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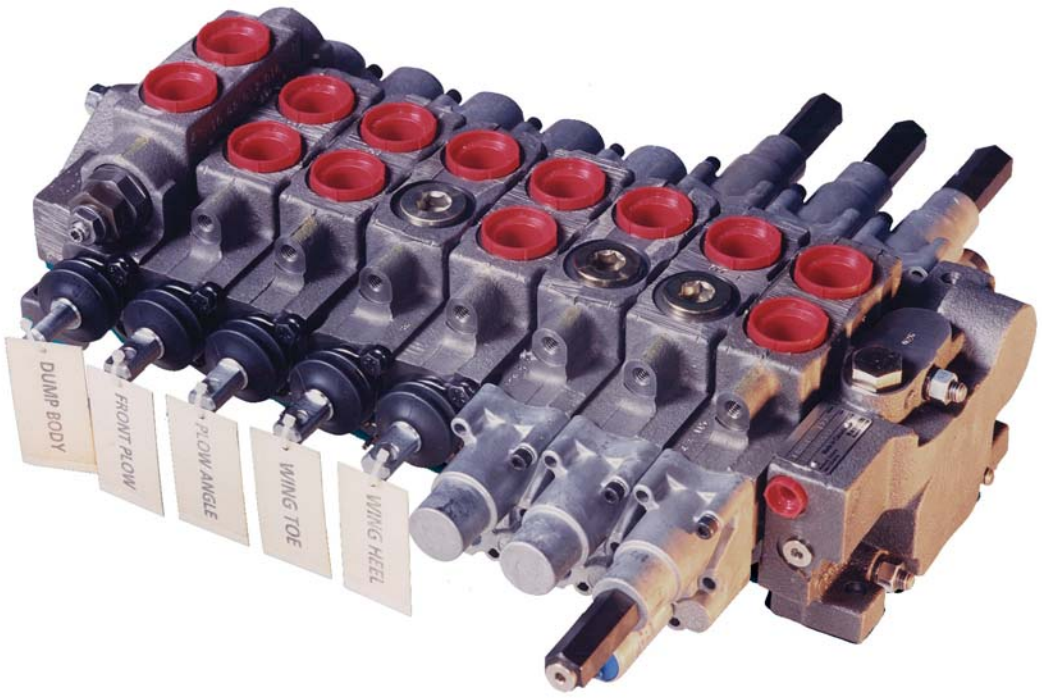
Rexroth
Bosch Group

MP18 Stacking Valve System Technical Information Manual

The Drive & Control Company



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- Manual Overrides are Incorporated
- Long Service Life
- Small Size
- Cast Iron Construction

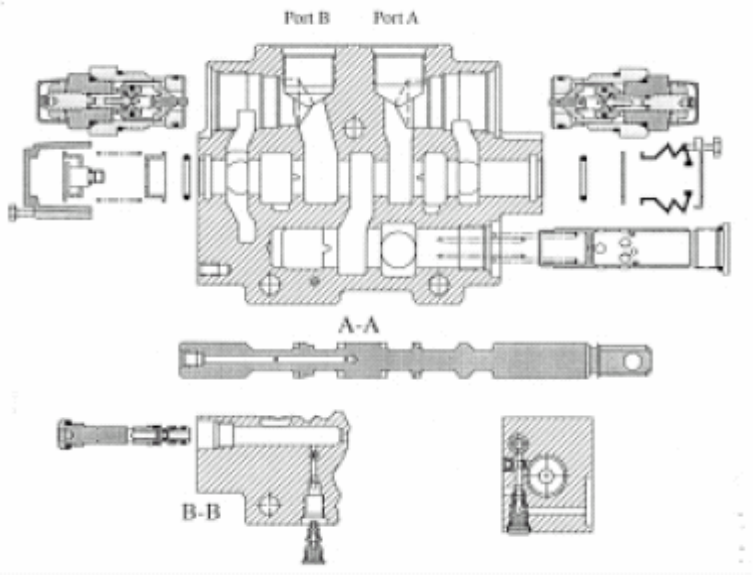
FUNCTIONAL PURPOSE

This stacking section type valve system provides modular building blocks for constructing hydraulic circuits to meet the needs of any spreader truck application.

Inlet sections are available to accept the flow from variable (piston) or from fixed (gear) pumps in an energy efficient manner.

Valve spool sections allow for electronic control of the spreader hydraulic motors, in forward or in reverse. In this way, the operator can vary the spinner speed and the Compu-spread electronic controller can automatically vary the material conveyor/auger speed, according to the vehicle speed, maintaining a selectable and constant spread rate. An optional material conveyor/auger reverse function is also available for use in solving the problem of conveyor/auger jamming caused by ice or foreign material (ie: rocks or bricks).

The valve circuit is extendable to control the other hydraulic actuators on your truck (such as: plow functions and dump hoists) simply by adding valve sections. Any of these additional valve sections can also be electronically controlled or they may be operated by on/off electrical solenoids, proportional air pilots, mechanical cables or levers, the choice is yours. You may also choose to add mechanical detents and/or port relief valves with make up checks to any of these additional valve sections.



Modular stacking valve spool section

DESCRIPTION

Individual manifold sections, containing the integrated circuit valving for each specific hydraulic function (such as the conveyor/auger motor drive), are bolted together to form a system specifically suited to your particular vehicle.

