGS

PORT TYPE
9-STANDARD PORTS SAE PER CHART BELOW
OPTIONAL PORTS CONSULT FACTORY SIDE PORT ONLY
8-METRIC O-RING
7-BSPP
6-SAE SPLIT FLANGE 16-33 CC ONLY
5-METRIC SPLIT FLANGE 16-33 CC ONLY

ROTATION (FACING END OF SHAFT)
L-COUNTER CLOCKWISE
R-CLOCKWISE DRIVE SHAFT

DRIVE SHAFT
9-SAE 9 TOOTH 16/32 SPLINE
2-SAE 5/8" STRAIGHT KEYED
3-11 TOOTH 16/32 SPLINE*
4-3/4" STRAIGHT KEYED*
5 -SAE 10 TOOTH 16/32 SPLINE

MOUNTING
H-SAE "A" 2 BOLT

*REQUIRED FOR DISPLACEMENT CODES 30 AND 33

SPECIFICATIONS

MODEL NUMBER	DISP. IN³/REV	RATED PRESSURE (PSI)	MAX° RPM	A	B	INLET PORT			OUTLET PORT			WT. (LB.)
						SAE SIZE		FULL THREAD DEPTH	SAE SIZE		FULL THREAD DEPTH	
						SIDE	REAR		SIDE	REAR		
SP20B06	.400	3000	4000	1.79	4.22	7/8-14 UN-2B	1 5/16-12 UN-2B	5/8"	3/4-16 UN-2B	1/16-12 UN-2B	9/16"	5.0
SP20B08	.499	3000	4000	1.83	4.30	1 1/16-12 UN-2B		3/4"	7/8-14 UNF-2B			5.1
SP20B09	.589	3000	4000	1.87	4.38						5/8"	5.3
SP20B11	.677	3000	4000	1.91	4.46							5.5
SP20B14	.860	3000	4000	1.99	4.62							5.7
SP20B16	.976	3000	4000	2.04	4.71		1 5/16-12 UN-2B			1 1/16-12 UN-2B		6.0
SP20B20	1.220	3000	3500	2.15	4.93	1 5/16-12 UN-2B		3/4"	1 1/16-12 UN-2B		3/4"	6.2
SP20B23	1.403	2500	3500	2.23	5.09							6.4
SP20B27	1.654	2500	3500	2.34	5.31							6.6
SP20B30	1.881	2500	3500	2.41	5.46							7.1
SP20B33	2.014	2500	3500	2.49	5.62							7.6

°Max. RPM for side ported models. Rear ported models should be restricted to 21 gpm. Standard Seal Kit for all SP20 Models is Prince Part No. PMCK-SP20.

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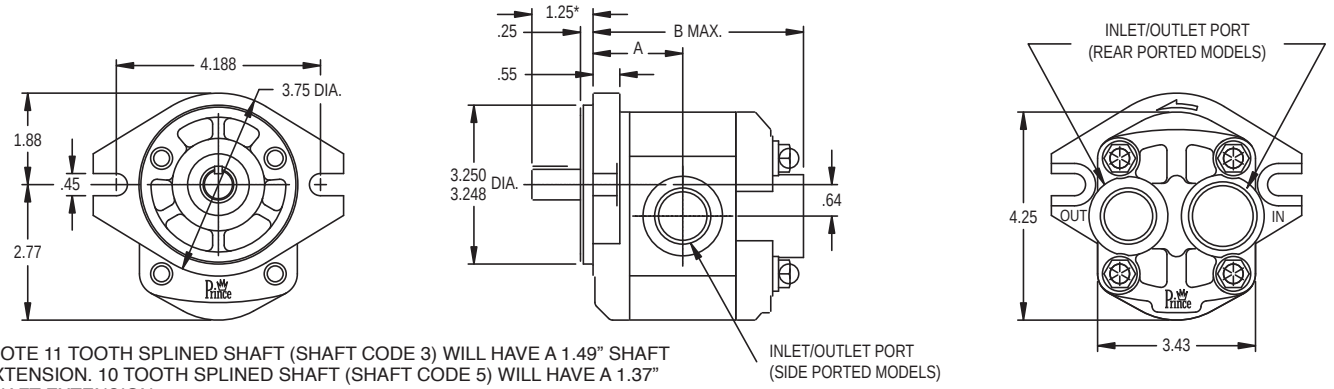
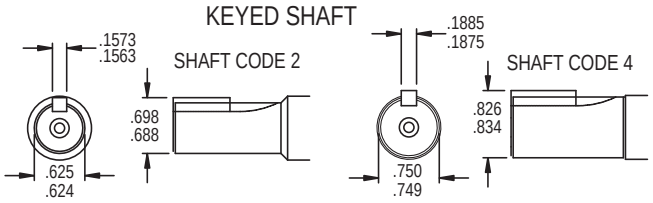
CATP 10-09-04-01

SEE PAGE 25 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

SP20 SERIES DIMENSIONAL DATA



*NOTE 11 TOOTH SPLINED SHAFT (SHAFT CODE 3) WILL HAVE A 1.49" SHAFT EXTENSION. 10 TOOTH SPLINED SHAFT (SHAFT CODE 5) WILL HAVE A 1.37" SHAFT EXTENSION.



SPLINED SHAFT

SHAFT CODE 9	SHAFT CODE 5	SHAFT CODE 3
9 TOOTH	10 TOOTH	11 TOOTH
16/32 DP	16/32 DP	16/32 DP
30° PA	30° PA	30° PA
FLAT ROOT SIDE FIT	FLAT ROOT SIDE FIT	FLAT ROOT SIDE FIT

TYPICAL PERFORMANCE DATA

		RPM								PRESSURE
MODEL		500	1000	1500	2000	2500	3000	3500	4000	(PSI)
SP20B06	FLOW (GPM)	.78	1.62	2.48	3.35	4.24	5.10	5.98	6.92	
	INPUT HORSE POWER	1.85	3.77	5.66	7.57	9.45	11.13	13.06	14.80	
SP20B08	FLOW (GPM)	.88	1.91	2.97	4.04	5.10	6.16	7.27	8.33	
	INPUT HORSE POWER	2.23	4.38	6.53	8.83	11.13	13.57	16.17	18.69	
SP20B09	FLOW (GPM)	1.03	2.30	3.52	4.75	5.97	7.19	8.46	9.74	
	INPUT HORSE POWER	2.61	5.03	7.54	10.14	12.84	15.54	18.43	21.31	
SP20B11	FLOW (GPM)	1.27	2.74	4.16	5.63	7.05	8.51	9.98	11.40	3000
	INPUT HORSE POWER	2.98	5.77	8.75	11.63	14.80	17.87	21.12	24.38	
SP20B14	FLOW (GPM)	1.61	3.36	5.19	7.01	8.91	10.74	12.56	14.39	
	INPUT HORSE POWER	3.68	7.09	10.51	14.19	18.00	21.68	25.49	29.43	
SP20B16	FLOW (GPM)	1.80	3.82	5.87	7.93	9.98	12.11	14.24	16.22	
	INPUT HORSE POWER	4.01	7.86	11.87	15.87	20.17	24.33	28.78	34.12	
SP20B20	FLOW (GPM)	2.35	4.92	7.49	10.05	12.70	15.26	17.76		
	INPUT HORSE POWER	5.21	9.98	14.89	20.10	25.16	30.52	35.73		
SP20B23	FLOW (GPM)	2.80	5.72	8.73	11.60	14.68	17.61	20.55		
	INPUT HORSE POWER	5.06	9.68	14.44	19.21	24.27	29.48	34.54		
SP20B27	FLOW (GPM)	3.30	6.90	10.47	13.90	17.52	20.94	24.46		
	INPUT HORSE POWER	5.98	11.59	17.20	23.00	28.98	34.78	41.13		2500
SP20B30	FLOW (GPM)	3.85	7.78	11.47	15.36	19.22	23.03	26.86		
	INPUT HORSE POWER	6.40	12.56	18.38	24.64	30.93	37.59	43.80		
SP20B33	FLOW (GPM)	4.13	8.47	12.60	16.86	21.11	25.26	29.52		
	INPUT HORSE POWER	7.14	13.40	19.98	27.04	33.90	41.05	47.89		

Typical Performance Data Based on 140 SUS Oil at 120° F

PUMPS AND MOTORS

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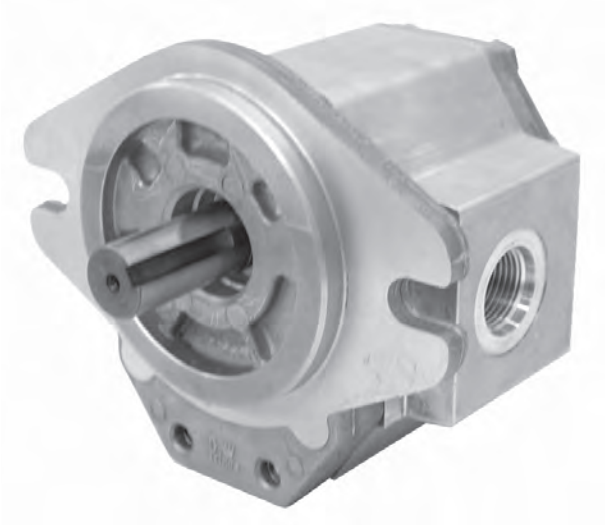
SP25 SERIES SAE "B" FLANGE PUMP



MODEL CODE

SP25A 38 A 9 H 1-R X

SERIES NO — SP25A

DISPLACEMENT CODE (CC/REV) — 38

PORT LOCATION — A

- A-SIDE INLET AND OUTLET
- D-REAR INLET AND OUTLET
- C-BOTH SIDE AND REAR INLET AND OUTLET, STEEL PLUGS
- E-BOTH SIDE AND REAR INLET AND OUTLET, PLASTIC PLUGS

