



Bulletin HY14-2720-M1/US
Service Bulletin

VO40 Open-Center Directional Control Valve

Effective: March 15, 2006



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Offer of Sale

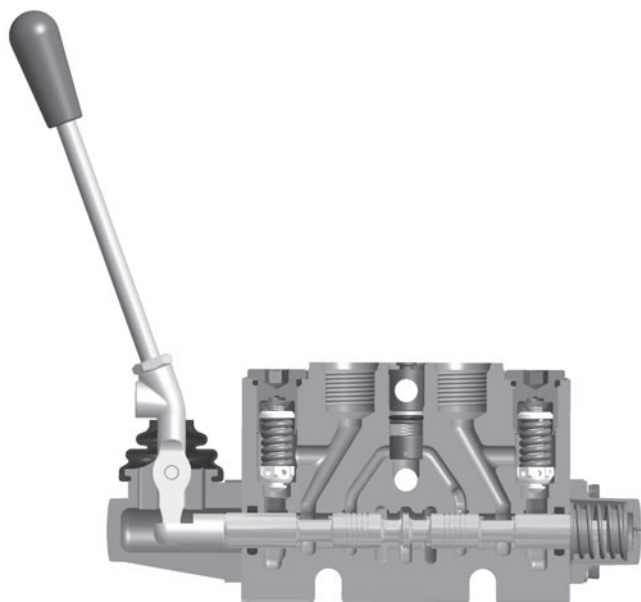
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General Description

The VO40 is an open-center directional control valve with the flexibility of sectional construction. Consistent with this technology, it is simple in its application, reliable, easy to trouble-shoot and cost effective. The global design reflects the performance and quality expected by today's machine designers. Spools have metering notches in the three critical areas – open center, parallel path and tank, which optimizes simultaneous metering. Contemporary honing technology is used to deliver low work port to tank leakage. Additionally, each work section has a transition check to ensure that a load does not “dip” during simultaneous operation. All of these features, plus those listed below, were intended to take machine controllability to the next level.

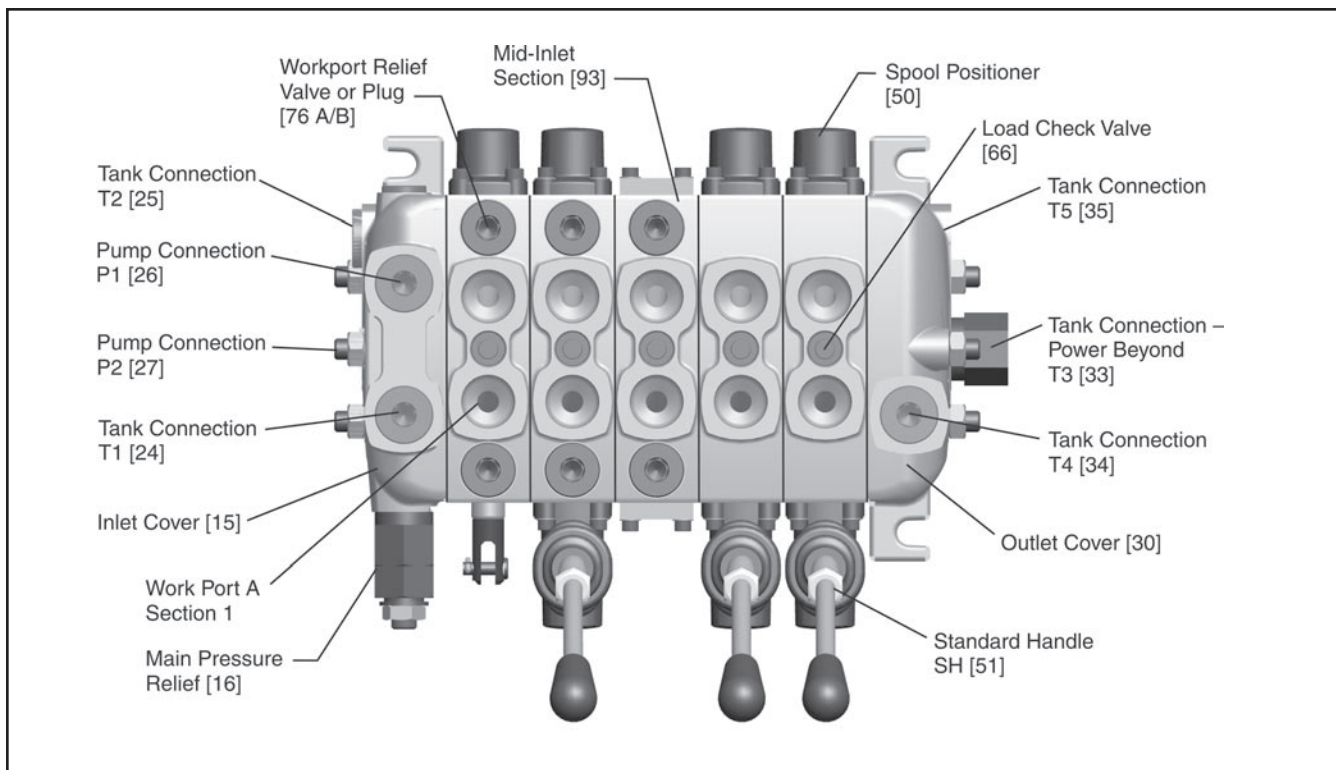
Operation

The VO40 incorporates traditional open-center technology. It is usually interfaced with a constant flow pump, whose flow is routed directly to tank when the spools are in neutral. When one or more spools are selected, flow is directed to the actuators. The throttling of that flow depends upon the spool position and the design of the metering notches. Spool notches can be designed to accommodate resistive loads (meter-in) and negative loads (meter-out). To accommodate multiple pump circuits, split flow and combined flow mid inlets are available.



