Prince

VALVES

Prince Manufacturing Corporation
North Sioux City, South Dakota

INDEX

PRINCE MANUFACTURING CORPORATION • NORTH SIOUX CITY, SOUTH DAKOTA 57049
URL: www.princehyd.com • E-MAIL: prince@princehyd.com • PHONE: (605) 235-1220

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.
SECTIONS AVAILABLE:

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

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

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

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

	PART NO.	WORK SECTIONS	PART NO.	WORK SECTIONS
TIE-ROD TORQUE 30-32 ft-lbs	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 SECT SEAL KIT (5.6)
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
(FOR PRESET CARTRIDGE USE 20PR-OX PG V28)

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
(FOR PRESET CARTRIDGE USE 20 IR-OX PG V28)

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
660190043	SHIM ASSORTMENT

LOAD SENSE KITS

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

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SEE PAGE 1, 5 & 14 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

SPECIAL SECTIONS AVAILABLE:

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

20 X X X X X X X

WORK SECTION TYPE
P-STANDARD PARALLEL
T-TANDEM CENTER
L-PARALLEL WITH BUILT IN PILOT OPERATED CHECKS**
S-SERIES
_B-PILOT PASS THROUGH HOLES****

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 (MUST USE FLOAT ACTION)
E - 3 WAY 3 POSITION FREE FLOW MOTOR
N - 4 WAY 3 POSITION SERIES
P - 4 WAY 3 POSITION SERIES MOTOR

SPOOL ACTIONS
A - SPRING CENTER TO NEUTRAL
B - 3 POSITION DETENT
C - FRICTION DETENT
D - FLOAT DETENT (MUST USE FLOAT SPOOL)
E - SPRING CENTER PNEUMATIC ACTUATOR
F - 2 POSITION DETENT NEUTRAL & OUT (NO IN POSITION)
H - HYDRAULIC ACTUATOR (USE HANDLE OPTION 7)
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
7 - BLANK FOR OPTIONAL JOYSTICK HANDLE

PORT RELIEF "B" (LEAVE BLANK FOR 20L)

PORT RELIEF "A" (LEAVE BLANK FOR 20L)
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.
**** ONLY PLACE A 'B' NEXT TO THE WORK SECTION TYPE MODEL CODE WHEN THE MANUAL SECTION IS PLACED BETWEEN A SOLENOID SECTION AND THE PILOT SUPPLY. AN EXAMPLE WOULD BE 20PB1BA1AA. SEE THE SOLENOID SECTION OF THE CATALOG FOR MORE INFORMATION.

INLET SECTION

20 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

20 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 °
4 - STANDARD OPEN CENTER WITH SOLENOID PILOT LINE SEALS

° 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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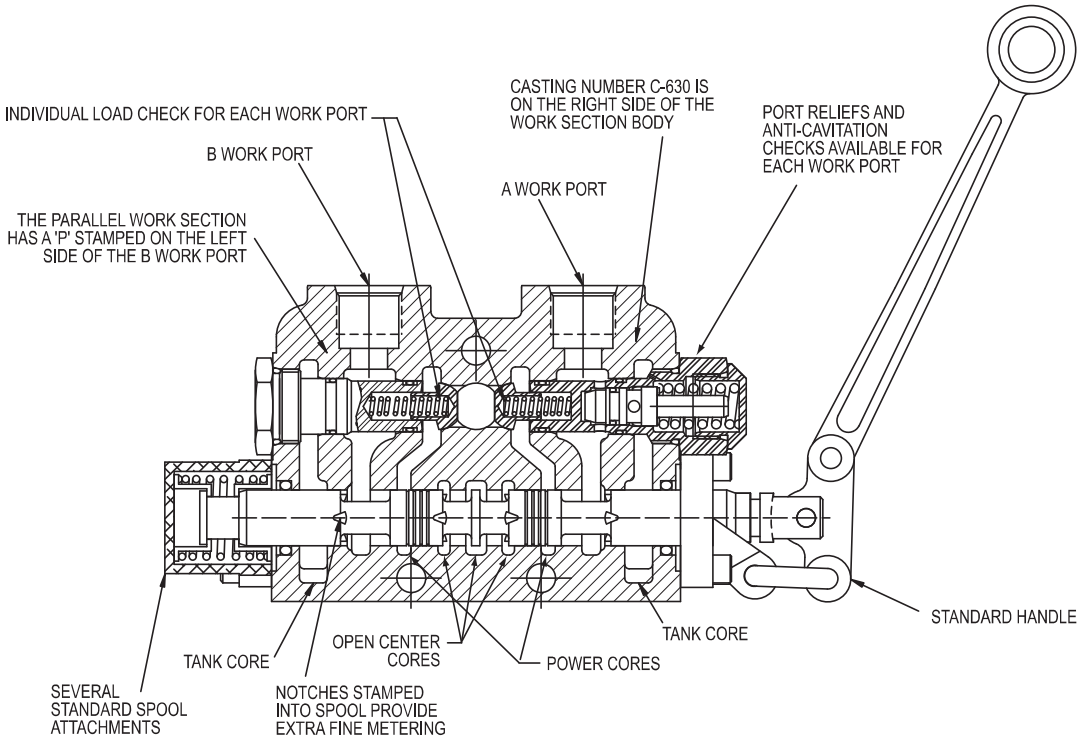
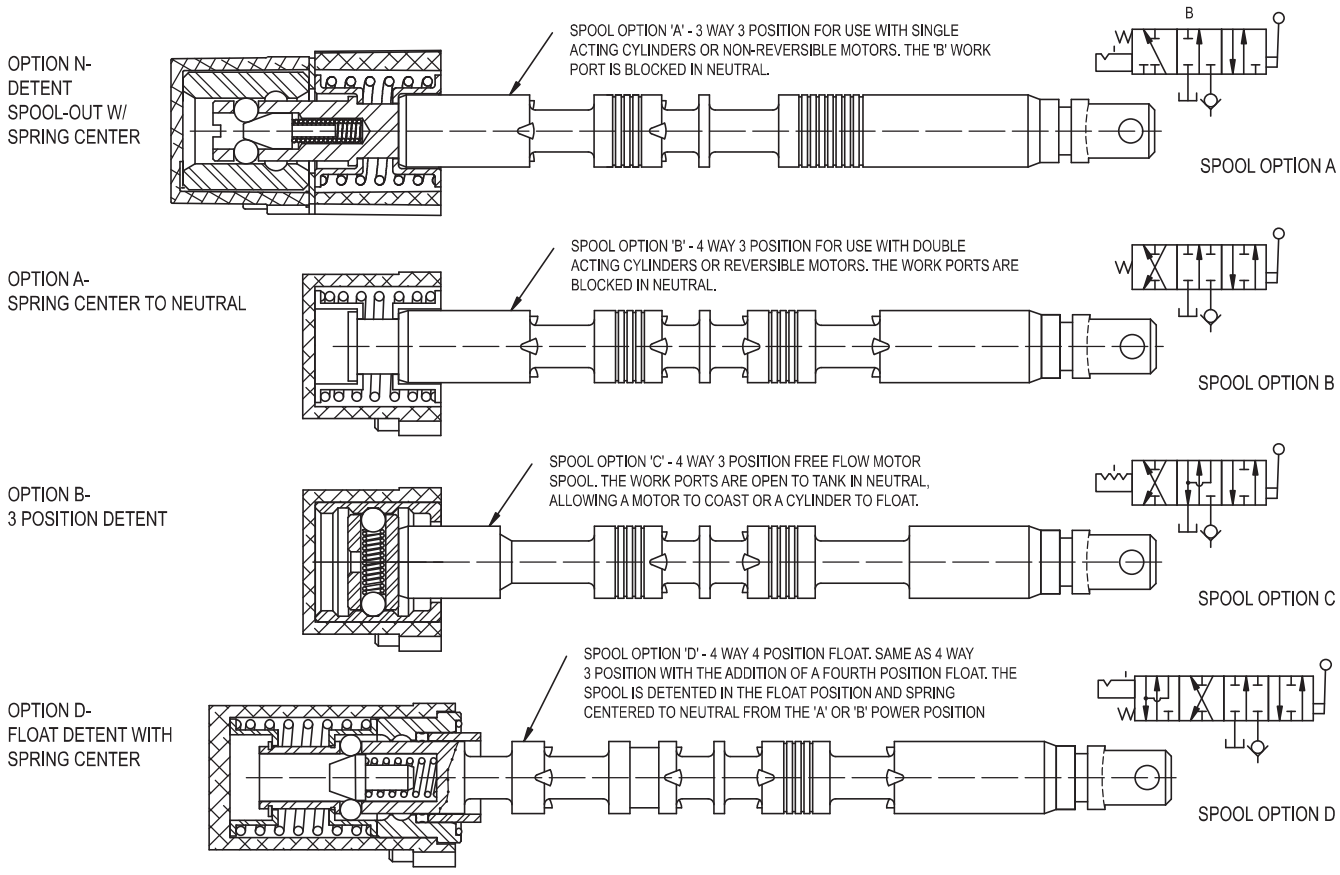
SEE PAGE 5 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

CROSS SECTION OF 20P1BA1DA PARALLEL WORK SECTION



SPOOLS AND SPOOL ATTACHMENTS



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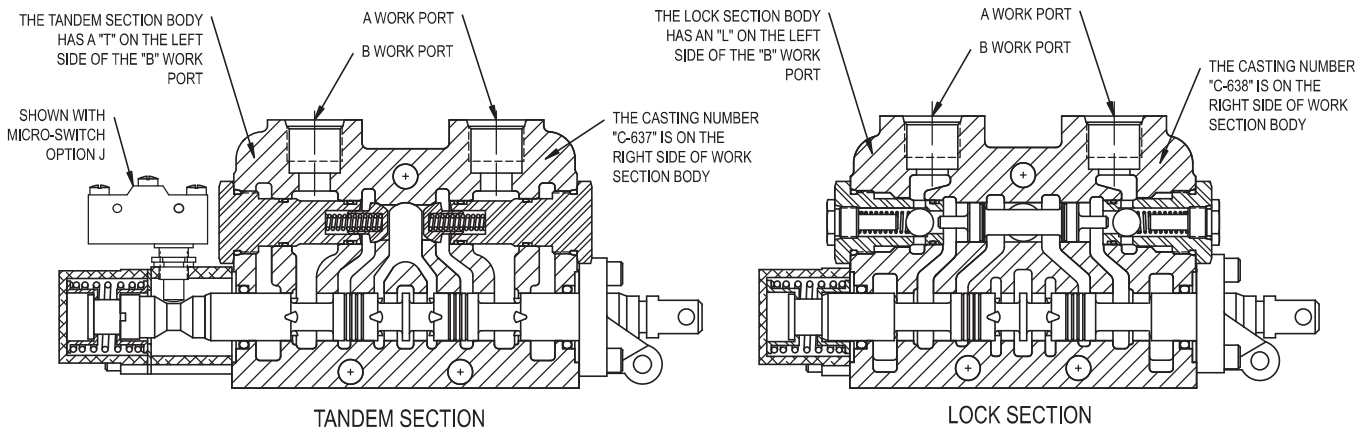
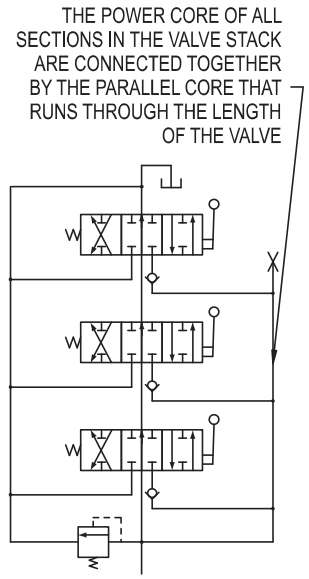
CROSS SECTION OF TANDEM WORK SECTION AND LOCK SECTION



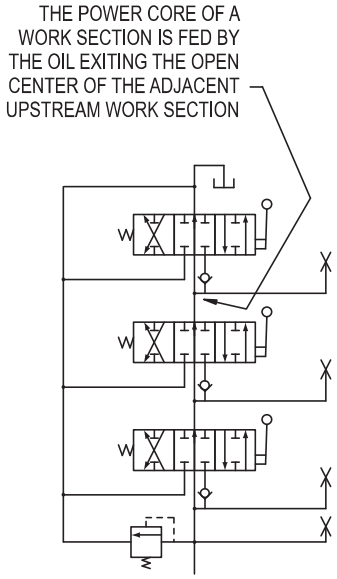
MODEL 20P PARALLEL CIRCUIT

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.



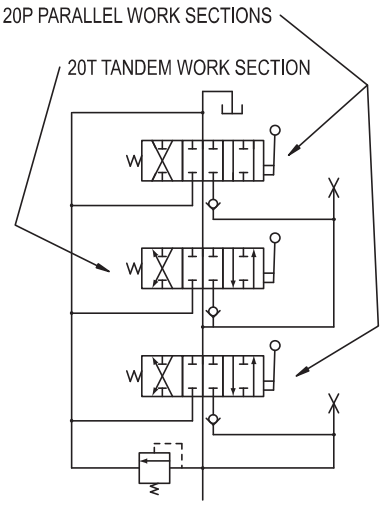
MODEL 20T TANDEM CIRCUITS

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.



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.

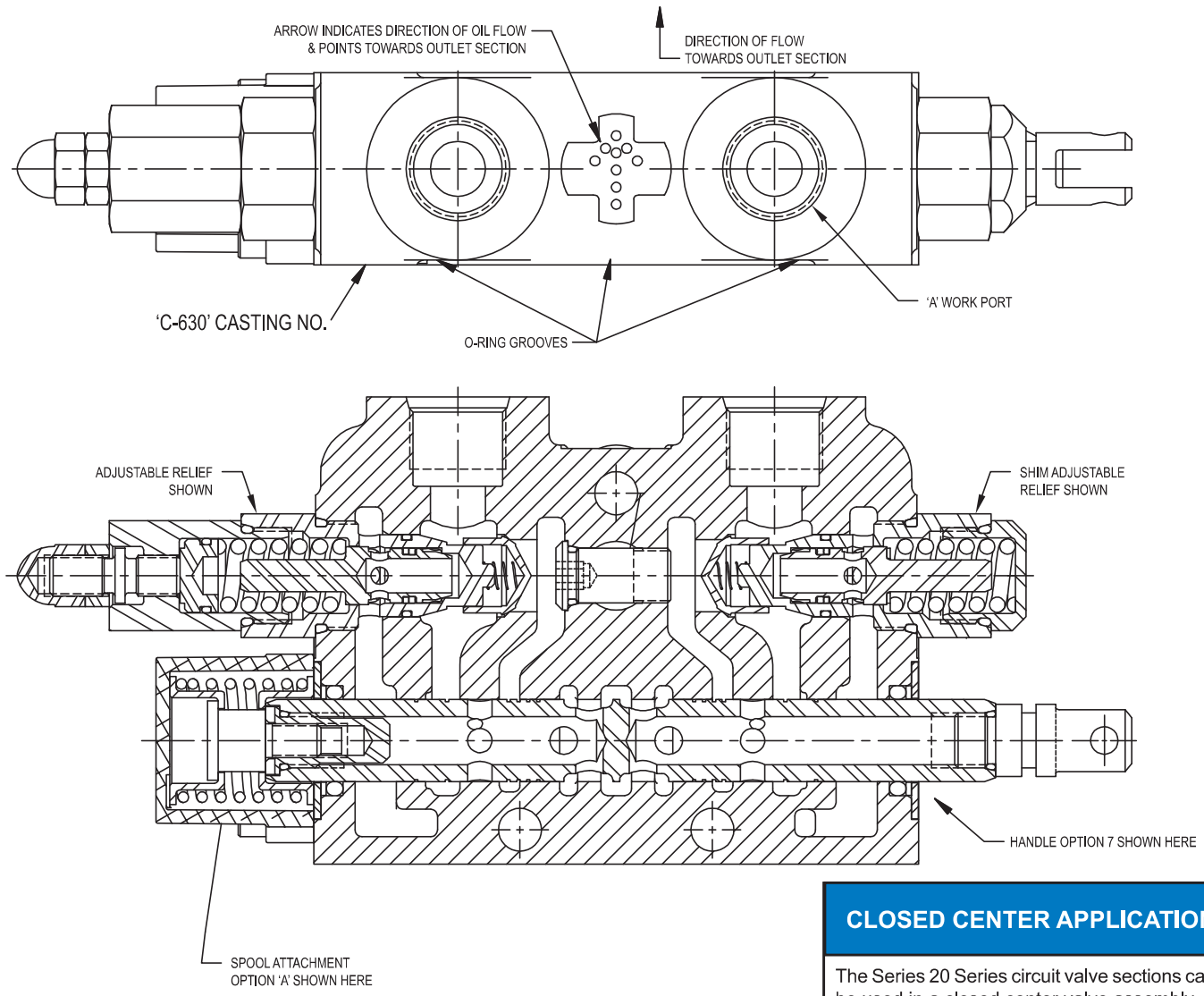
PLEASE NOTE that the maximum pressure in an open center system is controlled by a relief valve. The Series 20 inlet sections are available with a built in inlet relief for this purpose.

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.

SERIES CIRCUIT SERIES 20 WORK SECTIONS
CROSS SECTION OF SERIES SECTION



MODEL 20S SERIES CIRCUIT

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 for the pump pressure rating. It is not required to have a Series 20 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

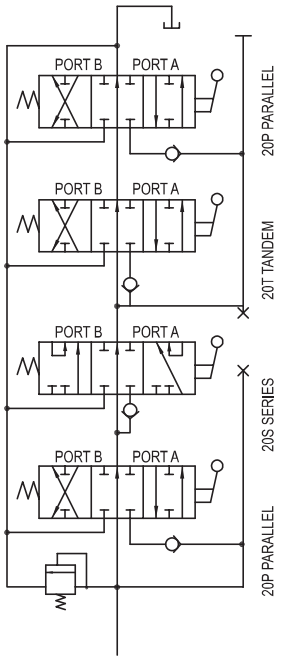
The Series 20 series sections may be stacked with 20P parallel circuit valve sections. When using a series section, the immediate downstream section needs to be a series, tandem, or outlet section. 20P sections can be either in front of the Series 20 series sections or behind a combination of series and tandem sections.

For solenoid operation with series sections and a 20U utility section, there needs to be a Series 20 tandem section with pilot passageways between the series section and the utility section.

In the valve assembly shown below, the first and fourth sections are parallel. The second section is series, the third section is tandem. 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 well as the second and fourth sections. The third and fourth sections are in parallel with each other.

CLOSED CENTER APPLICATIONS

The Series 20 Series circuit valve sections cannot be used in a closed center valve assembly.



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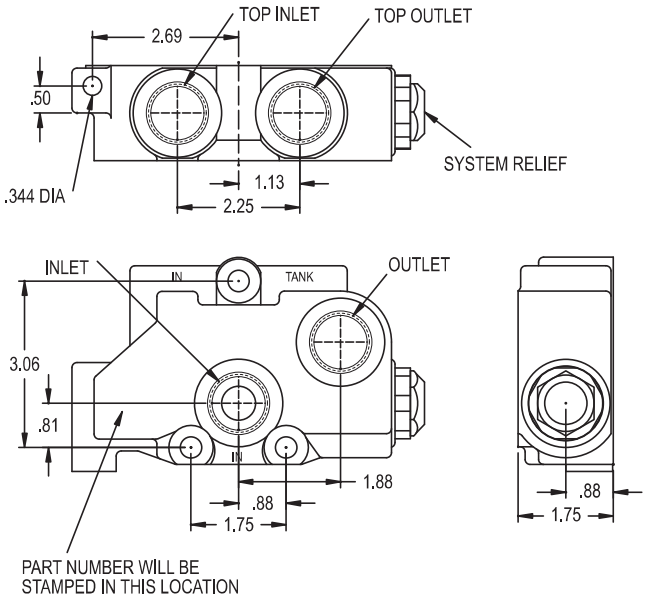
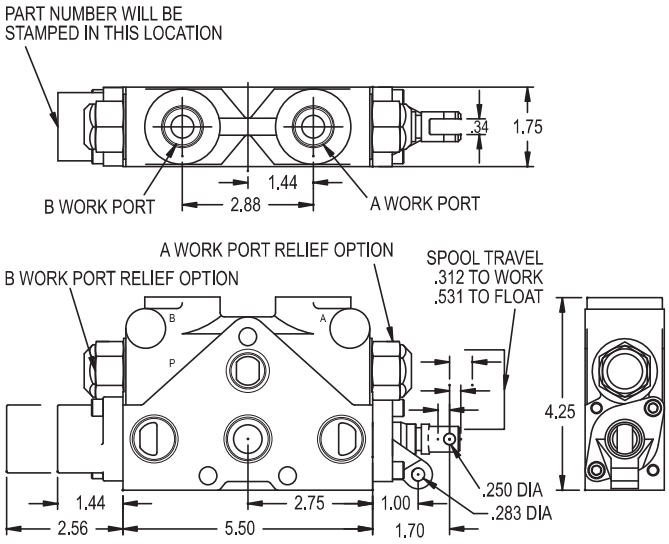
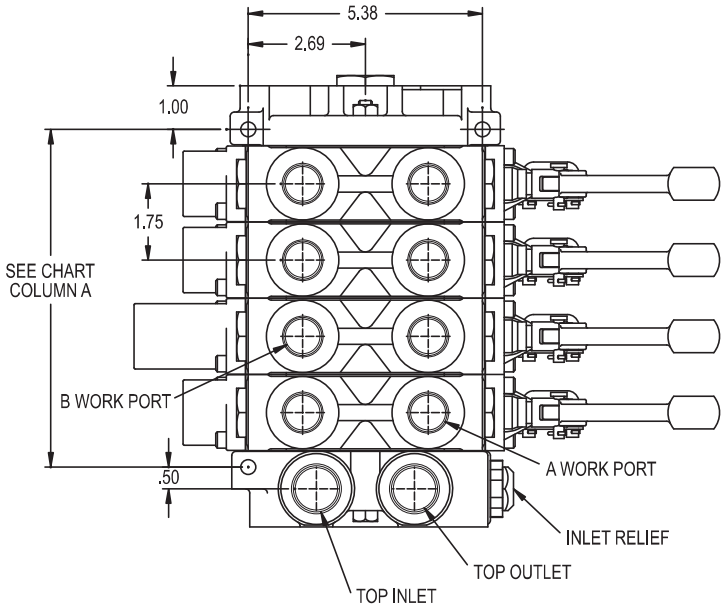
INLET COVER DIMENSIONS



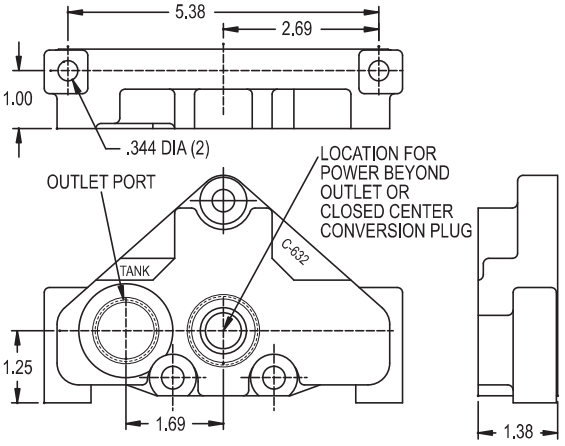
WORK SECTIONS DIMENSIONS



DIMENSIONAL DATA

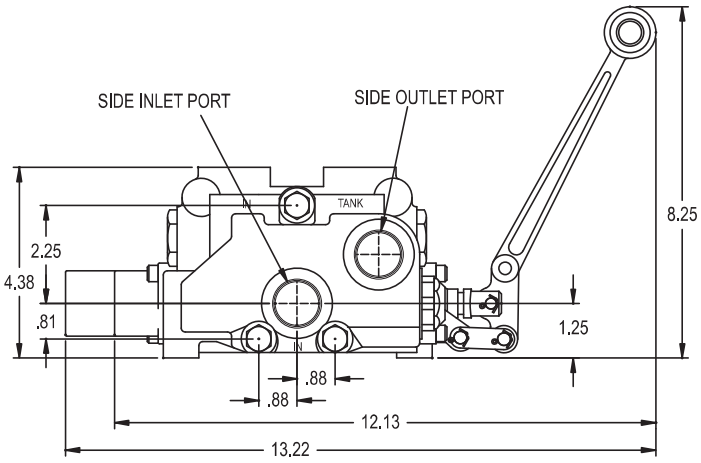


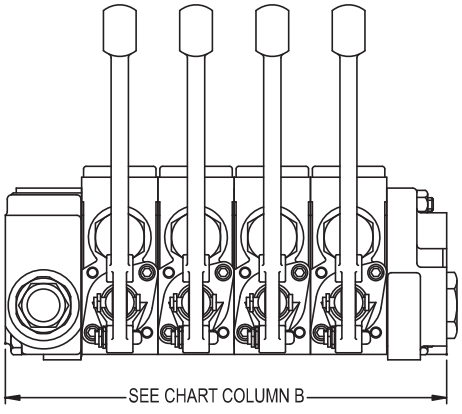
OUTLET COVER DIMENSIONS



NUMBER OF WORK SECTIONS

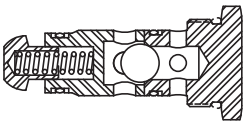
	1	2	3	4	5	6	7	8	9	10
A	2.50	4.25	6.00	7.75	9.50	11.25	13.00	14.75	16.50	18.25
B	4.88	6.63	8.38	10.13	11.88	13.63	15.38	17.13	18.88	20.63





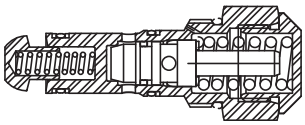
VALVES

WORK PORT RELIEF CARTRIDGES



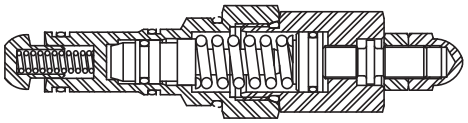
OPTION K ANTI-CAVITATION CHECK
This option allows oil to be drawn from the tank core into the work port if there is a vacuum on the work port. This vacuum would be caused by a overrunning motor or cylinder. The check will be open whenever the pressure in the tank core is higher than that in the work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

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



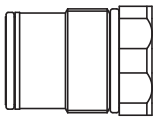
A port relief can be installed to limit the pressure at the work port to less than the system pressure. Also, it can be installed to provide spike pressure protection when the spool is in the neutral position. The pressure of these reliefs can be changed by changing shims.

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



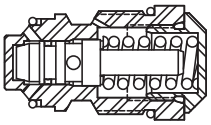
This is the same differential poppet type relief as above but externally adjustable within the specified range.

INLET RELIEF CARTRIDGES



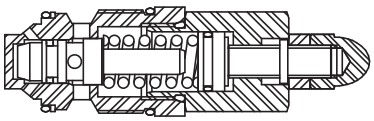
OPTION A NO RELIEF
When no main inlet relief is required the no relief plug is installed. All inlet sections have the relief cavity machined so a inlet relief can be installed in the field.

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



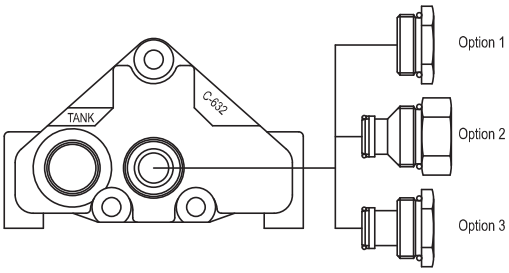
These options provide for an internally shim adjustable main inlet relief. The relief is a hydraulically dampened differential poppet design. This provides for smooth quiet operation in a relief that is moderately tolerant to contamination. The pressure of these reliefs can be changed, within the specified 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.

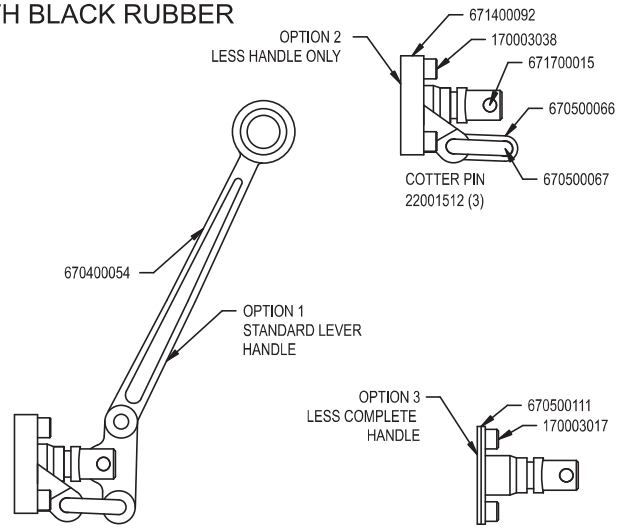
OUTLET SECTION OPTIONS



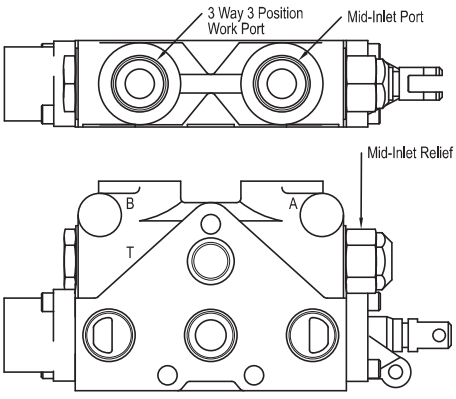
OPTION 1 STANDARD OPEN CENTER WITH CONVERSION PLUG
This is the standard outlet option. This option allows for conversion in the field for power beyond or closed center applications. When the spools are in neutral the inlet is unloaded to tank.
OPTION 3 CLOSED CENTER OUTLET
This option provides for closed 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

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

For nonstandard settings, add setting in PSI (-XXXX) after mid inlet relief 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.

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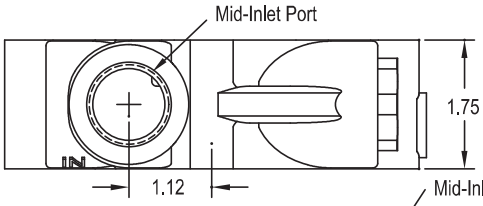
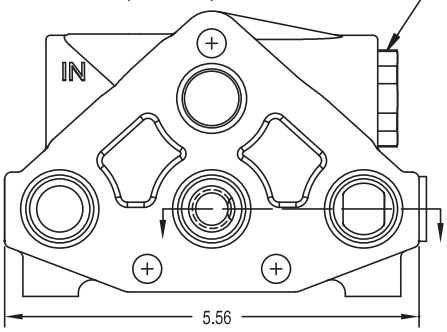
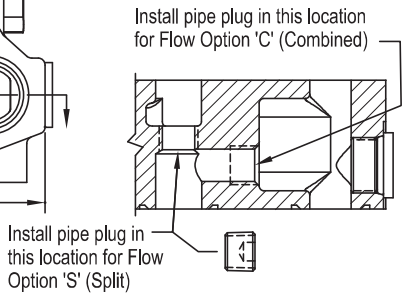
SERIES 20 MID-INLET SECTION





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

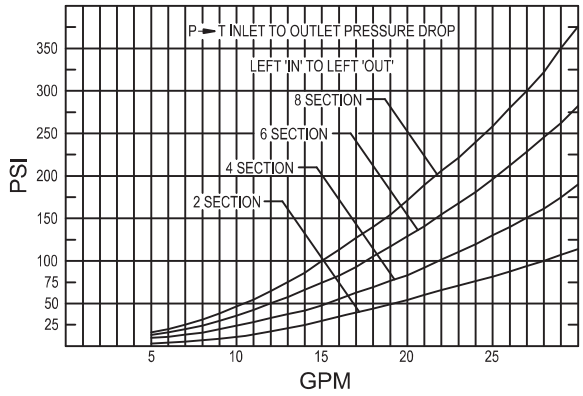
LAST FOUR DIGITS SPECIFY A NON-STANDARD RELIEF PRESSURE IN PSI. LEAVE BLANK FOR STANDARD SETTING.

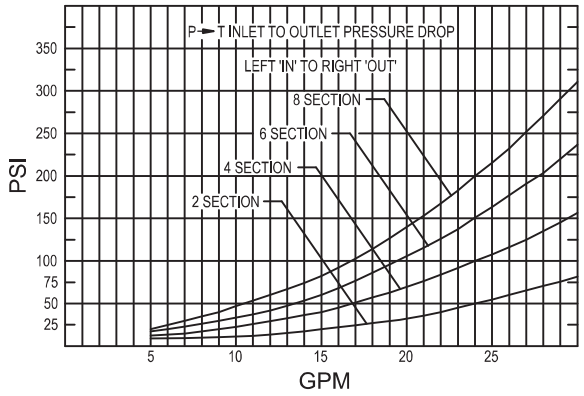
MID-INLET RELIEF OPTIONS:

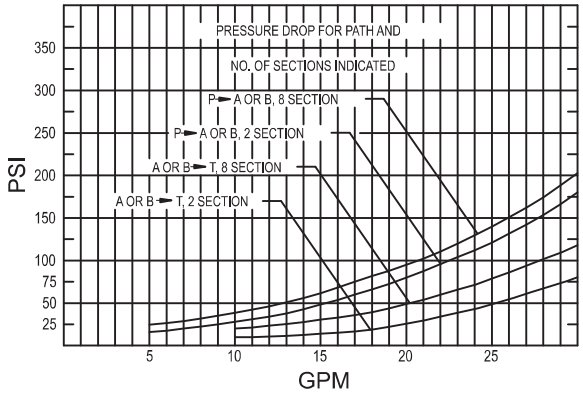
OPTION NO.	RELIEF TYPE	STD. SETTING @ 10 GPM
"BLANK"	BODY LESS RELIEF CARTRIDGE/PLUG	--
A	NO-RELIEF PLUG	--
B	SHIM ADJUSTABLE 500-1350 PSI	1350 PSI
C	SHIM ADJUSTABLE 1350-1750 PSI	1750 PSI
D	SHIM ADJUSTABLE 1750-2200 PSI	2200 PSI
E	SHIM ADJUSTABLE 2200-3000 PSI	2500 PSI
F	ADJUSTABLE 500-1350 PSI	1350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

*For solenoid sections upstream of the Mid-Inlet, use valve code 20IMBxxxx. The rest of the options are available. This allow pilot pressure to be available to the upstream sections."

TEST DATA



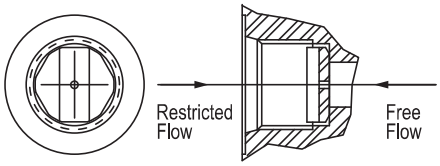




Oil 140 SUS at 110 degrees F. The pressure drop curves are representative, but the actual pressure drop will vary some from valve to valve. More detailed test data is available upon request.

ONE WAY WORK PORT RESTRICTOR FOR SERIES 20 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**

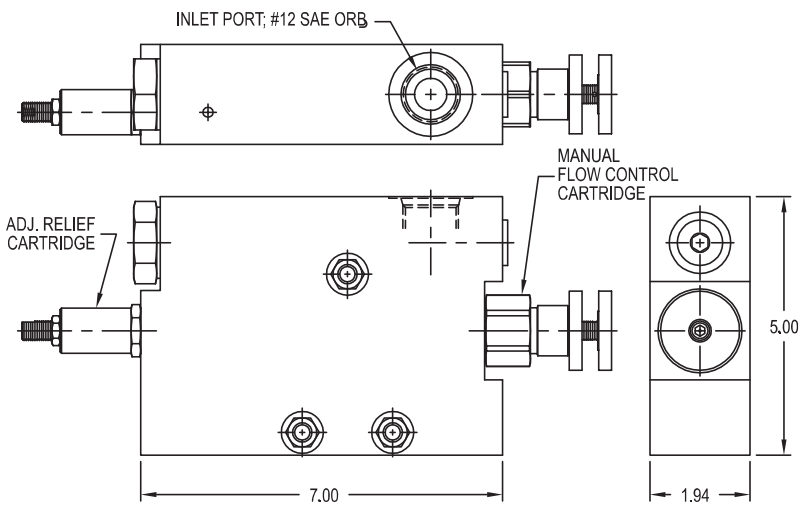
HEX BRASS RESTRICTOR #10 **670811000**

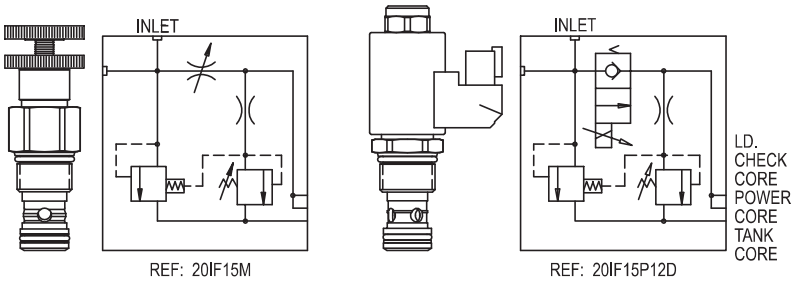
The last three digits of part number are the orifice size in thousandths of an inch.

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

VALVES

SERIES 20 FLOW CONTROL INLET SECTION





REF: 20IF15M

REF: 20IF15P12D

20IF15 _ _ _ _ - X X X X

- Digits Specify A Non-Standard Relief Pressure in PSI. Leave blank for standard setting.
- Solenoid Option: (Omit for Flow Opt. 'M') 12 D – 12 VDC Deutsch (DT04-2P)
- Flow Control Option: M – Manual Control P – Electro-Proportional

Pilot Operated Relief Adjustable From 2000-3500 PSI.

Standard Relief Setting: 2500 PSI @ 10 GPM

MANUAL (OPT 'M') DESCRIPTION:

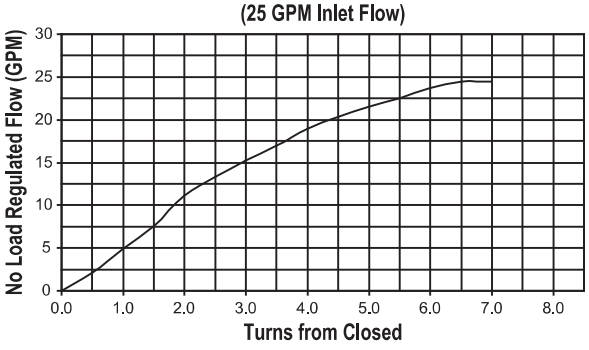
This inlet incorporates a manually operated pressure compensated flow control. With the flow control knob turned fully in (clockwise), all of the inlet flow is diverted to the tank core. By turning the flow control knob counter-clockwise, the inlet flow directed to the power core will be proportionally increased. (Approximately 6 turns varies the controlled flow from no flow to 26 GPM. Maximum number of turns on flow control is approximately 8 turns.)

ELECTRO-PROPORTIONAL (OPT 'P') DESCRIPTION:

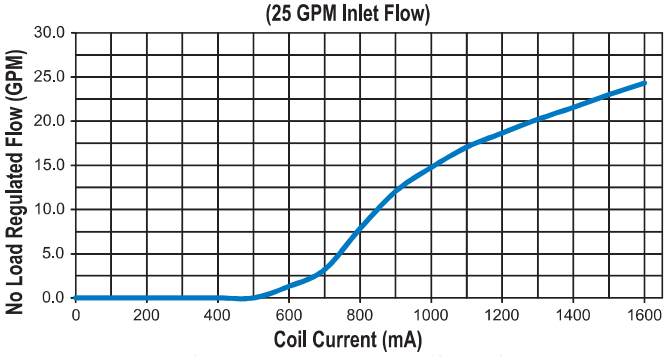
This inlet incorporates a solenoid operated, electrically variable pressure-compensated flow control. With no current going through the solenoid, all of the inlet flow is diverted to the tank core. By increasing the current through the solenoid, the flow being directed to the power core will be proportionally increased. (The current range is 400-1600 mA. At a current of 1600 mA max controlled flow is approximately 25 GPM.) Control current is provided via a controller card providing a PWM signal. See Page V38 for more information on a controller.