PORT TYPE — 9

- 9-STANDARD PER CHART

MOUNTING — H

- H-SAE "B" 2 BOLT

DRIVE SHAFT — 1

- 1-SAE 13 TOOTH 16/32 SPLINE
- 2-SAE 7/8" STRAIGHT KEYED

ROTATION (FACING END OF SHAFT) — R

- L-COUNTER CLOCKWISE
- R-CLOCKWISE

SHAFT SEAL TYPE — X

- OMIT FOR STANDARD BUNA-N
- H-MEDIUM PRESSURE BUNA-N

SPECIFICATIONS

MODEL NUMBER	DISP. IN³/REV (PSI)	RATED PRESSURE	MAX° RPM	A	B	INLET PORT			OUTLET PORT			WT. (LB.)
						SAE SIZE		FULL THREAD DEPTH	SAE SIZE		FULL THREAD DEPTH	
						SIDE	REAR		SIDE	REAR		
SP25A19	1.141	3000	3000	2.49	5.50	1 5/16-12 UN-2B	1 5/16-12 UN-2B	3/4"	1 1/16-12 UN-2B	1 1/16-12 UN-2B	3/4"	10.4
SP25A22	1.349	3000	3000	2.55	5.62							10.6
SP25A27	1.660	3000	3000	2.64	5.79							11.0
SP25A32	2.008	3000	3000	2.74	5.99	1 5/8-12 UN-2B			1 5/16-12 UN-2B			12.4
SP25A38	2.318	3000	3000	2.83	6.17							13.5
SP25A44	2.697	3000	3000	2.94	6.38							13.9
SP25A52	3.179	2500	3000	3.07	6.66							14.4
SP25A63	3.869	2500	3000	3.27	7.05	1 7/8-12						15.4

°Max. RPM for side ported models. Rear ported models should be restricted to 25 GPM due to limitation on the inlet port size. Standard Seal Kit for all SP25 Models is Prince Part No. PMCK-SP25.

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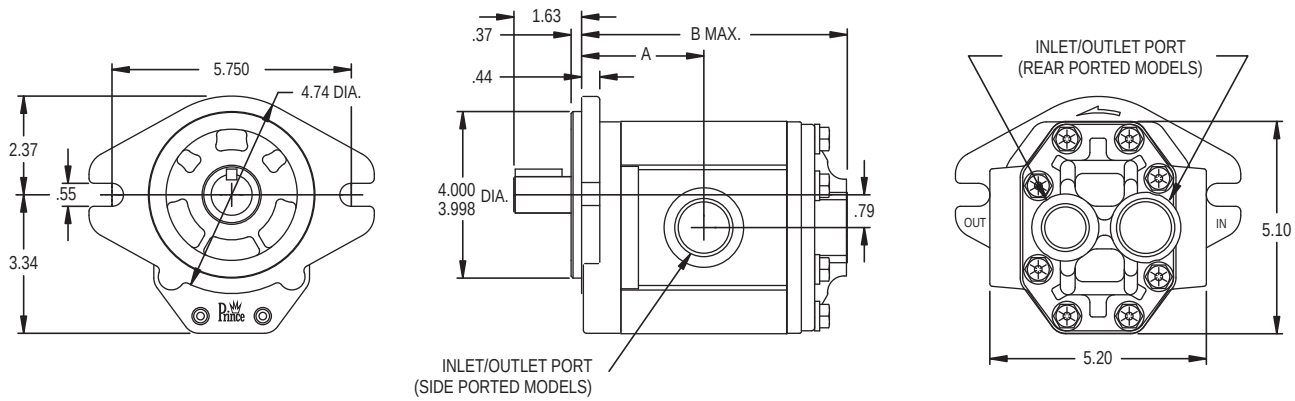
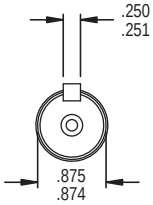
SEE PAGE 25 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

CATP 12-09-04-01

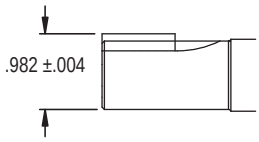
SP25 SERIES DIMENSIONAL DATA





KEYED SHAFT

SHAFT CODE 2



SPLINED SHAFT

SHAFT CODE 1

13 TOOTH
16/32 DP
30° PA
FLAT ROOT SIDE FIT

TYPICAL PERFORMANCE DATA

MODEL		RPM 500	1000	1500	2000	2500	3000	PRESSURE (PSI)
SP25A19	FLOW (GPM)	2.09	4.55	6.90	9.39	11.89	14.24	3000
	INPUT HORSE POWER	4.65	9.31	13.96	18.70	23.45	28.29	
SP25A22	FLOW (GPM)	2.64	5.28	8.22	11.08	13.94	16.81	
	INPUT HORSE POWER	5.58	10.98	16.38	21.96	27.36	33.31	
SP25A27	FLOW (GPM)	3.33	6.75	10.27	13.70	17.22	20.74	
	INPUT HORSE POWER	6.99	13.48	20.22	26.97	33.96	40.95	
SP25A32	FLOW (GPM)	3.91	8.22	12.43	16.73	21.14	25.44	
	INPUT HORSE POWER	8.24	15.98	24.22	32.46	40.95	49.94	
SP25A38	FLOW (GPM)	4.26	9.10	14.09	19.08	24.07	28.77	
	INPUT HORSE POWER	8.56	18.24	27.54	36.85	46.90	56.57	
SP25A44	FLOW (GPM)	4.99	10.86	16.44	22.16	27.89	33.61	
	INPUT HORSE POWER	10.42	21.22	32.01	43.18	54.71	66.25	
SP25A52	FLOW (GPM)	6.16	12.92	19.67	26.42	33.17	39.63	2500
	INPUT HORSE POWER	11.17	21.96	32.38	43.55	55.09	67.00	
SP25A63	FLOW (GPM)	7.52	15.60	23.86	31.93	40.00	48.08	
	INPUT HORSE POWER	14.14	26.43	39.45	52.85	66.62	80.77	

Typical Performance Data Based on 140 SUS Oil at 120° F.

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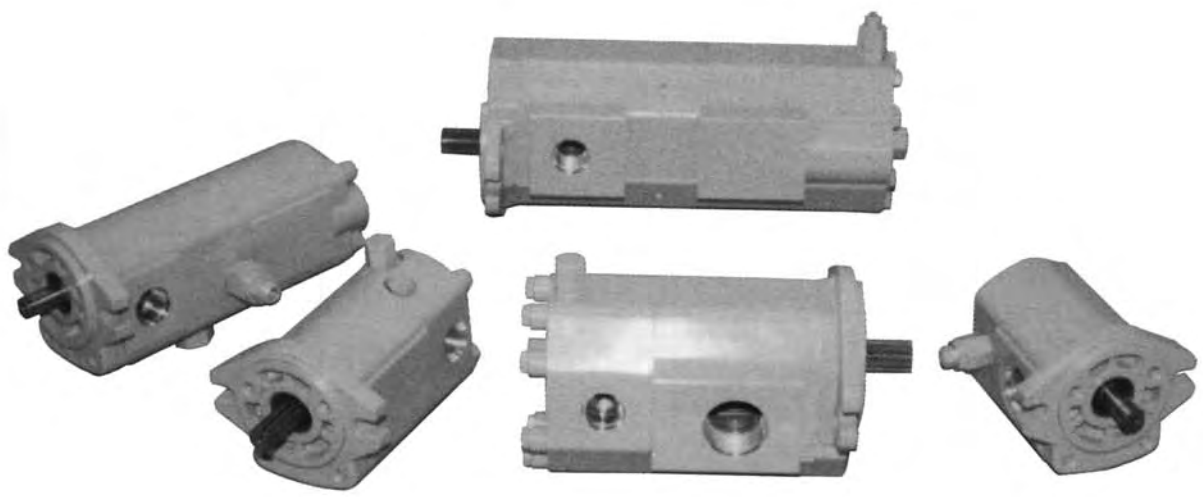
SP PUMP INTEGRAL VALVING OPTIONS



PRINCE SP PUMPS WITH INTEGRAL VALVING FEATURE EXTRUDED ALUMINUM REAR COVERS. THE EXTRUDED REAR COVERS ALLOW EXCEPTIONAL FLEXIBILITY FOR INCORPORATING DIFFERENT VALVING AND PORTING OPTIONS. PRINCE'S USE OF COMPUTER CONTROLLED MACHINING CENTERS IN THE MANUFACTURING PROCESS ALLOW EITHER STANDARD OR CUSTOM DESIGNS TO BE MADE IN BOTH SMALL AND LARGE QUANTITIES.

- **PRIORITY FLOW DIVIDER PUMPS**
  Priority flow divider pumps split the flow between a priority port and an excess flow port. The flow is initially directed to the priority port until the priority setting is satisfied. At that time any additional flow is directed to the excess flow port. Priority divider pumps are typically used in steering circuits, brake circuits or any circuit where a primary flow needs to be satisfied first.

- **RELIEF VALVES**
  Various styles and configurations of relief valves can be provided in the rear cover. The relief return flow can be either ported external to the pump or internally ported back to the inlet. Caution must be used so that the duration of the internally ported flow does not cause excessive heat build up.

- **CUSTOM DESIGN VALVE PACKAGES**
  Prince Manufacturing offers custom designed integral valve packages. Configurations are developed based on customer specifications.

- **SOLENOID VALVES**
  Various configurations of controlling pump flow by using solenoid cartridge valves are available.

- **SPECIAL REAR PORTING**
  A wide variety of port types as well as port locations can be accommodated with the extruded rear cover.

- **DOUBLE PUMP CONFIGURATIONS**
  Integral valve configurations can easily be integrated into double pump configurations. Valves in the rear cover typically control flow from the rear pump section, however valves can also be incorporated into the center section of the double pump for additional control options.

- **HIGH-LO PUMPS (Horse power limiting pumps)**
  A high-lo configuration is available based on the SP20 series pump. The typical configuration provides 28 gpm low pressure flow and 7 gpm high pressure flow (at 3500 rpm). Typical horsepower requirements are 19 hp at 3000 psi and 3500 rpm.

PRINCE MANUFACTURING CORPORATION
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FAX: 605-235-1082

SP20P SERIES - PRIORITY FLOW DIVIDER PUMPS
MODEL CODE

SP20PB 23 K 185 H 2 R

SERIES NO.