Benefits

- **Enhanced metering** – especially during simultaneous operation, this is accomplished by having notches in the three critical areas of the spool: open center, parallel path and tank.
- **Improved simultaneous metering** – having a transition check in each work section ensures that a load does not “dip” downward when metering two or more work-sections.
- **Repeatability** – consistent metering from valve to valve is achieved by flycutting all of the critical cast lands. This means that the notch position relative to the spool stroke is controlled and predictable. The result is consistent machine control.
- **Reduced operator fatigue** – the open-center core is a split wing or “Y” core design, which provides for a consistent lever force when selecting the spool from neutral to both power positions.
- **Reduced function drift** – low internal leakage accomplished thru the use of contemporary honing technology. Also, for those functions requiring near zero drift, pilot-operated checks are available.
- **Small footprint** – port accessories are installed vertical to the spool, allowing the handle to be positioned closer to the valve body.
- **Ease of service** – the bottom two stud assemblies are slotted, enabling a work section to be replaced without completely disassembling the valve assembly. This is accomplished by loosening the top tie bolt and then lifting the section out of the assembly. Downtime is minimized.
- **Easy conversion from a left-handed to a right-handed section** – the work section housing and spool are symmetrical, which enables the spool to be inserted in either end of the housing.
- **Improved spool seal life** – the enclosed handle assembly protects the spool and spool seal area from contamination and the potential corrosion.



Specifications

Pressures	Inlet Port: 300 Bar (4350 PSI) Tank Port: 50 Bar (725 PSI) Work Ports: 300 Bar (4350 PSI)
Flow Rates (maximum recommended)	40 LPM (10.6 GPM)
Internal Pilot Pressure	Required for solenoids – consult factory
Spool Leakage from work port to tank	Max. 6 mL/min @ 172 Bar (2500 PSI) Oil temp. 50°C (122°F), and viscosity 40 cSt

Weights

Weights are approximate due to number of variations available

Inlet with relief	1.92 kg (4.2 lbs)
Outlet	1.88 kg (4.1 lbs)
Work section with reliefs and manual actuator	1.93 kg (4.3 lbs)
Work section and manual actuator without reliefs	1.98 kg (4.4 lbs)
Work Section, PO Checks with manual actuator	2.1 kg (4.6 lbs)
Joystick assembly	0.8 kg (1.8 lbs)

Connections

Standard valves are available in SAE-6 or SAE-8 (J1926/1). Also available in 3/8" BSP (DIN 3852/2).

Connection	Location	SAE -8	SAE-6	BSP
P1, P2	Inlet	3/4-16 UNF	9/16-18 UNF	3/8-19
T1, T2	Inlet	3/4-16 UNF	9/16-18 UNF	3/8-19
P3	Outlet	3/4-16 UNF	9/16-18 UNF	3/8-19
T3	Outlet	3/4-16 UNF	9/16-18 UNF	3/8-19
PB1	Outlet	3/4-16 UNF	9/16-18 UNF	3/8-19
Work Ports	Work Sections	3/4-16 UNF	9/16-18 UNF	3/8-19
GAGE PORT	Inlet	7/16-20 UNF	7/16-20 UNF	1/4
PC (Hyd. Conn.)	Work Sections	7/16-20 UNF	7/16-20 UNF	1/4
PT (Pneu.Conn.)	Work Sections	1/8 NPT	1/8 NPT	1/8 NPT

The new VO40 directional control valve provides a compact and reliable solution for applications up to 10 GPM (40 liters/minute). The features listed below make this valve adaptable to a variety of applications, but in a cost-effective package.

Features:

- Handle assembly easily converts from vertical to horizontal with no additional parts
- Work-port relief valve has built-in anti-cavitation ability
- Numerous positioner options available
- Pilot-Operated Check (Lockout) version available
- Hydraulic, Pneumatic, Solenoid, and Proportional Solenoid actuation also available