A closed centre inlet section is incorporated for use with variable displacement (piston) pumps. This inlet has a load (pressure) sensing port for communicating the system's requirements to the pump's control valves. In this way the pump will limit the maximum pressure that can be produced and will only provide the power that your hydraulic system requires.

If a fixed displacement pump is to be used, an open centre inlet section is selected. This inlet has a relief valve included, to limit the maximum pressure that can be produced. The relief valve also provides a load (pressure) sensing control based on the system's requirements. In this way the excess flow, provided by the pump, is bypassed to the reservoir at no greater pressure than necessary, reducing the power wasted (heat) that occurs in fixed displacement pump systems.

A load (pressure) sensing circuit within the valve sections determines the maximum pressure requirement of your vehicle and communicates this information to the main pressure control valve. This main pressure control valve could be in the pump (variable displacement types) or in the inlet section of this valve assembly, if a fixed displacement pump is used.

The spreader valve sections have main spools that are positioned by electronic solenoids, to control the oil flow to, and therefore speed of, the hydraulic motors. The flow is controlled proportionally to the electric current supplied. An optional electronic solenoid is available to operate the material conveyor/auger in reverse. This option is useful if the material conveyor/auger should become jammed by some foreign object. Any additional valve sections (ie: for plow functions) can also be electronically controlled or they may be operated by on/off electrical solenoids, proportional air pilots and mechanical cables or levers, the choice is yours.

Each valve section contains a pressure control valve that monitors the load (pressure) requirement of its hydraulic actuator and provides constant fluid flow (compensates) regardless of load changes and regardless of other valve section activity. By doing this, control is consistent and repeatable.

Manual overrides are provided for emergency operation of the valves should the electronic controller fail and to aid in trouble shooting the system. There is an override pin in the end of each electrical solenoid. The harder the pin is pushed the faster the hydraulic motor should turn. There is also an override screw at the end of the main valve spools. By turning these screws in, you can position the spools to establish a desired hydraulic motor speed. See the spare parts illustration of the end caps.

This modular arrangement allows an addition of auxiliary sections for plow and wing functions etc. For further assistance when specifying additional valve sections please consult your nearest Bosch Rexroth Canada Corp.

SPECIFICATIONS

Pressure Maximum Primary Relief Setting 3,000 P.S.I.

Flow Maximum Flow 35 G.P.M. (133L/Min.)

Solenoids

On/Off	P/N 029636 12 Volt	P/N 029752 24 Volt
Type of Supply	DC	DC
Nominal Voltage (V)	12	24
Power Requirement @ 65oF 20oC(W)	14.4	14.4
Coil Resistance (ohms)	10	40
Duty in (%)	100	100

Proportional	P/N 138956 12 Volt	P/N 202707 24 Volt
Type of Supply	DC	DC
Nominal Voltage (V)	12	24
Power Requirement @ 65oF 20oC (W)	1.8	0.8
Coil Resistance (ohms)	2.4	12
Duty in (%)	100	100

Number of Sections 8 sections maximum
Note: Please consult Bosch Rexroth when ordering 8 or more sections

OPERATING CONDITIONS

Recommended Filtration

In order to guarantee reliable function, both return and pressure filters should have 10 micron absolute elements installed.

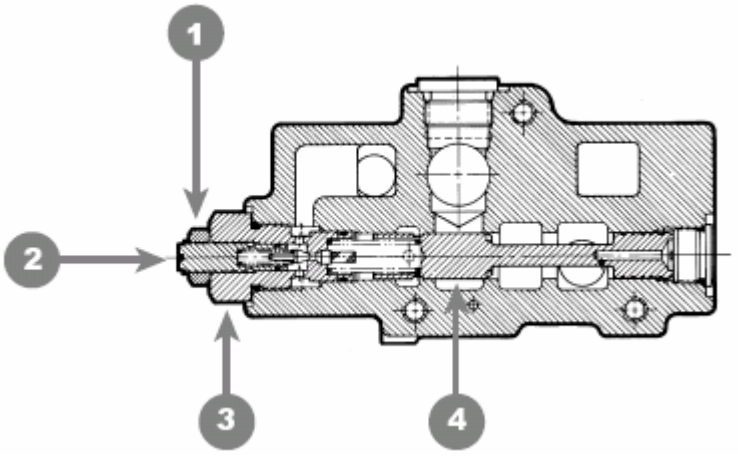
PRESSURE ADJUSTMENTS

Open Centre Unloading Inlet

Turn the maximum pressure adjustment screw (as shown) counter clockwise as far as possible. To do this you must first loosen the jam nut (as shown).

While dead heading one of the valve functions turn the pressure adjustment screw clockwise. Turn until you read the maximum pressure your system requires on the pressure gauge this is usually 1500-2500 psi.

Tighten jam nut (as shown) to secure setting.



