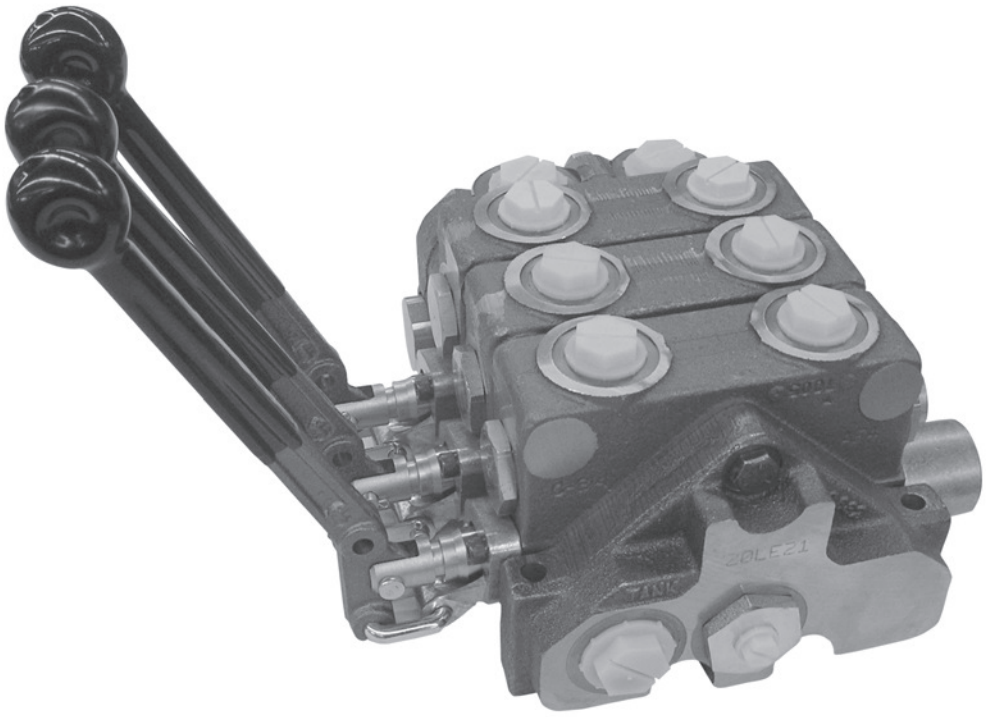
LOAD SENSE SECTIONS



Series "20"

STANDARD FEATURES

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

SPECIFICATIONS

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

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

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

SPECIAL SECTIONS AVAILABLE:

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

WORK SECTION

2 0 XX X X X X X X

WORK SECTION TYPE

LP-STANDARD LOAD SENSE SECTION

PORT SIZE

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

SPOOL TYPE

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

SPOOL ACTIONS

A - SPRING CENTER TO NEUTRAL
B - 3 POSITION DETENT
C - FRICTION DETENT
D - FLOAT DETENT
E - SPRING CENTER PNEUMATIC ACTUATOR
F - 2 POSITION DETENT NEUTRAL & OUT (NO IN POSITION)
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"

PORT RELIEF "A"

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

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

FOR WORK PORT RELIEF SETTING OTHER THAN STANDARD

20P1BA1DH-18-20

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

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

SEE PAGE 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

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.

