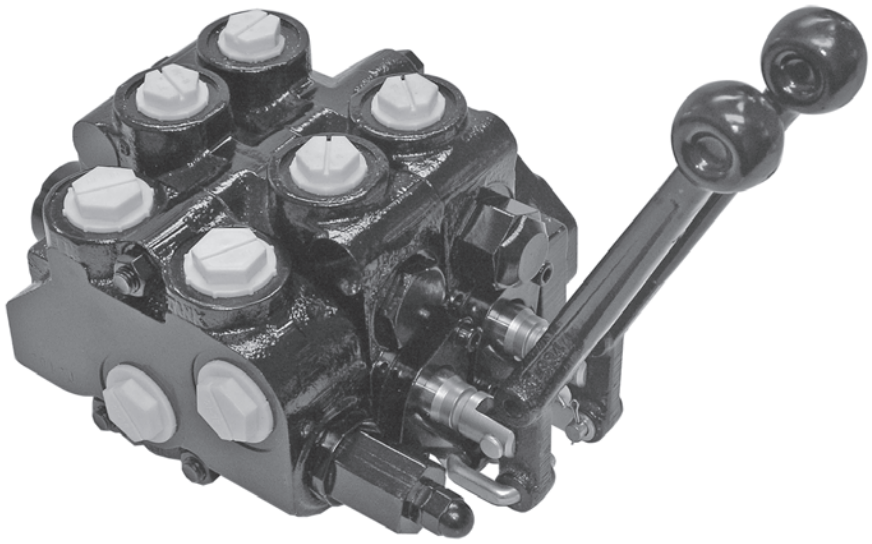
SECTIONAL BODY



Series "20"

STANDARD FEATURES

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

SPECIFICATIONS

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

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

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

Maximum Operating Temp .....180°F

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

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

STANDARD INLET SECTIONS

ALL SECTIONS HAVE BOTH TOP AND SIDE INLET AND TANK PORTS

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

STANDARD PARALLEL CIRCUIT WORK SECTIONS

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

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

STANDARD TANDEM CIRCUIT WORK SECTIONS

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

STANDARD OUTLET SECTIONS

ALL SECTIONS HAVE SIDE OUTLET

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

TIE-ROD KITS

TIE-ROD TORQUE 30-32 ft-lbs

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

SERIES 20 HARDWARE AND SEAL KITS

660190003	SPRING CENTER KIT
660190004	3 POSITION DETENT KIT
660190005	FRICTION DETENT KIT
660190028	SPRING CTR PNEUMATIC ACTUATOR KIT
660190001	VERTICAL HANDLE, LINK & PINS
660190002	STD. HANDLE, LINK & PINS
660190006	COMPLETE VERT. HANDLE KIT
660190007	COMPLETE STD. HANDLE KIT
660190025	SEAL RETAINER PLATE
660190026	HANDLE CLEVIS
660290004	POWER BEYOND PLUG #10 SAE
660290017	POWER BEYOND PLUG 3/4" NPTF
660290005	CLOSED CENTER PLUG
660290006	OPEN CENTER OUTLET PLUG
660585001	WORK SECTION SEAL KIT
660585008	LOCK SECTION SEAL KIT
660590030	SOLENOID OPERATED 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 20 PR-OX PG V16)

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 V16)

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 11, 12 & 13 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

SPECIAL SECTIONS AVAILABLE:

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

WORK SECTION

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-STANDARD PARALLEL ****

PORT SIZE
1. #10 SAE (7/8-14 THREAD)
2. #8 SAE (3/4-16 THREAD)
3. #12 SAE (1 1/16-12 THREAD)
4. 1/2 NPTF (2000 PSI MAX)
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
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
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
4 - VERTICAL LEVER 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.
****USED WHEN A MANUAL SECTION IS PLACED BETWEEN THE SOLENOID SECTION