1. Jam Nut
2. Pressure Adjustment Screw
3. Relief Cartridge
4. Unloading Spool

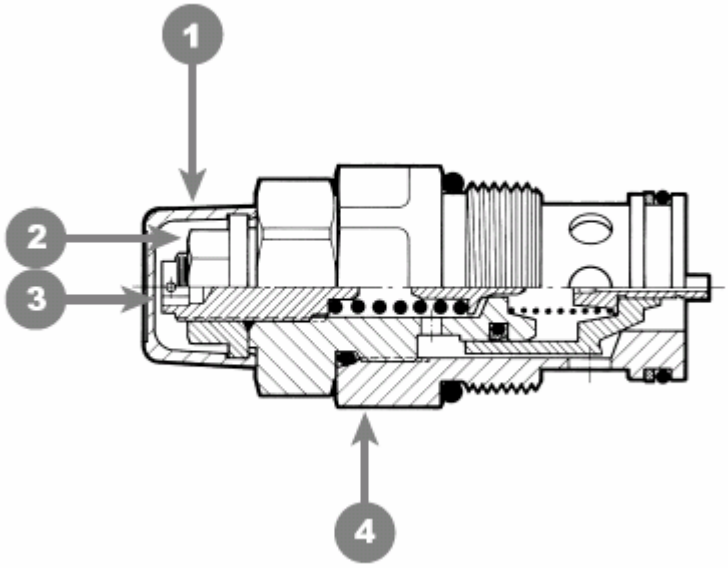
PRESSURE ADJUSTMENTS

A and B Port Reliefs

Turn the maximum pressure adjustment screw (as shown) counter clockwise as far as possible. To do this you must first loosen the jam nut (as shown).

While dead heading valve function with port relief, turn the pressure adjustment screw clockwise. Turn until you read the desired pressure on the pressure gauge. Tighten jam nut (as shown) to secure setting.

NOTE: As per spare parts information be aware of the relief cartridge you are using. Low pressure relief range is between 300 and 1400 psi and high pressure relief is between 1450and 3625 psi



1. Protective Plastic Cap
2. Jam Nut 3/4"
3. Pressure Adjustment Screw 3/16" Allen Head
4. Port Relief Cartridge

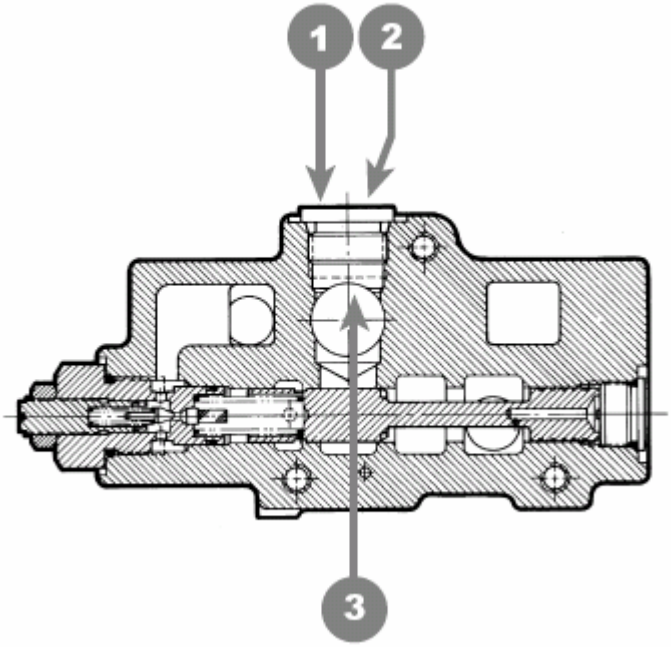
FIELD CONVERSIONS

Open Centre Unloading Inlet with Power Beyond Port

Caution: Upon conversion of standard unloading inlet to a power beyond inlet, relief protection must always be supplied on the power beyond circuit.

The conversion is very simple, remove the port plug normally located on top of the inlet (as shown). Install hollow Hex Pipe Plug, Bosch Rexroth P/N 016846, into cavity (as shown).

NOTE: Pipe plug 3/4" Dry Seal



1. Remove port plug normally installed here. SAE-12 size.
2. Power beyond circuit must provide relief protection.
3. Install hollow hex pipe into cavity here.

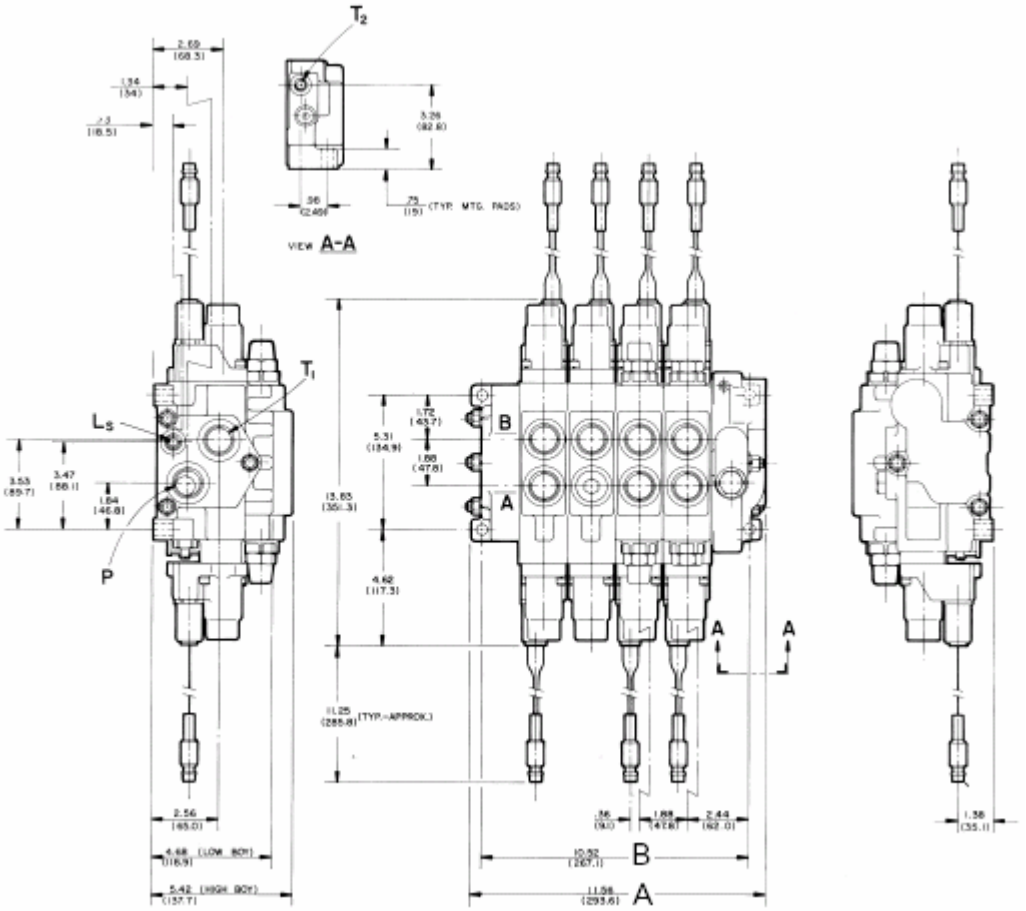
UNIT DIMENSIONS MP STACKING HYDRAULIC VALVE

