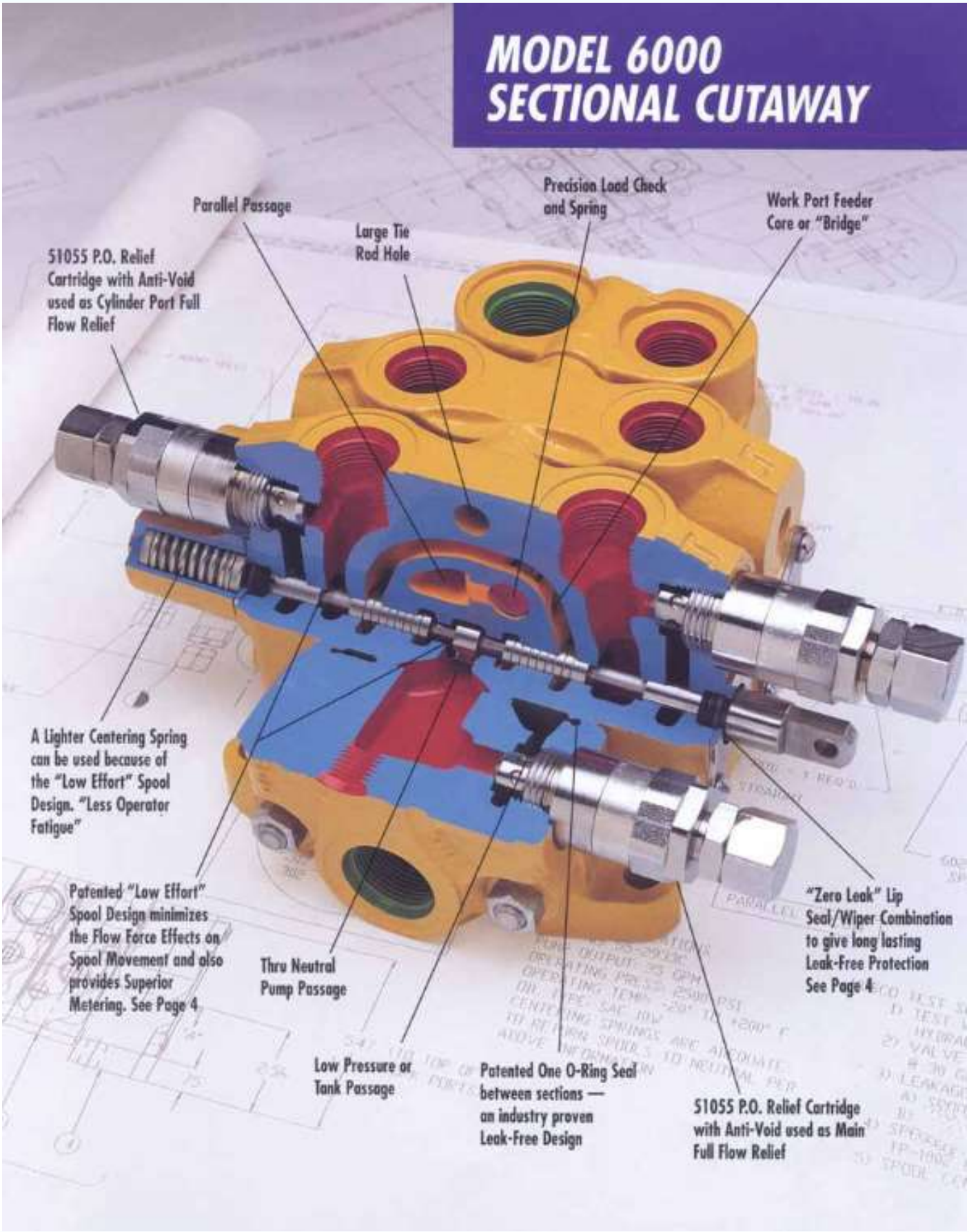
CONTROL FOCUSED . TECHNOLOGY DRIVEN

6000

Hydraulic Control Valves

HUSCO INTERNATIONAL
control focused - technology driven

MODEL 6000 SECTIONAL CUTAWAY



Model 6000

The Model 6000 sectional valve is a directional control valve designed for use with parallel, conventional and serious circuit hydraulic systems, of open or closed center types. Model 6000 inlets, mid-inlets, outlets and spool sections provide a compact envelope to save space.

Standard spool types include single acting, double acting, motor and double acting float, with non-standard custom designed spools available.

Most design requirements can be met with a variety of work port options and end mechanisms.

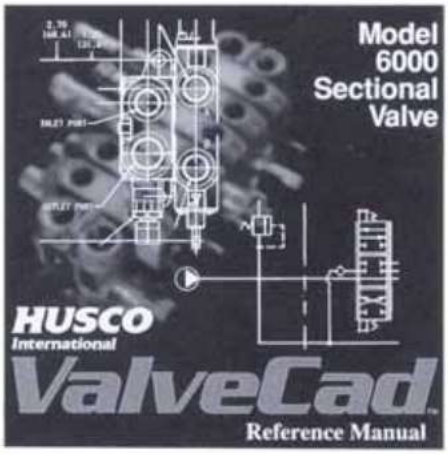
Features

- "Low effort " spools
- "Zero leak spool seals } see page 4.
- 4000 psi maximum operating pressure-see page 6.
- Open center or closed center operation.
- Hard chrome plated spools.
- Load check in each section.
- Single "low pressure" O-ring sealing between sections.
- Precision metering.

Options

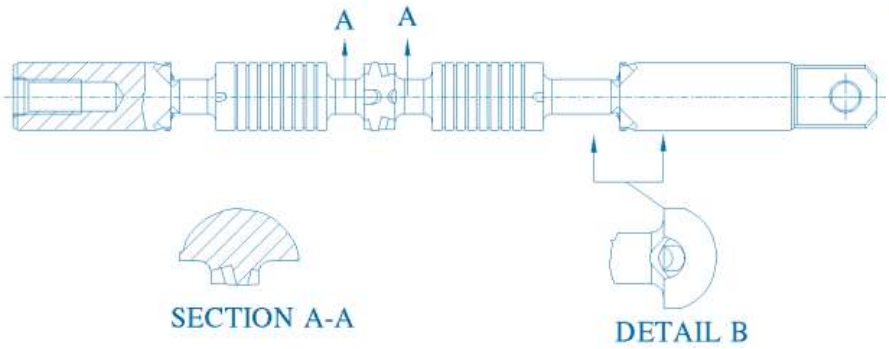
- High pressure carry over (Power Beyond)
- Lock-Out section.*
- Mid-inlet check/upstream flow combiner or separator.
- Left hand spool sections.
- Parallel, Conventional and Serious circuitry.
- End Mechanism:
  - Spring Centered;
  - Detent-single or multi position;
  - 4th Position float;
  - Hydraulic pilot operated;
  - Automatic kickout;
  - Magnetic detent*.
- Auxiliary Valves:
  - Pilot Operated, anti-cavitation check combination; relief Cartridges.
  - Anti-Cavitation: Cartridges.
- Regenerative spools*
- Specialized spools*
- Consult Factory.

ValveCad™ Software Package
For Your AutoCAD® System



With the ValveCad Software Package, you can place all the dimensional and circuit information on components, options and accessories for the HUSCO Model 6000 sectional control valve directly into your AutoCAD® drawing system. This will significantly increase the speed, accuracy and efficiency of your design process, and help you produce specification drawings in a fraction of the time required to redraw the parts from scratch.

Information about obtaining and using the ValveCad package for your application is available from your local HUSCO Distributor or directly from the factory.



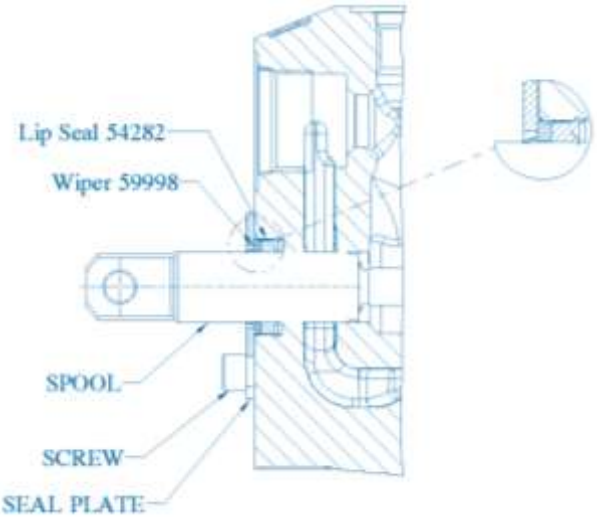
The term “Low Effort” was associated with this spool
Type as result of the successful design efforts to reduce the variety of flow forces on the spool during operation.

The machined notch design in detail A directs the **fluid entering** the spool land area in such a way as to create a reactionary force on the spool that reduces the force created by the high velocity. The machined notch in detail B cushions the **exhausting fluid** from the land area by directing the initials flow jet back against the housing land when the grooves are first exposed, then vertical to the spool axis as the groove completely opens.

The combined effect of both notch types not only reduces the flow forces the flow forces for easier spool movement and with less operator fatigue, it also provides a spool with an increased metering band for superior control. Especially during multifunction operations

For the reasons above and many years of proven successful applications of “low effort” spool type design. Model 6000 spool sections equipped with “low effort “ type spools became the obvious choice to feature in the Model 6000 Catalog.

“Zero Leak” Seals



Through may hours of research and testing. HUSCO international has determined the best seal arrangement to keep your system dry.

This seal arrangement has been incorporated into our standard catalog of model 6000 spool sections and specified as “zero Leak” seals.

Note: The “Zero Leak” seal arrangement contains a lip seal that requires a special tool and procedure for its installation in the field. Consult factory for this procedure. The machined groove for spool end seals did not change to accommodate the “zero Leak” arrangement. Therefore, the previous P/N 571 O-ring and P/N 4137 back-up ring combination can be used. These are still used on the end mechanism kits for ease of field installation

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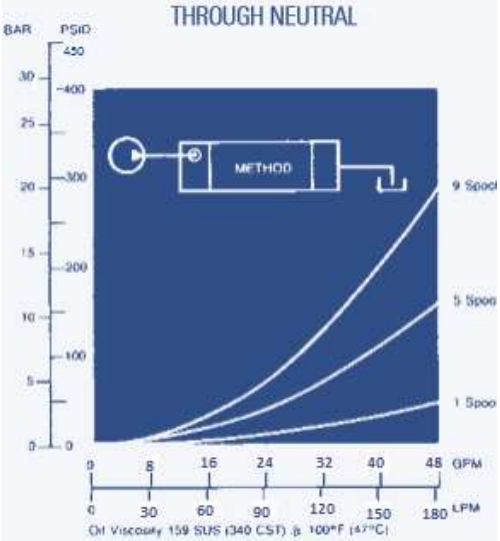
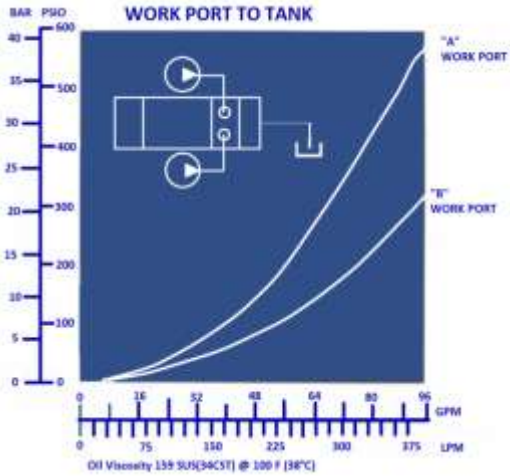
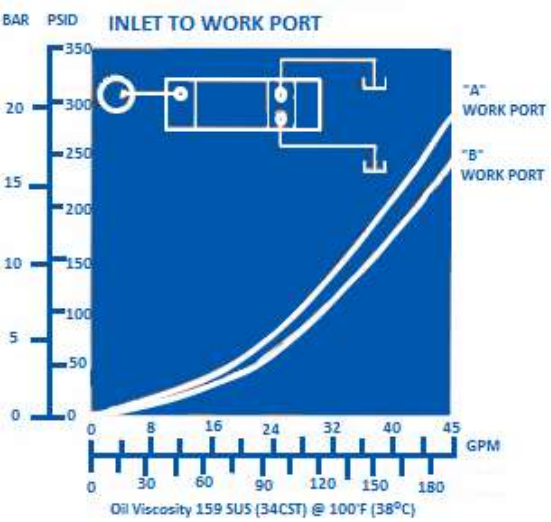
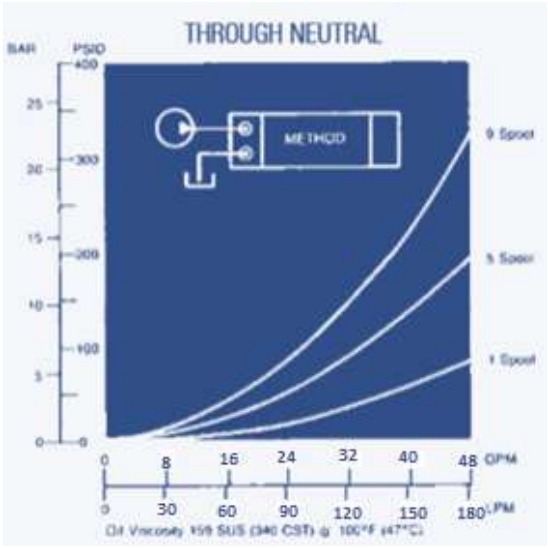
Pressure Drop Curves









Technical Data

Flow rating (nominal).....35 U.S. gpm (132 lpm)

Maximum Rated Operating pressure
Parallel Spool Sections..... 4000 psi (276 bar)*
Conventional Spool Sections.... Consult Factory

(Method of verifying rated fatigue pressure of the pressure containing conforms to NFPA recommended Std.
NFPA/2.6-1974 Category 1/90)

Seals..... Buna-N Standard Vitron optional.

Recommended
Filtration.....10 micron nominal

Maximum number of spool sections (any combination of) per valve assembly.....10

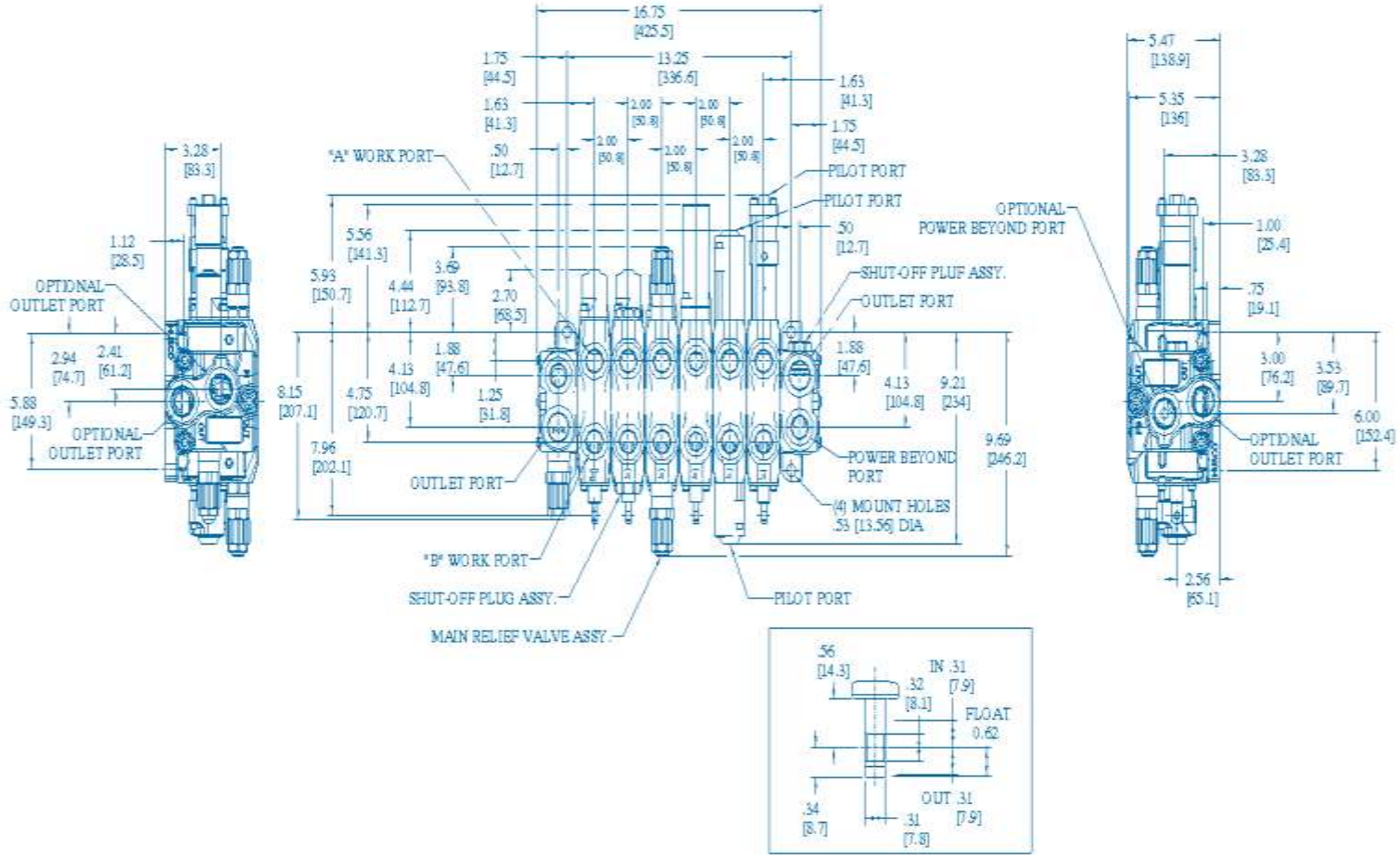
Maximum outlet per pressure.....250 PSI

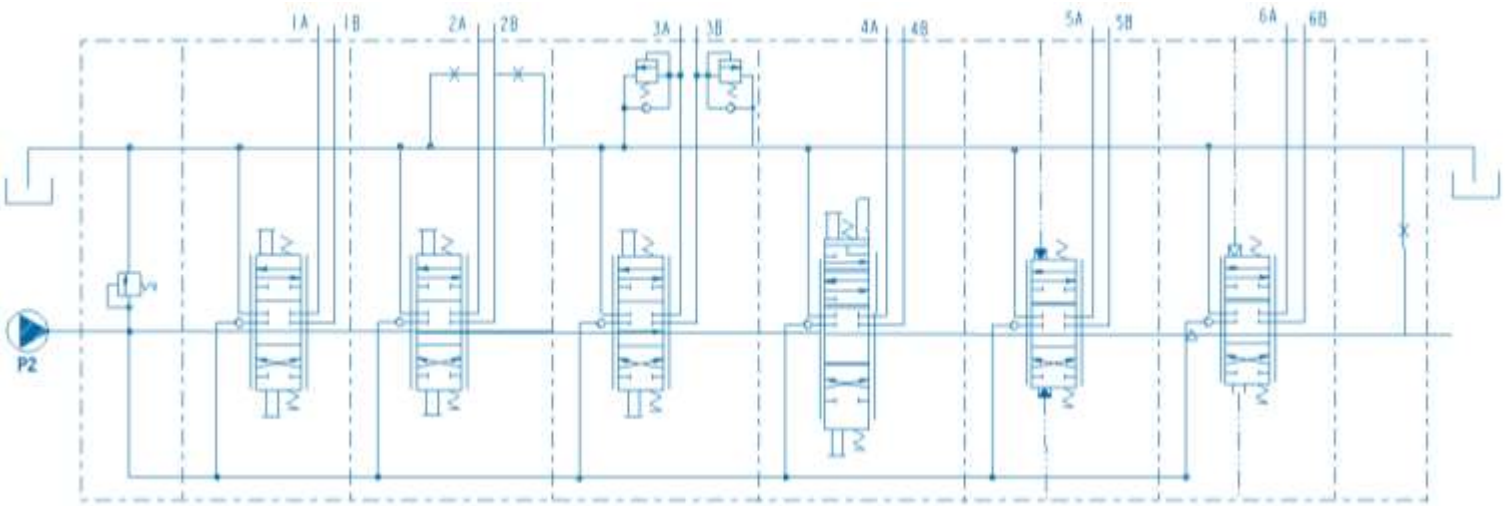
We reserve the right to amend these specifications at any time without notice. The only warranty applicable is our standard written warranty. We make no other warranty, expressed or implied.

Performance characteristics shown are typical of production units tested in the laboratory and not necessarily representative of any one unit.

- Consult factory-certain port sizes may reduce this rating.

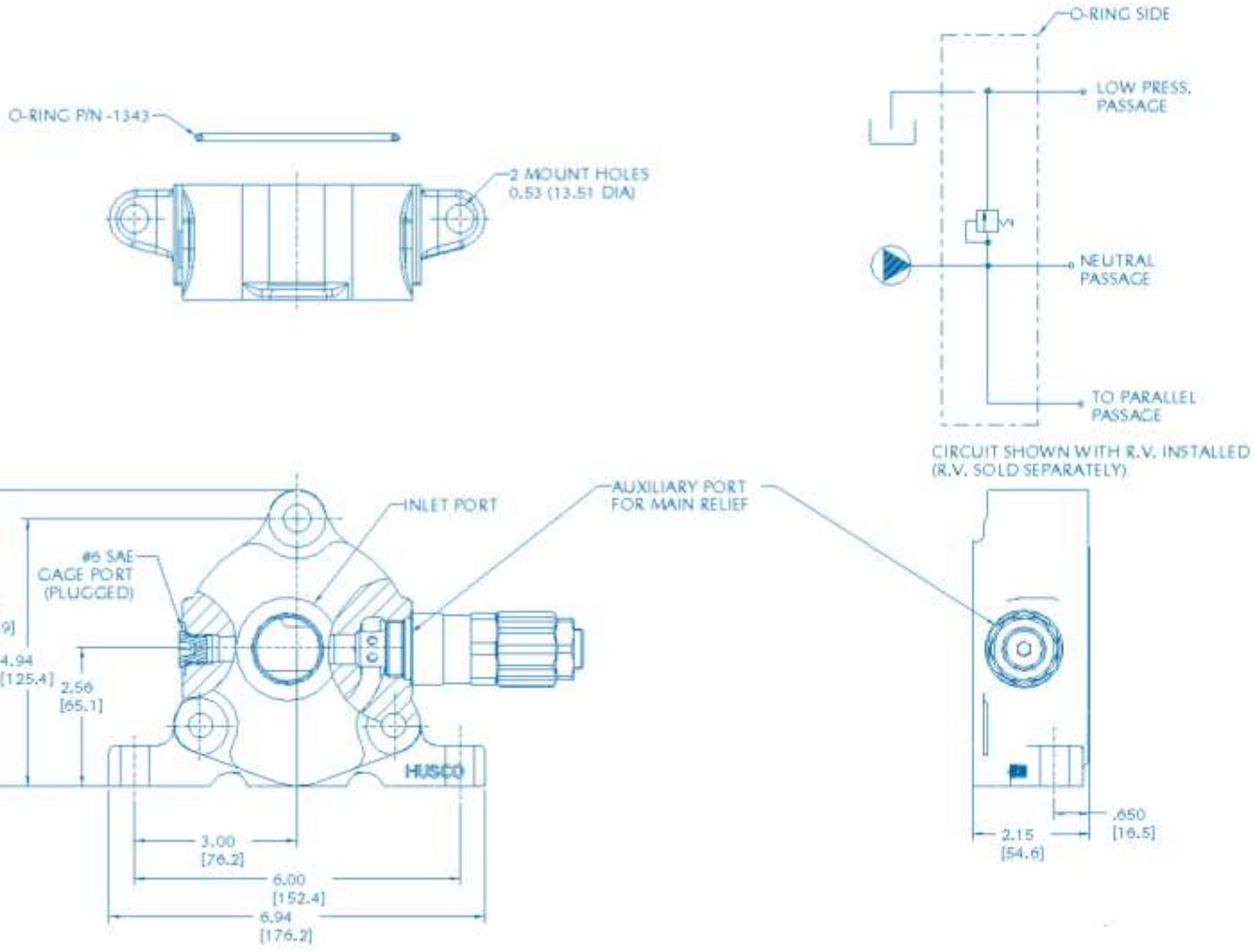
Model 6000 Valve Assembly





Inlet Section Assemblies

With Auxiliary Port For Main Relief Valve.
End Inlet And Side Gage Port (Plugged)



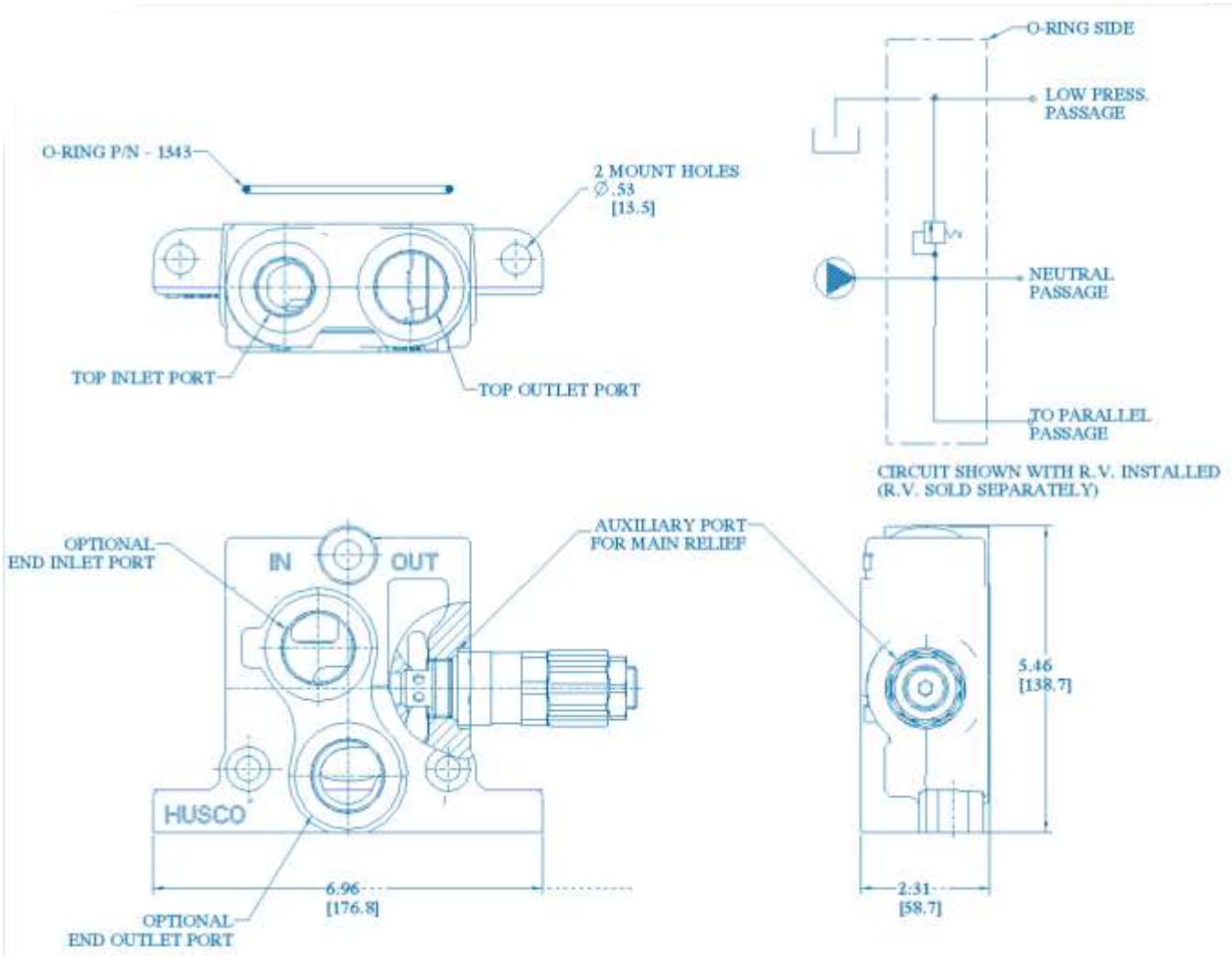
PORT SIZE	INLET SECTION (PART NUMBER (51055-R.V.)
SAE #16	6001-J11

Used in Section 1 of the Valve Assembly Specification Sheet (Pg. 33)

Weight: Approx. 9.44 lbs. (4.3 kg)

Inlet/Outlet Section Assemblies

With auxiliary ort for main relief valve. Top inlet/outlet ports and optional end inlet/outlet ports



PORT SIZES				INLET SECTION PART NUMBER (51055 R.V.)
INLET		OUTLET		
TOP	END	TOP	END	
SAE 12	NONE	SAE 16	NONE	6001-D100
SAE 12	SAE 16	SAE 16	SAE 16	6001-D102

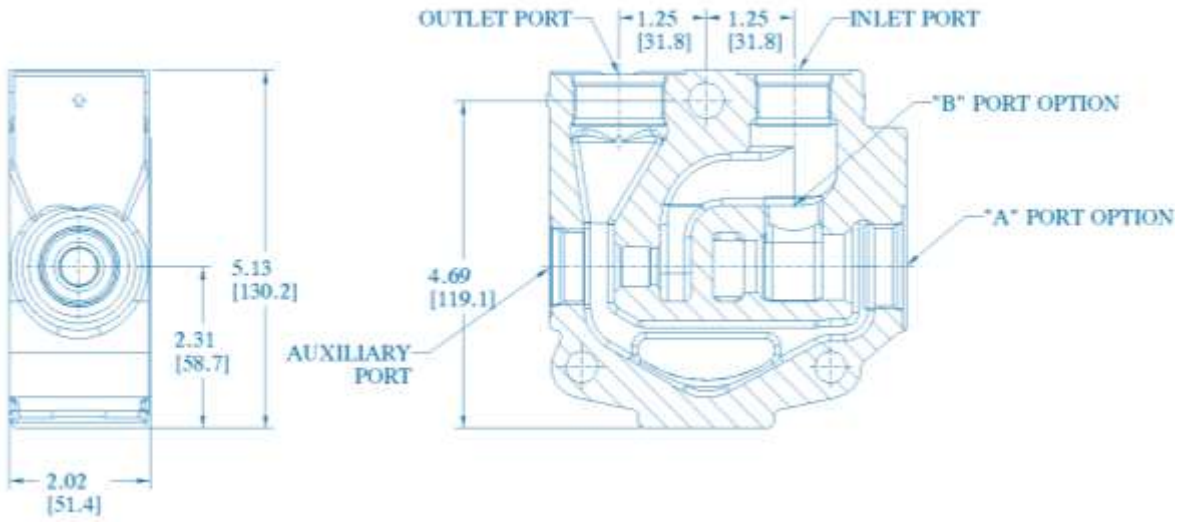
See page 7 for additional dimension information

Used in section 1 of the valve assembly specification sheet (Pg. 33)

Weight:
Approx. 9.5 lbs (4.3 kg)