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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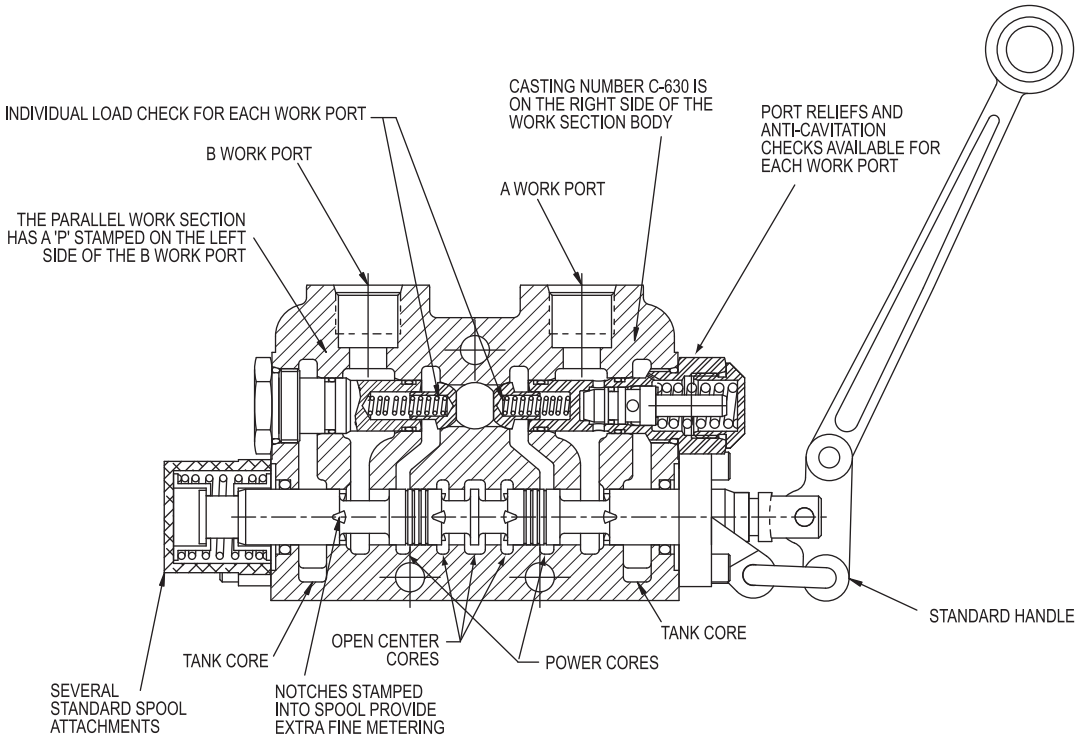
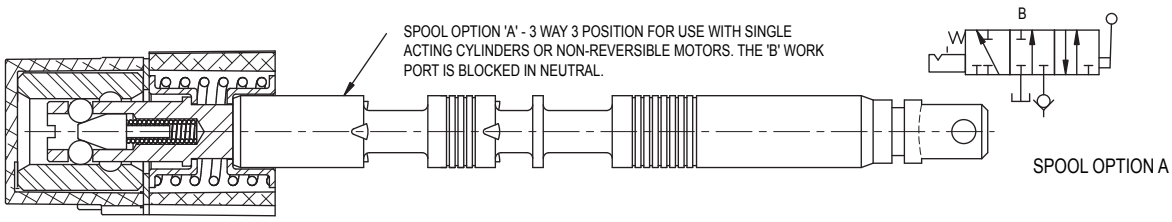
SEE PAGE 12 &13 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

CROSS SECTION OF 20P1BA1DA PARALLEL WORK SECTION

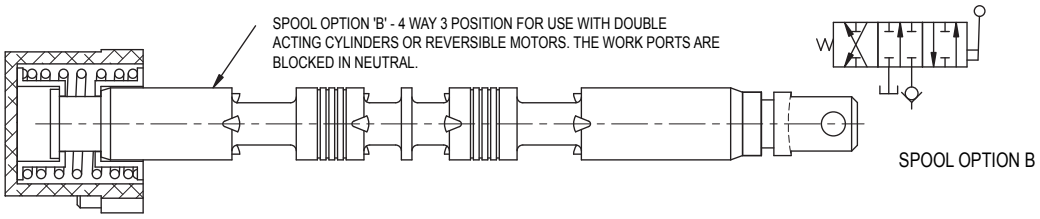


SPOOLS AND SPOOL ATTACHMENTS

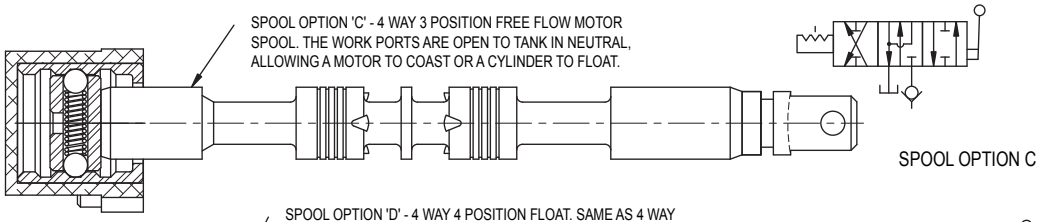
OPTION N-
DETENT
SPOOL-OUT W/
SPRING CENTER