Standard Port Sizes (SAE)

Inlet Section	P (Inlet)	T (Tank)	LS (Load Sense)
Closed Centre	# 16	# 16	# 6
Open Centre	# 16	# 16	—

Spool Section	A & B (Work Ports)
	# 12

End Cover	P (Inlet)	T (Tank)	LS (Load Sense)	T2 (Drain)
L (CPL)	# 12	# 12	# 4	—
Q	—	—	—	# 4
Q (CPL)	# 16	# 16	# 4	# 4



Closed Centre Inlet with Standard End Cover

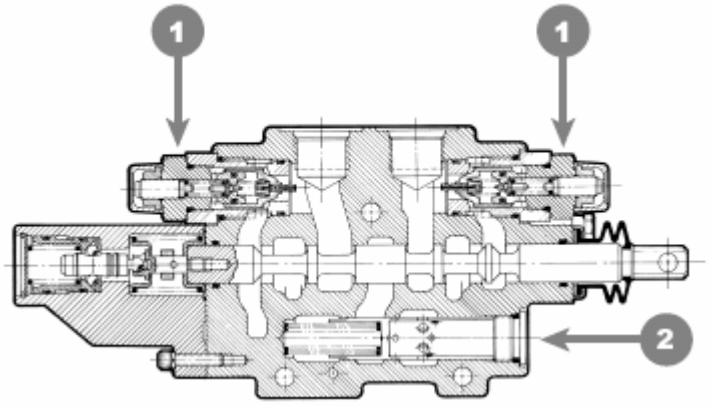
Number of Directional Control Spools	Overall Length A		Bolt Hole Covers B	
	IN	MM	IN	MM
1	5.70	144.8	4.88	124.0
2	7.58	192.6	6.76	171.7
3	9.46	240.3	8.64	219.5
4	11.34	288.0	10.52	267.2
5	13.22	335.7	12.40	314.9
6	15.10	383.5	14.28	362.6
7	16.98	431.2	16.16	410.4
8	18.86	478.9	18.04	458.0

Open Centre Inlet with Standard End Cover

Number of Directional Control Spools	Overall Length A		Bolt Hole Covers B	
	IN	MM	IN	MM
1	6.86	174.3	6.01	152.6
2	8.74	222.0	7.89	200.3
3	10.62	269.8	9.77	248.0
4	12.50	317.5	11.64	295.8
5	14.38	335.7	13.52	343.5
6	16.26	412.9	15.40	391.2
7	18.14	460.7	17.28	438.9
8	20.02	508.4	19.16	486.7

HIGHBOY/LOWBOY MANIFOLD SECTIONS

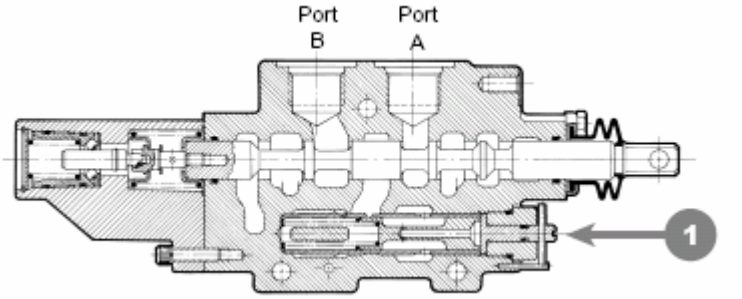
"High Boy" manifold sections are taller than "Low Boy" manifold sections. This extra height allows for material that may be machined to accept work port ("A" & "B") relief valves cartridges with make up checks. These optional valve cartridges are provided if over pressure protection is desired for the hydraulic actuators, motors or cylinders. Over pressure protection may be desired if a plow cylinder is forced to move by the load. Without protection, the pressure may build to a high enough level to damage the cylinder or burst a hose.



High Boy

1. Work port optional valve cartridges
2. Compensator spools with fixed flow limit

"High Boy" manifold sections will accept compensator spools that provide a fixed maximum flow limit. "Low Boy" manifold sections will not.



Low Boy

1. Compensator spools with adjustable flow limit

"Low Boy" manifold sections will accept compensator spools that provide an adjustable flow limit (3 to 30 GPM). "High Boy" manifold sections will not.