DISPLACEMENT CODE (CC/REV)

PRIORITY FLOW +
- G - 1.5 GPM PRIORITY FLOW
- H - 2.0 GPM PRIORITY FLOW
- J - 2.5 GPM PRIORITY FLOW
- K - 3.0 GPM PRIORITY FLOW
- L - 3.5 GPM PRIORITY FLOW
- M - 4.0 GPM PRIORITY FLOW
- N - 4.5 GPM PRIORITY FLOW
- P - 5.0 GPM PRIORITY FLOW

PRIORITY FLOW RELIEF SETTING

THE THREE DIGIT CODE REPRESENTS RELIEF VALVE SETTING DIVIDED BY 10. FOR INSTANCE A CODE NUMBER OF 185 REPRESENTS A RELIEF SETTING OF 1850 PSI. (RELIEF SETTING MUST BE BETWEEN 1000 AND 2250 PSI.)

ROTATION (FACING END OF SHAFT)
- L-COUNTER CLOCKWISE
- R-CLOCKWISE

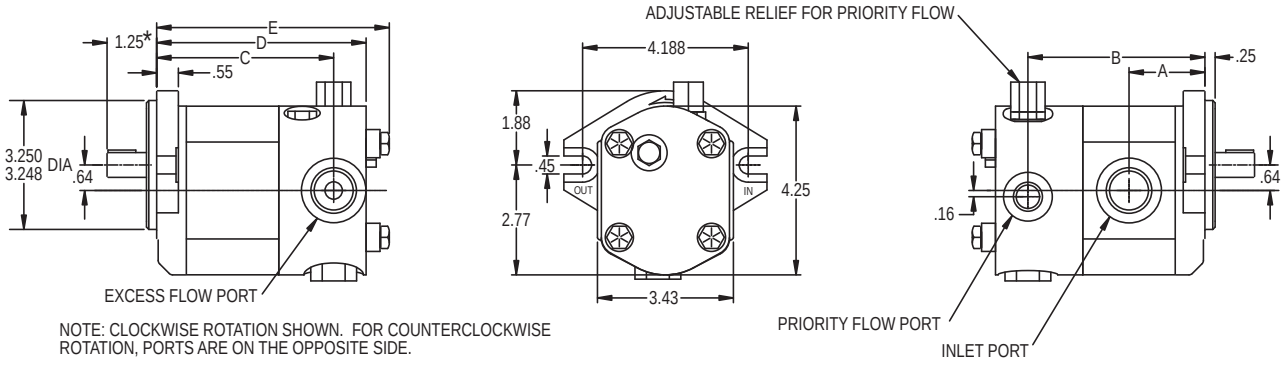
DRIVE SHAFT
- 9-SAE 9 TOOTH 16/32 SPLINE
- 2-SAE 5/8" STRAIGHT KEYED
- 3-11 TOOTH 16/32 SPLINE
- 4-3/4" STRAIGHT KEYED
- 5-SAE 10 TOOTH 16/32 SPLINE

MOUNTING
- H-SAE "A" 2 BOLT

+ FOR PRIORITY FLOWS AND RELIEF SETTINGS NOT INDICATED, CONTACT FACTORY.

0 FOR DISPLACEMENT CODES 08 THROUGH 27, SHAFT CODES 2 AND 9 ARE STANDARD. FOR DISPLACEMENT CODES 30 AND 33, SHAFT CODES 3 AND 4 ARE STANDARD. PUMPS WITH NONSTANDARD SHAFT CODES ARE AVAILABLE IN MINIMUM QUANTITIES.

SP20P SERIES DIMENSIONAL DATA



NOTE: CLOCKWISE ROTATION SHOWN. FOR COUNTERCLOCKWISE ROTATION, PORTS ARE ON THE OPPOSITE SIDE.

* 11 TOOTH SPLINED SHAFT (SHAFT CODE 3) WILL HAVE A 1.49" SHAFT EXTENSION.

SPECIFICATIONS

MODEL NUMBER	DISP. IN³/REV	RATED PRESSURE PSI	MAX RPM	A	B	C	D	E	INLET PORT SIZE	EXCESS FLOW PORT SIZE	PRIORITY FLOW PORT SIZE	WT. (LB.)
SP20PB06	.400	3000	4000	1.79	4.22	4.22	5.04	5.36	7/8-14 UN-2B 5/8" FULL THREAD DEPTH	1 1/16-12 UN-2B 3/4" FULL THREAD DEPTH	9/16-18 UNF-2B 3/4" FULL THREAD DEPTH	6.7
SP20PB08	.499	3000	4000	1.83	4.30	4.30	5.12	5.82	1 1/16-12 UN-2B 3/4" FULL THREAD DEPTH			6.8
SP20PB09	.589	3000	4000	1.87	4.38	4.38	5.20	5.80				7.0
SP20PB11	.677	3000	4000	1.91	4.46	4.46	5.28	5.88				7.2
SP20PB14	.860	3000	4000	1.99	4.62	4.62	5.44	5.81				7.4
SP20PB16	.976	3000	4000	2.04	4.72	4.72	5.53	5.84				7.7
SP20PB20	1.220	3000	3500	2.15	4.93	4.93	5.75	6.35	1 5/16-12 UN-2B 3/4" FULL THREAD DEPTH			7.9
SP20PB23	1.403	2500	3500	2.23	5.09	5.09	5.91	6.28				8.1
SP20PB27	1.654	2500	3500	2.34	5.31	5.31	6.12	6.82				8.3
SP20PB30	1.881	2500	3000	2.41	5.46	5.46	6.28	6.88				8.8
SP20PB33	2.014	2500	3000	2.49	5.62	5.62	6.44	6.81				9.3

FOR PUMP PERFORMANCE DATA AND DIMENSIONAL DATA, REFER TO THE SP20B PUMP SECTION Standard Seal Kit for all SP20B Models is Prince Part No. PMCK-SP20.

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SEE PAGE 26 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

SP25P SERIES - PRIORITY FLOW DIVIDER PUMPS
MODEL CODE

SP25P 52 J 185 H 2 R

SERIES NO.

DISPLACEMENT CODE (CC/REV)

PRIORITY FLOW +

G - 1.5 GPM PRIORITY FLOW
H - 2.0 GPM PRIORITY FLOW
J - 2.5 GPM PRIORITY FLOW
K - 3.0 GPM PRIORITY FLOW
L - 3.5 GPM PRIORITY FLOW
M - 4.0 GPM PRIORITY FLOW
N - 4.5 GPM PRIORITY FLOW
P - 5.0 GPM PRIORITY FLOW

PRIORITY FLOW RELIEF SETTING +

THE THREE DIGIT CODE REPRESENTS RELIEF VALVE SETTING DIVIDED BY 10. FOR INSTANCE A CODE NUMBER OF 185 REPRESENTS A FULL FLOW RELIEF SETTING OF 1850 PSI. (RELIEF SETTING MUST BE BETWEEN 1000 AND 2250 PSI.)

MOUNTING

H-SAE "B" 2 BOLT

DRIVE SHAFT

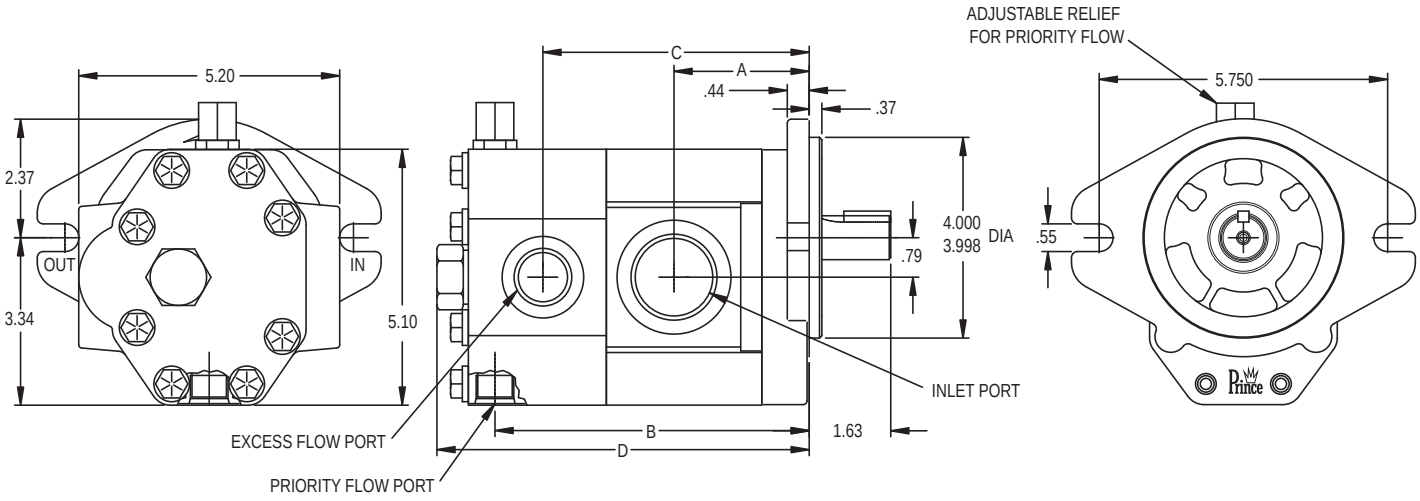
1-SAE 13 TOOTH 16/32 SPLINE
2-SAE 7/8" STRAIGHT KEYED

ROTATION (FACING END OF SHAFT)

L-COUNTERCLOCKWISE
R-CLOCKWISE

+ FOR PRIORITY FLOWS AND RELIEF SETTINGS NOT INDICATED, CONTACT FACTORY.

SP25P SERIES DIMENSIONAL DATA



RIGHT HAND ROTATION SHOWN. FOR LEFT HAND ROTATION, INLET AND EXCESS FLOW PORTS GO TO THE OPPOSITE SIDE OF THE PUMP, PRIORITY FLOW PORT GOES FROM THE BOTTOM TO THE TOP OF THE PUMP.