Mid-inlet Section Assemblies

Must be ordered in conjuction with one of the options show below

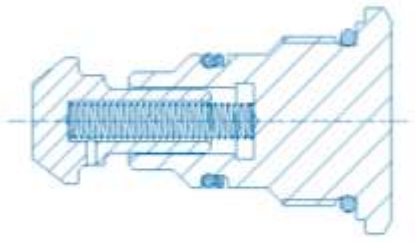


PORT SIZES		INLET SECTION PART NUMBER (51055 R.V.)
INLET	OUTLET	
SAE 12	SAE 16	6001-M21

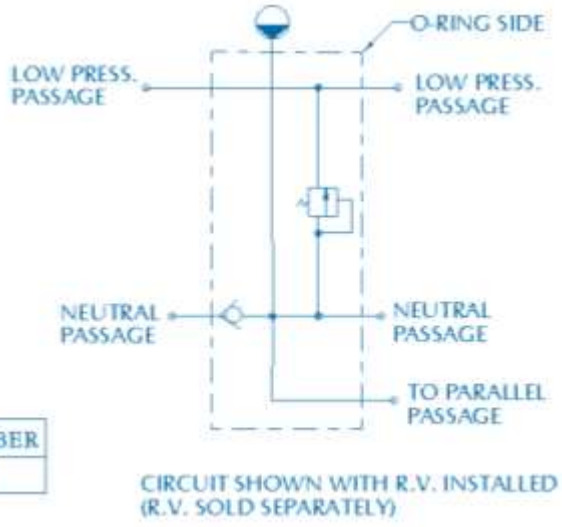
Weight:
Approx. 7 lbs (3.2 kg)

Used in section 2 of the valve assembly specification sheet (pg. 33)

Mid-inlet Combiner Option



PART NUMBER
52664

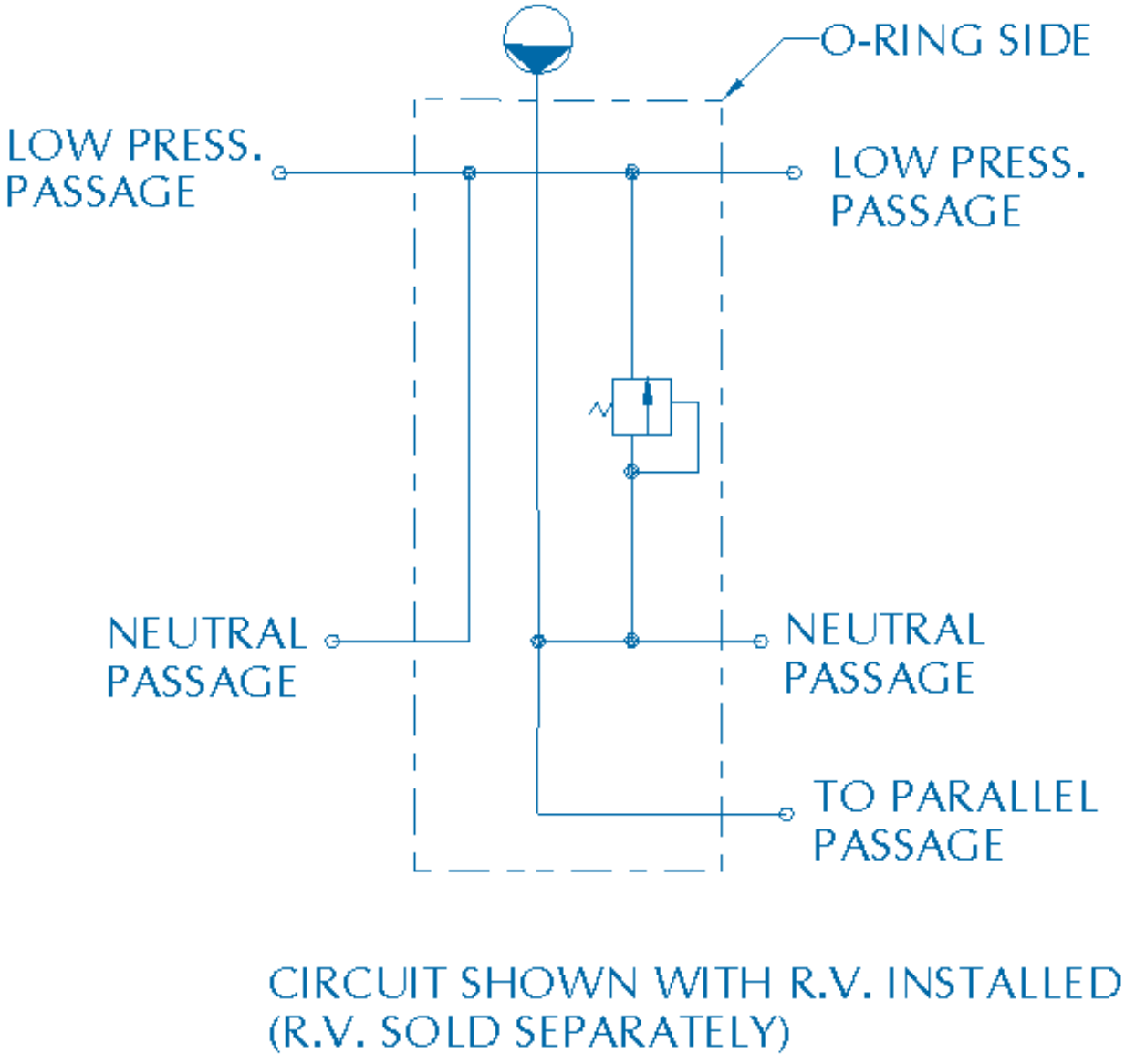


To combine inlet flow order this check valve assy and install in “A” option port of mid-inlet

Mid-Inlet Separate Flow Option

To separate inlet flow order this pipe plug and install into “B” port option and also this SAE plug and install into “A” Port option

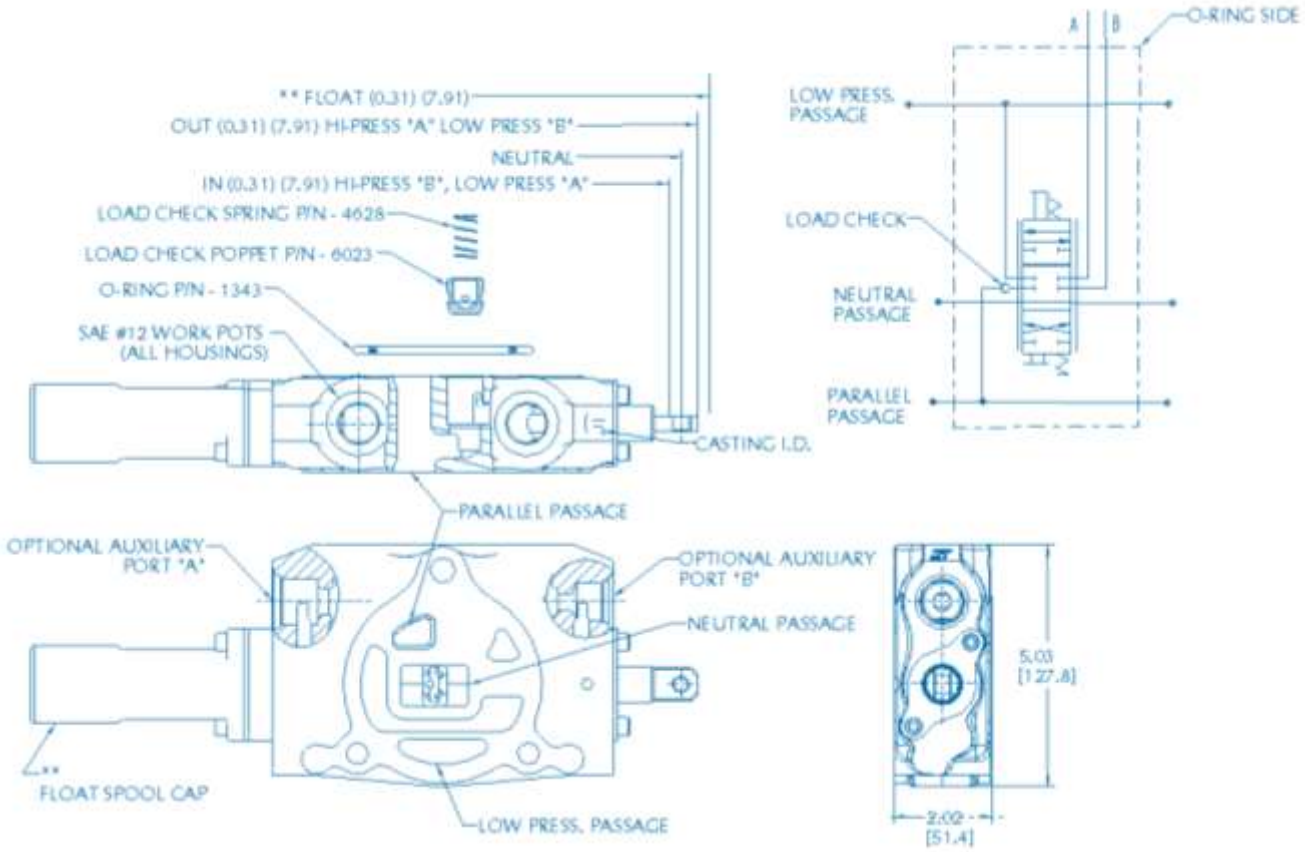
DESCRIPTION	PART NUMBER
PIPE PLUG	229
SAE 14	11240



CIRCUIT SHOWN WITH R.V. INSTALLED
(R.V. SOLD SEPARATELY)

Parallel Circuit Manually Operated Spool Section

Features HUSCO Patented “Low Effort”
Spool and “Zero Leak” spool seals

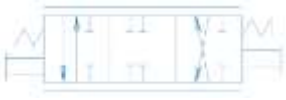


Weight Aprox. 14 lbs (6.4 Kg)

Standard spring centering forces (Spring P/N:3329B) = 37lbs.

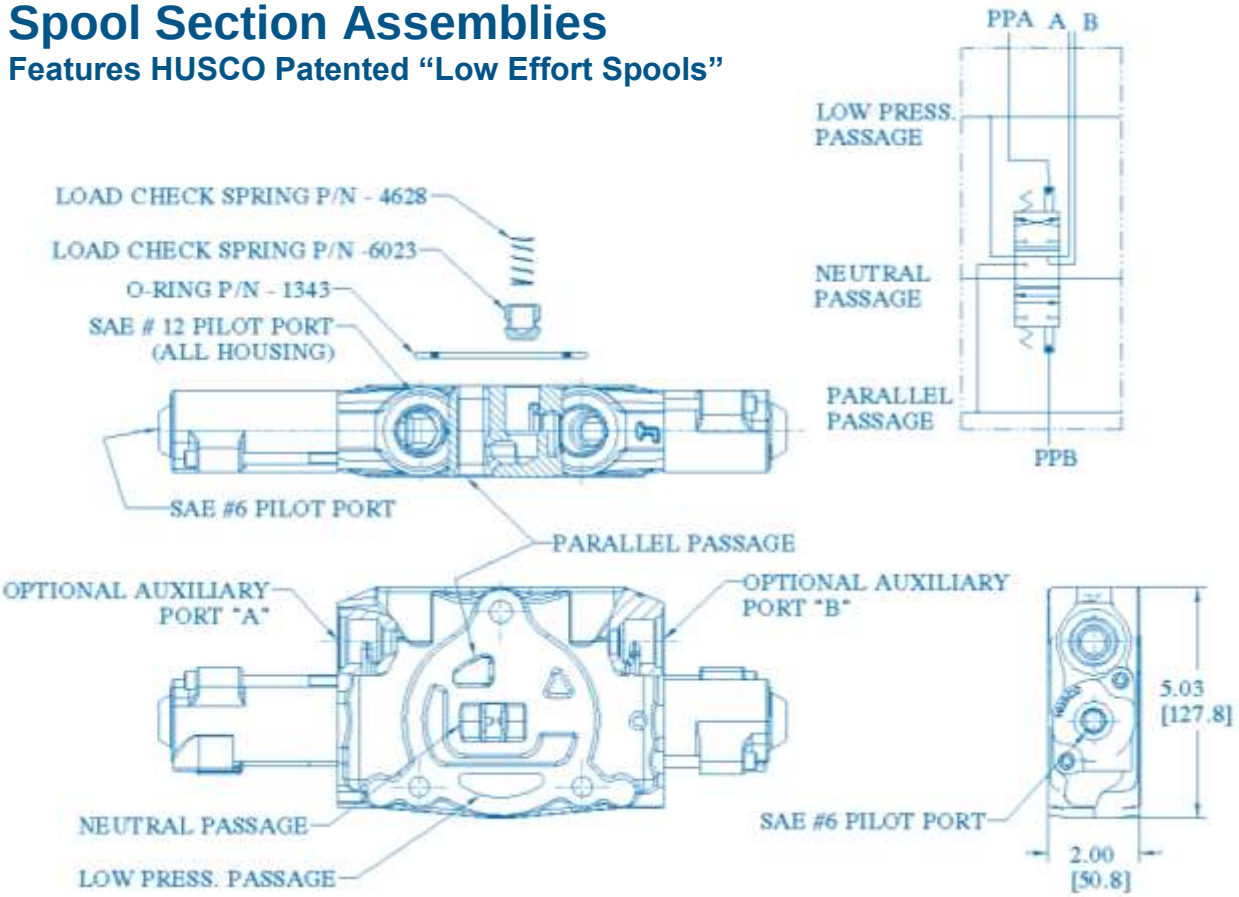
See page 7 for additional dimensional information

Used in section 2 of the valve assembly specification (Pg. 33)

3 POS,- 4 WAY				SPOOL SECTION ASSY PART NO.	
SPOOL AND END MECHANISM IN ⟷ OUT		SPOOL P/N:	END MECHANISM KIT P/N	WITH NO AUX. VALVE PORTS 	WITH 51055 STYLE AUX PORTS 
	SPRING CTR	51054	D10-200	6002-J433	6002-J387
	SPRING CTR FLT IN NEUTRAL (MOTOR)	51476	D10-200	6002-J154	6002-J394
	3 POS DETENTED FLT IN NEUTRAL (MOTOR)	51476	D11-100	6002-J328	6002-J395
3 POS, - 3 WAY					
	SPRING CTR (SINGLE ACTING)	51425	D10-200	6002-J332	Consult HUSCO

Parallel Circuit Hydraulic Remote (Oil Pilot Operated) Spool Section Assemblies

Features HUSCO Patented "Low Effort Spools"



Weight approx: 16lbs (7.2 kg)

3 POS,- 4 WAY				SPOOL SECTION ASSY PART NO.	
SPOOL AND END MECHANISM IN ⟷ OUT		SPOOL P/N:	END MECHANISM KIT P/N	WITH NO AUX. VALVE PORTS	WITH 51055 STYLE AUX PORTS
	SPRING CTR	51054	D12-109	6002-J631	6002-J605
	SPRING CTR FLT IN NEUTRAL (MOTOR)	51476	D12-109	6002-J632	6002-J662

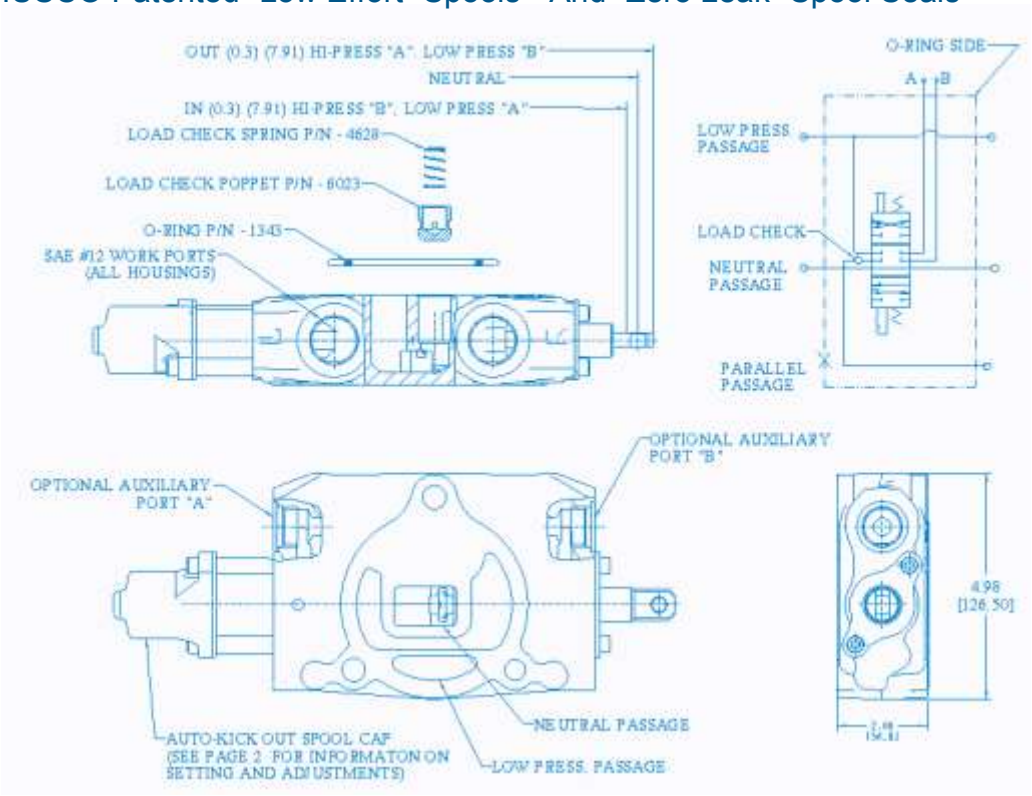
Approximate pilot pressure vs spool travel
20 PSI ------Spool starts to shift
80 PSI ----- Flow begins at work port
360 PSI ----Full shift, full work port flow
1000 PSI ---Maximum pilot pressure

Used in section 2 oof the valve assembly specification sheet (pg. 33)

Use with HUSCO manual hydraulic controller:
STD section type: P/N – 7470-A15 (1 spool operation)
STD. joystick type: P/N 7480-19 (2 spool operation)

Conventional Circuit Manually Operated (Tandem) Spool Section Assemblies

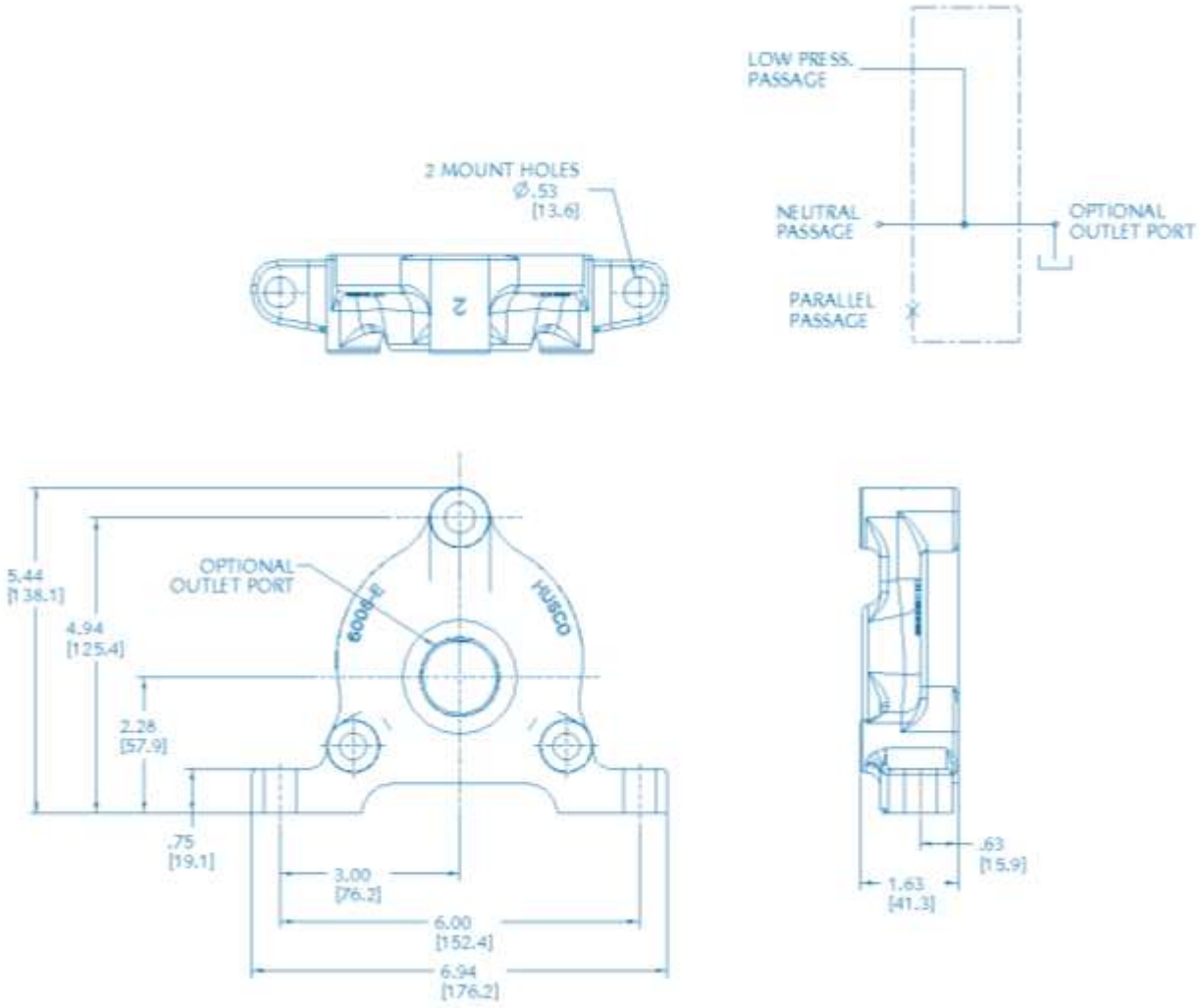
Feature HUSCO Patented “Low Effort” Spools - And “Zero Leak” Spool Seals



3 POS. - 4 WAY				SPOOL SECTION ASSY PART NO.	
SPOOL AND END MECHANISM IN ⟷ OUT		SPOOL P/N	END MECHANISM KIT P/N	WITH NO AUX. VALVE PORTS	WITH 51055 STYLE AUX PORTS
	SPRING CTR	51054	D10-200	6002-K142	6002-K140
	SPRING CENTER DETENT IN & OUT (AUTO-KICK OUT)	53169	N/A	6002-W3	6002-W23

Standard spring centering forces (Spring P/N: 3329B) = 37 lbs (Doesn’t apply to auto-K.O. section)	Used in section 2 of the valve assembly specification sheet (Pg 33)
Weight: Aprox 13.21 lbs (5.99 kg)	See page 7 for additional dimensional information

End Outlet/Turnaround - Outlet Section Assemblies



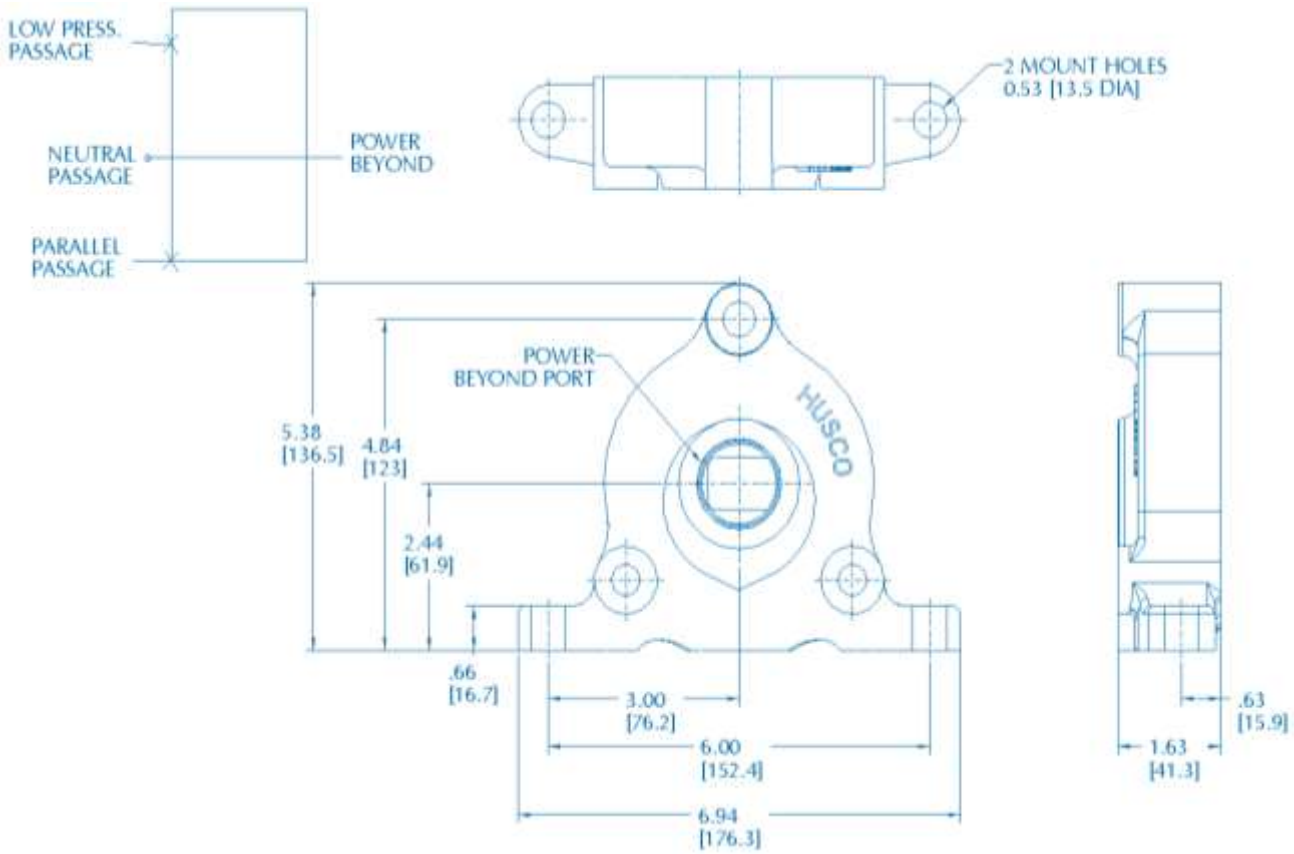
PORT SIZES	OUTLET SECTION PART NUMBERS
* NONE	6003-E1
SAE 16	6003-E2

Weight:
Approx. 4.85 lbs (2.20 kg)

*Remove upstream outlet port somewhere else in valve assembly.

Used in section 3 of the valve Assembly specification sheet (Pg 33)

Power Beyond / Closed Center - Section Assemblies



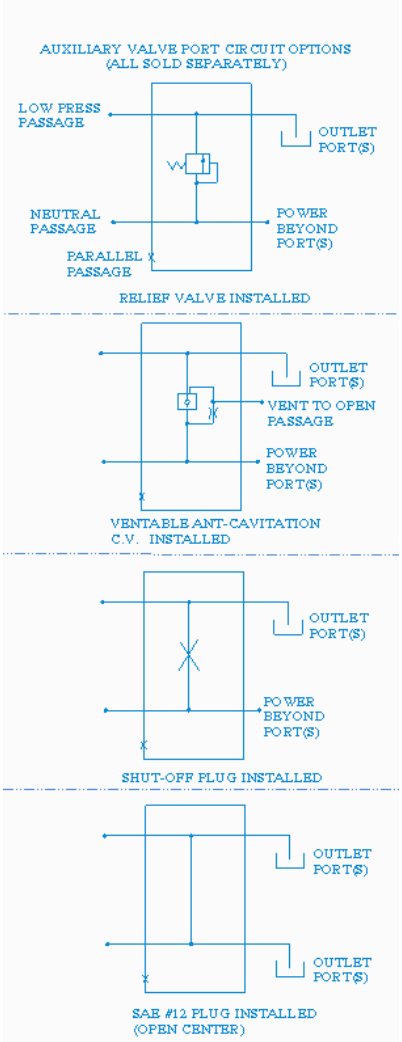
PORT SIZES	OUTLET SECTION PART NUMBER
SAE 16	6003-K3

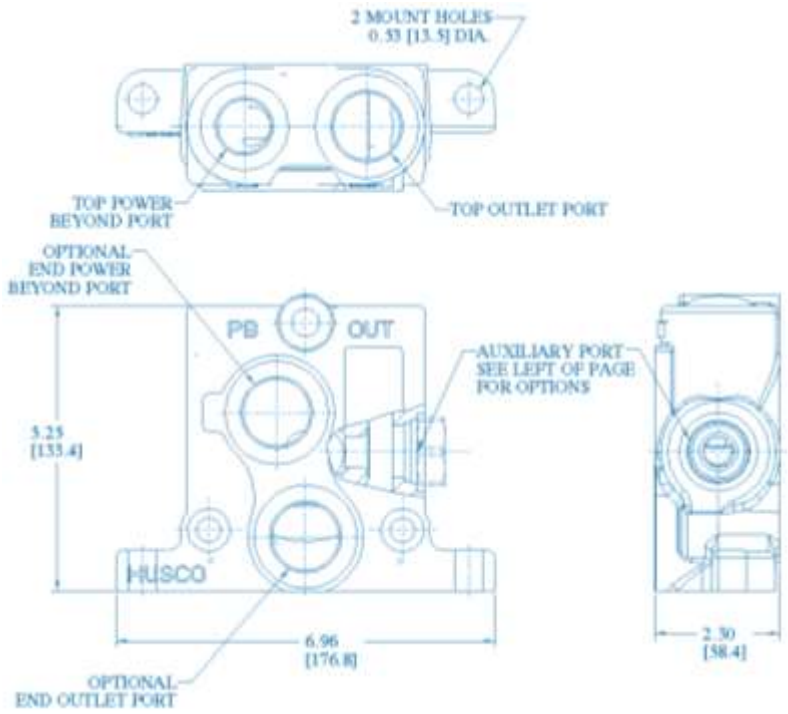
To create a closed center circuit plug power beyond port.