SPINNER AND AUGER/CONVEYOR ASSEMBLIES ONLY

The most common valve assemblies are used to provide actuation of spinner and auger/conveyor functions only. A wide range of value configurations are available to control additional functions. Please review this module for further information regarding valve models and configurations.

Photographs are supplied to aid in the identification of existing valve assemblies, as well as, to show standard configurations available for immediate delivery.

MP 18 Valve Assembly

Valve P/N122185 for gear pump applications, the assembly is equipped with an unloader inlet. The valve is of cast iron construction to prevent salt corrosion. Pressure compensation for both spinner and auger/conveyor functions is standard

Inlet-Closed Center

Valve P/N122419 for closed center variable piston pump applications. In this case the unloader inlet has been removed in favour of the closed centre inlet as shown. Again, functionality and construction as per P/N122185, only the pump supplying the valve assembly is a closed center, variable piston pump (see Module 3A).

If you already have a valve assembly consisting of more than the two valve sections for the spreader motors, the inlet section and end cap; the detailed information for your valve system will be outlined in Module 1 "Order Specific Information" module of the Compu-Spread Manual.

BUILDING A MANIFOLD BANK ASSEMBLY

What you need to build a valve assembly

1. Arrange the manifolds in the following order according to function, on a flat surface.

You will require:

1.1 one inlet section (Part No. 016489 - closed centre for variable displacement piston pumps) or (Part No. 190156 - open centre for fixed displacement gear pumps)

1.2 one to eight main valve sections

1.3 one end cover Use P/N 016463 or 003857 if assembly has one or more electrical sections. Use P/N 018095 or 005120 if assembly has no electrical sections.

1.4 one tie bolt kit consisting of:
- O-rings
- shims
- three tie bolts
- lock washers
- nuts

For Part No. see Bolt Kit listing under spare parts

1.5 one dust boot kit for each mechanically (cable or air) actuated section. Part No. 014244

1.6 four O-rings for each electrically or electronically actuated section. Part No. 005974

2. Lubricate the O-rings with clean hydraulic oil and put them in place.

3. Insert the tie bolts, ensuring that there is one (and only one) shim on each tie bolt between each manifold section.

4. Loosely install the lock washers and nuts.

5. Ensure that all manifold sections are flush against the flat surface.

6. Torque the tie rod nuts to 28 lb. ft.

BUILDING A MANIFOLD BANK ASSEMBLY

Recommended Assembly Order

1. Inlet
2. Spinner
3. Conveyor/Auger
4. Dump Body
5. Plow Angle
6. Front Plow
7. Wing Toe
8. Wing Heel
9. Wing Brace
10. End Cap

NOTE: If items 4-9 as above are not electrical or proportional sections place them between inlet and spinner section.

PROBLEM SOLVING GUIDE

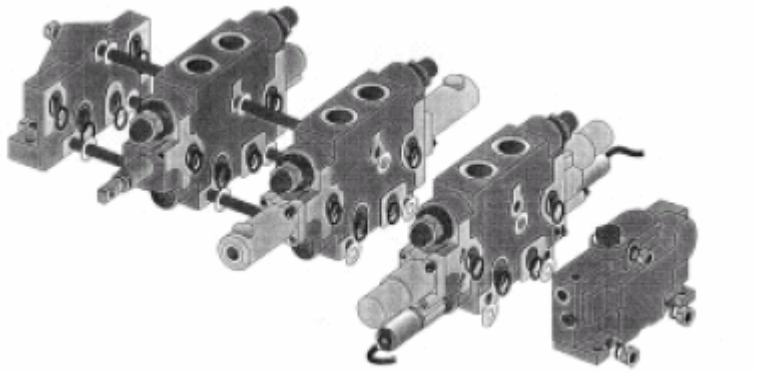
Problem	Probable Cause	Corrective Action
High P-T pressure drop	• Sticky unloading valve spool • Sticky main spool - not in neutral	• Remove, clean and flush inlet • Record LS pressure at inlet plug, shift main spools to determine which is sticky • Remove, clean and flush section
High or low system Pressure	• Wrong main relief setting • Wrong pump compensator setting	• Re-adjust main relief valve • Re-adjust pump compensator
	• Loss of pilot signal at LS port	• Dirt in shuttles, Dead head all ports starting from first section to determine which shuttle may have dirt. Remove shuttle, clean and flush section.
	• Low setting of cyl. port relief valve or section pressure regulator	• Check and re-adjust cyl. port relief valve or section pressure regulator
Pump stays at high Pressure	• Sticky main spool • Sticky compensator spool	• See sticky spool below • Remove compensator spool and inspect for dirt of damage. Clean spool and flush valve if dirty. If spool is damaged, change section.
	• Actuation pressure does not drain	• Check that actuation pressure from pilot controller is at 0 PSI. If this occurs in an electrical section, remove the solenoid and inspect that the spool is free. Blow in end of solenoid valve, air should come out tank drain.
Can build pressure or obtain flow from one port	• Dirt in primary shuttle or damaged O-ring on shuttle	• Remove primary shuttle, check O-ring, clean and replace O- rings if required. Flush valve and re-install shuttle.
No pressure or flow at either work port	• Dirt in secondary shuttle	• Starting with first spool, shift in both directions with blocked work ports. Work towards end cover, testing each section until you come to section which will not build pressure. Remove and check O-ring, replace if required clean and flush the secondary shuttle in this section. If you still can't build pressure, repeat procedure in previous section.