SPECIFICATIONS

MODEL NUMBER	DISP. IN³REV	RATED PRESSURE	MAX. RPM	A	B	C	D	INLET PORT SIZE		EXCESS FLOW PORT SIZE	PRIORITY FLOW PORT SIZE	WT. (LB.)
SP25P19	1.141	3000	3000	2.49	6.26	5.32	7.42	1 5/16-12 UN-2B	3/4" FULL THREAD DEPTH	1 1/16-12 UN-2B	3/4-16 UN-2B	14.7
SP25P22	1.349	3000	3000	2.55	6.38	5.44	7.54					14.9
SP25P27	1.660	3000	3000	2.64	6.56	5.62	7.71					15.3
SP25P32	2.008	3000	3000	2.74	6.75	5.82	7.91	1 5/8-12 UN-2B		3/4" FULL THREAD DEPTH	9/16" FULL THREAD DEPTH	16.7
SP25P38	2.318	3000	3000	2.83	6.93	5.99	8.09					17.8
SP25P44	2.697	3000	3000	2.94	7.15	6.21	8.30					18.2
SP25P52	3.179	2500	2500	3.07	7.42	6.49	8.58					18.7
SP25P63	3.869	2500	2100	3.27	7.82	6.88	8.97	1 7/8-12				19.7

FOR PUMP PERFORMANCE DATA AND SHAFT DIMENSIONAL DATA, REFER TO THE SP25A PUMP SECTION.
Standard Seal Kit for all SP25 Models is Prince Part No. PMCK-SP25.

PUMPS AND MOTORS

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SEE PAGE 26 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

CATP 16-09-04-01

SPHL1 HI-LO PUMP SERIES
MODEL CODE

SPHL1B 0616 H 2 R

SERIES NO.

DISPLACEMENT CODE (^{CC}/REV)

06 16 (CC/REV)
08 23 (CC/REV)

MOUNTING

H-SAE "A" 2 BOLT
TIME FACTORY SETTING FOR THE SHIFTING SEQUENCE CARTRIDGE IS SET FOR 500 PS. SHIFTING SEQUENCE CARTRIDGE IS ADJUSTABLE.

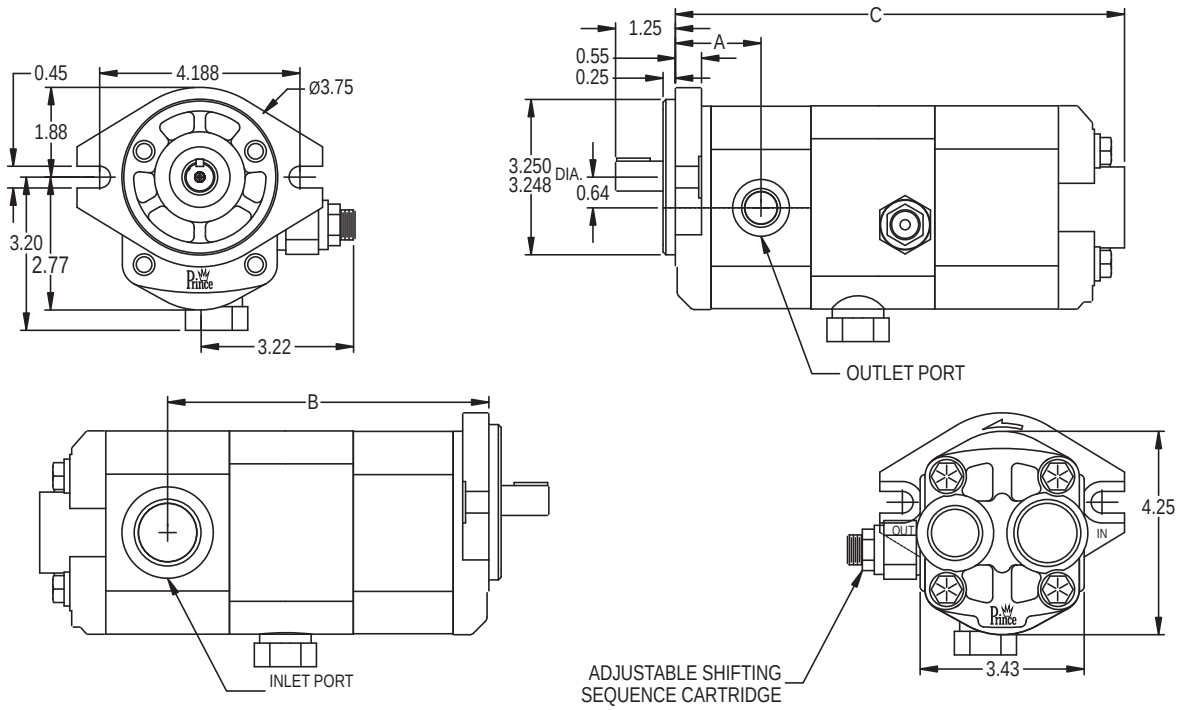
ROTATION (FACING END OF SHAFT)

L-COUNTERCLOCKWISE
R-CLOCKWISE

DRIVE SHAFT

9-SAE 9 TOOTH 16/32 SPLINE
2-SAE 5/8" STRAIGHT KEYED

SPHL1 DIMENSIONAL DATA



NOTE: CLOCKWISE ROTATION SHOWN. FOR COUNTERCLOCKWISE ROTATION, PORTS ARE ON THE OPPOSITE SIDES.

SPECIFICATIONS

MODEL NUMBER	FRONT DISP. IN³/REV.	REAR DISP. IN³/REV.	RATED PRESSURE	MAX RPM	A	B	C	INLET PORT SIZE	OUTLET PORT SIZE	FULL THREAD DEPTH	WT. (LB.)
SPHL1B0616	.400	.976	3000	3600	1.79	6.72	9.39	1 5/16-12 UN-2B	3/4-16 UN-2B	3/4"	14.4
SPHL1B0823	.499	1.403	3000	3600	1.83	6.99	9.85		1 1/16-12 UN-2B		14.7

PERFORMANCE

PUMP	RPM	HIGH FLOW (GPM)	LOW FLOW (GPM)	RECOMMENDED INPUT HORSEPOWER FOR 3000 PSI MAXIMUM WORKING PRESSURE
SPHL1B0616	1800	10.51	2.98	7.8
	3600	21.01	6.00	16.0
SPHL1B0823	1800	14.40	3.70	10.0
	3600	28.52	7.51	22.0

***NOTE:**
PLEASE CONSULT FACTORY FOR HORSEPOWER REQUIREMENTS OF DIFFERENT WORKING AND SHIFT PRESSURES.

Seal Kit for SPHL1 is Prince Part No. PMCK-SPHL1

PUMPS AND MOTORS

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SPD2 DOUBLE PUMPS

SPD2 as shown from rear

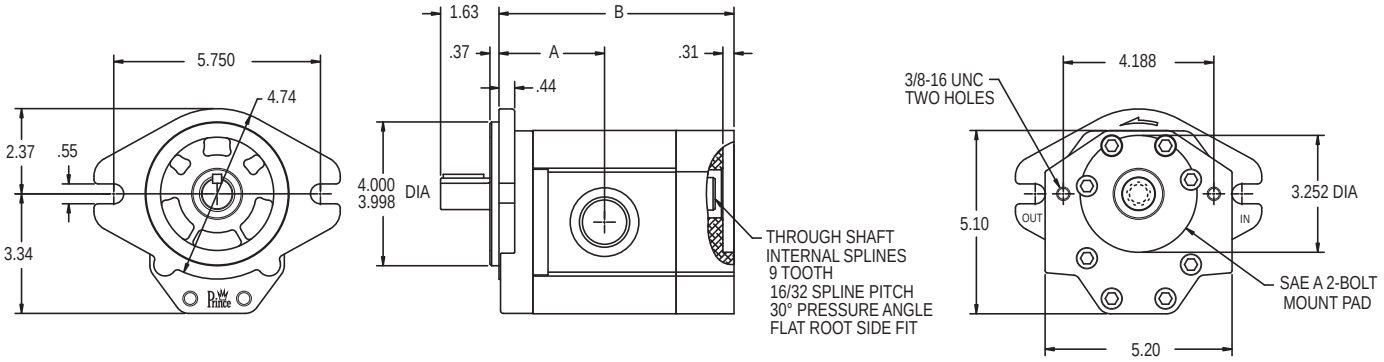
The SPD2 series of pumps are special SP-25A series pumps with through shafts. The through shafts have 9 tooth internal splines at the rear and the pump's rear cover has an integral SAE A-2 bolt mount pad. For double pump operation, a standard SAE A-2 bolt-splined shaft pump can be directly mounted on the rear on the SPD2. Typical performance of the pump is the same as indicated for the SP-25A series pump.

MODEL NO. CODING

SPD2 27 A 9 H 1 – L

- **BASIC MODEL NO.**
- **DISPLACEMENT CODE:** (see chart)
- **PORT LOCATION:** A: SIDE–INLET AND OUTLET
- **PORT TYPE:** STANDARD–AS INDICATED
- **ROTATION (Facing End of Shaft)** L: COUNTER CLOCKWISE R: CLOCKWISE
- **DRIVE SHAFT: (SEE SP-25A series for specifications)** 1: SAE 13 TOOTH 16/32 SPLINE 2: SAE 7/8 STRAIGHT KEYED
- **MOUNTING:** H: 2 BOLT "B" FLANGE

SPECIFICATIONS



SPD2 THROUGH SHAFT PUMPS (PLUG-IN STYLE DOUBLE PUMPS)

MODEL NUMBER & DISPLACEMENT CODE	DISP. IN³/REV	RATED* PRESSURE (PSI)	MAX RPM	A (IN)	B (IN)	INLET PORT SIZE°	OUTLET PORT SIZE°	WT. (LB.)
SPD219	1.141	3000	3000	2.49	5.65	1 5/16-12	1 1/16-12	12.9
SPD222	1.349	3000	3000	2.55	5.77	1 5/16-12	1 1/16-12	13.1
SPD227	1.660	3000	3000	2.64	5.95	1 5/16-12	1 1/16-12	13.5
SPD232	2.008	3000	3000	2.74	6.15	1 5/8-12	1 5/16-12	13.9
SPD238	2.318	3000	3000	2.83	6.32	1 5/8-12	1 5/16-12	14.4
SPD244	2.697	3000	3000	2.94	6.54	1 5/8-12	1 5/16-12	14.9
SPD252	3.179	2500	3000	3.07	6.81	1 5/8-12	1 5/16-12	15.7
SPD263	3.869	2500	3000	3.27	7.21	1 7/8-12	1 5/16-12	16.4

° Standard ports as indicated are UN-2B straight thread 0-Ring boss ports. Optional sizes and configurations are available. Consult factory. *Maximum operating pressure may be decreased depending on the displacement and operating pressure of the rear pump. The combination must conform to the following equation PF X DF + PR X DR < 13200 where PF and PR are the operation pressures (psi) and DF and DR are the displacements (in³/rev) for the front and rear pumps respectively.