TEST DATA

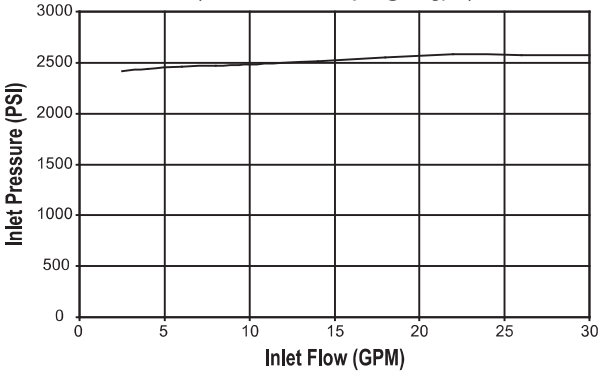
Turns vs. Regulated Flow
Series 20 Manual Flow Control Inlet
(25 GPM Inlet Flow)



Current vs. Regulated Flow
Series 20 Electro-Proportional Flow Control Inlet
(25 GPM Inlet Flow)



Flow over Relief vs. Pressure
Series 20 Flow Control Inlet
(Relief set at 2500 psi @ 10 gpm)



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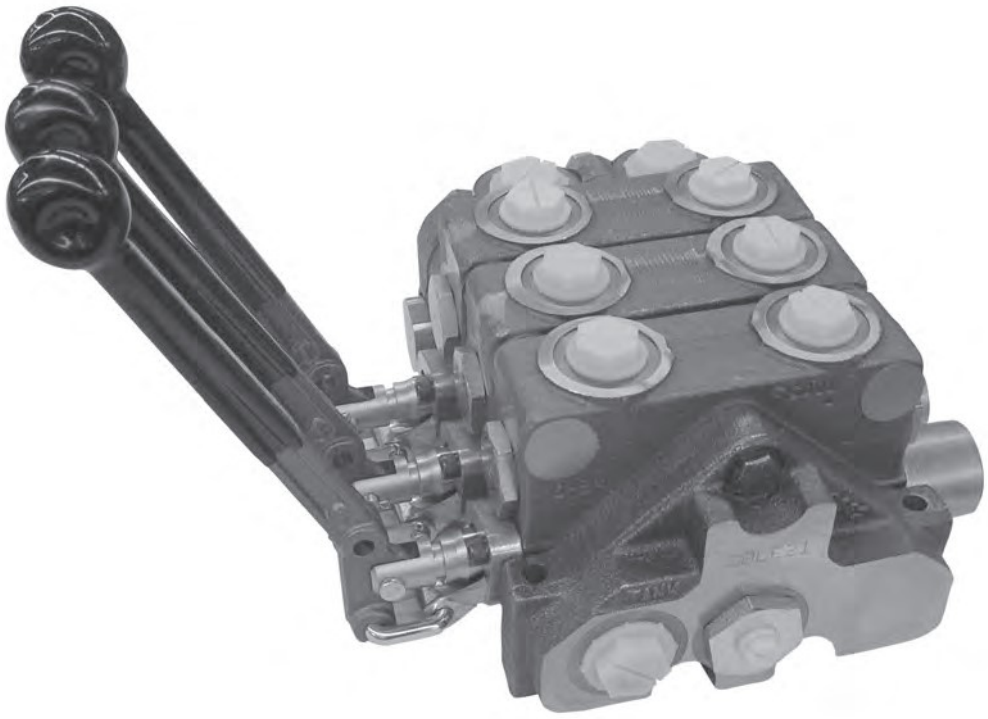
LOAD SENSE SECTIONS



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:

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
LPC-LOAD SENSE PRESSURE COMPENSATED

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 WITH D SPOOL ACTION)
J05 - 5 GPM PRESSURE COMP (LPC ONLY)
J10 - 10 GPM PRESSURE COMP (LPC ONLY)
J15 - 15 GPM PRESSURE COMP (LPC ONLY)
J20 - 20 GPM PRESSURE COMP (LPC ONLY)
K05 - 5 GPM PRESSURE COMP MOTOR (LPC ONLY)
K10 - 10 GPM PRESSURE COMP MOTOR (LPC ONLY)
K15 - 15 GPM PRESSURE COMP MOTOR (LPC ONLY)
K20 - 20 GPM PRESSURE COMP MOTOR (LPC ONLY)

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)
H - HYDRAULIC ACTUATOR (USE HANDLE OPTION 7)
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 OU
P - 2 POSITION DETENT NEUTRAL & IN (NO OUT POSITION)

HANDLE OPTIONS
1 - STANDARD LEVER HANDLE*
2 - LESS HANDLE ONLY
3 - LESS COMPLETE 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

°ANTI-CAVITATION CHECKS AND RELIEFS NOT AVAILABLE WITH LPC SECTIONS. WORK PORT RELIEFS ON 20LPC USE A DIFFERENT CARTRIDGE THAN THE STANDARD SERIES 20P CARTRIDGE

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 12 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
3. OUTLET FOR USE WITH 20ILFS INLET (OUTLET SEALS FOR SOLENOID PILOT LINES)

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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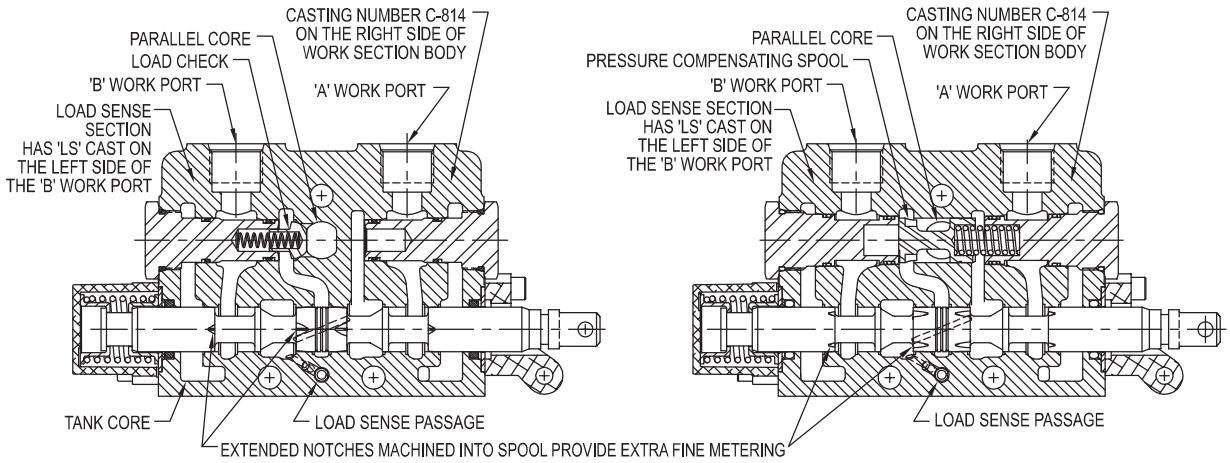
SEE PAGE 5 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

CROSS SECTION OF LOAD SENSE & LOAD SENSE PRESSURE COMPENSATED WORK SECTIONS

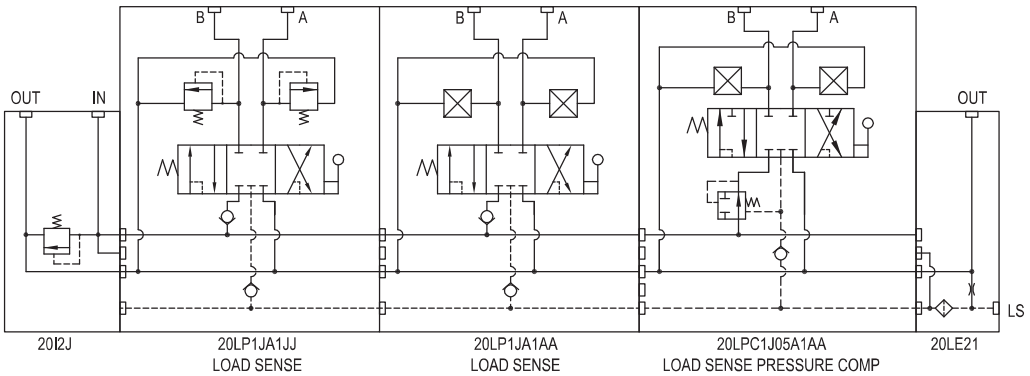


MODEL 20LP LOAD SENSE & 20LPC LOAD SENSE PRESSURE COMPENSATED CIRCUITS

The Series 20LP and 20LPC 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 valves 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.

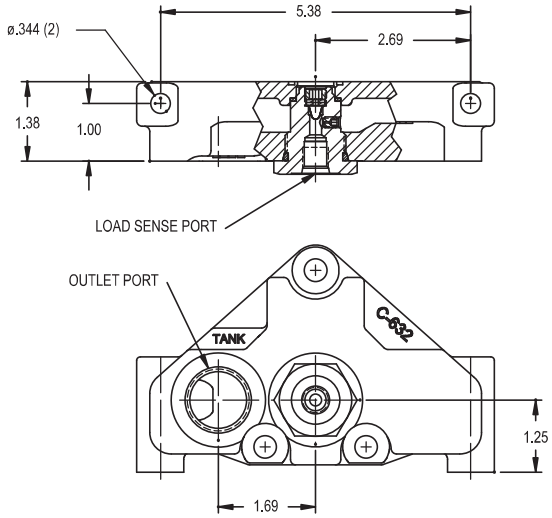
There are a number of benefits to load sense systems, one of the primary ones being in the metering of the flow to the work ports. Metering is typically accomplished when the flow passes through metering notches in the spool. In a load sense valve, the pressure that drives the flow through the notches 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.

The Series 20LPC load sense pressure compensated valve incorporates a pressure compensator upstream to the metering notches on the spool (“pre-comp”). With either a fully shifted or partially shifted spool, work port flow will remain constant regardless of changing load pressure requirements. Pressure compensated sections are particularly useful in applications where the metering of flow, with varying pressure and flow conditions is required. The 20LPC sections have flow rated spools that determine the maximum flow from the individual work section. For instance the maximum flow from a work sections with a J10 spool is 10 gpm. Metering notches extend to the full travel of the spool. The lower flow spools will provide increased flow vs. spool travel resolution. With parallel circuitry, multiple sections can be used simultaneously to meter flow. If the sum of the flow rating of the shifted spools is less than the flow rating of the pump, all sections will receive flow. If the call for flow based on spool position from all work sections calls for more flow than the output of the pump, there may be some division of flow based on the section with the lowest pressure demand. The 20LPC is an optimal choice for proportional solenoid operation. It provides the greatest resolution of all the Prince proportional solenoid valves.

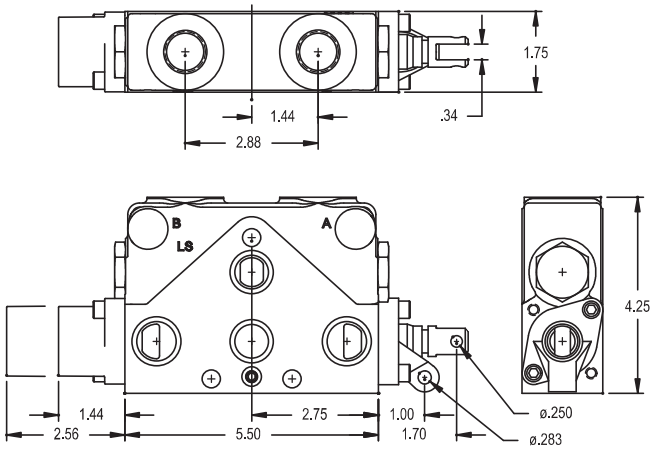


VALVES

LOAD SENSE OUTLET DIMENSIONS

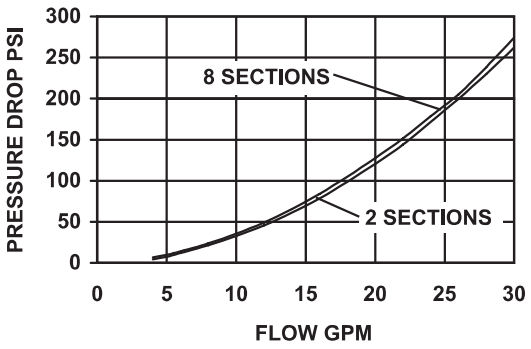


LOAD SENSE WORK SECTION DIMENSIONS

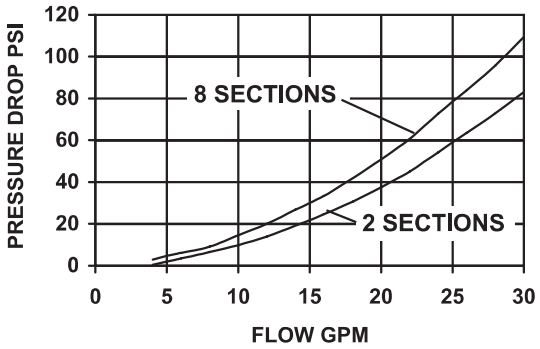


TEST DATA

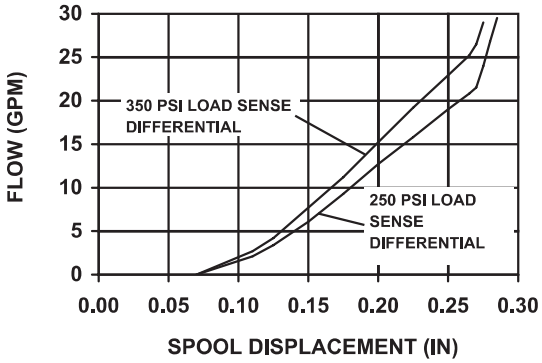
PRESSURE DROP - INLET TO WORK PORT



PRESSURE DROP - WORK PORT TO TANK



WORK PORT FLOW VS. SPOOL POSITION



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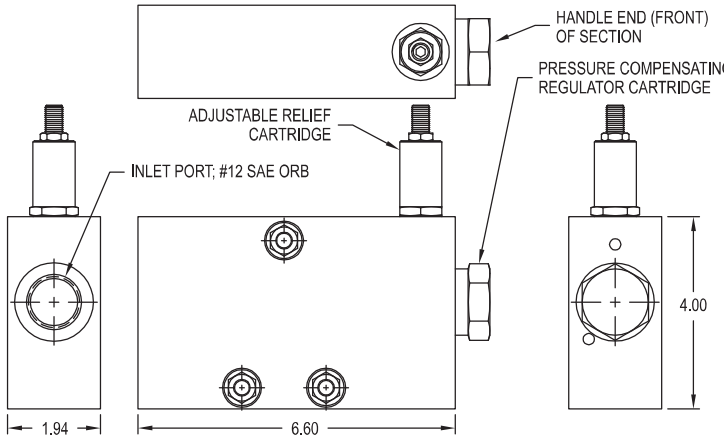
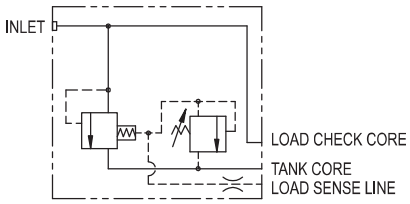
SERIES 20 LOAD SENSE INLET (FOR FIXED DISPLACEMENT PUMP)



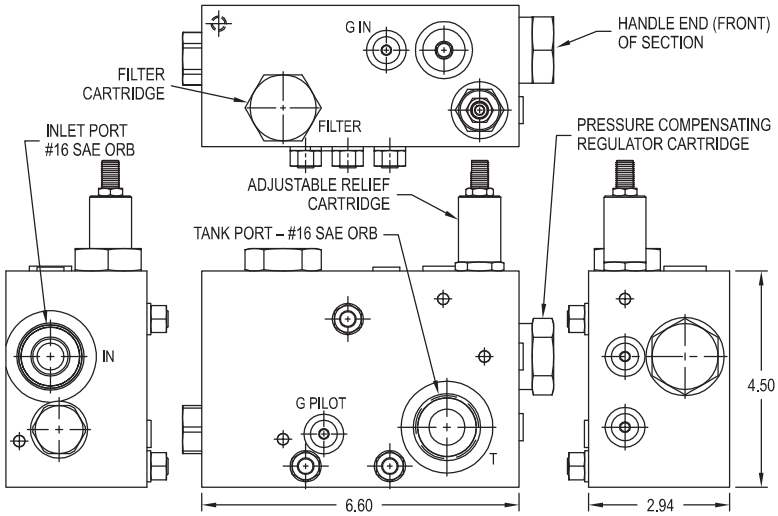
20ILF25___ – XXXX

COMPENSATOR SETTING:
090 – 90 PSI COMPENSATOR
150 – 150 PSI COMPENSATOR (STANDARD)
230 – 230 PSI COMPENSATOR

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



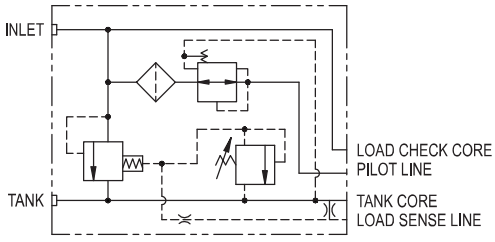
SERIES 20 LOAD SENSE INLET (FOR FIXED DISPLACEMENT PUMP w/SOLENOID OPERATORS)



20ILFS65___ – XXXX

COMPENSATOR SETTING:
230 – 230 PSI COMPENSATOR
350 – 350 PSI COMPENSATOR
(PROPORTIONAL OPERATORS)

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

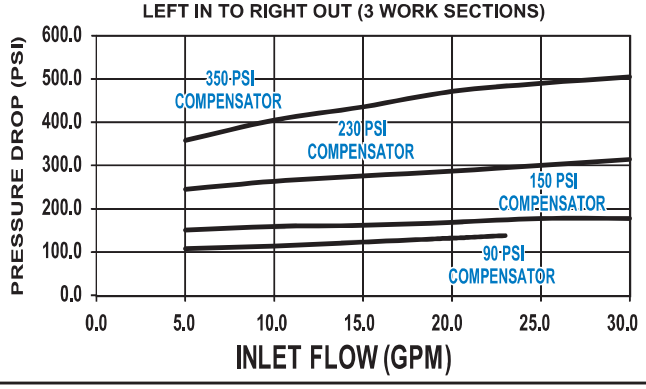


APPLICATION NOTES – 20ILF and 20ILFS:

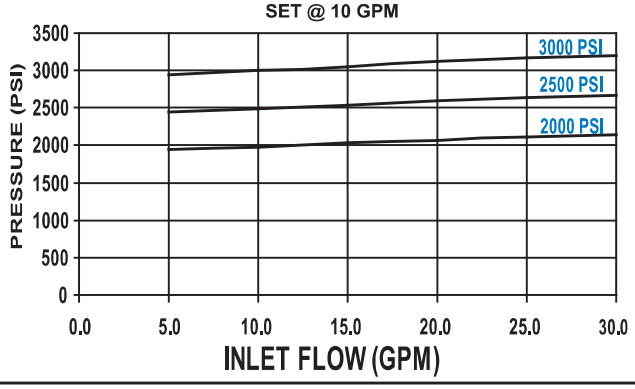
1. These inlets are for use with a fixed displacement pump (such as a gear pump) and Prince Series 20 load sense sections.
2. When all spools are centered, the inlet allows the pump flow to be diverted to tank at relatively low pressure.
3. When a spool is shifted, the compensator directs the flow to the work port at a flow and pressure relative to the work port/load sense pressure. The inlet retains the enhanced metering control of the load sense work sections.
4. For the 20ILF inlet, the 150 psi compensator is standard. It is typically used with flows up to approximately 25 gpm. For lower flows, a 90 psi compensator can be used. For higher flows, a 230 psi compensator can be used. For the 20ILFS inlet, a 230 psi compensator is standard. For proportional operators a 350 psi compensator is needed. In the 20ILFS, the compensator generates pilot pressure to initiate a spool shift when a solenoid is energized. Load induced pressure is required to complete and then maintain the spool shift.
5. For the 20ILFS, the flow to the solenoid cartridges is filtered through a 10 µ replaceable cartridge pressure filter. Only the pilot flow is filtered thus providing a long filter life.
6. A Series 20 load sense outlet (20LEx1 for the 20ILF or a 20LEx3 for the 20ILFS) must be used in the stack valve assembly.
7. The load sense port on the outlet needs to be plugged with a steel plug. There is no external load sense line.
8. The 20ILFS requires a tie rod kit for one extra section.

TEST DATA

20ILF PRESSURE DROP INLET TO TANK
LEFT IN TO RIGHT OUT (3 WORK SECTIONS)



20ILF RELIEF CURVE
SET @ 10 GPM



VALVES

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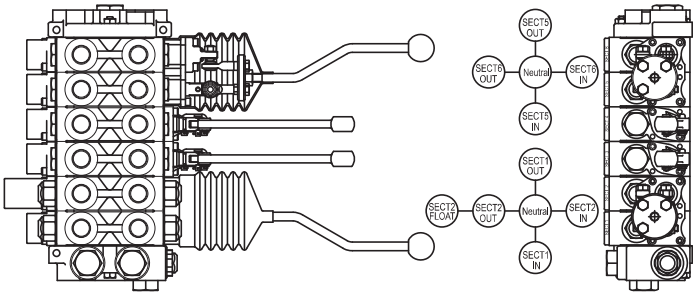
JOYSTICK HANDLES FOR SERIES “20”



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 SOLENOID OPERATED WORK SECTIONS

The solenoid operated Series 20 work sections allow remote electrical on-off control or, depending on the model, manual control. The solenoid operated sections contain two, 3 way-2 position screw in style cartridge valves. The screw in cartridges provide a robust platform for the higher tank pressures often seen in mobile applications.

Prince solenoid operated valves are pilot operated valves where pilot pressure is used to shift the spool. Depending on the model, the pilot pressure will be applied either directly to the end of the spool or to a piston that is connected to the spool. When both solenoids are de-energized, both spool end cavities or piston cavities are connected to tank. When the “A” solenoid is energized, pilot pressure is applied to the “A” end of the spool/piston, causing the spool to shift, against spring bias, and allow flow to the “A” work port. Energizing the “B” solenoid causes similar action on the “B” end. Internal pilot passageways convey pilot pressure to the solenoid actuators.

Pilot pressure is typically supplied by a utility section, but in the case of load sense sections or closed center assemblies, it can also be provided by an inlet manifold, which can be provided with filtered pilot flow. If a utility section is used, it must be installed between the last work section and the outlet cover. The utility section, or inlet manifold, limit the pilot pressure to approximately 350 psi.

For an open center system, a pressure build up cartridge is needed in the utility section. The pressure build up section provides pilot pressure to initiate the spool shift. 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 center or light load applications a restrictor installed in the work port line may be required. Manual sections used in the same assembly with solenoid sections must either be upstream of solenoid sections or be custom sections machined with pilot passage ways in an assembly using a utility section. In assemblies with an inlet manifold, both solenoid and manual sections can be in the same assembly but, manual sections may have to be machined with pilot pass through passageways. For solenoid operated series sections, a tandem section with pilot pass through passageways must be between the series section and the utility section. Consult your sales representative for your application.

Prince solenoid operators are offered in both a divided design (a solenoid on each end of the section) and a combined design (both solenoids on the end opposite the handle). We also currently offer models in both 10 thread size and 8 thread size solenoid cartridges. The 8 thread size offers a more compact assembly and a more economical choice as compared to a 10 thread size.

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SERIES 20 (8 SERIES) COMBINED SOLENOID OPERATORS (BOTH OPERATORS ON ONE END)

A Series 20 solenoid operated section with a handle code of 1, 2, 3 or 4 will designate a combined configuration with both solenoid cartridges on one end, opposite the handle end of the section. The combined operator configurations provide for either electric or manual operation. Handle configurations will be the same as the standard manual sections.

A “C” prefix on the solenoid and coil designation will designate an 8 series design and will have screw in solenoid cartridges with a #8 thread size. The #8 size cartridges allow for a more compact section size. An optional manual override feature is available for the #8 solenoid cartridges. Cartridges and coils on the 8 series are not interchangeable with the Prince 10 series solenoid sections or sections manufactured prior to November 2014. Any of the standard “-S”, “-T”, “-C” or “-D” style Prince Series 20 solenoid operated work sections may be used in any combination within a stack valve assembly.

8 SERIES SOLENOID OPERATED WORK SECTION

2 0 P X X X X X X - C X X X

WORK SECTION TYPE
P - Standard Parallel
LP - Load Sense
LPC - Load Sense Pressure Compensated
S - Series (Use Spool Type N or P)

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
H - 3 - Way 3-Position 20LP Only
J - 4 - Way 3-Position 20LP Only
K - 4 - Way 3-Position Free Flow Motor - 20 LP Only
N - 4 - Way 3-Position Series
P - 4 - Way 3-Position Series Motor
J05 - 5 GPM Pressure Comp (LPC Only)
J10 - 10 GPM Pressure Comp (LPC Only)
J15 - 15 GPM Pressure Comp (LPC Only)
J20 - 20 GPM Pressure Comp (LPC Only)
K05 - 5 GPM Pressure Comp Motor (LPC Only)
K10 - 10 GPM Pressure Comp Motor (LPC Only)
K15 - 15 GPM Pressure Comp Motor (LPC Only)
K20 - 20 GPM Pressure Comp Motor (LPC Only)

SPOOL ACTION
A - Spring Center

*See page V48 for coil details.

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

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

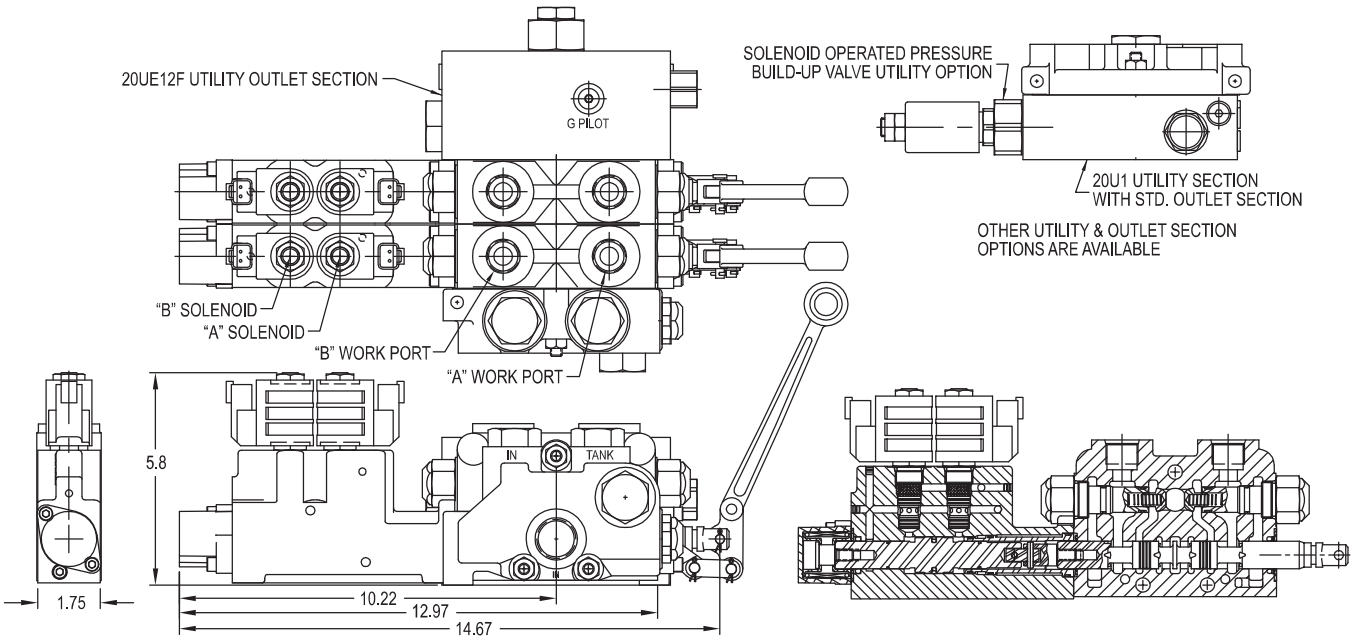
PORT RELIEF “B” OPTION
A - Relief Cavity Plugged
B - Shim Adjustable Relief 500-1350 PSI Set at 1350
C - Shim Adjustable Relief 1351-1750 PSI Set at 1750
D - Shim Adjustable Relief 1751-2200 PSI Set at 2200
E - Shim Adjustable Relief 2201-3000 PSI Set at 2500

Note: Work port relief cartridges on the 20LPC and 20S are different than the standard Series 20P cartridge.

SOLENOID OPERATION
C - Standard Solenoid Cartridge
CM - Solenoid Cartridge w/Manual Override

COIL VOLTAGE & TERMINATION *
12Q, 12 VDC Double Spade
12L, 12 VDC Double Wire
12H, 12 VDC DIN 43650
12D, 12 VDC Integral Deutsch
24Q, 24 VDC Double Spade
24L, 24 VDC Double Wire
24H, 24 VDC DIN 43650
24D, 24 VDC Integral Deutsch
11H, 120 VAC DIN 43650

SERIES 20 (8 SERIES) TYPE C - SOLENOID OR MANUAL WORK SECTION DIMENSIONS



VALVES

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SERIES 20 (8 SERIES) DIVIDED SOLENOID OPERATORS (OPERATORS ON BOTH ENDS)

A Series 20 solenoid operated section with a handle code of 5 or 6 will designate a split configuration with a solenoid cartridge on each end of the section. Handle option 5 provides electric operation only. Handle option 6 provides a lever handle for either electric or manual operation.

A "D" prefix on the solenoid and coil designation will designate an 8 series design and will have screw in solenoid cartridges with a #8 thread size. The #8 size cartridges allow for a more compact section size. An optional manual override feature is available for the #8 solenoid cartridges. Cartridges and coils on the 8 series are not interchangeable with the Prince 10 series solenoid sections or sections manufactured prior to November 2014. Any of the standard "-S", "-T", "-C" or "-D" style Prince Series 20 solenoid operated work sections may be used in any combination within a stack valve assembly.

8 SERIES SOLENOID OPERATED WORK SECTION

2 0 P X X X X X X - D X X X

WORK SECTION TYPE
P - Standard Parallel
LP - Load Sense
LPC - Load Sense Pressure Compensated
S - Series (Use Spool Type N or P)

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
H - 3 - Way 3-Position - 20LP Only
J - 4 - Way 3-Position - 20LP Only
K - 4 - Way 3-Position Free Flow Motor - 20LP Only
N - 4 - Way 3-Position Series
P - 4 - Way 3-Position Series Motor
J05 - 5 GPM Pressure Comp (LPC Only)
J10 - 10 GPM Pressure Comp (LPC Only)
J15 - 15 GPM Pressure Comp (LPC Only)
J20 - 20 GPM Pressure Comp (LPC Only)
K05 - 5 GPM Pressure Comp Motor (LPC Only)
K10 - 10 GPM Pressure Comp Motor (LPC Only)
K15 - 15 GPM Pressure Comp Motor (LPC Only)
K20 - 20 GPM Pressure Comp Motor (LPC Only)

SPOOL ACTION
A - Spring Center

*See page V47 for coil details.

COIL VOLTAGE & TERMINATION *
12Q, 12 VDC Double Spade
12L, 12 VDC Double Wire
12H, 12 VDC DIN 43650
12D, 12 VDC Integral Deutsch
24Q, 24 VDC Double Spade
24L, 24 VDC Double Wire
24H, 24 VDC DIN 43650
24D, 24 VDC Integral Deutsch
11H, 120 VAC DIN 43650

SOLENOID OPERATION
D - Standard Solenoid Cartridge
DM - Solenoid Cartridge w/Manual Override

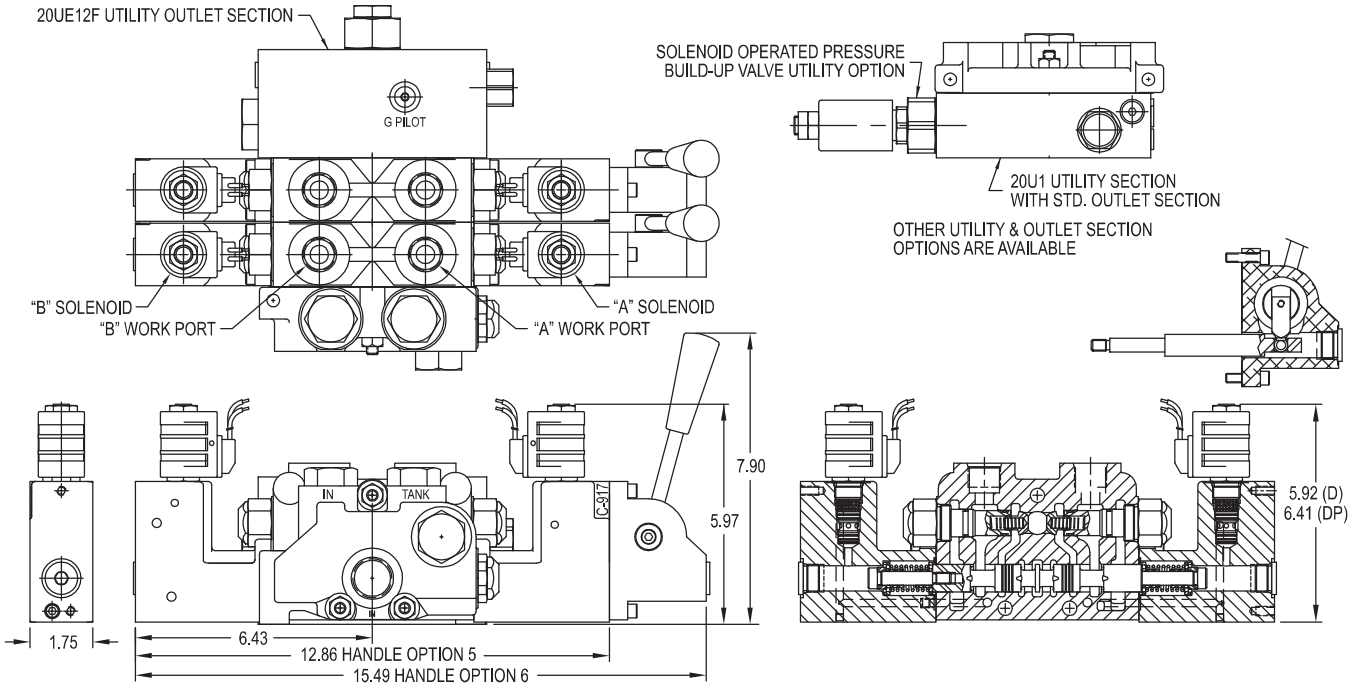
PORT RELIEF "B" OPTION
A - Relief Cavity Plugged
B - Shim Adjustable Relief 500-1350 PSI Set at 1350
C - Shim Adjustable Relief 1351-1750 PSI Set at 1750
D - Shim Adjustable Relief 1751-2200 PSI Set at 2200
E - Shim Adjustable Relief 2201-3000 PSI Set at 2500

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

Note: Work port relief cartridges on the 20LPC and 20S are different than the standard Series 20P cartridge.

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

SERIES 20 (8 SERIES) TYPE D & DP - SOLENOID OR MANUAL WORK SECTION DIMENSIONS



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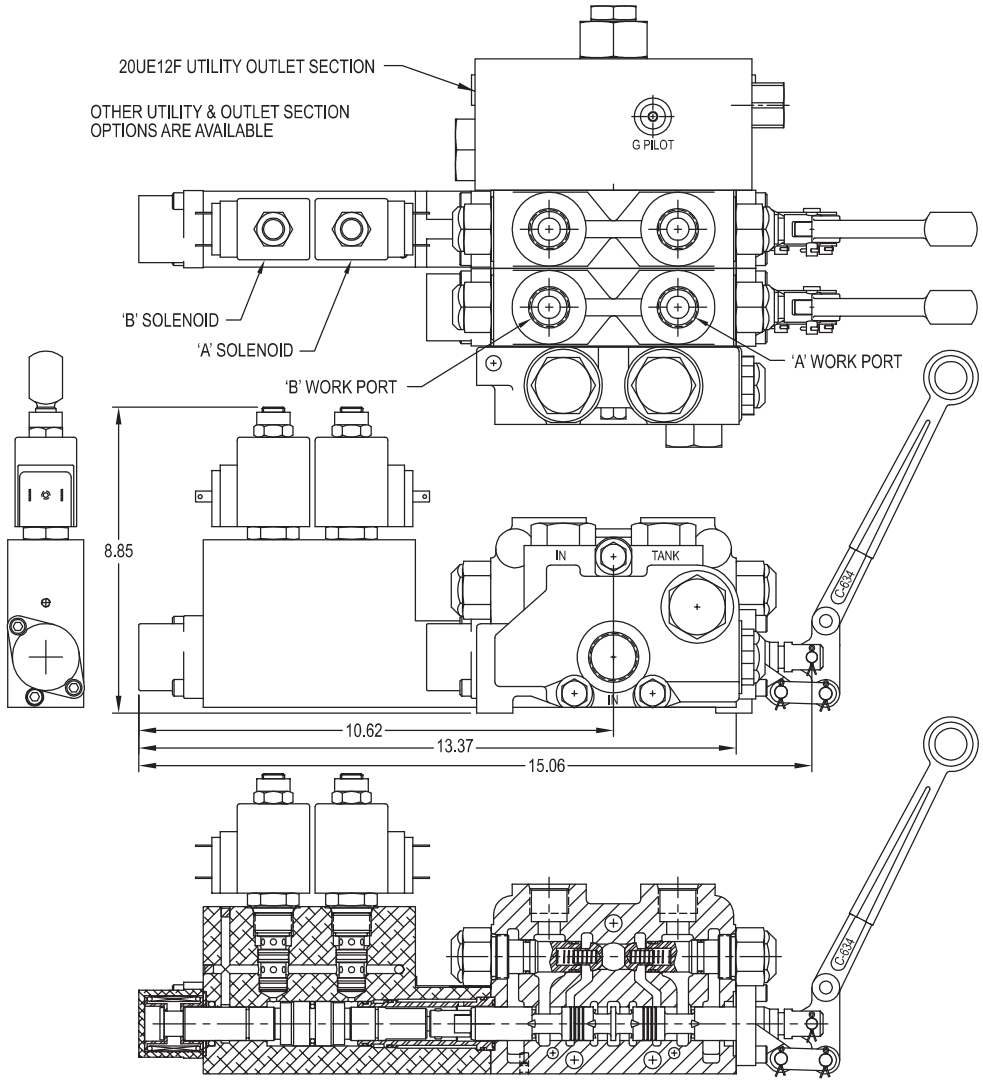
SERIES 20 (10 SERIES) COMBINED SOLENOID OPERATORS (BOTH OPERATORS ON ONE END)

A Series 20 solenoid operated section with a handle code of 1, 2, 3 or 4 will designate a combined configuration with both solenoid cartridges on one end, opposite the handle end of the section. The combined operator configurations provide for either electric or manual operation. Handle configurations will be the same as the standard manual sections.

An "S" prefix on the solenoid and coil designation will designate a 10 series design and will have screw in solenoid cartridges with a #10 thread size. Cartridges and coils on the 10 series will be interchangeable with the components on Prince solenoid operated valves manufactured prior to November 2014 as well as current production 10 series valves. The 10 series sections will have a dimensional envelope the same as Prince solenoid operated sections manufactured prior to November, 2014.



10 SERIES SOLENOID OPERATED WORK SECTION

2 0 P X X X X X X - S X X X

WORK SECTION TYPE
P - Standard Parallel
LP - Load Sense
LPC - Load Sense Pressure Compensated
S - Series (Use Spool Type N or P)

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
H - 3 - Way 3-Position 20LP Only
J - 4 - Way 3-Position 20LP Only
K - 4 - Way 3-Position Free Flow Motor - 20 LP Only
N - 4 - Way 3-Position Series
P - 4 - Way 3-Position Series Motor
J05 - 5 GPM Pressure Comp (LPC Only)
J10 - 10 GPM Pressure Comp (LPC Only)
J15 - 15 GPM Pressure Comp (LPC Only)
J20 - 20 GPM Pressure Comp (LPC Only)
K05 - 5 GPM Pressure Comp Motor (LPC Only)
K10 - 10 GPM Pressure Comp Motor (LPC Only)
K15 - 15 GPM Pressure Comp Motor (LPC Only)
K20 - 20 GPM Pressure Comp Motor (LPC Only)

*See page V48 for coil details.

SPOOL ACTION
A - Spring Center

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

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

Note: Work port relief cartridges on the 20LPC and 20S are different than the standard Series 20P cartridge.