PROBLEM SOLVING GUIDE

Problem	Probable Cause	Corrective Action
High work port leakage	• Dirt in cyl. port relief valve • Damaged relief valve seals • Spool not centered	• Remove, clean, flush, re-install • Inspect and replace as required • Check for sticky spool
Leaks between sections	• Missing or damaged face seals	• Disassemble valve stack & check for missing or damaged O-rings
Sticky spool	• Damaged spool	• Remove & inspect, if damaged change section
	• Linkage binding	• Check linkage for friction, clean and lubricate
	• Uneven torque of tie rods of mounting bolts	• Loosen mounting bolts, if spool is free, re-mount on level surface. Loosen tie rods and re-torque to 22 - 25 ft. lbs. with valve on level surface.
	• Incorrect number of shims on tie rods	• Disassemble and check that inspect for dirt or damage causing sticky spool in tube. If dirty, clean & flush valve and reassemble. If damaged, replace section.
Detent will not hold	• Broken detent shaft	• Remove detent housing & inspect shaft. If damaged, clean housing replace shaft.
Electrical sections will not function	• Broken electrical connection	• Check for proper electrical connections. Actuate manual override pin on solenoid to determine if problem is electrical or hydraulic.
	• Burned out solenoid coil	• Check resistance of coil (see coil specifications in this module) If value out of range replace solenoid assembly.
	• No pilot pressure to solenoid valves	• Check pressure at P2 port in end cover for pilot supply pressure. If pressure is below 100 PSI the pressure reducing valve is stuck. Remove & clean the pressure reducing valve & flush end cover.

STANDARD SPARE PARTS

Part Number	Description
008716 Seal Kit	O-rings and shims required between any two sections



Bolt Kits Include:

- shims
- O-rings
- tie-bolts
- nuts & lock washers

For closed centre applications (variable displacement pumps)

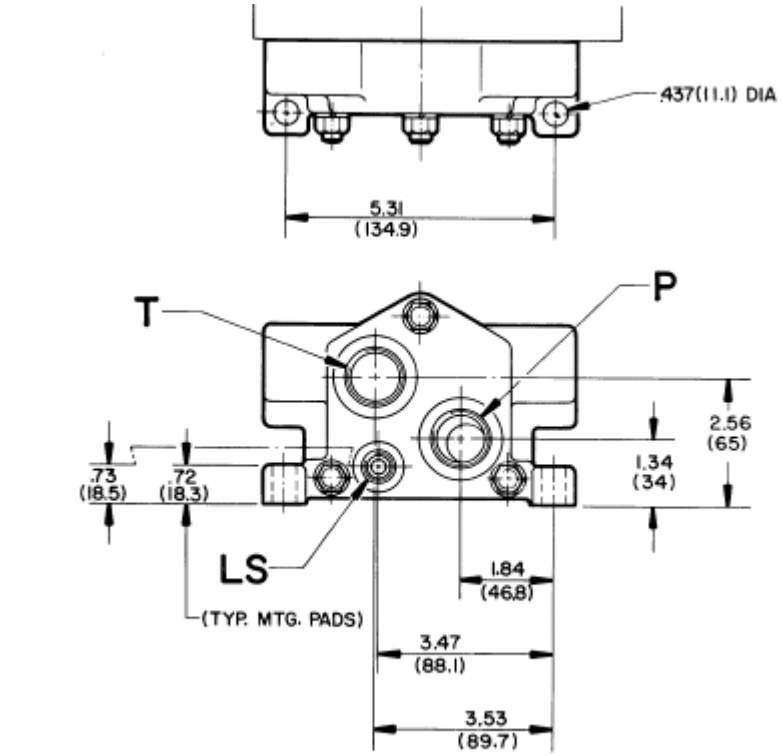
010672	2 section
012358	3 section
005115	4 section
014124	5 section
014359	6 section
015288	7 section

For open centre applications (fixed displacement pumps)

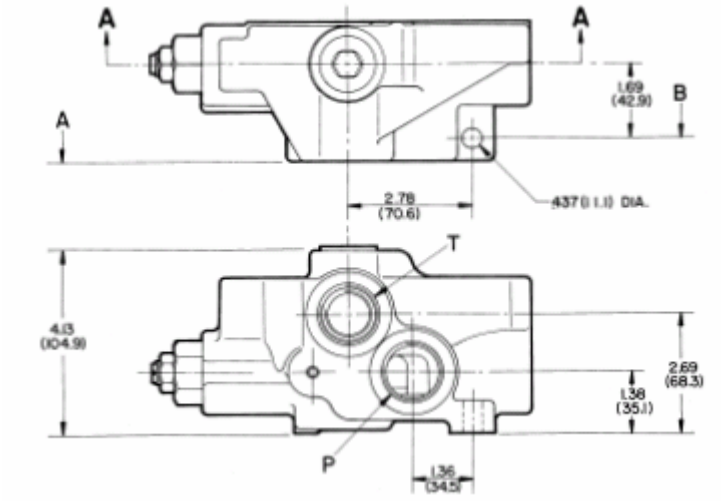
014123	2 section
003739	3 section
010898	4 section
016499	5 section
016498	6 section
016501	7 section

Standard Inlet Sections

Part Number	Description
016489	closed centre for variable displacement piston pumps