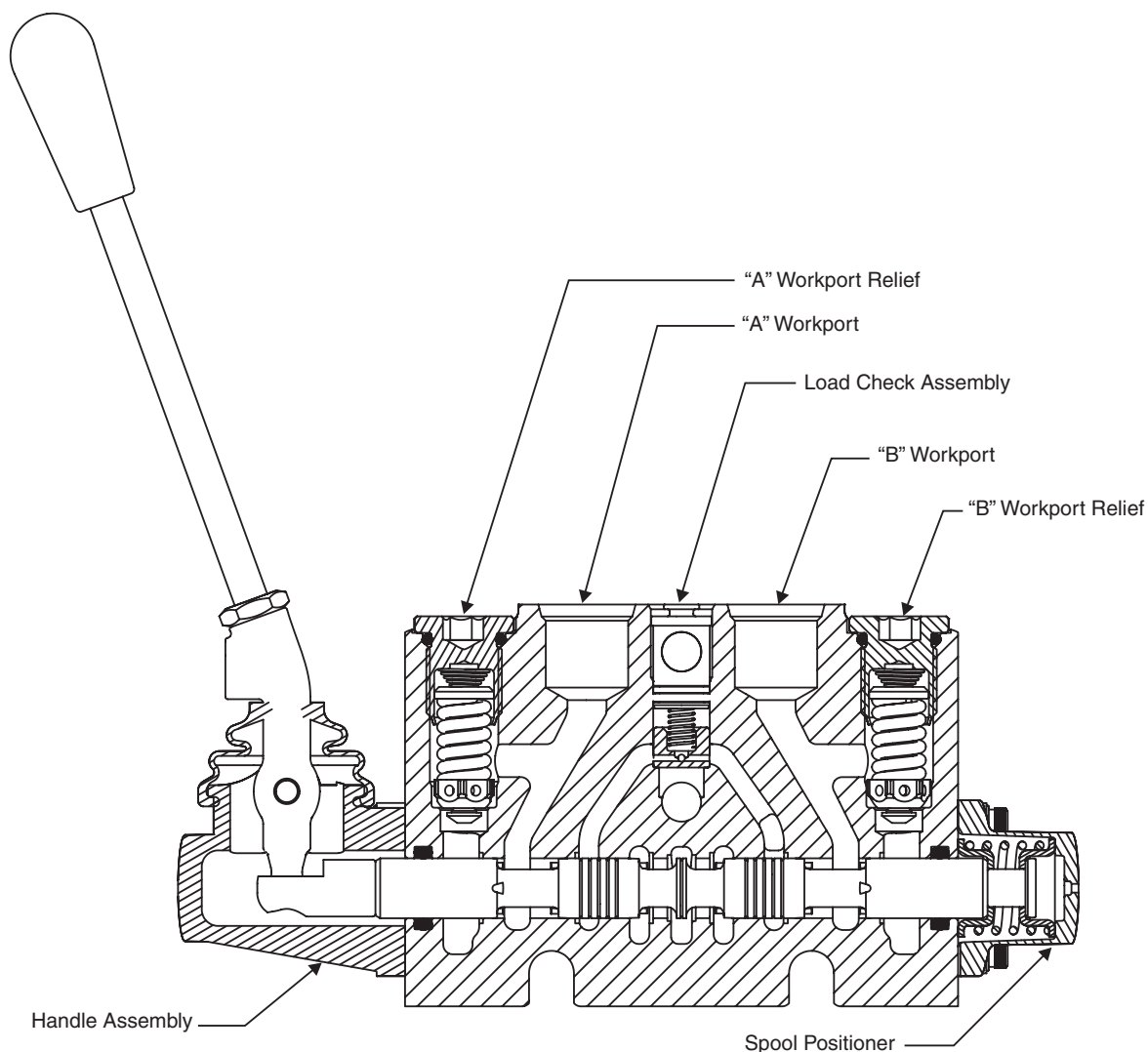


Figure 1
Upstream View

1. Remove the handle and positioner hardware. (Do not remove clevis from spool.)

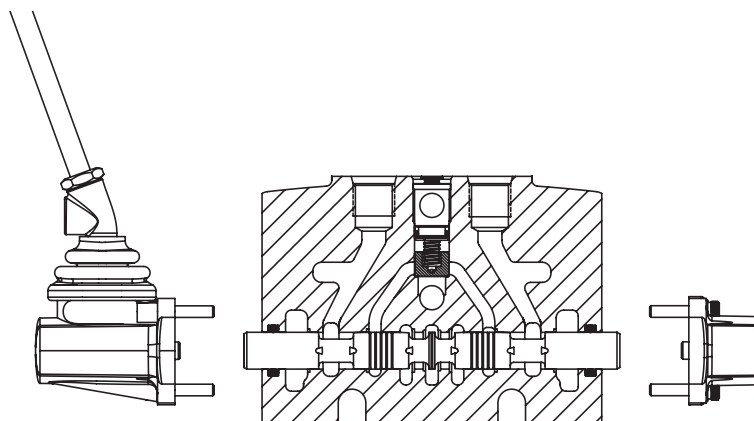


Figure 2

2. Insert a punch or screwdriver through spool clevis. Pull the spool out slightly until the spool seal is viewable and accessible.
3. With a small seal pick, carefully remove the seal from the groove in the body.

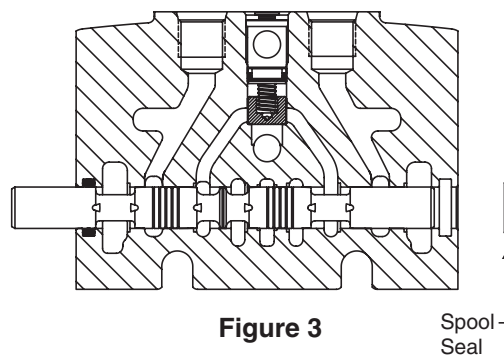


Figure 3

4. Push the spool back through the housing enough so the opposite spool seal is viewable and accessible.
5. With a small seal pick, carefully remove the seal from the groove in the body.

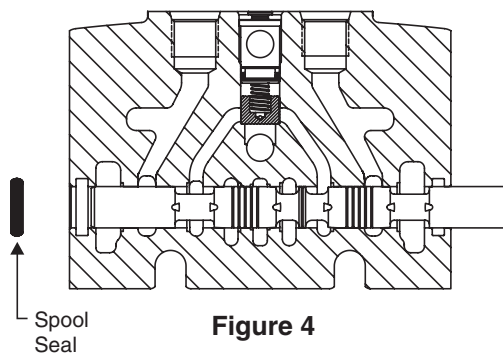


Figure 4

1. Lightly lube and insert the handle end spool seal first. Ensure proper seal fit by running finger around the inside edge of the seal. The seal should fill the groove smoothly with no kinks, twists, or bumps.
2. Lightly oil the valve spool and gently insert the spool into the valve housing, using a slight twisting motion, starting from the positioner end. Do not force the spool. When the spool contacts the seal installed on the opposite end, gently continue pushing while twisting the spool.

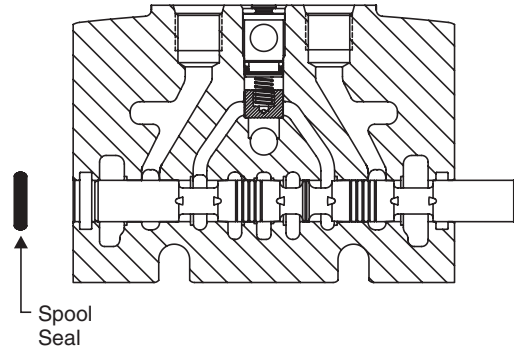


Figure 5

3. Pull the spool through only until the positioner end seal groove is exposed.
CAUTION: Pulling the spool through too far risks cutting or nicking the spool seal.
4. Lightly lube and install the remaining spool seal as in step 1.

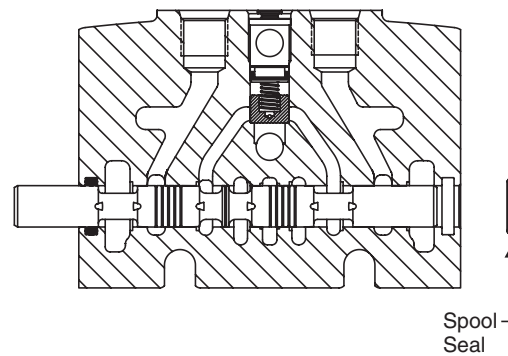


Figure 6

5. Center the spool and reattach the positioner and handle hardware. (See positioner and actuator pages for torque information.)