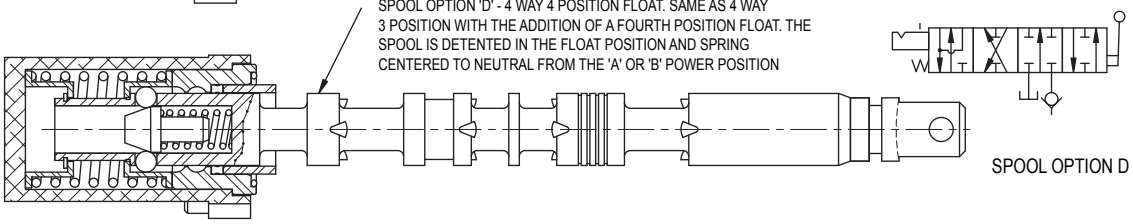
OPTION A-
SPRING CENTER TO NEUTRAL



OPTION B-
3 POSITION DETENT



OPTION D-
FLOAT DETENT WITH
SPRING CENTER



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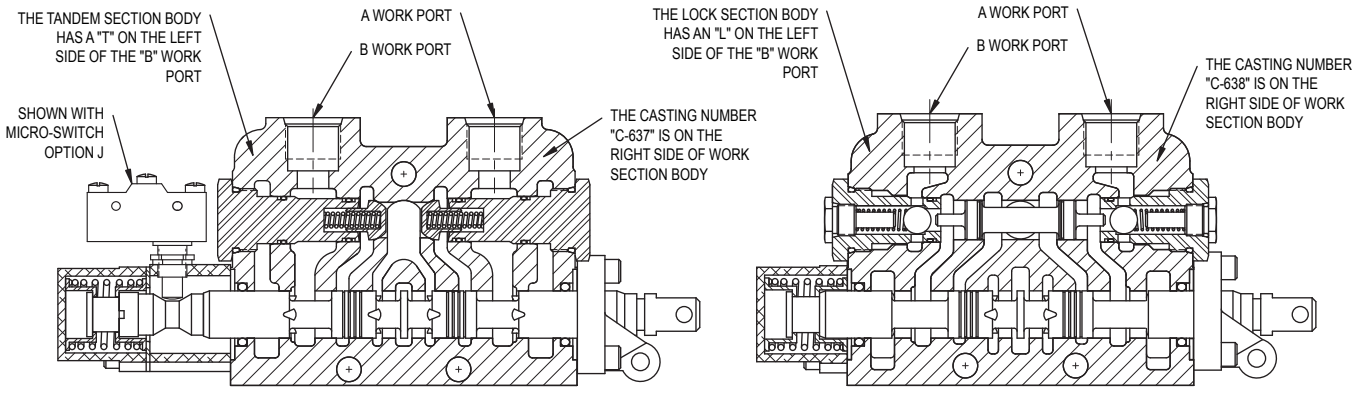
CROSS SECTION OF TANDEM WORK SECTION AND LOCK SECTION



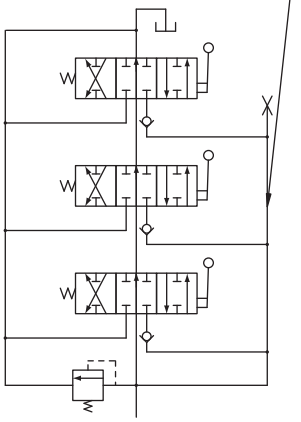
TANDEM SECTION

LOCK SECTION

MODEL 20P PARALLEL CIRCUIT

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

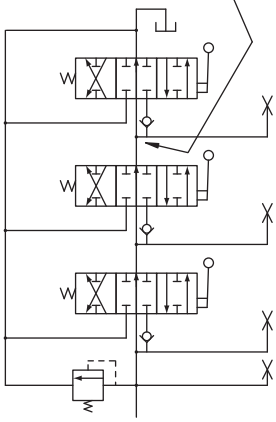
THE POWER CORE OF ALL SECTIONS IN THE VALVE STACK ARE CONNECTED TOGETHER BY THE PARALLEL CORE THAT RUNS THROUGH THE LENGTH OF THE VALVE



MODEL 20T TANDEM CIRCUITS

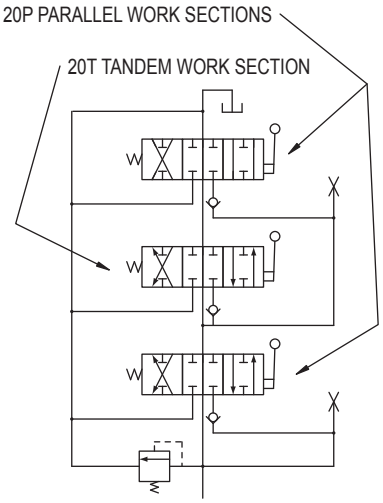
Tandem circuit construction is also referred to as priority circuit. When the spool of a section is shifted, oil is cut off to all downstream sections. Thus the section nearest to the inlet has priority over the other sections in the valve bank. If more than one spool is fully shifted all the oil will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