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

COIL VOLTAGE & TERMINATION *
12Q, 12 VDC Double Spade
12L, 12 VDC Double Wire
12H, 12 VDC DIN 43650
12D, 12 VDC Deutsch
24Q, 24 VDC Double Spade
24L, 24 VDC Double Wire
24H, 24 VDC DIN 43650
11L, 120VAC Lead Wires
24D, 24 VDC Deutsch

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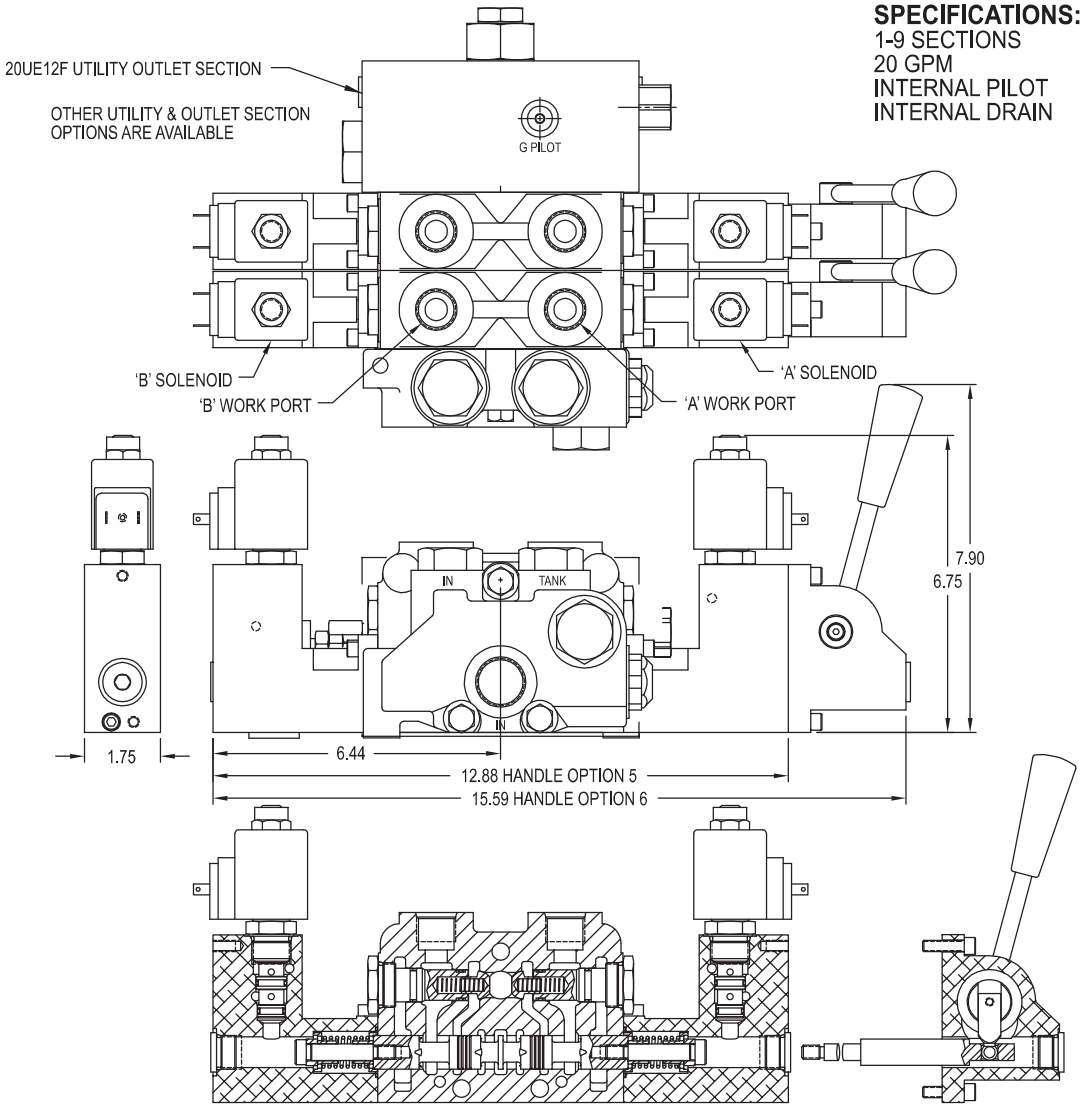
SERIES 20 (10 SERIES) SPLIT SOLENOID OPERATORS (OPERATORS ON BOTH ENDS)

A Series 20 solenoid operated section with a handle code of 5 or 6 will designate a split configuration with a solenoid cartridge on each end of the section. Handle option 5 provides electric operation only. Handle option 6 provides a lever handle for either electric or manual operation.

An "S" prefix on the solenoid and coil designation will designate a 10 series design and will have screw in solenoid cartridges with a #10 thread size. Cartridges and coils on the 10 series will be interchangeable with the components on Prince solenoid operated valves manufactured prior to November 2014 as well as current production 10 series valves. The 10 series sections will have a dimensional envelope the same as Prince solenoid operated sections manufactured prior to November, 2014.



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

10 SERIES SOLENOID OPERATED WORK SECTION

2 0 P X X X X X X - S X X X

WORK SECTION TYPE
P - Standard Parallel
LP - Load Sense
LPC - Load Sense Pressure Compensated
S - Series (Use Spool Type N or P)

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
H - 3 - Way 3-Position - 20LP Only
J - 4 - Way 3-Position - 20LP Only
K - 4 - Way 3-Position Free Flow Motor - 20LP Only
N - 4 - Way 3-Position Series
P - 4 - Way 3-Position Series Motor
J05 - 5 GPM Pressure Comp (LPC Only)
J10 - 10 GPM Pressure Comp (LPC Only)
J15 - 15 GPM Pressure Comp (LPC Only)
J20 - 20 GPM Pressure Comp (LPC Only)
K05 - 5 GPM Pressure Comp Motor (LPC Only)
K10 - 10 GPM Pressure Comp Motor (LPC Only)
K15 - 15 GPM Pressure Comp Motor (LPC Only)
K20 - 20 GPM Pressure Comp Motor (LPC Only)
*See page V48 for coil details.

SPOOL ACTION
A - Spring Center

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

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
Note: Work port relief cartridges on the 20LPC and 20S are different than the standard Series 20P cartridge.

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

COIL VOLTAGE & TERMINATION *
12Q, 12 VDC Double Spade
12L, 12 VDC Double Wire
12H, 12 VDC DIN 43650
12D, 12 VDC Deutsch
24Q, 24 VDC Double Spade
24L, 24 VDC Double Wire
24H, 24 VDC DIN 43650
11L, 120VAC Lead Wires
24D, 24 VDC Deutsch

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SEE PAGE 5 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

SERIES 20 UTILITY SECTIONS (FOR USE WITH SOLENOID OPERATED SECTIONS)

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 (Required with Load Sense Assembly)
4. #10 SAE ORB Power Beyond (No Pressure Build-Up) *
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. Option 4 requires pilot pressure to be provided by downstream function.

COIL VOLTAGE & TERMINATION*
(omit for options 2 thru 5)
12Q, 12 VDC Double Spade
12L, 12 VDC Double Wire
12H, 12 VDC DIN 43650
12D, 12 VDC Deutsch
24Q, 24 VDC Double Spade
24L, 24 VDC Double Wire
24H, VDC DIN 43650
24D, 24 VDC Deutsch
11L, 120VAC Lead Wires

COMBINATION OUTLET/UTILITY SECTION 20UEXXX

OUTLET PORT SIZE
1. #10 SAE ORB (7/8 – 14 UNF)

PRESSURE BUILD-UP OPTIONS
2. Mechanical Pressure Build-Up
3. Closed Center
4. Mech. Pressure Build-Up; #12 SAE ORB Power Beyond
5. Mech. Pressure Build-Up, Medium Pressure; #12 SAE Power Beyond**
6. Mech. Pressure Build-Up, Medium Pressure**
7. #12 SAE ORB Power Beyond (No Pressure Build-Up)***
8. Load Sense (closed center)

FILTER OPTIONS
A - Without Filter Element
F - With Filter Element
(Cavity is always present)

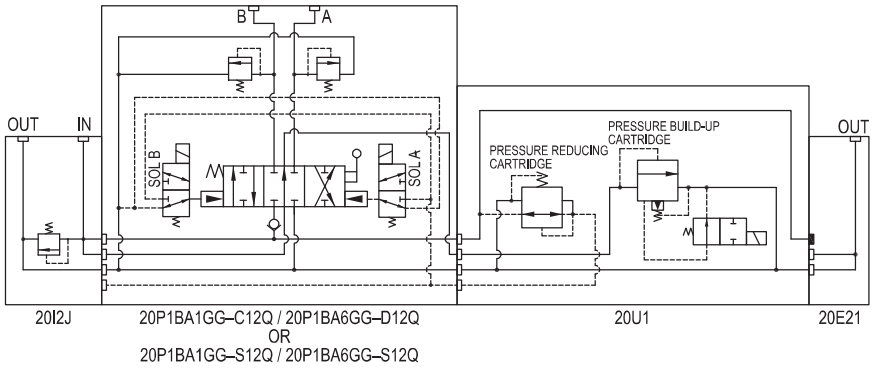
SERIES 20 COMBINATION UTILITY SECTION AND OUTLET

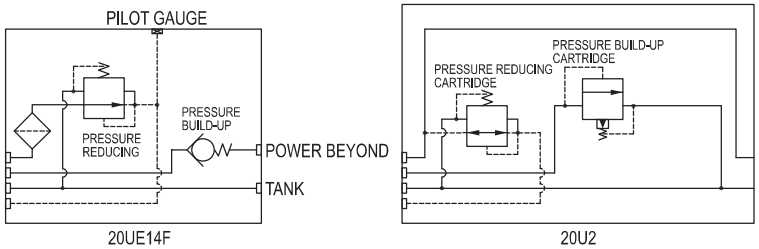
Incorporates both the utility and outlet sections into one mainfold.
For use in solenoid operatied assemblies (either on/off or proportional).
Provides reducing cartridge (350 psi) limits pressure to solenoids.
Mechanical pressure build-up (open center or PBY), or closed center.
Optional filtration of pilot flow. The 20UE requires a tie rod kit for one extra section.

** Medium pressure buildups can be considered for higher flow proportional applications.

*** Build-up option 7 requires pilot pressure to be provided by downstream function.

SERIES 20 SYMBOL SCHEMATIC OF A SOLENOID OPERATOR ASSEMBLY





For remote control options for on/off and proportional solenoids, see page V52.

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SERIES 20 PROPORTIONAL WORK SECTIONS

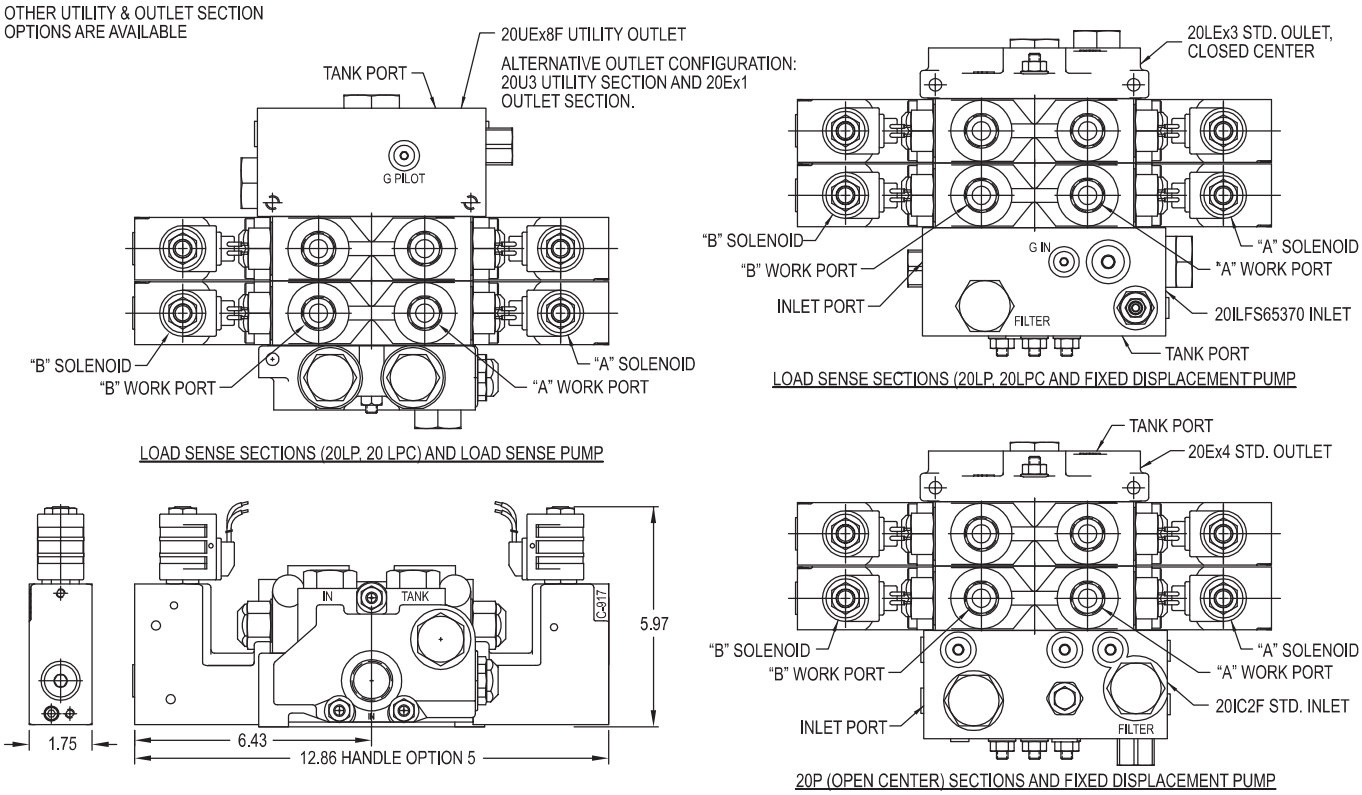
In the Series 20 proportional work sections, varying pilot pressure is applied to the end of the spools to shift the spool against spring bias. Proportional pressure reducing cartridges are used to vary the pressure on the spools. As the current through the cartridge coil increases, the amount of the available pilot pressure applied to the ends of the spools also, proportionally increases. There will be a threshold pressure/current (dead band) to overcome the initial spring centering force and initial land coverage. Once this pressure/current has been exceeded, increasing the current through the coil will increase the flow from the work ports.

Current to the coils is typically provided by a PWM current control module and a joystick or other input device. The coils require a maximum current of approximately 1300 mA (@ 12 volts), and for reduced hysteresis, a dither frequency of approximately 100 Hz and a dither amplitude of 50 to 100 mA. The controller should have adjustable minimum current and maximum current settings to minimize the dead band before work port flow starts and to maximize the control resolution. See page V38.6 for examples of control module and joystick components.

The proportional work sections require pilot pressure to shift the spools. Approximately 325 psi pilot pressure will fully shift the spool in Prince proportional sections. With open center valve assemblies, the pilot pressure is typically supplied by a compensator inlet (20IC). The compensator inlets will provide adequate pilot pressure regardless of the load induced pressure. On load sense or load sense pressure comp systems used with a fixed displacement pump, a 20ILFS65370 inlet will provide pilot pressure. For load sense and load sense pressure comp systems used with a load sense pump, the standby pressure setting should be approximately 325 psi or more to provide for completely shifting the spool.

Prince offers three basic proportional families. The first is open center proportional (based on the 20P family). The open center family, which is typically used with a fixed displacement (gear) pump is the least expensive of the three families. The open center family will provide controlled starts and stops of the work port flow, however, the metering band is not as wide as the other proportional families. The flow rate is also somewhat pressure dependent. The second family is load sense proportional and is based on the 20LP family. The load sense proportional has a wider metering band and the flow is not pressure dependent. The third family, based on the 20LPC family, is load sense pressure comp proportional. The load sense pressure comp family has the widest metering band, giving the most control and resolution. The load sense pressure comp family also has flow rated spools, providing for high resolution and control even for a few gpm with the 5 gpm spool. Using current minimum and current maximum settings on the controller will enhance the control in all three families.

SERIES 20 PROPORTIONAL ASSEMBLIES



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SERIES 20 PROPORTIONAL SOLENOID OPERATED WORK SECTIONS

2 0 — A — - DP

WORK SECTION TYPE
P - Standard Parallel
LP - Load Sense
LPC - Load Sense Pressure Compensated

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

SPOOL TYPE
A - 3-Way 3-Position (20P)
B - 4-Way 3-Position (20P)
C - 4-Way 3-Position Motor (20P)
J - 4-Way 3-Position (20LP)
K - 4-Way 3-position Motor (20LP)
J05 - 4-Way 3-Position, 5 GPM (20LPC)
J10 - 4-Way 3-Position, 10 GPM (20LPC)
J15 - 4-Way 3-Position, 15 GPM (20LPC)
J20 - 4-Way 3-Position, 20 GPM (20LPC)
K05 - 4-Way 3-Position Motor, 5 GPM (20LPC)
K10 - 4-Way 3-Position Motor, 10GPM (20LPC)
K15 - 4-Way 3-Position Motor, 15 GPM (20LPC)
K20 - 4-Way 3-Position Motor, 20 GPM (20LPC)

SPOOL ACTION
A - Spring Center

COIL VOLTAGE & TERMINATION*
12Q, 12 VDC Double Spade
12L, 12 VDC Double Wire
12H, 12 VDC Din 43650
12D, 12 VDC Integral Deutsch
24Q, 24 VDC Double Spade
24L, 24 VDC Double Wire
24H, 24 VDC Din 43650
24D, 24 VDC Integral Deutsch
11H, 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

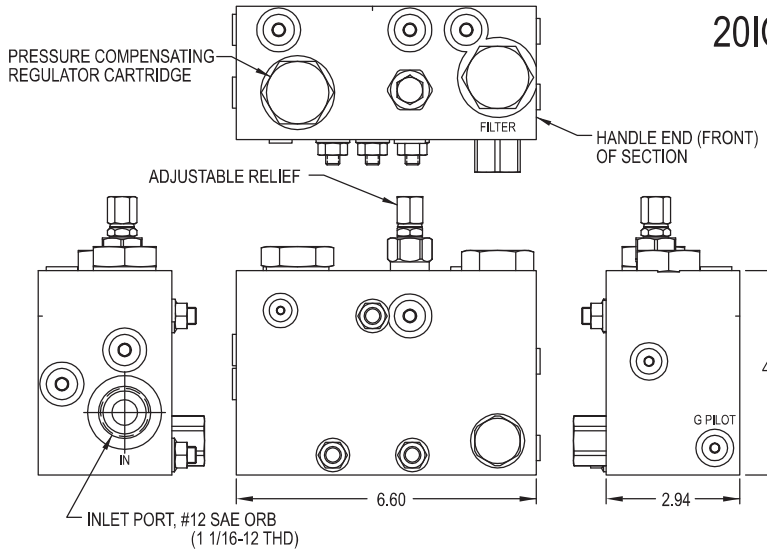
PORT RELIEF "A" OPTION
A - Relief Cavity Plugged
B - Shim Adjustable Relief 500 - 1350 PSI set at 1350
C - Shim Adjustable Relief 1351 - 1750 PSI set at 1750
D - Shim Adjustable Relief 1751 - 2200 PSI set at 2200
E - Shim Adjustable Relief 2201 - 3000 PSI set at 2500

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

*See Page V48 Series 8 Solenoid Coils for Coil Information.

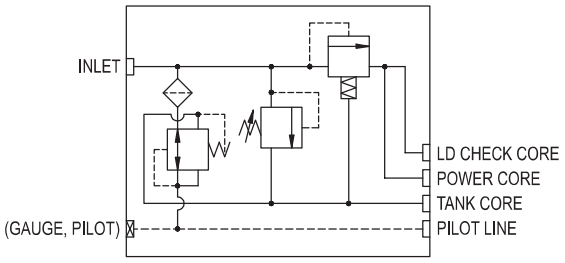
**With handle option 6 on a proportional section, the current required for full flow is reduced by approximately 15%. The force required to manually shift the spool with the handle is increased as compared to the force required with a standard work section – handle option 1.

20IC2F INLET ASSEMBLY



20IC2F – XXXX

SPECIAL RELIEF SETTING (LEAVE BLANK FOR STD SETTING OF 2500 PSI). ADJUSTMENT RANGE: 2000-3500 PSI

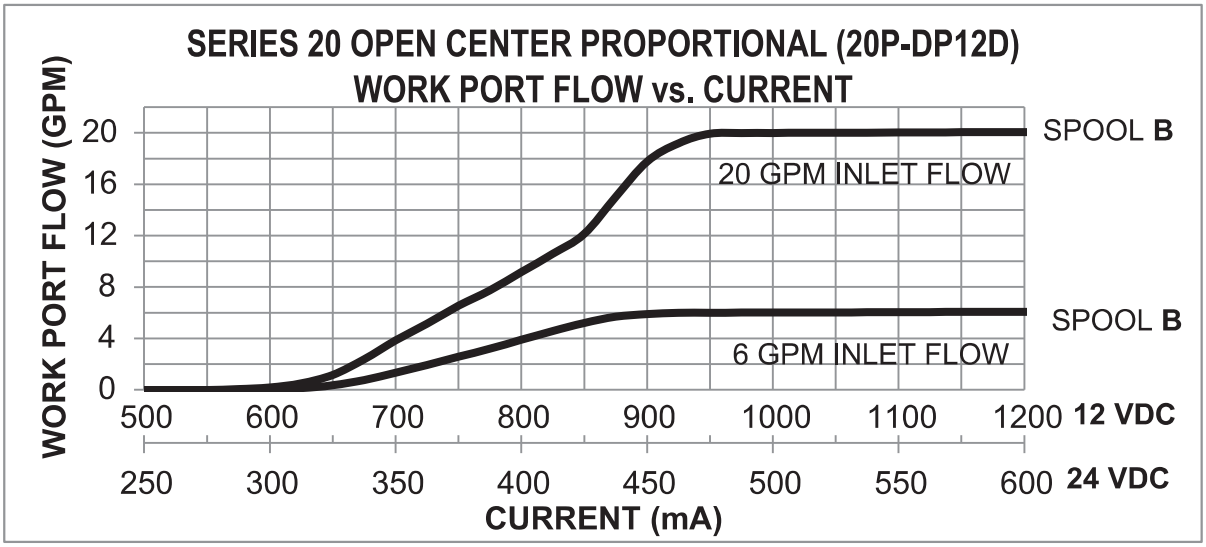


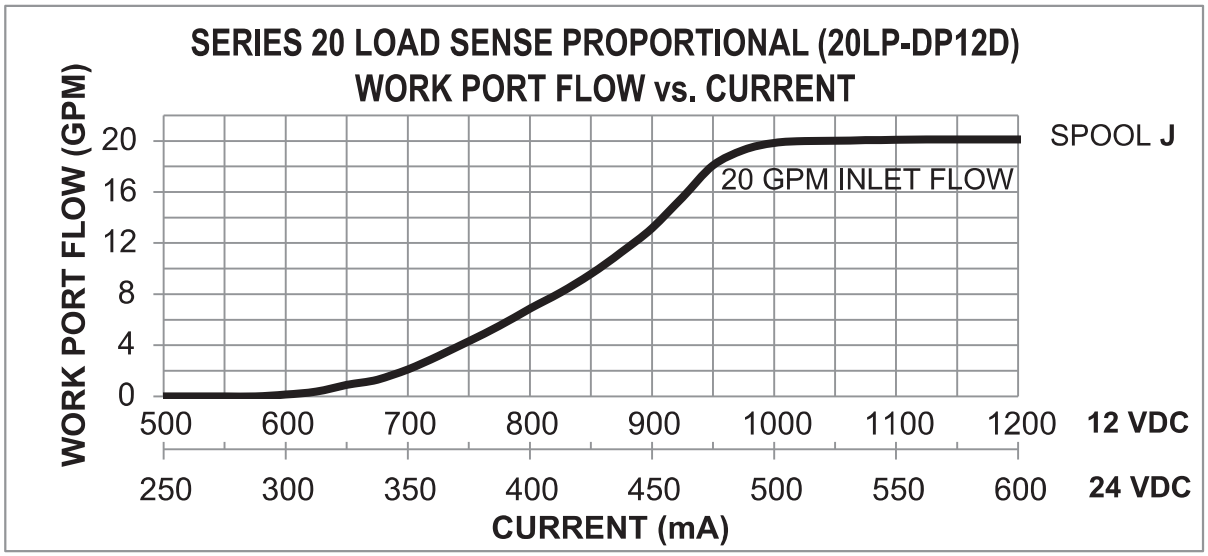
APPLICATION NOTES:

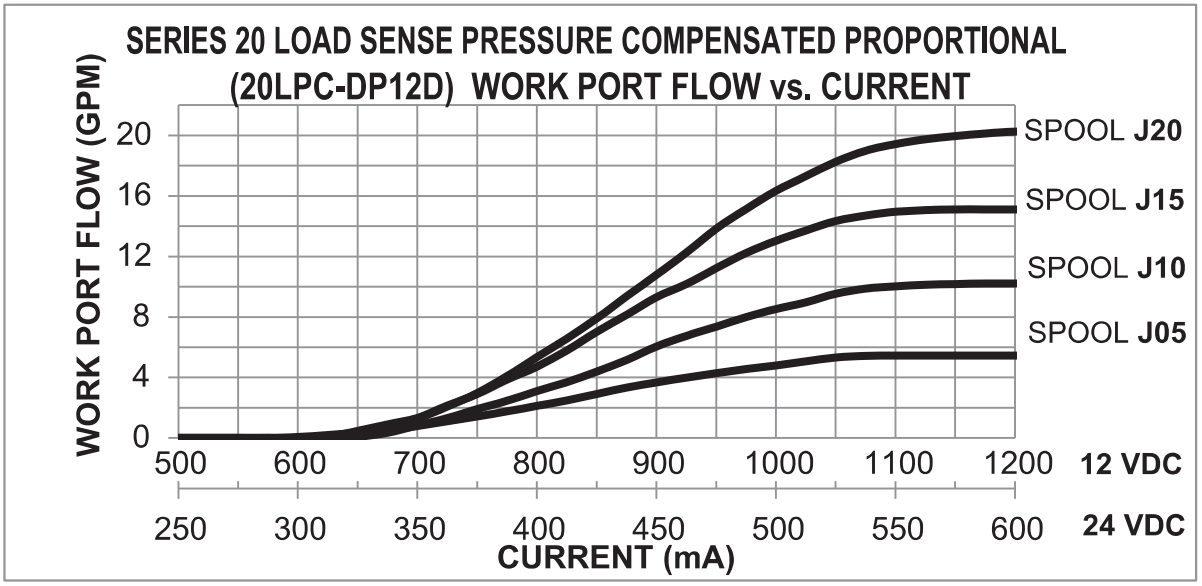
The 20IC2F is an inlet assembly used with the "20P" (open center) proportional solenoid assemblies. It is used with fixed displacement pumps (typically gear pumps) and has a compensator cartridge in the manifold that provides approximately 370psi pilot pressure for the proportional solenoids. It also incorporates a pressure reducing cartridge to limit the pressure to the solenoid cartridges, and a 10µ filter cartridge to filter the pilot flow. The 20IC2F requires a tie rod kit for one extra section, and requires a 20Ex4 outlet section to be used.

The 20IC2F has other applications such as low flow systems. The inlet can provide a constant pilot pressure regardless of flow, guaranteeing a shift in either on/off or proportional solenoids. Likewise, systems that also have little to no load induced pressure can benefit from the constant pilot pressure the 20IC2F provides, guaranteeing a shift regardless of work port pressure.

The 10 micron filter included in the inlet helps keep the pilot lines clean. This helps eliminate contamination in the oil being sent to the solenoid cartridges.







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EXAMPLES OF TYPICAL SERIES 20 SOLENOID OPERATED SECTIONS AND ASSEMBLIES

ON – OFF SOLENOID ASSEMBLIES

SERIES 20 COMMON WORK SECTIONS
20P1BA1AA-C12D (8 series solenoids)
20P1BA5AA-DM12D (8 series-manual override solenoids)
20P1BA6AA-C12L (8 series solenoids)
20P1BA1AA-S12Q (10 series solenoids)
20P1BA5AA-S12H (10 series solenoids)
20P1BA6AA-S12L (10 series solenoids)

SERIES 20 common assemblies
20I2J; 20P1BA1AA-C12D; 20U2 (utility section); 20E21
20I2J; 20P1BA1AA-C12D; 20UE12F (combination utility & outlet section w/ filter)

OPEN CENTER PROPORTIONAL (fixed displacement pump)

SERIES 20 COMMON WORK SECTION
20P1BA5AA-DP12D (proportional solenoids)

Series 20 common assembly
20IC2F (compensator inlet); 20P1BA5AA-DP12D; 20E24 (pilot seal outlet)

LOAD SENSE PROPORTIONAL

SERIES 20 COMMON WORK SECTION
20LP1JA5AA-DP12D (proportional solenoids)

Series 20 common assemblies
20I2A; 20LP1JA5AA-DP12D; 20U3; 20LE21 (load sense pump)
20I2A; 20LP1JA5AA-DP12D; 20UE18F (load sense pump, combination utility outlet - load sense w/ filter)
20ILFS65370; 20LP1JA5AA-DP12D; 20LE23 (fixed displacement pump, compensator inlet w/ filter, load sense - pilot seal outlet)

LOAD SENSE PRESSURE COMPENSATED PROPORTIONAL

SERIES 20 COMMON WORK SECTION
20LPC1J15A5AA-DP12D (proportional solenoids, 15 gpm spool)

Series 20 common assemblies
20I2A; 20LPC1J15A5AA-DP12D; 20U3; 20LE21 (load sense pump)
20I2A; 20LPC1J15A5AA-DP12D; 20UE18F (load sense pump, combination utility outlet - load sense w/ filter)
20ILFS65370; 20LPC1J15A5AA-DP12D; 20LE23 (fixed displacement pump, compensator inlet w/ filter, load sense - pilot seal outlet)

ON – OFF SOLENOID				PUMP TYPE
Work Sect.	**Inlet**	**Utility**	**Outlet**	
20(P/S)	20Ixx	20Ux	20Ex1	FIXED DISPLACEMENT PUMP
20(P/S)	20Ixx	n/a	20UE12x	FIXED DISPLACEMENT PUMP
20(LP/LPC)	20ILFS65230	n/a	20LEx3	FIXED DISPLACEMENT PUMP
20(P/S)	20Ixx	20U3	20Ex1	PRESSURE COMPENSATED PUMP
20(P/S)	20Ixx	n/a	20UE13x	PRESSURE COMPENSATED PUMP
20(LP/LPC)	20Ixx	20U3	20LExx	LOAD SENSE PUMP
20(LP/LPC)	20Ixx	n/a	20UE18x	LOAD SENSE PUMP
OPEN CENTER PROPORTIONAL SOLENOID				**PUMP TYPE**
20P	20IC2F	n/a	20Ex4	FIXED DISPLACEMENT PUMP
LOAD SENSE PROPORTIONAL SOLENOID				**PUMP TYPE**
20LP	20ILFS65370	n/a	20LEx3	FIXED DISPLACEMENT PUMP
20LP	20Ixx	20U3	20LExx	LOAD SENSE PUMP
20LP	20Ixx	n/a	20UE18x	LOAD SENSE PUMP
LOAD SENSE PRESSURE COMPENSATED PROPORTIONAL SOLENOID				**PUMP TYPE**
20LPC	20ILFS65370	n/a	20LEx3	FIXED DISPLACEMENT PUMP
20LPC	20Ixx	20U3	20LExx	LOAD SENSE PUMP
20LPC	20Ixx	n/a	20UE18x	LOAD SENSE PUMP

SERIES 20 PRESET RELIEF CARTRIDGES

PRESET INLET RELIEF CARTRIDGE

20IR - OX - X X X X

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 - X X X X

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	2200 PSI @ 3 GPM
Y - ANTI-CAV/SCREW RELIEF 2201-3000 PSI	2500 PSI @ 3 GPM

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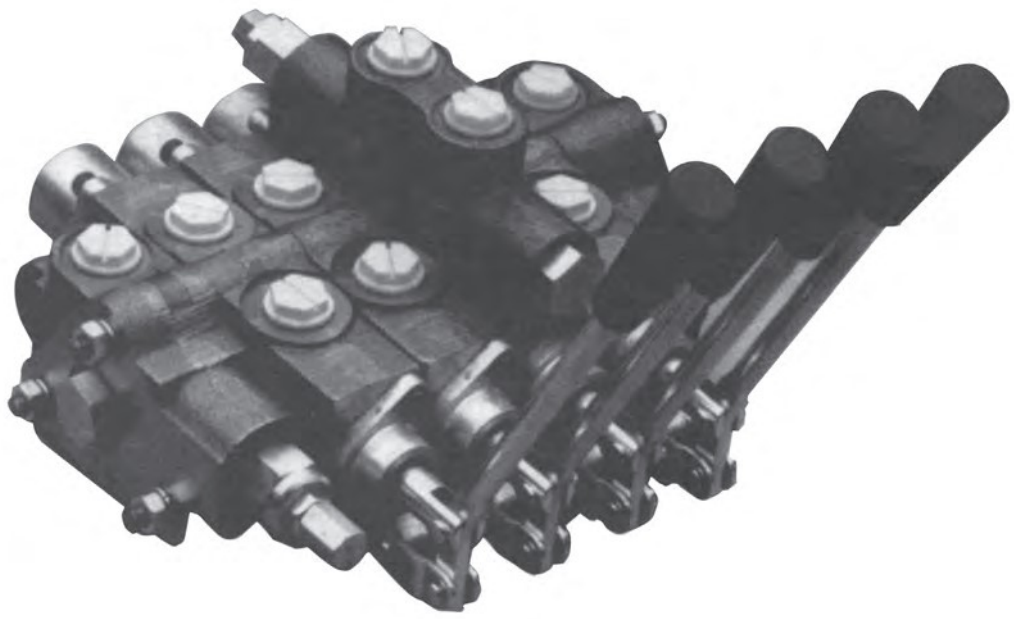
SECTIONAL BODY



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 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)
SVW1BA11	4-Way Double Acting w/ Spring Center (Work Ports Blocked in Neutral) / Enclosed Handle
SVW1BA2	4-Way Double Acting w/ Spring Center (Work Ports Blocked in Neutral) / Less Handle Only
SVW1BA9	4-Way Double Acting w/ Spring Center (Work Ports Blocked in Neutral) / Blank for Optional Joystick Handle
SVW1DD2	4-Way 4 Position Float w/ Spring Center and Float Detent / Less Handle Only
SVW2BA6	4-Way Double Acting w/ Spring Center (Work Ports Blocked in Neutral) / Clevis Spool End Only
SVW1BAA-S12H	4-Way Double Acting w/ Spring Center (Work Ports Blocked in Neutral) 12 VDC DIN 43650
SVW1BA1-S12Q	4-Way Double Acting w/ Spring Center (Work Ports Blocked in Neutral) 12 VDC Double Spade
SVW1BA2-S12L	4-Way Double Acting w/ Spring Center (Work Ports Blocked in Neutral) / Less Handle 12 VDC Double Wire

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
SVH1BA1GG	4-Way Double Acting w/ Spring Center	Adjustable 1500-3000 PSI
SVH1BA1AH	4-Way Double Acting w/ Spring Center	Adjustable 500-1500 PSI
SVH1BA1HA	4-Way Double Acting w/ Spring Center	Adjustable 500-1500 PSI
SVR1ES1GG	4-Way Meter Spool w/ Spring Center	Adjustable 1500-3000 PSI
SVS1GA1AA	4-Way Double Acting Series w/ Spring Center	Port Relief Plugged
SVH1DD1BB	4-Way 4 Position Float w/ Spring Center and Float Detent	Shim Adjustable 1500-3000 PSI

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 Power 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)
SVE28	Medium Pressure Build-Up (for Low Flow Applications)	#10 SAE ORB (7/8-14 THD)

TIE ROD KITS

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

*Number of Work Sections

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*

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)

[0] Often used with no relief. Review application

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
8. Medium Pressure Build-up (For Low Flow Applications)
9. Medium Pressure Build-up Power Beyond #8 SAE Beyond Port (For Low Flow Applications)

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.

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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 (Must Use Float Action)
E - 4-Way 3 Position Metering (SVM only)
K - 4-Way 3 Position Counterbalance Drain (SVW)
M - 4-Way 3 Position Counterbalance Drain/Motor (SVM)
1. Lock Valve Section available only with Spool Option C.
2. Metering Section available only with Spool Options E, F, or M.
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
13. Locking Handle

SPOOL ACTION
A - Spring Center (SVW & SVL only)
B - 3 Position Detent
C - Friction Detent
D - Spring Center w/Float Detent (SVW only) (Must Use Float Spool)
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
P - 2 Position Detent Neutral and IN (No OUT Position)
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 (Must Use Float Action)
E - 4-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)
K - 4-Way 3 Position Counterbalance Drain (SVH)
M - 4-Way 3 Position Counterbalance Drain/Motor (SVR)

SPOOL ACTION
A - Spring Center (SVH & SVS only)
B - 3 Position Detent
C - Friction Detent
D - Spring Center w/ Float Detent (SVH only) (Must Use Float Spool)
E - Light Spring Center
G - 2 Position Neutral and Out Spring Offset to Out
H - 2 Position Neutral and In Spring Offset to In
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 "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 in³/min @1000 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
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

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. Consult your sales representative with your specifications.

VALVES

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SEE PAGE 5 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
660180006 Adjustable Handle Kit
660180055 Joystick Handle Kit Less Handle
660180234 Locking Handle Kit

*Bracket only, Micro-Switch is not provided.

660180033 Bent Joystick Handle Kit
660180017 Straight Joystick Handle Kit
660180018 Offset Joystick Handle Kit
671300011 Rubber Boot for Joystick Handles**

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
660180215 Shim Assortment

** Boot is to be ordered in addition to joystick handle kits

INLET RELIEFS

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

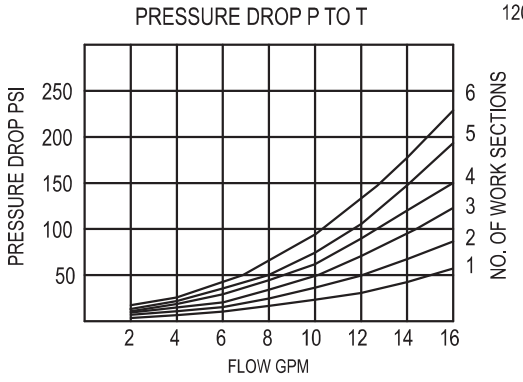
OUTLET CARTRIDGES

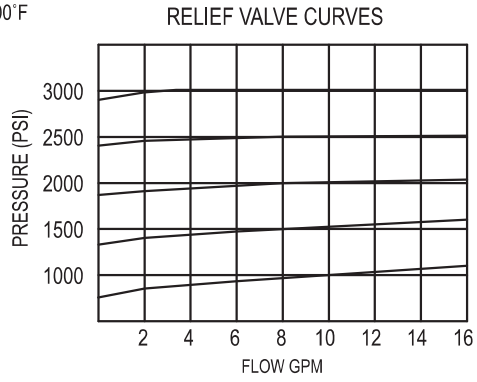
200400030 Open Center Plug
660280001 #8 SAE Power Beyond Cart.
660280002 Closed Center Plug
660280093 Open Center Build-Up Cart.
660280092 Power Beyond Build-Up Cart.
660280090 Med. Press. Open Center Build-Up Cart.
660280089 Med. Press. Power Beyond Build-Up Cart.

