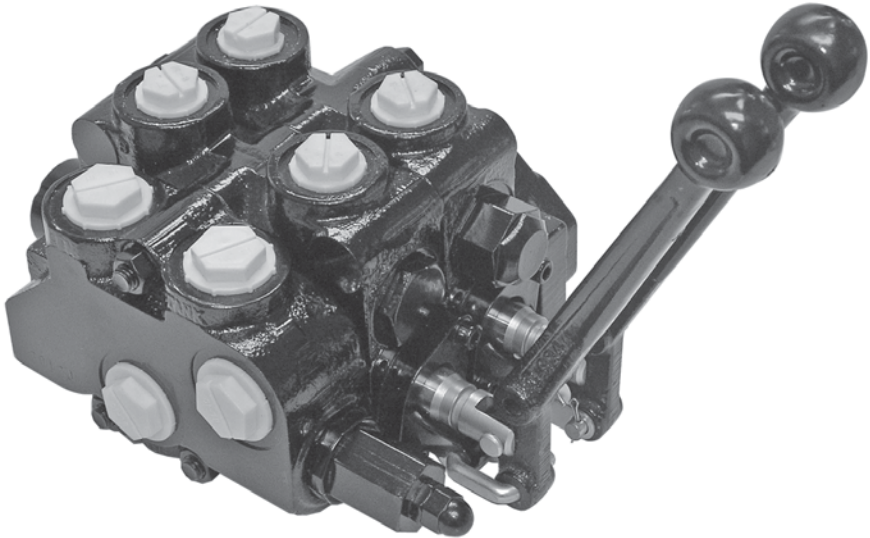


SECTIONAL BODY



Series "20"

VALVES

STANDARD FEATURES

- 1 -10 Work Sections
- Power Beyond Capability
- Load Checks on Each Work Port
- 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
- Extra Fine Spool Metering
- Reversible Handle
- Hard Chrome Plated Spools

SPECIFICATIONS

Parallel or Tandem Circuit Pressure Rating

Maximum Operating Pressure 3500 psi
Maximum Tank Pressure..... 500 psi

Nominal Flow Rating 20 gpm

Please Refer to Pressure Drop Charts.
Allowable Pressure Loss thru Valve
Determines the Maximum flow.

Foot Mounting Weight

Inlet Cover Approx 6 lbs
Outlet Cover Approx 3.5 lbs
Work Section Approx 9 lbs

Maximum Operating Temp 180°F

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

ORDERING INFORMATION:

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

STANDARD SECTIONS AVAILABLE:

STANDARD INLET SECTIONS

ALL SECTIONS HAVE BOTH TOP AND SIDE INLET AND TANK PORTS

PART NO.	RELIEF TYPE AND SETTING	PORT SIZE
2012A	NO RELIEF	#12 SAE ORB
2012C	SHIM ADJUSTABLE 1351-1750 PSI, SET AT 1750 PSI @ 10 GPM	#12 SAE ORB
2012D	SHIM ADJUSTABLE 1751-2200 PSI, SET AT 2200 PSI @ 10 GPM	#12 SAE ORB
2012E	SHIM ADJUSTABLE 2201-3000 PSI, SET AT 2500 PSI @ 10 GPM	#12 SAE ORB
2012G	ADJUSTABLE 1351-1750 PSI, SET AT 1750 PSI @ 10 GPM	#12 SAE ORB
2012H	ADJUSTABLE 1750-2200 PSI, SET AT 2200 PSI @ 10 GPM	#12 SAE ORB
2012J	ADJUSTABLE 2201-3000 PSI, SET AT 2500 PSI @ 10 GPM	#12 SAE ORB

STANDARD PARALLEL CIRCUIT WORK SECTIONS

ALL WORK SECTIONS HAVE #10 SAE ORB PORTS, LOAD CHECKS, AND STANDARD LEVER HANDLES.