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



COMBINED PARALLEL/ TANDEM CIRCUITS

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



LOAD CHECK

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

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

OPEN CENTER APPLICATIONS

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

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

CLOSED CENTER APPLICATIONS

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

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

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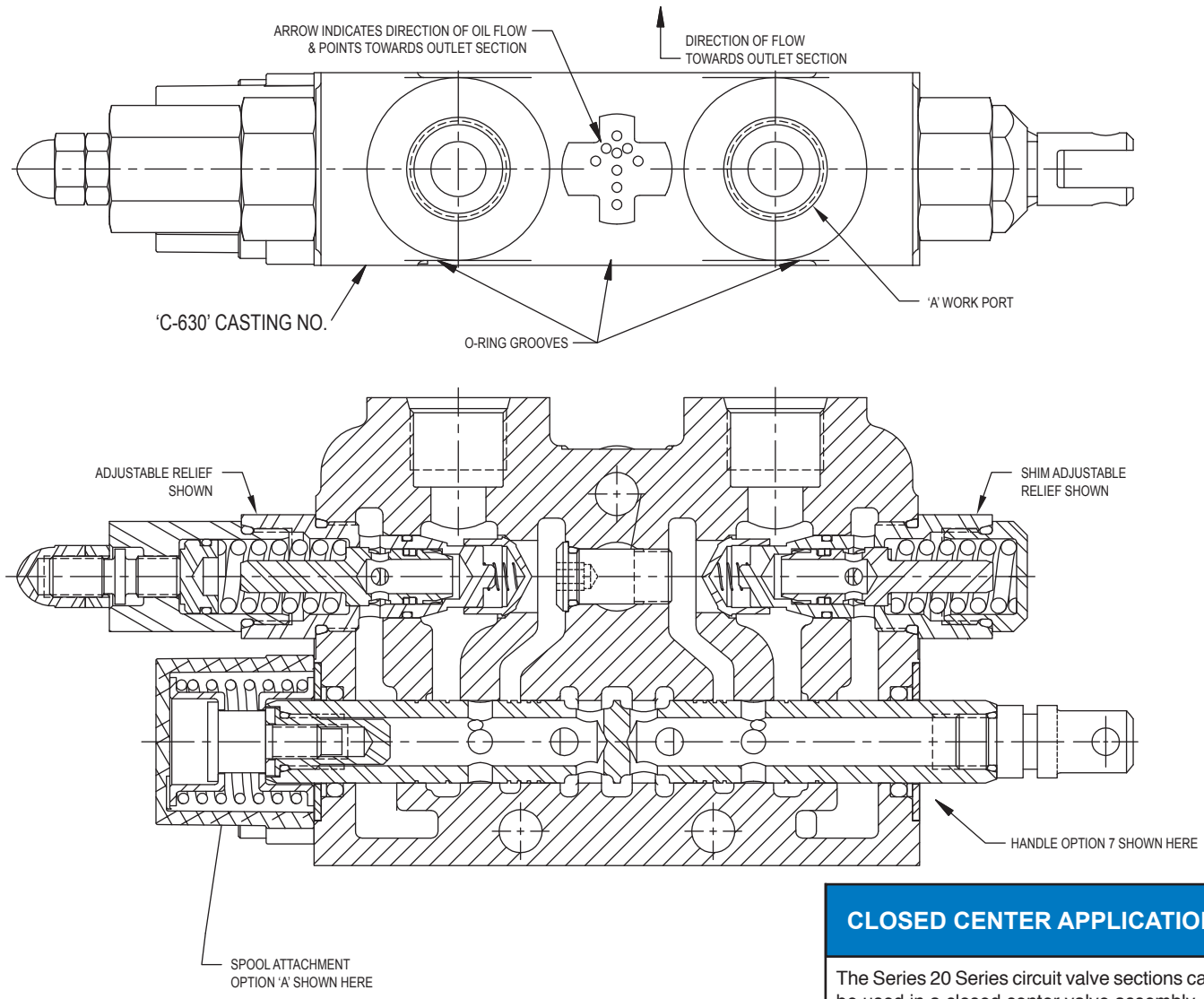
SERIES CIRCUIT SERIES 20 WORK SECTIONS
CROSS SECTION OF SERIES SECTION



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

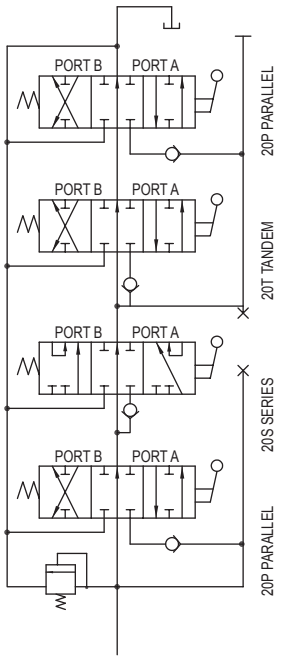
The Series 20 series sections may be stacked with 20P parallel circuit valve sections. When using a series section, the immediate downstream section needs to be a series, tandem, or outlet section. 20P sections can be either in front of the Series 20 series sections or behind a combination of series 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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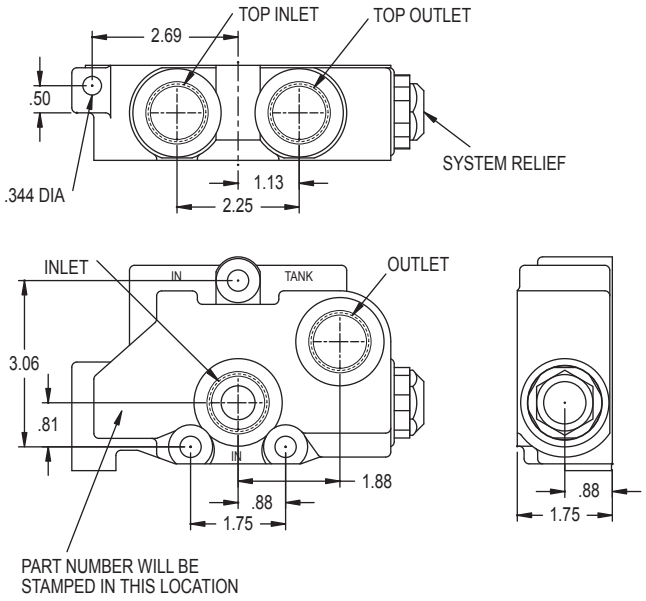
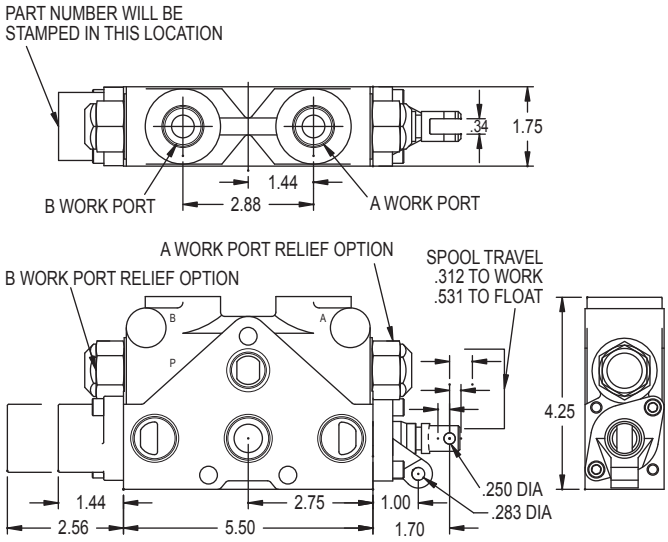
CATV 8-11-16-01