Used in section 3 of the valve Assembly specification sheet (Pg. 33)

Weight:
aprox. 6.41 lbs. (2.91 kg)

Universal Outlet/Power Beyond Option Section Assemblies





Weight:
approx. 9.44 lbs (4.28 kg)

To create a closed center circuit. Plug power beyond port(s) and install shut-off plug in auxiliary port

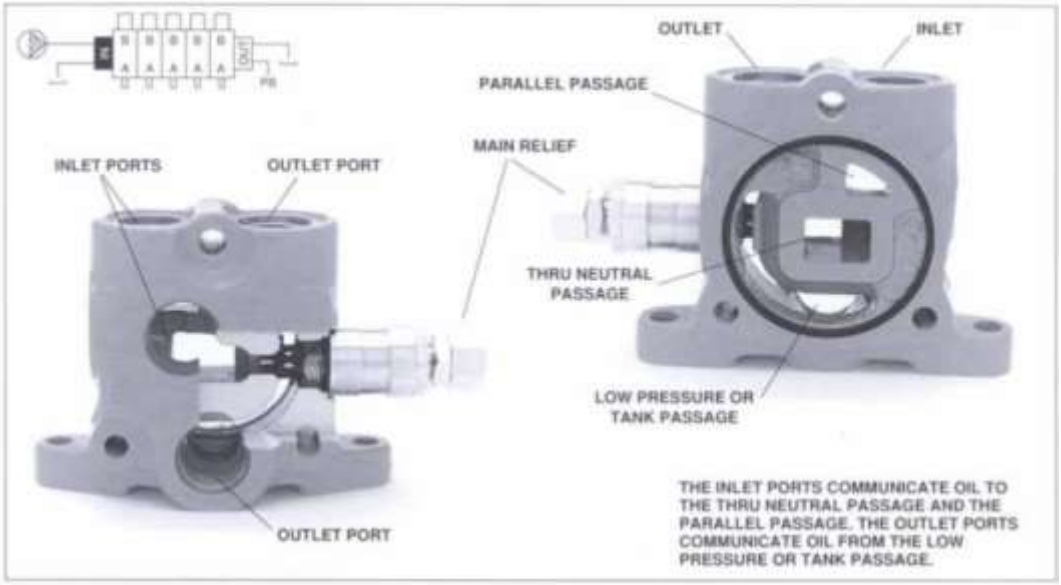
With 53203 hollow hex plug installed in auxiliary port, all ports. All ports are common to outlet

See Page 7 for additional dimension information

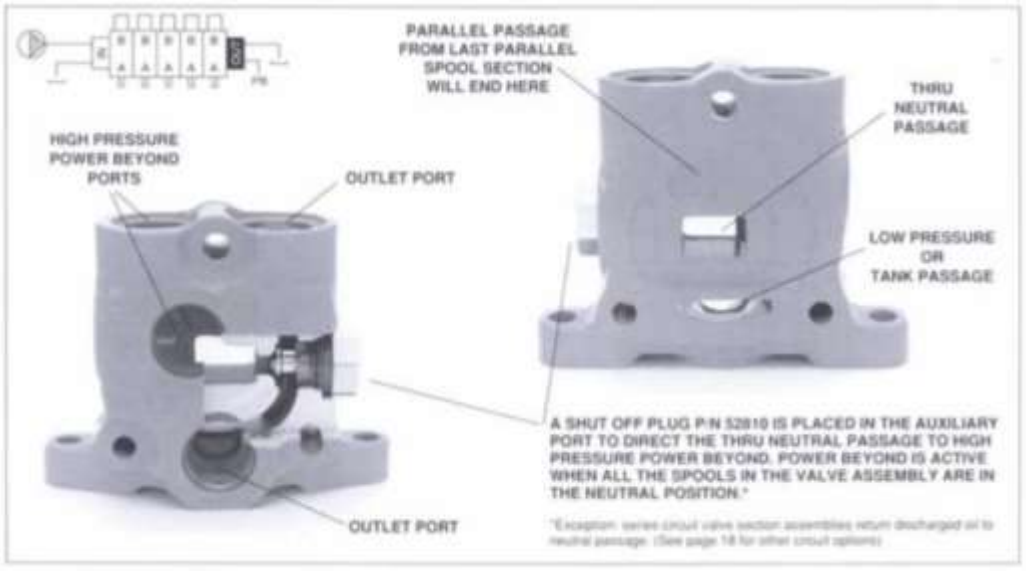
Used in section **3** of the valve assembly specification sheet (Pg 33)

PORT SIZES				OUTLET SECTION PART NUMBER (51055 R.V.)
OUTLET		POWER BEYOND		
TOP	END	TOP	END	
SAE 16	NONE	SAE 12	NONE	6003-D48
SAE 16	SAE 16	SAE 12	SAE 16	6003-D49

Cutaway View and Upstream View (Non-“O”-Ring Face) Of Outlet End Section Assembly P/N 6003-D49

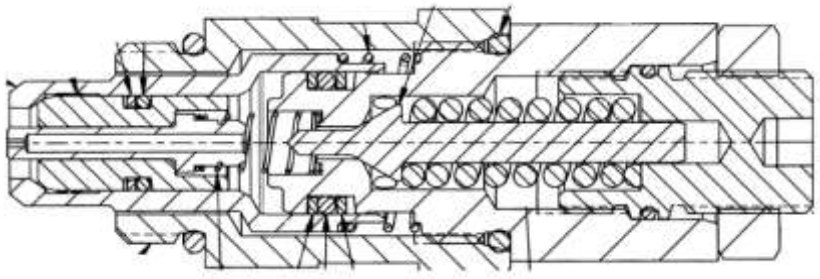


Cutaway View and upstream View (Now-“O”-ring Face) Of Outlet End section Assembly P/N 6003-D49)



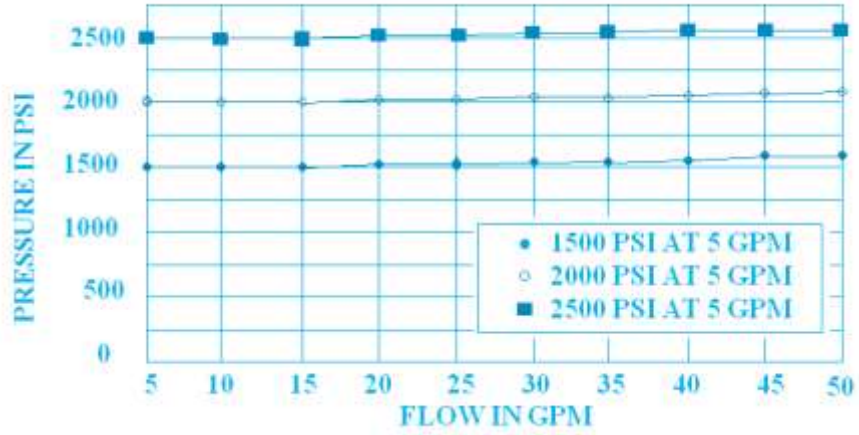
Relief Valve Assemblies

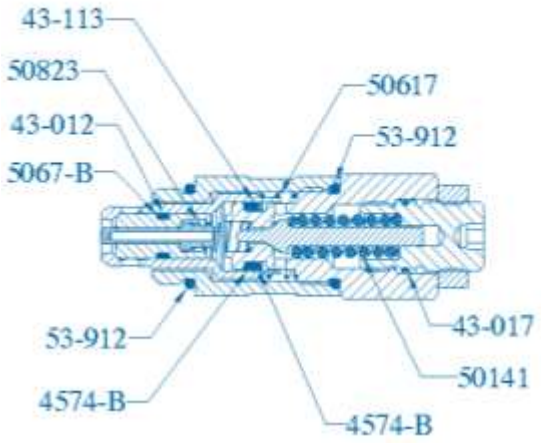
High Performance Relief Valve Assembly: 51055-22



51055-22

- Preset at factory to 2000 psi
- PSI range from 600-7000 psi
- Manually adjustable

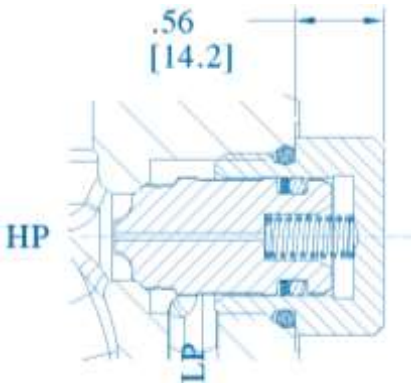




50823	SPRING	1
50617	SPRING	1
50141	SPRING	1
5067-B	BACK-UP RING	1
4574-B	BACK-UP RING	2
43-017	O-RING	1
53-912	O-RING	2
43-113	O-RING	1
43-012	O-RING	1
PART NUMBER	DESCRIPTION	QTY
SPRING & SEAL KIT 51055-22		

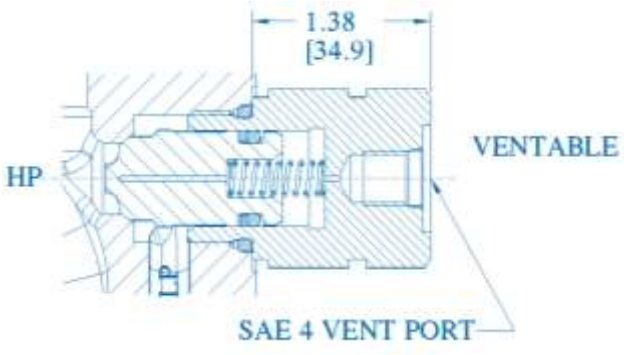
Auxiliary Valve and Tie Rod Information

Anti-Cavitation Check Valve



The anti-cavitation check valve opens when L.P. passage pressure exceeds the H.P passage pressure.

R.V. STYLE	P/N:	TORQUE
51055	5375-F	43-53-FT-LBS



The ventable anti-cavitation check valve opens when the L.P. passage pressure exceeds the H.P. passage pressure or when the vent port is opened to tank.

R.V. STYLE	P/N:	TORQUE
51055	**5375-H**	43-53-FT-LBS

Shut-off Plug Assembly

The shut off plug is used to shut off L.P. passage from the H.P. passage in all the aux valve ports. It is used to plug the aux valve port when an aux valve is not required. The shut-off plug is also used in the outlet section to activate the power beyond port(s).

R.V. STYLE	P/N:	TORQUE
51055	52810	43-53-FT-LBS

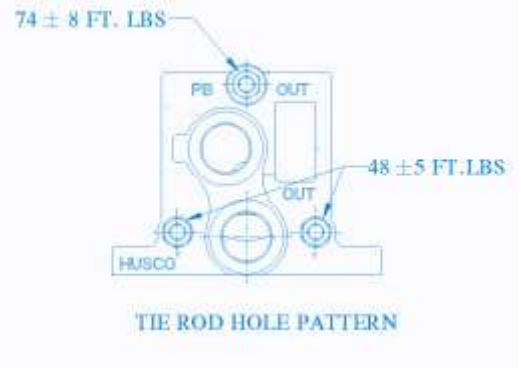
Standard SAE Plug and O-Ring

DESCRIPTION	P/N:	TORQUE
*12 SAE	11210	66-82 FT-LBS
*12 SAE	11215	66-82 FT-LBS
*16 SAE	11270	94-116 FT-LBS

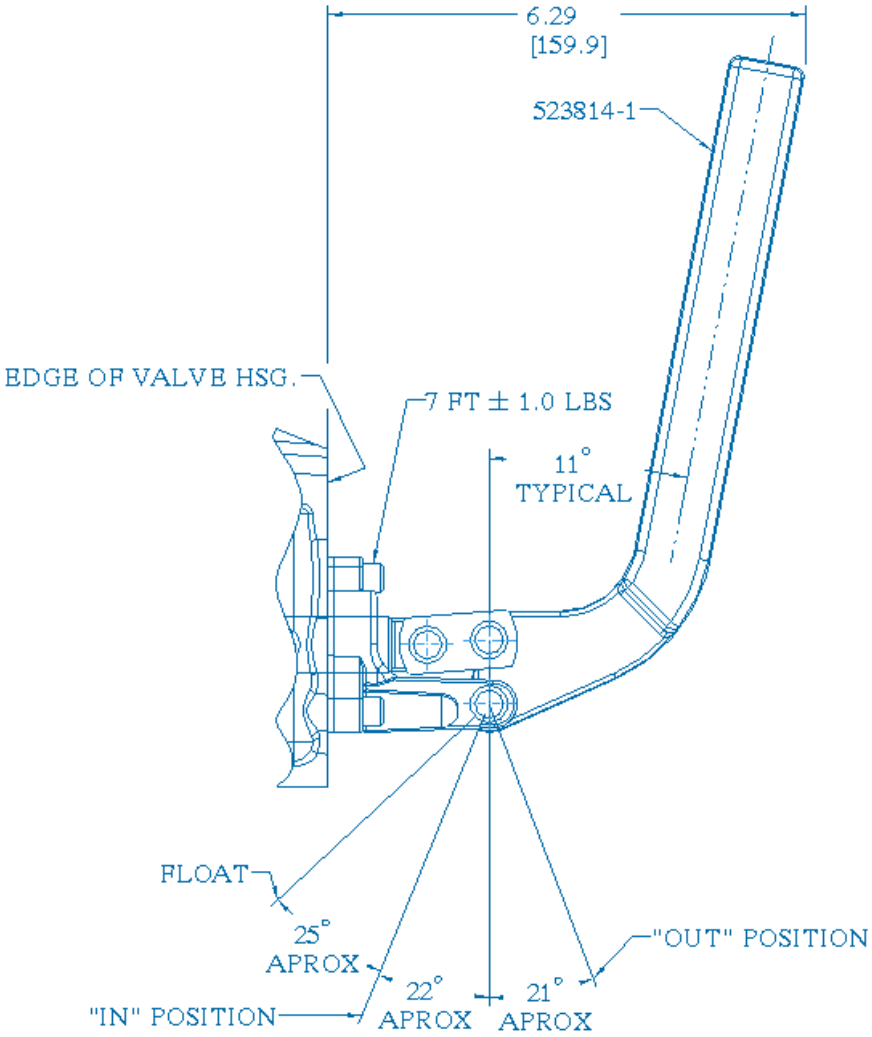
Torque – any qty. of sections

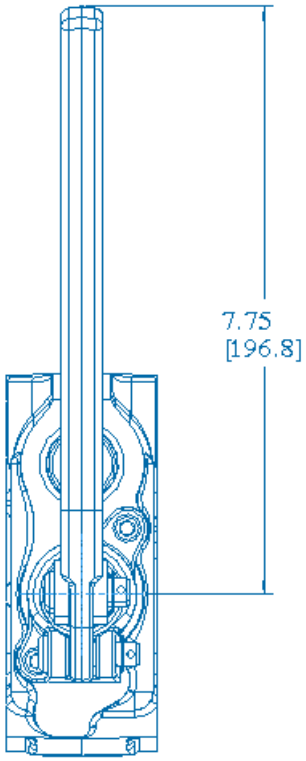
Model 6000 TIE ROD KITS

P/N:	NO OF SECTIONS
6246-41	1
6246-2	2
6246-43	3
6246-44	4
6246-45	5
6246-46	6
6246-47	7
6246-48	8
6246-49	9



Lever Assemblies - Heavy Duty Lever





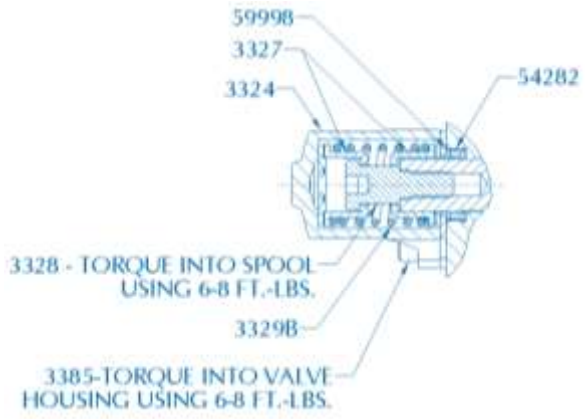
PART NUMBER 6105-A
LEVER ASSY. AS SHOWN

PART NUMBER 6105-C
LESS LEVER P/N 52384-1

End Mechanism Kit
For Parallel and Conventional Circuit Sections

3 Position. 4 Way
Double Acting Spring
Centered

KIT #D10-200

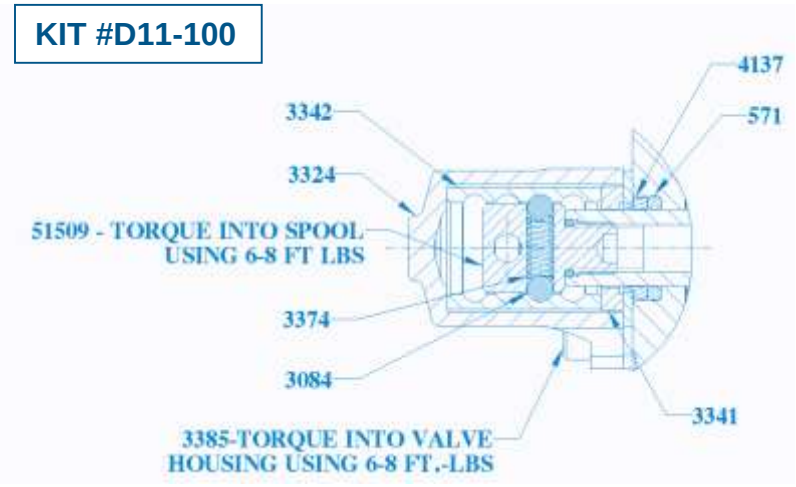


PART NO.	DESCRIPTION	QTY.
54282	SEAL-SPOOL	1
3324	CAP	1
3326	SEAL PLATE	1
3327	SPRING SEAT	2
3328	SCREW	1
3329B	SPRING	1
3385	CAP SCREW	2
59998	WIPER	1

For serious circuit sections use, KIT #D10-104 (P/N 4156 AND 4159 REPLACE P/N 3328)

3 Position. 4 Way
Double Acting
Detent

KIT #D11-100

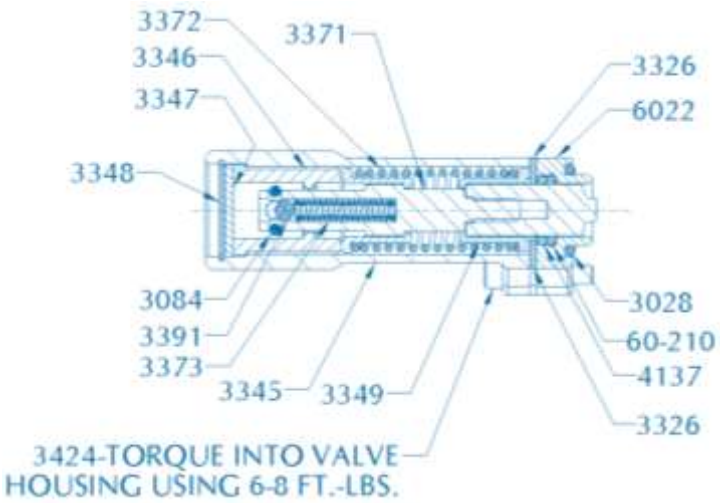


PART NO.	DESCRIPTION	QTY
571	O-RING	1
3084	BALL	2
3324	CAP	1
3326	SEAL PLATE	1
3341	SPACER	1
3342	DET, SLEEVE	1
3343	DET, PIN	1
3374	SPRING	1
3385	CAP SCREW	2
4137	WIPER	1

FOR SERIES CIRCUIT USE: KIT #D11-116 (P/N 51509 AND 4159 REPLACE P/N 3343)

4 Position. 4 Way
Double Acting Spring
Centered Detent in Float

KIT #D11-204

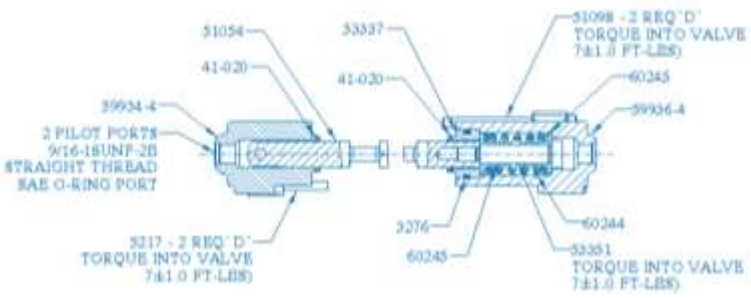


*Not for Conversion

PART NO.	DESCRIPTION	QTY.
60-210	O-RING	1
3028	O-RING	1
3084	BALL	4
3391	BALL	1
3396	SEAL PLATE	1
3345	CAP	1
3346	DET. SLEEVE	1
3347	DET, PLUG	1
3348	SNAP RING	1
3349	SPRING SEAT	2
3371	DET. PIN	1
3372	SPRING	1
3373	SPRING	1
3324	CAP SCREW	2
4137	WIPER	1
3326	SPACER	1

End Mechanism Kits
-Not for Series Sections-
Hydraulic Remote (Oil Pilot Operated)

Kit P/N: D12-109



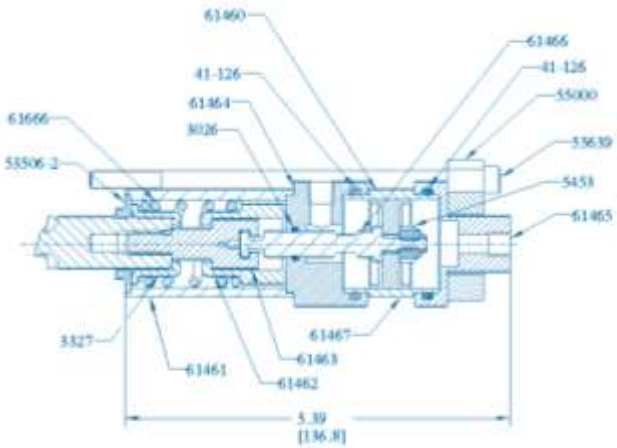
PART NUMBER	DESCRIPTION	QTY
5217	CAP SCREW-SOC. HD.	2
41-020	O-RING-020	2
3276	O-RING-216	1
59934-4	CAP-SPOOL, P.O.	1
51098	CAP SCREW-SOC. HD.	2
59936-4	CAP-SPOOL, P.O.	1
60244	SPRING	1
60245	SPRING SEAT	2
53337	RETAINER-CAP,SPOOL	1
53351	SHOULDER SCREW-SOC. HD.	1
51054	SPOOL	1

Pilot Pressure Range:
18 PSI to Begin Spool Shift -
390 PSI to Complete Spool Shift

For Series Circuit Sections Use
KIT *D12-110

Pneumatic Remote (Air Pilot Operated)

KIT P/N: 61661

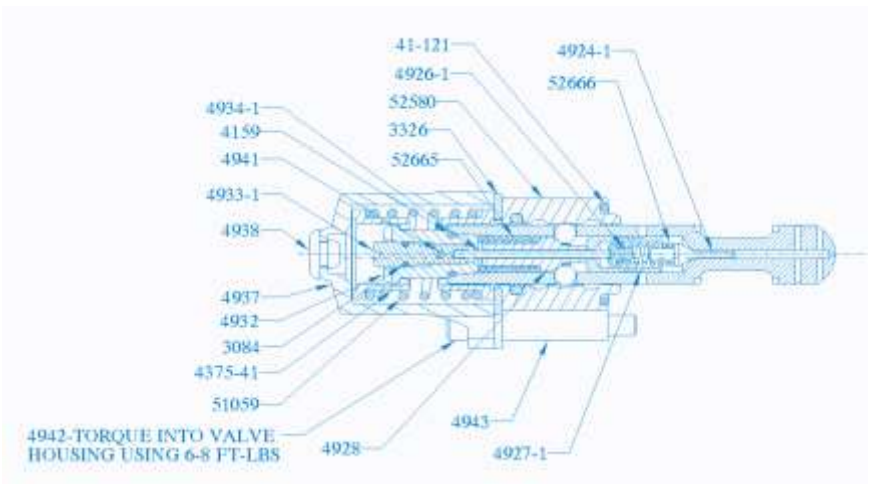


PART NUMBER	DESCRIPTION	QTY
4628	SPRING	1
6023	POPPET-C.V.	1
1343	O-RING	1
61666	SPRING	1
55639	CAP SCREW-SOC. HD.	2
41-126	O-RING	2
5453	NUT-LOCK	1
61460	PISTON	1
61466	ROD-PISTON	1
55000	RETAINER	1
61465	END CAP P.O.	1
61467	CYLINDER	1
8026	O-RING	1
61464	SPACER-CAP,SPOOL	1
61462	SPRING SEAT	1
61463	SPOOL END	1
3327	SPRING SEAT	1
61461	TUBE	1
53506-2	RETAINER-CAP,SPOOL	1

THIS CHART IS SPRING FORCE ONLY	START TO SHIFT PSI	FULL SHIFT PSI
BASE SIDE STROKE “OUT”	30 PSI	55 PSI
ROD SIDE STROKE “IN”	34 PSI	62 PSI

Automatic Kickout Feature

The auto-kickout feature, more commonly used and available on conventional circuit spool section assemblies (page 14), is an optional spool end mechanism. The auto-kickout mechanism combines a spring centered mechanism with a spool dented “in and “out” mechanism that will release the spool to the center position at a pre-determined settable cylinder port pressure. The illustration below identifies the working components of the auto-kickout mechanism. The auto-kickout mechanism is not available in kit conversion from because it requires special valve section housing for its operation. Consult HUSCO for disassembly and reassembly maintenance procedures.



PART NUMBER	QTY	DESCRIPTION
1343	1	O-RING
4628	1	SPRING
6023	1	POPPET-C.V.
4938	1	PLUG
4159	1	O-RING
4942	2	CAP SCREW-SOC.HD.
4943	2	SPACER
4937	1	CAP-SPOOL
4941	1	INSERT-LOCKING
4375	1	O-RING
4927-1	1	SLEEVE
3084	4	BALL

PART NUMBER	QTY	DESCRIPTION
4928	1	CAM-DETENT
52665	1	SPRING
4932	1	SPOOL END
51059	1	SPRING
4933-1	1	SCREW-ADJUST
4934-1	1	ADJUST ROD
4926-1	1	GUIDE-SPRING
52666	1	SPRING
4924-1	1	POPPET
4341-1	2	SPRING SEAT
3326	2	PLATE-SEAL
17250	1	SLEEVE ASSY.-DETENT

Auto-Kickout Setting and Adjustment

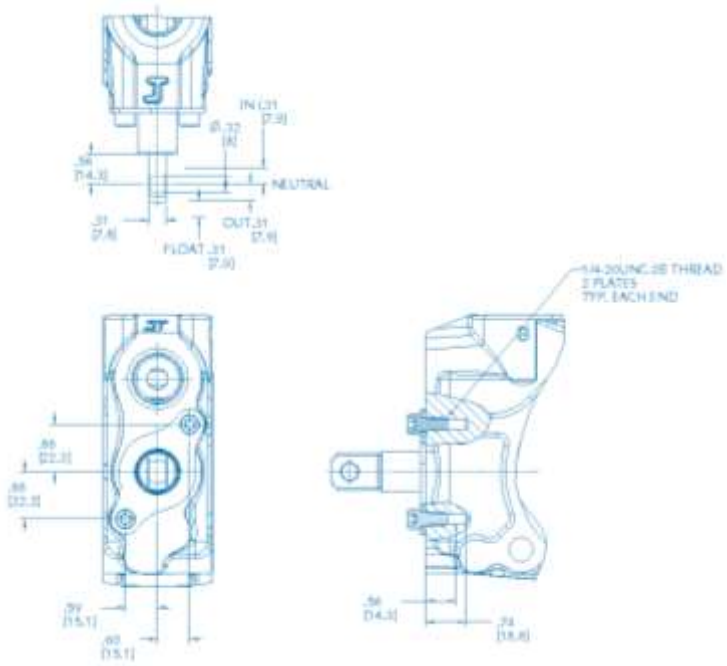
Adjustments to the auto-kickout valve section are made when integrated within a hydraulic circuit.

1. Install a pressure gage in the valve assembly inlet or cylinder port line which is in communication with the auto-kickout valve section to be adjusted.
2. With the hydraulic system off, shift auto-kickout valve section to be detented position.
3. Active the hydraulic system at a reduced pressure below that of the desired setting. Let the cylinder bottom out or plug the cylinder port to allow pressure build-up for kickout activation. Slowly increase the hydraulic system pressure (the main system relief may be used for the purpose) until the auto-kickout activates and spool returns to the center neutral position. **Do not exceed system capability**. Note the pressure reading at time of kickout: this will determine its current setting. Standard factory setting. If not specified, is 2000 PSI.
4. To make adjustments, remove rubber plug (P/N 4938) from end cap to access adjustment screw (P/N 4933-1). With hydraulic system off, turn adjustment screw clockwise (in) to increase the pressure setting. Counterclockwise (out) to decrease pressure setting. One revolution of the adjustment screw is approximately equal to 650 PSI change in the kickout pressure. Repeat procedure #3 above until desired setting is achieved. Adjustment range is 1000-2600 PSI. Run a few cycles to assure setting consistency, replace rubber plug. Note: Final main relief setting must be at least 250 PSI higher than the highest auto-kickout setting in the system.
   Caution: To avoid damaged or lost parts do not remove adjustment screw.

(For reference, the adjustment screw has approximately 15 full turns of thread engagement before it “bottoms out.” The kickout adjustment range is within the last 5 full turns before the “bottom out” condition occurs.)

Spool End Orientation

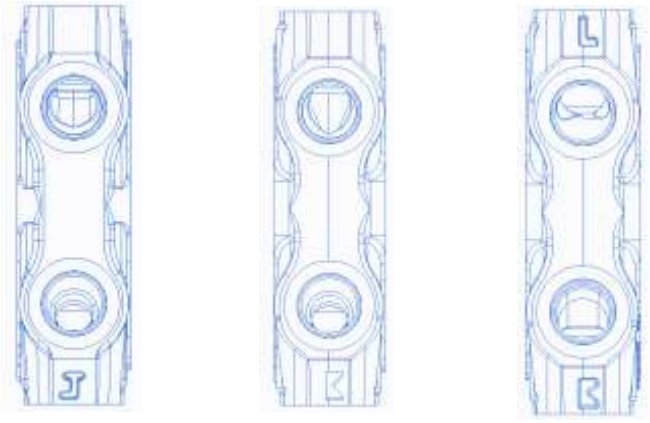
(Consult cable manufacturer for further information)



CABLE CONNECTORS	
MANUFACTURER	KIT P/N
CABLERAFT INC.	180-100-002
FELESTED	59103
MORSE CONTROLS	303031

Basic Casting Identification
(Non-Servicable)

Note:
Casting options shown are represented in this catalog.
Contact HUSCO for other available options.

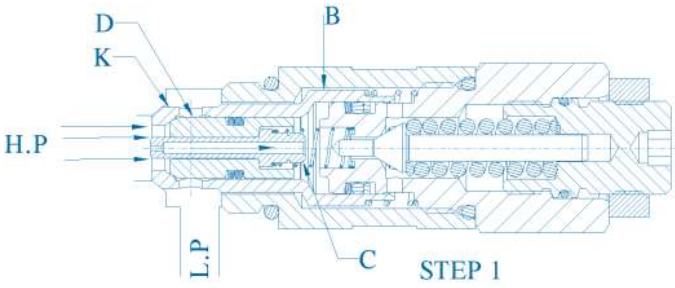


Sectional Assembly Base No. (Ref. only)	6002J	6002K	6002W
Casting Base No. (Ref. only)	6005J	6005K	6005W
Iron Type	Grey	Grey	Grey
Circuit	Parallel R.H.	Conventional R.H.	Conventional L.H.