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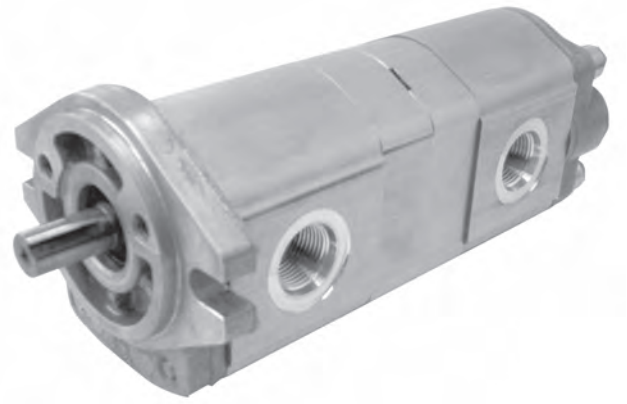
CATP 18-09-04-01

SEE PAGE 27 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

SPD1 DOUBLE PUMPS

The SPD1 series of double pumps consists of two SP20B pump sections. The typical performance of each section and the features of the pump are the same as indicated for the SP20B series of pumps.



SPD1 DOUBLE PUMPS

SPD1B 16 09 - 1 H 9 L

BASIC MODEL NO.

FRONT PUMP (SHAFT END) Displacement Code (see chart)

REAR PUMP DISPLACEMENT CODE (SEE CHART)

INLET CODE:
1: COMMON INLET (NO REAR INLET)
2: SEPARATE INLET (INLETS-BOTH SECTIONS)

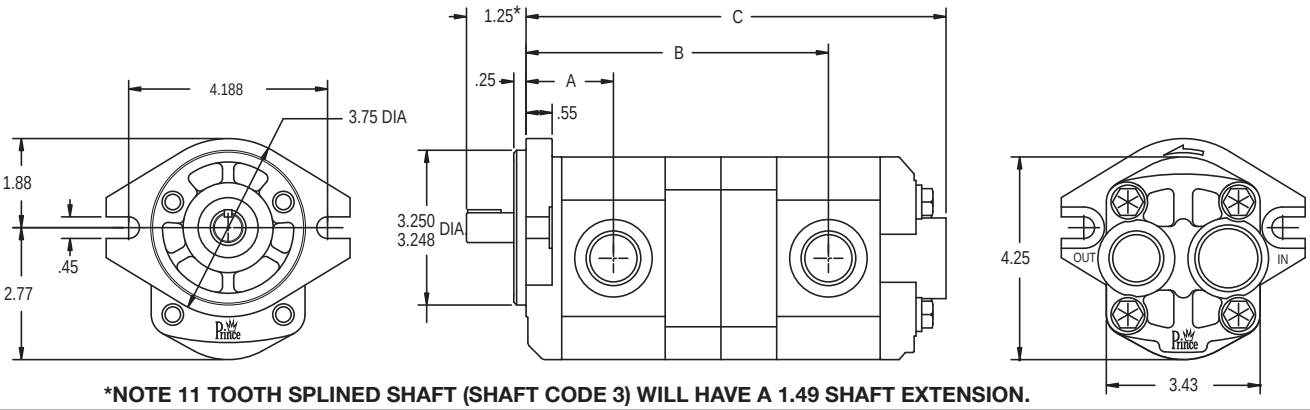
MOUNTING:
H: 2 BOLT "A" FLANGE

Drive Shaft Code:*
9: SAE 9 TOOTH 16/32 SPLINE
2: SAE 5/8" STRAIGHT KEYED
3 - 11 TOOTH 16/32 SPLINE
4 - 3/4 STRAIGHT KEYED

ROTATION: (FACING END OF SHAFT)
L: COUNTER CLOCKWISE
R: CLOCKWISE

*Pumps with nonstandard shafts available in minimum quantities.

SPD1 DOUBLE PUMPS



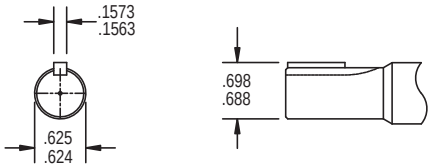
***NOTE 11 TOOTH SPLINED SHAFT (SHAFT CODE 3) WILL HAVE A 1.49 SHAFT EXTENSION.**

SPLINED SHAFT SPECIFICATIONS

SHAFT CODE 9
9 Tooth
16/32 DP
30⁰ PA
Flat Root Side Fit

SHAFT CODE 3
11 Tooth
16/32 DP
30⁰ PA
Flat Root Side Fit

KEYED SHAFT SPECIFICATIONS



PUMPS AND MOTORS

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SEE PAGE 26 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

SPD1 SERIES DOUBLE PUMPS

BASIC MODEL NUMBER & DISPLACEMENT CODES	DISPLACEMENT		MAXIMUM PRESSURE For 9 tooth & 5/8" shaft (for 11 tooth and 3/4" see formula below)		MAXIMUM SPEED RPM	OUTLET PORT[0] SAE SIZE		INLET PORT SAE SIZE[0] SEPARATE INLET PUMP		INLET PORT SAE SIZE COMMON INLET PUMP		PUMP DIMENSIONS			WT. (L.B.)
	FRONT CU IN/REV	REAR CU IN/REV	FRONT PSI	REAR PSI		FRONT PUMP	REAR PUMP	FRONT PUMP	REAR PUMP	FRONT PUMP	REAR PUMP	A IN.	B IN.	C IN.	
SPD1B 08 08	0.499	0.499	3000	3000	3500	7/8-14	7/8-14	1 1/16-12	1 1/16-12	1 1/16-12	NONE	1.83	6.35	8.81	11.6
SPDIB 09 08	0.589	0.499	3000	3000	3500	7/8-14	7/8-14	1 1/16-12	1 1/16-12	1 1/16-12	NONE	1.87	6.43	8.89	11.8
SPD1B 09 09	0.589	0.589	3000	3000	3500	7/8-14	7/8-14	1 1/16-12	1 1/16-12	1 1/16-12	NONE	1.87	6.46	8.97	12.0
SPD1B 11 08	0.677	0.499	3000	3000	3500+	7/8-14	7/8-14	1 1/16-12	1 1/16-12	1 1/16-12	NONE	1.91	6.50	8.97	12.0
SPD1B 11 09	0.677	0.589	3000	3000	3500+	7/8-14	7/8-14	1 1/16-12	1 1/16-12	1 1/16-12	NONE	1.91	6.54	9.05	12.2
SPD1B 11 11	0.677	0.677	3000	3000	3500+	7/8-14	7/8-14	1 1/16-12	1 1/16-12	1 1/16-12	NONE	1.91	6.58	9.13	12.4
SPD1B 14 08	0.860	0.499	3000	3000	3500	7/8-14	7/8-14	1 1/16-12	1 1/16-12	1 5/16-12	NONE	1.99	6.66	9.13	12.2
SPD1B 14 09	0.860	0.589	2800*	2800*	3500	7/8-14	7/8-14	1 1/16-12	1 1/16-12	1 5/16-12	NONE	1.99	6.70	9.21	12.4
SPD1B 14 11	0.860	0.677	2600*	2800*	3500	7/8-14	7/8-14	1 1/16-12	1 1/16-12	1 5/16-12	NONE	1.99	6.74	9.29	12.6
SPD1B 14 14	0.860	0.860	2400*	2400*	3500	7/8-14	7/8-14	1 1/16-12	1 1/16-12	1 5/16-12	NONE	1.99	6.82	9.44	12.8
SPD1B 16 08	0.976	0.499	2800*	2800*	3500	7/8-14	7/8-14	1 1/16-12	1 1/16-12	1 5/16-12	NONE	2.04	6.76	9.23	12.5
SPD1B 16 09	0.976	0.589	2600*	2600*	3500	7/8-14	7/8-14	1 1/16-12	1 1/16-12	1 5/16-12	NONE	2.04	6.80	9.30	12.7
SPD1B 16 11	0.976	0.677	2400*	2600*	3500	7/8-14	7/8-14	1 1/16-12	1 1/16-12	1 5/16-12	NONE	2.04	6.84	9.38	12.9
SPD1B 16 14	0.976	0.860	2200*	2400*	3500	7/8-14	7/8-14	1 1/16-12	1 1/16-12	1 5/16-12	NONE	2.04	6.92	9.54	13.1
SPD1B 16 16	0.976	0.976	2000*	2200*	3500+	7/8-14	7/8-14	1 1/16-12	1 1/16-12	1 5/16-12	NONE	2.04	6.97	9.64	13.4
SPD1B 20 08	1.220	0.499	2400*	2400*	3500	1 1/16-12	7/8-14	1 5/16-12	1 1/16-12	1 5/16-12	NONE	2.15	6.98	9.44	12.7
SPD1B 20 09	1.220	0.589	2200*	2400*	3500	1 1/16-12	7/8-14	1 5/16-12	1 1/16-12	1 5/16-12	NONE	2.15	7.02	9.52	12.9
SPD1B 20 11	1.220	0.677	2200*	2200*	3500	1 1/16-12	7/8-14	1 5/16-12	1 1/16-12	1 5/16-12	NONE	2.15	7.06	9.60	13.1
SPD1B 20 14	1.220	0.860	2000*	2000*	3500	1 1/16-12	7/8-14	1 5/16-12	1 1/16-12	1 5/16-12	NONE	2.15	7.13	9.76	13.3
SPD1B 20 16	1.220	0.976	1800*	2000*	3500+	1 1/16-12	7/8-14	1 5/16-12	1 1/16-12	1 5/16-12	NONE	2.15	7.18	9.86	13.6
SPD1B 20 20	1.220	1.220	1600*	1800*	3500+	1 1/16-12	1 1/16-12	1 5/16-12	1 5/16-12	1 5/16-12	NONE	2.15	7.29	10.07	13.8
SPD1B 23 08	1.403	0.499	2200*	2200*	3500	1 1/16-12	7/8-14	1 5/16-12	1 1/16-12	1 5/8-12	NONE	2.23	7.13	9.60	12.9
SPD1B 23 09	1.403	0.589	2000*	2200*	3500	1 1/16-12	7/8-14	1 5/16-12	1 1/16-12	1 5/8-12	NONE	2.23	7.17	9.68	13.1
SPD1B 23 11	1.403	0.677	2000*	2000*	3500	1 1/16-12	7/8-14	1 5/16-12	1 1/16-12	1 5/8-12	NONE	2.23	7.21	9.76	13.3
SPD1B 23 14	1.403	0.860	1800*	2000*	3500	1 1/16-12	7/8-14	1 5/16-12	1 1/16-12	1 5/8-12	NONE	2.23	7.29	9.92	13.5
SPD1B 23 16	1.403	0.976	1800*	1800*	3500	1 1/16-12	7/8-14	1 5/16-12	1 1/16-12	1 5/8-12	NONE	2.23	7.34	10.01	13.8
SPD1B 23 20	1.403	1.220	1600*	1600*	3500+	1 1/16-12	1 1/16-12	1 5/16-12	15/16-12	1 5/8-12	NONE	2.23	7.45	10.23	14.0
SPD1B 23 23	1.403	1.403	1400*	1600*	3500+	1 1/16-12	1 1/16-12	1 5/16-12	1 5/16-12	1 5/8-12	NONE	2.23	7.53	10.39	14.2
SPD1B 27 08	1.654	0.499	1800*	2000*	3500	1 1/16-12	7/8-14	1 5/16-12	1 1/16-12	1 5/8-12	NONE	2.34	7.35	9.82	13.1
SPD1B 27 09	1.654	0.589	1800*	2000*	3500	1 1/16-12	7/8-14	1 5/16-12	1 1/16-12	1 5/8-12	NONE	2.34	7.39	9.90	13.3
SPD1B 27 11	1.654	0.677	1800*	1800*	3500	1 1/16-12	7/8-14	1 5/16-12	1 1/16-12	1 5/8-12	NONE	2.34	7.43	9.97	13.5
SPD1B 27 14	1.654	0.860	1600*	1800*	3500	1 1/16-12	7/8-14	1 5/16-12	1 1/16-12	1 5/8-12	NONE	2.34	7.51	10.13	13.7
SPD1B 27 16	1.654	0.976	1600*	1600*	3500	1 1/16-12	7/8-14	1 5/16-12	1 1/16-12	1 5/8-12	NONE	2.34	7.56	10.23	14.0
SPD1B 27 20	1.654	1.220	1400*	1600*	3500+	1 1/16-12	1 1/16-12	1 5/16-12	1 5/16-12	1 5/8-12	NONE	2.34	7.67	10.45	14.2
SPD1B 27 23	1.654	1.403	1400*	1400*	3500+	1 1/16-12	1 1/16-12	1 5/16-12	1 5/16-12	1 5/8-12	NONE	2.34	7.74	10.60	14.4
SPD1B 27 27	1.654	1.654	1200*	1400*	3500+	1 1/16-12	1 1/16-12	1 5/16-12	1 5/16-12	1 5/8-12	NONE	2.34	7.85	10.82	14.6