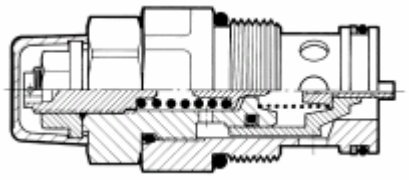
190156	open centre for fixed displacement gear pumps



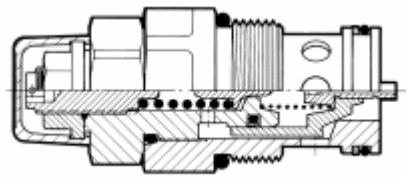
STANDARD SPARE PARTS

Secondary Port Options (for highboy sections only)

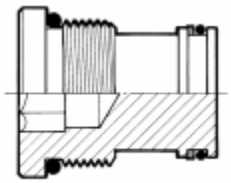
Part Number	Description
016497	relief valve cartridge with make up check (for over load protection at “A” or “B” port option, 300 - 1400 PSI application)

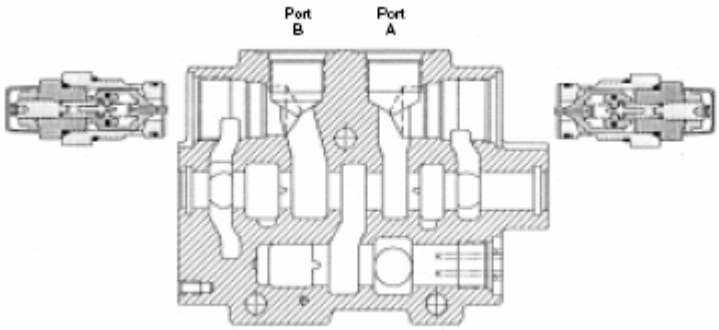


012357	relief valve cartridge with make up check (for over load protection at “A” or “B” port option, 1450 - 3625 PSI application)



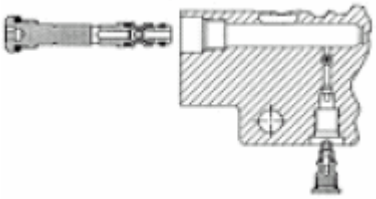
019310	"A” or “B” port option plug



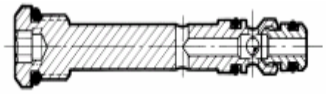


STANDARD SPARE PARTS

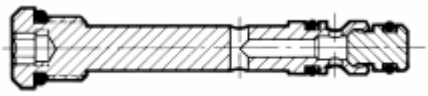
Primary Shuttle Assembly



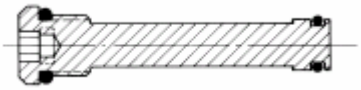
Part Number	Description
016490	double acting “A” & “B”



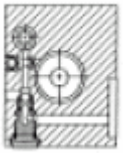
150424	single acting “B”



019307	single acting “A”



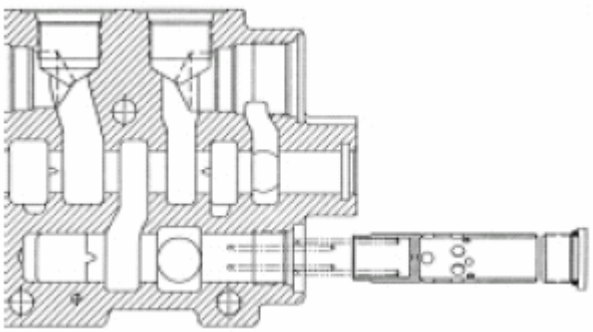
Secondary Shuttle Assembly



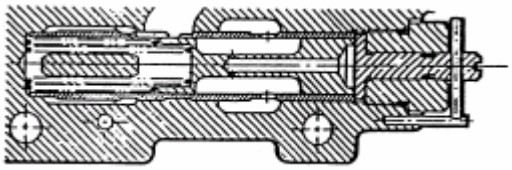
Part Number	Description
160794	ball and seat plug

STANDARD SPARE PARTS

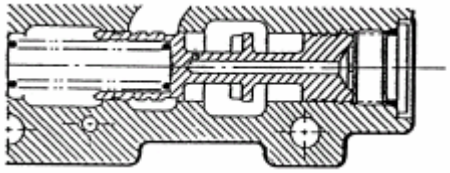
Flow Controls and Compensators



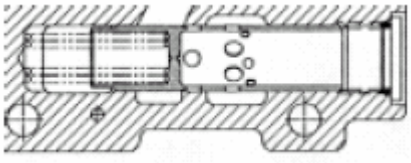
Part Number	Description
129648	long stem adjustable flow control, low boy only (3 to 30 GPM)
123883	short stem adjustable flow control, low boy only (3 to 30 GPM)



123925	solid compensator kit low or high boy (35 GPM)

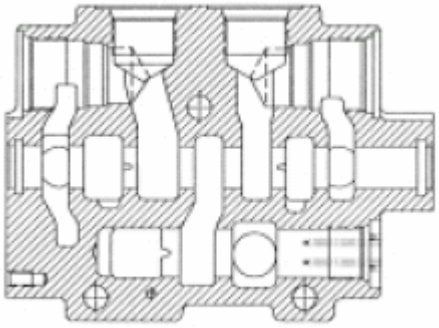


123911	hollow compensator kit, high boy only (15 GPM)
132478	hollow compensator kit, high boy only (30 GPM)
104337	compensator spool (15 GPM)
020416	compensator spool (30 GPM)