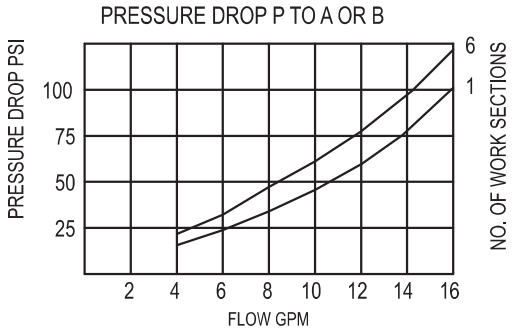
MISC. KITS

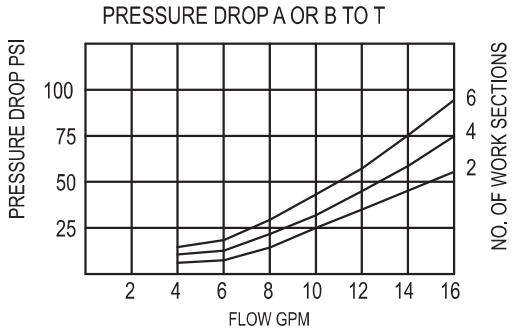
660180052 Load Check Kit

PERFORMANCE CURVES

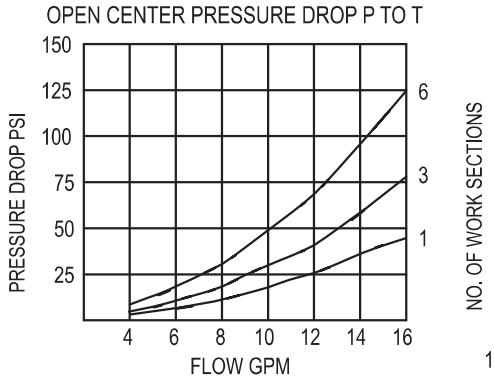


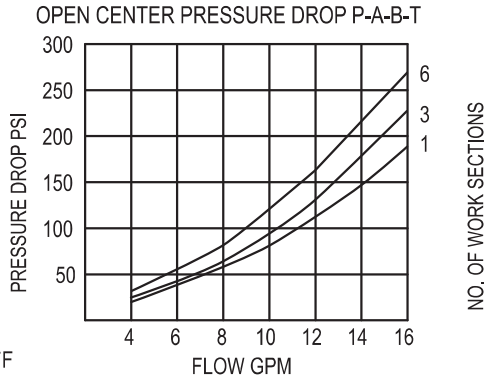






SVS SERIES SECTION TEST DATA





VALVES

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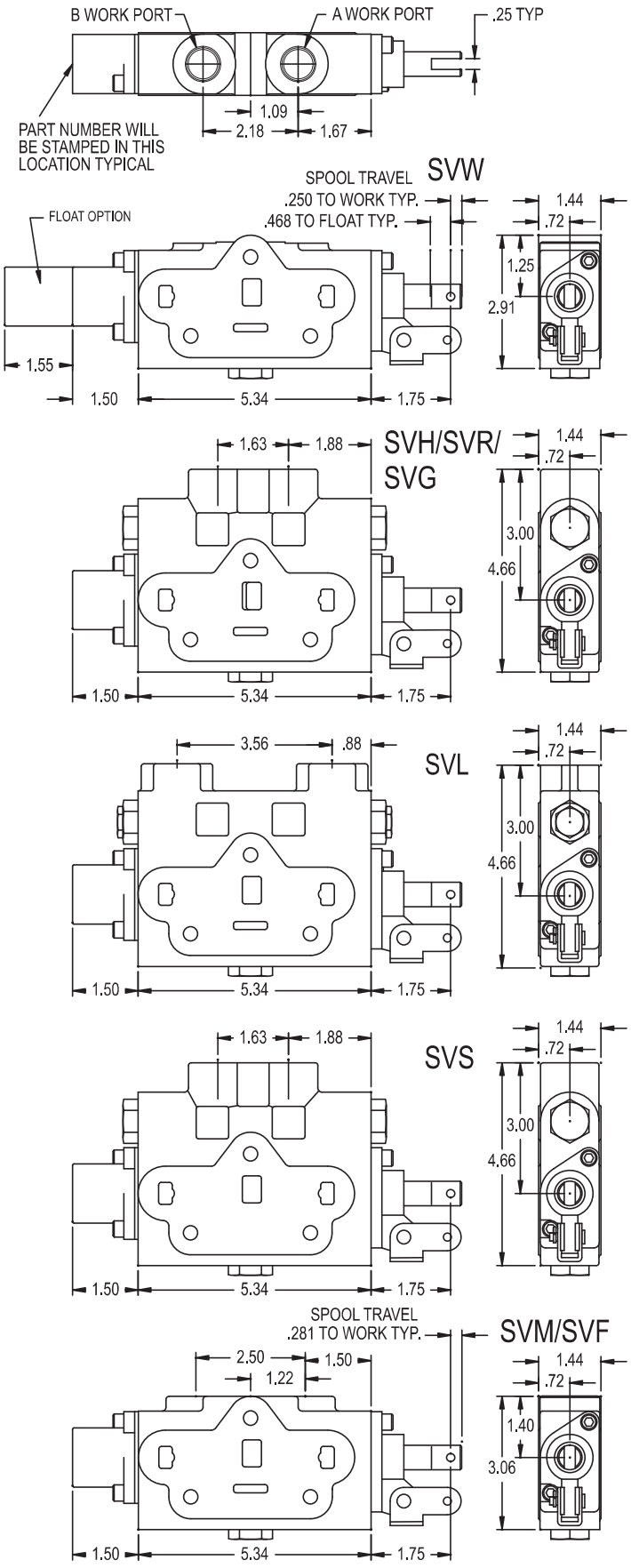
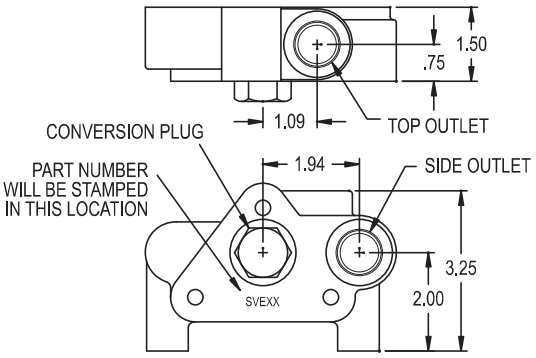
DIMENSIONAL DATA

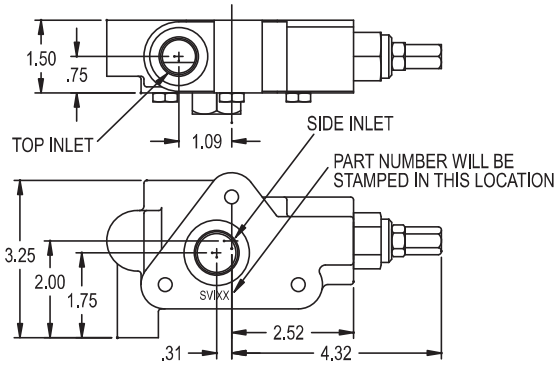
WORK SECTIONS



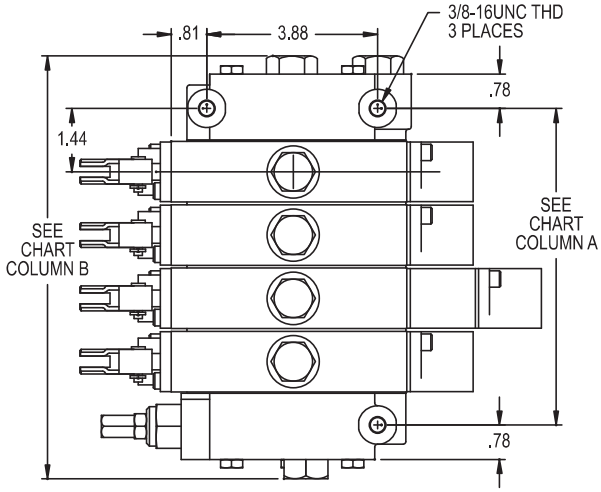
OUTLET COVER



INLET COVER



BOTTOM VIEW OF MOUNTING DIMENSIONS

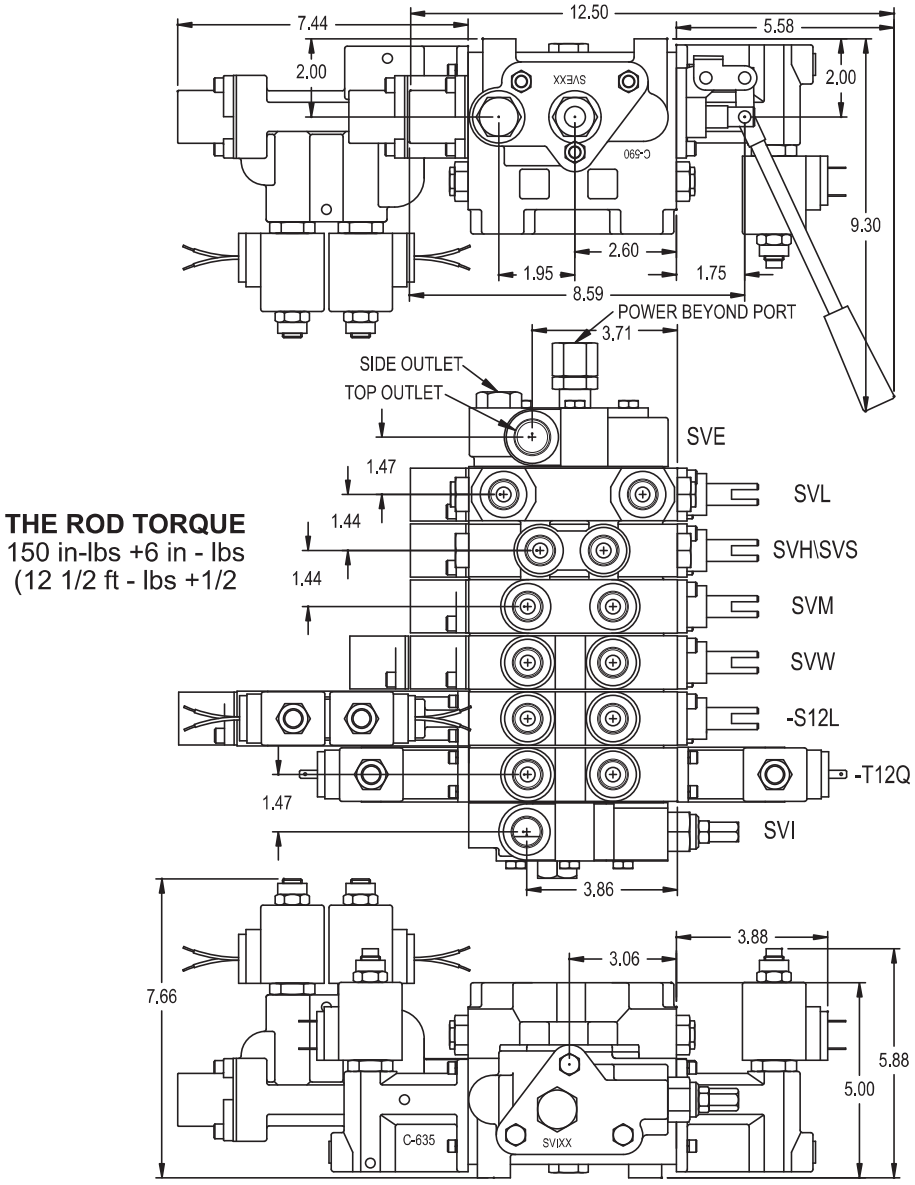


Number of Work Sections	"A"	"B*"
1	2.875	5.875
2	4.312	7.312
3	5.750	8.750
4	7.187	10.187
5	8.625	11.625
6	10.062	13.062
7	11.500	14.500
8	12.937	15.937
9	14.375	17.375
10	15.812	18.812

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

VALVES

TYPICAL STACK DIMENSIONAL DATA



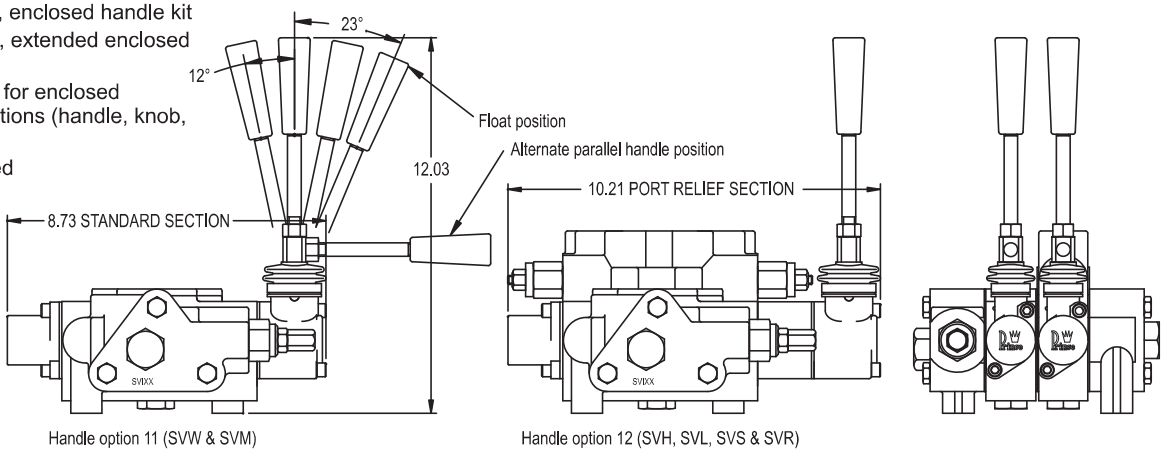
THE ROD TORQUE
150 in-lbs +6 in - lbs
(12 1/2 ft - lbs +1/2

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)

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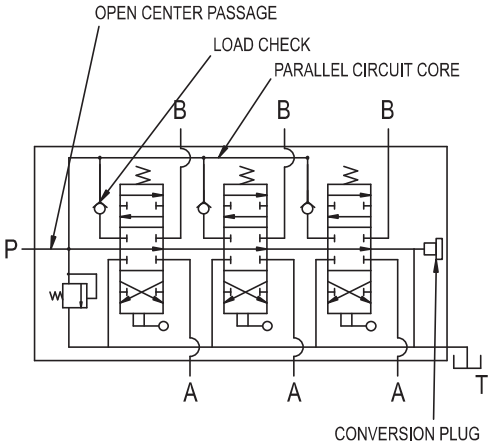
PARALLEL CIRCUIT SVW, SVM, SVF, SVH, SVR, SVG AND SVL WORK SECTIONS

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 least load and provide flow to two unequal loads.



ENHANCED METERING SECTIONS

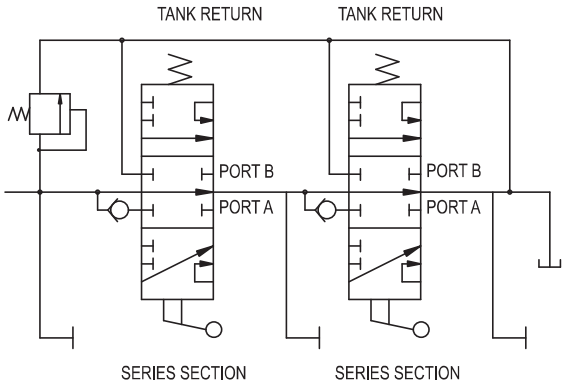
The SVM, SVF, SVR and SVG sections have metering notches machined into the spool to allow for better "feathering" of a load. The spool travel for these sections is also a little longer at .281" vs. .250" for the standard sections. In addition to the metering notches in the spool, the lands in the SVF 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. Cracking pressure on the standard SVL section is 40psi. Higher pressure cartridges are available.

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.



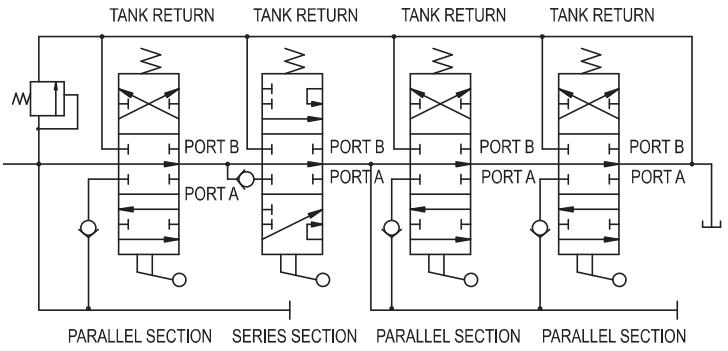
COMBINED SERIES / PARALLEL CIRCUITS

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.



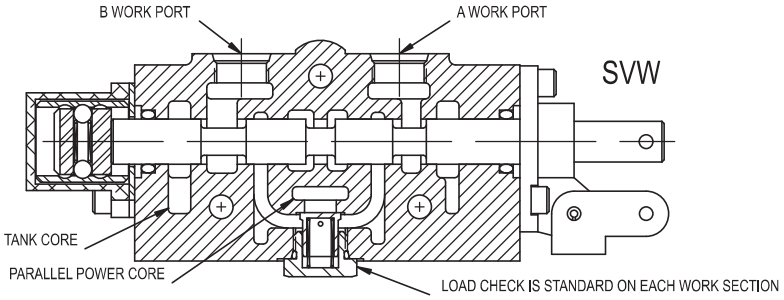
CLOSED CENTER APPLICATIONS

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

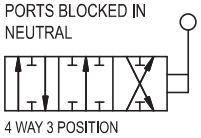
VALVES

WORK SECTIONS

SPOOL ATTACHMENT OPTION B
3 POSITION DETENT

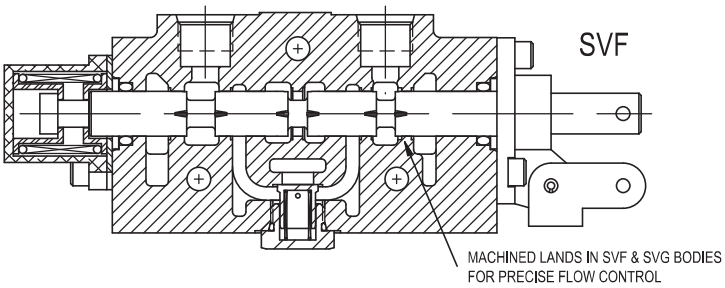


SPOOL OPTION B
DOUBLE ACTING WORK PORTS BLOCKED IN NEUTRAL

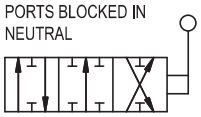


4 WAY 3 POSITION

SPOOL ATTACHMENT OPTION S
SPRING CENTER (FINE METERING)

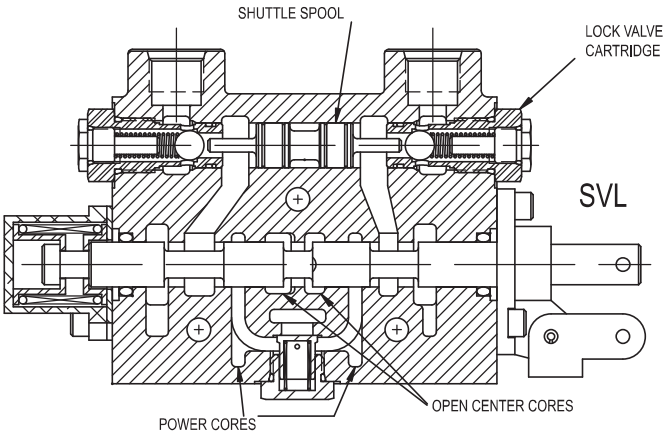


SPOOL OPTION J
DOUBLE ACTING WORK PORTS BLOCKED IN NEUTRAL

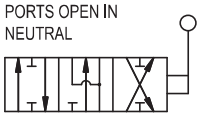


4 WAY 3 POSITION

SPOOL ATTACHMENT OPTION A
SPRING CENTER



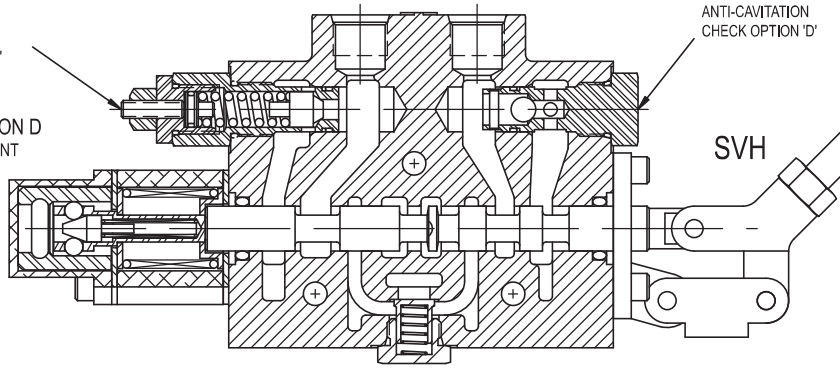
SPOOL OPTION C
DOUBLE ACTING WORK PORTS OPEN IN NEUTRAL



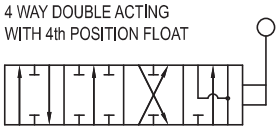
4 WAY 3 POSITION MOTOR

ADJUSTABLE HANDLE OPTION 4

SPOOL ATTACHMENT OPTION D
SPRING CENTER W/FLOAT DETENT

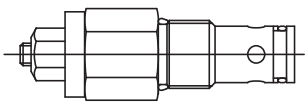


SPOOL OPTION D
4 WAY DOUBLE ACTING WITH 4th POSITION FLOAT



SV WORK PORT RELIEF*

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



* Also used as standard main relief only models and RD4100 models.

PR	-	0		-	
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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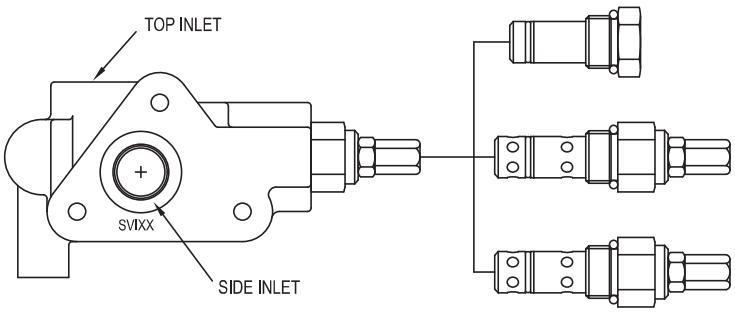
SV INLET RELIEF OPTIONS



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

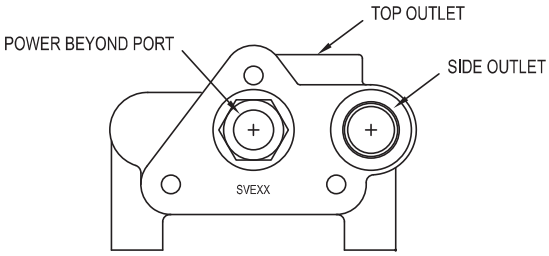
This option provides for a differential poppet relief adjustable from 500-1500 PSI. Set at 1000 PSI @ 10 GPM.

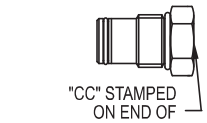
OPTION 5 HIGH PRESSURE ADJUSTABLE RELIEF

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 V68.

SV OUTLET COVER OPTIONS





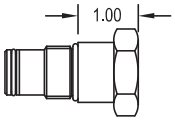
OPTION 3 CLOSED CENTER OUTLET

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.

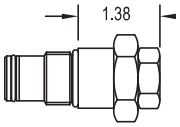
OPTION 1 STANDARD OPEN CENTER OUTLET WITH CONVERSION PLUG

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.



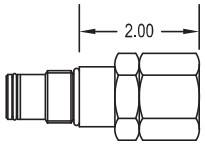
OPTION 2 POWER BEYOND OUTLET WITH #8 SAE BEYOND PORT

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

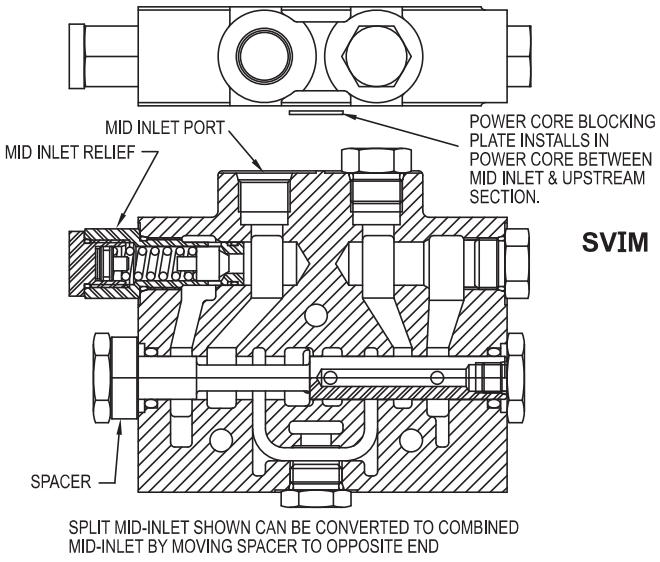
This option directs oil from open center core thru pressure build-up valve and then to tank. See solenoid section for description of operation. Option 8 is the same as option 6, but has a higher rate spring designed to build pressure in low flow applications. (Flows Ranging from 1 to 6 gpm.)



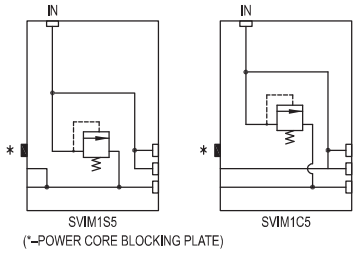
OPTION 7 POWER BEYOND PRESSURE BUILD-UP VALVE FOR SOLENOID OPTION

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. Option 9 is the same as option 7, but has a higher rate spring designed to build pressure in low flow applications. (Flows Ranging from 1 to 6 gpm.)

SV MID-INLET SECTION



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



(*–POWER CORE BLOCKING PLATE)

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)
  L-Pressure Build Up, Split Low Flow 1-6 GPM (for solenoid valves upstream)
  H-Pressure Build Up, Split High Flow 7-12 GPM (for solenoid valves upstream)
  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

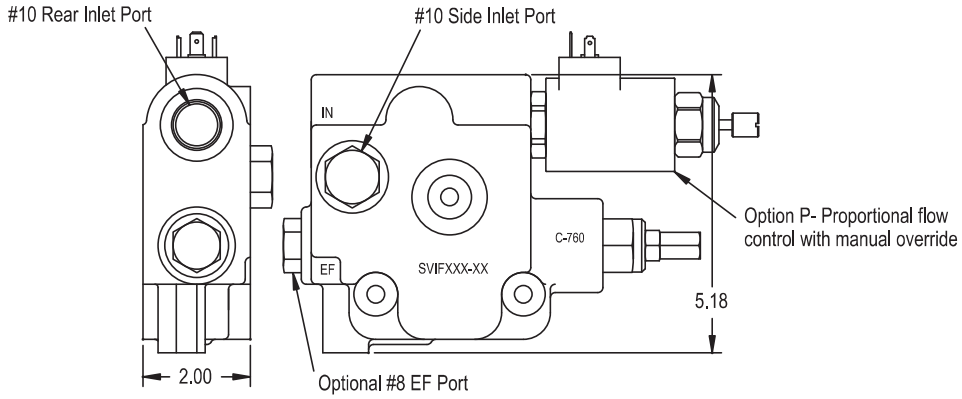
S V I F X X X X X X

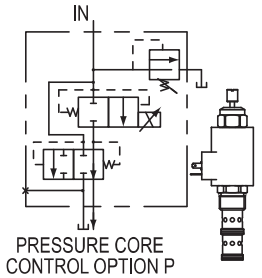
PORT SIZE
1- Side and End Inlet #10 SAE ORB
2- Side and End Inlet #10 SAE ORB, with #8 SAE ORB External EF Circuit

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. SVIF15P12Q2700 is set at 2700 psi

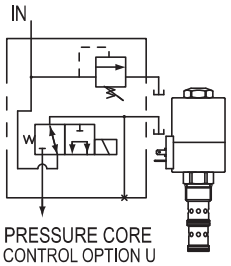
SOLENOID OPTION
Omit for Flow Control Option M
12Q-12VDC Double Spade Coil
24Q-24VDC Double Spade Coil
12H-12VDC DIN 43650 Coil
24H - 24VDC DIN 43650 Coil
12L-12VDC Double Lead Wire Coil
24L - 24VDC Double Lead Wire Coil
12W -12VDC Double Lead Wire w/ Weatherpak Connector Coil
24W - 24VDC Double Lead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

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

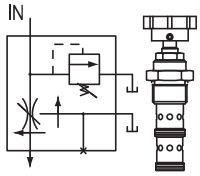




PRESSURE CORE CONTROL OPTION P CIRCUIT SCHEMATIC



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.

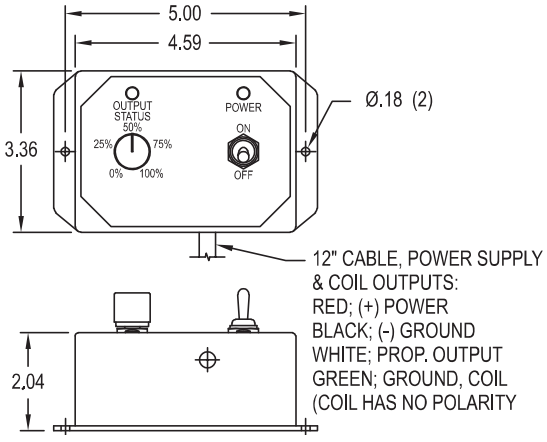
M OPTION incorporates a manually operated pressure-compensated flow control cartridge. With the control knob turned fully in (clockwise), all of the inlet flow is diverted to the tank core/EF port. By turning the flow control knob counter clockwise, the inlet flow directed to the power core and downstream 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.

PROPORTIONAL CONTROL BOX (USE WITH SVIFP & 20IF FLOW CONTROL INLETS); P/N 671300048

The proportional control box is used to provide an adjustable electrical signal to a proportional solenoid on the SVIF and 20IF inlet sections. Once the dial is set, the regulated flow through the valve should remain approximately constant regardless of pressure. Within the operation range, flow varies approximately linearly with dial rotation.

CONNECTIONS AND OPERATION:
- Connect leads to the power supply and solenoid coil. Power supply should be between 9 and 30 VDC.
- With the power off, the inlet flow is directed to tank (or excess flow port).
- To provide power to the control, move the power switch to 'ON'. (RED LED is on when control box 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 100% is aligned with the center mark.
- Clockwise knob rotation increases flow into the valve.
- Some adjustment may be needed for operation. I-min, I-max, dither frequency & ramp time can be adjusted. See drawing for calibration instructions



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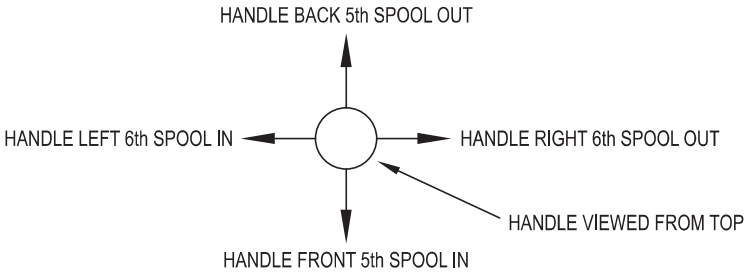
JOYSTICK HANDLE FOR MODEL SV STACK VALVE



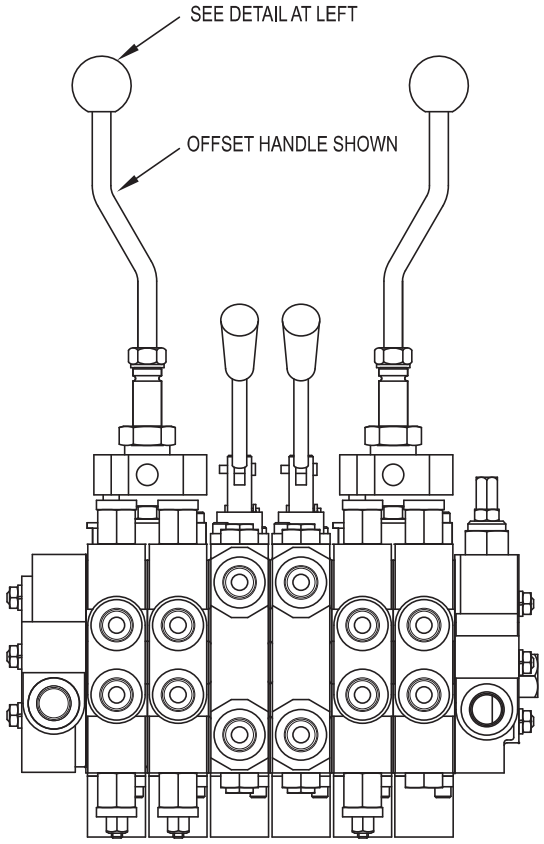
This is a special handle for the model SV stack valve that allows the spools of two adjacent sections to be operated by one common handle. The spools can be operated independently or simultaneously depending on handle movement. The option is normally used on spring center to neutral sections, but can 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

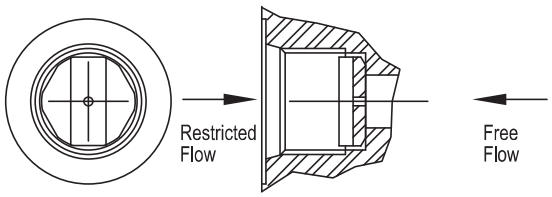
JOYSTICK ASSEMBLY W/BENT HANDLE:
ASSEMBLED ON VALVE ..... SVJB
KIT 660180033



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

ONE WAY WORK PORT RESTRICTOR FOR SVH, SVM, SVR, SVF, SVS, SVG& 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, SVF, SVS, SVG & SVL work section.



ORDERING INFORMATION

HEX BRASS RESTRICTOR

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

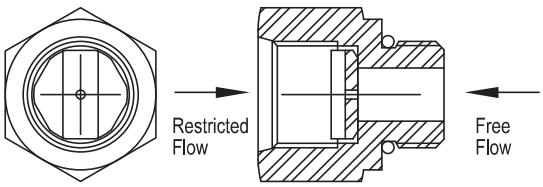
SQUARE STEEL RESTRICTOR CONICAL SPRING 661181XXX

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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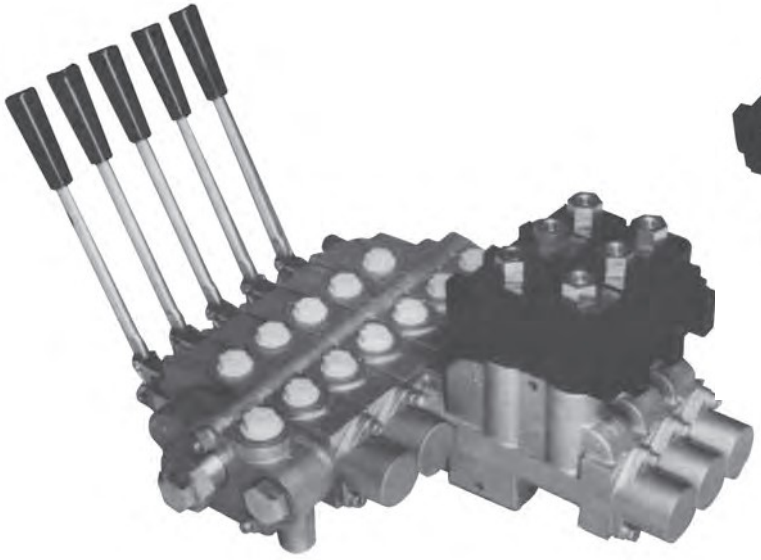
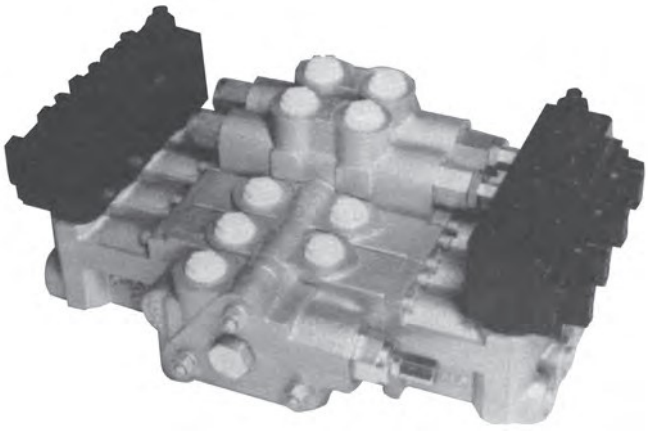
SV SOLENOID OPERATED

Work Sections

- Type “-D” and “-T” Solenoid Operated
- Type “-C” and “-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**
- **8 Series (“C” and “D”) more economical and compact**

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 “-D” and “-T” Work Section.....Approx. 11.0 lbs.
Type “-C” and “-S” Work Section .... Approx. 14.5 lbs.

SV (8 SERIES) SOLENOID OR MANUAL WORK SECTIONS (BOTH SOLENOIDS ON ONE END) DESCRIPTION OF OPERATION

The Type "-C" SV Solenoid Work Section allows remote electrical on-off or manual control. The "-C" sections are 8 series work sections which use screw in cartridges with a #8 thread size. The screw in cartridges provide a robust platform for the higher tank pressures often seen in mobile applications and the #8 size allows for a more compact section size. Cartridges and coils on the 8 series are not interchangeable with the Prince 10 series solenoid sections or sections manufactured prior to November 2014. Any of the standard "-S", "-T", "-C" or "-D" style Prince SV solenoid operated work sections may be used in any combination within a stack valve assembly.

The Type "-C" SV Solenoid Section contains two 3-way 2-position, #8 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 and direct flow 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 and direct flow to work port "B". An optional manual override feature is available for the solenoid cartridges.

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 power beyond pressure build-up valve. Both versions supply 150-200 PSI pilot pressure to the solenoid actuator. A closed center assembly does not require a pressure build-up valve. For an open center system, the pilot pressure can also be provided by an in inlet manifold, which can provide filtered pilot flow.

ORDER CODE MATRIX - TYPE "-C" SOLENOID OR MANUAL WORK SECTIONS

8 SERIES SOLENOID OPERATED SVW, SVM AND SVL SECTION

S V W X X X X – C X X X

SECTION TYPE
W - Standard Work Section
L - Lock Section (Use C Spool)
M - Metering Work Section (Use E, F, or M Spool)

PORT SIZE
1. #8 SAE

SPOOL TYPE
A - 3-Way 3-Position
B - 4-Way 3-Position
C - 4-Way 3-Position Motor
E - 4-Way 3 Position Metering (SVM only)
F - 3-Way 3 Position Metering (SVM only)
K - 4-Way 3 Position Counterbalance Drain (SVW only)
M - 4-Way 3 Position Counterbalance Drain (SVM only)

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
12D, 12 VDC Integral Deutsch
24Q, 24 VDC Double Spade
24 L, 24 VDC Double Wire
24H, 24 VDC DIN 43650
24D, 24 VDC Integral Deutsch
11H, 120 VAC DIN 43650

SOLENOID OPERATION
C - Standard Solenoid Cartridge
CM - Solenoid Cartridge w/Manual Override

8 SERIES SOLENOID OPERATED PORT RELIEF WORK SECTIONS

S V H X X X X X X – C X X X

SECTION TYPE
H - Port Relief Section
S - Series Section (Use G Spool)
R - Metering Work Section (Use E, F, or M Spool)

PORT SIZE
1. #8 SAE

SPOOL TYPE
A - 3-Way 3-Position
B - 4-Way 3-Position
C - 4-Way 3-Position Motor
E - 4-Way 3 Position Metering (SVR only)
F - 3-Way 3 Position Metering (SVR only)
G - 4-Way Series
H - 4-Way Series Motor
K - 4-Way 3 Position Counterbalance Drain (SVH only)
M-4-Way 3 Position Counterbalance Drain (SVR only)

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

*See page V48 for Coil details

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 OPERATION
C - Standard Solenoid Cartridge
CM - Solenoid Cartridge w/Manual Override

COIL VOLTAGE & TERMINATION*
12Q,12 VDC Double Spade
12L, 12 VDC Double Wire
12H, 12 VDC DIN 43650
12D, 12 VDC Integral Deutsch
24Q, 24 VDC Double Spade
24 L, 24 VDC Double Wire
24H, 24 VDC DIN 43650
24D, 24 VDC Integral Deutsch
11H, 120 VAC DIN 43650

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SV (8 SERIES) SOLENOID WORK SECTION (SOLENOID ON BOTH ENDS) DESCRIPTION OF OPERATION

The Type "-D" SV Solenoid Work Section allows remote electrical on-off control. The "-D" sections are 8 series work sections which use screw in cartridges with a #8 thread size. The screw in cartridges provide a robust platform for the higher tank pressures often seen in mobile applications and the #8 size allows for a more compact section size. Cartridges and coils on the 8 series are not interchangeable with the Prince 10 series solenoid sections or sections manufactured prior to November 2014. Any of the standard "-S", "-T", "-C" or "-D" style Prince SV solenoid operated work sections may be used in any combination within a stack valve assembly.

The Type "-D" SV Solenoid Section contains two 3-way 2-position, #8 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 the neutral position to full stroke which directs flow to work port "A". 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 which directs flow to work port "B". An optional manual override feature is available for the solenoid cartridges.

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 power beyond pressure build-up valve. Both versions supply 150-200 PSI pilot pressure to the solenoid actuator. A closed center assembly does not require a pressure build-up valve. For an open center system, the pilot pressure can also be provided by an in inlet manifold, which can provide filtered pilot flow.