[0] Standard ports as indicated arc UN-2B straight thread 0-Ring boss ports. Optional sizes and configurations are available. Consult factory.

∗ Different pressure and shaft combinations may be used if required provided they conform to the following equations PF x DF + PR x DR < 4150 for 9 tooth & 5/8" shafts (6250 for 11 tooth & 3/4" shafts) where PF and PR are the operating pressures (psi) and DF and DR are the displacements (cu in/rev) for the front and rear pumps respectively (maximum pressures are 3000 psi for displacement codes 8 -20 and 2500 psi for displacement codes 23 - 27).

+ Common inlet pumps require a reduction in maximum rpm. Consult factory.

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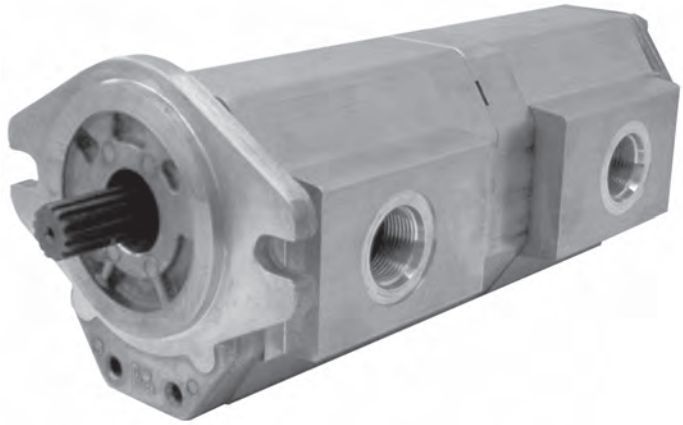
SPD3 DOUBLE PUMPS



The SPD3 series of double pumps consists of two SP-25A pump sections. The typical performance of each section and the features of the pump are the same as indicated for the SP-25A series of pumps.

MODEL NO. CODING

SPD3 44 22 - 1 H 1 L

BASIC MODEL NO.

FRONT PUMP (SHAFT END) DISPLACEMENT CODE (SEE CHART)

REAR PUMP DISPLACEMENT CODE (SEE CHART)

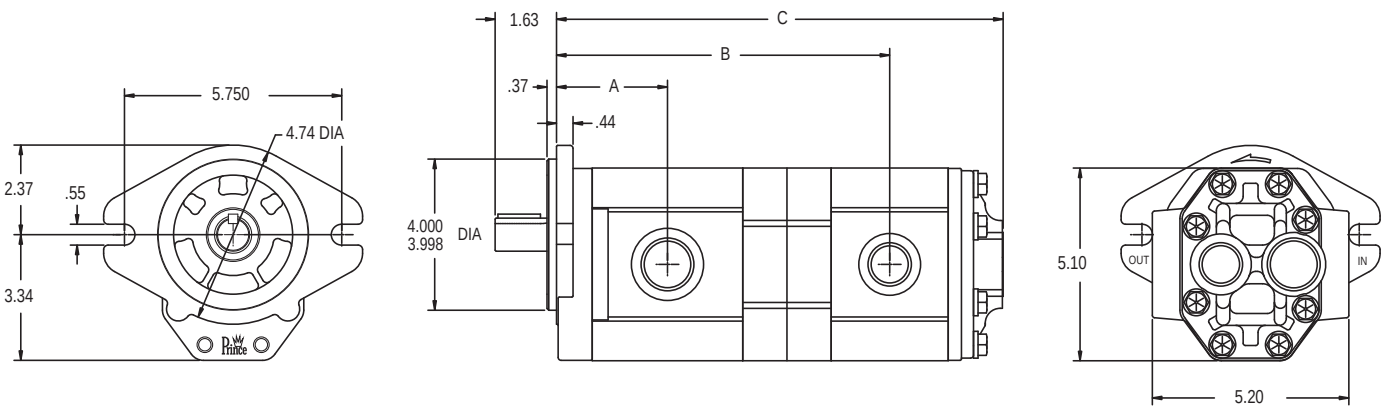
ROTATION: (FACING END OF SHAFT)
- L: COUNTER CLOCKWISE
- R: CLOCKWISE

Drive Shaft Code:
- 1: SAE 13 TOOTH 16/32 SPLINE
- 2: SAE 7/8" STRAIGHT KEYED

MOUNTING:
- H: 2 BOLT "B" FLANGE

INLET CODE:
- 1: COMMON INLET (NO REAR INLET)
- 2: SEPARATE INLET (INLETS-BOTH SECTIONS)

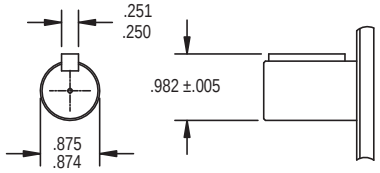
DIMENSIONS



SPLINED SHAFT SPECIFICATIONS

Per SAE Specifications
- 13 Tooth
- 16/32 Spline Pitch
- 30 Degree Pressure Angle
- Flat Root Side Fit