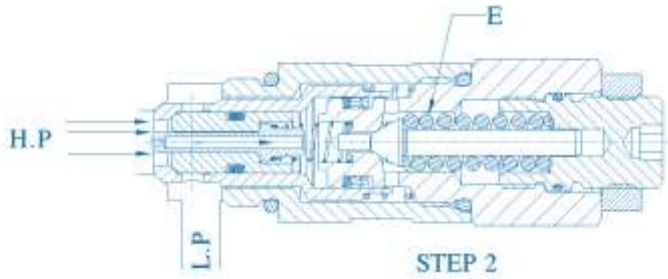
Service Information - HUSCO Combination Work

Port Relief and Anti-Void Unit

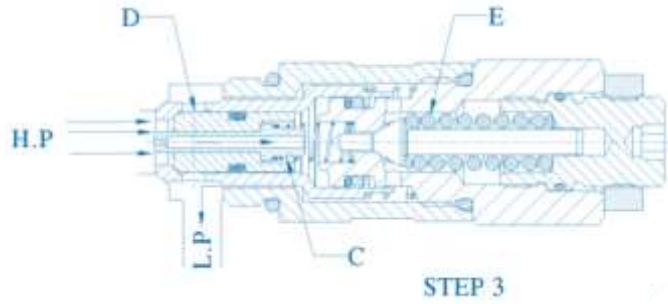
As Work Port Relief



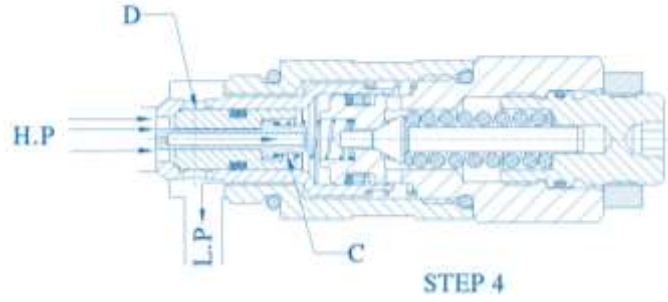
The relief valve is in communication between the high pressure port “HP” and low pressure “LP”. Oil is admitted through the hole in poppet “C” and because of the differential area between diameter “A” and “B” relief valve poppet “D” and check valve poppet “K” are tightly seated as shown in the first step.



The oil pressure in the high pressure port “HP” has reached the setting of the pilot poppet spring force and unseats the pilot “E” and oil flows around the poppet – through the cross drilled holes and to the low pressure area “LP”

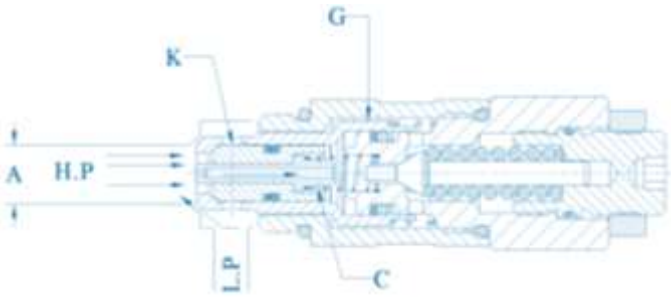


The loss of oil behind poppet “C”, effected by the opening of pilot poppet “E”, causes poppet “C” to move back and seat against pilot poppet “E”. This shuts off the oil flow to the area behind relief valve poppet “D”, and causes a low pressure area internally.



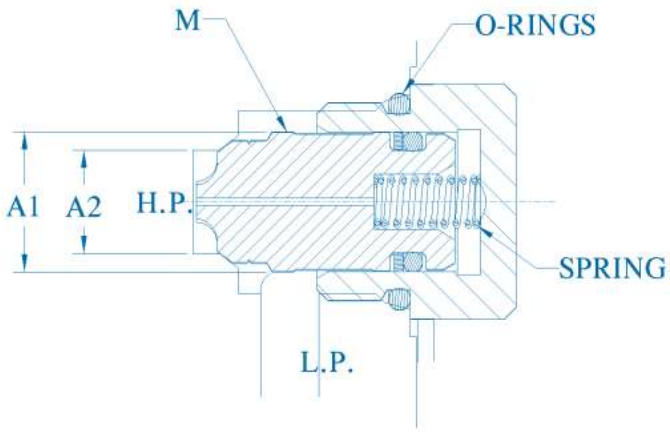
The imbalance of pressure on the inside as compared to that of the high pressure port “HP”, forces the relief valve poppet “D” to the open and relieve the oil directly to the low pressure chamber “LP” in the valve.

As Anti-Void



The anti-void unit supplies oil to the high pressure port “HP” when cavitation has occurred. A lower pressure exists in the port “HP” compared to the low pressure chamber “LP”. The difference between the effective area of the diameter “A” and “G” causes imbalance of the Check Valve poppet “K” which unseats, Thus allowing oil from the low pressure chamber “LP” to enter the port “HP”

As Separate Anti-void



The anti-void Check Valve opens when cavitation occurs in the high pressure port “HP” and supplies oil from the reservoir “LP” to help fill this void. The poppet “M” is held on its seat by the port pressure “HP”, acting on the larger area behind the “O” ring. When pressure “HP” drops below atmosphere, the tank pressure “LP” operating on the annular area A_1-A_2 will over-come the port pressure “HP” and the spring force to open the poppet. When the void is eliminated the spring will return the poppet which will then be tightly seated by the port pressure “HP”.

Check HUSCO first for modern hydraulic/electro hydraulic components and systems engineered to your specific needs.

Maintenance Proceducre for HUSCO
Combination Work Port Relief and Anti-void Unit

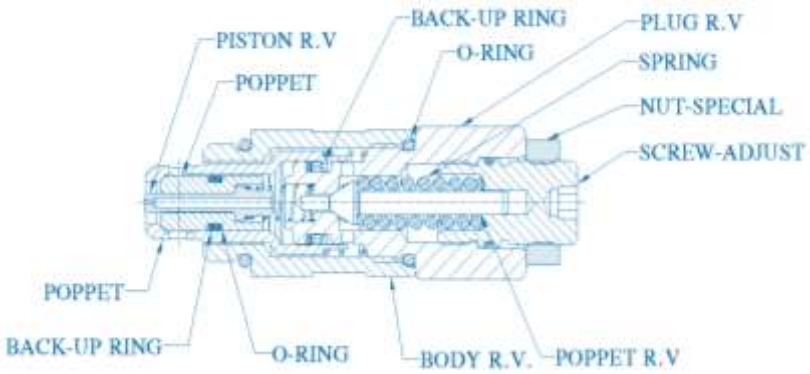
Service and Repair Information

The cartridge type work port reliefs used in the HUSCO
Valves are typically of the pilot poppet with external adjustment. Any mal-functioning is usually the result of foreign matter lodging between the pistons, relief valve poppet, and check vale.

To perform service, clean the surrounding area and remove the complete relief valve cartridge. Examine the seat in the main valve housing and if grooves or ridges are present, the valve must be returned to HUSCO for re-machining.
The design of the poppet and its seat provides positive seating and very seldom requires any maintenance. Therefore, the pilot section can be removed from the cartridge housing without disturbing the setting. With it will come the check valve poppet and other internal parts.

These are easily disassembled and should be smooth and free of nicks, scratches or grooves. Examine O-rings and back up washers for any damage and replace if necessary.
All moving parts should slide freely, with only seal friction being present.
After inspecting and cleaning, immerse all parts in hydraulic oil and re-assemble. Since pressure setting was not disturbed, unit can be tested for proper functioning under actual working conditions.
If operating difficulties indicate that the pilot poppet is leaking or sticking, remove internal parts of the pilot section, and follow the same procedure as above plus follow “How to set Pressure” previously discussed.
If unit still does not function properly, you may wish to return the cartridge to HUSCO.

There are several Variations to the work port relief.
However all are similar in nature regarding service and repair.



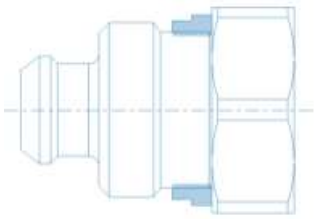
The Void control Feature is not adjustable but is designed to operate whenever the work port pressure is lower than reservoir pressure.

A good pressure gage must be installed in the line which is in communication with the work port relief. A load must be applied in a manner to reach the set pressure of the port relief unit. Then, follow these steps.

- Loosen lock nut
- Set adjusting nut to desired pressure setting.
- If desired pressure setting cannot be achieved, add or remove shims as required.
- Tighten shims as required.
- Tighten lock nut.
- Retest in similar manner as above.

Troubleshooting

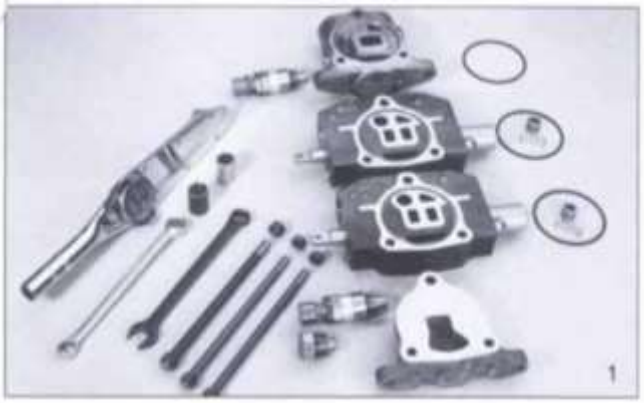
Difficulty	Probable Cause	Remedy
Can`t get Pressure	Poppet D, E or K stuck open or contamination under seal.	Check for foreign matter poppets D, E or K and their mating parts. Parts must slide freely.
Erratic Pressure	Pilot poppet seat damaged. Poppet C sticking in D.	Replace the relief Valve. Clean and remove surface marks for free movement.
Pressure setting not correct	Normal was. Lock nut & adj, screw loose.	See “How to set pressure on work port relief.”
Leaks	Damaged seats. Worn O-rings. Parts sticking due to contamination.	Replace the relief Valve. Install seal and spring kit. Disassemble and clean.



Shut-off Valve
Shut-off valves are available to fit most work port and main relief valve machining locations.

Trouble Shooting – Anti-void
Trouble resulting in malfunctioning can usually be traced to foreign matter plugging the sensing hole or preventing free movement of poppet. Also check seat for scratches, nicks or other marks.

Assembly Procedures for the HUSCO 6000 Valve



1. Lay out valve components on a clean, flat working surface. The inlet assembly will include an “O” ring. And the spool section(s) include an “O” ring, a load check poppet and load check spring. Tools required for basic valve assembly include ¾ and 11/16 open or box end wrenches and a torque wrench with thin wall sockets.

2. Assembly tie rod nuts to one end of each tie rod with one or two threads showing. Insert tie rods thorough tie rods thorough tie rod holes of inlet (larger tie rod at top). Lay inlet on end with tie roads up, place “o” ring into position.

3. Place first spool section (“o” ring side up) on inlet section, position “o” ring and insert load check poppet (nose down) and spring (behind poppet) into load check cavity as shown. Repeat this procedure for each spool section; the load check springs are compressed by the following section during assembly.

4. Position end section on last spool section as shown and hand tighten tie road nuts. The end section on picture is a “turn around” section without ports, (pg-16). Universal outlet/power beyond section (pg. 18) and power beyond and closed center sections (pg. 17) are also used as end sections. These end sections do not have “O” ring grooves.

5. Position valve assemble with the mounting pads of the end sections on flat surface. To obtain proper alignment of end sections relative to the end spool sections apply downward pressure to the end section: snug tie rod nuts to about 10 ft. lbs.

   Final torque the two 11/16 nuts to 48+/-5 ft lbs; final torque the ¾ nut to 74+/-8 ft lbs. check proper spool movement.

6. Install auxiliary valves and plugs torque to proper specifications.

General assembly notes:

A. Lever assemblies can be installed on section or after complete valve assembly.
B. The load check and spring may be omitted from assembly in certain circuit condition (i.e. motor spools)

HUSCO INTERNATIONAL
control focused - technology driven

Model 6000 Sectional Valve Assembly Specification Sheet

CUSTOMER : ---------- CUSTOMER P/N : ----------
MATERIAL TYPE : ---------- MACHINE MODEL : ----------
ESTIMATED ANNUAL USAGE : ---------- SUBMITTED BY:---------- DATE:----------
OPERATING PRESSURE : ---------- INLET FLOW : ---------- MID-INLET FLOW : ----------

			**4** AUXILIARY VALVES		**5** LEVERS
SECTIONS			AUX. "A"	AUX. "B"	ASSEMBLY P/N
1	INLET END COVER	6001-_____	P/N:	INLET END COVER PORT PLUGS SEE LISTING OF PLUG P/N `S BELLOW	
			PSI:	TOP IN: _____	TOP OUT: _____
				END IN: _____	END OUT: _____
OR MID-INLETS	FUNCT: TIE-ROAD KIT 6246-41	600__-___	P/N: PSI:	P/N: PSI:	
	FUNCT: TIE-ROAD KIT 6246-42	600__-___	P/N: PSI:	P/N: PSI:	
	FUNCT: TIE-ROAD KIT 6246-43	600__-___	P/N: PSI:	P/N: PSI:	
	FUNCT: TIE-ROAD KIT 6246-44	600__-___	P/N: PSI:	P/N: PSI:	
2	FUNCT: TIE-ROAD KIT 6246-45	600__-___	P/N: PSI:	P/N: PSI:	
SPOOL SECTION	FUNCT: TIE-ROAD KIT 6246-46	600__-___	P/N: PSI:	P/N: PSI:	
	FUNCT: TIE-ROAD KIT 6246-47	600__-___	P/N: PSI:	P/N: PSI:	
	FUNCT: TIE-ROAD KIT 6246-48	600__-___	P/N: PSI:	P/N: PSI:	
	FUNCT: TIE-ROAD KIT 6246-49	600__-___	P/N: PSI:	P/N: PSI:	
3	OUTLET END COVER	6003__-___	P/N:	OUTLET END COVER PORT PLUGS SEE LISTING OF PLUG P/N `S BELLOW	
				TOP P.B :_____	TOP OUT : _____
			P/N:	END P.B :_____	END OUT. :_____

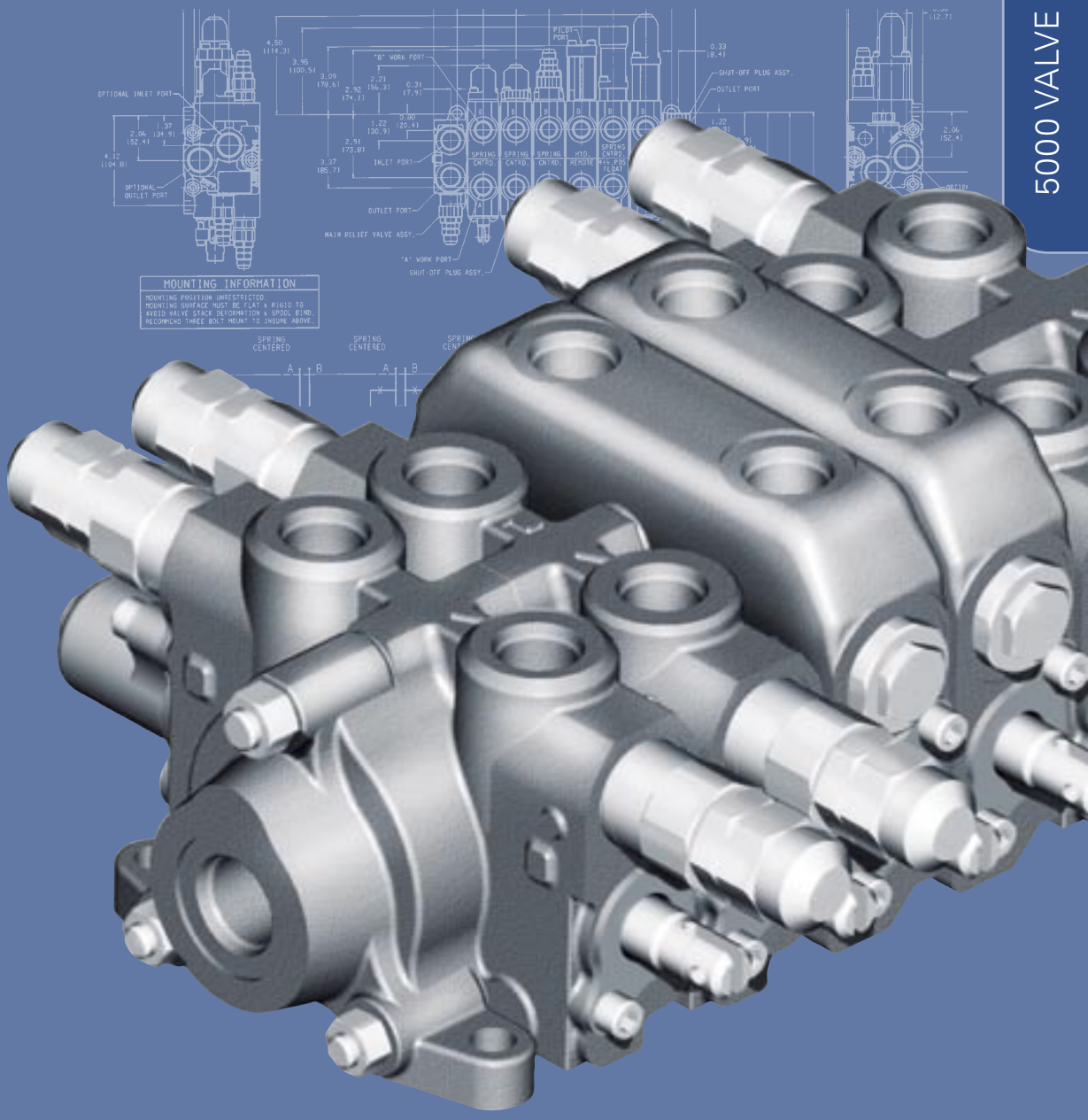
COMMENTS:

SAE PLUG ASSY P/N : 12 SAE - 11210 16 SAE – 11270

TIE ROD TORQUE: LARGE DIA. 74 FT.LBS. SMALL DIA. 48FT. LBS.

5000 VALVE SERIES

CONTROL FOCUSED • TECHNOLOGY DRIVEN

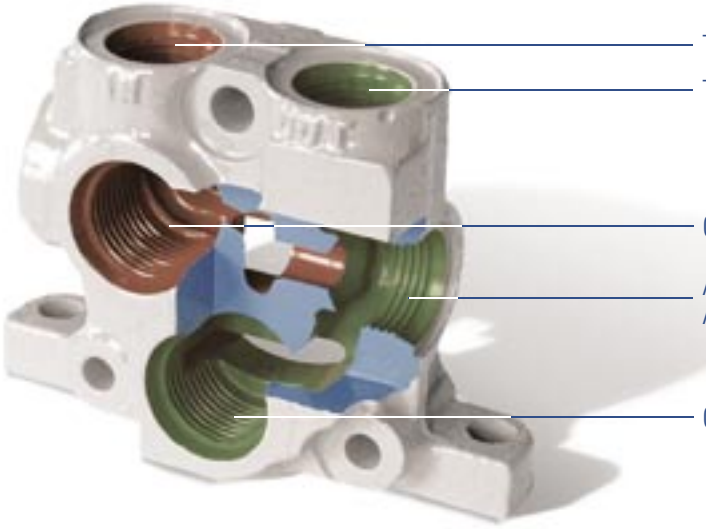


MODEL 5000
SECTIONAL VALVE

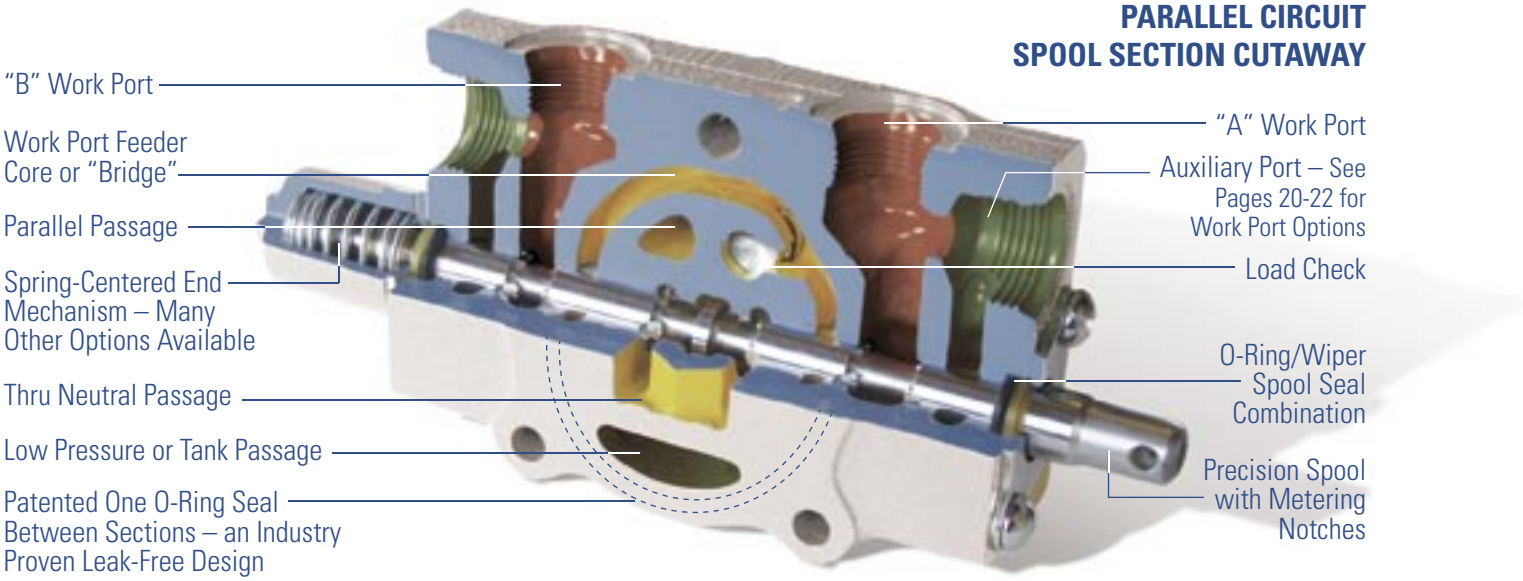
HUSCO INTERNATIONAL
control focused - technology driven

MODEL 5000
SECTIONAL CUTAWAY

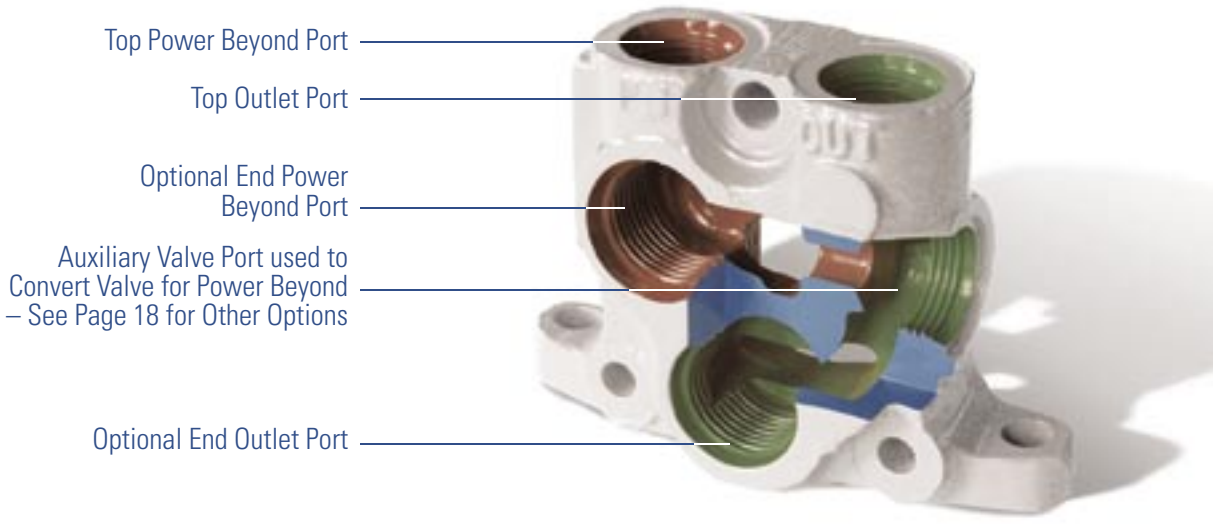
INLET/OUTLET SECTION CUTAWAY



PARALLEL CIRCUIT SPOOL SECTION CUTAWAY



UNIVERSAL OUTLET/ POWER BEYOND SECTION CUTAWAY



Since 1946, HUSCO International has established itself as the resource OEM engineers rely on for help designing high quality, innovative, customized products that meet precision motion control requirements. This catalog fully illustrates the component features and options you need to specify, build and service a Model 5000 sectional body directional control valve.

Designed for hydraulic systems, the Model 5000 valve line is made from an assortment of valve component sections and options that deliver the desired control valve circuit to match your specific application.

FEATURES

- 3000 psi operating pressure rating (207 bar)
- Open-center or closed-center operation
- Hard chrome plated spools
- Load check in each section
- Single "low pressure" O-ring sealing between sections
- Precision spool with metering notches

OPTIONS

- High pressure carryover (Power Beyond)
- Lock-out spool section (Built-in pilot operated check valve section)
- Mid-inlet flow combiner or separator
- Left-hand spool sections*
- Parallel, Conventional and Series circuitry
- End mechanisms:
  - Spring centered
  - Detent – single or multi-position
  - 4th position float
  - Hydraulic remote
  - Pneumatic remote
  - Automatic kick-out
- Auxiliary valves:
  - Pilot-operated, anti-cavitation check combination; relief cartridges
  - Anti-cavitation; cartridges
- Regenerative spools*
- Specialized spools*

* Consult HUSCO

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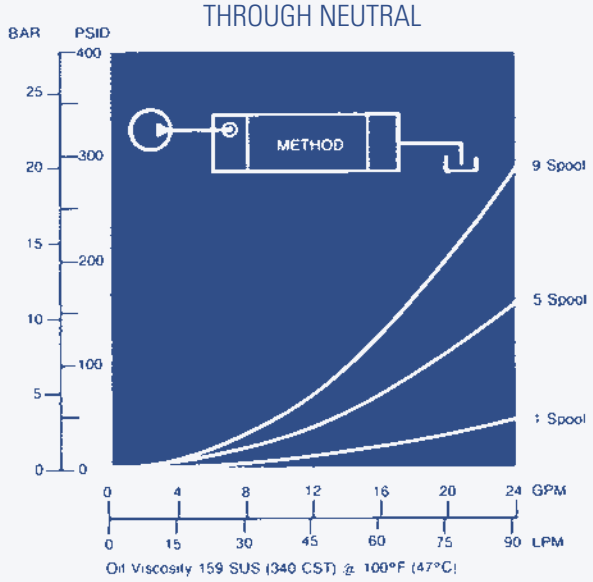
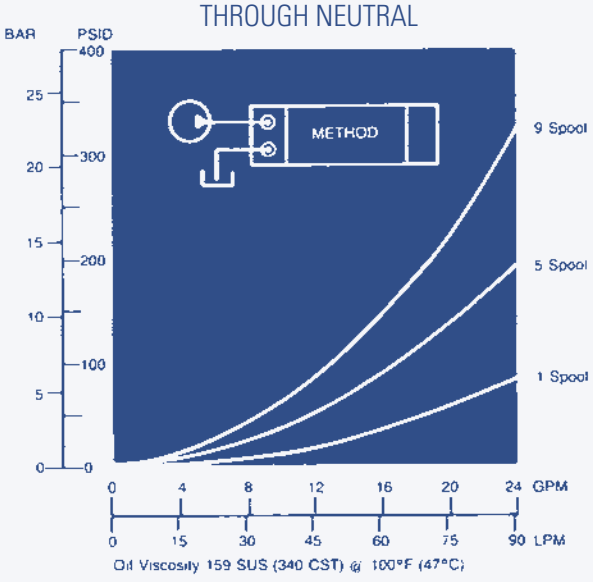
APPENDICES

PRESSURE DROP CURVES AND TECHNICAL DATA

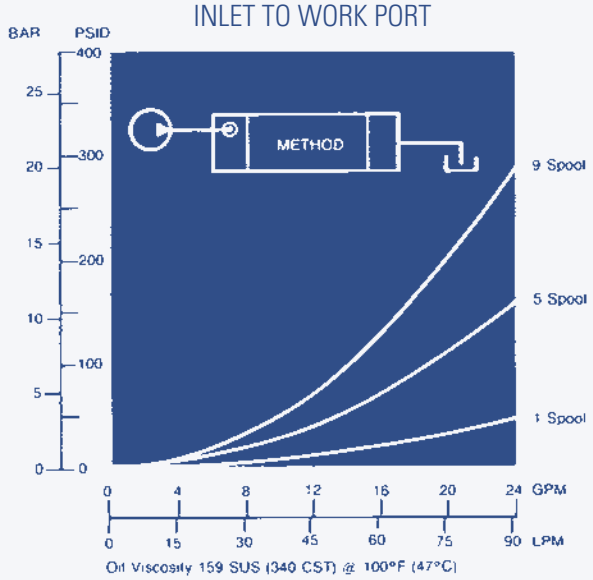
THROUGH NEUTRAL



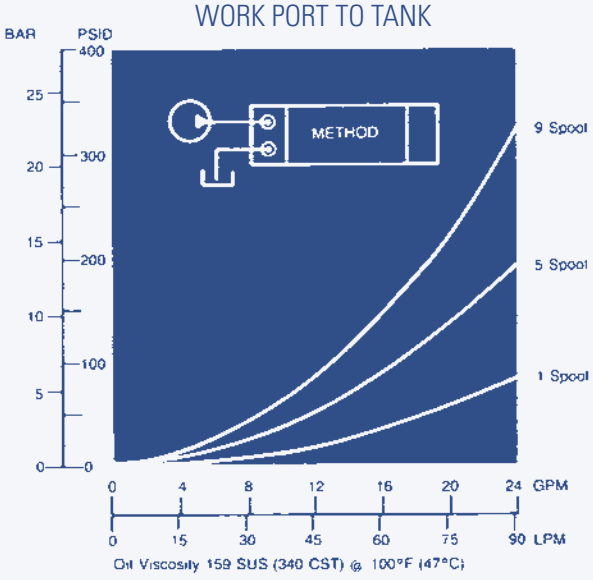
THROUGH NEUTRAL



INLET TO WORK PORT



WORK PORT TO TANK



Flow rating (nominal) ..... 20 gpm (75 lpm)

Operating Pressure* ..... 3000 psi (207 bar)
(Method of verifying rated fatigue pressure of the pressure containing envelope conforms to NFPA Recommended Std., NFPA/2.6.1 – 1974 Category 1/90)