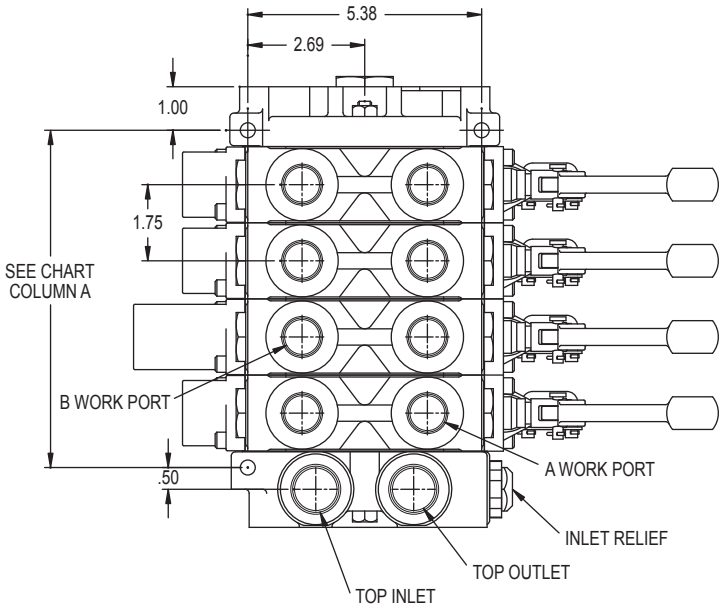
INLET COVER DIMENSIONS



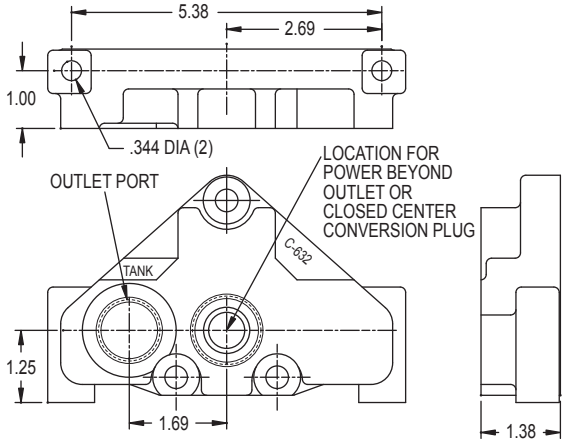
WORK SECTIONS DIMENSIONS



DIMENSIONAL DATA

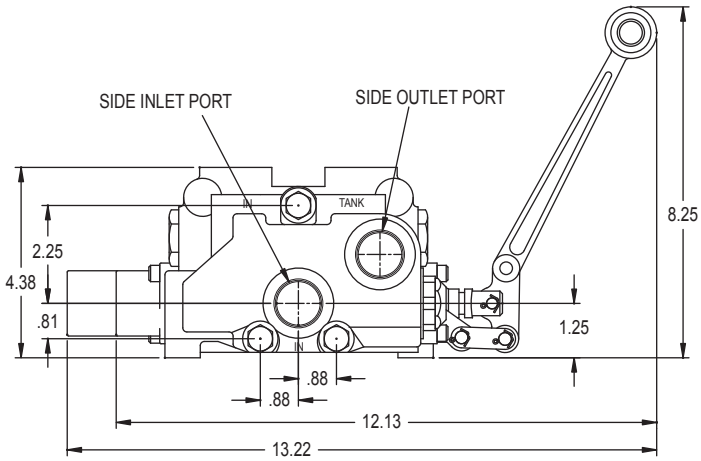


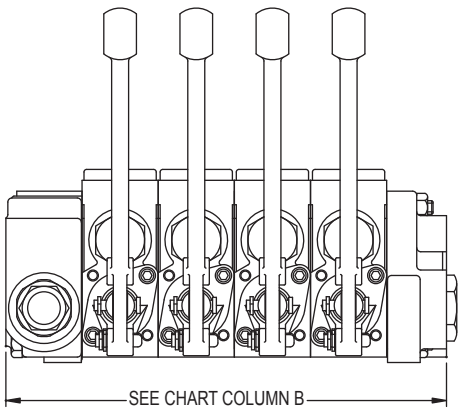
OUTLET COVER DIMENSIONS



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

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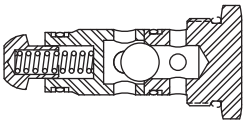
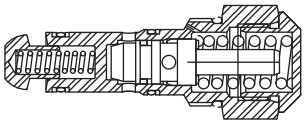
WORK PORT RELIEF CARTRIDGES