CATV 14-07-13-02

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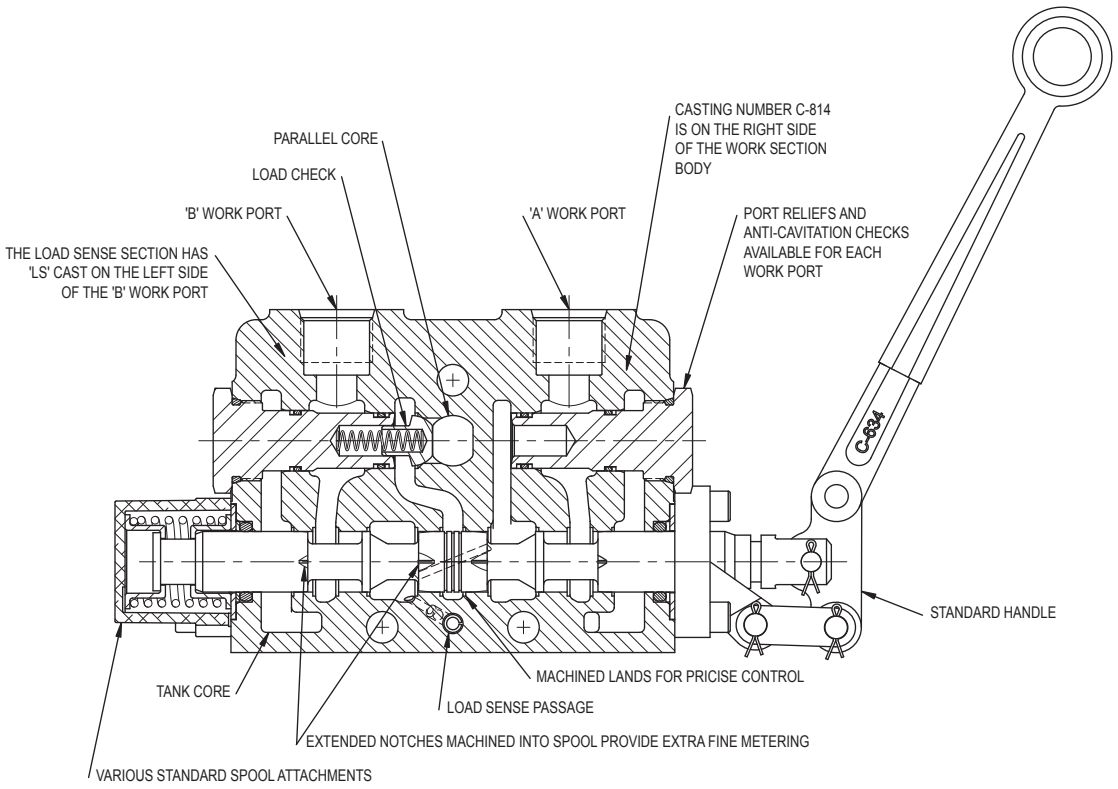
SEE PAGE 12 & 13 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

CROSS SECTION OF 20LP1JA1AA LOAD SENSE WORK SECTION

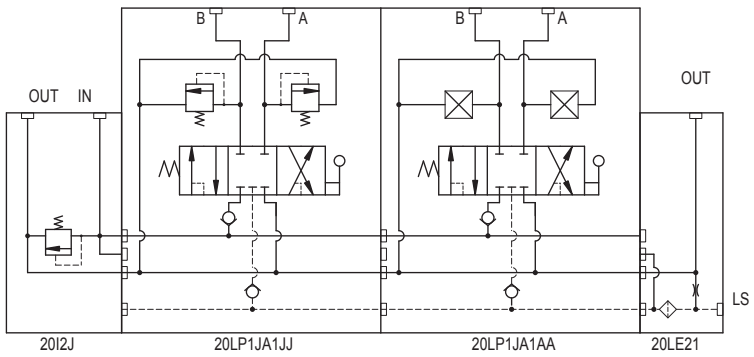


LOAD SENSE CIRCUITS

MODEL 20LP LOAD SENSE CIRCUIT

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

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



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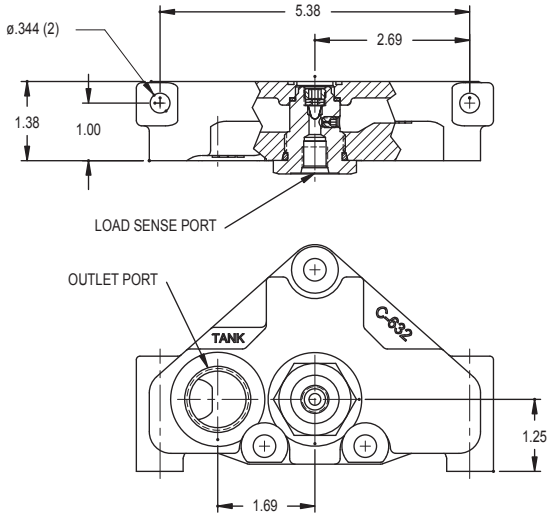
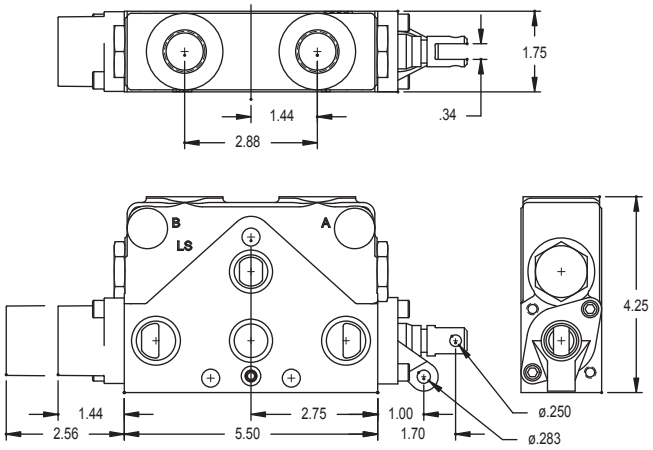
LOAD SENSE OUTLET DIMENTIONS