KEYED SHAFT SPECIFICATIONS



PUMPS AND MOTORS

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SPD3 SERIES DOUBLE PUMPS

BASIC MODEL NUMBER & DISPLACEMENT CODES	DISPLACEMENT		MAXIMUM PRESSURE		MAXIMUM SPEED RPM	OUTLET PORT[o] SAE SIZE		INLET PORT SAE SIZE[o] SEPARATE INLET PUMP		INLET PORT SAE SIZE[o] COMMON INLET PUMP		PUMP DIMENSIONS			WT. (L.B.)
	FRONT CU IN/REV	REAR CU IN/REV	FRONT PSI	REAR PSI		FRONT PUMP	REAR PUMP	FRONT PUMP	REAR PUMP	FRONT PUMP	REAR PUMP	A IN.	B IN.	C IN.	
SPD3 19 19	1.141	1.141	3000	3000	3000	1 1/16-12	1 1/16-12	1 5/16-12	1 5/16-12	1 5/8-12	NONE	2.49	7.93	10.93	23.3
SPD3 22 19	1.349	1.141	3000	3000	3000	1 1/16-12	1 1/16-12	1 5/16-12	1 5/16-12	1 5/8-12	NONE	2.55	8.05	11.05	23.5
SPD3 22 22	1.349	1.349	3000	3000	3000	1 1/16-12	1 1/16-12	1 5/16-12	1 5/16-12	1 5/8-12	NONE	2.55	8.11	11.17	23.7
SPD3 27 19	1.660	1.141	3000	3000	3000	1 1/16-12	1 1/16-12	1 5/16-12	1 5/16-12	1 5/8-12	NONE	2.64	8.23	11.23	23.9
SPD3 27 22	1.660	1.349	3000	3000	3000	1 1/16-12	1 1/16-12	1 5/16-12	1 5/16-12	1 5/8-12	NONE	2.64	8.29	11.35	24.1
SPD3 27 27	1.660	1.660	3000	3000	3000	1 1/16-12	1 1/16-12	1 5/16-12	1 5/16-12	1 5/8-12	NONE	2.64	8.37	11.52	24.5
SPD3 32 19	2.008	1.141	3000	3000	3000	1 5/16-12	1 1/16-12	1 5/8-12	1 5/16-12	1 7/8-12	NONE	2.74	8.42	11.42	24.3
SPD3 32 22	2.008	1.349	3000	3000	3000	1 5/16-12	1 1/16-12	1 5/8-12	1 5/16-12	1 7/8-12	NONE	2.74	8.48	11.54	24.5
SPD3 32 27	2.008	1.660	3000	3000	3000	1 5/16-12	1 1/16-12	1 5/8-12	1 5/16-12	1 7/8-12	NONE	2.74	8.57	11.72	24.9
SPD3 32 32	2.008	2.008	3000	3000	3000	1 5/16-12	1 5/16-12	1 5/8-12	1 5/8-12	1 7/8-12	NONE	2.74	8.67	11.92	25.3
SPD3 38 19	2.318	1.141	3000	3000	3000	1 5/16-12	1 1/16-12	1 5/8-12	1 5/16-12	1 7/8-12	NONE	2.83	8.60	11.60	24.8
SPD3 38 22	2.318	1.349	3000	3000	3000	1 5/16-12	1 1/16-12	1 5/8-12	1 5/16-12	1 7/8-12	NONE	2.83	8.66	11.72	25.0
SPD3 38 27	2.318	1.660	3000	3000	3000	1 5/16-12	1 1/16-12	1 5/8-12	1 5/16-12	1 7/8-12	NONE	2.83	8.75	11.90	25.4
SPD3 38 32	2.318	2.008	3000	3000	3000	1 5/16-12	1 5/16-12	1 5/8-12	1 5/8-12	1 7/8-12	NONE	2.83	8.85	12.09	25.8
SPD3 38 38	2.318	2.318	3000	2700*	3000	1 5/16-12	1 5/16-12	1 5/8-12	1 5/8-12	17/8-12	NONE	2.83	8.94	12.27	26.3
SPD3 44 19	2.697	1.141	3000	3000	3000	1 5/16-12	1 1/16-12	1 5/8-12	1 5/16-12	1 7/8-12	NONE	2.94	8.82	11.82	25.3
SPD3 44 22	2.697	1.349	3000	3000	3000	1 5/16-12	1 1/16-12	1 5/8-12	1 5/16-12	1 7/8-12	NONE	2.94	8.88	11.94	25.5
SPD3 44 27	2.697	1.660	3000	3000	3000	1 5/16-12	1 1/16-12	1 5/8-12	1 5/16-12	1 7/8-12	NONE	2.94	8.96	12.11	25.9
SPD3 44 32	2.697	2.008	2900*	2700*	3000	1 5/16-12	1 5/16-12	1 5/8-12	1 5/8-12	1 7/8-12	NONE	2.94	9.06	12.31	26.3
SPD3 44 38	2.697	2.318	2800*	2500*	3000+	1 5/16-12	1 5/16-12	1 5/8-12	1 5/8-12	1 7/8-12	NONE	2.94	9.15	12.49	26.8
SPD3 44 44	2.697	2.697	2600*	2300*	3000+	1 5/16-12	1 5/16-12	1 5/8-12	1 5/8-12	1 7/8-12	NONE	2.94	9.26	12.70	27.3
SPD3 52 19	3.179	1.141	2500	3000	3000	1 5/16-12	1 1/16-12	1 5/8-12	1 5/16-12	1 7/8-12	NONE	3.07	9.09	12.09	26.1
SPD3 52 22	3.179	1.349	2500	3000	3000	1 5/16-12	1 1/16-12	1 5/8-12	1 5/16-12	1 7/8-12	NONE	3.07	9.15	12.21	26.3
SPD 52 27	3.179	1.660	2500	3000	3000	1 5/16-12	1 1/16-12	1 5/8-12	1 5/16-12	1 7/8-12	NONE	3.07	9.24	12.39	26.7
SPD3 52 32	3.179	2.008	2500*	2500*	3000	1 5/16-12	1 5/16-12	1 5/8-12	1 5/8-12	1 7/8-12	NONE	3.07	9.34	12.59	27.1
SPD3 52 38	3.179	2.318	2300*	2500*	3000+	1 5/16-12	1 5/16-12	1 5/8-12	1 5/8-12	1 7/8-12	NONE	3.07	9.43	12.76	27.6
SPD3 52 44	3.179	2.697	2100*	2400*	3000+	1 5/16-12	1 5/16-12	1 5/8-12	15/8-12	1 7/8-12	NONE	3.07	9.54	12.98	28.1
SPD3 52 52	3.179	3.179	2000*	2100*	3000+	1 5/16-12	1 5/16-12	15/8-12	1 5/8-12	1 7/8-12	NONE	3.07	9.67	13.26	28.9
SPD3 63 19	3.869	1.141	2500*	2900*	3000	1 5/16-12	1 1/16-12	1 7/8-12	1 5/16-12	1 7/8-12	NONE	3.27	9.49	12.49	26.8
SPD3 63 22	3.869	1.349	2500*	2500*	3000	1 5/16-12	1 1/16-12	1 7/8-12	1 5/16-12	1 7/8-12	NONE	3.27	9.55	12.61	27.0
SPD3 63 27	3.869	1.660	2300*	2500*	3000	1 5/16-12	1 1/16-12	1 7/8-12	1 5/16-12	1 7/8-12	NONE	3.27	9.63	12.78	27.4
SPD3 63 32	3.869	2.008	2100*	2500*	3000+	1 5/16-12	1 5/16-12	1 7/8-12	1 5/8-12	1 7/8-12	NONE	3.27	9.73	12.98	27.8
SPD3 63 38	3.869	2.318	2000*	2300*	3000+	1 5/16-12	1 5/16-12	1 7/8-12	1 5/8-12	1 7/8-12	NONE	3.27	9.82	13.16	28.3
SPD3 63 44	3.869	2.697	1900*	2100*	3000+	1 5/16-12	1 5/16-12	1 7/8-12	1 5/8-12	1 7/8-12	NONE	3.27	9.93	13.37	28.8
SPD3 63 52	3.869	3.179	1700*	2000*	3000+	1 5/16-12	1 5/16-12	17/8-12	1 5/8-12	1 7/8-12	NONE	3.27	10.07	13.65	29.6
SPD3 63 63	3.869	3.869	1500*	1800*	3000+	1 5/16-12	1 5/16-12	1 7/8-12	1 7/8-12	1 7/8-12	NONE	3.27	10.26	14.04	3.03

[o] Standard ports as indicated are UN-2B straight thread 0-Ring boss ports. Optional sizes and configurations are available. Consult factory.

∗ Different pressure combinations may be used if required provided they conform to the following equation PF x DF + PR x DR < 13200 where PF and PR are the operating pressures (psi) and DF and DR are the displacements (cu in/rev) for the front and rear pumps respectively (maximum pressures are 3000 psi for displacement codes 19 - 44 and 2500 psi for displacement codes 52 - 63). Consult factory.

+ Common inlet pumps require a reduction in maximum rpm. Consult factory.

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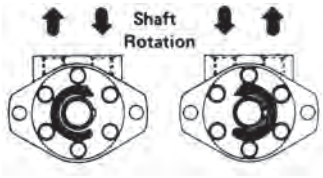
CATP 22-09-04-01

CMM SERIES GEROTOR MOTOR – LOW SPEED – HIGH TORQUE



The Prince CMM Series of high-torque, low speed motors incorporates the orbiting gerotor principle for dependable operation over a wide range of applications. Although dimensionally small, this motor is capable of providing considerable power over a wide speed range and is instantly reversible by simply reversing the direction of the hydraulic fluid flow. The needs of many applications requiring high starting, stall and running torque combined with slow speed are met by this motor.

Feature

- Fully reversible simply by reversing the direction of hydraulic fluid flow.
- Alternative port positioning for versatility of installation. (see next page).
- Optional shaft configurations. (see next page).
- Modular construction for economical servicing and repair, also permits special adaptations.

Filtration

10 micron or finer. (Per ISO cleanliness code level 17/14.

Ordering Code □ □ □ □ □

MOTOR TYPE:
CMM

MOTOR SIZE:
50
100
200
300
400

MOUNTING:
4 Hole Flange – 4

SHAFT TYPE:
Standard 1* Key R

PORTS:
P – 1/2 NPTF (Standard)

APPLICATIONS

Use the CMM Series for light to medium duty applications such as grain augers and elevators, salt and sand spreaders, car wash and sweeper brushes, conveyors, winches, scissor lifts, and many other. To assure optimum motor life, run motor for approximately one hour at 30% of rated pressure before application of full load.

CROSS REFERENCE

CHARLYNN "H" Series

DANFOSS "DH" Series

It is not recommended to operate at a condition requiring both maximum torque and speed. Splined shafts are recommended in application operating at above 2500 in-lbs. continuous torque or under conditions of frequent reversal.

ADM	DISPLACEMENT CC/REV	DISPLACEMENT CU.IN/REV	MAXIMUM PRESSURE PSI CONT	MAXIMUM PRESSURE PSI INT⁰	MAXIMUM PRESSURE Kgf/CM² CONT	MAXIMUM PRESSURE Kgf/CM² INT⁰	MAXIMUM SPEED RPM CONT	MAXIMUM SPEED RPM INT⁰	WT.*
50	49.1	3.0	1400	2200	98	153	800	1000	12.8
100	99.6	6.1	1300	2000	91	139	600	750	13.4
200	199.2	12.2	1200	1800	84	125	300	400	14.5
300	293.2	17.9	1000	1600	70	111	200	250	15.5
400	398.4	24.4	900	1300	63	90	125	160	16.7

Maximum Axial Thrust Load on Shaft 1000 lbs.