* Higher pressure applications consult HUSCO

Seals ..... Buna-N Standard
Vitron Optional

Recommended Filtration ..... ISO 20/18/13

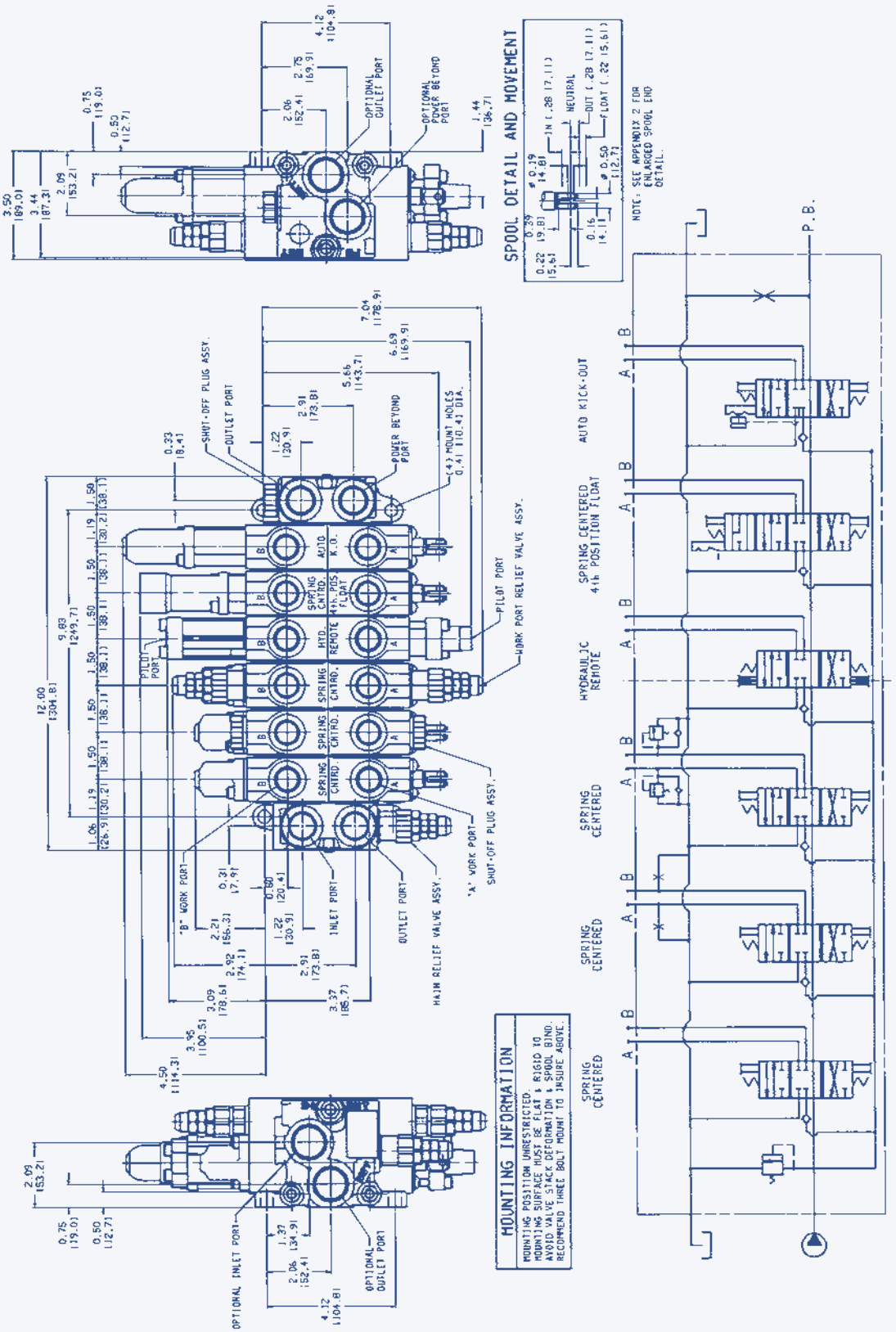
Maximum number of spool sections (any combination of) per valve assembly 11

Maximum outlet port/tank core (return) pressure..... 500 psi

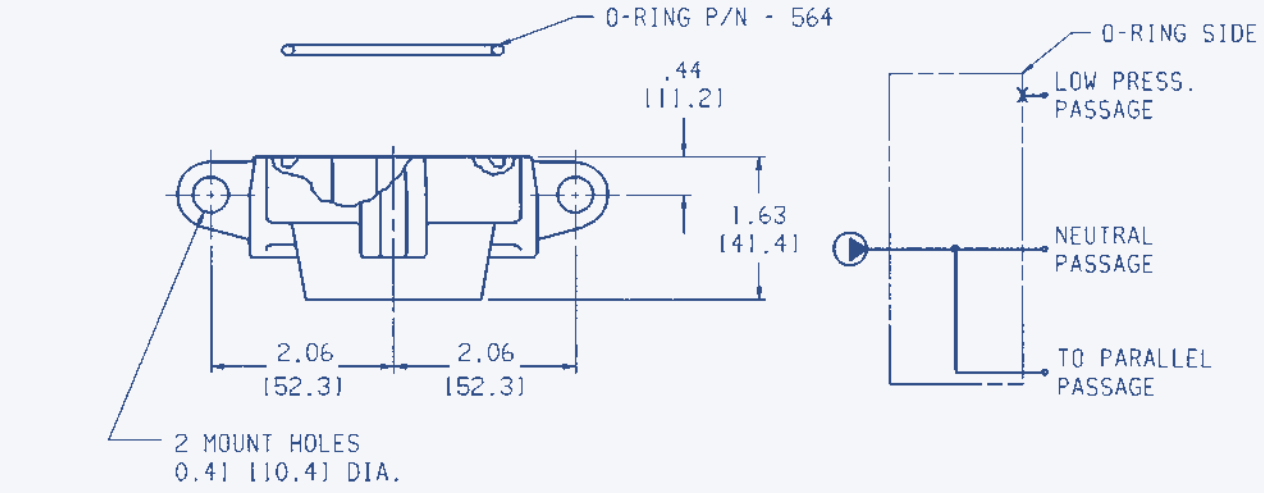
We reserve the right to amend these specifications at any time without notice. The only warranty applicable is our standard written warranty. We make no other warranty, expressed or implied.

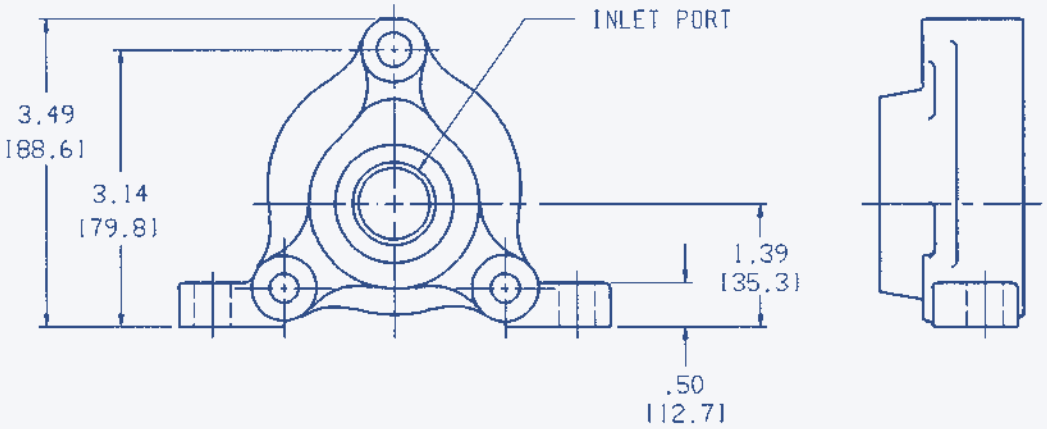
Performance characteristics shown are typical of production units tested in the laboratory and are not necessarily representative of any one unit.

MODEL 5000 VALVE ASSEMBLY



WITH END PORT. NO AUXILIARY VALVE PORT OPTION (FOR APPLICATIONS THAT DO NOT REQUIRE A MAIN RELIEF VALVE AT THE VALVE ASSEMBLY)



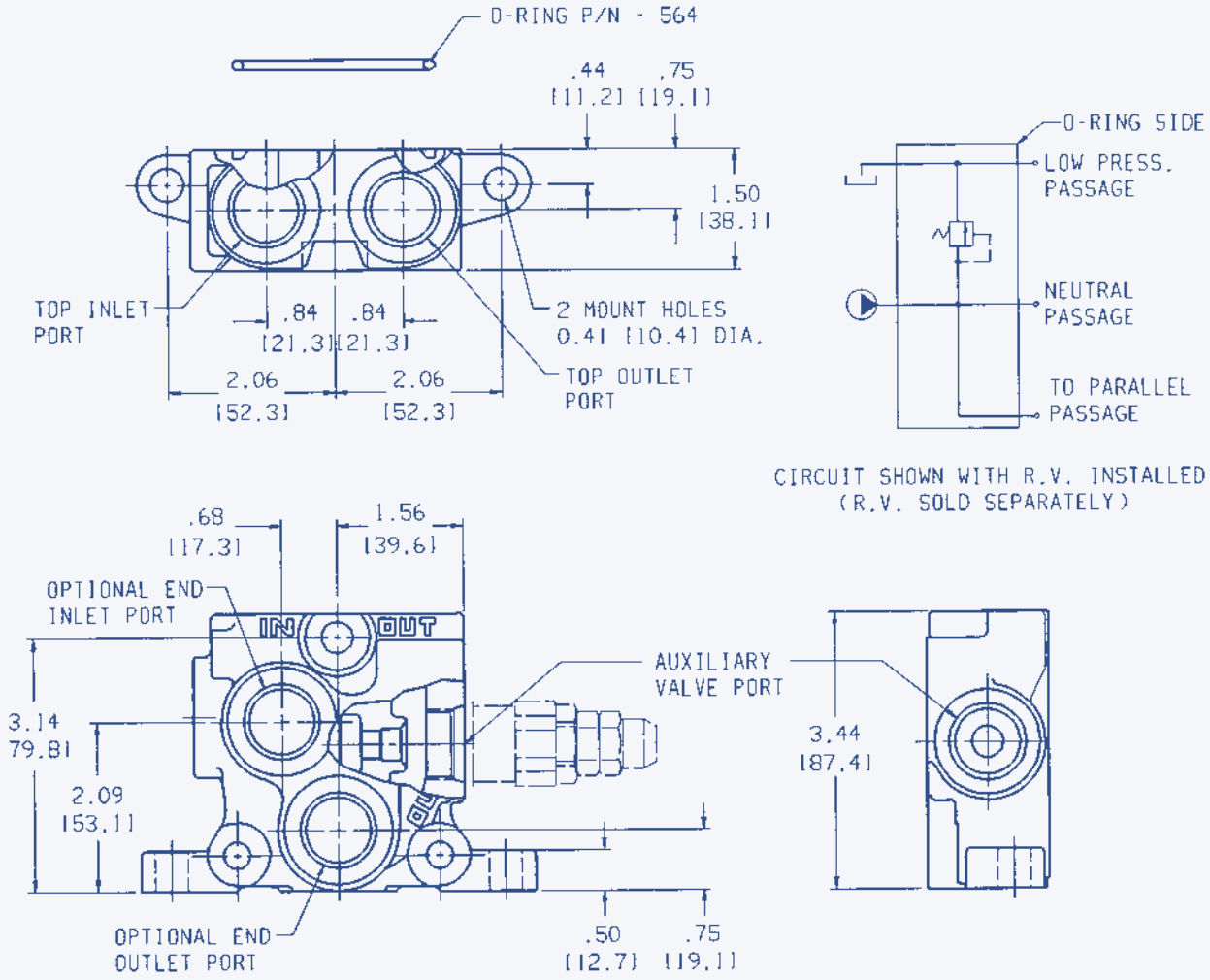


PORT SIZE	INLET SECTION PART NUMBER
SAE 10	5001-A35

USED IN SECTION (1) OF THE VALVE ASSEMBLY SPECIFICATION SHEET

WEIGHT: APPROX. 2 LBS. [0.9 kg]

WITH AUXILIARY VALVE PORT FOR MAIN RELIEF VALVE.
TOP INLET/OUTLET PORTS OPTIONAL END INLET/OUTLET PORTS.



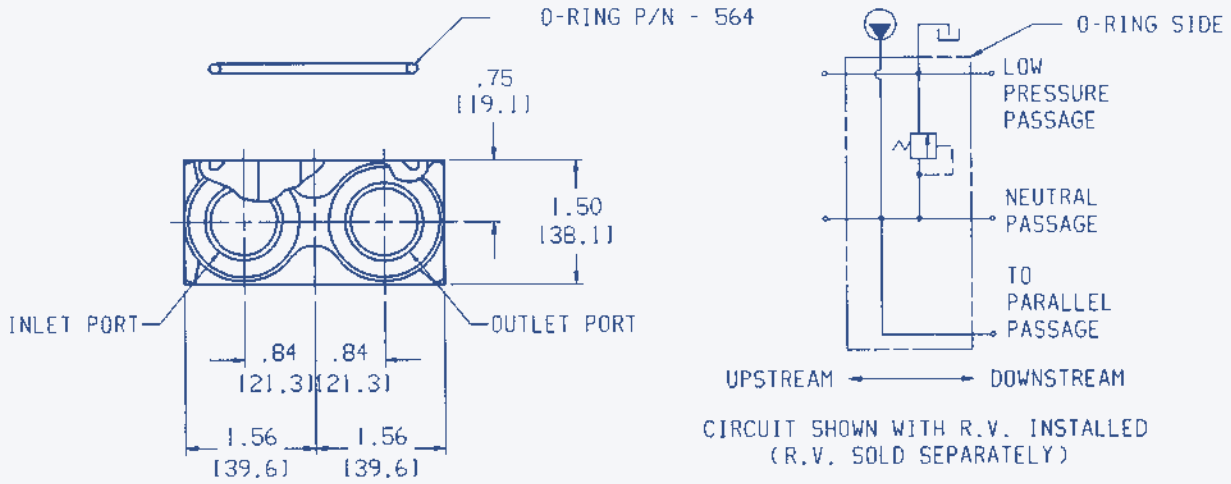
PORT SIZES				INLET SECTION PART NUMBERS
INLET TOP	INLET END	OUTLET TOP	OUTLET END	
SAE 10	NONE	SAE 10	NONE	5001-A59
SAE 10	SAE 10	SAE 10	SAE 10	5001-A115
SAE 10	SAE 12	SAE 10	SAE 12	5001-A88

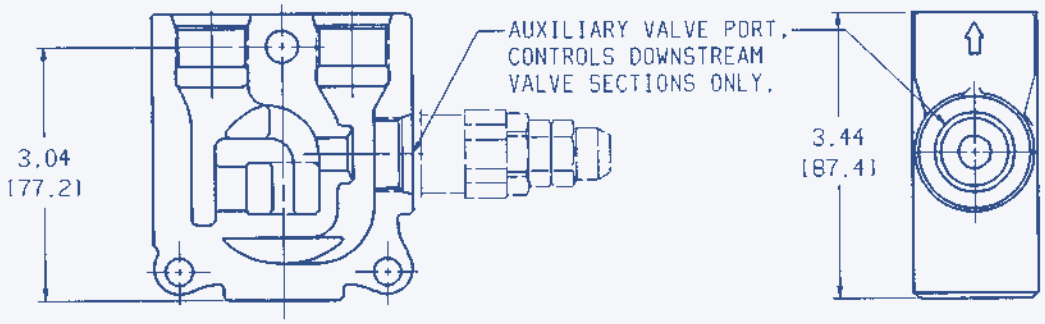
USED IN SECTION (1) OF THE VALVE ASSEMBLY SPECIFICATION SHEET

SEE CUT-AWAY PHOTO ON PAGE 19

WEIGHT: APPROX. 3.1 LBS. [1.4 kg]

MID-INLET PUMP FLOW COMBINES WITH UPSTREAM PUMP FLOW TO FEED DOWNSTREAM SPOOL SECTIONS. WHEN UPSTREAM SPOOL SECTIONS ARE ACTIVATED, DOWNSTREAM SPOOL SECTIONS ARE EXPOSED TO MID-INLET PUMP FLOW ONLY.





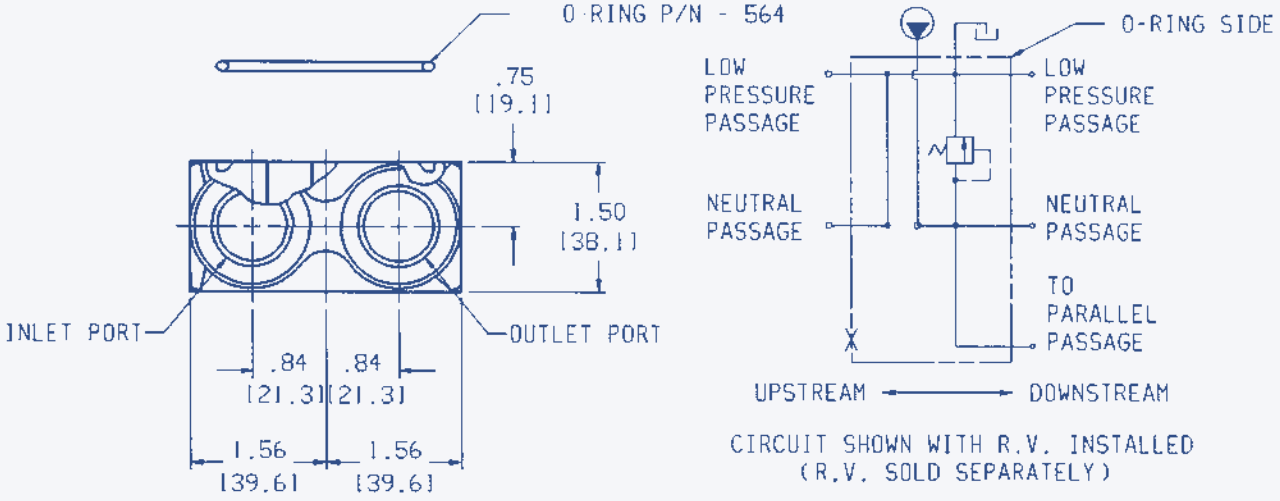
MID-INLET SECTIONS ARE USED IN-BETWEEN SPOOL SECTIONS EITHER TO ADD FLOW TO THE DOWNSTREAM SPOOL SECTIONS "COMBINER" OR TO INTRODUCE A "SEPARATE FLOW" CONDITION TO THE DOWNSTREAM SPOOL SECTIONS. MID-INLET SECTIONS ARE COUNTED AS A SPOOL SECTION WHEN DETERMINING TIE ROD KIT NUMBER.

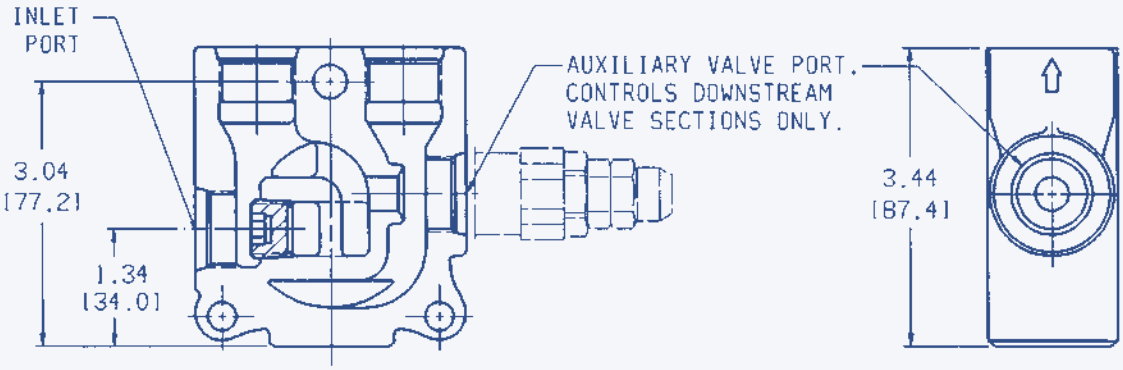
PORT SIZES		INLET SECTION PART NUMBER
INLET	OUTLET	
SAE 10	SAE 10	5001-M15

USED IN SECTION (2) OF THE VALVE ASSEMBLY SPECIFICATION SHEET

WEIGHT: APPROX. 2.5 LBS. [1.1 kg]

MID-INLET PUMP FLOW FEEDS DOWNSTREAM SPOOL SECTIONS. UPSTREAM PUMP FLOW TO LOW PRESSURE.





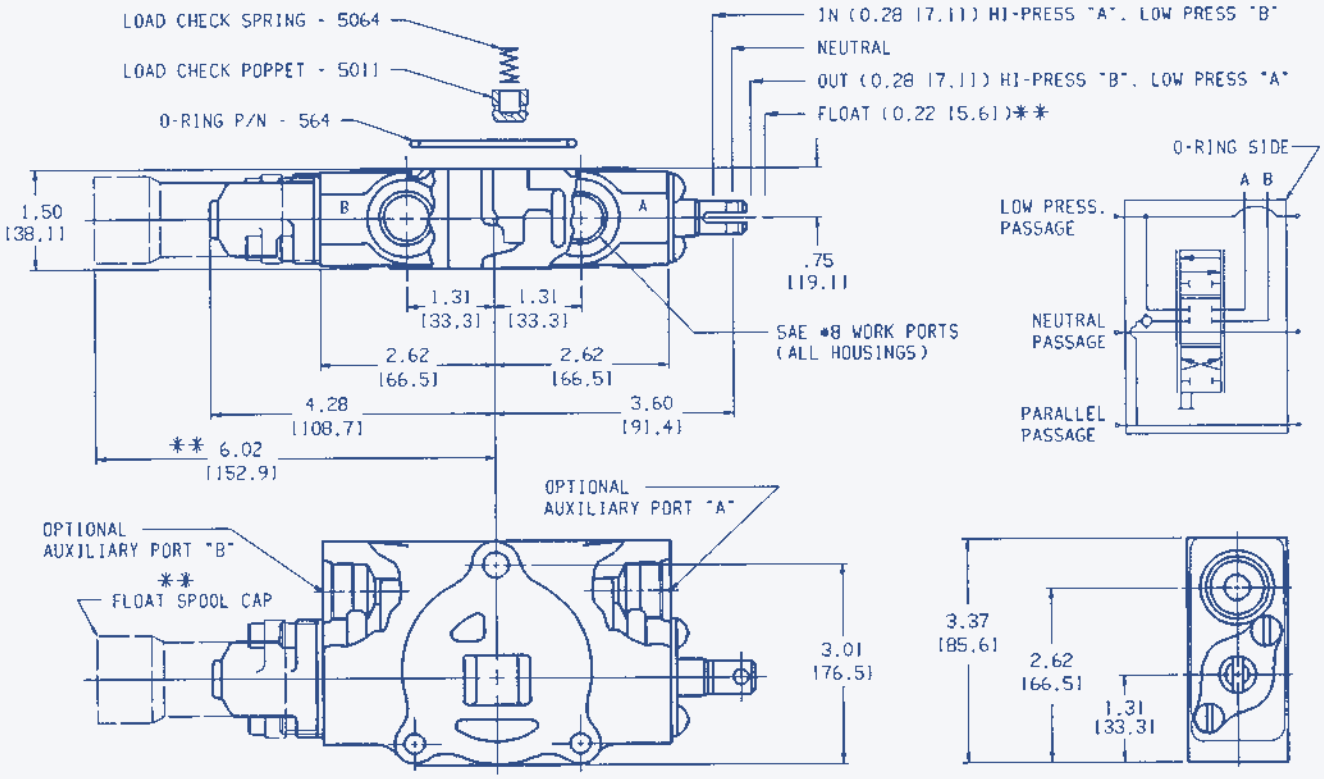
MID-INLET SECTIONS ARE USED IN-BETWEEN SPOOL SECTIONS EITHER TO ADD FLOW TO THE DOWNSTREAM SPOOL SECTIONS "COMBINER" OR TO INTRODUCE A "SEPARATE FLOW" CONDITION TO THE DOWNSTREAM SPOOL SECTIONS. MID-INLET SECTIONS ARE COUNTED AS A SPOOL SECTION WHEN DETERMINING TIE ROD KIT NUMBER.

PORT SIZES		INLET SECTION PART NUMBER
INLET (BOTH)	OUTLET	
SAE 10	SAE 10	5001-M16

USED IN SECTION (2) OF THE VALVE ASSEMBLY SPECIFICATION SHEET

WEIGHT: APPROX. 2.5 LBS. [1.1 kg]

PARALLEL CIRCUIT MANUALLY OPERATED SPOOL SECTION ASSEMBLIES



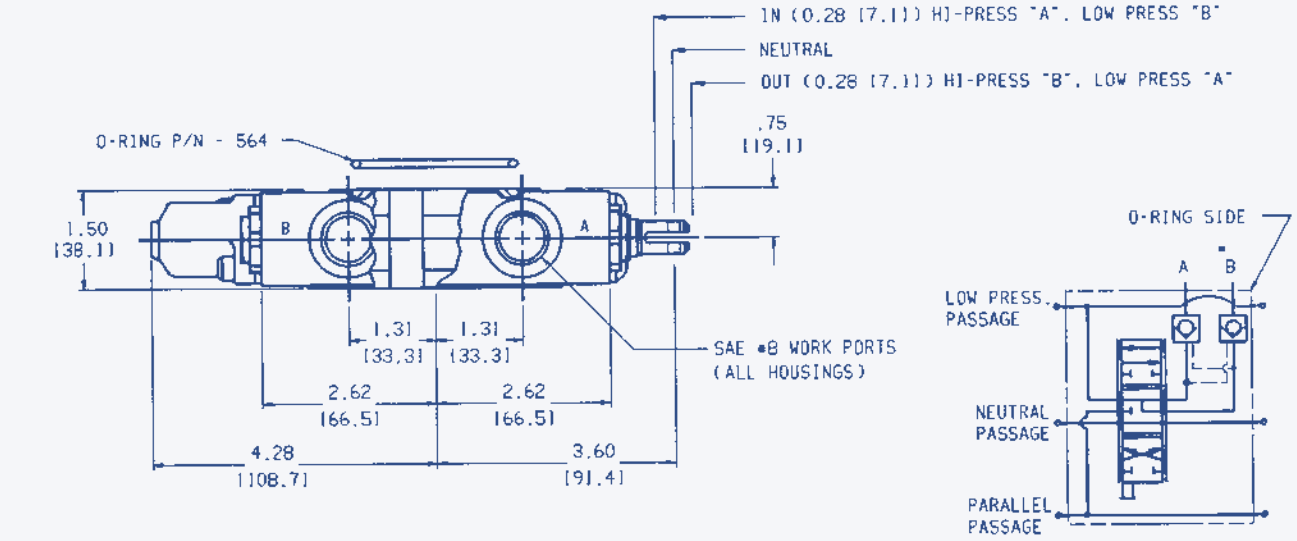
3 POS. - 4 WAY SPOOL AND END MECHANISM IN ⟷ OUT	SPOOL P/N:	END MECHANISM KIT P/N:	SPOOL SECTION ASSY. PART NUMBERS WITH NO AUX. VALVE PORTS	 WITH 2 AUX. VALVE PORTS
SPRING CTR	5031	B10-100	5002-A1	5002-A269
3 POS, DETENTED	5031	B11-100	5002-A2	5002-A511
SPRING CTR FLT IN NEUTRAL (MOTOR)	5051	B10-100	5002-A10	5002-A522
3 POS DET FLT IN NEUTRAL (MOTOR)	5051	B11-100	5002-A11	5002-A654
3 POS. - 3 WAY				
SPRING CTR (SINGLE ACTING)	5030	B10-100	5002-A4	5002-A655*
** 4 POS. - 4 WAY	* ONLY ONE AUX. PORT ("A" SIDE)			
SPRING CTR DETENTED FLOAT	5032	B11-105	5002-A8	5002-A465

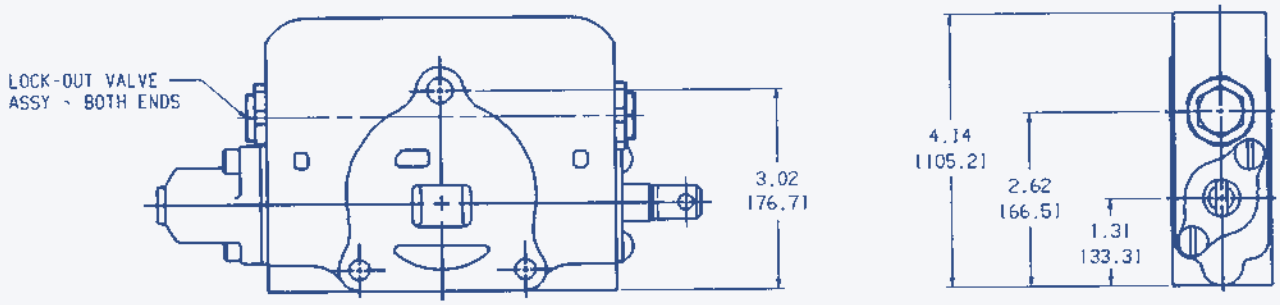
STANDARD SPRING CENTERING FORCES (SPRING P/N: 5014) = 37 LBS.

USED IN SECTION ② OF THE VALVE ASSEMBLY SPECIFICATION SHEET

WEIGHT: APPROX. 5.1 LBS. [2.3 kg] **WEIGHT: APPROX. 5.4 LBS. [2.4 kg]

(PILOT OPERATED CHECK SECTION)





3 POS. - 4 WAY

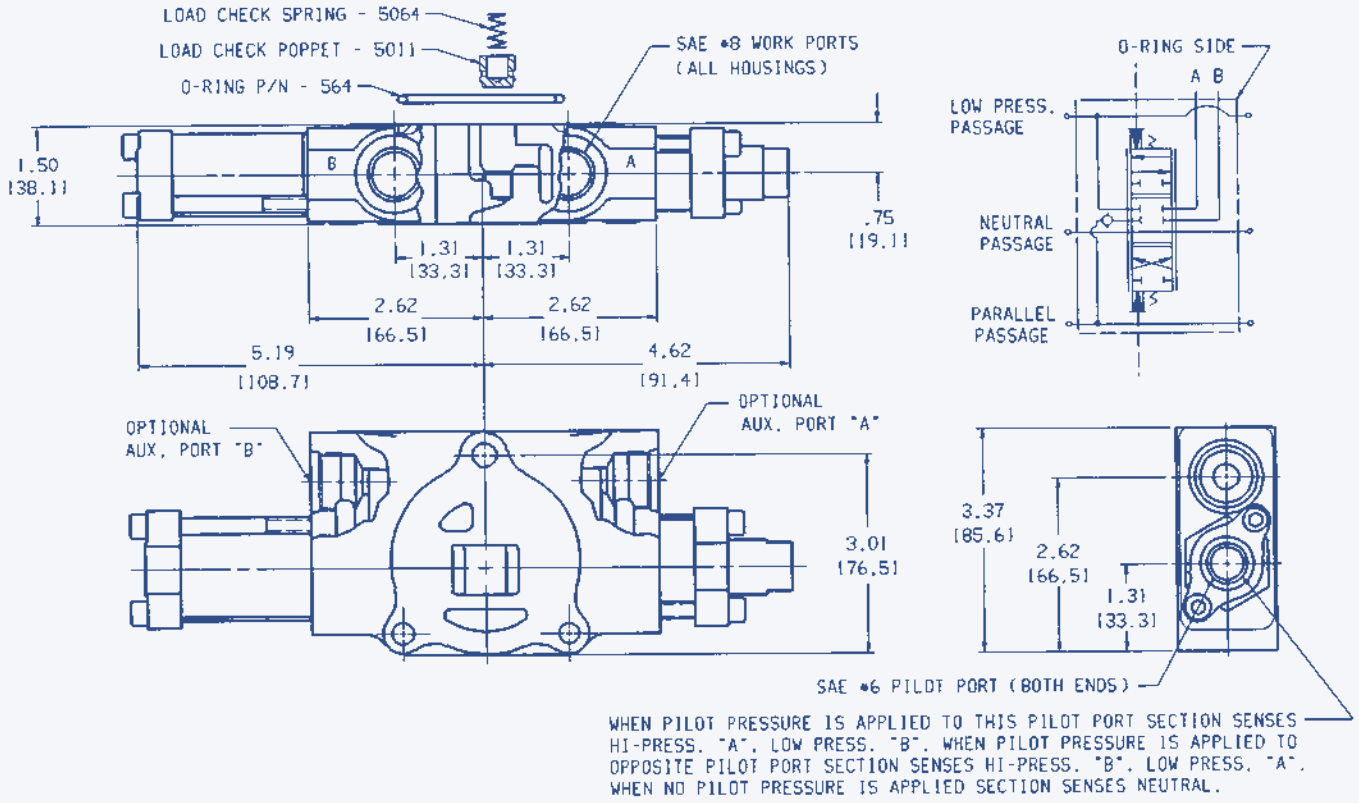
SPOOL AND END MECHANISM IN ⟷ OUT	SPOOL P/N:	END MECHANISM KIT P/N:	SPOOL SECTION ASSY. PART NUMBER
 SPRING CTR	50963-1	B10-100	5002-YA2

STANDARD SPRING CENTERING FORCES (SPRING P/N: 5014) - 37 LBS.