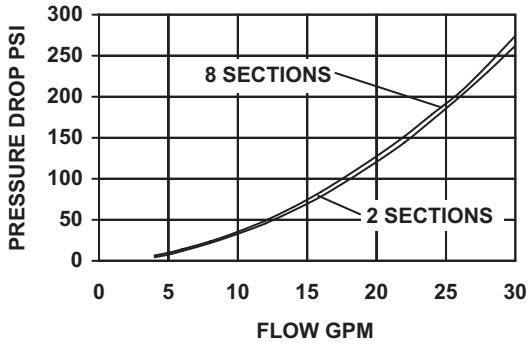


LOAD SENSE WORK SECTION DIMENSIONS

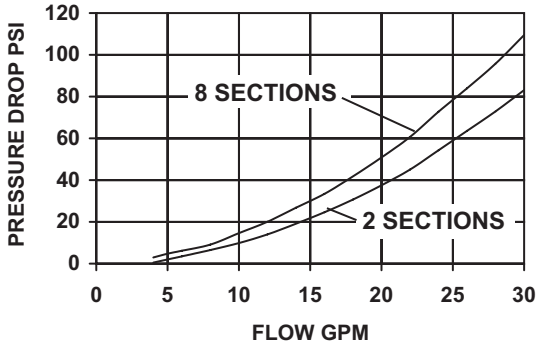


TEST DATA

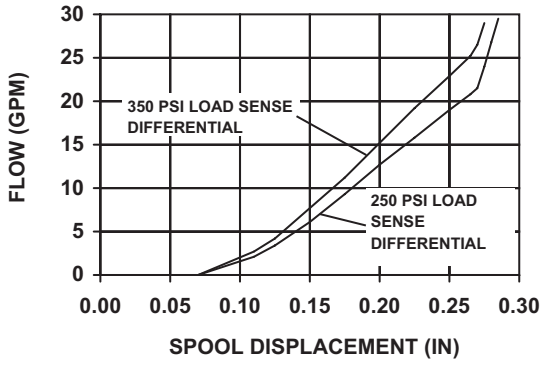
PRESSURE DROP - INLET TO WORK PORT



PRESSURE DROP - WORK PORT TO TANK



WORK PORT FLOW VS. SPOOL POSITION



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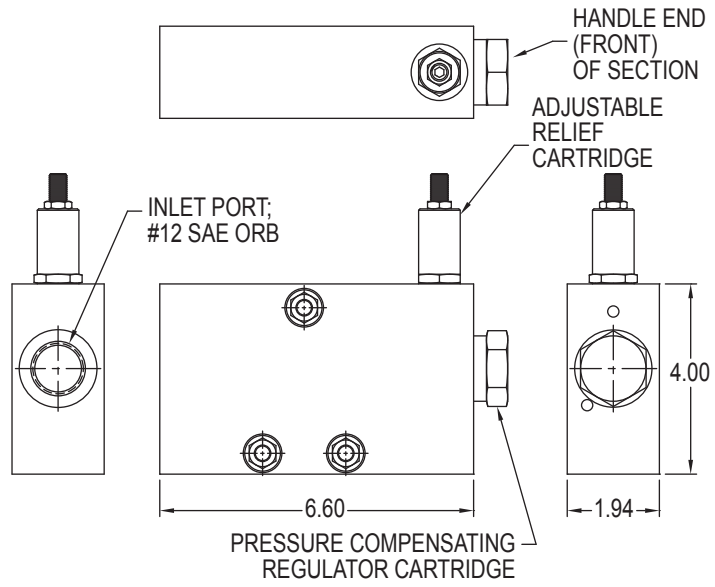
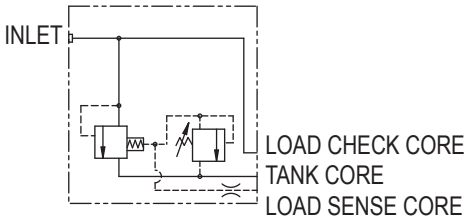
SERIES 20 LOAD SENSE INLET (FOR FIXED DISPLACEMENT PUMP)