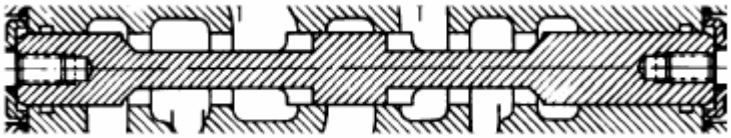
STANDARD SPARE PARTS

Directional Valve Spools



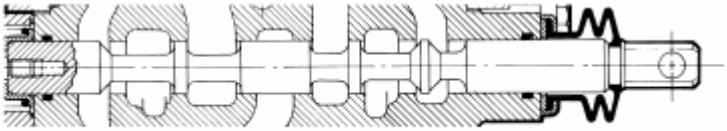
For use with electrical/electronic solenoids or with hydraulic pneumatic pilots

Part Number	Description
016484	11 GPM for cylinders
016483	15 GPM for cylinders
109879	24 GPM for cylinders
016488	35 GPM for cylinders
110548	11 GPM for motors
110299	15 GPM for motors
185559	24 GPM for motors
110366	35 GPM for motors



For use with mechanical cables/levers

Part Number	Description
110457	35 GPM for cylinders
106962	35 GPM for motors



STANDARD SPARE PARTS

Section End Caps

PartNumber	Description
144529	"A" end without solenoid assembly with manual override screw
027297	"B" end without solenoid assembly with manual override screw
113192	blank end cap

NOTE: Manual override screws may be turned in until they push the main valve spool far enough to allow oil to flow to the hydraulic motor. Once the motor is running at the desired speed, the override may be locked in place. This feature will allow the operator to continue to spread material if the electronic spreader control fails.

Solenoid Assembly

Part Number	Description
Electrical on/off	
029636	12 volt (10 ohms)
029752	24 volt (40 ohms)
Electronic Proportional	
138956	12 volt (2.4 ohms)
117664	24 volt (12 ohms)

O-Rings

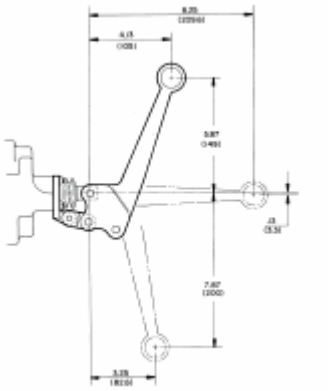
For between end cap and manifold sections

Part Number	Description
006048	large diameter (either end)
007646	small diameter ("A" end only)
005974	small diameter ("B" end only)

STANDARD SPARE PARTS

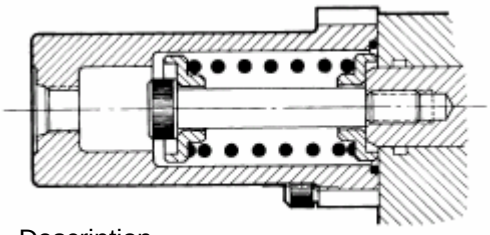
Mechanical Accessories

Part Number	Description
004779	lever assembly complete with dust boot kit
014244	dust boot kit only



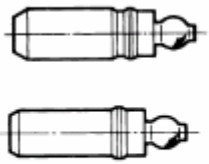
Pilot Options

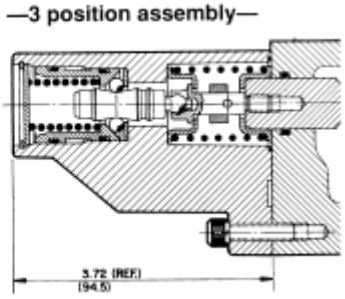
Part Number	Description
200585	hydraulic housing
123489	Del pneumatic (air) shifter



Detent Assemblies

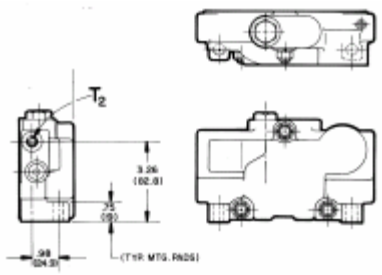
Part Number	Description
019315	code “E” for plow down (spring centre / detent on “A”)
019316	code “J” for plow float (spring centre / fourth position)
019313	code “A” operator kit (spring centre)



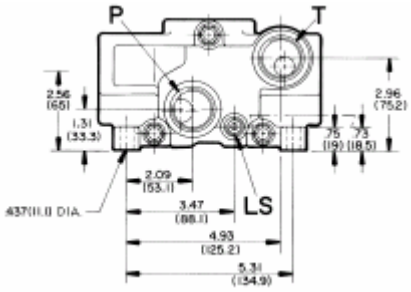


Standard End Covers

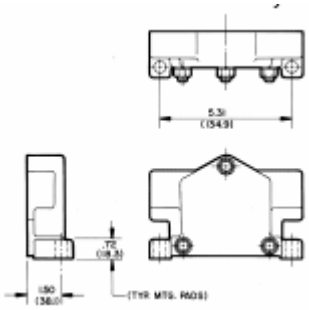
Part Number	Description
016463	for use with electronic / electrical solenoid operated valve sections



003857	same as above with auxiliary “P”, “T” and “LS” ports



018095	for use with mechanical cable / lever or hydraulic / pneumatic operated valve sections



005120	same as above with auxiliary “P”, “T” and “LS” ports