USED IN SECTION (2) OF THE VALVE ASSEMBLY SPECIFICATION SHEET

WEIGHT: APPROX. 6.9 LBS. [3.1 kg]

PARALLEL CIRCUIT HYDRAULIC REMOTE (OIL PILOT OPERATED) SPOOL SECTION ASSEMBLIES



3 POS. - 4 WAY

SPOOL AND END MECHANISM IN ⟷ OUT		SPOOL P/N:	END MECHANISM KIT P/N:	SPOOL SECTION ASSY. PART NUMBERS	
				WITH NO AUX. VALVE PORTS	WITH 2 AUX. VALVE PORTS
	SPRING CTR	5031	B12-108	5002-A831	5002-A832
	SPRING CTR MOTOR	5051	B12-108	5002-A833	5002-A834

APPROXIMATE PILOT PRESSURE VS SPOOL TRAVEL:

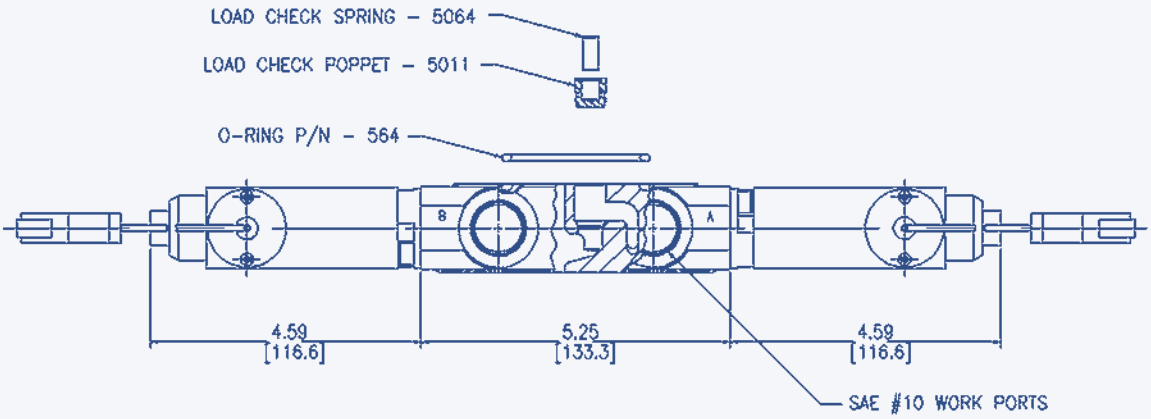
20 PSI -- SPOOL STARTS TO SHIFT
80 PSI -- FLOW BEGINS AT WORK PORT
360 PSI -- FULL SPOOL SHIFT, FULL WORK PORT FLOW
1000 PSI -- MAX.

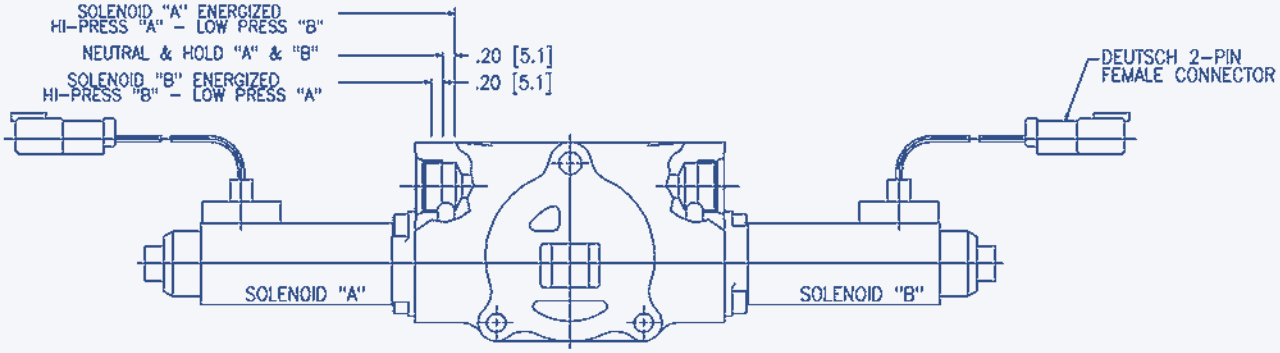
USE WITH HUSCO MANUAL HYDRAULIC CONTROLLERS:

STD. SECTIONAL TYPE: P/N 7470-A15 (1-SPOOL OPERATION)
STD. JOYSTICK TYPE: P/N 7480-19 (2-SPOOL OPERATION)

USED IN SECTION (2) OF THE VALVE ASSEMBLY SPECIFICATION SHEET

WEIGHT: APPROX. 6.0 LBS. [2.7 kg]



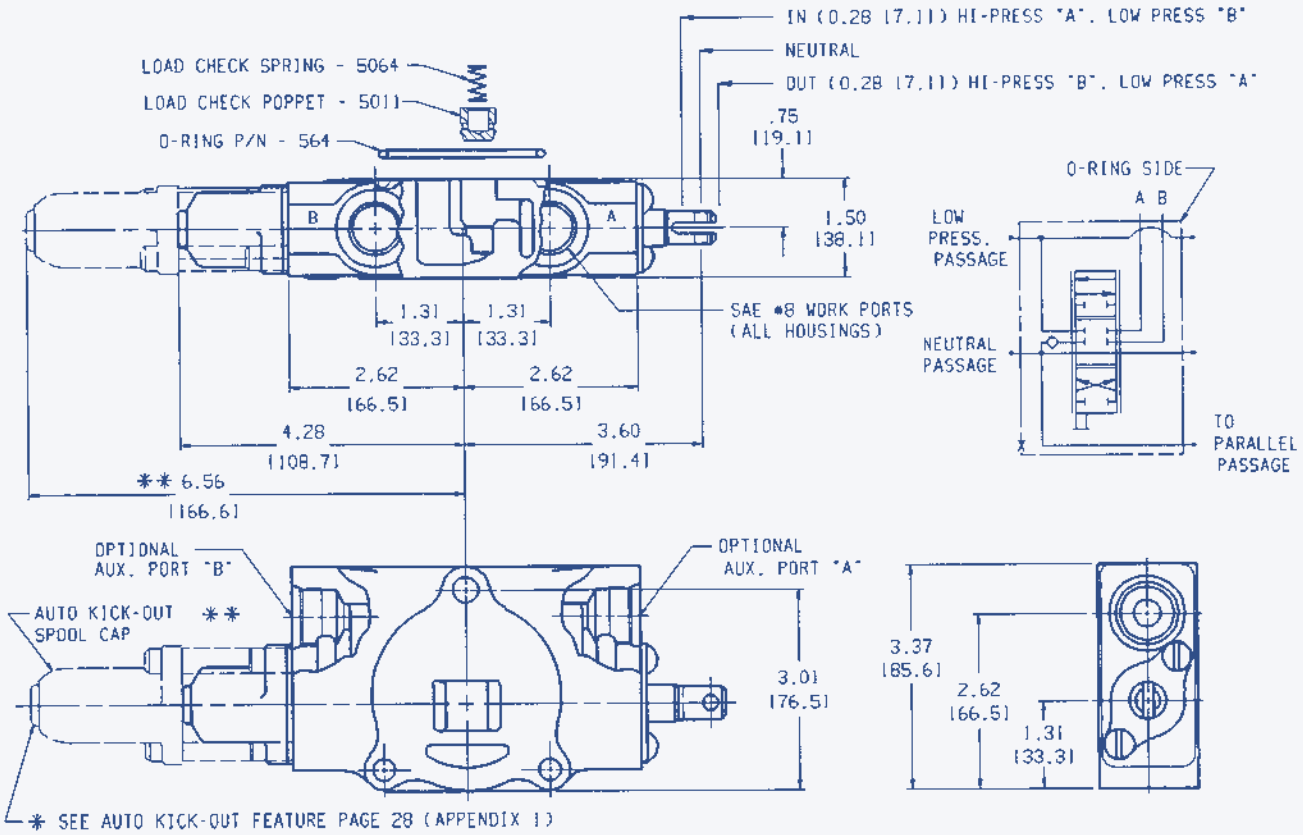


3 POS.–4 WAY			SPOOL SECTION ASSY. PART NUMBERS	
SPOOL AND END MECHANISM IN ⟷ OUT	SPOOL P/N:	SOLENOID P/N:	WITH NO AUX. VALVE PORTS	WITH 2 AUX. VALVE PORTS
SPRING CTR	52310	54077–5	5002–A1156	5002–A963

SOLENOID SPECIFICATIONS:
VOLTAGE: 12 VDC NOMINAL
CURRENT: 4.6 AMPS
POWER: 54 WATTS
FORCE: 40 N
STROKE: 0.20" [5.1 mm]
TYPE: ON/OFF
CONTINUOUSLY RATED

USED IN SECTION ② OF THE VALVE ASSEMBLY SPECIFICATION SHEET

WEIGHT: APPROX. 5.6 LBS. [2.5 kg]



3 POS. - 4 WAY			SPOOL SECTION ASSY. PART NUMBERS	
SPOOL AND END MECHANISM IN ⟷ OUT	SPOOL P/N:	END MECHANISM KIT P/N:	WITH NO AUX. VALVE PORTS	WITH 2 AUX. VALVE PORTS
SPRING CTR	5031	B10-100	5002-B3	5002-B135
** 3 POS. - 4 WAY (AUTO KICK-OUT)				
SPRING CTR DETENT IN & OUT (AUTO KICK-OUT)	N/A	N/A	5002-B141	5002-B142

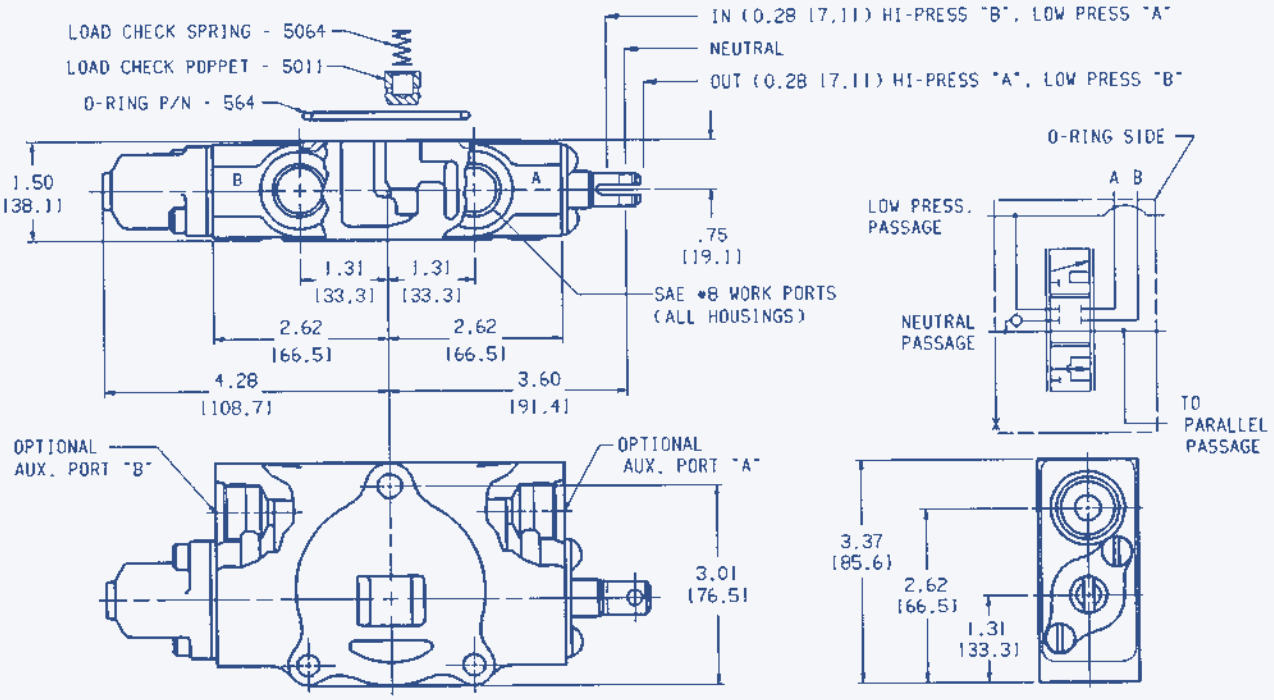
STANDARD SPRING CENTERING FORCES (SPRING P/N: 5014) - 37 LBS.

* REMOVE CAP FOR AUTO KICK-OUT ADJUSTMENTS. USE FLAT HEAD SCREWDRIVER FOR ADJUSTING. (SEE Pg. 28)
FACTORY SET AT 2000 PSI.
SETTING RANGE: 1000 - 2500 PSI

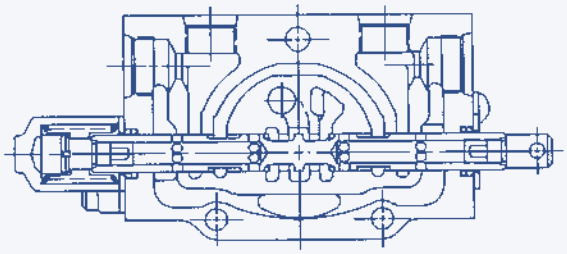
USED IN SECTION (2) OF THE VALVE ASSEMBLY SPECIFICATION SHEET

WEIGHT: APPROX. 5.1 LBS. [2.3 kg] **WEIGHT: APPROX. 5.6 LBS. [2.5 kg]

SERIES CIRCUIT MANUALLY OPERATED
SPOOL SECTION ASSEMBLIES



FULL SECTION VIEW OF P/N: 5002E36



SERIES CIRCUITRY IS ACCOMPLISHED BY USING A HOLLOW SPOOL

NOTE: BECAUSE THE WORK PORT TO TANK FLOW PATH IS THROUGH A HOLLOW SPOOL, THE WORK PORT TO TANK PRESSURE DROP ON SERIES SECTION ASSEMBLIES INCREASES APPROXIMATELY 300% OVER THE AMOUNT LISTED ON THE GRAPH ON PAGE 5. ALL OTHER PRESSURE DROPS REMAIN THE SAME. THE SERIES SPOOL SECTION ASSEMBLY IS THE ONLY SECTION THAT IS SYMMETRICAL AND CAN BE CONVERTED FROM R. H. (STD) TO L. H. ASSEMBLY.

3 POS. - 4 WAY			SPOOL SECTION ASSY. PART NUMBERS	
SPOOL AND END MECHANISM IN ⟷ OUT	SPOOL P/N:	END MECHANISM KIT P/N:	WITH NO AUX. VALVE PORTS	WITH 2 AUX. VALVE PORTS
SPRING CTR	52261	B10-103	5002-E31	5002-E36

STANDARD CENTERING SPRING FORCES (SPRING P/N: 5014) - 37 LBS.

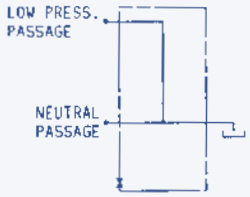
USED IN SECTION (2) OF THE VALVE ASSEMBLY SPECIFICATION SHEET

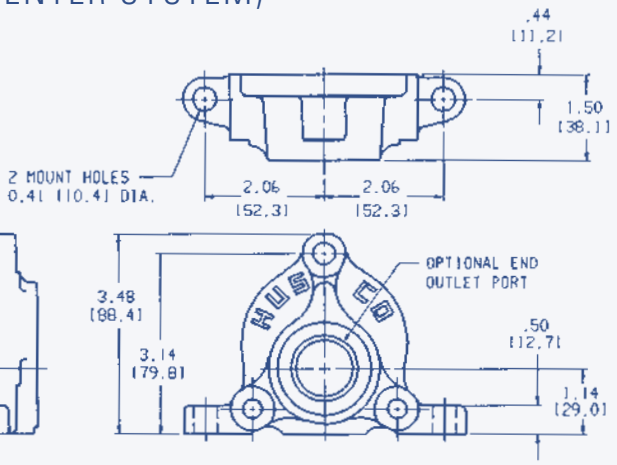
WEIGHT: APPROX. 5.1 LBS. [2.3 kg]

END OUTLET/TURNAROUND (OPEN-CENTER SYSTEM)

PORT SIZE	OUTLET SECTION PART NUMBER
NONE	5003-A1 *
SAE 12	5003-A3

* REQUIRES UPSTREAM OUTLET PORT SOMEWHERE ELSE IN VALVE STACK

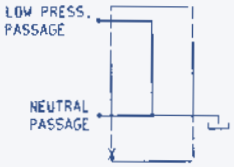


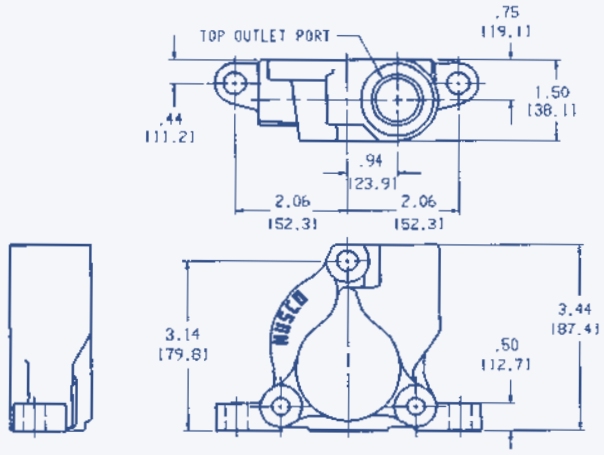


WEIGHT : APPROX. 2.0 LBS. [0.9] kg

OUTLET SECTION W/TOP OUTLET PORT (OPEN-CENTER SYSTEM)

PORT SIZE	OUTLET SECTION PART NUMBER
SAE 10	5003-A9





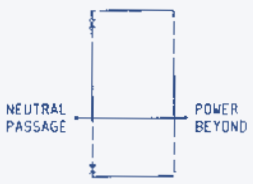
WEIGHT : APPROX. 2.6 LBS. [1.2] kg

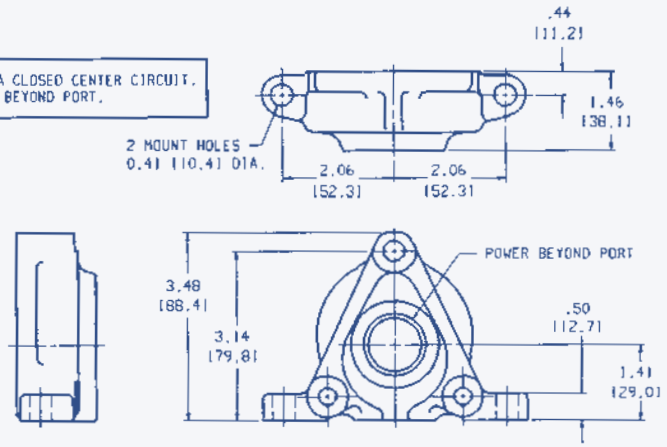
POWER BEYOND/CLOSED-CENTER

PORT SIZE	OUTLET SECTION PART NUMBER
SAE 10	5003-E2
SAE 12	5003-E5

REQUIRES UPSTREAM OUTLET PORT IN VALVE STACK FOR POWER BEYOND OPERATION.

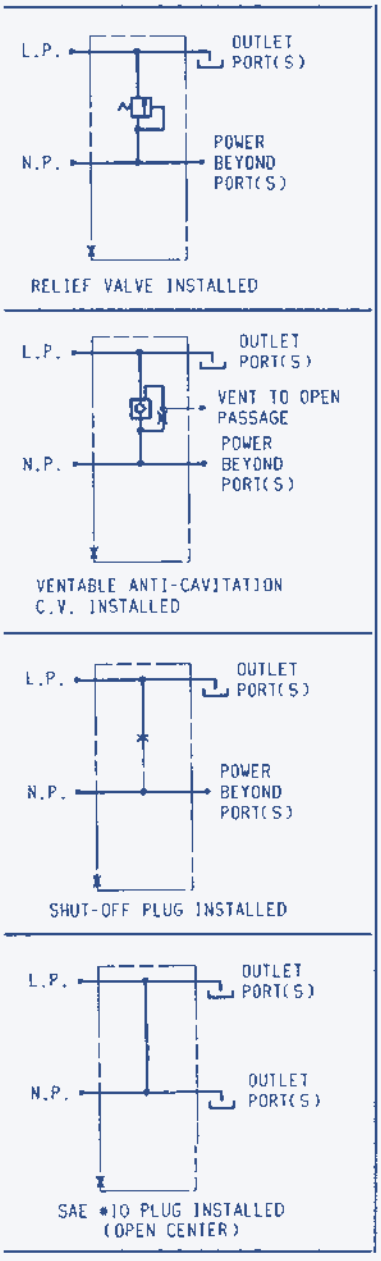
TO CREATE A CLOSED CENTER CIRCUIT, PLUG POWER BEYOND PORT.

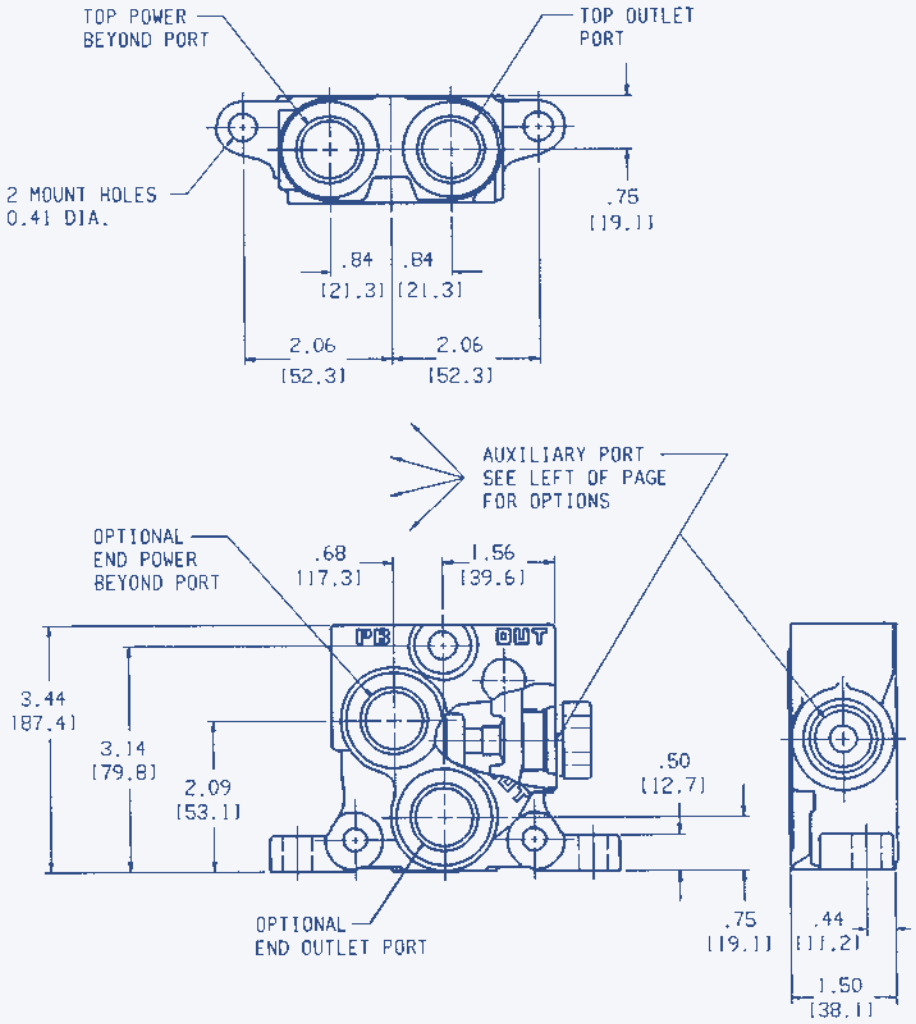




WEIGHT : APPROX. 2.4 LBS. [1.1] kg

AUXILIARY VALVE PORT CIRCUIT OPTIONS
(ALL SOLD SEPARATELY)





PORT SIZES				OUTLET SECTION PART NUMBERS
OUTLET		POWER BEYOND		
TOP	END	TOP	END	
SAE 10	NONE	SAE 10	NONE	5003-A67
SAE 10	SAE 12	SAE 10	SAE 12	5003-A68

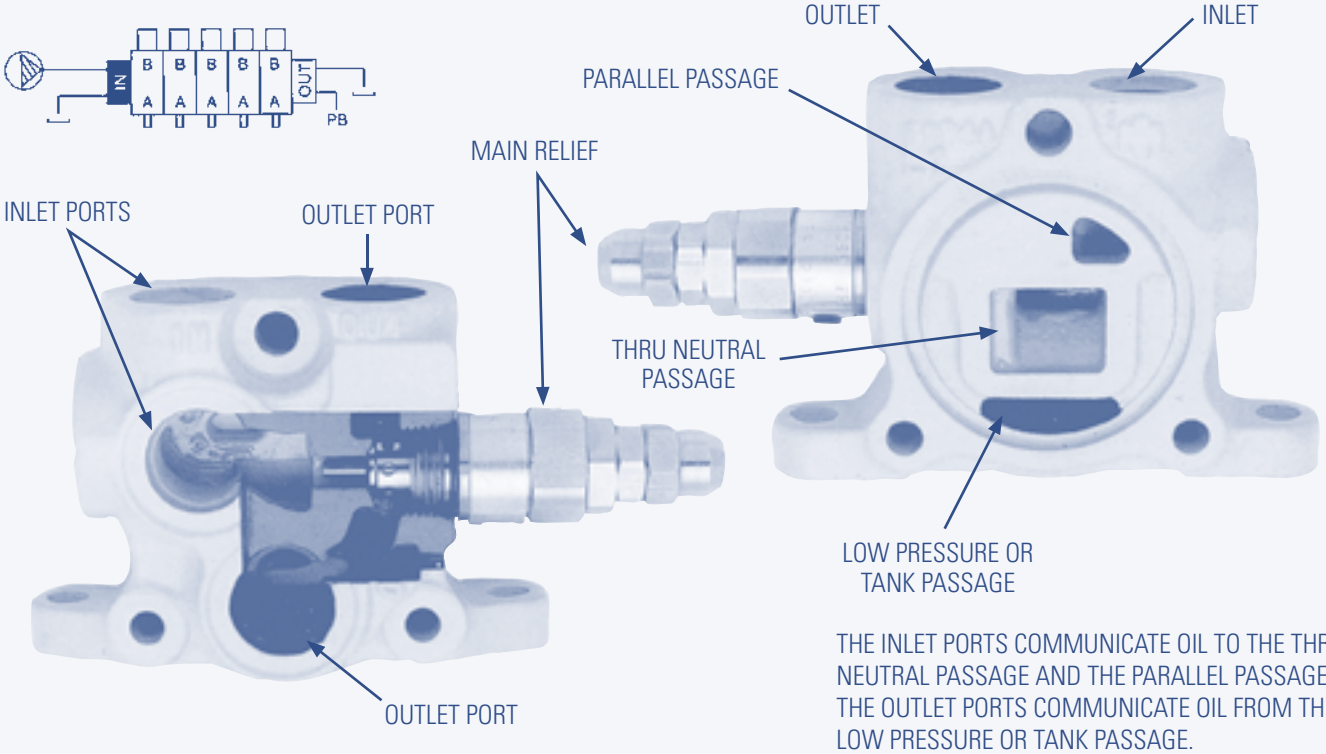
TO CREATE A CLOSED CENTER CIRCUIT, PLUG POWER BEYOND PORT(S) AND INSTALL SHUT-OFF PLUG IN AUXILIARY PORT.