Pilot Operated Relief Adjustable From 2000 PSI to 3500 PSI.

Standard Relief Setting: 2500 PSI @ 10 GPM.

20ILF25 _ _ _ - X X X X

Digits Specify A Non-Standard Relief Pressure in PSI. Leave blank for standard setting.

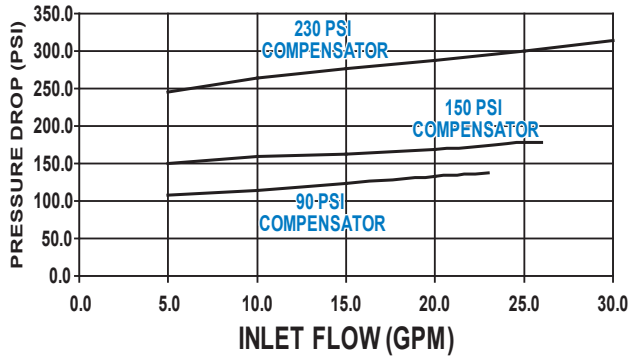
Compensator Setting:
090– 90 PSI Compensator
150–150 PSI Compensator (Standard)
230–230 PSI Compensator

APPLICATION NOTES:

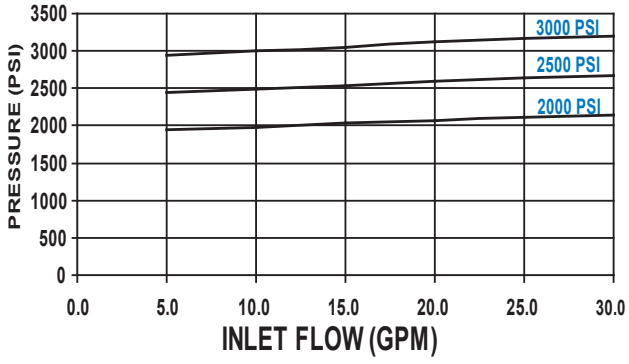
1. This inlet is for use with a fixed displacement pump (such as a gear pump) and Prince Series 20 Load Sense Sections.
2. When all spools are centered, the inlet allows the flow to be diverted to tank at relatively low pressure.
3. When a spool is shifted, the compensator directs the flow to the work port at a flow and pressure relative to the work port/load sense pressure. The inlet maintains the enhanced metering control of the load sense work sections.
4. The 150 PSI compensator is the standard compensator and is typically used with flows up to approximately 25 GPM. For higher flows, the 230 PSI compensator should be used. For lower flows, a 90 PSI compensator can be used.
5. A Series 20 Load Sense Outlet (20LEx1) must be used in the stack valve assembly. The outlet must have the bleed down orifice.
6. The load sense port on the outlet needs to be plugged with a steel plug. There is no external load sense line.

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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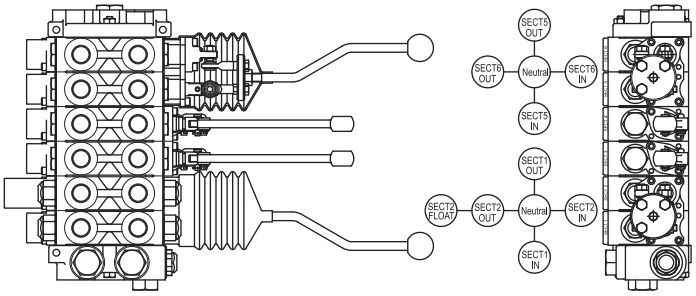
JOYSTICK HANDLES FOR SERIES “20”



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.