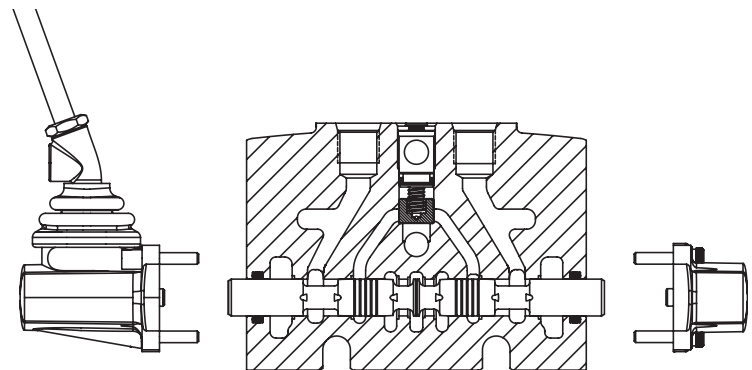


Figure 7

Note: Nitrile rubber seals are standard with all VO40 valves; however, fluorocarbon variants are also available. Consult factory for availability.

Spool Seal Kit number: 1716013 (contains 2 pcs. of 0401277)

Tie Rod Kits

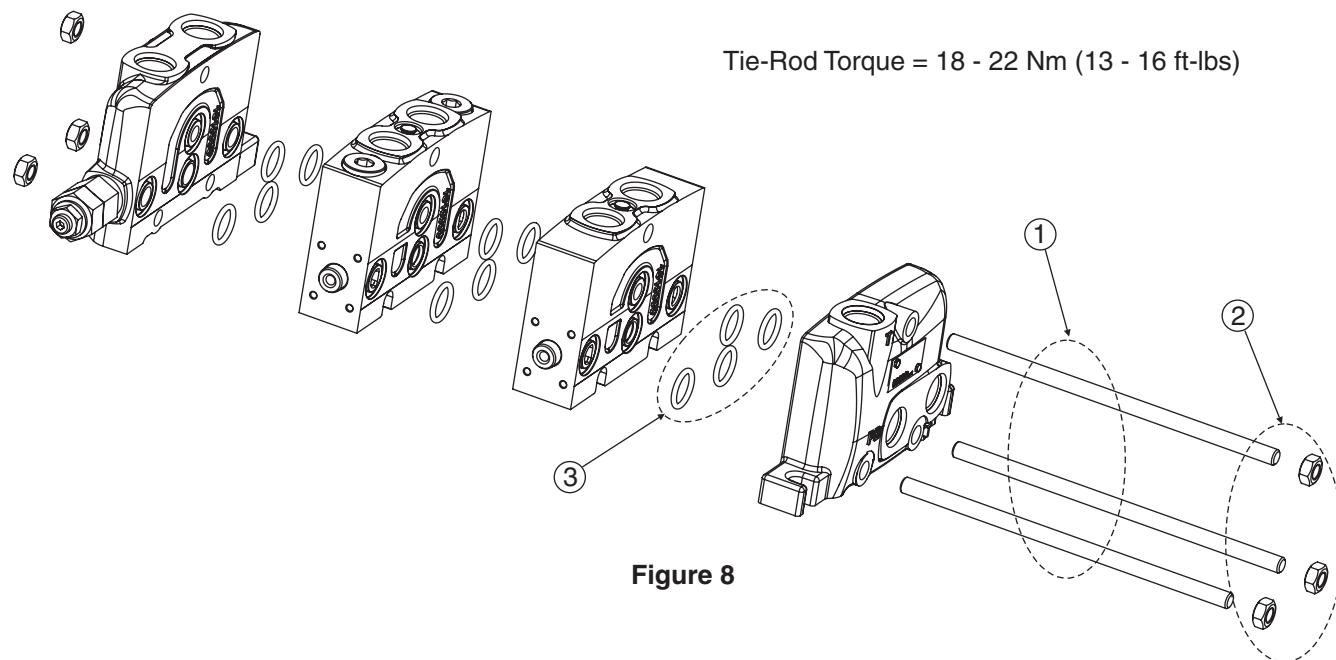


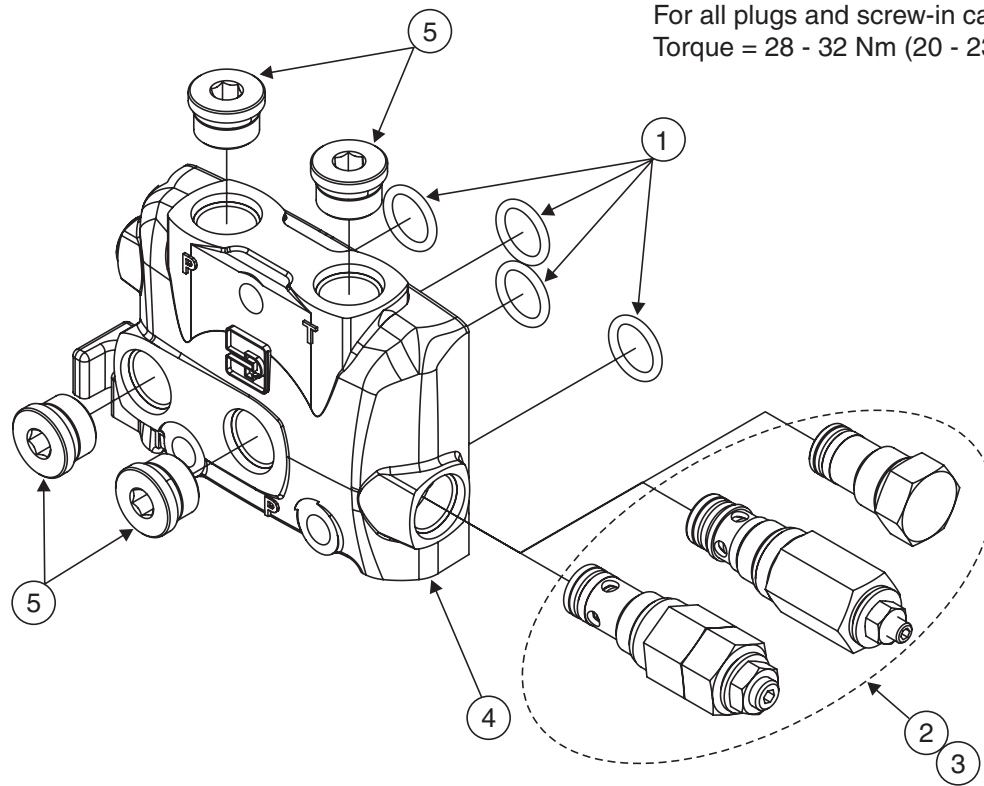
Figure 8

Kit Number	Description	Item	Qty.
K-VO40-1	Tie-Rod Kit (1 Work-section)	1	3
K-VO40-2	Tie-Rod Kit (2 Work-sections)		
K-VO40-3	Tie-Rod Kit (3 Work-sections)		
K-VO40-4	Tie-Rod Kit (4 Work-sections)		
K-VO40-5	Tie-Rod Kit (5 Work-sections)		
K-VO40-6	Tie-Rod Kit (6 Work-sections)		
K-VO40-7	Tie-Rod Kit (7 Work-sections)		
K-VO40-8	Tie-Rod Kit (8 Work-sections)		
K-VO40-9	Tie-Rod Kit (9 Work-sections)		
K-VO40-10	Tie-Rod Kit (10 Work-sections)		
All	M8X1 Nut	2	6
1716012	Section Seal Kit – Sold Separately	3	1

Notes:

1. Ensure proper torque on all tie rods to prevent spools from binding and section seals from extruding. Before applying final torque, align sections on a flat surface.
2. Do not lubricate section seals prior to installation.
3. Torque all tie-rods evenly to ensure proper alignment of surfaces and avoid spool bind.

Inlet Cover



For all plugs and screw-in cartridges shown:
Torque = 28 - 32 Nm (20 - 23 ft-lbs)

Figure 9

Plug and Seal Kits

Item	Kit/Part Number	Description
1	1716012	Section Seal Kit
2	0785294	Pilot-operated Inlet Relief 50 to 300 bar (725 to 4300 PSI)
	0785056	Direct-operated Inlet Relief: 60-207 bar (900-3000 PSI)