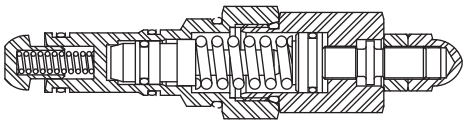
OPTION K ANTI-CAVITATION CHECK
This option allows oil to be drawn from the tank core into the work port if there is a vacuum on the work port. This vacuum would be caused by a overrunning motor or cylinder. The check will be open whenever the pressure in the tank core is higher than that in the work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

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



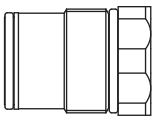
A port relief can be installed to limit the pressure at the work port to less than the system pressure. Also, it can be installed to provide spike pressure protection when the spool is in the neutral position. The pressure of these reliefs can be changed by changing shims.

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



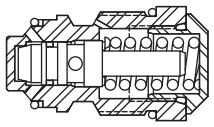
This is the same differential poppet type relief as above but externally adjustable within the specified range.

INLET RELIEF CARTRIDGES



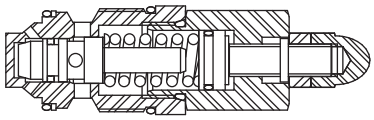
OPTION A NO RELIEF
When no main inlet relief is required the no relief plug is installed. All inlet sections have the relief cavity machined so a inlet relief can be installed in the field.

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



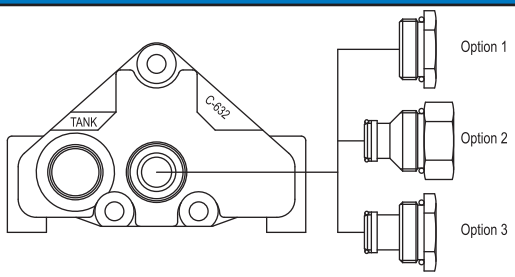
These options provide for an internally shim adjustable main inlet relief. The relief is a hydraulically dampened differential poppet design. This provides for smooth quiet operation in a relief that is moderately tolerant to contamination. The pressure of these reliefs can be changed, within the specified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

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



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

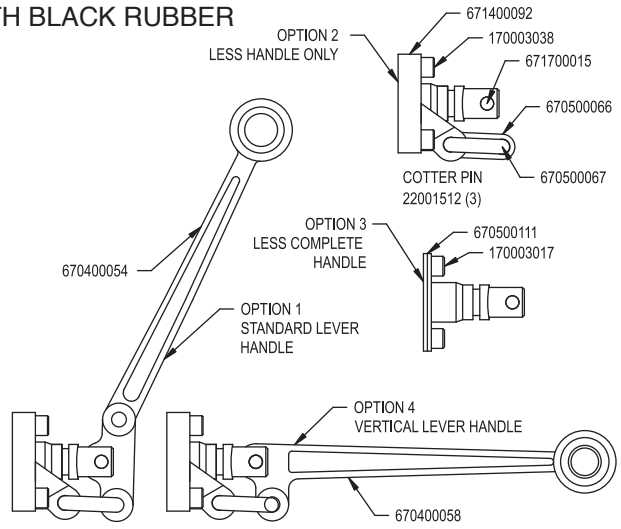
OUTLET SECTION OPTIONS



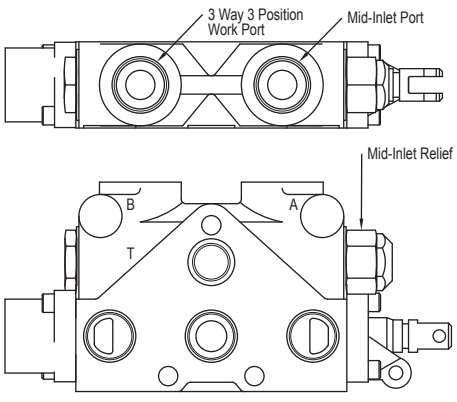
OPTION 1 STANDARD OPEN CENTER WITH CONVERSION PLUG
This is the standard outlet option. This option allows for conversion in the field for power beyond or closed center applications. When the spools are in neutral the inlet is unloaded to tank.
OPTION 3 CLOSED CENTER OUTLET
This option provides for closed center operation. This is typically used with a variable displacement pressure compensated pump or in a system with an unloading valve. When the spools are in neutral the inlet port is blocked.
OPTION 2 POWER BEYOND WITH #10 SAE BEYOND PORT
This option provides for a high pressure power beyond port. This would be used if a valve is to be added downstream. The outlet must be connected to tank. When the spools are in neutral the inlet is connected to power beyond port.