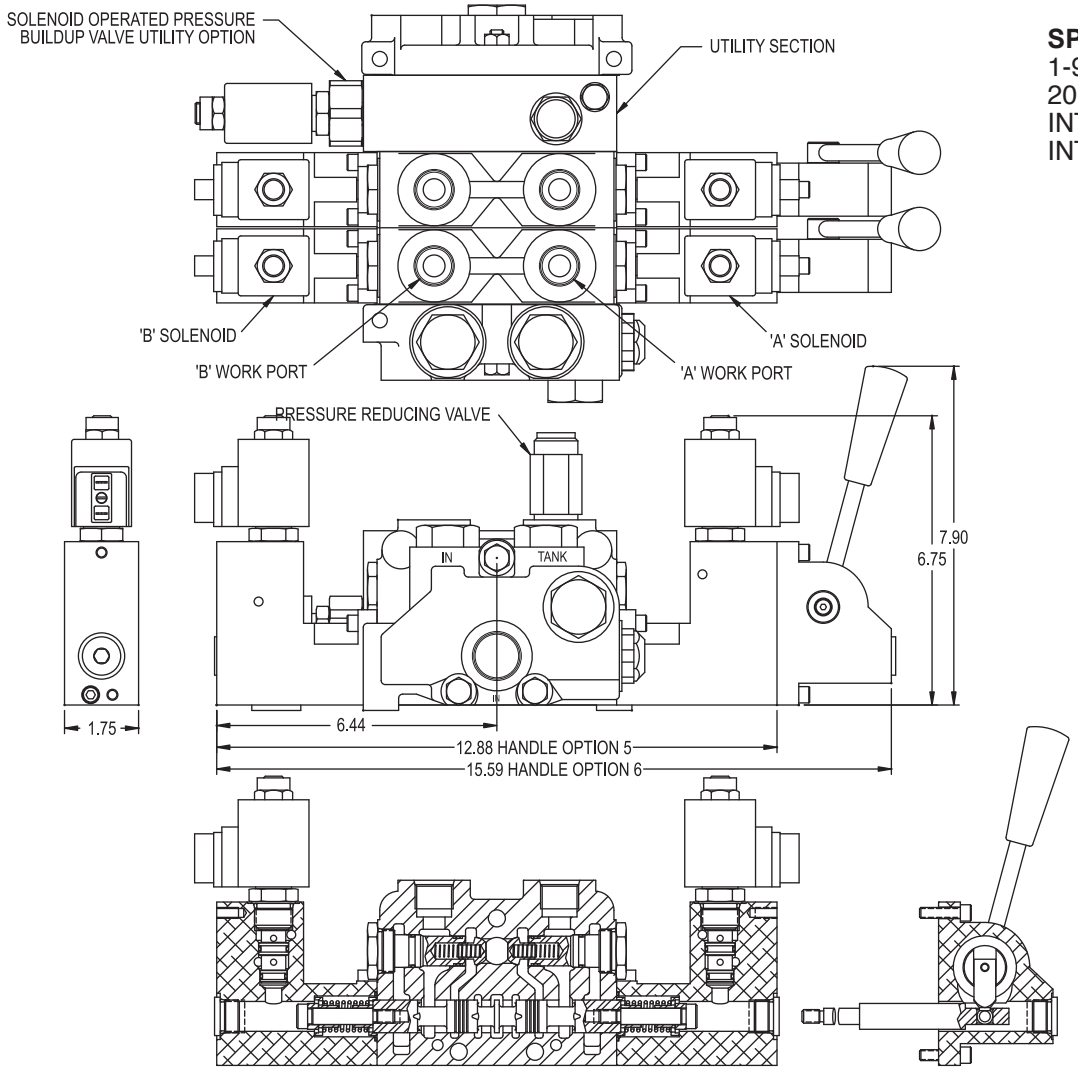
A typical handle to spool movement pattern is shown. Different patterns are also available. The Joystick handle can be used with standard three position spools or with four position float spools. If work port reliefs are required on the joystick end of a section, the relief cartridges must be the shim 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” SPLIT SOLENOID OPERATORS (SOLENOID OPERATORS ON BOTH ENDS)



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

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SERIES "20" SOLENOID OPERATED WORK SECTION

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

SOLENOID OPERATED WORK SECTION

20 P X X X X X X - S X X X

WORK SECTION TYPE
P - Standard Parallel
LP - Load Sense

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

SPOOL ACTION
A - Spring Center

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

*See page V34 for coil details.