3	RCP-15A	Inlet NR Plug
	0785139	Seal Kit - Piloted Relief Valve
4	0875166	Seal Kit - Direct Relief Valve and NR Plug
	Consult Factory	Inlet Cover
5	8HP5ON-S	SAE-8 Port Plug
	6HP5ON-S	SAE-6 Port Plug

Notes:

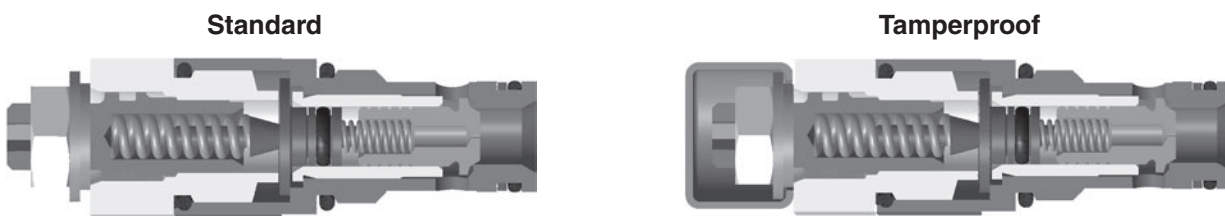
- Standard inlet cover is SAE-8 available either with top P and T ports, or with top and side P and T ports.
- See Figure 10 on Page 8 for detailed views of relief valves.
- Consult factory to order a relief valve with a specific setting.
- Tamperproof relief valves are available. Consult factory with required setting.
- Lubricate o-rings on cartridges and plugs prior to installing into Inlet Cover.
- Do not lubricate section seals prior to installation.
- Nitrile rubber seals are standard with all VO40 valves; however, fluorocarbon variants are also available. Consult factory for availability.

Inlet Cover – Main Relief Valve

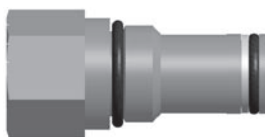
Direct-Acting Relief Valves – 0785056



Pilot Operated Relief Valves – 0785294



NR Plug Assembly – RCP-15A



For all plugs and screw-in cartridges shown:
Torque = 28 - 32 Nm (20 - 23 ft-lbs)

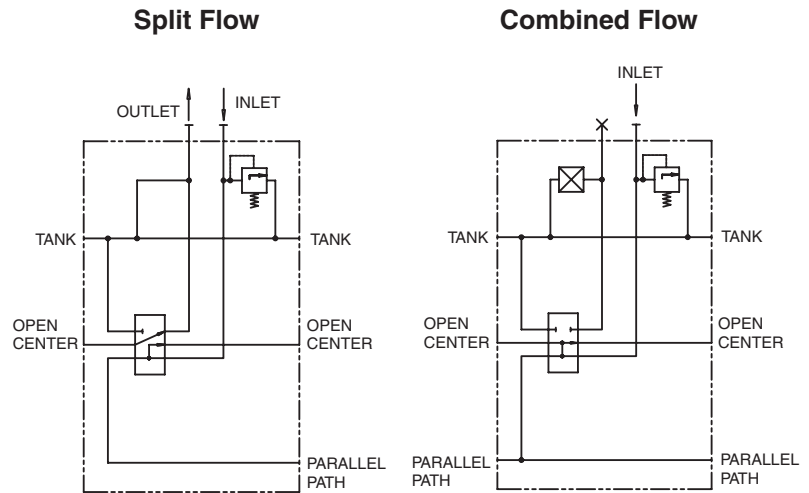
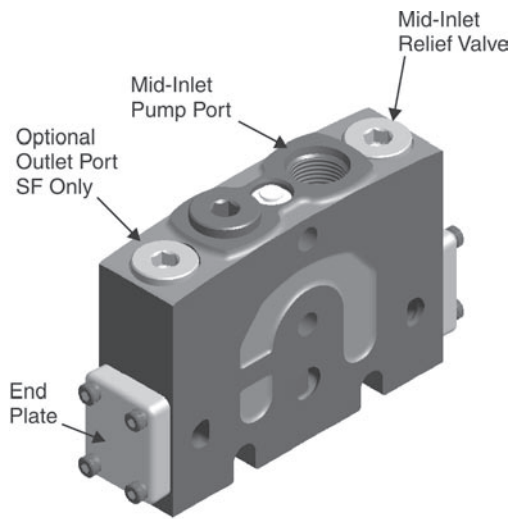
Figure 10
Main Relief Valve Variations

Notes:

1. Consult factory to order a relief valve with a specific setting.
2. Tamperproof relief valves are available. Consult factory with required setting.
3. Lubricate o-rings on cartridges and plugs prior to installing into Inlet Cover.