ORDER CODE MATRIX - TYPE "-D" SOLENOID OR MANUAL WORK SECTIONS

8 SERIES SOLENOID OPERATED SVW, SVM AND SVL WORK SECTIONS

S V W X X X — D 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
K - 4-Way 3-Position Counterbalance Drain (SVW only)

SPOOL ACTIONS
A - Spring Center

COIL VOLTAGE & TERMINATION *
12Q, 12 VDC Double Spade
12L, 12 VDC Double Wire
12H, 12 VDC DIN 43650
12D 12 VDC Integral Deutsch
24Q, 24 VDC Double Spade
24 L, 24 VDC Double Wire
24H, 24 VDC DIN 43650
24D 24 VDC Integral Deutsch
11H, 120 VAC Din 43650

SOLENOID OPERATION
D - Standard Solenoid Cartridge
DM - Solenoid Cartridge w/Manual Override

8 SERIES SOLENOID OPERATED PORT RELIEF WORK SECTION

S V H X X X X X — D 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
H - 4-Way Series Motor
K - 4-Way 3-Position Counterbalance Drain (SVH only)

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

COIL VOLTAGE & TERMINATION *
12Q, 12 VDC Double Spade
12L, 12 VDC Double Wire
12H, 12 VDC DIN 43650
12D 12 VDC Integral Deutsch
24Q, 24 VDC Double Spade
24L, 24 VDC Double Wire
24H, 24 VDC DIN 43650
24D 24 VDC Integral Deutsch
11H, 120 VAC DIN 43650

SOLENOID OPERATION
D - Standard Solenoid Cartridge
DM - Solenoid Cartridge w/Manual Override

* See page V48 for coil details

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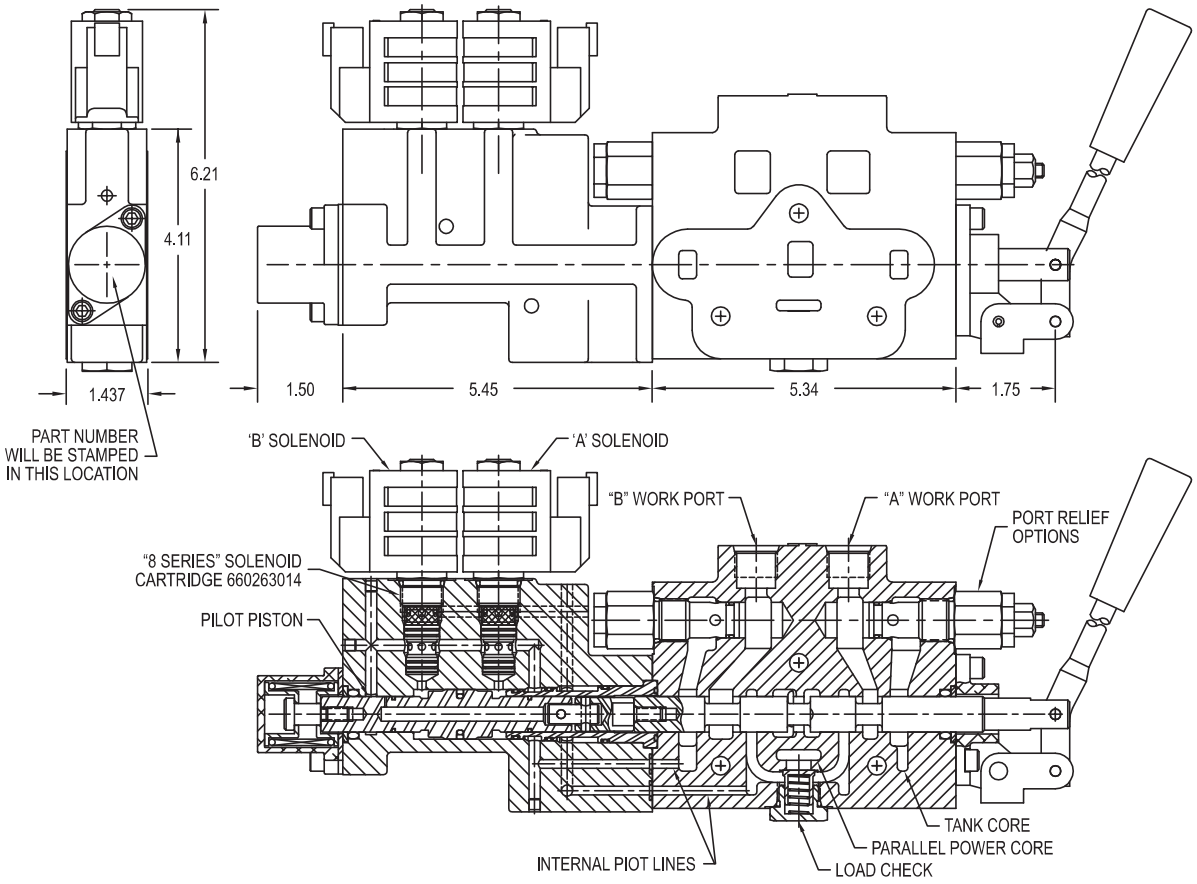
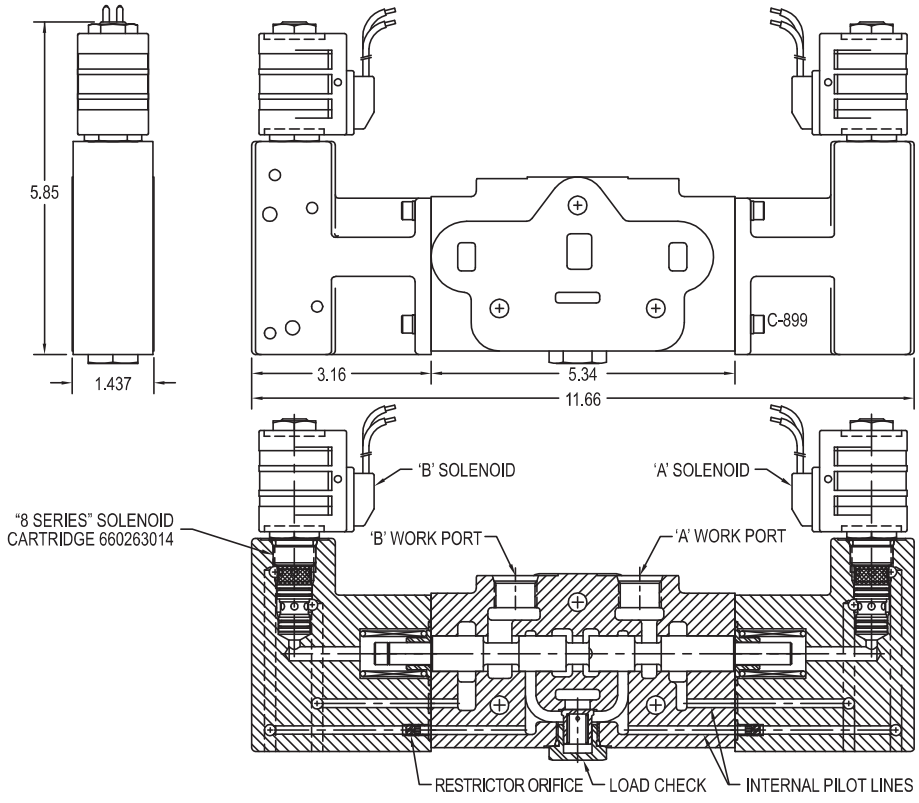
SV "8 SERIES" TYPE C
SOLENOID OR MANUAL WORK SECTION DIMENSIONS



SV "8 SERIES" TYPE D
SOLENOID WORK SECTION DIMENSIONS



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SV (10 SERIES) SOLENOID OR MANUAL WORK SECTIONS (BOTH SOLENOIDS ON ONE END) DESCRIPTION OF OPERATION

The Type "-S" SV Solenoid Work Section allows remote electrical on-off or manual control. The "-S" sections are 10 series work sections which use screw in cartridges with a #10 thread size. Cartridges and coils on the 10 series will be interchangeable with the components on Prince solenoid operated valves manufactured prior to November 2014 was well as current production 10 series valves. Any of the standard "-S", "-T", "-C" or "-D" style Prince SV solenoid operated work sections may be used in any combination within a stack valve assembly.

The Type "-S" SV Solenoid Section contains two 3-way 2-position, #10 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 and direct flow 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 and direct flow 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 power beyond pressure build-up valve. Both versions supply 150-200 PSI pilot pressure to the solenoid actuator. A closed center assembly does not require a pressure build-up valve. For an open center system, the pilot pressure can also be provided by an in inlet manifold, which can provide filtered pilot flow.

ORDER CODE MATRIX - TYPE "-S" SOLENOID OR MANUAL WORK SECTIONS

10 SERIES 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)
M - Metering Work Section (Use E, F or M spool)

PORT SIZE
1. #8 SAE

SPOOL TYPE
A - 3-Way 3-Position
B - 4-Way 3-Position
C - 4-Way 3-Position Motor
E - 4-Way 3 Position Metering (SVM only)
F - 3-Way 3 Position Metering (SVM only)
K - 4-Way 3 Position Counterbalance Drain (SVW only)
M - 4-Way 3 Position Counterbalance Drain (SVM only)

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
12D, 12 VDC Deutsch
24Q, 24 VDC Double Spade
24 L, 24 VDC Double Wire
24H, 24 VDC DIN 43650
24D, 24 VDC Deutsch
11L, 120VAC Lead Wires

SOLENOID AND MANUAL OPERATION
S - Standard Solenoid Cartridge
SM - Solenoid Cartridge w/Manual Override

10 SERIES SOLENOID OPERATED 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 & H Spools)
R - Metering Work Section (Use E, F or M 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
H - 4-Way Series Motor
E - 4-Way 3 Position Metering (SVR only)
F - 3-Way 3 Position Metering (SVR only)
K - 4-Way 3 Position Counterbalance Drain (SVH only)
M - 4-Way 3 Position Counterbalance Drain (SVR only)

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
S - Standard Solenoid Cartridge
SM - Solenoid Cartridge w/Manual Override

COIL VOLTAGE & TERMINATION*
12Q,12 VDC Double Spade
12L, 12 VDC Double Wire
12H, 12 VDC DIN 43650
12D, 12 VDC Deutsch
24Q, 24 VDC Double Spade
24 L, 24 VDC Double Wire
24H, 24 VDC DIN 43650
24D, 24 VDC Deutsch
11L, 120VAC Lead Wires

*See page V48 for Coil details

SV (10 SERIES) SOLENOID WORK SECTION (SOLENOID ON BOTH ENDS) DESCRIPTION OF OPERATION

The Type "-T" SV Solenoid Work Section allows remote electrical on-off control. The "-T" sections are 10 series work sections which use screw in cartridges with a #10 thread size. Cartridges and coils on the 10 series will be interchangeable with the components on Prince solenoid operated valves manufactured prior to November 2014 was well as current production 10 series valves. Any of the standard "-S", "-T", "-C" or "-D" style Prince SV solenoid operated work sections may be used in any combination within a stack valve assembly.

The Type "-T" SV Solenoid Section contains two 3-way 2-position, #10 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 the neutral position to full stroke which directs flow to work port "A". 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 which directs flow 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 power beyond pressure build-up valve. Both versions supply 150-200 PSI pilot pressure to the solenoid actuator. A closed center assembly does not require a pressure build-up valve. For an open center system, the pilot pressure can also be provided by an in inlet manifold, which can provide filtered pilot flow.

ORDER CODE MATRIX - TYPE "-T" SOLENOID OR MANUAL WORK SECTIONS

10 SERIES 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
K - 4-Way 3 Position Counterbalance Drain (SVW only)

SPOOL ACTIONS
A - Spring Center

COIL VOLTAGE & TERMINATION *
12Q, 12 VDC Double Spade
12L, 12 VDC Double Wire
12H, 12 VDC DIN 43650
12D, 12 VDC Deutsch
24Q, 24 VDC Double Spade
24 L, 24 VDC Double Wire
24H, 24 VDC DIN 43650
24D, 24 VDC Deutsch
11L, 120VAC Lead Wires

SOLENOID OPERATION

10 SERIES 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 & H Spools)

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
H - 4-Way Series Motor
K - 4-Way 3 Position Counterbalance Drain (SVH only)

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

COIL VOLTAGE & TERMINATION *
12Q, 12 VDC Double Spade
12L, 12 VDC Double Wire
12H, 12 VDC DIN 43650
12D, 12 VDC Deutsch
24Q, 24 VDC Double Spade
24L, 24 VDC Double Wire
24H, 24 VDC DIN 43650
24D, 24 VDC Deutsch
11L, 120VAC Lead Wires

SOLENOID OPERATION

* See page V48 for coil details

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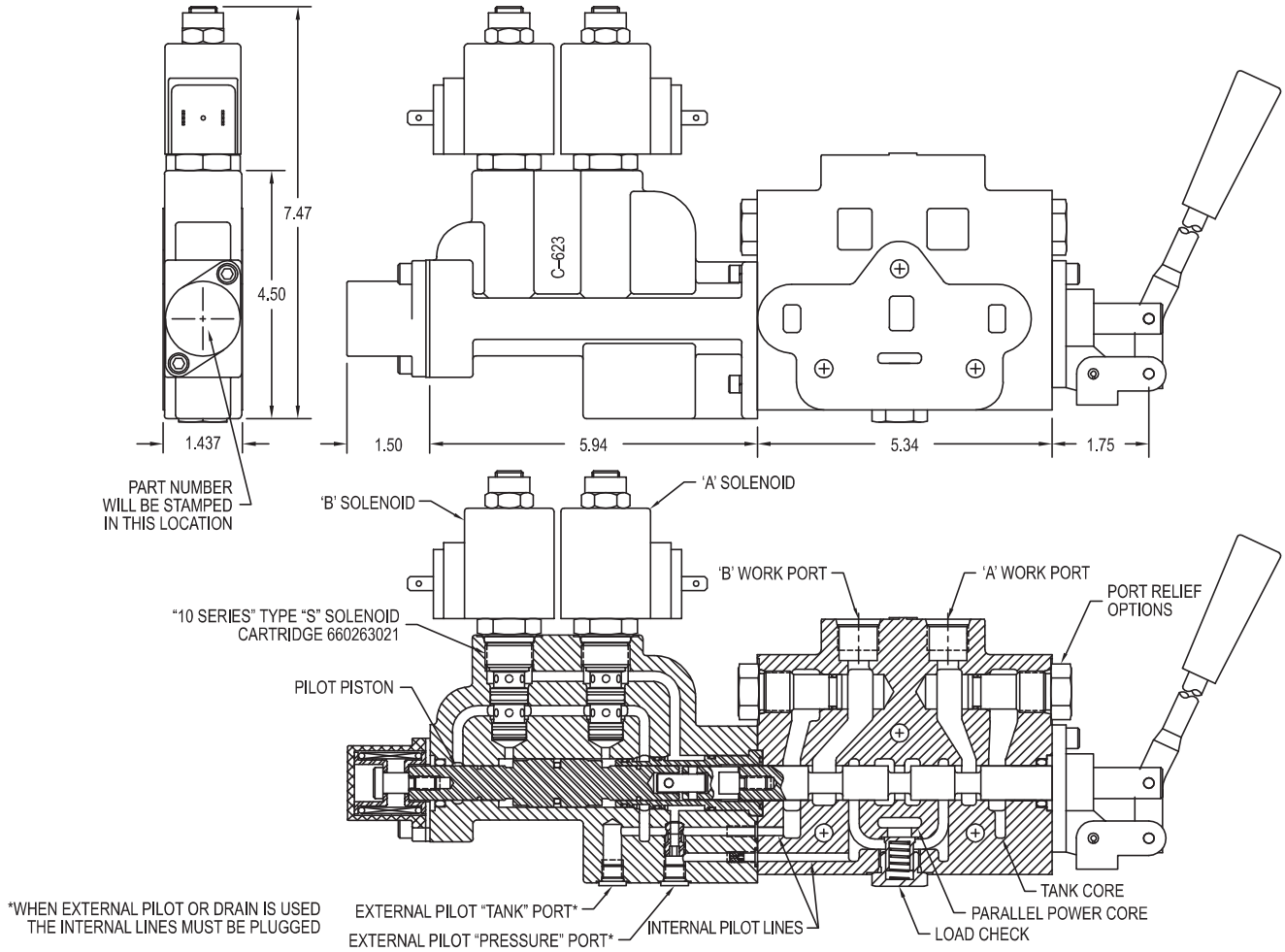
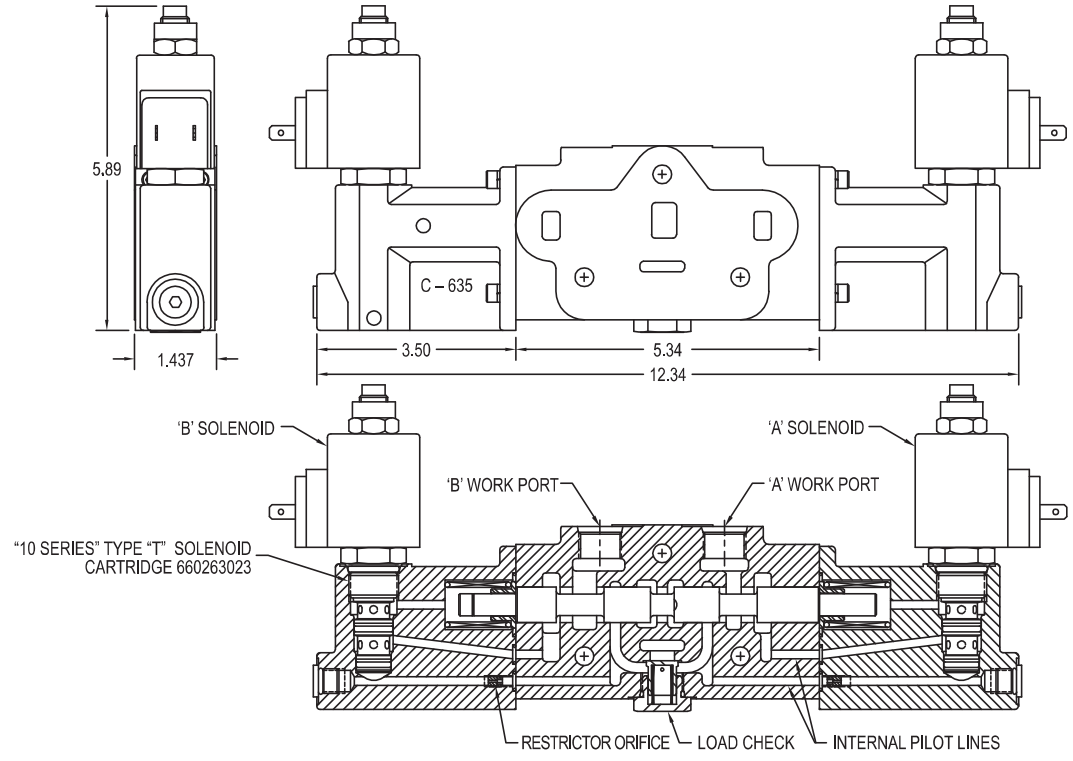
SV "10 SERIES" TYPE S SOLENOID OR MANUAL WORK SECTION DIMENSIONS



SV "10 SERIES" TYPE T SOLENOID WORK SECTION DIMENSIONS



VALVES

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SV SOLENOID OPERATED WORK SECTION - 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.** On "C" and "S" solenoid sections, 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 more information.

SERIES 8 SOLENOID COILS ALL "C", "D", AND "DP" WORK SECTIONS

COIL PART NUMBERS

12H – 671302168 -12 VDC DIN-43650
12L – 671302160 -12 VDC DUAL LEAD WIRES
12Q – 671302165 - 12 VDC DUAL SPADE
12D – 671302163 - 12 VDC INTEGRAL DEUTSCH
24H – 671302169 - 24 VDC DIN-43650
24L – 671302167 - 24 VDC DUAL LEAD WIRES
24Q – 671302166 - 24 VDC DUAL SPADE
24D – 671302164 - 24 VDC INTEGRAL DEUTSCH
11H – 671302170 - 110 VAC DIN-43650

COIL SPECIFICATIONS

DUTY RATING .....CONTINUOUS AT 100% VOLTAGE
INGRESS PROTECTION RATING IP65
IP69 FOR INTEGRAL DEUTSCH COIL & CONNECTOR
WATTAGE .....19 WATTS
AMPERAGE DRAW (NOMINAL)
12 VOLT ..... 1.6 AMPS
24 VOLT ..... 0.78 AMPS
110 VOLT..... 0.19 AMPS
LEAD WIRE LENGTH ..... 18 GAUGE 24" LONG
AC COILS HAVE INTERNAL FULL WAVE RECTIFIERS
RATED FOR 1000 VOLTS MAX REVERSE VOLTAGE
DIN STYLE COILS ARE DIN 43650 TYPE A
DEUTSCH COILS USE DT04-2P CONNECTORS

SERIES 10 SOLENOID COILS ALL "S" AND "T" WORK SECTIONS

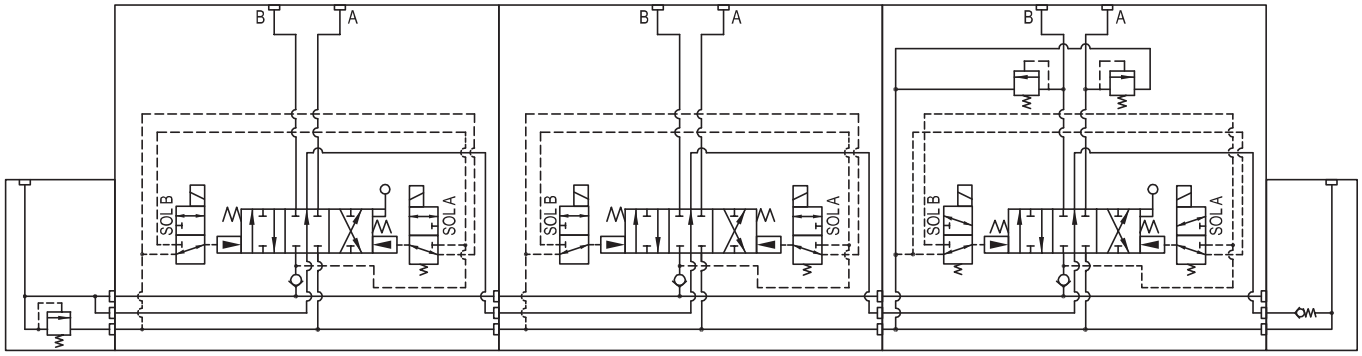
COIL PART NUMBERS

12H – 671302221 - 12 VDC COIL DIN 43650
12L – 671302220 - 12 VDC COIL DOUBLE WIRE
12Q – 671302226 - 12 VDC COIL DOUBLE SPADE
12D – 671302222 - 12 VDC COIL DEUTSCH
24H – 671302224 - 24 VDC COIL DIN 43650
24L – 671302223 - 24 VDC COIL DOUBLE WIRE
24Q – 671302227 - 24 VDC COIL DOUBLE SPADE
24D – 671302225 - 24 VDC COIL DEUTSCH
11L – 671302228 - 120 VAC LEAD WIRES

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 HAVE A RECTIFIER ON THE LEAD WIRES.
LEAD WIRES ARE NOT TO BE REMOVED FOR USE.
AC LEAD WIRES ARE 6" LONG.
DIN STYLE COILS ARE DIN 43650 TYPE A.

SYMBOL SCHEMATIC OF A 3 SECTION, SOLENOID OPERATED STACK VALVE ASSEMBLY



SVI25 | SVW1BA1 – C12Q OR SVW1BA1 – S12Q | SVW1BA – D12Q OR SVW1BA – T12Q | SVH1BA1GB – C12Q OR SVH1BA1GB – S12Q | SVE26

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SV PROPORTIONAL WORK SECTIONS

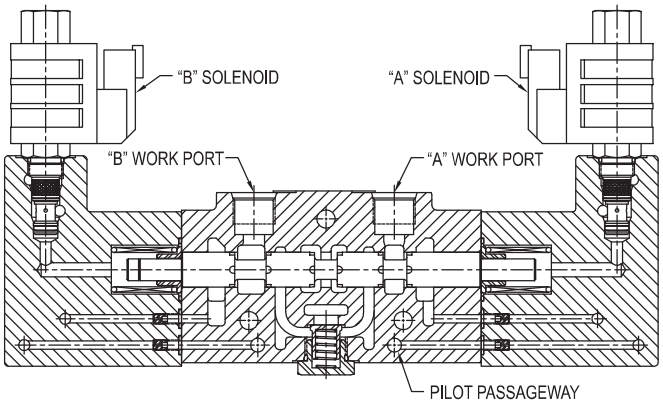
In the SV proportional work sections, varying pilot pressure is applied to the end of the spools to shift the spool against spring bias. Proportional pressure reducing cartridges are used to vary the pressure on the spools. As the current through the cartridge coil increases, the amount of the available pilot pressure applied to the ends of the spools also, proportionally increases. There will be a threshold pressure/current (dead band) to overcome the initial spring centering force and initial land coverage. Once this pressure/current has been exceeded, increasing the current through the coil will increase the flow from the work ports.

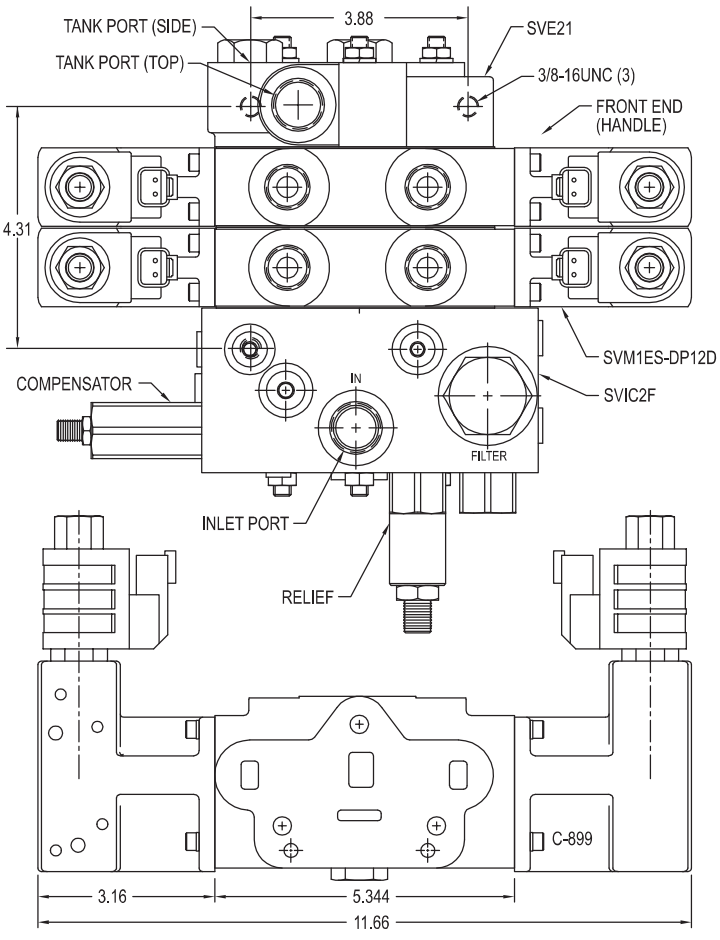
Current to the coils is typically provided by a PWM current control module and a joystick or other input device. The coils require a maximum current of approximately 1300 mA (@ 12 volts), and for reduced hysteresis, a dither frequency of approximately 100 Hz and a dither amplitude of 50 to 100 mA. The controller should have adjustable minimum current and maximum current settings to minimize the dead band before work port flow starts and to maximize the control resolution. See page V38 for examples of control module and joystick components.

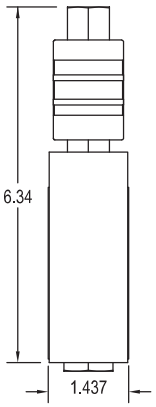
The proportional work sections require pilot pressure to shift the spools. Approximately 325 psi pilot pressure will fully shift the spool in Prince proportional sections. With open center valve assemblies, the pilot pressure is typically supplied by a compensator inlet (SVIC).

The SV proportional work sections are open center sections based on the SVM family. The open center sections, which are typically used with a fixed displacement (gear) pump, provide for a cost effective circuit. The open center sections will provide controlled starts and stops of the work port flow, however, the metering band is not as wide as the other proportional families and metering is somewhat pressure dependent. Using current minimum and current maximum settings on the controller will enhance the metering control.

SV PROPORTIONAL WORK SECTION DIMENSIONS







All SV proportional work sections require pilot supply passageways. All SVM-DPxxx proportional sections will automatically have pilot passageways, however, any non-proportional sections in the assembly will also have to have pilot passageways. To designate SVW, SVH, SVM, SVF, SVR or SVG non-proportional sections with pilot passageways, add a "P" after the three letter model prefix. For instance a SVW1BA1 section with pilot passageways would be called out as a SVWP1BA1. An example of a SVH with passageways would be a SVHP1BA1GG. An example of a non-proportional solenoid section to be included in a proportional assembly would be a SVWP1BA1-C12D. Please contact sales at Prince Manufacturing for additional assistance in configuring assemblies.

SVM / SVR PROPORTIONAL SOLENOID OPERATED WORK SECTIONS

SV ___ S ___ - DP

WORK SECTION TYPE
M - Standard Metering Section
R - Port Relief Metering Section

PORT SIZE
1. #8 SAE ORB (3/4-16 Thread)

SPOOL TYPE
E - 4-Way 3-Position Metering
M - 4-Way 3-Position Counterbalance Drain/Motor

SPOOL ACTION
S - Spring Center (Metering sections)

PORT RELIEF "A" OPTIONS (OMIT FOR SVM)
A - Relief Cavity Plugged
B - Non-Adjustable Direct Acting Relief 1500-3000 PSI set at 2000
C - Non-Adjustable Direct Acting Relief 500-1500 PSI set at 1000
G - Adjustable Direct Acting Relief 1500-3000 PSI set at 2000
H - Adjustable direct Acting Relief 500-1500 PSI set at 1000

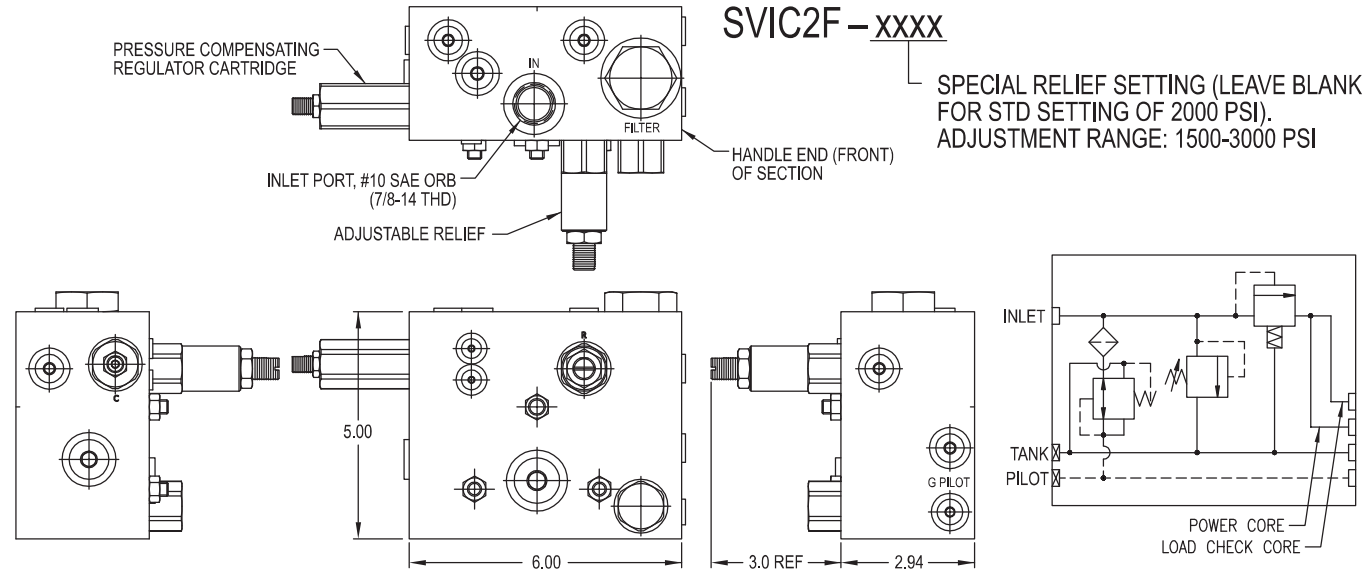
COIL VOLTAGE & TERMINATION
12Q, 12 VDC Double Spade
12L, 12 VDC Double Wire
12H, 12 VDC Din 43650
12D, 12 VDC Integral Deutsch
24Q, 24 VDC Double Spade
24L, 24 VDC Double Wire
24H, 24 VDC Din 43650
24D, 24 VDC Integral Deutsch
11H, 120 VAC Din 43650

SOLENOID OPERATION
DP - Solenoid on each end of section – no lever

PORT RELIEF "B" OPTION (OMIT FOR SVM)
A - Relief Cavity Plugged
B - Non-Adjustable Direct Acting Relief 1500-3000 PSI set at 2000
C - Non-Adjustable Direct Acting Relief 500-1500 PSI set at 1000
G - Adjustable Direct Acting Relief 1500-3000 PSI set at 2000
H - Adjustable direct Acting Relief 500-1500 PSI set at 1000

*See Page V48 Series 8 Coils for Coil Information.

SVIC2F INLET ASSEMBLY



SVIC2F – XXXX

SPECIAL RELIEF SETTING (LEAVE BLANK FOR STD SETTING OF 2000 PSI).
ADJUSTMENT RANGE: 1500-3000 PSI

APPLICATION NOTES:

The SVIC2F is an inlet assembly used with "SVM" (open center) proportional solenoid assemblies. It is used with fixed displacement pumps (typically gear pumps) and has a compensator cartridge in the manifold that provides approximately 350 psi pilot pressure for the proportional solenoids. It also incorporates a pressure reducing cartridge to limit pressure to the solenoid cartridges, and a 10 µ filter cartridge to filter the pilot flow. The SVIC2F requires a tie rod kit for one extra section. Any non-proportional "SV" work sections in the assembly require pilot passageways. A standard "SVE" open center outlet with conversion plug should be used in the assembly.

The SVIC2F has other applications such as low flow systems. The inlet can provide a constant pilot pressure regardless of flow, guaranteeing a shift in either on/off or proportional solenoids. Likewise, systems that also have little to no load induced pressure can benefit from the constant pilot pressure the SVIC2F provides, guaranteeing a shift regardless of work port pressure.

The 10 micron filter included in the inlet helps keep the pilot lines clean. This helps eliminate contamination in the oil being sent to the solenoid cartridges.

To configure work sections to use with this inlet, refer to the text on page V49 that talks about adding a 'P' to the model codes.

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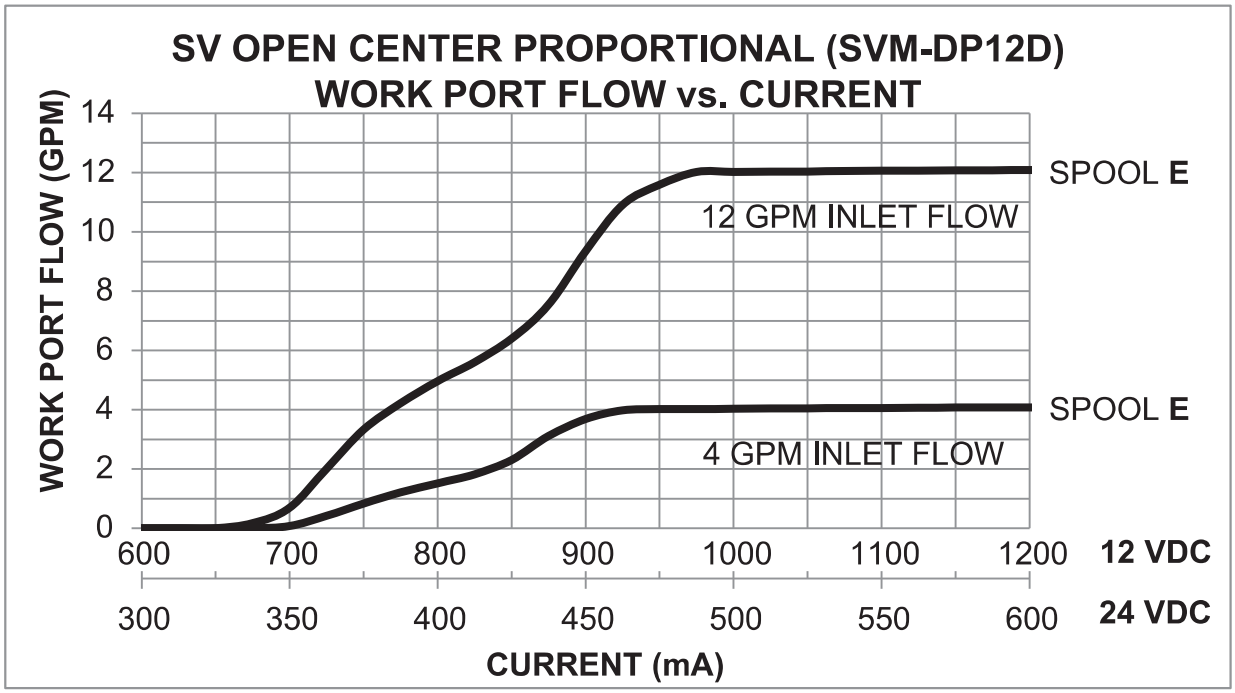
SV PROPORTIONAL WORK SECTIONS PERFORMANCE CURVES



EXAMPLES OF TYPICAL SV SOLENOID OPERATED SECTIONS AND ASSEMBLIES

ON – OFF SOLENOID ASSEMBLIES

SV COMMON WORK SECTIONS:
SVW1BA1-C12D (8 series solenoids)
SVW1BA-DM12D (8 series-manual override solenoids)
SVW1BA1-S12L (10 series solenoids)
SVW1BA-T12L (10 series solenoids)

SV common assembly:
SVI25; SVW1BA1-C12D; SVE26

OPEN CENTER PROPORTIONAL (fixed displacement pump)

SV COMMON WORK SECTION
SM1ES-DP12D (proportional solenoids)

SV common assembly: (note: non-solenoid sections require solenoid passageways)
SVIC2F (compensator inlet); SM1ES-DP12D; SVE21

ON – OFF SOLENOID				PUMP TYPE
Work Sect.	**Inlet**	**Utility**	**Outlet**	
SV(W/L/M) SV(H/S/R)	SVIxx	n/a	SVEx6	FIXED DISPLACEMENT PUMP
SV(W/L/M) SV(H/S/R)	SVIxx	n/a	SVEx3	PRESSURE COMPENSATED PUMP
OPEN CENTER PROPORTIONAL SOLENOID				**PUMP TYPE**
SV(M/R)	SVIC2F	n/a	SVEx1	FIXED DISPLACEMENT PUMP

RADIO REMOTE OFFERINGS FOR ON/OFF SOLENOID OPERATED VALVES

MACRO TRANSMITTERS

4 buttons
(2 section valve)
#671303111

6 buttons
(3 section valve)
#671303112

8 buttons
(4 section valve)
#671303113

RECEIVERS

4 outputs
(up to 2 section valve)
#671303001

8 outputs
(up to 4 section valve)
#671303002

CHARGER (MICRO USB)

12 VDC car charger
#671303003

Wall charger
#671303005

FEATURES:

- Palm sized transmitter (4.7" x 2.6" x .9" typical)
- Rechargeable transmitter - micro USB (20 hr of active transmitting battery life)
- Range of up to 300 ft
- Two way communication with real time feedback
- Easy sync with receiver
- 900 Hz
- Ingress protection IP66
- Receiver input voltage (9 - 30VDC)

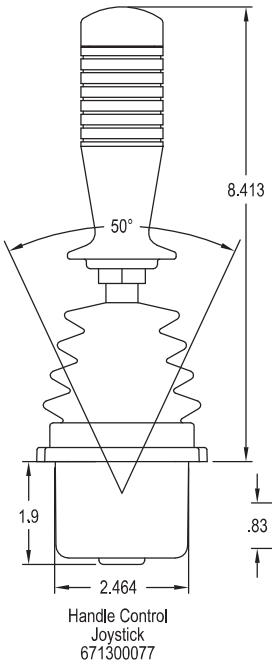
PROPORTIONAL CONTROLLERS & WIRING HARNESSES

Prince proportional operators are often controlled with a thumb or handle control and a PWM control module. Prince offers a small thumb control joystick and a larger handle control joystick, as well as a PWM control module that can be used in conjunction with these joysticks. The control module provides a performance enhancing dither to the current. The minimum and maximum current from the module can also be set to minimize the dead band before work port flow starts and to maximize the control resolution.