MODELS WITH PORT RELIEFS ARE SHIM ADJUSTABLE.

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

STANDARD TANDEM CIRCUIT WORK SECTIONS

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

STANDARD OUTLET SECTIONS

ALL SECTIONS HAVE SIDE OUTLET

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

TIE-ROD KITS

TIE-ROD TORQUE	PART NO.	WORK SECTIONS	PART NO.	WORK SECTIONS
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 SECTION SEAL KIT
660585002	INLET SECTION SEAL KIT
660585003	OUTLET SECTION SEAL KIT
660585004	SEAL KIT O-RINGS BETWEEN SECTION ONLY

660585006	SOLENOID PILOT PASSAGE SEAL KIT
660390103	20 WORK SECT COIL & CART ASSY 12VDC/LEADS
660390107	20 WORK SECT COIL & CART ASSY 24VDC/LEADS
660290010	20 UTIL SECT CONTINUOUS ON PBU CART
660390153	20 UTIL SECT PBU COIL & CART ASSY 12VDC/LEADS
660390157	20 UTIL SECT PBU COIL & CART ASSY 24VDC/LEADS
270006092	20 UTIL SECT PRESSURE REDUCING CART
660290012	20 UTIL SECT POWER BEYOND PLUG #10 SAE

PORT RELIEF KITS

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

INLET RELIEF KITS

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

RELIEF HARDWARE KITS

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

LOAD SENSE KITS

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

SPECIAL SECTIONS AVAILABLE:

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

WORK SECTION

WORK SECTION TYPE

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

PORT SIZE

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

SPOOL TYPE

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

SPOOL ACTIONS

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

HANDLE OPTIONS

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

2 0 X X X X X X X

PORT RELIEF "B"

PORT RELIEF "A"