Mid-Inlet

The VO40 mid-inlet options are split or combined flow. They are available with a main RV option. There is also a provision for an outlet port on the split flow version only.



VO40 Mid-Inlet Relief Options

Item No.	Part Number	Set @ 2.5 GPM	Relief Valve Anti-Cav	No Relief Plug
1	VO40 RV/AC-500	500 PSI	•	
2	VO40 RV/AC-750	750 PSI	•	
3	VO40 RV/AC-1000	1000 PSI	•	
4	VO40 RV/AC-1250	1250 PSI	•	
5	VO40 RV/AC-1500	1500 PSI	•	
6	VO40 RV/AC-1750	1750 PSI	•	
7	VO40 RV/AC-2000	2000 PSI	•	
8	VO40 RV/AC-2250	2250 PSI	•	
9	VO40 RV/AC-2500	2500 PSI	•	
10	VO40 RV/AC-2750	2750 PSI	•	
11	VO40 RV/AC-3000	3000 PSI	•	
12	VO40 RV/AC-3250	3250 PSI	•	
13	VO40 RV/AC-3500	3500 PSI	•	
14	VO40 RV/AC-3750	3750 PSI	•	
15	VO40 RV/AC-4000	4000 PSI	•	
16	VO40 RV/AC-4250	4250 PSI	•	
17	VO40-NR			•

Relief Plugs and Kits

Item	Kit/Part Number	Description
1	See Above	Direct Relief Valve
	VO40-NR	NR Plug Assy
2	1716015	Seal Kit - Relief Valve
	1716016	Seal Kit - NR Plug
	1716024	Seal Kit for End Plates only
	1716025	Seal Kit 1716024 Plus Section Seals