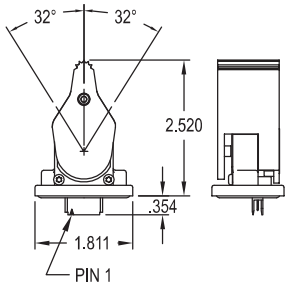
The connector on the thumb joystick is a Molex #CGRID/SL (7 male pins). The connector on the handle joystick is a Deutsch #HD14-9-16P (9 male pins). The connector on the PWM control module is a Deutsch #DT04-8P (8 male pins).

Prince offers a harness to connect the joystick, PWM module, and coils with Deutsch connectors. The harness system consists of a coil harness (approximately 60" long) to connect the PWM to the coils, to the power, etc. (671300108). The second part of the harness is a jumper harness that connects either the thumb control joystick or the handle control joystick to the PWM module. The standard length of the jumper harness is 10 feet, but other lengths are available. The 10 foot jumper harness for the thumb control joystick is 671304110. The 10 foot jumper harness for the handle control joystick is 671304210.

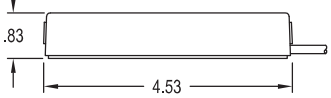
Additional controls such as multi spool proportional controllers as well as proportional RF controllers (belly packs) can be quoted upon request. Please contact sales at Prince Manufacturing for additional information.



Handle Control
Joystick
671300077



Thumb Control Joystick
671300076



671300107 PWM Control Module
I min & I max preset for 12 VDC

671300106 PWM Control Module
I min & I max preset for 24 VDC

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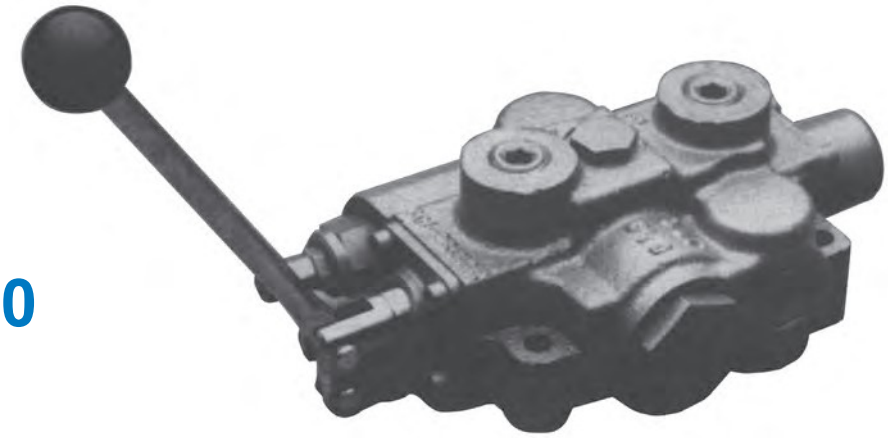
MODEL RD5000

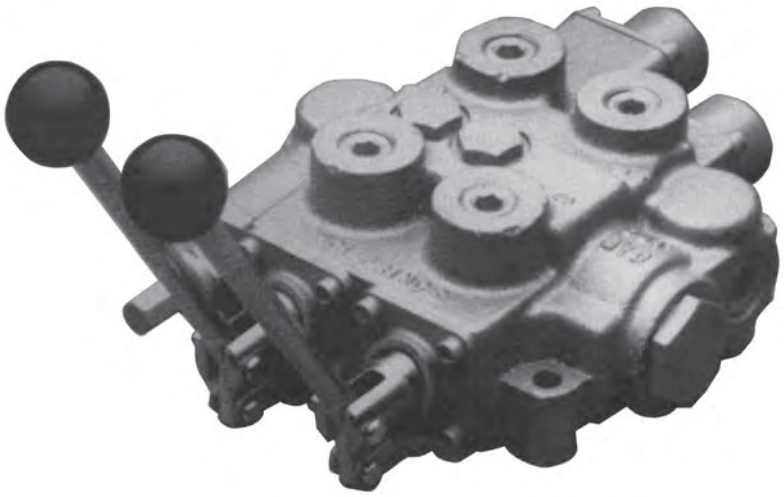
MONO-BLOCK

Directional Control Valves

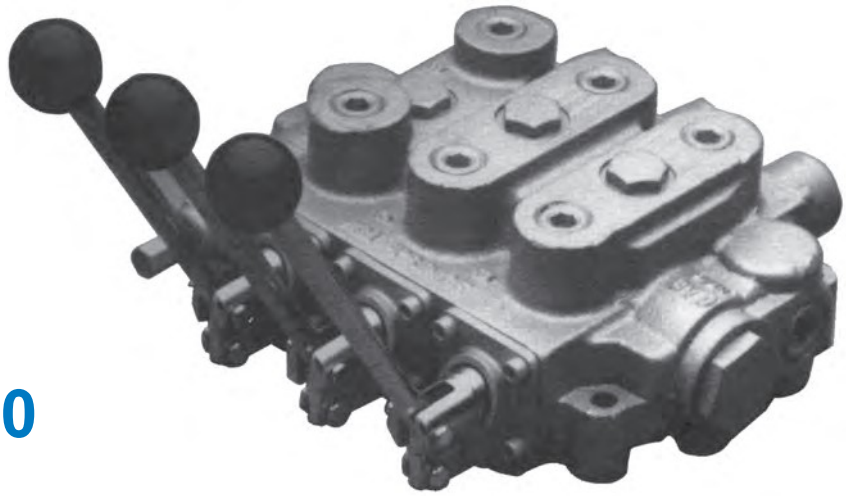
1, 2, 3 Spool



Model RD5100



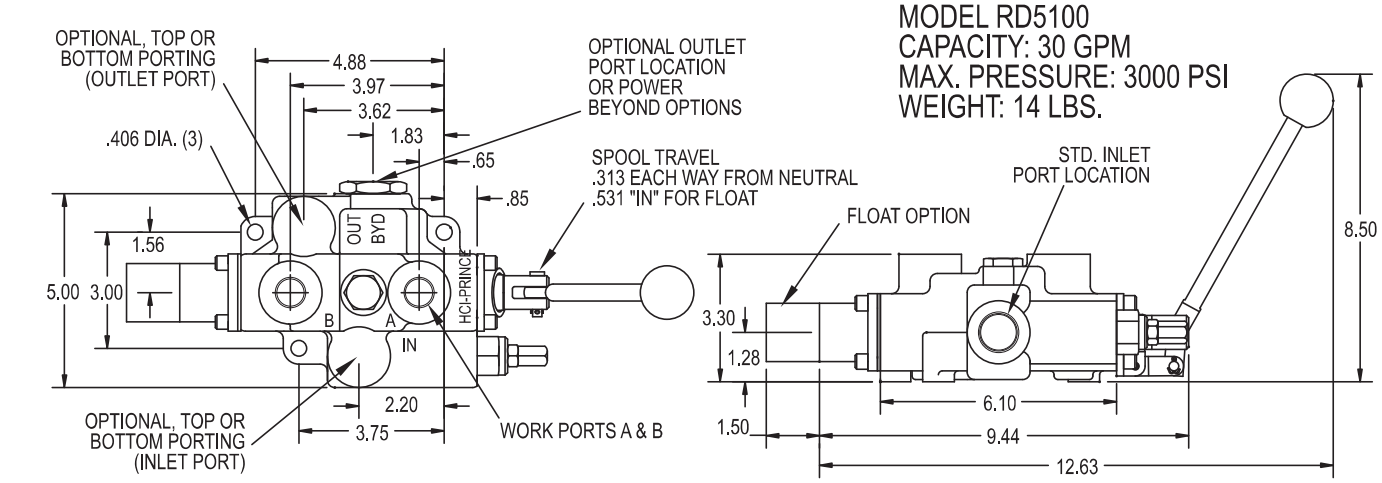
Model RD5200



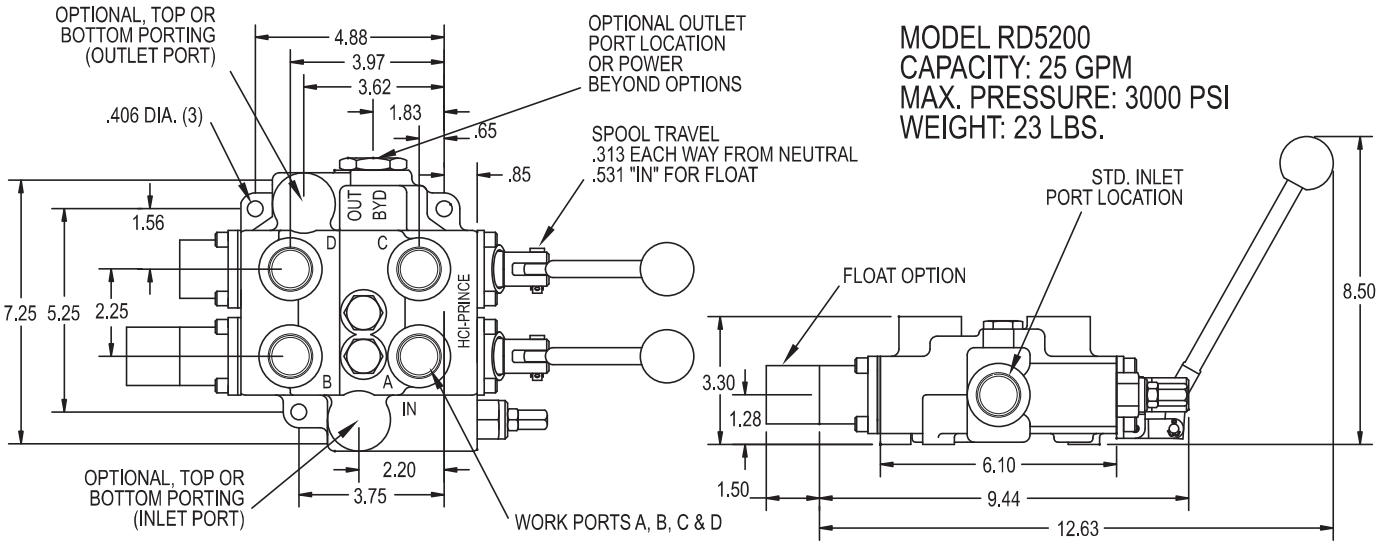
Model RD5300

MODEL RD5000 DIMENSIONAL DATA

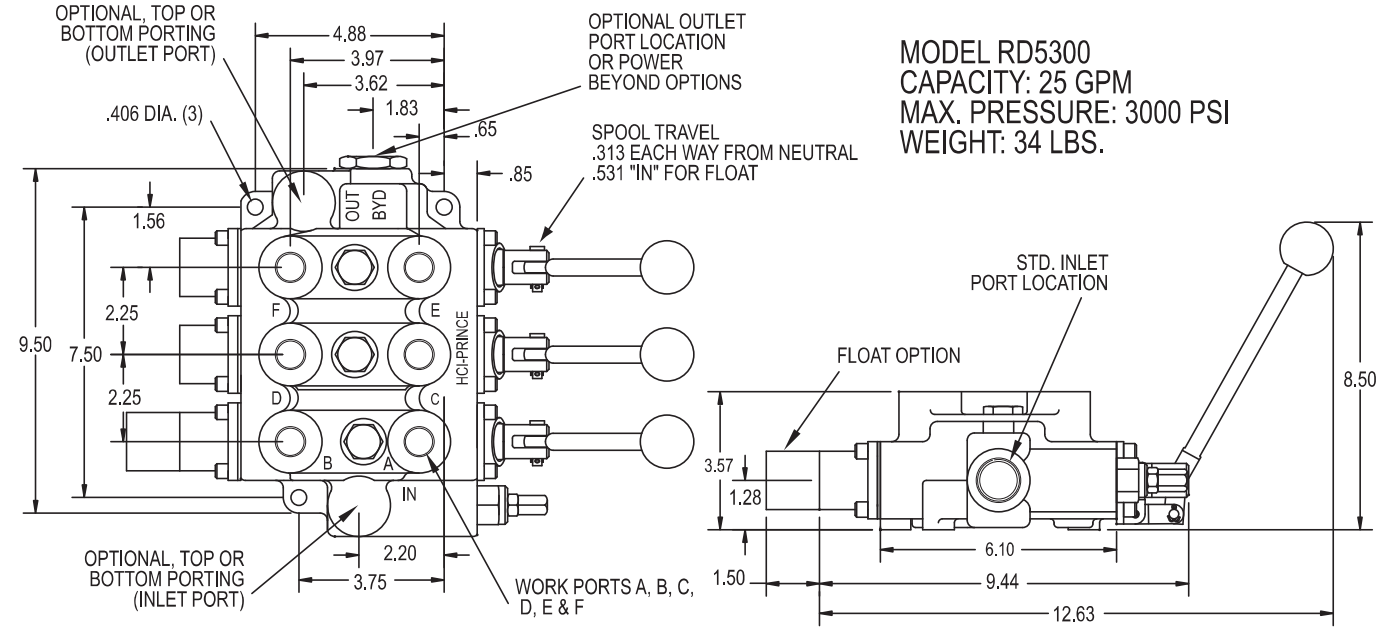
MODEL RD5100
CAPACITY: 30 GPM
MAX. PRESSURE: 3000 PSI
WEIGHT: 14 LBS.



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



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



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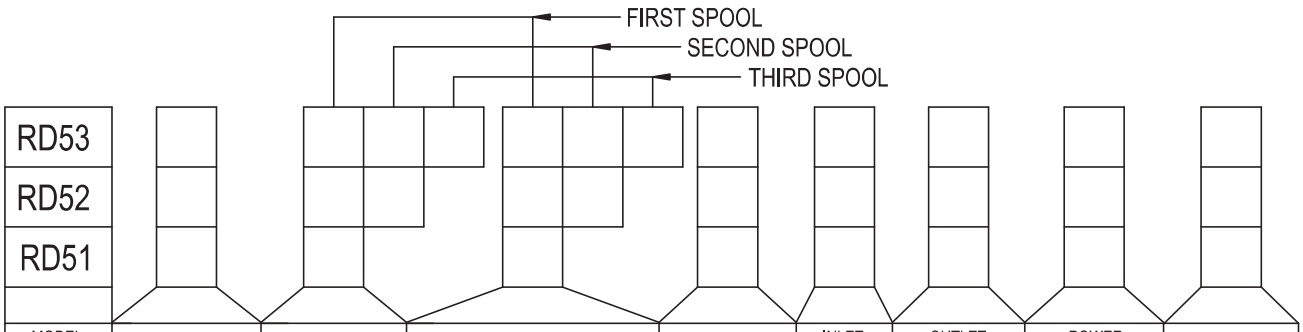
RD5000 ORDER CODE

SPECIAL VALVES AVAILABLE:

RD5000 Mono-block Valves 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 9 #10 SAE In/Out #8 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 or 4 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 C Bottom	1 END (with Power Beyond Option A) 2 TOP 3 BOTTOM 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 4 Rotary Handle 7 Locking Handle RD5200 5*** Bent Joystick Handle 6*** Straight Joystick Handle Joystick can be installed on RD5300 on special order

**Spool option "G", spool attachment "F", and spool attachment "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.

SEE PAGE 6 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.

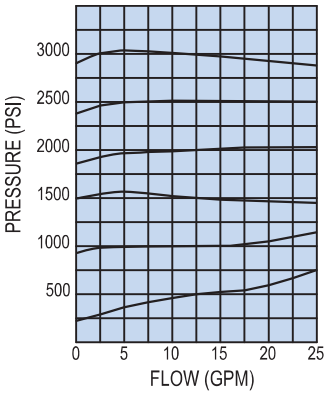
SPECIFICATIONS

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

RD5000 RELIEF VALVE 110 SUS OIL AT 115°F



RD5200 TWO SPOOL VALVE PRESSURE DROP VALUES

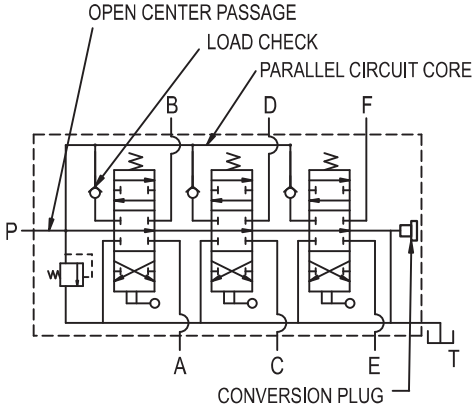
110 SUS OIL AT 115°F				
	Δ P-PSI			
FLOW (GPM)	INLET TO OUTLET	INLET TO WORK PORTS	A OR B TO OUTLET	C OR D TO OUTLET
5	3	11	2	2
10	8	22	8	5
15	16	38	15	11
20	28	57	27	19
25	44	83	43	29

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.

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



The above drawing shows a symbol for a Three-Spool Valve Model Number 532CCCAAA5A4B1

VALVES

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RD5000 ORDERING INFORMATION

STANDARD MODELS AVAILABLE: Unless otherwise noted, all models listed have end inlet and outlet locations, power beyond (closed center) conversion plug, and complete handle assemblies. Unless otherwise noted, all models listed have adjustable differential poppet relief; preset 2000 PSI @ 10 GPM. (1500-3000 PSI)

VALVE PART NUMBER:	notes	SPOOL OPTIONS: 1st SPOOL TANDEM	MOTOR	FLOAT	2nd TANDEM	3rd TANDEM	SPOOL ATTACHMENT OPTIONS: 1st SPOOL SPR CNTR	3POS DET	FRIC DET	FLOAT	PR REL DET	2nd SPR CNTR	3rd SPR CNTR	PORT SIZES: INLET OUTLET	WORK PORT
RD512CA5A4B1		X					X							3/4-NPTF	1/2-NPTF
RD512EA5A4B1			X				X							3/4-NPTF	1/2-NPTF
RD512GG5A4B1				X						X				3/4-NPTF	1/2-NPTF
RD513CA5A4B1		X					X							3/4-NPTF	3/4-NPTF
RD513CB5A4B1		X						X						3/4-NPTF	3/4-NPTF
RD513EB5A4B1			X					X						3/4-NPTF	3/4-NPTF
RD513EC5A4B1			X						X					3/4-NPTF	3/4-NPTF
RD515CA5A4B1		X					X							#12 SAE/ORB	#12 SAE/ORB
RD515EB5A4B1			X					X						#12 SAE/ORB	#12 SAE/ORB
RD515EC5A4B1			X						X					#12 SAE/ORB	#12 SAE/ORB
RD516CA5A4B1		X					X							#12 SAE/ORB	#10 SAE/ORB
RD516EB5A4B1			X					X						#12 SAE/ORB	#10 SAE/ORB
RD516GG5A4B1				X						X				#12 SAE/ORB	#10 SAE/ORB
RD522CCAA5A4B1		X			X		X					X		3/4-NPTF	1/2-NPTF
RD522CCEA5A4B1		X			X						X	X		3/4-NPTF	1/2-NPTF
RD522GCGA5A4B1				X	X					X		X		3/4-NPTF	1/2-NPTF
RD522GCGA5A4B6	a			X	X					X		X		3/4-NPTF	1/2-NPTF
RD523CCAA5A4B1		X			X		X					X		3/4-NPTF	3/4-NPTF
RD525CCAA5A4B1		X			X		X					X		#12 SAE/ORB	#12 SAE/ORB
RD526CCAA5A4B1		X			X		X					X		#12 SAE/ORB	#10 SAE/ORB
RD526GCGA5A4B1				X	X					X		X		#12 SAE/ORB	#10 SAE/ORB
532CCCAAA5A4B1		X			X	X	X					X	X	3/4-NPTF	1/2-NPTF
532GCCGAA5A4B1				X	X	X				X		X	X	3/4-NPTF	1/2-NPTF
536CCCAAA5A4B1		X			X	X	X					X	X	#12 SAE/ORB	#10 SAE/ORB
536CCCEAA5A4B1		X			X	X					X	X	X	#12 SAE/ORB	#10 SAE/ORB
RD523MMEE5A1A1	b	AUTO-CYCLE TWO SPOOL VALVE												3/4-NPTF	3/4-NPTF
RD523MMEE5A4B1		AUTO-CYCLE TWO SPOOL VALVE												3/4-NPTF	3/4-NPTF
RD525MMEE5A4B1		AUTO-CYCLE TWO SPOOL VALVE												#12 SAE/ORB	#12 SAE/ORB
RD525MMEE5A4F1	c	AUTO-CYCLE TWO SPOOL VALVE												#12 SAE/ORB	#12 SAE/ORB

[a] - RD522GCGA5A4B6 includes a joystick handle assy.

[b] - RD523MMEE5A1A1 is not convertible & does not have power beyond or closed center capability.

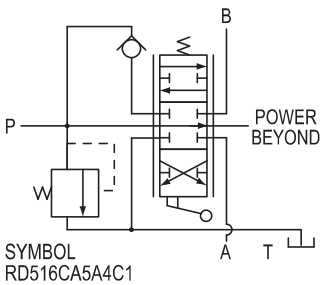
[c] - RD525MMEE5A4F1 has #12 SAE/ORB power beyond installed.

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

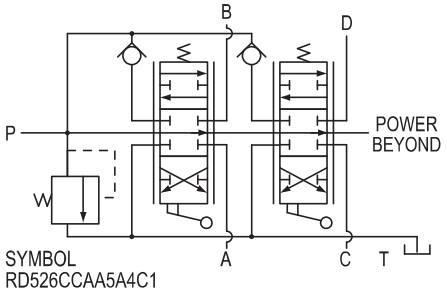
MATRIX CODE		
660150001	A	SPRING CENTER KIT
660150002	B	3 POSITION DETENT KIT
660150003	C	FRICTION DETENT KIT
660150018	N	1 POSITION DETENT SPOOL OUT W/ SPRING CENTER
660150020	P	2 POSITION DETENT W/SPRING CENTER KIT
660312003	B	CONVERSION PLUG
660312004	C	POWER BEYOND PLUG 3/4 NPTF
660312008	F	POWER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

MATRIX CODE		
660250006	1	NO RELIEF PLUG
660250003	4	LOW PRESSURE ADJUSTABLE RELIEF CARTRIDGE
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
660180215		RELIEF SHIM ASSORTMENT
660150084		ROTARY HANDLE 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	45° BENT JOYSTICK HANDLE PARTS
660150014	G	FLOAT HARDWARE KIT
660552002		AUTO CYCLE SEAL KIT
660150060	H	AIR SHIFT KIT



SYMBOL RD516CA5A4C1



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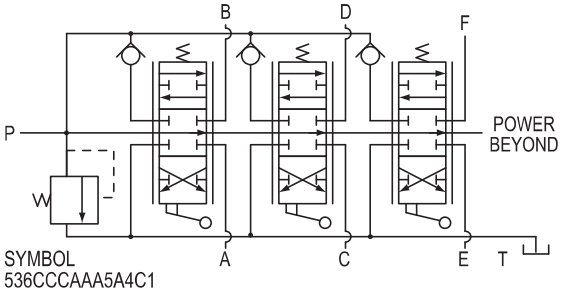

SYMBOL 536CCCAAA5A4C1

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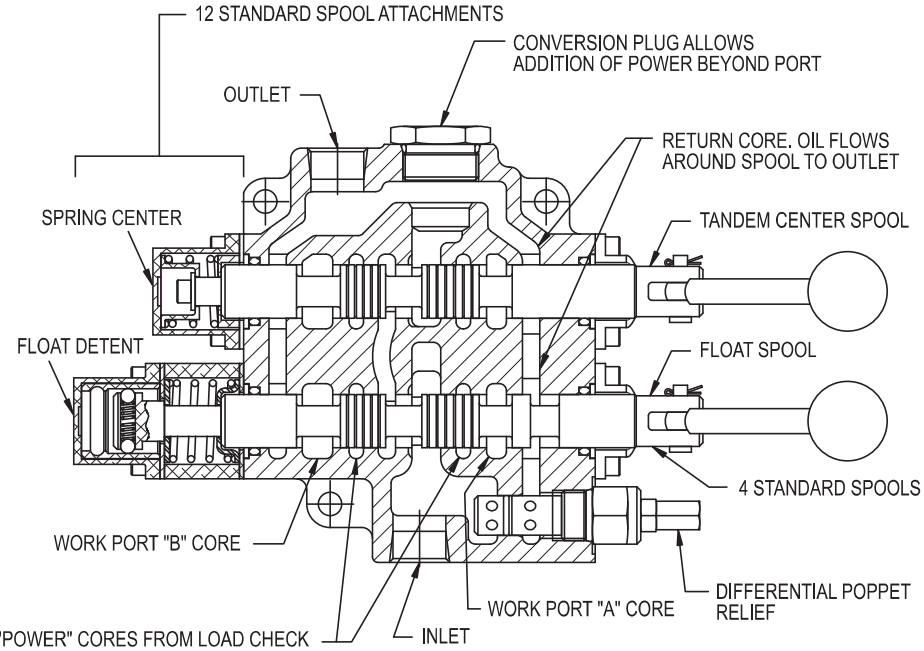
SEE PAGE 1 & 6 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

RD-5000 SERIES STANDARD AND SPECIAL FEATURE DESCRIPTIONS



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.

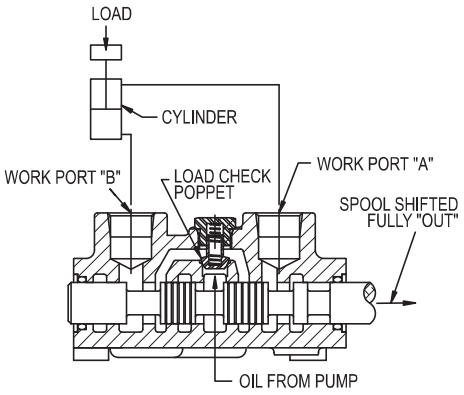
TWO SPOOL "JOYSTICK" HANDLE

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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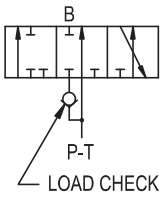
RD-5000 SERIES SPOOL OPTIONS

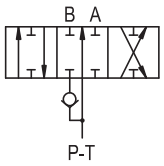
3 WAY 3 POSITION OPEN CENTER OPTION A

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.



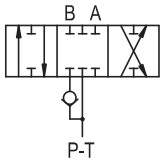
4 WAY 3 POSITION TANDEM CENTER OPTION C

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.**



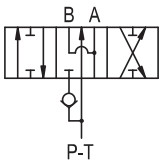
4 WAY 3 POSITION CLOSED CENTER

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).



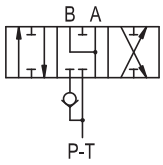
4 WAY 3 POSITION OPEN CENTER MOTOR SPOOL OPTION E

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.



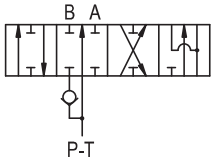
4 WAY 3 POSITION CLOSED CENTER MOTOR SPOOL

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.

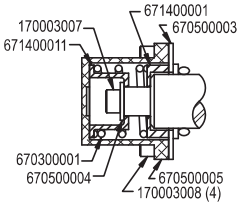


RD-5000 SERIES SPOOL ATTACHMENT OPTIONS

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.

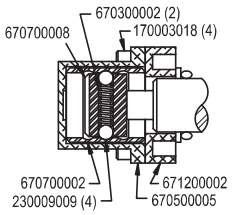
This option can be converted in the field to 3 position detent by ordering Kit 660150002. It can be converted to friction detent by ordering Kit 660150003.



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 affect operation.

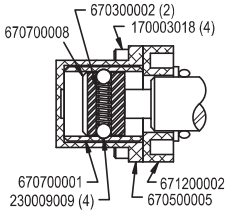
This option can be converted in the field to spring center by ordering Kit 660150001. It can be converted to friction detent by ordering Kit 660150003.



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.

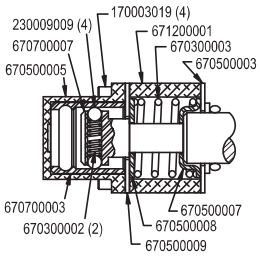
This option can be converted in the field to spring center by ordering Kit 660150001 and to 3 position detent by ordering Kit 660150002.



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".

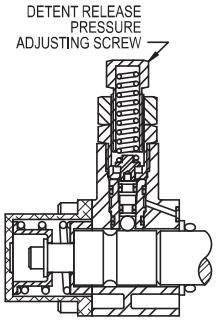
This option is available only with spool option 'G' and cannot be added to a valve in the field.



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.

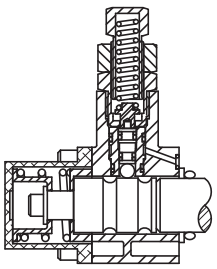
This option can not be added to a valve in the field due to special machining in the body.



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

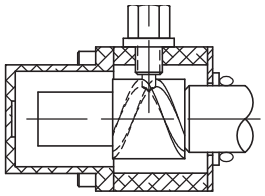
This option uses the same parts as option F above but is not pressure released. The handle must be manually removed from the detent position. The detent holding force is adjustable.

VALVES

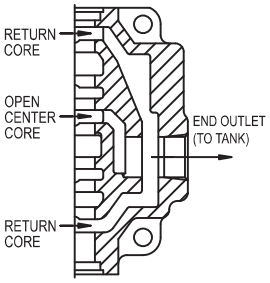
RD-5000 SERIES POWER BEYOND OPTIONS

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

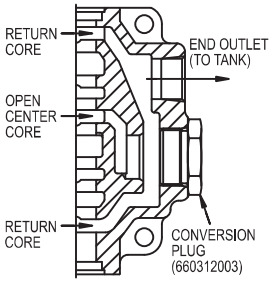


This option provides an outlet only with no provision for power beyond. This option can be used with any open center spools where there is no need for a power beyond port. The end outlet, shown at right, is considered standard but a top or bottom outlet can also be specified.

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

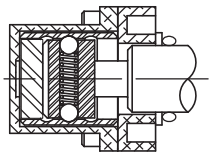


This option is similar in function to Option 'A' above except the conversion plug is installed in the power beyond location and the end outlet is relocated. This option should be used with the open center spool options and allows the valve to be converted to have power beyond function or be converted 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.

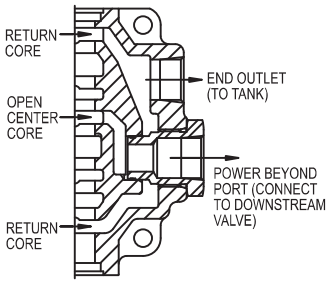
To convert a valve in the field to have power beyond, remove the conversion plug and replace it with one of the power beyond plugs listed. To convert valve to closed center, replace conversion plug with closed center plug 660312005.

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



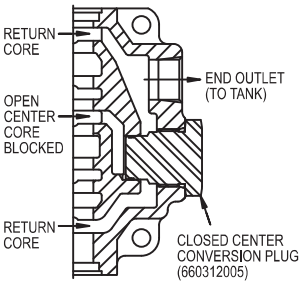
OPTION C Plug No. 660312004
OPTION F Plug No. 660312008

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.

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.

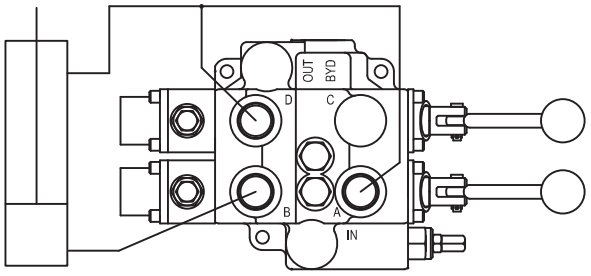
Note: If the closed center plug is installed in a valve that has a relief it may be necessary to install the no relief plug or adjust the relief pressure above the compensator setting.

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 RD525MMEE5A4B1



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. Maximum detent pressure setting is 2000 PSI.

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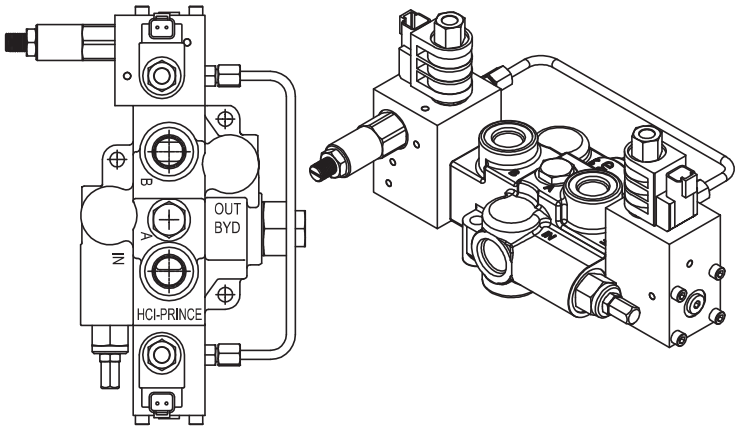
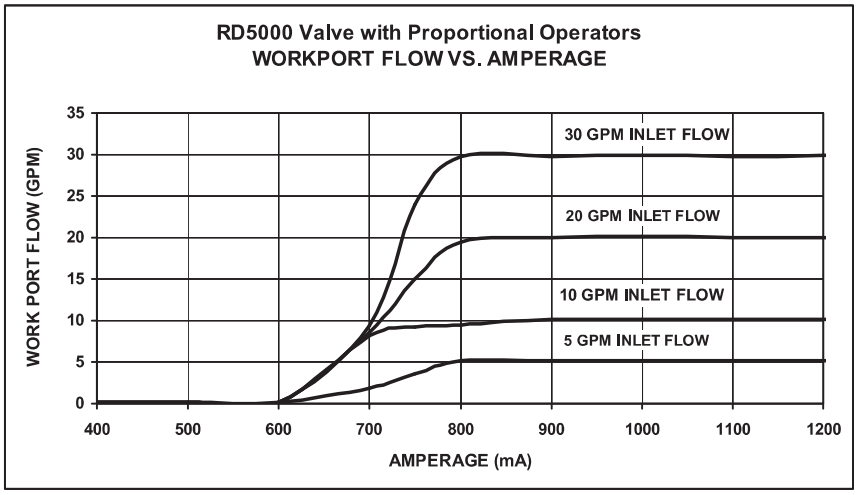
RD5000 SERIES VALVE WITH PROPORTIONAL OPERATORS



The RD5000 valve is available with proportional solenoid operators. The valve will allow controlled starts and stops of the work port flow as well as control of the work port flow rate over a limited metered range. Pilot pressure to initiate spool shift is provided internally by means of a pressure build-up cartridge in the power beyond port. Once the spool shift is initiated, load induced pressure is required to regulate the spool position and flow. By increasing the current through one of the solenoids, increasing pressure is applied to a spool end, causing the spool to shift against spring bias. Full spool shift is at approximately 1200 mA - 12 VDC (600 mA - 24 VDC).

The RD5000 proportional operators are typically controlled with a thumb or handle control and a PWM control module. Prince offers a small thumb control joystick (671300076) and a larger handle control joystick (671300077). A PWM control module (671300107) that can be used in conjunction with these joysticks is also offered by Prince. See page V52 for details.



RD51 — ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ — ☐

MODEL NUMBER	PORT SIZE	SPOOL TYPE	SPOOL ATTACHMENTS	RELIEF VALVE	INLET LOCATION	OUTLET LOCATION	POWER BEYOND	PROPORTIONAL SOLENOID COIL
RD51 Single Spool	6 #12 SAE In/Out #10 SAE Work	C 4 Way, 3 Position Tandem Center	A 3 Position, Spring Center to Neutral	1 No Relief 5 * Differential Poppet Adjustable 1500-3000 PSI Set at 2000 PSI	A End	4 End	H Open Center Pressure Build-up D ** Closed Center Conversion Plug Installed	DP12Q 12VDC Dual Spades DP12L 12VDC Dual Lead Wires DP12H 12DVC DIN-43650 DP12D 12VDC Integral Deutsch DP24Q 24VDC Dual Spades DP24L 24VDC Dual Lead Wires DP24H 24VDC DIN-43650 DP24D 24VDC Integral Deutsch DP11H 110VAC DIN-43650

* For other non-standard relief settings, please specify:

* RD516CA5A4H–DP12H–25

The last two digits are relief pressure in hundreds (example: 25=2500 PSI). All relief settings are at 10 gpm & 105°F.

** Often used with no relief. Review application

Additional options as well as two and three spool versions are available.

Please contact sales at Prince Manufacturing Corp. for additional information.

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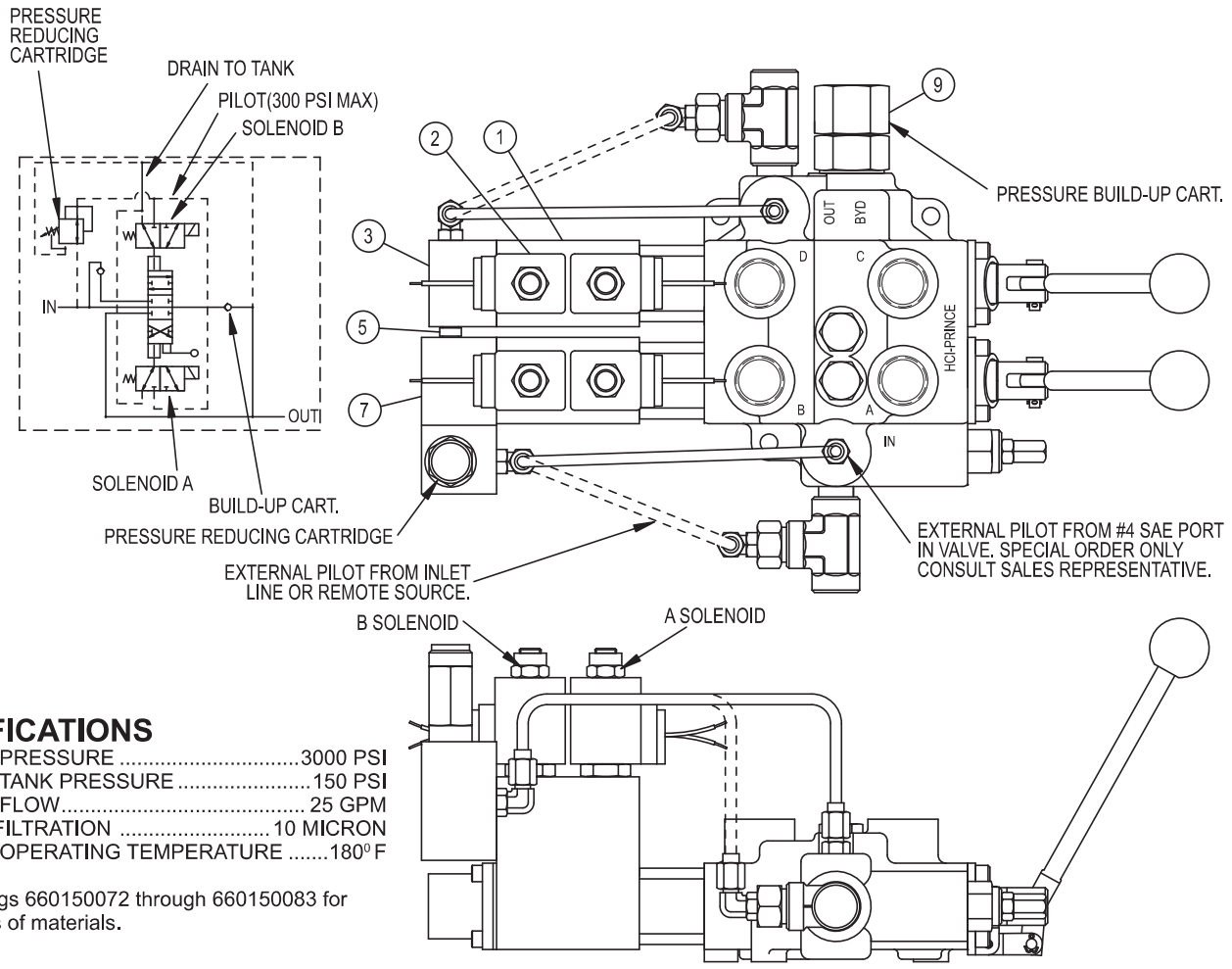
SOLENOID OPERATED RD5000 DIRECTIONAL CONTROL VALVE



SPECIFICATIONS

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

See drawings 660150072 through 660150083 for sample bills of materials.

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. Pressure release detent or float spool options cannot be converted to solenoid operated valves.