HANDLE OPTIONS

NOTE: HANDLES ARE COATED WITH BLACK RUBBER



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



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

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

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

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.

CATV 10-11-16-01

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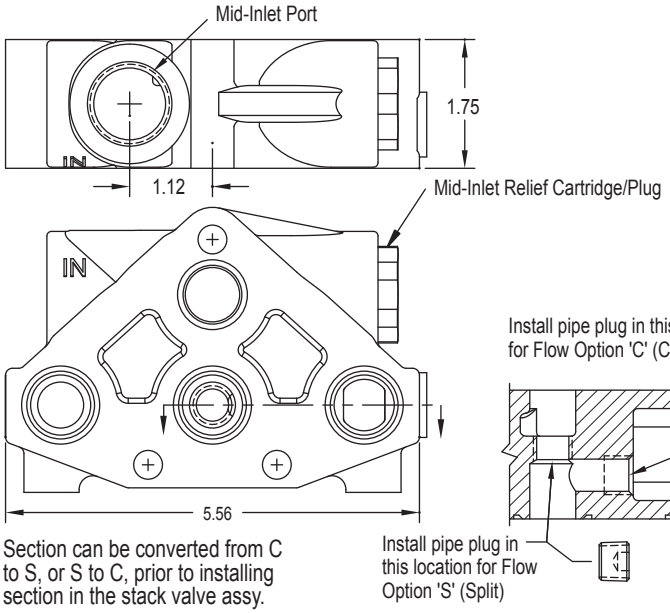
SEE PAGE 13 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

SERIES 20 MID-INLET SECTION



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

20IM X X X X -XXXX

FLOW OPTION
C - COMBINED FLOW
S - SPLIT FLOW

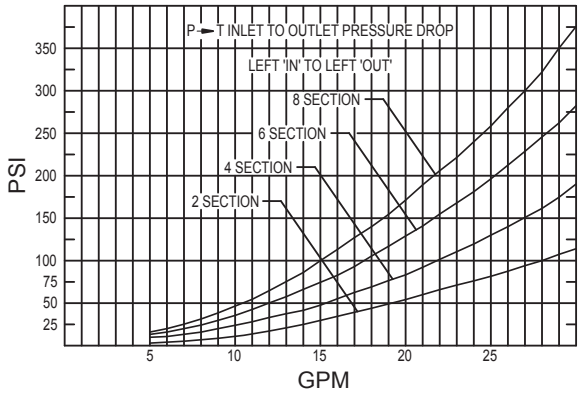
PORT SIZE
10 - #10 SAE (7/8-14 THREAD)
20 - #12 SAE (1 1/16-12 THREAD)
30 - 1/2-NPTF
40 - 3/4-NPTF

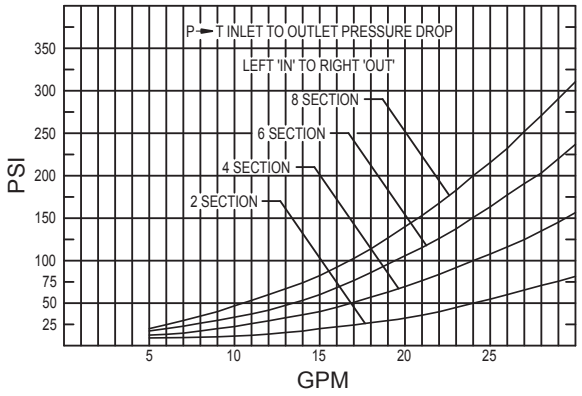
LAST FOUR DIGITS SPECIFY A NON-STANDARD RELIEF PRESSURE IN PSI. LEAVE BLANK FOR STANDARD SETTING.

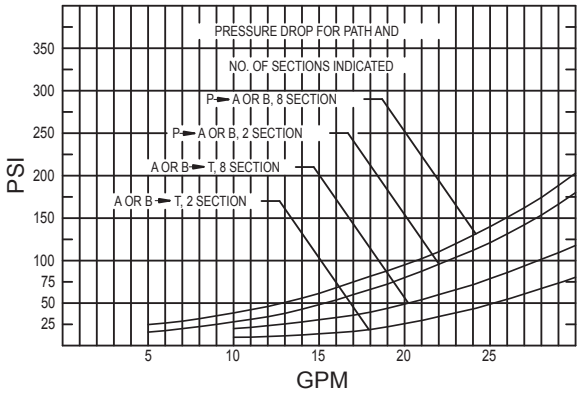
MID-INLET RELIEF OPTIONS:

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

TEST DATA



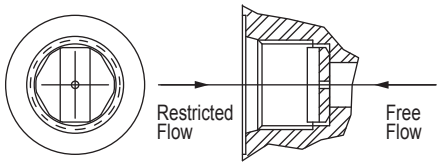




Oil 140 SUS at 110 degrees F. The pressure drop curves are representative, but the actual pressure drop will vary some from valve to valve. More detailed test data is available upon request.