Outlet Cover

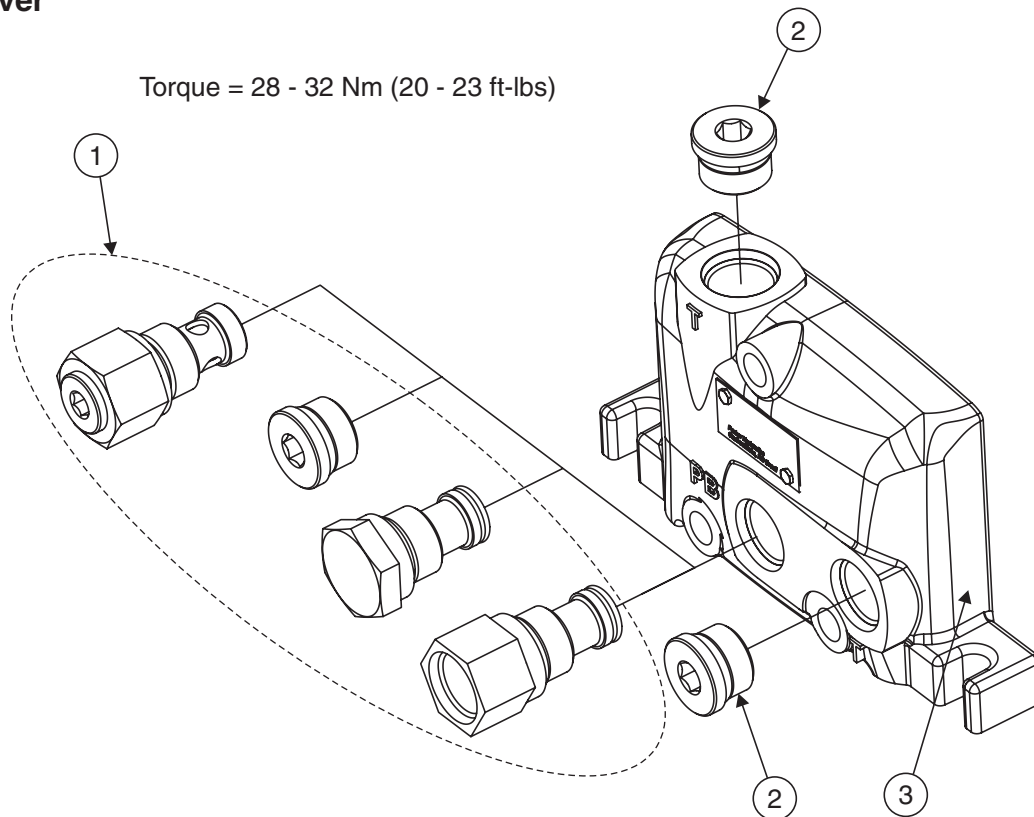


Figure 11

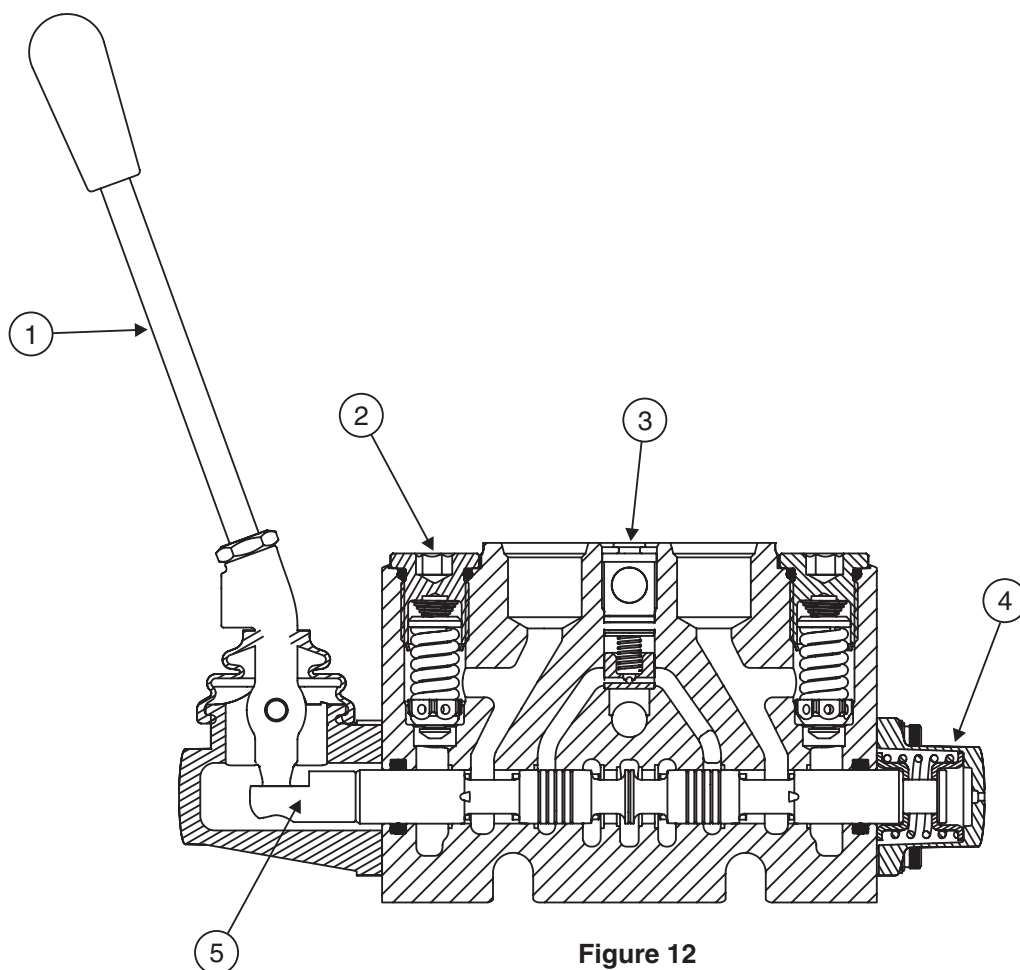
Plugs and Kits

Item	Kit/Part Number	Description
1	K-PB-08	Powerbeyond Fitting (SAE-8)
	K-CC-Plug	Closed Center Plug (SAE)
	K-Mech	Pressure Build-Up Valve (SAE)
	8HP5ON-S	SAE-8 Port Plug
	6HP5ON-S	SAE-6 Port Plug
2	8HP5ON-S	SAE-8 Port Plug
	6HP5ON-S	SAE-6 Port Plug
3	Consult Factory	Outlet Cover
4	1716017	Seal Kit - Plugs and Fittings

Notes:

1. Standard Outlet Cover is SAE-8, with only top outlet port machined or with top and side T ports with ability to convert to power beyond.
2. Pressure Build-Up Valve is for solenoid operation.
3. Item 4, Seal kit, includes seals for port plug or power-beyond sleeve.
4. Lubricate o-rings on cartridges and plugs prior to installing into Outlet Cover.
5. Nitrile rubber seals are standard with all VO40 valves; however, fluorocarbon variants are also available. Consult factory for availability.

Work Sections



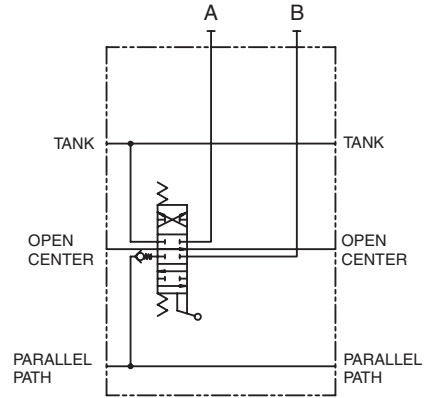
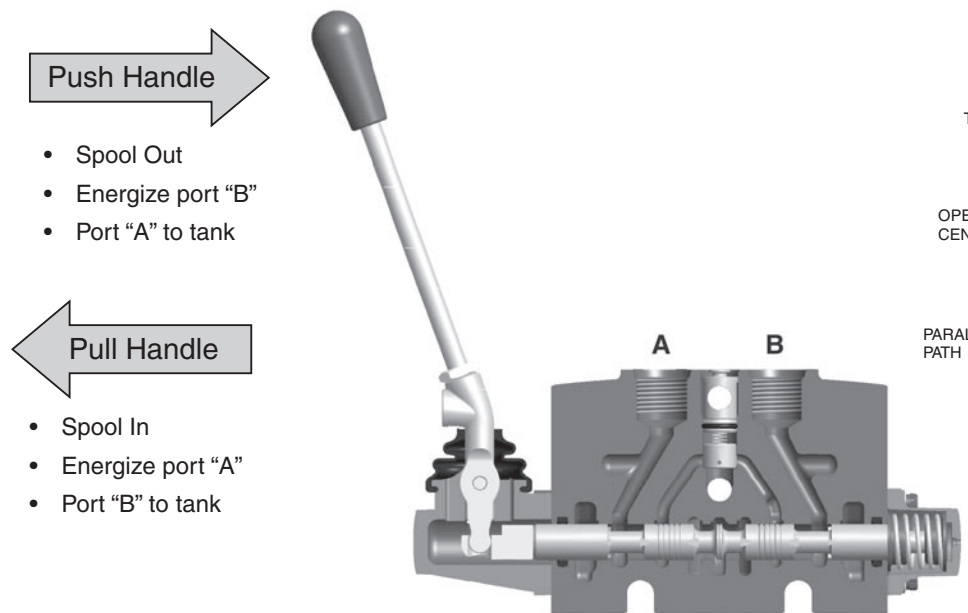
**Figure 12
 Upstream View**

Item	Page Reference	Description
1	13-16	Actuator
2	17-18	Work Port Accessory
3	19	Load Check
4	20-23	Positioners
5	Consult Factory	Spool

VO40 Complete Work Section Seal Kit 1716011 includes:
Spool Seal Kit: 1716013
Section Seal Kit: 1716012

Note: Nitrile rubber seals are standard with all VO40 valves; however, fluorocarbon variants are also available. Consult factory for availability.