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	671302220
12 VDC DOUBLE SPADE COIL	671302226
12 VDC DIN 43650 COIL	671302221
24 VDC LEAD WIRE COIL	671302223
24 VDC DOUBLE SPADE COIL	671302227
24 VDC DIN 43650 COIL	671302224
12 VDC DEUTSCH COIL	671302222
24 VDC DEUTSCH COIL	671302225
120 VAC LEAD WIRES COIL	671302228

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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MODEL RD4100 SINGLE SPOOL MONO-BLOCK VALVE

RD4100 SPECIFICATIONS

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.....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 11 Enclosed Handle

***RD412BA5A1A1-25**
T

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.

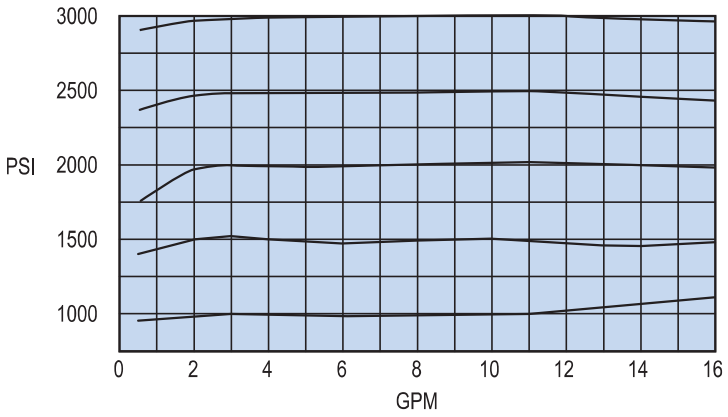
VALVE PART NUMBER	SPOOL TYPE			SPOOL ACTION			IN/OUT PORT SIZE	WORK PORT SIZE	RELIEF SETTING	CONVERTIBLE FROM OPEN CENTER TO CLOSED CENTER
	4 WAY 3 POSITION	4 WAY 3 POSITION MOTOR	4 WAY 4 POSITION FLOAT	SPRING CENTER TO NEUTRAL	3 POSITION DETENT	FLOAT DETENT				
RD412BA5A1A1	X			X			#10 SAE	#8 SAE	2000 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

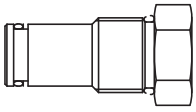
RD-4100 KITS, RELIEF CURVE, & PRESSURE DROP

RD-4100 SINGLE SPOOL PRESSURE DROP

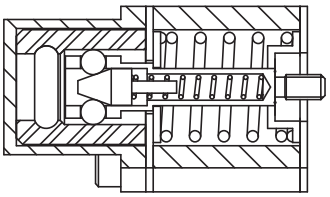
110 SUS OIL AT 115°F			
	Δ P-PSI		
FLOW (GPM)	INLET TO OUTLET	INLET TO A OR B	A OR B TO OUTLET
5	3	10	3
10	11	42	12
15	26	85	32

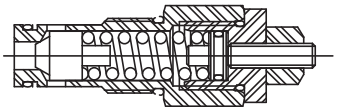
RD-4100 RELIEF VALVE CURVES

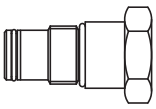


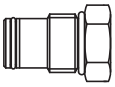

NO RELIEF PLUG


OPEN CENTER CONVERSION PLUG

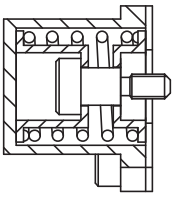

SPRING CENTER FLOAT DETENT

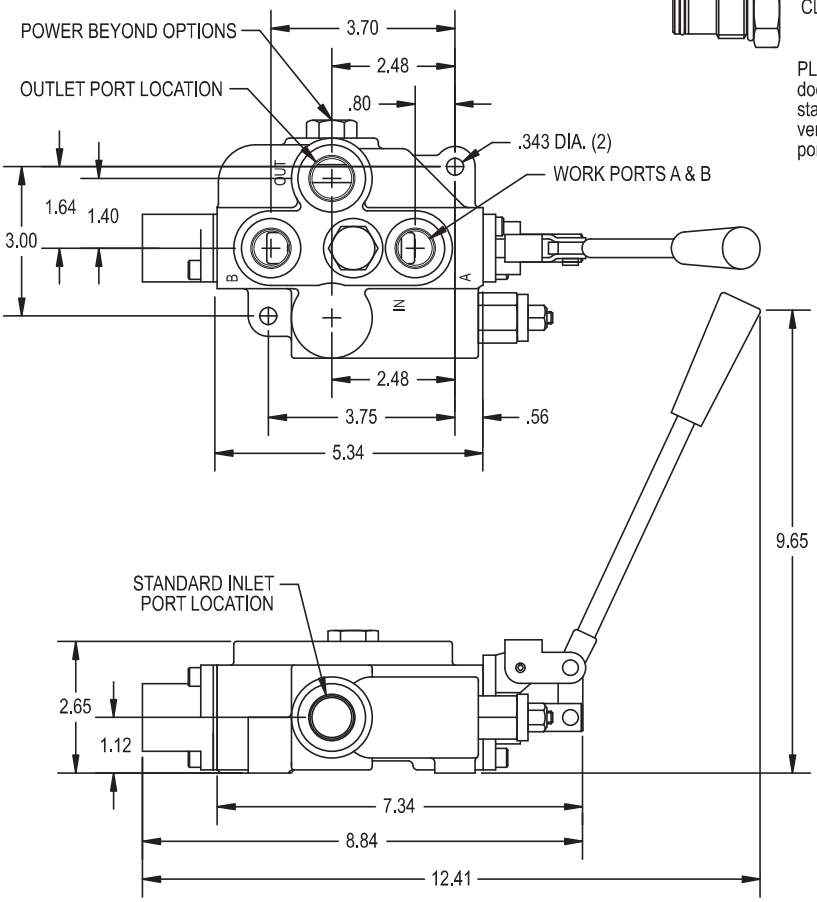

HIGH PRESSURE RELIEF CART.

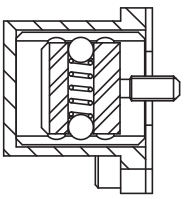

POWER BEYOND CART. (#8 SAE)


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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SEE PAGE 1 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

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

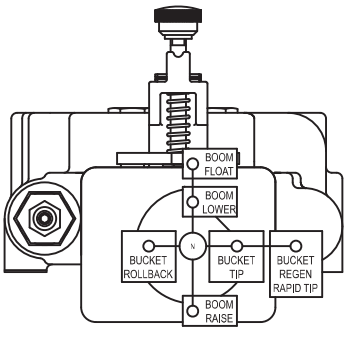
LVS SPECIFICATIONS

SERIES CIRCUIT (multifunction operation, simultaneous operation of both boom and bucket)
MAXIMUM OPERATING PRESSURE ..... 3000 PSI
MAXIMUM TANK PRESSURE ..... 500 PSI
MAXIMUM OPERATING TEMPERATURE ..... 180°F
RECOMMENDED SYSTEM FILTRATION .....ISO 4406 19/17/14
FLOW RATING ..... 11 GPM
WEIGHT 18.5lbs

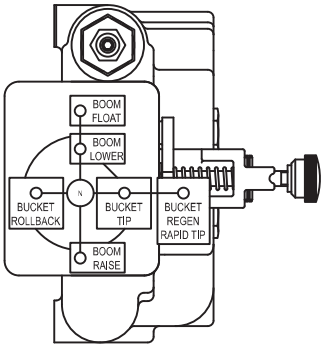
STANDARD FEATURES

- 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	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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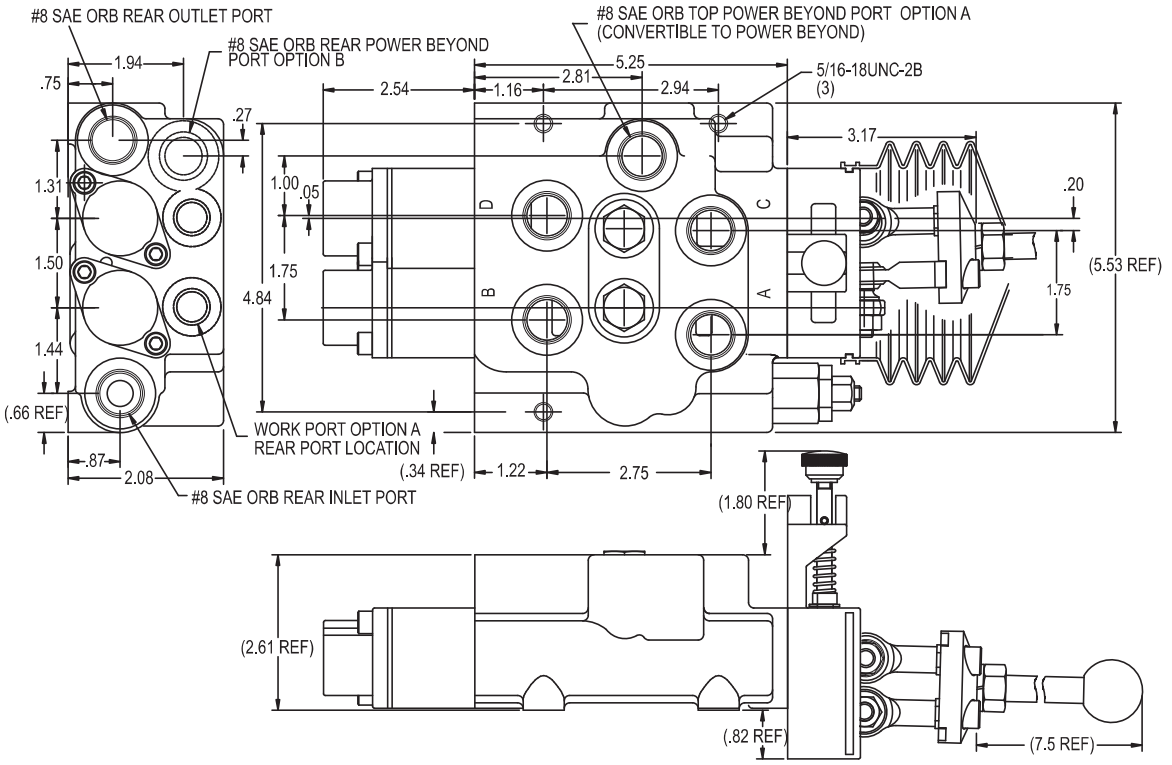
LVS SERIES LOADER VALVE DIMENSIONAL DATA



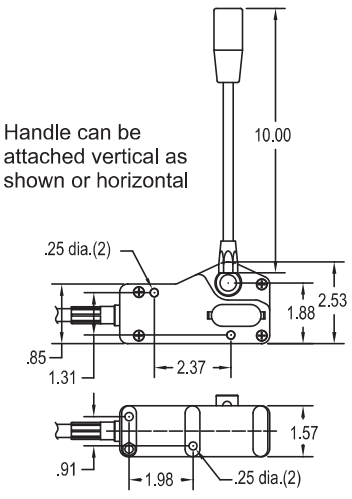
REMOTE CABLE CONTROLS FOR PRINCE VALVES

REMOTE CABLE CONTROL

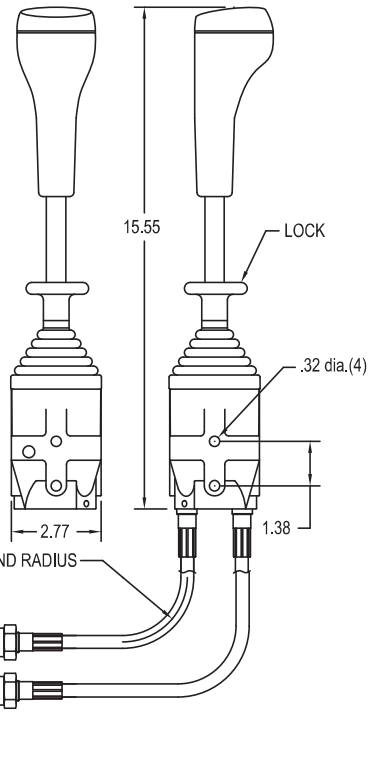
Heavy duty remote cable controls are available for most Prince directional control valves. The compact controller bodies are of die-cast metal construction and are available in either dual axis or single axis configurations. Dual axis joysticks are constructed with steel swivels and anti-wear bushings. 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. The connection kit works for all spool options by adjusting the locking nut.

* 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.

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 Beyond 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

FLOW (GPM)	110 SUS OIL AT 115°F Δ P-PSI INLET TO OUTLET	INLET TO WORK PORTS	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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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)

VALVES

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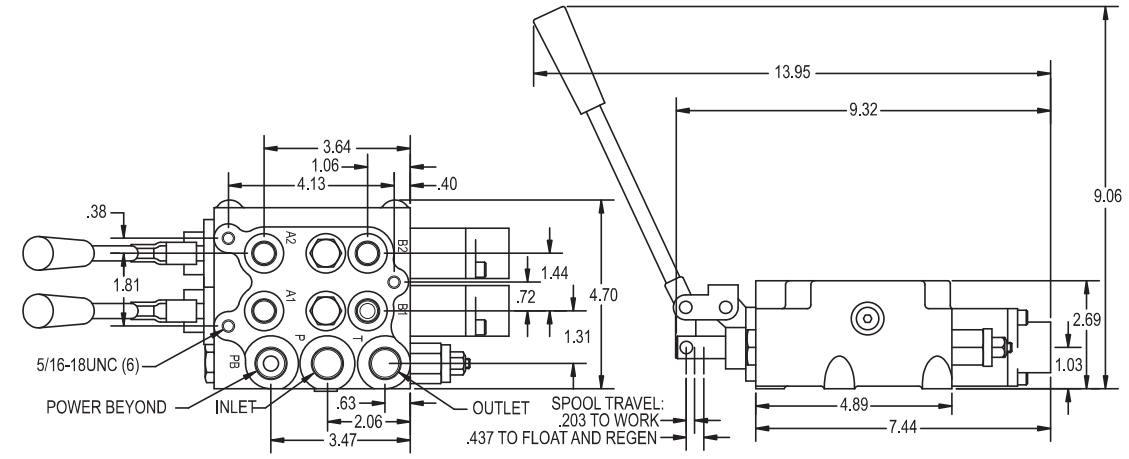
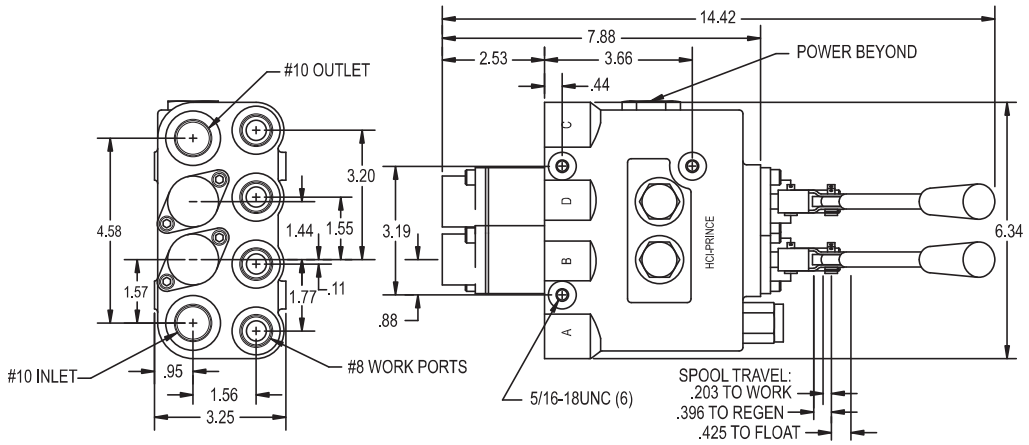
MODEL LVT/LVR MOUNTING DIMENSIONS AND OPERATIONS



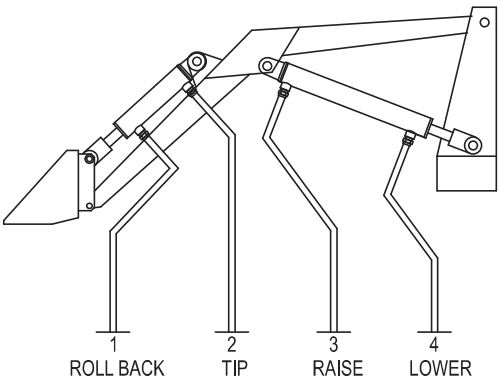


4 WAY 4 POSITION REGEN SPOOL OPERATION

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.

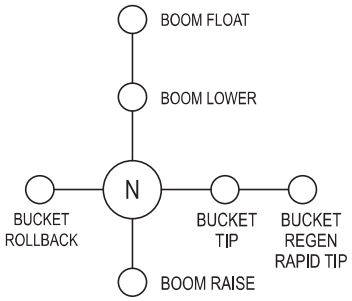
4 WAY 4 POSITION FLOAT SPOOL OPERATION

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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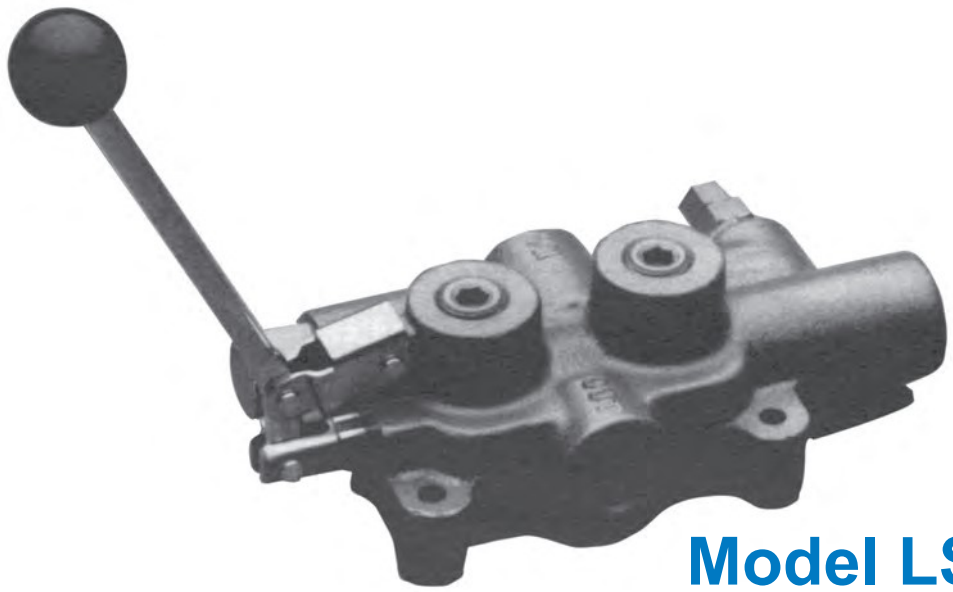
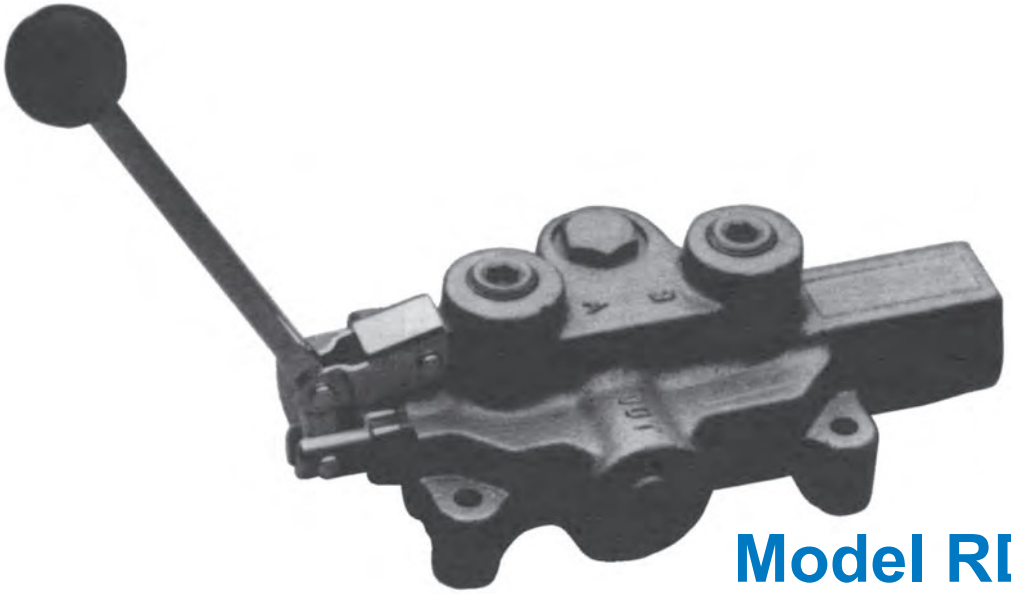
Directional Control Valves

LOG SPLITTER CONTROL VALVE



Model LS3000

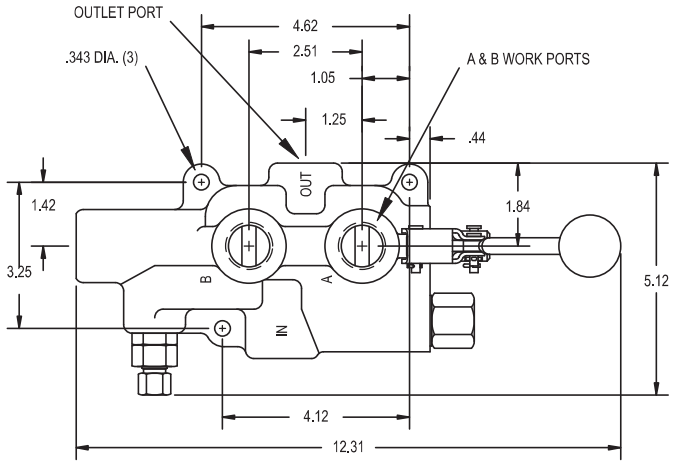
SINGLE SPOOL MONO-BLOCK 20GPM



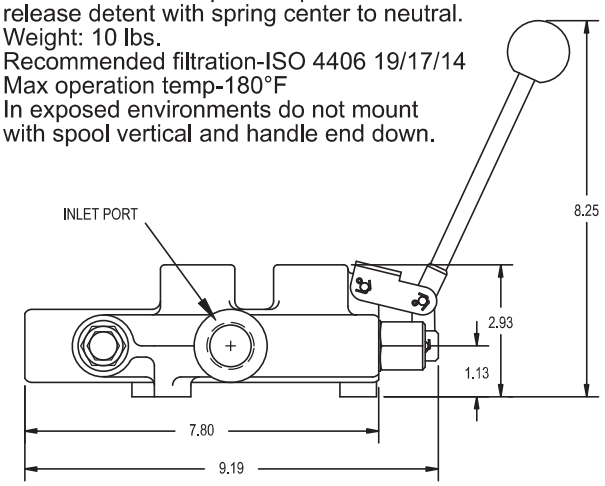
Model RD2500

MODEL LS3000 DIMENSIONAL DATA

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

LS-3000 HARDWARE AND SEAL KITS

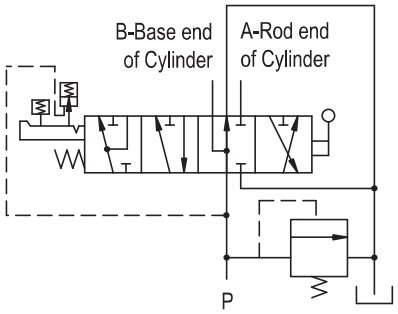
PART NO.	DESCRIPTION
660130001	HANDLE KIT
660125004	RELIEF KIT
660130004	SPRING CENTER CONVERSION KIT
660130003	3 POSITION DETENT KIT
660330003	DETENT SLEEVE & PISON SUB-ASSY
660330002	DETENT ADJUSTING CARTRIDGE
660130007	COMPLETE PRESSURE RELEASE DETENT KIT
660530001	SEAL KIT (CONTAINS SEALS FOR SPOOL AND DETENT)
200013903	VINYL SPOOL END CAP

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 from 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
10. In center position, B port connected to tank.



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SEE PAGE 1 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

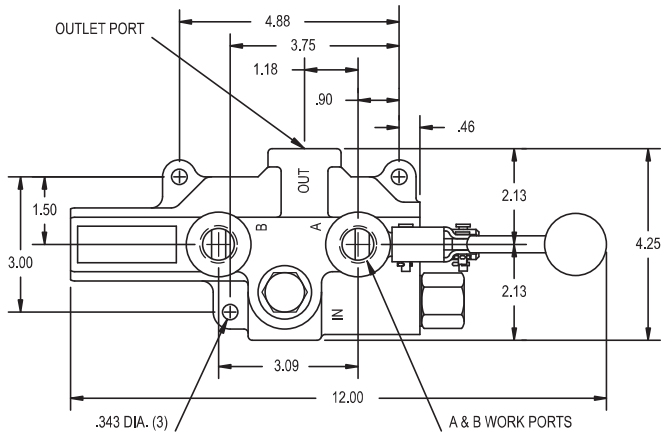
MODEL RD2500 DIMENSIONAL DATA

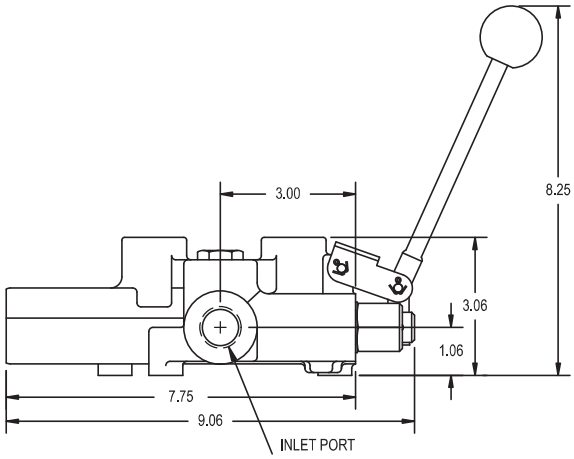
STANDARD FEATURES

- 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

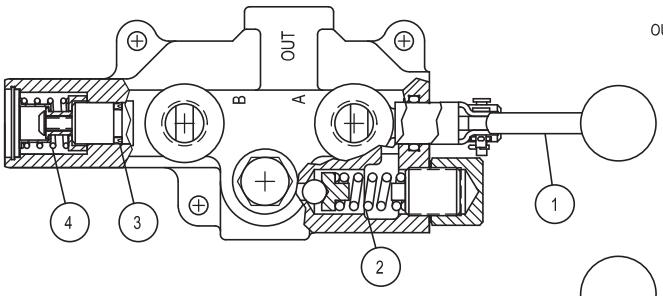
SPECIFICATIONS:

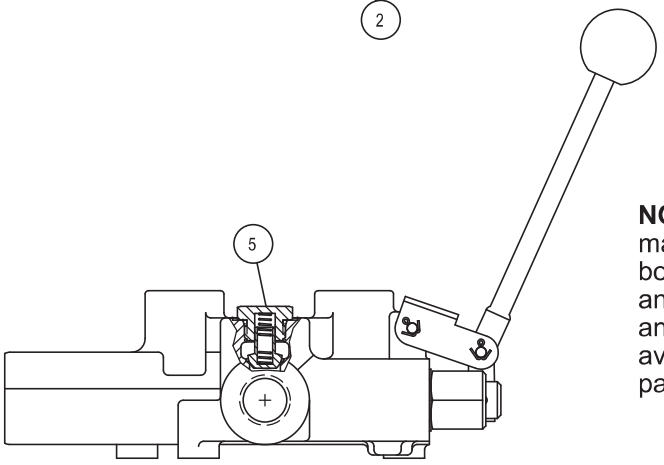
1. Max design and test pressure 3000 PSI
2. Max tank port pressure-150 PSI
3. Flow rating-20 GPM max.
4. Relief valve setting-1500 PSI
5. Weight: 9.5 lbs.
6. Recommended filtration-ISO 4406 19/17/14
7. Max operation temp-180°F
8. In exposed environments, do not mount with spool vertical and handle end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

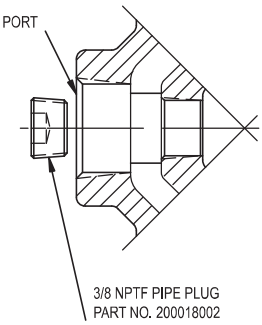




RD-2575-T4-ESA 1 PARTS BREAKDOWN

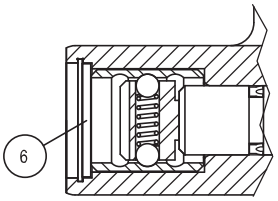






OPEN TO CLOSED CENTER CONVERSION This feature allows an otherwise open center valve to be converted to closed center operation. As shown, a 3/8 NPTF pipe plug is installed in the bottom of the outlet port to block open center passage. A pipe thread sealant should be used. This feature is standard on all RD-2500 valves except for the 1/2 NPTF inlet and outlet port option. 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 matched 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.

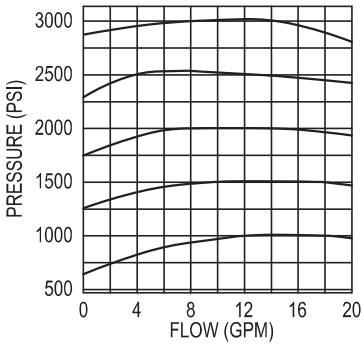
ITEM	PART NUMBER	DESCRIPTION
1	660130001	HANDLE KIT
2	660125004	RELIEF KIT
3	660525001	SEAL KIT
4	660125002	SPRING CENTER KIT
5	660150015	LOAD CHECK KIT
6	660125001	3 POSITION DETENT KIT

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

PRESSURE DROP

FLOW (GPM)	110 SUS OIL AT 115° Δ P-PSI					
	RD-2500			LS-3000		
	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



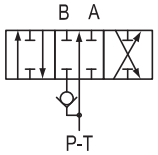
STANDARD VALVES AVAILABLE

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 Previous 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	YES
RD-2575-M4-EDA1		X			X		3/4 NPTF	1/2 NPTF	1500 PSI @ 12 GPM	YES
LS-3000-1 (detent spool out)	X					X	3/4 NPTF	1/2 NPTF	2250 PSI @ 3 GPM	NO
LS-3000-9 (detent spool out)	X					X	3/4 BSPP	3/4 BSPP	2250 PSI @ 3 GPM	NO
LS-3000-2 (detent spool out)	X					X	3/4 NPTF	3/4 NPTF	2250 PSI @ 3 GPM	NO
LS-3060-1 (detent spool in)	X					X	3/4 NPTF	1/2 NPTF	2250 PSI @ 3 GPM	NO
LS-3060-9 (detent spool in)	X					X	3/4 BSPP	3/4 BSPP	2250 PSI @ 3 GPM	NO
LS-3040-1	X				X		3/4 NPTF	1/2 NPTF	2250 PSI @ 12 GPM	NO
LSR-3060-3 (detent spool in)	4 WAY 4 POSITION W/ MANUAL RAPID EXTEND					X	1/2 NPTF	3/4 NPTF	2250 PSI @ 3 GPM	NO
LSR-3060-8 (detent spool in)	4 WAY 4 POSITION W/ MANUAL RAPID EXTEND					X	1/2 BSPP	3/4 BSPP	2250 PSI @ 3 GPM	NO

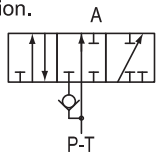
4 WAY SPOOL

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.



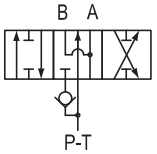
3 WAY SPOOL

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.

VALVES

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SEE PAGE 6 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

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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:

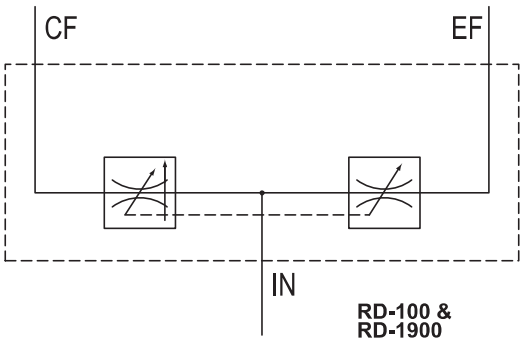
RDRS-150-16-20
Relief Pressure in Hundreds Example: 20=2000 PSI

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

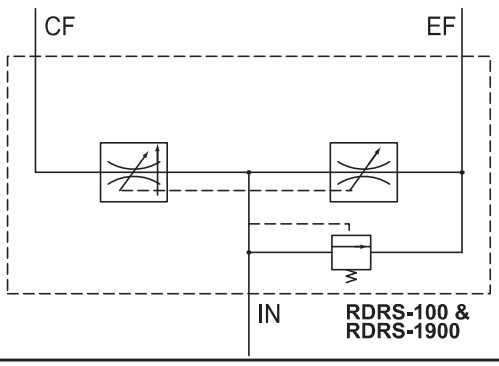
These models have built in relief set at 1500 psi @ 10 GPM.
Adjustment Range 1000 to 2500 psi

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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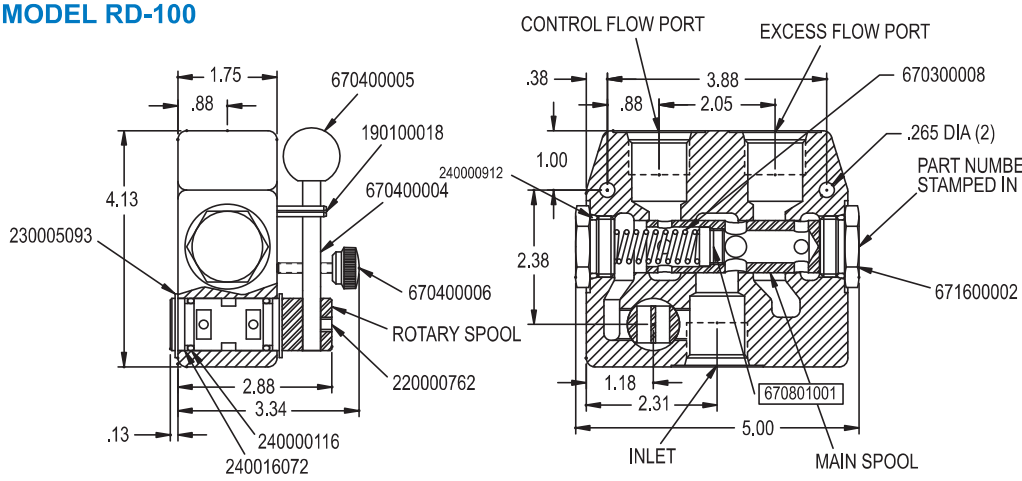
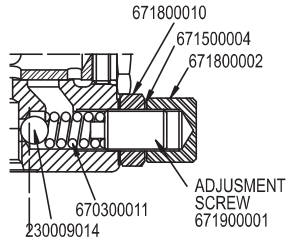
SEE PAGE 1 & 6 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

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

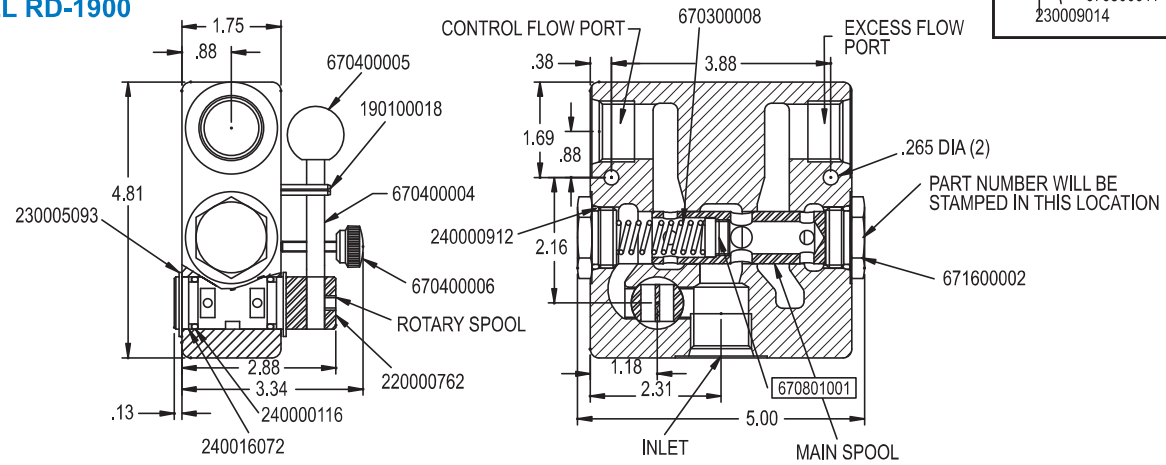
MODEL RD-100



RDRS MODEL RELIEF VALVE PARTS



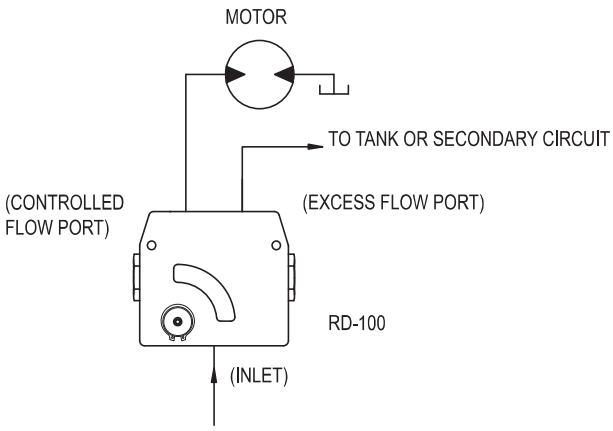
MODEL RD-1900



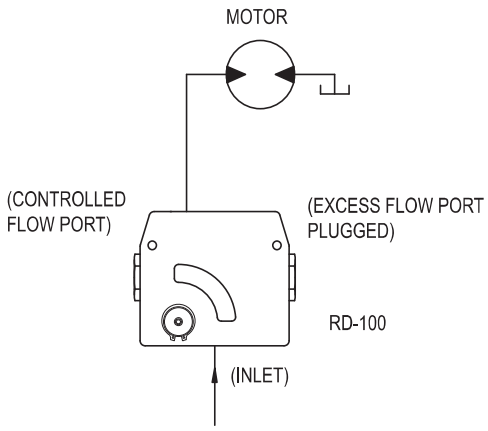
APPLICATIONS:

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 an 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-400-R 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. Relief Range is 500 to 2500psi.