USED IN SECTION ③ OF THE VALVE ASSEMBLY SPECIFICATION SHEET

SEE CUT-AWAY PHOTO Pg. 19

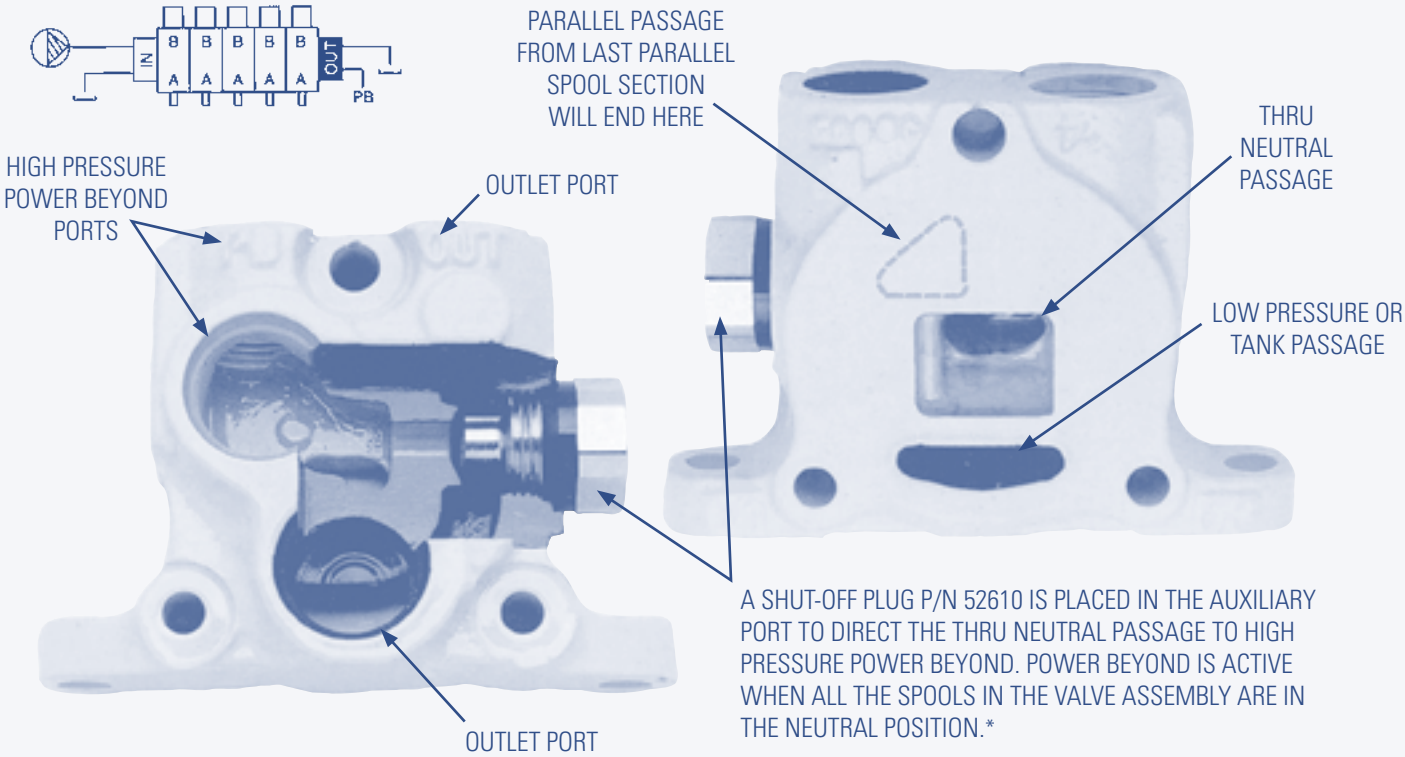
WEIGHT: APPROX. 3.0 LBS. [1.4 kg]

CUTAWAY VIEW AND DOWNSTREAM VIEW (O-RING FACE) OF INLET END SECTION ASSEMBLY P/N 5001-A88



THE INLET PORTS COMMUNICATE OIL TO THE THRU NEUTRAL PASSAGE AND THE PARALLEL PASSAGE. THE OUTLET PORTS COMMUNICATE OIL FROM THE LOW PRESSURE OR TANK PASSAGE.

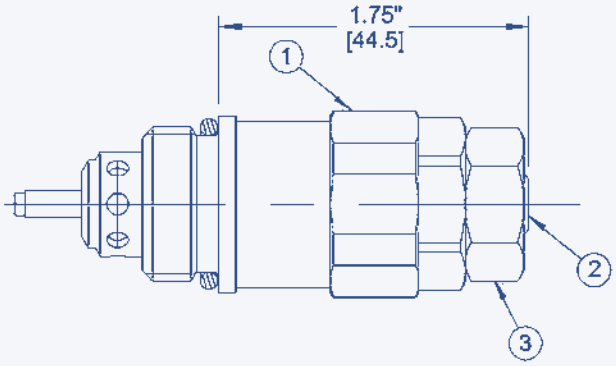
CUTAWAY VIEW AND UPSTREAM VIEW (NON-O-RING FACE) OF OUTLET END SECTION ASSEMBLY P/N 5003-A68



A SHUT-OFF PLUG P/N 52610 IS PLACED IN THE AUXILIARY PORT TO DIRECT THE THRU NEUTRAL PASSAGE TO HIGH PRESSURE POWER BEYOND. POWER BEYOND IS ACTIVE WHEN ALL THE SPOOLS IN THE VALVE ASSEMBLY ARE IN THE NEUTRAL POSITION.*

*Exception: series circuit valve section assemblies return discharged oil to neutral passage. (See page 18 for other circuit options)

MODEL 5060 PILOT OPERATED RELIEF VALVE WITH ANTI-VOID



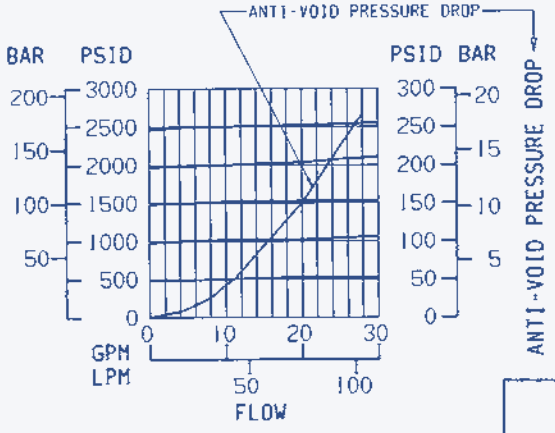
INSTALLATION AND ADJUSTMENT PROCEDURE

TORQUE MAIN BODY #1 INTO VALVE HOUSING USING 30 - 36 FT. LBS.

TO ADJUST PRESSURE SETTING, LOOSEN JAM NUT #3. TURN ADJUST SCREW #2 TO DESIRED SETTING. RE-TIGHTEN JAM NUT USING 6 - 8 FT. LBS.

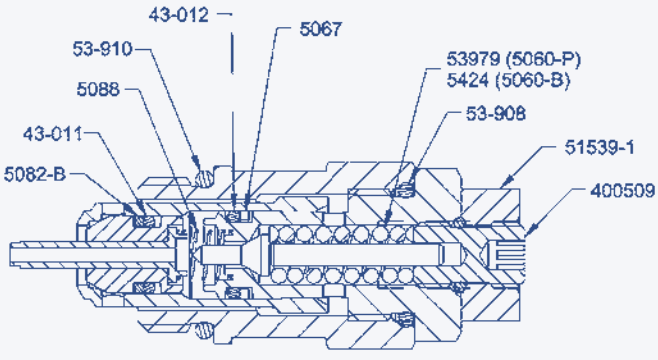
RELIEF VALVE ASSY. P/N	PRESSURE SETTING RANGE:	SPRING & SEAL KIT P/N:	SPRING P/N:	FACTORY SETTING AT 5 GPM	ADJUSTMENT VALUES PER 1/4 TURN
5060-B	100 - 1500 PSI	51790-1	5424	1000 PSI	200 PSI
5060-P	1500 - 3500 PSI	51790-3	53979	2000 PSI	550 PSI

5060-P RELIEF VALVE PERFORMANCE DATA



ABOUT THE 5060....

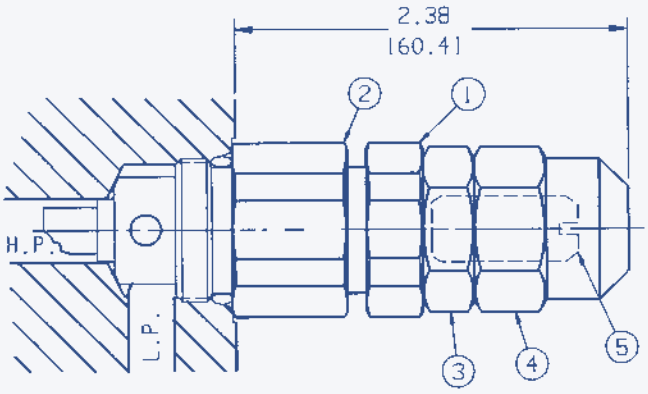
THE 5060 RELIEF VALVE IS THE WORKHORSE OF THE MODEL 5000 CONTROL VALVE LINE. THE 5060 IS USED AS A MAIN, CYLINDER PORT OR POWER BEYOND PRESSURE RELIEF VALVE. ITS HIGH FLOW PERFORMANCE CHARACTERISTICS AND ANTI-VOID CAPABILITIES MAKE IT THE UNIVERSAL CHOICE. THERE ARE OVER 2 MILLION 5060 RELIEFS IN OPERATION TODAY.



FOR KIT 51790-1 SPRING P/N 5424 REPLACES SPRING P/N 53979

SEAL & SPRING KIT 51790-3		
PART NO.	DESCRIPTION	QTY.
400509	ADJUST SCREW ASSY.	1
43-011	O-RING	1
43-012	O-RING	1
5067	BACK-UP RING	1
5082-B	BACK-UP RING	1
5088	SPRING	1
51539-1	JAM NUT	1
53-908	O-RING	1
53-910	O-RING	1
53979	SPRING	1
A1003-2	INSTRUCTION SHEET	1

MODEL 52710 DIRECT ACTING RELIEF VALVE



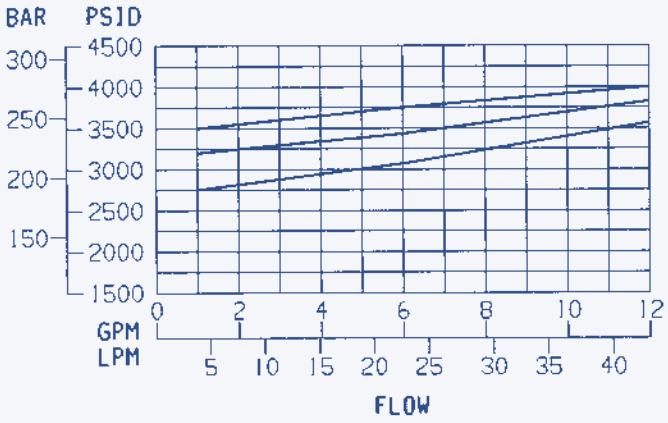
INSTALLATION AND ADJUSTMENT PROCEDURE

TORQUE MAIN BODY •1 INTO VALVE HOUSING THEN TORQUE LOCK NUT •2 USING 29.5 - 36.5 FT.-LBS. ON BOTH.

TO ADJUST PRESSURE SETTING, REMOVE ACORN NUT •4 AND LOOSEN JAM NUT •3. TURN ADJUST SCREW •5 TO DESIRED SETTING. RE-TIGHTEN JAM NUT AND ACORN NUT USING 9 - 11 FT.-LBS.

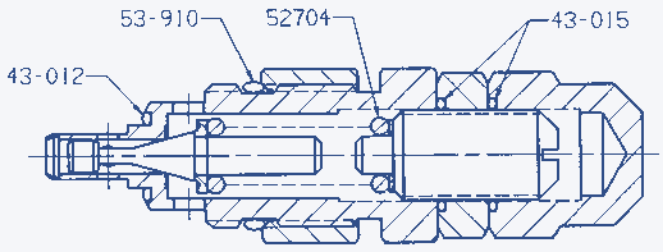
RELIEF VALVE ASSY. P/N	PRESSURE SETTING RANGE:	SPRING & SEAL KIT P/N:	SPRING P/N:	FACTORY SETTING AT 5.0 GPM	ADJUSTMENT VALUES PER 1/4 TURN
52710-B	500-1500 PSI	52727-1	52708	1000 PSI	175 PSI
52710-C	1500-3500 PSI	52727-2	52704	2000 PSI	250 PSI

52710 RELIEF VALVE PERFORMANCE DATA



ABOUT THE 52710....

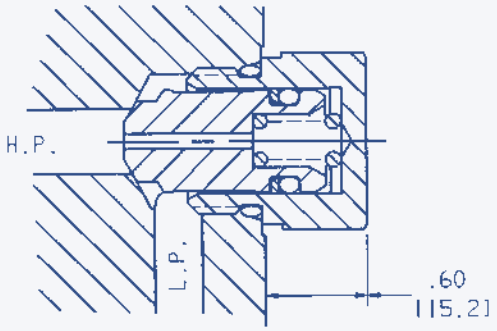
THE 52710 SERIES RELIEF IS A LOW COST, LOW FLOW, DIRECT ACTING RELIEF CARTRIDGE THAT FITS IN ALL THE AUXILIARY PORTS LISTED IN THIS CATALOG. IT IS USED EXTENSIVELY AS A CYLINDER PORT RELIEF WHEN A FULL FLOW RELIEF IS NOT NECESSARY. THIS RELIEF IS COMMONLY USED FOR ELIMINATING THE EFFECTS OF LOW FLOW PEAK PRESSURE SPIKES.



SPRING & SEAL KIT 52727-2 *		
PART NO.	DESCRIPTION	QTY.
43-012	O-RING	1
43-015	O-RING	2
52704	SPRING	1
53-910	O-RING	1

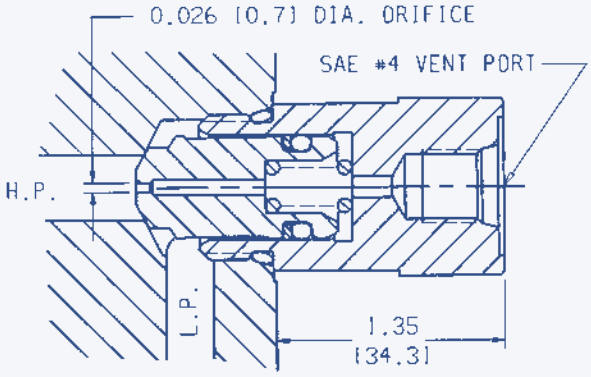
* FOR KIT 52727-1 SPRING P/N 52708 REPLACES SPRING P/N 52704

ANTI-CAVITATION CHECK VALVE



THE ANTI-CAVITATION CHECK VALVE OPENS WHEN L.P. PASSAGE PRESSURE EXCEEDS THE H.P. PASSAGE PRESSURE.

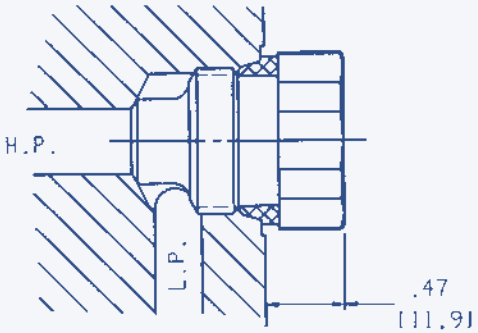
P/N:	TORQUE
5475	29.5 - 36.5 FT.-LBS.



THE VENTABLE ANTI-CAVITATION CHECK VALVE OPENS WHEN THE L.P. PASSAGE PRESSURE EXCEEDS THE H.P. PASSAGE PRESSURE OR WHEN THE VENT PORT IS OPENED TO TANK.

P/N:	TORQUE
52540-1	29.5 - 36.5 FT.-LBS.

SHUT-OFF PLUG ASSEMBLY



THE SHUT-OFF PLUG IS USED TO SHUT-OFF THE L.P. PASSAGE FROM THE H.P. PASSAGE IN ALL THE AUX. VALVE PORTS. IT IS USED TO PLUG THE AUX. VALVE PORT WHEN AN AUX. VALVE IS NOT REQUIRED. THE SHUT-OFF PLUG IS ALSO USED IN THE OUTLET SECTION TO ACTIVATE THE POWER BEYOND PORT(S).

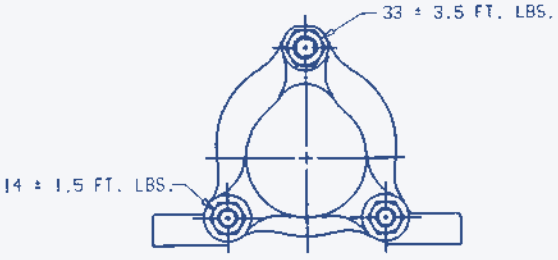
P/N:	TORQUE
52610	29.5 - 36.5 FT.-LBS.

STANDARD SAE PLUG AND O-RING ASSEMBLY

DESCRIPTION	P/N:	TORQUE
#8 SAE	11150	29.5-36.5 FT.-LBS.
#10 SAE	11180	43-53 FT.-LBS.
#12 SAE	11210	66-82 FT.-LBS.

MODEL 5000 TIE ROD KITS

P/N:	NUMBER OF SECTIONS
6131-1	1
6131-2	2
6131-3	3
6131-4	4
6131-5	5
6131-6	6
6131-7	7
6131-8	8
6131-9	9
6131-10	10
6131-11	11



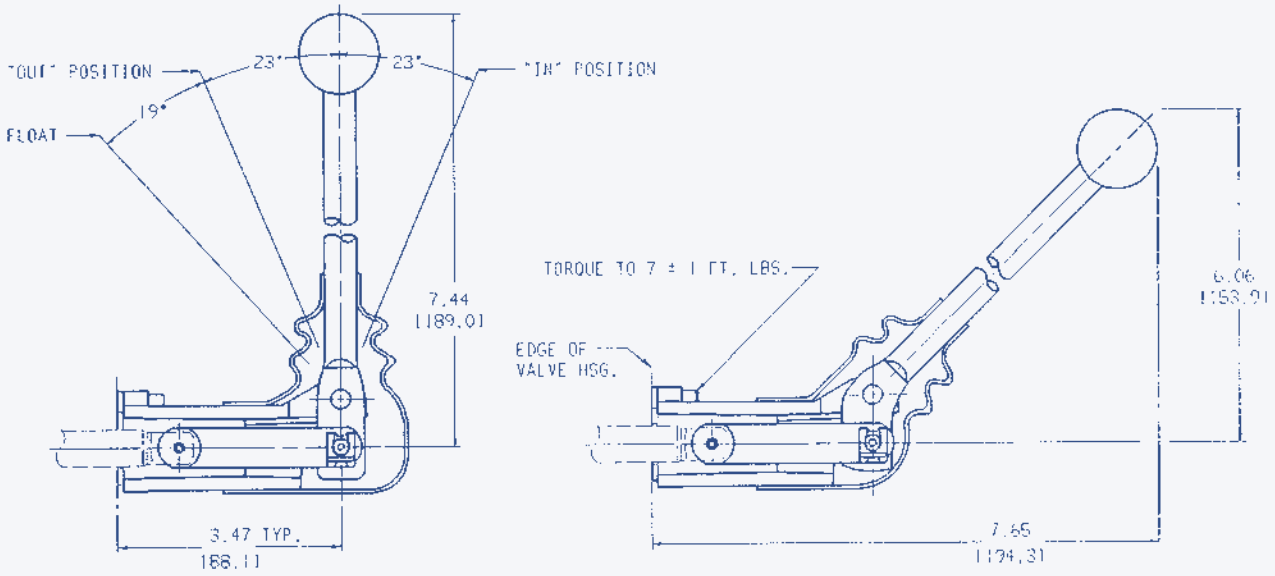
TIE ROD HOLE PATTERN
TORQUE - ANY QTY. OF SECTIONS

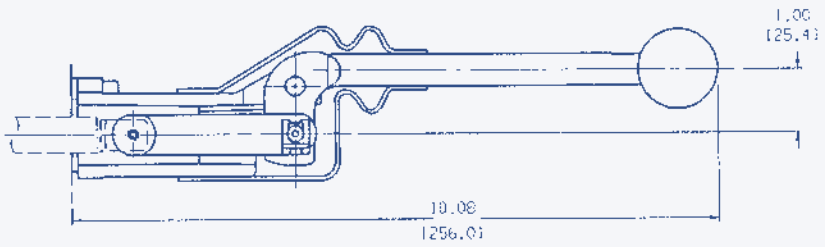
FIXED POSITION LEVER W/BOOT

NOTE: SEE APPENDIX 3 FOR PARTS LISTING

LEVER TRAVEL TYPICAL FOR EACH ASSY

NOTE: LEVERS MAY BE MOUNTED 180° FROM THE POSITIONS SHOWN

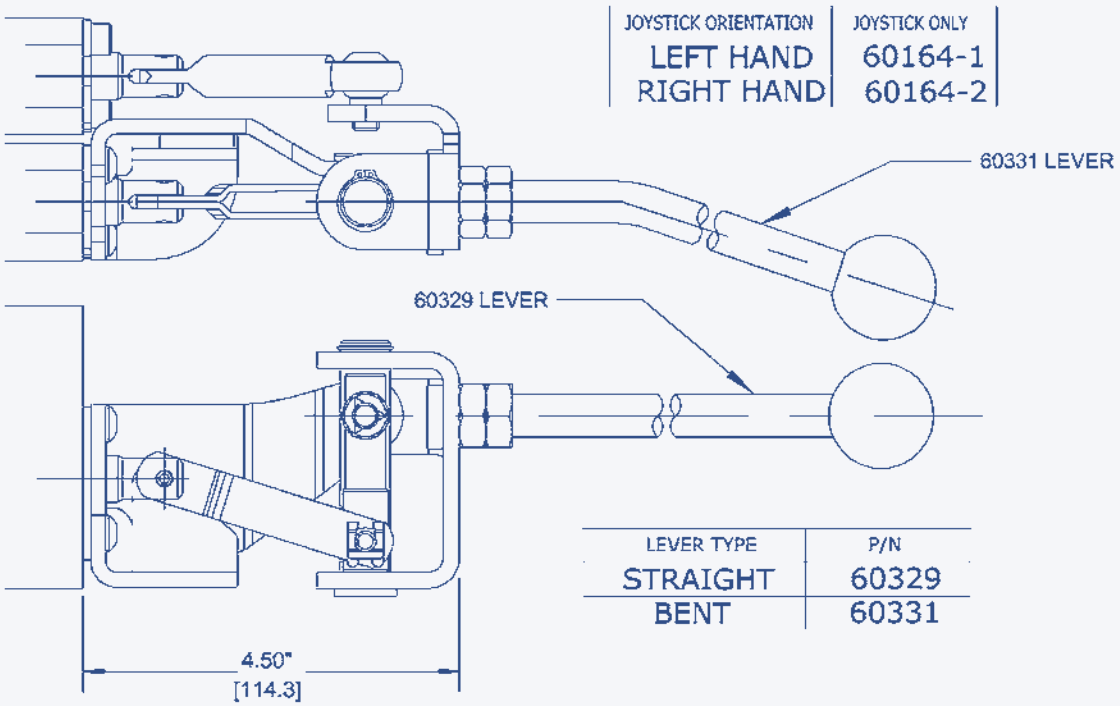




FIXED POSITION	P/N:
VERTICAL	52250-1
HORIZONTAL	52250-12
45°	52250-14

HEAVY DUTY MECHANICAL JOYSTICK

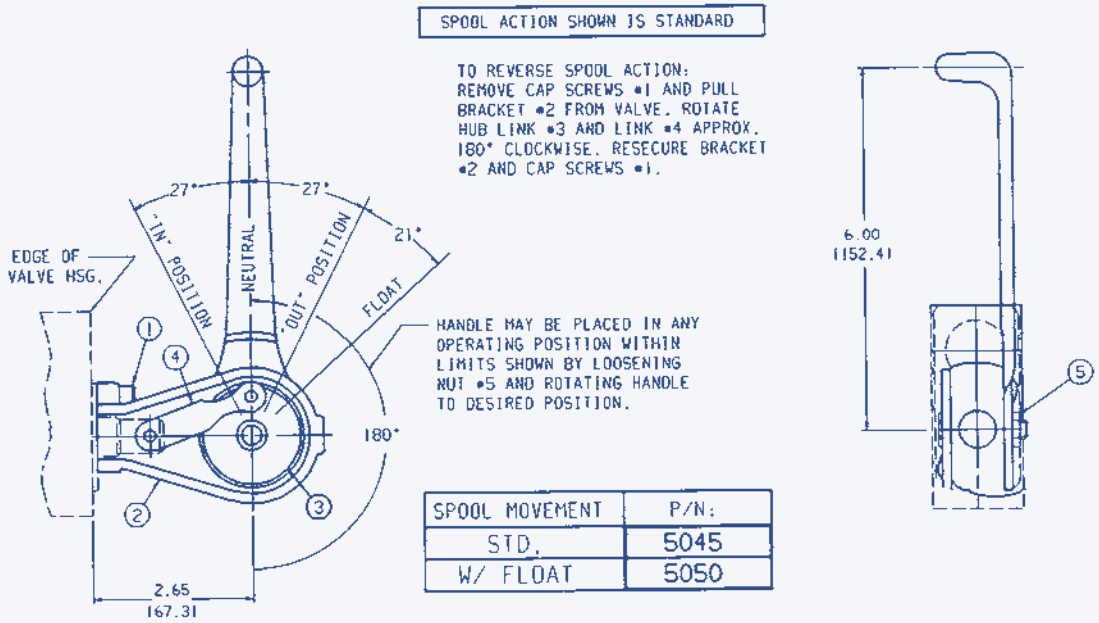
FOR SIMULTANEOUS CONTROL OF TWO SPOOL SECTIONS



JOYSTICK ORIENTATION	JOYSTICK ONLY
LEFT HAND	60164-1
RIGHT HAND	60164-2

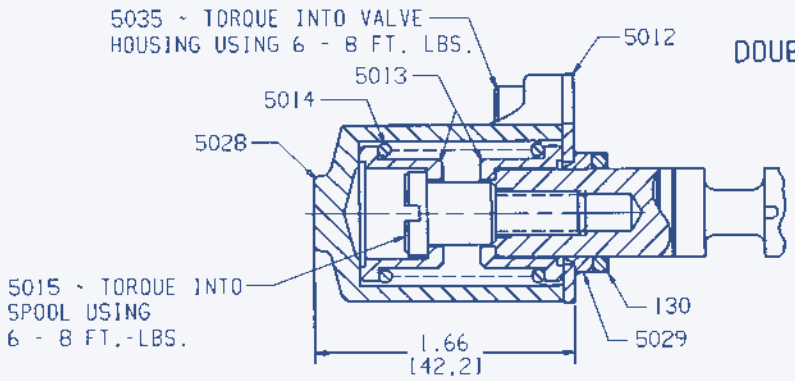
LEVER TYPE	P/N
STRAIGHT	60329
BENT	60331

INFINITE POSITION LEVER



SPOOL MOVEMENT	P/N:
STD.	5045
W/ FLOAT	5050

FOR PARALLEL AND CONVENTIONAL CIRCUIT SECTIONS

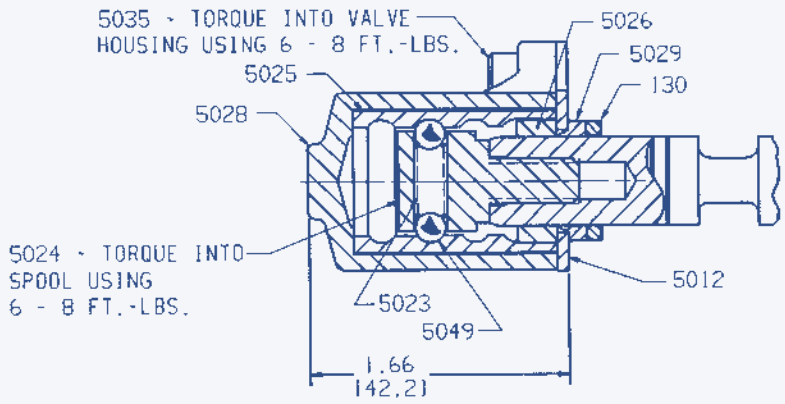


3 POSITION, 4 WAY DOUBLE ACTING SPRING CENTERED

KIT #B10-100

PART NO.	DESCRIPTION	QTY.
130	O-RING	1
5012	SEALPLATE	1
5013	SPRING SEAT	2
5014	SPRING	1
5015	SPOOL END	1
5028	CAP	1
5029	WIPER	1
5035	CAP SCREW	2

FOR SERIES CIRCUIT SECTIONS USE: KIT #B10-103 (P/N 51983 AND P/N 4623 REPLACE P/N 5015)

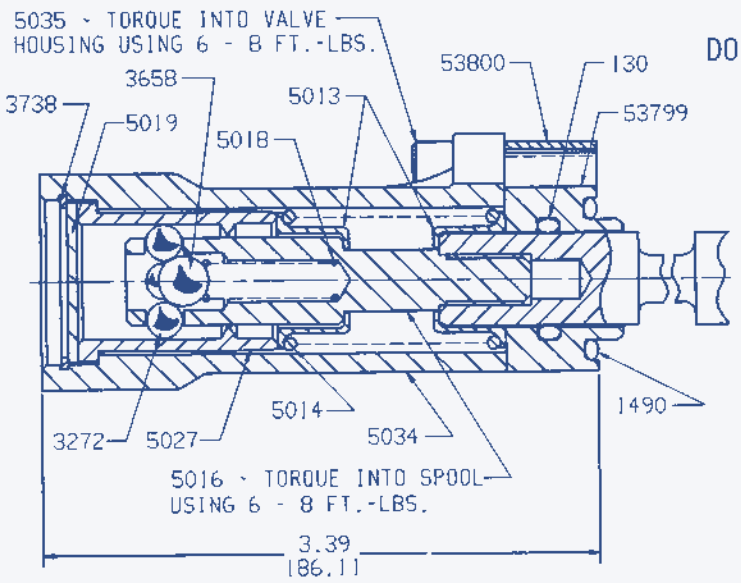


3 POSITION, 4 WAY DOUBLE ACTING DETENT

KIT #B11-100

PART NO.	DESCRIPTION	QTY.
130	O-RING	1
5012	SEALPLATE	1
5023	SPRING	1
5024	DET. PIN	1
5025	DET. SLEEVE	1
5026	SPACER	1
5028	CAP	1
5029	WIPER	1
5035	CAP SCREW	2
5049	BALL	2

FOR SERIES CIRCUIT SECTIONS USE: KIT #B11-119 (P/N 52272 AND P/N 4623 REPLACE P/N 5024)



4 POSITION, 4 WAY DOUBLE ACTING SPRING CENTERED DETENT "IN" FLOAT

KIT #B11-105

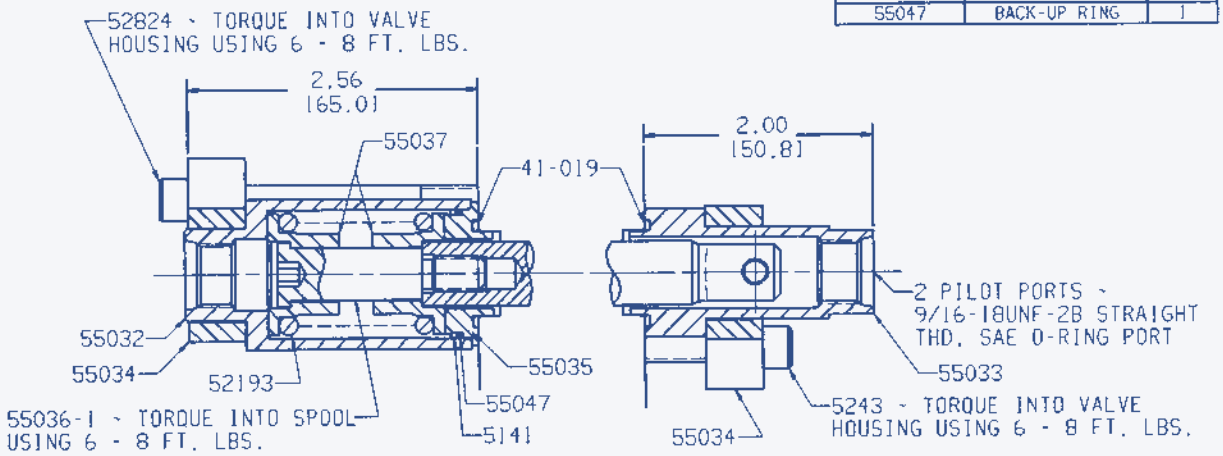
(NOT FOR CONVERSION)