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

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

FOR WORK PORT RELIEF SETTING OTHER THAN STANDARD

20P1BA1DH-18-20

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

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

INLET SECTION

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

2 0 I X X - X X X X

OUTLET SECTION

OUTLET TYPE

- E - STANDARD OUTLET

PORT SIZE

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

EXHAUST OPTIONS

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

° Often used with no relief. Review application

2 0 E X X

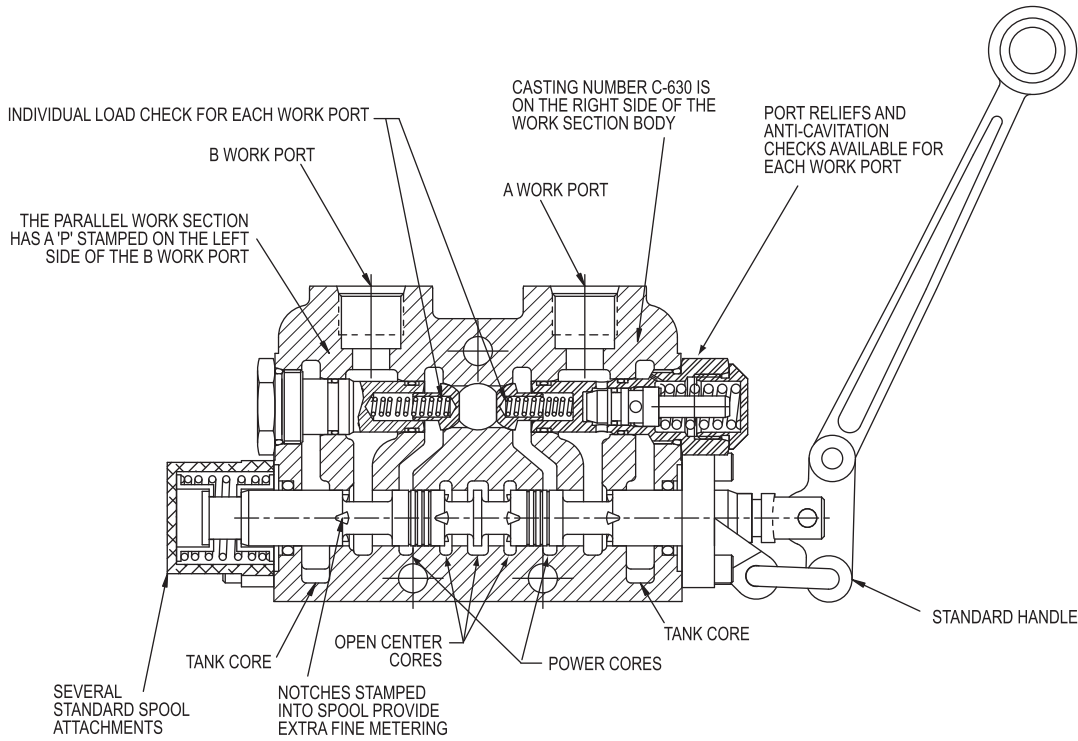
VALVE ASSEMBLIES

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

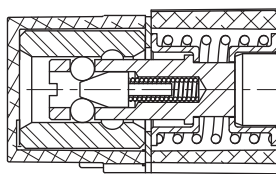
XXXX = Sequence of Numbers. This number will be assigned to final valve to be assembled and tested at the factory. Each new order or quote will be assigned a new assembly model number.

CROSS SECTION OF 20P1BA1DA PARALLEL WORK SECTION

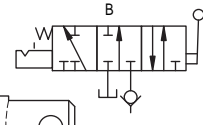


SPOOLS AND SPOOL ATTACHMENTS

OPTION N-
DETENT
SPOOL-OUT W/
SPRING CENTER

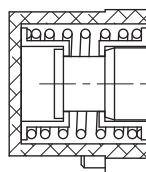


SPOOL OPTION 'A' - 3 WAY 3 POSITION FOR USE WITH SINGLE ACTING CYLINDERS OR NON-REVERSIBLE MOTORS. THE 'B' WORK PORT IS BLOCKED IN NEUTRAL.

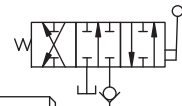


SPOOL OPTION A

OPTION A-
SPRING CENTER TO NEUTRAL

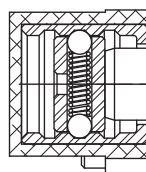


SPOOL OPTION 'B' - 4 WAY 3 POSITION FOR USE WITH DOUBLE ACTING CYLINDERS OR REVERSIBLE MOTORS. THE WORK PORTS ARE BLOCKED IN NEUTRAL.

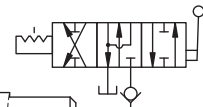


SPOOL OPTION B

OPTION B-
3 POSITION DETENT

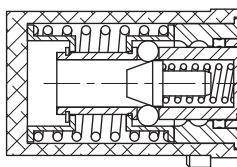


SPOOL OPTION 'C' - 4 WAY 3 POSITION FREE FLOW MOTOR SPOOL. THE WORK PORTS ARE OPEN TO TANK IN NEUTRAL, ALLOWING A MOTOR TO COAST OR A CYLINDER TO FLOAT.