⁰Intermittent operation = 10% Operation of every minute

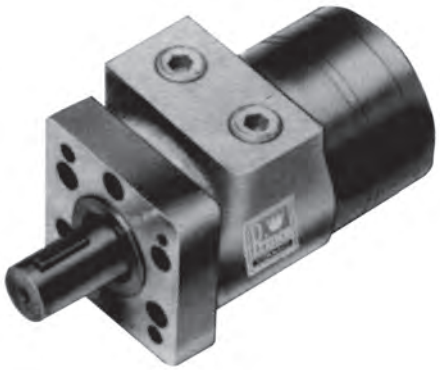
TEMP: NORMAL OPERATING 80⁰ F TO 140⁰ F, MAX 185⁰ F

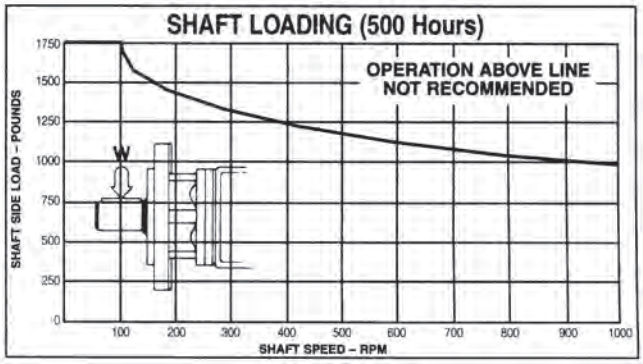
Maximum inlet pressure 2,500 psi for motors in series

Maximum back pressure 1,000 psi

OIL: Mineral based hydraulic fluid 100-200 SUS @ operating temperature.

CMM SERIES





PUMPS AND MOTORS

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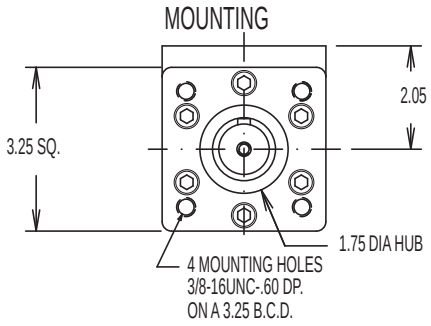
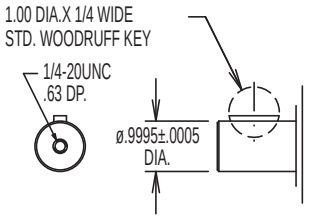
SEE PAGE 28 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

MOUNTING DIMENSIONS CMM



4 BOLT FLANGE

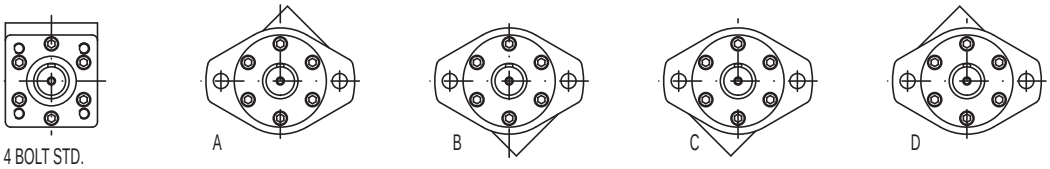
* NOTE: MOUNTING DIMENSIONS ARE THE SAME FOR THE CMM.



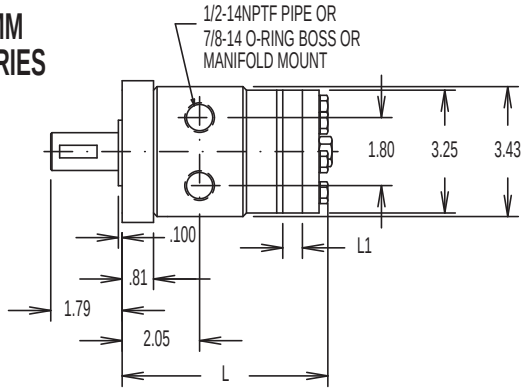
STRAIGHT KEYED SHAFT

STD.

PORT POSITIONS



CMM SERIES



CMM	50	100	200	300	400
L	5.14	5.40	5.89	6.39	6.89
L1	.250	.520	1.00	1.50	2.00

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Performance Data

346
280

Colored number on top = TORQUE (in-lbs)
Black number on bottom = SPEED (RPM)

GREATEST EFFICIENCY
HIGH EFFICIENCY

CMM 50

3.0 Cu. In. REV — ΔPSI

GPM	200	400	600	800	1000	1200	1400	Peak
2	69 149	139 143	209 137	279 131	349 125	419 119	489 113	787 63
4	66 304	136 298	206 292	276 286	346 280	416 274	486 268	784 218
6	62 459	132 453	202 447	272 441	342 435	412 429	482 423	780 373
8	55 614	125 608	195 602	265 596	335 590	405 584	475 578	775 529
10	47 769	117 763	187 757	257 751	327 745	397 739	467 733	768 684
12	37 924	107 918	177 912	247 906	317 900	387 894	457 888	758 839

CMM 100

6.07 Cu. In. REV — ΔPSI

GPM	200	400	600	800	1000	1200	Peak
2	144 72	292 68	440 64	588 60	736 56	884 52	1437 30
4	138 147	286 143	434 139	582 135	730 131	878 127	1431 105
6	130 222	278 219	426 216	574 213	722 210	870 207	1423 185
8	119 300	267 297	415 294	563 291	711 288	859 285	1412 263
10	104 375	252 372	400 369	548 366	696 363	844 360	1397 368
12	85 452	233 449	381 446	529 443	677 440	825 437	1378 415
14	64 528	212 525	360 522	508 519	656 516	804 513	1357 491

CMM 200

12.15 Cu. In. REV — ΔPSI

GPM	200	400	600	800	1000	Peak
2	283 35	563 32	843 29	1123 26	1403 23	
4	273 74	553 71	833 68	1113 65	1393 62	2305 45
6	258 112	538 109	818 106	1098 103	1378 100	2290 83
8	237 149	517 146	797 143	1077 140	1357 137	2269 120
10	209 187	489 184	769 181	1049 178	1329 175	2241 158
12	180 225	460 223	640 220	920 217	1200 214	2112 197
14	136 264	416 261	696 258	976 255	1256 252	2168 235

CMM 300

17.9 Cu. In. REV — ΔPSI

GPM	200	400	600	800	Peak
2	426 23	856 21	1286 18	1716 16	1350
4	413 49	843 46	1273 44	1703 41	2890 27
6	392 75	822 72	1252 70	1682 67	2865 53
8	362 101	791 98	1222 95	1652 93	2830 79
10	324 126	754 124	1184 121	1614 119	2785 105
12	277 152	707 150	1137 147	1567 144	2735 131
14	222 178	652 175	1082 173	1512 170	2680 157

CMM 400

24.4 Cu. In. REV — ΔPSI

GPM	200	400	600	800	Peak
2	565 16	1136 14	1707 12	2279 10	1200
4	549 36	1120 33	1691 31	2262 29	3392 20
6	520 55	1091 53	1663 51	2229 48	3371 39
8	481 74	1053 73	1624 70	2195 68	3335 59
10	430 94	1002 91	1573 89	2144 86	3274 77
12	368 113	939 11	1511 108	2082 106	3213 97
14	296 132	867 130	1438 127	2009 125	3147 116

ΔPSI – is the actual pressure difference between the inlet and outlet ports.
A SITUATION OF SIMULTANEOUS PEAK TORQUE AND MAXIMUM RPM SHOULD NOT BE ALLOWED TO OCCUR.
Splined shafts are recommended in applications that operate at torques higher than 2500 in-lbs. Operating motors at both low rpm (10-20 depending on disp) and low torque may result in rpm fluctuations during operation.
To calculate horsepower from chart data use formula:

$$\text{HP (out)} = \frac{\text{RPM} \times \text{TORQUE (in-lbs)}}{63025}$$

ADM SERIES HYDRAULIC MOTOR CROSS REFERENCE

	SHAFT	PORTS	MOTOR BRAND	DISPLACEMENT CU. IN./REV. 2.9	6.1	11.7	17.5	23.4
4 BOLT FLANGE MOUNTING	WOODRUFF KEYED	1/2 " NPT	PRINCE CHARLYN H DANFOSS DH	CMM50-4RP 101-1001 151-2121	CMM100-4RP 101-1003 151-2123	CMM200-4RP 101-1005 151-2126	CMM300-4RP 101-1007 151-2128	CMM400-4RP 101-1008 151-2129

NOTE: THE CROSS REFERENCE INFORMATION IN THIS CHART IS TO BE USED ONLY AS A REFERENCE FOR GUIDELINE PURPOSES ONLY. AFTER SELECTING A MODEL FROM ABOVE, REVIEW THE MOTOR SPECIFICATIONS TO DETERMINE COMPATIBILITY WITH SPECIFIC APPLICATION.

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Prince Manufacturing Corporation Warranty

Prince warrants only standard and custom products of its manufacture against operational failure occurring during normal use and caused by defective materials or workmanship in its product.

Standard product (listed in Prince's standard products catalog) is warranted for 36 months from the date of purchase by Prince's customer or 30 months from the date the product is first put into service, whichever is earlier.

Custom product is warranted for 15 months from the date of purchase by Prince's customer or 12 months from the date the product is first put into service, whichever is earlier.

Prince's obligation is to replace free of charge any part of its product that its inspection shows to be defective including the lowest round trip transportation charges from Prince's customer to Sioux City, Iowa, and return, but excluding all transportation costs from Prince's customer to its customer and all other costs such as removal and installation expenses.

Prince shall not be liable for loss of time, manufacturing costs, labor, material, loss of profits, consequential damages, direct or indirect, because of defective products, whether due to rights arising under the contract of sale or independently thereof, and whether or not such claim is based on contract, tort or warranty.

Written permission for any warranty claim return must be first obtained from authorized Prince personnel. All returns must the accompanied with a complete written explanation of claimed defects and the circumstances of operational failure.

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(This warranty voids all previous issues.)
(Effective Date: April, 2005)

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