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

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

UTILITY SECTION

20 U X - X X X

UTILITY TYPE
U - Standard Utility

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

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

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

PRESET INLET RELIEF CARTRIDGE

20IR - OX - 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	2000 PSI @ 3 GPM
Y - ANTI-CAV/SCREW RELIEF 2201-3000 PSI	2500 PSI @ 3 GPM

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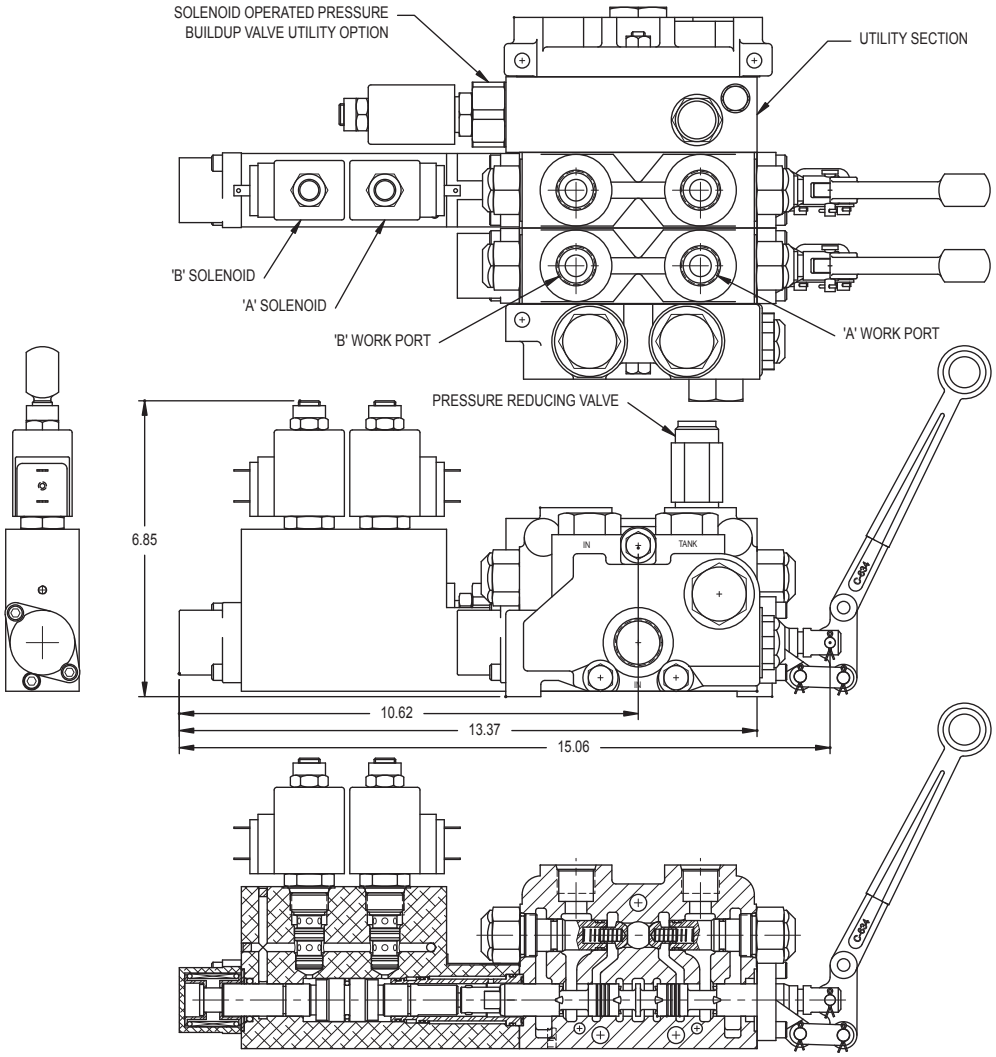
SEE PAGE 11, 12 & 13 OF THE STANDARD PRODUCT PRICE LIST FOR PRICING

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

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



SOLENOID OPERATED WORK SECTION

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

WORK SECTION TYPE
P - Standard Parallel
LP - Load Sense

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

SPOOL ACTION
A - Spring Center

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

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

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

*See page V34 for coil details.

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