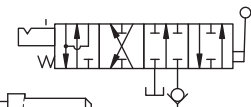


SPOOL OPTION C

OPTION D-
FLOAT DETENT WITH
SPRING CENTER

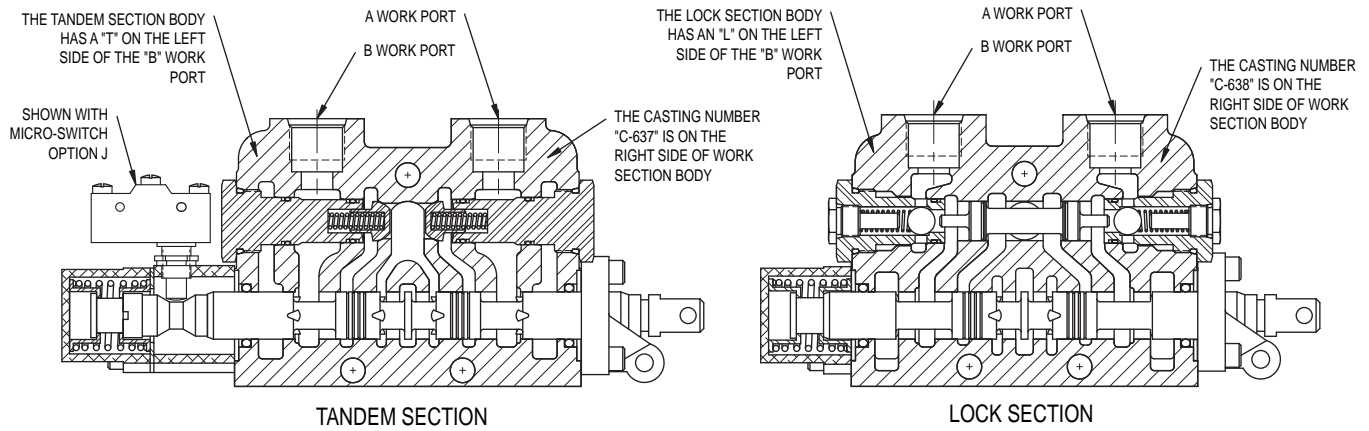


SPOOL OPTION 'D' - 4 WAY 4 POSITION FLOAT. SAME AS 4 WAY 3 POSITION WITH THE ADDITION OF A FOURTH POSITION FLOAT. THE SPOOL IS DETENTED IN THE FLOAT POSITION AND SPRING CENTERED TO NEUTRAL FROM THE 'A' OR 'B' POWER POSITION



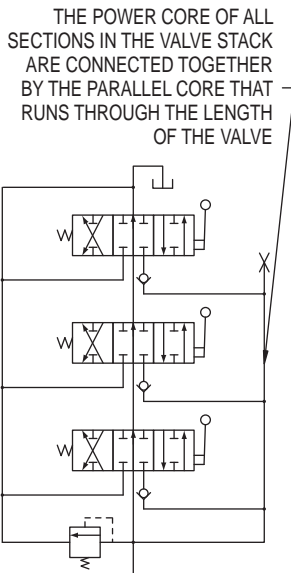
SPOOL OPTION D

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.



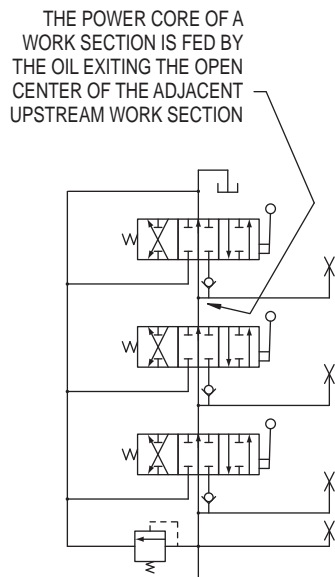
LOAD CHECK

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.

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 upstream section will allow two sections to operate at the same time. The schematic below shows a three section tandem circuit stack valve.



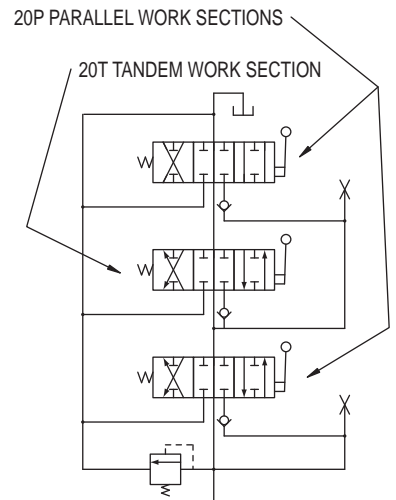
OPEN CENTER APPLICATIONS

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.

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.



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.