PART NO.	DESCRIPTION	QTY.
130	O-RING	1
1490	O-RING	1
3424	CAP SCREW	2
5013	SPRING SEAT	2
5014	SPRING	1
5018	SPRING	1
5019	SPACER	1
5021	DET. PIN	1
5027	DET. SLEEVE	1
5034	CAP	1
3272	BALL	4
3658	BALL	1
3738	RET. RING	1
53799	SPACER	2
53800	SPACER	1

HYDRAULIC REMOTE (OIL PILOT OPERATED)

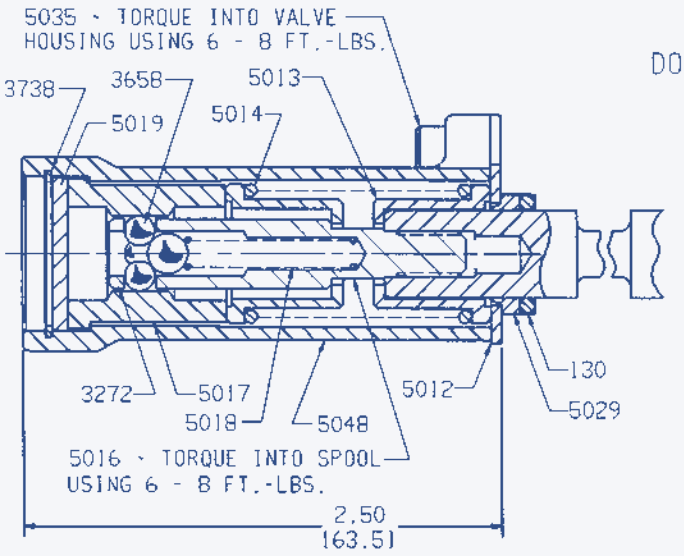
KIT P/N: B12-108

PART NO.	DESCRIPTION	QTY.
41-019	O-RING	2
5141	O-RING	1
52193	SPRING	1
5243	CAP SCREW	2
52824	CAP SCREW	2
55032	CAP	1
55033	CAP	1
55034	SEALPLATE	2
55035	RETAINER	1
55036-1	SPOOL END	1
55037	SPRING SEAT	2
55047	BACK-UP RING	1



FOR SERIES CIRCUIT SECTIONS USE: KIT #B12-109
(P/N 55036 AND P/N 4623 REPLACE P/N 55036-1)

FOR PARALLEL AND CONVENTIONAL CIRCUIT SECTIONS



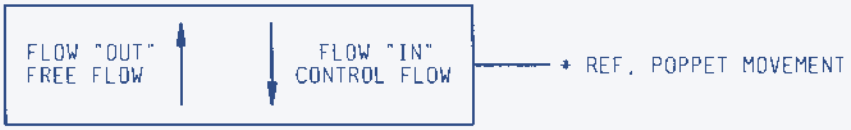
3 POSITION, 4 WAY
DOUBLE ACTING SPRING CENTERED
DETENT "IN" & "OUT"

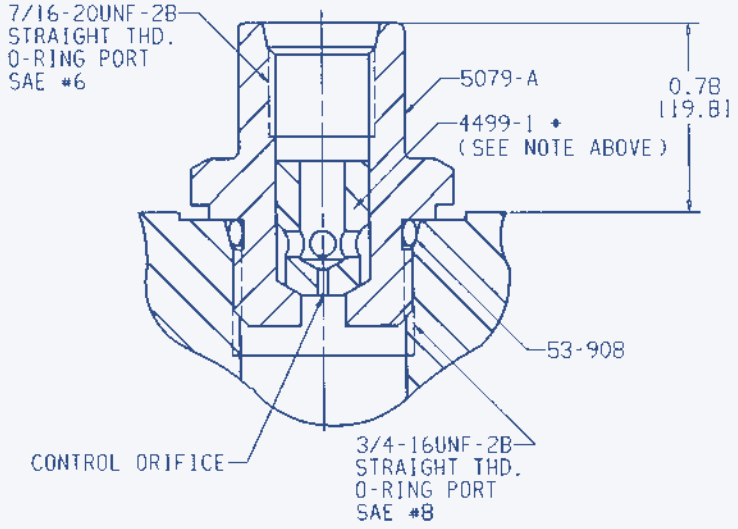
KIT #B11-103

PART NO.	DESCRIPTION	QTY.
130	O-RING	1
5012	SEALPLATE	1
5013	SPRING SEAT	2
5014	SPRING	1
5016	DET. PIN	1
5017	DET. SLEEVE	1
5018	SPRING	1
5019	SPACER	1
5029	WIPER	1
5035	CAP SCREW	2
5048	CAP	1
3272	BALL	4
3658	BALL	1
3738	RET. RING	1

FOR SPR. CTR. DETENT "IN" ONLY USE: KIT #B11-101 (DET.SLEEVE P/N 5283 REPLACES P/N 5017)
FOR SPR. CTR. DETENT "OUT" ONLY USE: KIT #B11-102 (DET.SLEEVE P/N 5163 REPLACES P/N 5017)

FLOW RESTRICTORS





KIT P/N: 11901-2

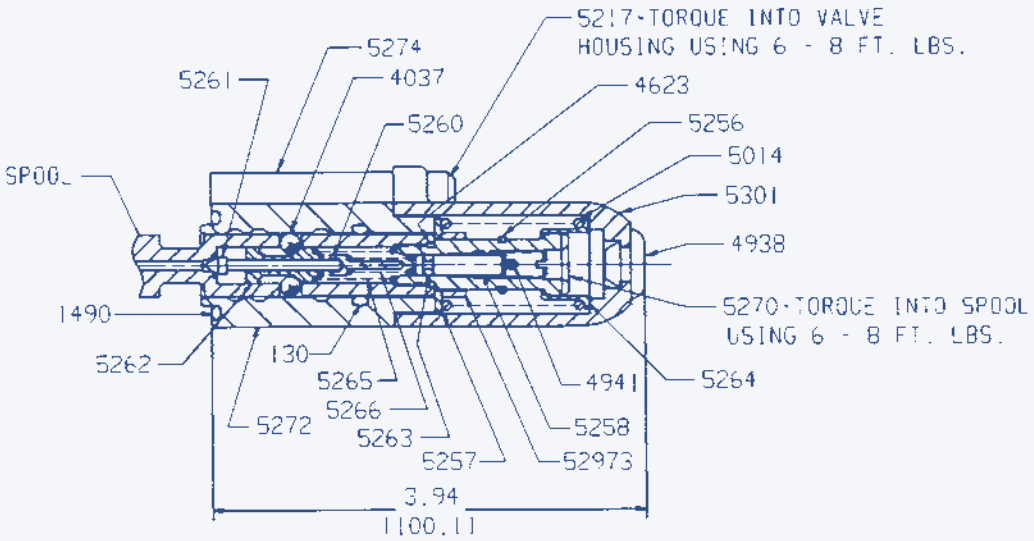
PART NO.	DESCRIPTION	QTY.
5079-A	FITTING	1
4499-1	POPPET *	1
53-908	VITON O-RING	1

* POPPET HOLE SIZE .0430 IN. (1.1 MM) CONSULT HUSCO FOR OTHER POPPET SIZES THAT ARE AVAILABLE - OR MACHINE ORIFICE TO DESIRED SIZE.

AUTOMATIC KICK-OUT FEATURE

The aut
mec
release the spool to the center position at a pre-determined settable cylinder port pressure.

The illustration below identifies the working components of the auto kick-out mechanism. The auto kick-out mechanism is not available in kit conv
maintenance procedures.



PART NO.	DESCRIPTION	QTY.
130	O-RING	1
1490	O-RING	1
4037	BALL	4
4623	O-RING	1
4938	PLUG	1
4941	LOCKING INSERT	1
5014	SPRING	1
5217	CAP SCREW	2
5256	RET. RING	1
5257	WASHER	1
5258	ADJUST SCREW	1
5260	SPRING GUIDE	1

PART NO.	DESCRIPTION	QTY.
5261	POPPET	1
5262	DET. CAM	1
5263	O-RING	1
5264	SPRING SEAT	1
5265	SPRING	1
5266	SPRING	1
5270	SPOOL END	1
5272	DET. SLEEVE	1
5274	SPACER	2
52973	SPACER	1
5301	CAP	1

AUTO KICK-OUT SETTING AND ADJUSTMENT

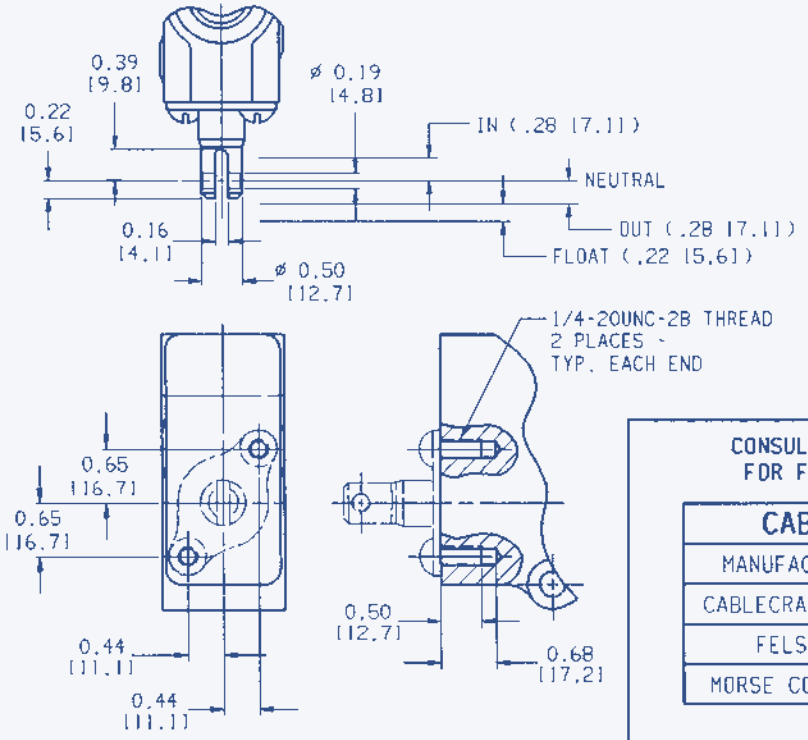
Adjustments to the auto kick-out valve section are made when integrated within a hydraulic circuit.

1. Install a press
   be adjusted.
2. With the hydraulic system off, shift auto kick-out valve section to a detented position.
3. Activate the
   to allow p
   the . Note
   the pressure reading at time of kick-out; this will determine its current setting. Standard factory setting, if not specified, is 2000 PSI.
4. To make
   adjustment
   above until desired setting is achieved. Adjustment range is 1000-2600 PSI. Run a few cycles to assure setting consistency, replace rubber plug. Note: Final main relief setting must be at least 250 PSI higher than the highest auto kick-out setting in the system.

Caution: To avoid damaged or lost parts do not remove adjustment screw.

APPENDIX 2

SPOOL END ORIENTATION



CONSULT CABLE MANUFACTURER
FOR FURTHER INFORMATION

CABLE CONNECTORS	
MANUFACTURER	KIT P/N
CABLECRAFT INC.	*
FELSTED	59119
MORSE CONTROLS	306769

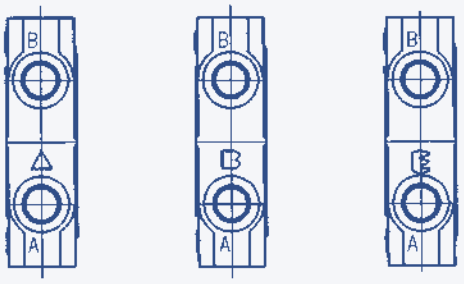
*KIT P/N 773-305-XX -
(THREADED CABLE END AT CONTROLLER)

*KIT P/N 773-306-XXX -
(CAM CABLE END AT CONTROLLER)

APPENDIX 3

BASIC CASTING IDENTIFICATION

(NON-SERVICEABLE)

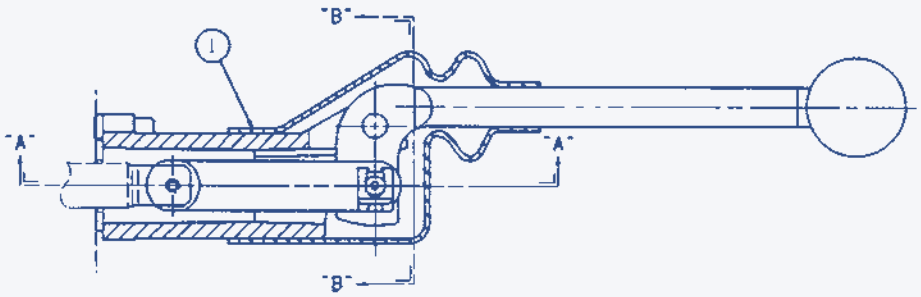


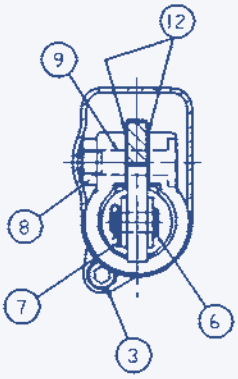
NOTE:
CASTING OPTIONS SHOWN ARE REPRESENTED IN THIS CATALOG.
CONTACT HUSCO FOR OTHER AVAILABLE OPTIONS.

SECTION ASSY. BASE No. (REF. ONLY)	5002A	5002B	5002E
CASTING BASE No. (REF. ONLY)	5005A	5005B	5005E
IRON TYPE	GREY	GREY	GREY
CIRCUIT	PARALLEL R.H.	CONVENTIONAL R.H.	SERIES R.H.

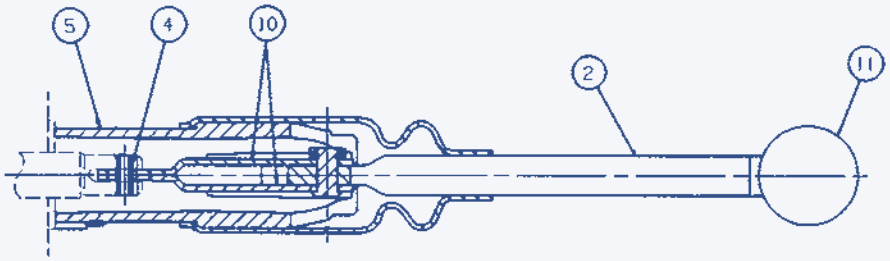
LEVER ASSEMBLIES – PARTS LISTING

FIXED POSITION LEVER W/ BOOT





SECTION "B-B"



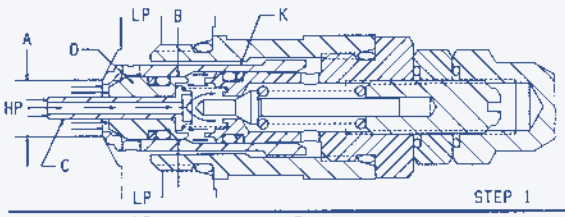
SECTION "A-A"

REF.: 52250-12 HANDLE ASSY. SHOWN

ITEM	DESCRIPTION	HANDLE ASSEMBLY P/N REFERENCE		
		VERTICAL	HORIZONTAL	45°
		52250-1	52250-12	52250-14
1	BOOT	51662	52348	51662
2	HANDLE	52552	52987-3	52663
3	CAP SCREW	5035		
4	ROLL PIN	5349		
5	HANDLE BRACKET	52128-1		
6	PIN	52214		
7	RETAINER	52216		
8	NUT	52217		
9	PIVOT BOLT	52218-1		
10	LINK	52219A		
11	KNOB	52508		
12	SHIM	52986		

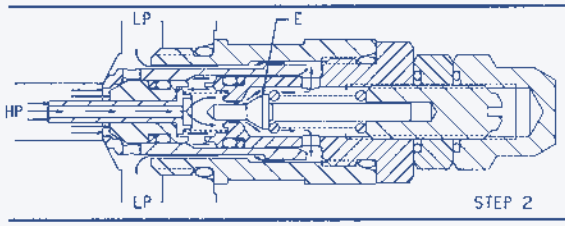
SEE PAGE 23 FOR ORDERING & DIMENSIONAL INFORMATION

HUSCO COMBINATION WORK PORT RELIEF AND ANTI-VOID UNIT

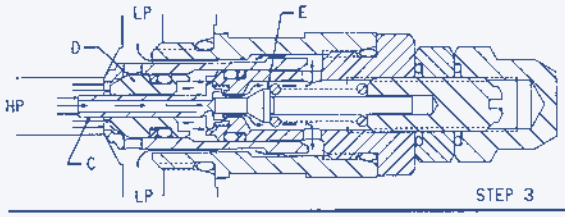


AS WORK PORT RELIEF

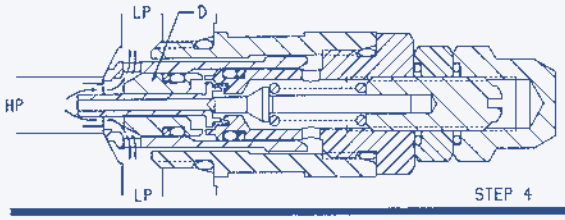
The relief valve is in communication between the high pressure port "HP" and low pressure "LP." Oil is admitted through the hole in poppet "C" and because of the differential area between diameters "A" and "B" relief valve poppet "D" and check valve poppet "K" are tightly seated as shown in the first step.



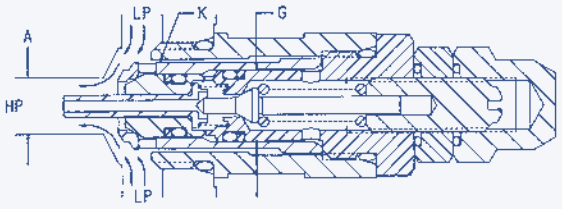
The oil pressure in the high pressure port "HP" has reached the setting of the pilot poppet spring force and unseats the pilot poppet "E." Oil flows around the poppet – through the cross drilled holes and to the low pressure area "LP."



The loss of oil behind Poppet "C," effected by the opening of pilot poppet "E," causes poppet "C" to move back and seat against pilot poppet "E." This shuts off the oil flow to the area behind relief valve poppet "D," and causes a low pressure area internally.

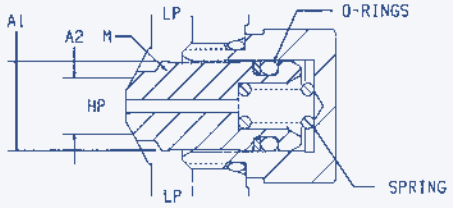


The imbalance of pressure on the inside, as compared to that of the high pressure port "HP," forces the relief valve poppet "D" to open and relieve the oil directly to the low pressure chamber "LP" in the valve.



AS ANTI-VOID

The anti-void unit supplies oil to the high pressure port "HP" when cavitation has occurred. A lower pressure exists in the port "HP" compared to the low pressure chamber "LP." The difference between the effective area of diameter "A" and "G" causes imbalance of the check valve poppet "K" which unseats, thus allowing oil from the low pressure chamber "LP" to enter the port "HP" and fill the void.

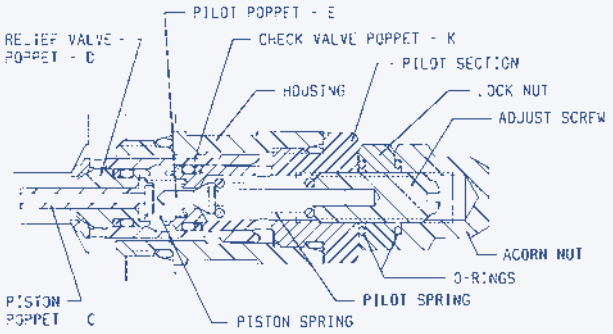


AS SEPARATE ANTI-VOID

The anti-void check valve opens when cavitation occurs in the high pressure port "HP" and supplies oil from the reservoir "LP" to help fill this void. The poppet "M" is held on its seat by the port pressure "HP," acting on the larger area behind the O-ring. When pressure "HP" drops below atmosphere, the tank pressure "LP" operating on the annular area A1-A2 will overcome the port pressure "HP" and the spring force to open the poppet. When the void is eliminated the spring will return the poppet which will then be tightly seated by the port pressure "HP."

Check HUSCO first for modern hydraulic/electrohydraulic components and systems engineered to your specific needs.

HUSCO COMBINATION WORK PORT RELIEF AND ANTI-VOID UNIT



There are several variations to the Work Port Relief. However all are similar in nature regarding service and repair.

HOW TO SET PRESSURE ON WORK PORT RELIEF

A good pressure gage must be installed in the line which is in communication with the work port relief. A load must be applied in a manner to reach the set pressure of the port relief unit. Then, follow these steps:

- Remove acorn nut and loosen lock nut
- Set adjusting screw to desired pressure setting
- Tighten lock nut and reassemble acorn nut
- Retest in similar manner as above

The Void Control Feature is not adjustable but is designed to operate whenever the work port pressure is lower than the reservoir pressure.

SERVICE AND REPAIR INFORMATION

The cartridge type work port reliefs used in the HUSCO valves are typically of the pilot poppet type with external adjustment. Any malfunctioning is usually the result of foreign matter lodging between the piston, relief valve poppet and check valve.

To perform service, clean the surrounding area and remove the complete relief valve cartridge. Examine the seat in the main valve housing and if grooves or ridges are present, the valve must be returned to HUSCO for re-machining.

The design of the pilot poppet and its seat provides positive seating and very seldom requires any maintenance. Therefore, the pilot section can be removed from the cartridge housing without disturbing the setting. With it will come the check valve poppet and other internal parts. These are easily disassembled and should be examined for foreign matter. All seats and seating surfaces should be smooth and free of nicks, scratches or grooves. Examine O-rings and backup washers for any damage and replace if necessary. All moving parts should slide freely, with only seal friction being present.

After inspecting and cleaning, immerse all parts in hydraulic oil and reassemble. Since pressure setting was not disturbed, unit can be tested for proper functioning under actual working conditions.

If operating difficulties indicate that the pilot poppet is leaking or sticking, remove internal parts of the pilot section and follow the same procedure as above, plus follow "How to Set Pressure" previously discussed.

If unit still does not function properly, you may wish to return the cartridge to HUSCO.

DIFFICULTY	PROBABLE CAUSE	REMEDY
Can't get Pressure	Poppet D, E or K stuck open or contamination under seat.	Check for foreign matter between poppets D, E or K and their mating parts. Parts must slide freely.
Erratic Pressure	Pilot poppet seat damaged.	Replace the relief valve.
	Poppet C sticking in D.	Clean and remove surface marks for free movement.
Pressure setting not correct	Normal wear. Lock nut & adj. screw loose.	See "How to set pressure on work port relief."
Leaks	Damaged seats.	Replace the relief valve.
	Worn O-rings.	Install seal and spring kit.
	Parts sticking due to contamination.	Disassemble and clean.

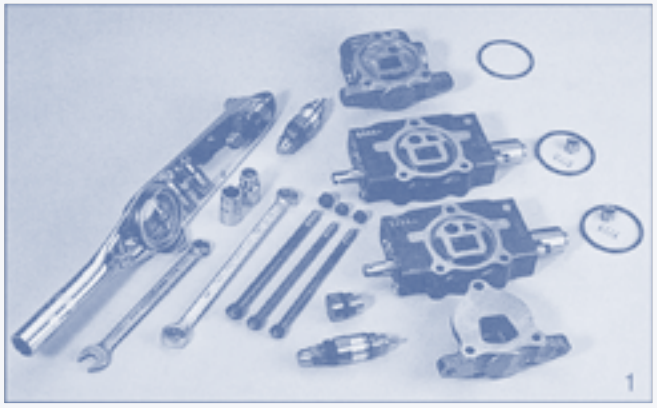
TROUBLE SHOOTING – ANTI-VOID

Trouble resulting in malfunctioning can usually be traced to foreign matter plugging and sensing hole or preventing free movement of poppet. Also check seat for scratches, nicks or other marks.

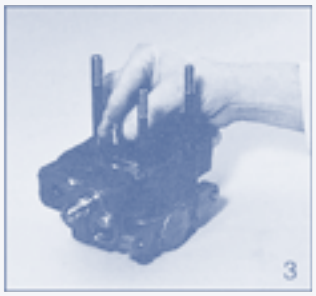
SHUT-OFF VALVE

Shut-off valves are available to fit most work port and main relief valve machining locations.

ASSEMBLY PROCEDURES FOR THE HUSCO 5000 VALVE



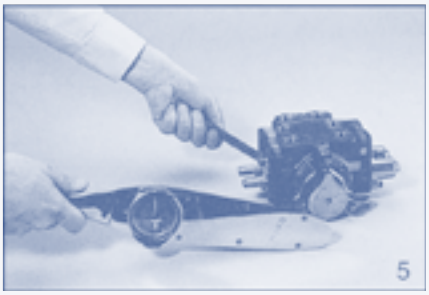
1. Lay out valve components on a clean, flat working surface. The inlet assembly will include an O-ring, and the spool section(s) include an O-ring, a load check poppet and a load check spring. Tools required for basic valve assembly include 1/2" and 9/16" open or box end wrenches and a torque wrench with thin wall sockets.



2. Assemble tie rod nuts to one end of each tie rod with one or two threads showing. Insert tie rods through tie rod holes of inlet (larger tie rod at top). Lay inlet on end with tie rods up, place O-ring into position.

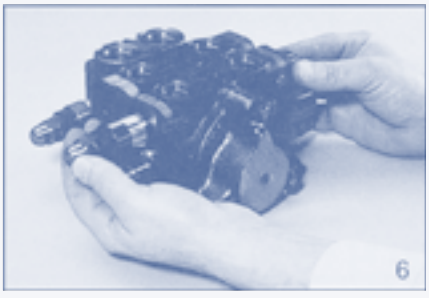
3. Place first spool section (O-ring side up) on inlet section, position O-ring and insert load check poppet (nose down) and spring (behind poppet) into load check cavity as shown. Repeat this procedure for each spool section; the load check springs are compressed by the following sections during assembly.

4. Position end section on last spool section as shown and hand tighten tie rod nuts. The end section is a "turn around" section without ports. Universal outlet/power beyond section and power beyond and closed center sections are also used as end sections. These end sections do not have O-ring grooves.



5. Position valve assembly with the mounting pads of the end sections on a flat surface. To obtain proper alignment of end sections relative to the spool sections, apply downward pressure to the end sections; snug tie rod nuts to about 10 ft-lb.

Final torque the two 1/2" nuts to 14 ft-lb; final torque the 9/16" nut to 33 ft-lb. Check for proper spool movement.



6. Install auxiliary valves and plugs and torque to proper specifications.

GENERAL ASSEMBLY NOTES:

A. Lever assemblies can be installed on section before or after complete valve assembly.

B. The load check and spring may be omitted from assembly in certain conditions (i.e., motor spools).

MODEL 5000 SECTIONAL VALVE ASSEMBLY SPECIFICATION SHEET

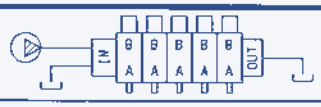
MODEL 5000 SECTIONAL VALVE ASSEMBLY SPECIFICATION SHEET

CUSTOMER: _____ CUSTOMER P/N: _____

MACHINE TYPE: _____ MACHINE MODEL: _____

ESTIMATED ANNUAL USAGE: _____ SUBMITTED BY: _____ DATE: _____

OPERATING PRESSURE: _____ INLET FLOW: _____ MID-INLET FLOW: _____



SECTIONS			(4) AUXILIARY VALVES AUX. "A"	AUX. "B"	(5) LEVERS ASSEMBLY P/N
(1)	INLET END COVER	5001- _____	P/N: _____ PSI:	INLET END COVER PORT PLUGS (SEE LISTING OF PLUG P/N'S BELOW) TOP IN: _____ TOP OUT: _____ END IN: _____ END OUT: _____	
(2) SPOOL SECTIONS OR MID-INLETS	FUNCT: _____ TIE-ROD KIT 6131-1	500 __ - _____	P/N: _____ PSI:	P/N: _____ PSI:	
	FUNCT: _____ TIE-ROD KIT 6131-2	500 __ - _____	P/N: _____ PSI:	P/N: _____ PSI:	
	FUNCT: _____ TIE-ROD KIT 6131-3	500 __ - _____	P/N: _____ PSI:	P/N: _____ PSI:	
	FUNCT: _____ TIE-ROD KIT 6131-4	500 __ - _____	P/N: _____ PSI:	P/N: _____ PSI:	
	FUNCT: _____ TIE-ROD KIT 6131-5	500 __ - _____	P/N: _____ PSI:	P/N: _____ PSI:	
	FUNCT: _____ TIE-ROD KIT 6131-6	500 __ - _____	P/N: _____ PSI:	P/N: _____ PSI:	
	FUNCT: _____ TIE-ROD KIT 6131-7	500 __ - _____	P/N: _____ PSI:	P/N: _____ PSI:	
	FUNCT: _____ TIE-ROD KIT 6131-8	500 __ - _____	P/N: _____ PSI:	P/N: _____ PSI:	
	FUNCT: _____ TIE-ROD KIT 6131-9	500 __ - _____	P/N: _____ PSI:	P/N: _____ PSI:	
	FUNCT: _____ TIE-ROD KIT 6131-10	500 __ - _____	P/N: _____ PSI:	P/N: _____ PSI:	
(3)	OUTLET END COVER	5003- _____	P/N: _____ PSI:	OUTLET END COVER PORT PLUGS (SEE LISTING OF PLUG P/N'S BELOW) TOP P.B.: _____ TOP OUT: _____ END P.B.: _____ END OUT: _____	

COMMENTS:

SAE PLUG ASSY P/N's: 6 SAE - 11120 | 8 SAE - 11150 | 10 SAE - 11180 | 12 SAE - 11210

TIE ROD TORQUE: LARGE DIA. 33 FT.LBS., SMALL DIA. 14 FT.LBS.

CONTROL FOCUSED - TECHNOLOGY DRIVEN

For over 50 years, HUSCO International has been designing and producing some of the most important custom hydraulic and electrohydraulic products in the construction, forestry and material handling industry. Today HUSCO control products can be found on a variety of leading off-highway equipment including: Caterpillar, CNH, Crown, Daewoo, Deere & Company, Hyundai, JCB, Jerr-Dan, JLG, Komatsu, Kubota, Liebherr, Manitowoc Crane Group, NACCO, Volvo, Terex, just to name a few.

Dedicated to meeting and exceeding the changing control needs of the off-highway market for today and well into tomorrow, HUSCO employs an extensive engineering staff capable of designing customized, cost-effective solutions to maximize the efficiency, productivity, controllability and reliability of vehicles.

And with vehicle fit-up and testing capabilities, we're able to design, install and test valve configurations at HUSCO facilities, reducing product development time while optimizing vehicle performance through iterative testing.

With manufacturing facilities in North America, Europe and Asia, we continue to expand as we work with international partners in South America, Korea, Japan, India, South Africa and Australia to bring you any product you need, anywhere in the world.

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