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-400-R-____**	3/4 NPTF	3/8 NPTF	1.5
RD-405-____	**RD-405-R-____**	3/4 NPTF	1/2 NPTF	2
RD-412-____	**RD-412-R-____**	#12 SAE	#8 SAE	3
RD-450-____	**RD-450-R-____**	1/2 NPTF	3/8 NPTF	4
RD-455-____	**RD-455-R-____**	1/2 NPTF	1/2 NPTF	5
RD-477-____	**RD-477-R-____**	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-405-R-**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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CATV 78-11-23-01

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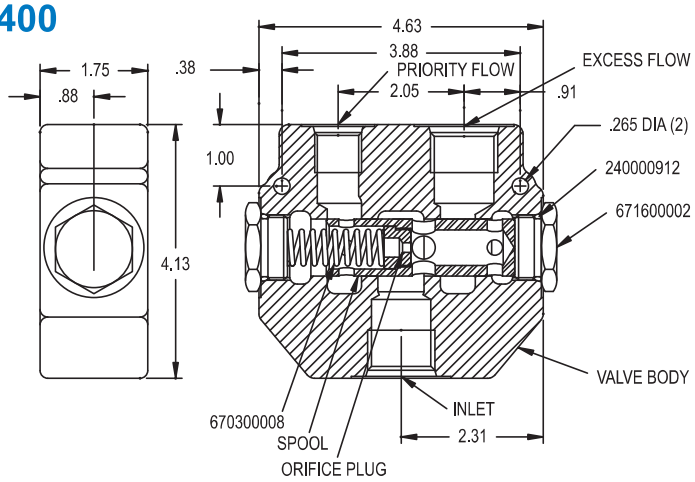
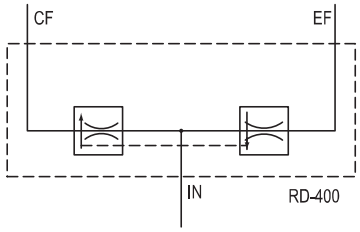
MODEL RD-400, RD-400R AND RD-500
PARTS BREAKDOWN AND DIMENSIONS

RD-400

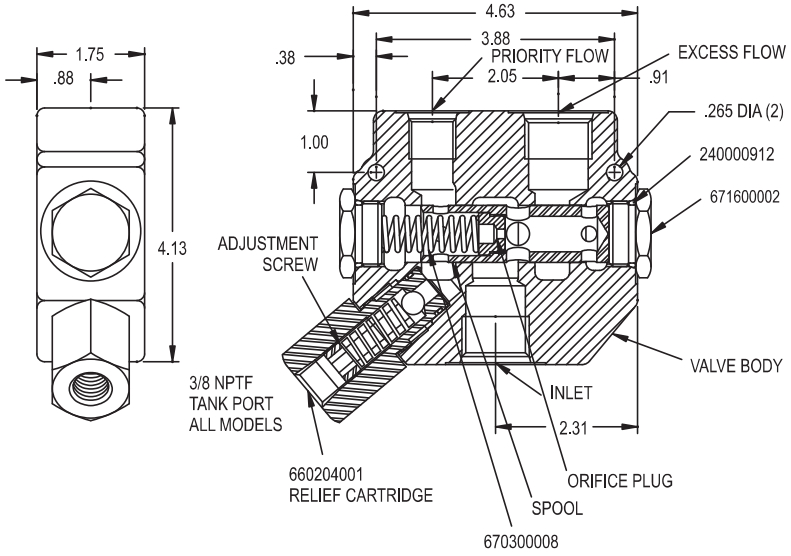


SYMBOL

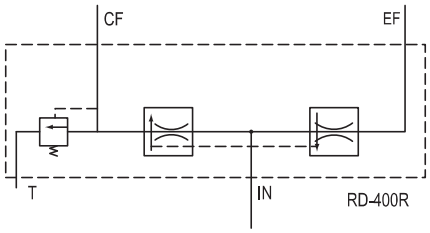


SEAL KIT NO. 660504001

RD-400R

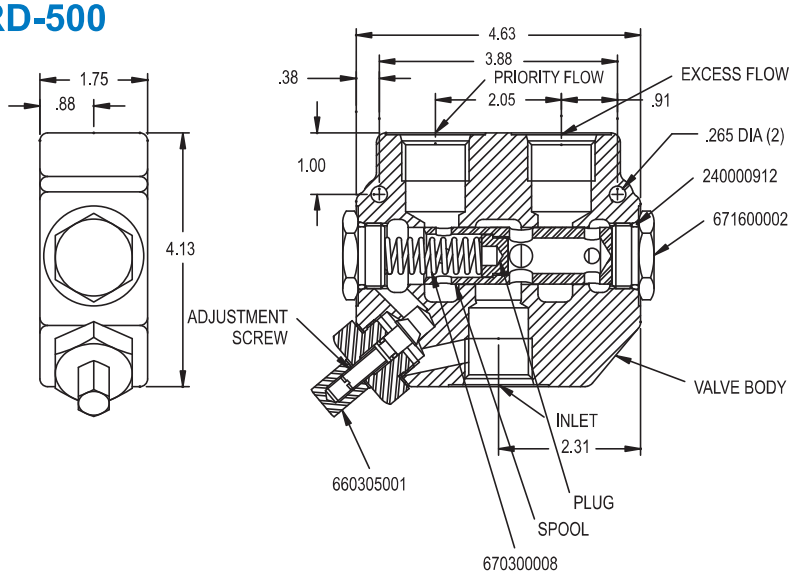


SYMBOL

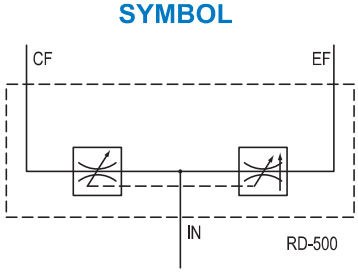


SEAL KIT NO. 660504002

RD-500



SYMBOL



SEAL KIT NO. 660505001

NOTE: spools are not available separately

VALVES

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.

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	8-16 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.

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-1000-S
INTERNALLY PILOTED SEQUENCE VALVE WITH EXTERNAL DRAIN

The PRINCE valve model RD-1000-S 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.

MODELS AVAILABLE

MODEL NUMBER	PORT SIZE INLET AND SEQUENCE	DRAIN PORT
RD-1050-S___	1/2 NPTF	3/8 NPTF
RD-1075-S___	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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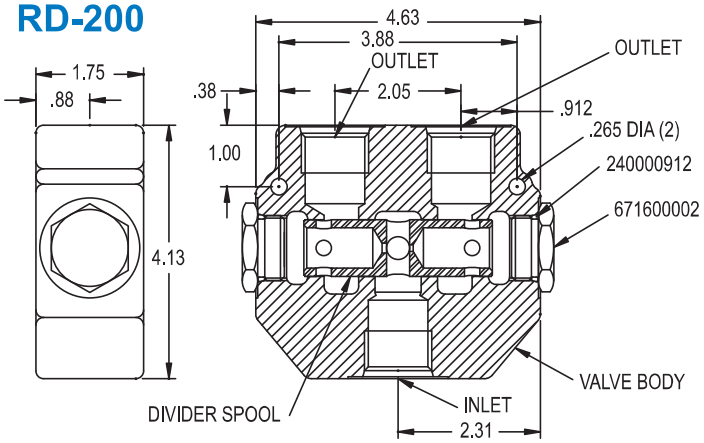
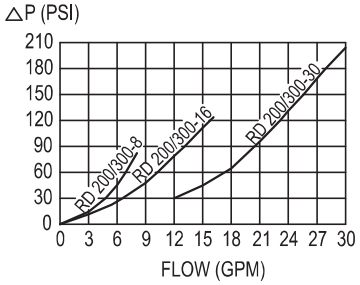
MODEL RD-200, RD-300, RD-300AB, RD-500P, AND RD-1000S PARTS BREAKDOWN AND DIMENSIONS

RD-200





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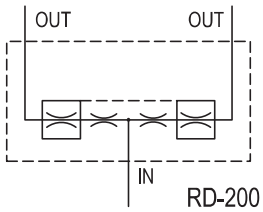
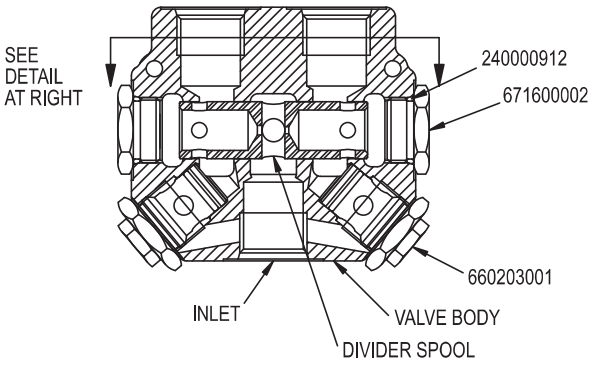
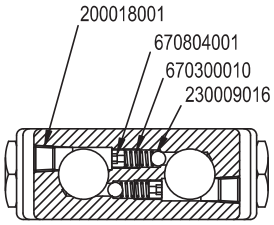


SEAL KIT NO. 660502001

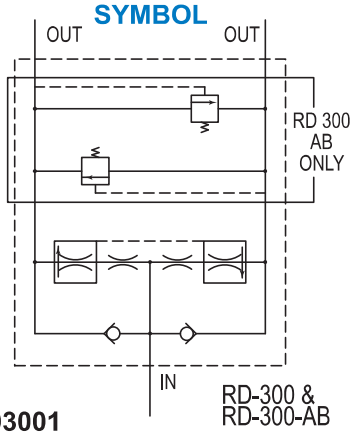
RD-300





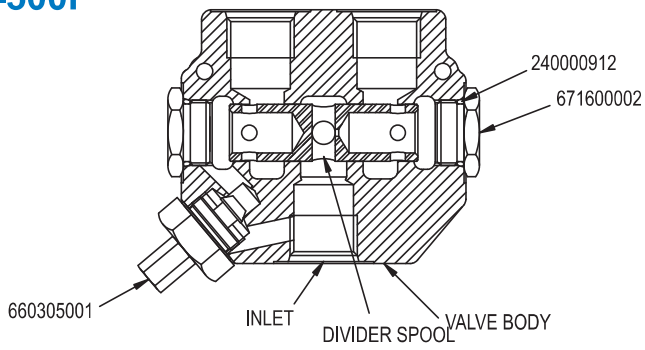
The RD-300AB valve has a built-in automatic bypass. This allows oil to crossover from one outlet to the other when the pressure difference between the two outlet reaches 750 PSI.

SYMBOL



SEAL KIT NO. 660503001

RD-500P



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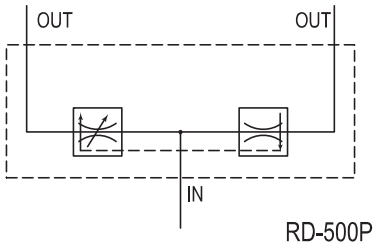
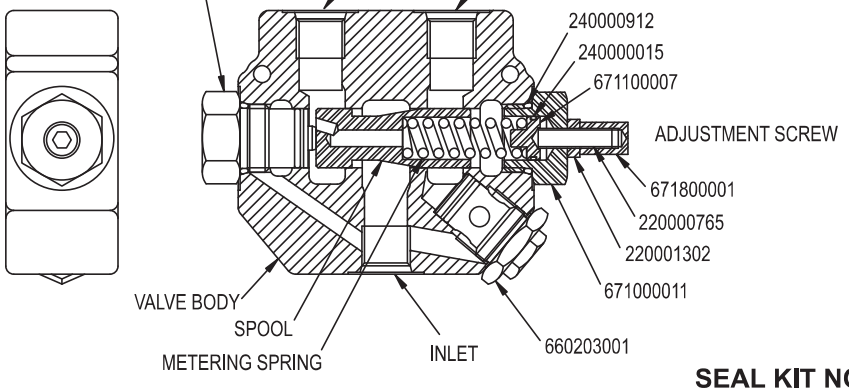
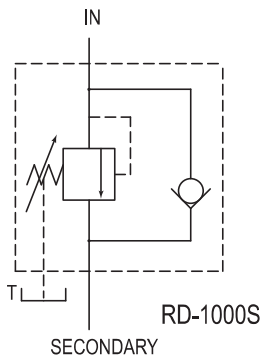


SEAL KIT NO. 660505001

RD-1000S



SYMBOL



SEAL KIT NO. 660510001

VALVES

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 as reversible hydraulic motor, or 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 6 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

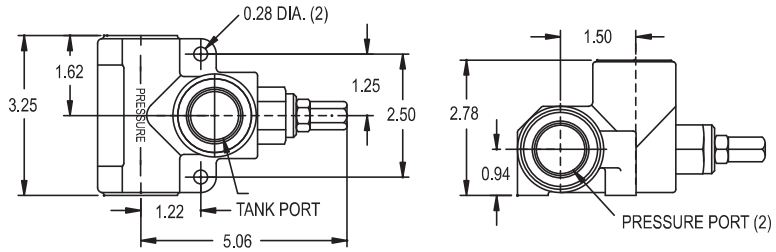
SPECIAL MODEL DRV RELIEF VALVES

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.

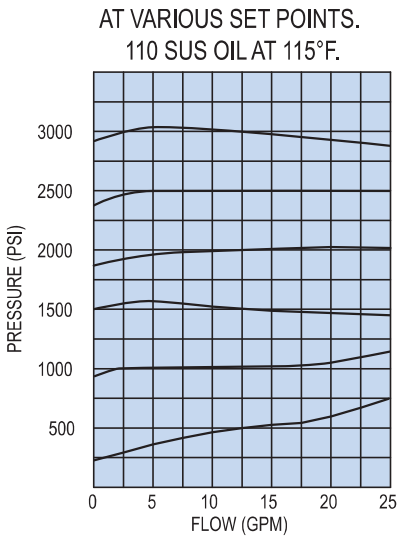
DRV — ____ ____ ____ — XX — XX

MODEL NUMBER	PORT SIZE	RELIEF TYPE Port A/B #1	RELIEF TYPE Port C/D #2	RELIEF SETTINGS (PSI) Port A/B	RELIEF SETTINGS (PSI) Port C/D
DRV	0 - Cartridge only. No Body. 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	

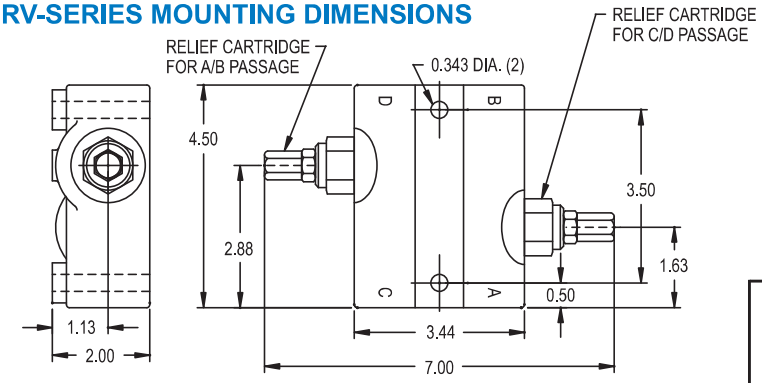
RV-SERIES MOUNTING DIMENSIONS



RV-SERIES RELIEF CURVES



DRV-SERIES MOUNTING DIMENSIONS

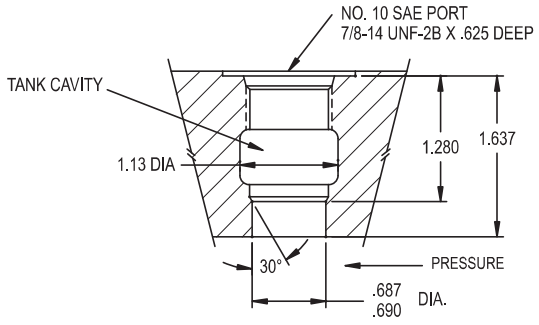


FIELD CONVERSION KITS:

660250002	ADJ. RELIEF CARTRIDGE 1500-3000 PSI RV ONLY
660250003	ADJ. RELIEF CARTRIDGE 500-1500 PSI RV ONLY
660250004	NON-ADJUSTABLE RELIEF CARTRIDGE 1500-3000 PSI RV ONLY
660250005	NON-ADJUSTABLE RELIEF CARTRIDGE 500-1500 PSI RV ONLY
660250011	ADJ. RELIEF CARTRIDGE 1500-3000 PSI DRV ONLY
660250012	NON-ADJUSTABLE RELIEF CARTRIDGE 1500-3000 DRV ONLY
660250015	Adj Relief Cartridge 500-1500 PSI DRV ONLY
660250016	Non-Adjustable Relief Cartridge 500-1500 PSI DRV ONLY
660590001	RV SEAL KIT
660590004	DRV SEAL KIT
670300005	1500-3000 PSI RELIEF SPRING
670300006	500-1500 PSI RELIEF SPRING

NOTE: The RV and DRV cartridges are not the same. To order a non-preset cartridge, use the 9-digit part number above. To order a Preset Cartridge, use the RV-0x-xx option above or the DRV-0x-xx option above.

MACHINING DIMENSIONS FOR RELIEF VALVE CARTRIDGE



VALVES

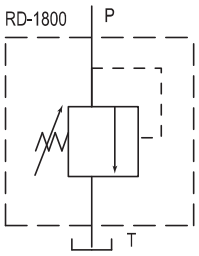
MODEL RD-1800 PRESSURE RELIEF
MODEL RD-900 SELECTOR VALVE

MODEL RD-1800
BALL/SPRING TYPE
DIRECT ACTING RELIEF

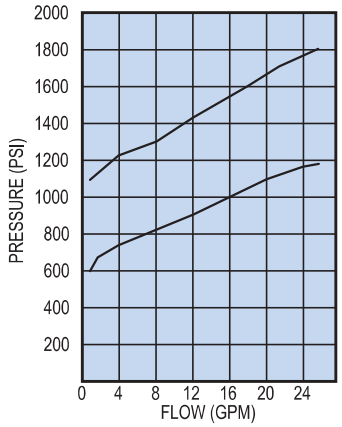
The PRINCE valve model RD-1800 is a direct acting ball/spring type pressure relief. The valve is compact and simple in design. This type relief is fast opening and is well suited for pressure spike protection. The performance curves below indicate the low cracking pressure typical to ball/spring reliefs. 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.

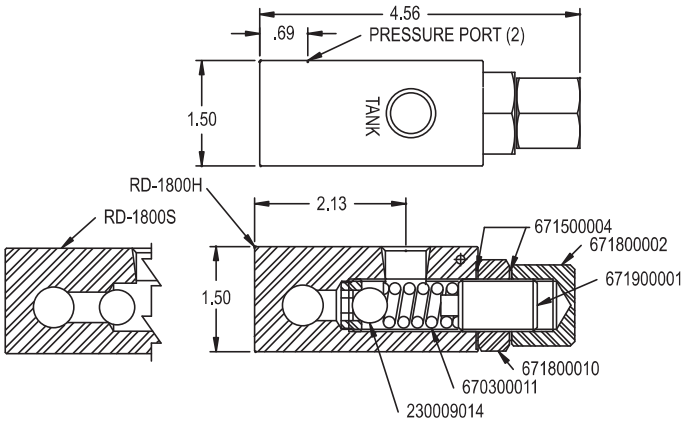
VALVE SPECIFICATIONS:
Capacity: 20 gpm max inlet flow
Pressure: 2500 psi max
Weight: 2 lb.
Adjustment Range: 1000 PSI to 2500 PSI

SYMBOL



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



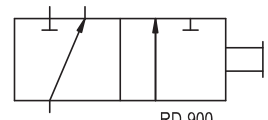


STANDARD MODELS AVAILABLE		
MODEL #	PORT SIZES	MAX FLOW
RD-1837-S	3/8 NPTF	8 GPM
RD-1850-H	1/2 NPTF	16 GPM
RD-1850-S	1/2 NPTF	16 GPM
RD-1875-S	3/4 NPTF	20 GPM

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

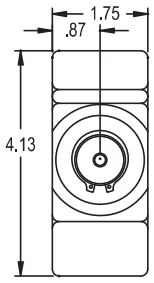
MODEL RD-900
SELECTOR VALVE

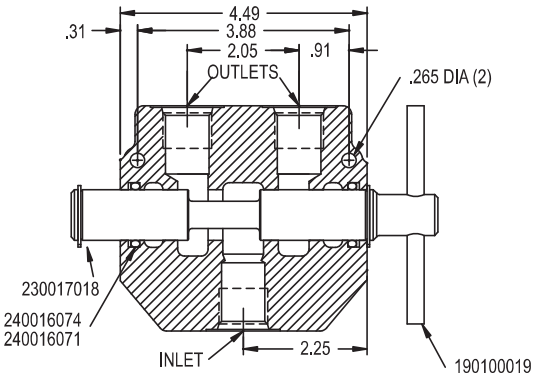
The PRINCE valve model RD-900 is a manual 3-way 2-position selector valve. This valve will allow one pump source to supply two separate circuits. Pushing the handle in diverts oil flow to port away from handle. Pulling the handle out diverts oil flow to port nearest handle.



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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SEE PAGE 6 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

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 blocks both outlets when spool is pulled out.

VALVE SPECIFICATIONS:

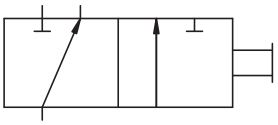
Capacity: 20 gpm max inlet flow
Pressure: 3000 psi*
Weight: 4 lbs.

*For use at 3000 psi, a lever handle (handle option E) is recommended.

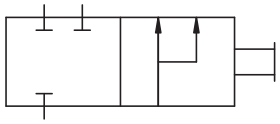
KITS:

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

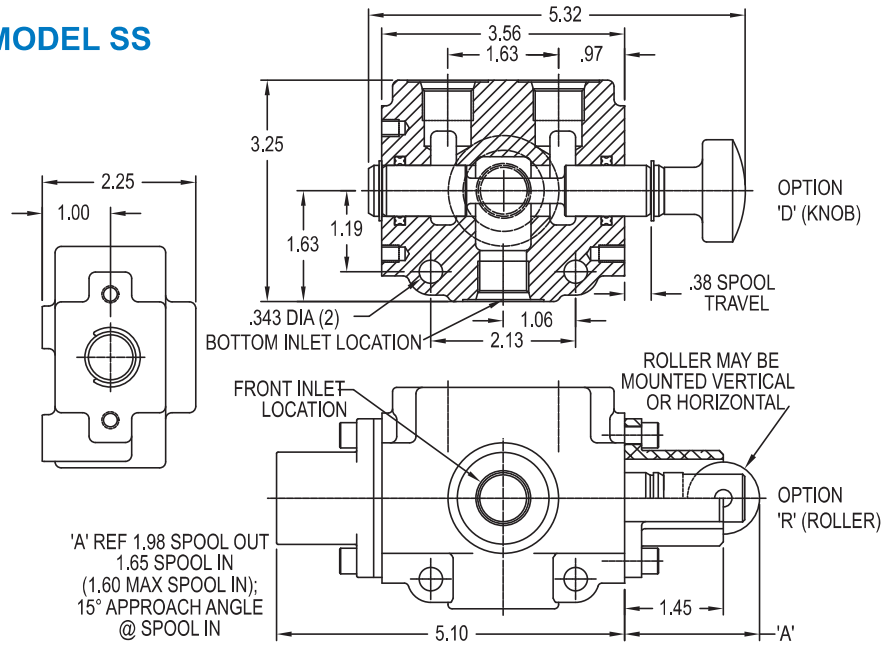
Other selector valves not listed as standard above are available in **OEM quantities**. To select a model number use the order code matrix at right. Consult a sales representative if options other than those listed are required.

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 4-HEAVY SPRING OFFSET, SPOOL OUT	A-NONE B-CLEVIS ONLY C-CLEVIS W/ PINS AND LINK D-KNOB (standard) E-LEVER HANDLE R-ROLLER (use w/attachment 4)

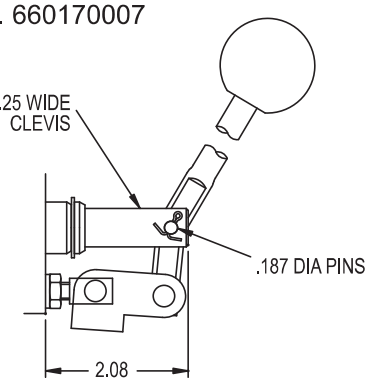
PARTS BREAKDOWN AND DIMENSIONS

MODEL SS



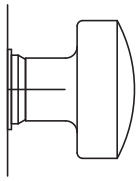
LEVER HANDLE OPTION E

KIT NO. 660170007



KNOB OPTION D

PART NO. 670400031



VALVES

SEE PAGE 6 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

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.

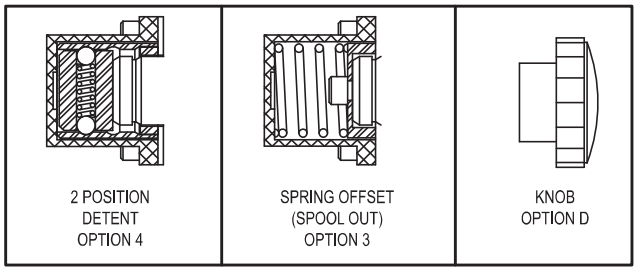
KITS:

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

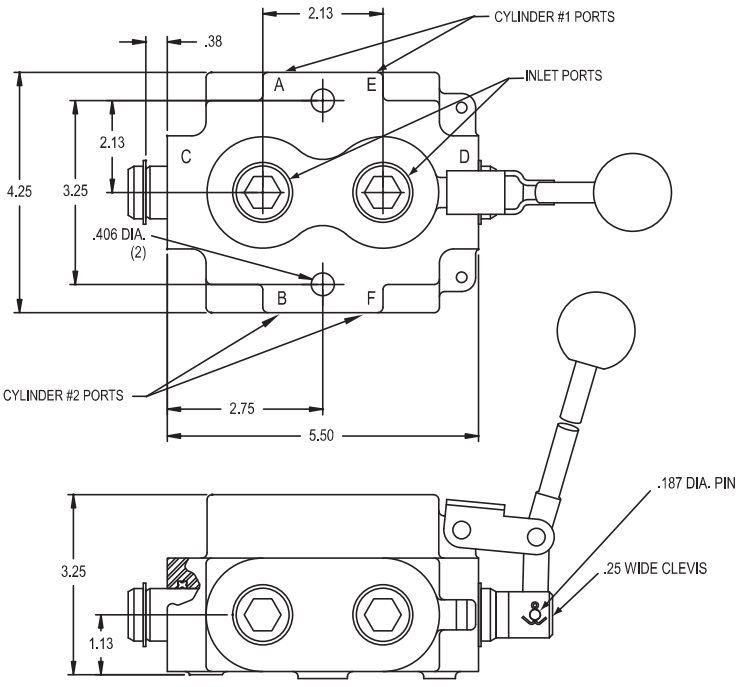
MODEL #	PORT SIZE	DESCRIPTION
DS-4A1E	3/4 NPTF	DOUBLE SELECTOR WITH LEVER HANDLE
DS-5A1E	#12 SAE	DOUBLE SELECTOR WITH LEVER HANDLE
DS-4A1D	3/4 NPTF	DOUBLE SELECTOR WITH KNOB HANDLE
DS-4A1A	3/4 NPTF	DOUBLE SELECTOR WITHOUT ATTACHMENTS
DS-1A1E	1/2 NPTF	DOUBLE SELECTOR WITH LEVER HANDLE

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.

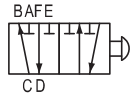


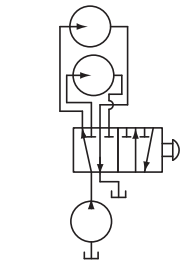
DS —

MODEL	PORT SIZE	SPOOL TYPE	SPOOL ATTACHMENTS	HANDLE
DS	1 - 1/2 NPTF 2 - #8 SAE 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 5 - HYDRAULIC ACTUATOR (REQUIRES HANDLE OPT. A)	A - NONE B - CLEVIS ONLY C - CLEVIS W/ PINS AND LINK D - KNOB E - LEVER HANDLE (standard)

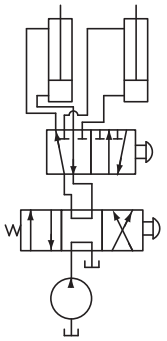


SYMBOL
SELECTOR SPOOL

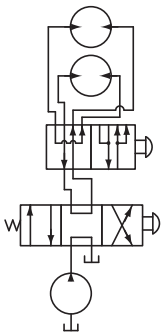




CIRCUIT SELECTOR



CIRCUIT SELECTOR



SERIES/PARALLEL

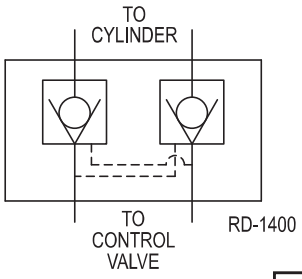
VALVES

PRINCE MANUFACTURING CORPORATION • NORTH SIOUX CITY, SOUTH DAKOTA 57049
URL: www.princehyd.com • E-MAIL: prince@princehyd.com • PHONE: (605) 235-1220

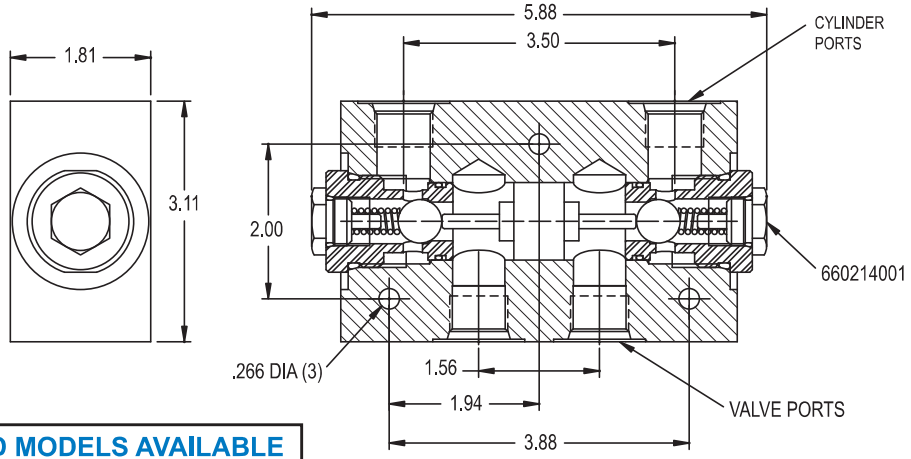
CATV 86-11-23-01

SEE PAGE 6 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

MODEL RD-1400
LOCK VALVE DOUBLE PILOT-OPERATED



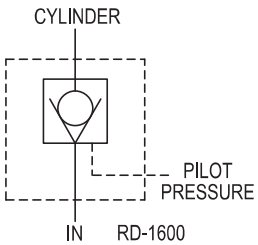
The PRINCE valve model RD-1400 is a double pilot-operated lock valve. This valve will lock a cylinder in place when a directional control valve is in the neutral position. In operation oil is directed to one of the valve ports and oil can free flow to the corresponding cylinder port. The pressure on 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.



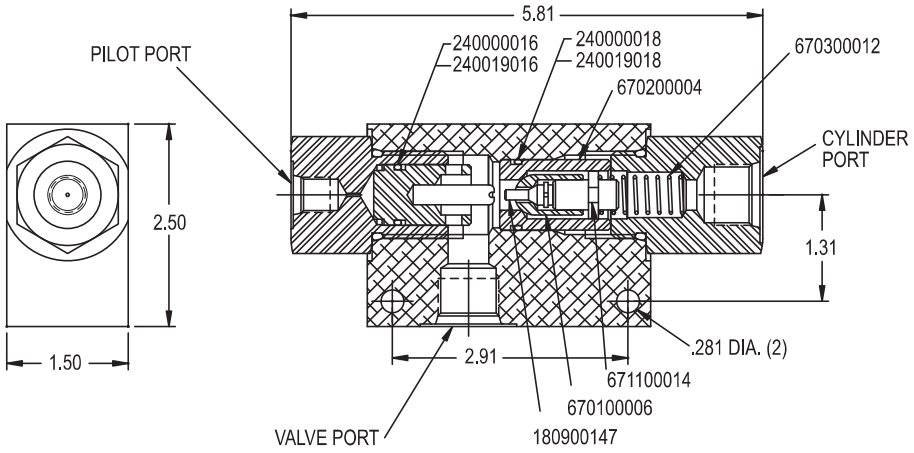
STANDARD MODELS AVAILABLE	
MODEL NUMBER	**PORT SIZE**
RD-1450	1/2 NPTF
RD-1475	3/4 NPTF

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

PRINCE MANUFACTURING CORPORATION • NORTH SIOUX CITY, SOUTH DAKOTA 57049
URL: www.princehyd.com • E-MAIL: prince@princehyd.com • PHONE: (605) 235-1220

SEE PAGE 6 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

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 • NORTH SIOUX CITY, SOUTH DAKOTA 57049
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Valve Quick Reference Guide
Parker/Gresen to Prince Manufacturing

Parker/Gresen Models: V20, V10, SP, SPK, 300, 400 & Accessory	Prince Manufacturing Models: Series 20, SV, RD5000, RD2500 & Accessory	
PARKER/GRESEN V20	**PRINCE SERIES 20 STACKABLE VALVE**	
Parallel Work Sections	**Parallel Work Sections 20 GPM 3500 PSI**	
20-10-4 With K-20-VH-B Handle	20P1BA1AA	4 Way 3 Position, #10 SAE Ports
20-50-4 With K-20-VH-B Handle	20P4BA1AA	4 Way 3 Position, 1/2" NPTF Ports
20-10-4 With K-20-VH-B Handle and Two RC-2550 Work Port Reliefs	20P1BA1EE	4 Way 3 Position, #10 SAE Ports With 2500 PSI Work Port Reliefs
	Float Work Sections	
20-50-K4 With K-20-VH-B Handle	20P4DD1AA	4 Way 4 Position With Float, 1/2" NPTF Ports
	Motor Spool Work Sections	
20-10-DF4 With K-20-VH-B Handle	20P1CB1AA	4 Way 3 Position, #10 SAE Ports
Tandem Work Sections	**Tandem Work Sections**	
20T-10-04 With K-20-VH-B Handle	20T1BA1AA	4 Way 3 Position, #10 SAE Ports
Parallel Lock Sections With Pilot Operated Checks	**Parallel Lock Sections With Pilot Operated Checks**	
20-10-L04 With K-20-VH-B Handle	20L1CA1	4 Way 3 Position, #10 SAE Ports
Inlet Sections (Left Cover)	**Inlet Sections (Left Cover)**	
20-LC-12 With WH-2550 Relief	20I2E	#12 SAE Ports, Non Adjusted Relief
20-LC-75 With WH-2550 Relief and K-WH-A Adjusted Kit	20I3J	3/4" NPTF Ports, Adjusted Relief
Outlet Sections (Right Cover)	**Outlet Sections (Right Cover)**	
20-RC-12-E	20E21	#12 SAE Ports
20-RC-75-E-MY With K-20-50-Y Power Beyond Kit	20E32	3/4" NPTF Ports, Power Beyond
	See Series 20 Valve In Catalog, or on www.princehyd.com	
PARKER/GRESEN V10	**PRINCE SV STACKABLE VALVE**	
Parallel Work Sections	**Parallel Work Sections 12 GPM 3000 PSI**	
V10 Is Not Available With Economical Handle	SVW1BA1	4 Way 3 Position, #8 SAE Ports, Standard Handle
10-8N-04 With K-10-VH Handle	SVW1BA11	4 Way 3 Position, #8 SAE Ports, Enclosed Handle
10-8-04 With K-10-VH Handle and Two RP10A-3000 Adjustable Work Port Reliefs	SVH1BA11GG	4 Way 3 Position, #8 SAE Ports, Enclosed Handle, Work Port Reliefs
	Float Work Sections	
10-8N-K4 With K-10-VH Handle	SVW1DD11	4 Way 4 Position, With Float #8 SAE Ports, Enclosed Handle
	Motor Spool Sections	
10-8N-F4 With K-10-VH Handle	SVW1CA11	4 Way 3 Position, #8 SAE Ports, Enclosed Handle
	Solenoid Sections (On-Off Operation)	
10-08-03-SOL-I-12 and Two Solenoid Cartridges and Coils	SVW1BA-T12Q	4 Way 3 Position, #8 SAE Ports, 12 Volt Solenoid Coils
Series Work Sections	**Series Work Sections**	
V10 Does Not Have a Standard Series Work Section	SVS1GA1AA	4 Way 3 Position, #8 SAE Ports, Series Circuit, Work Port Relief Plugs
Parallel Lock Sections With Pilot Operated Checks	**Parallel Lock Sections With Pilot Operated Checks**	
V10 Does Not Have a Standard Lock Section With Pilot Operated Checks	SLV1CA1	Double P.O. Checks, #8 SAE Ports, 4 Way 3 Position Motor, Spring Center
Inlet Sections (Left Cover)	**Inlet Sections (Left Cover)**	
10-LC10 With RCMA-3000 Relief	SV125	#10 SAE Ports, Adjusted Relief
Outlet Sections (Right Cover)	**Outlet Sections (Right Cover)**	
10-RC-10-EY	SVE21	#10 SAE Ports, Convertible to Power Beyond or Closed Center
	See SV Valve In Catalog, or on www.princehyd.com	

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PARKER/GRESEN	PRINCE VALVE	1,2,3 SPOOL MONO-BLOCK
SP Series	**RD5000 Series**	**30 GPM – 3000 PSI**
SP-4-HP, SPX-4-HP	RD512CA5A4B1	4 Way 3 Position, 3/4" In & Out, 1/2" Work Ports, Spring Center
SPK-4-HP	RD512GC5A4B1	4 Way 4 Position with Float Detent, 3/4" In & Out, 1/2" Work Ports, Spring Center
SP-4-4-HP, SPX-4-4-HP	RD522CCAA5A4B1	4 Way 3 Position, 3/4" In & Out, 1/2" Work Ports, Spring Center
SPK-4-4-HP	RD522GCGA5A4B1	4 Way 4 Position with 1st Spool Float Detent, 3/4" In & Out, 1/2" Work Ports, Spring Center
SP-4-4-4-HP, SPX-4-4-4-HP	RD532CCCAAA5A4B1	4 Way 3 Position, 3/4" In & Out, 1/2" Work Ports, Spring Center
SPK-4-4-4-HP	RD532GCCGAA5A4B1	4 Way 4 Position with 1st Spool Float Detent, 3/4" In & Out, 1/2" Work Ports, Spring Center
300/400 Series	**RD2500 Series**	
300	RD2575-T3-ESA1	3 Way 3 Position, 3/4" In & Out, 1/2" Work Ports, Spring Center
400	RD2575-T4-ESA1	4 Way 3 Position, 3/4" In & Out, 1/2" Work Ports, Spring Center
410	RD2575-T4-EDA1	4 Way 3 Position Detent, 3/4" In & Out, 1/2" Work Ports
410-40	RD2575-M4-EDA1	4 Way 3 Position Detent, Motor Spool, 3/4" In & Out, 1/2" Work Ports
Accessory Valves		
CFD-10-5-NR	RD-412-5	Constant Volume Priority Flow Divider, #12 Ports
CFD-10-6-HP	RD-412-R-6	Constant Volume Priority Flow Divider, #12 Ports
CFD-50-3-HP	RD-400-R-3	Constant Volume Priority Flow Divider, 3/4" Ports
CFD-50-4	RD-400-R-4	Constant Volume Priority Flow Divider, 3/4" Ports
CFD-50-8	RD-450-R-8	Constant Volume Priority Flow Divider, 1/2" Ports
CFD-50-10-HP	RD-400-R-10	Constant Volume Priority Flow Divider, 3/4" Ports
CFD-75-2-HP	RD-405-R-2	Constant Volume Priority Flow Divider, 3/4" Ports
CFD-75-3-HP	RD-405-R-3	Constant Volume Priority Flow Divider, 3/4" Ports
CFD-75-3-NR	RD-405-3	Constant Volume Priority Flow Divider, 3/4" Ports
CFD-75-5-NR	RD-405-5	Constant Volume Priority Flow Divider, 3/4" Ports
CFD-75-10-NR	RD-405-10	Constant Volume Priority Flow Divider, 3/4" Ports
CFD-A-50	RD-550	Screw Adjust Priority Flow Control, 1/2" Ports
CFD-A-75	RD-575	Screw Adjust Priority Flow Control, 3/4" Ports
CFQ-A-50	RD-150-16, RD-1950-16	Lever Adjust Priority Flow Control, 1/2" Ports
CFQ-A-75R	RDRS-175-30, RDRS-1975-30	Lever Adjust Priority Flow Control, 3/4" Ports, Adjustable Relief
DC25A-75-0-NR	RD-575-P-30	Screw Adjust Priority Flow Control, 3/4" Ports
DS-12	DS-4A1D	Double Selector, 3/4" Ports
DS-75	DS-5A1D	Double Selector, #12 Ports
DWV-12-25	DRV-1NHNH-2500	Double Cross-Over Relief (Cushion), #12 Ports
DWV-50-A-12	DRV-4LL-12-12	Double Cross-Over Relief (Cushion), 1/2" Ports
DWV-50-20	DRV-4NHNH-2000	Double Cross-Over Relief (Cushion), 1/2" Ports
DWV-75-A	DRV-2HH	Double Cross-Over Relief (Cushion), 3/4" Ports
DWV-75-20	DRV-2NHNH-2000	Double Cross-Over Relief (Cushion), 3/4" Ports
HM-50	SS-2B1B	Two Position Float Valve, 1/2" Ports
JT-50-HP, JL-50-HP	RD-1850H	Adjustable Relief (Ball Spring), 1/2" Ports
LD1-50-1S	RD-1650	Single Lock Valve, 1/2" Ports
LO-50-D	RD-1450	Double Lock Valve, 1/2" Ports
PD-12-50	RD-212-30	Proportional Flow Divider, #12 Ports
PD-50-50-50	RD-250-16	Proportional Flow Divider, 1/2" Ports
PD-50-60-40	RD-250-16(60/40)	Proportional Flow Divider, 1/2" Ports
PD-75-50-50	RD-275-30	Proportional Flow Divider, 3/4" Ports
S-50	RD-950	Selector Valve, 1/2" Ports
S-75	RD-975	Selector Valve, 3/4" Ports
SM-50, S-50	SS-2A1D, RD-950	Single Selector 1/2" Work Ports
SM-8	SS-3A1D	Single Selector #8 Work Ports
WJL-10-A	RV-3H	Adjustable Relief (Differential Poppet), #10 Ports
WJL-50-13	RV-4L	Adjustable Relief (Differential Poppet), 1/2" Ports
WJL-50-20	RV-4H	Adjustable Relief (Differential Poppet), 1/2" Ports

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