ONE WAY WORK PORT RESTRICTOR FOR 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**

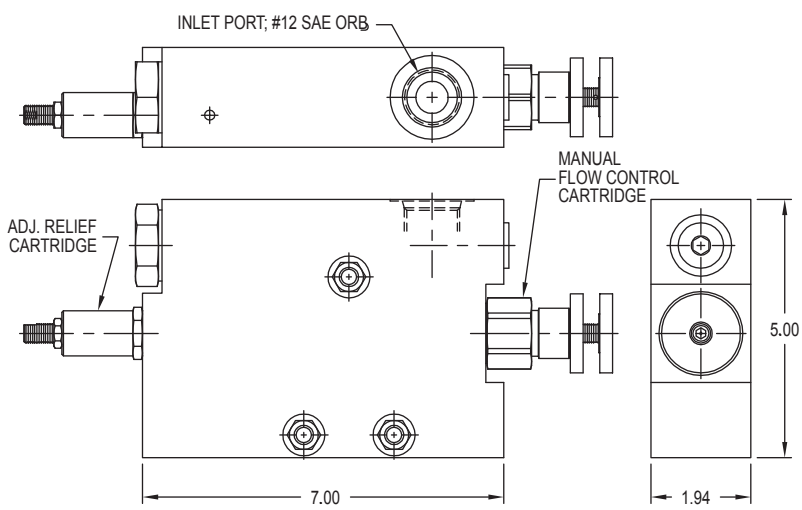
HEX BRASS RESTRICTOR #10 **670811000**

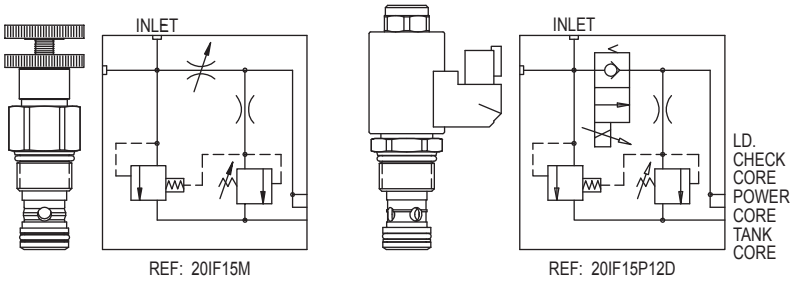
The last three digits of part number are the orifice size in thousandths of an inch.

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

VALVES

SERIES 20 FLOW CONTROL INLET SECTION





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:

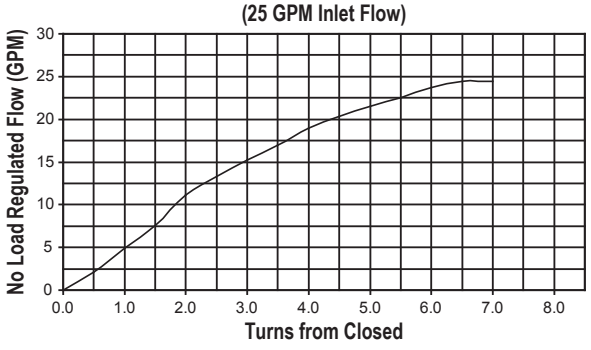
This inlet incorporates a manually operated pressure compensated flow control. With the flow control knob turned fully in (clockwise), all of the inlet flow is diverted to the tank core. By turning the flow control knob counter-clockwise, the inlet flow directed to the power core will be proportionally 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:

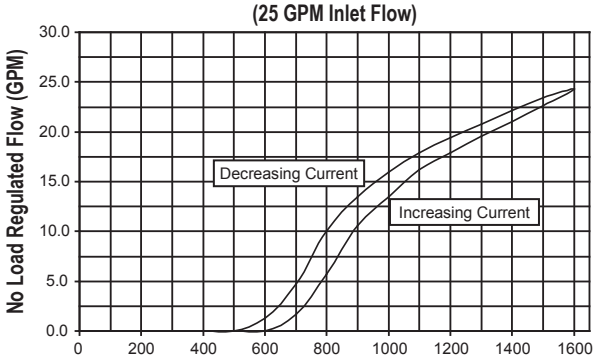
This inlet incorporates a solenoid operated, electrically variable pressure-compensated flow control. With no current going through the solenoid, all of the inlet flow is diverted to the tank core. By increasing the current through the solenoid, the flow being directed to the power core will be proportionally 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.

TEST DATA

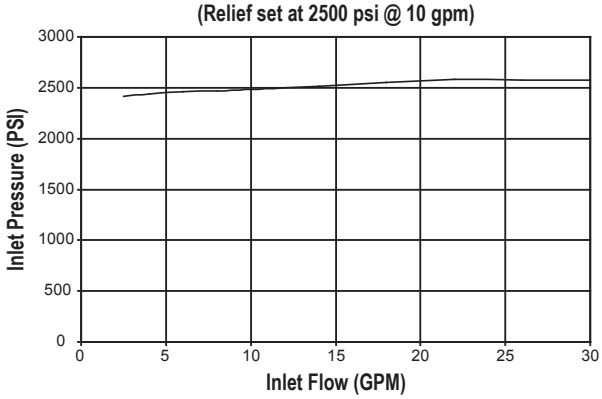
Turns vs. Regulated Flow
Series 20 Manual Flow Control Inlet
(25 GPM Inlet Flow)



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)



CATV 12-11-16-01

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