Handle Actuation vs. Spool Direction



Note:
 Circuit reflects spool position, not handle position

**Figure 13
 Upstream View**

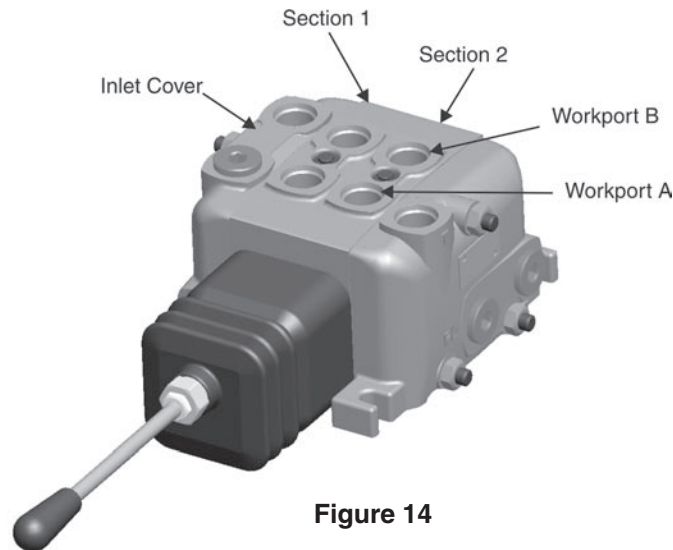
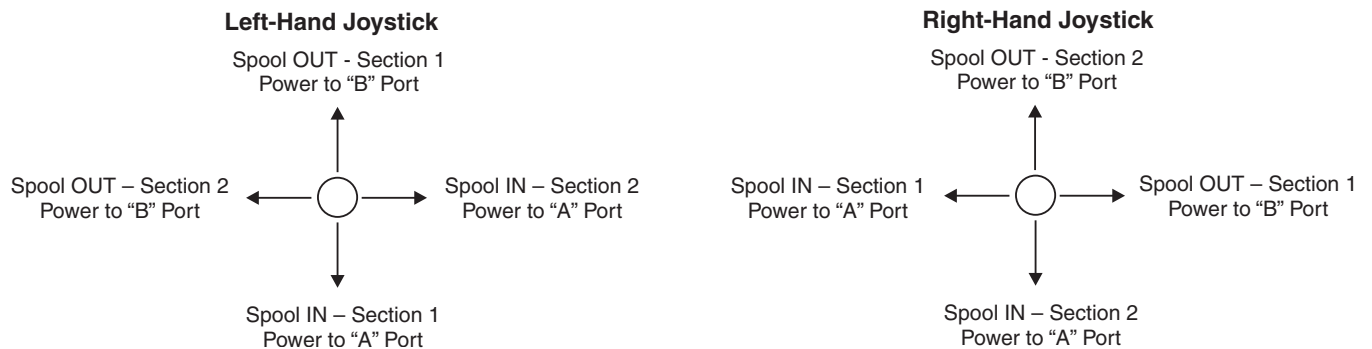


Figure 14



Work Sections – Actuators

Handle Parts Breakdown

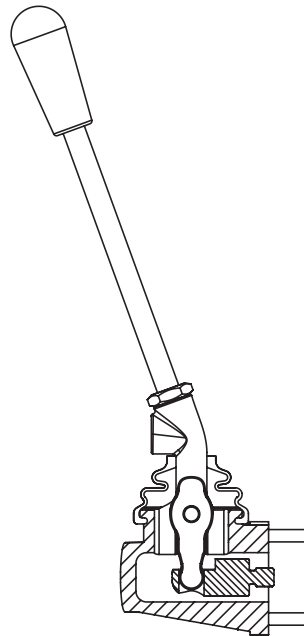
Item	Description	Qty.
1	Bonnet	1
2	Screw	4
3	Washer	4
4	Adaptor	1
5	Pin	1
6	Boot	1
7	Clevis	1
8	Locknut	1
9	Lever	1
10	Knob	1

Handle Kit 1715038 includes items 1-7.

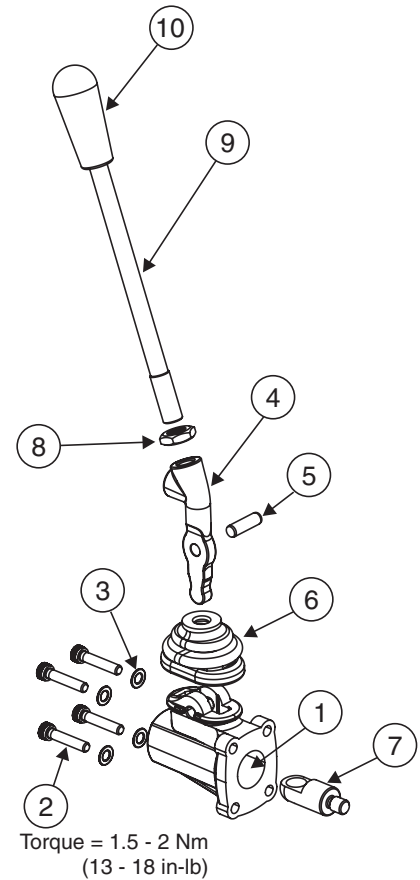
Straight Handle Lever Kit K-VO40-H1 includes items 8-10.

Offset Handle Lever Kit K-VO40-H2 includes items 8 (offset version), 9 and 10.

Handle Kit 1715018 includes items 1-10 (straight handle only).

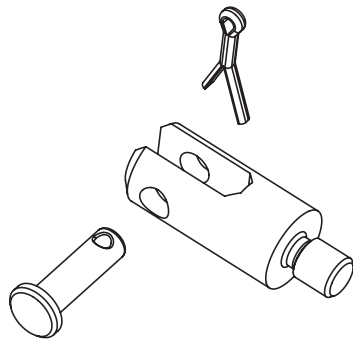


**Figure 15
 Handle Kit**



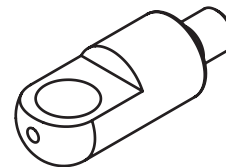
Torque = 1.5 - 2 Nm
 (13 - 18 in-lb)

**Figure 16
 Handle Breakdown**



Torque = 2 - 3 Nm (18 - 25 in-lbs)
 Apply thread locker to threads prior to assembly.

**Figure 15a
 Female Clevis
 Kit 1715019**



Torque = 2 - 3 Nm (18 - 25 in-lbs)
 Apply thread locker to threads prior to assembly.

**Figure 15b
 Handle Clevis
 (for use with Handle Kit 1715018 only)**

Work Sections – Actuators

Left-Hand Mechanical Joystick

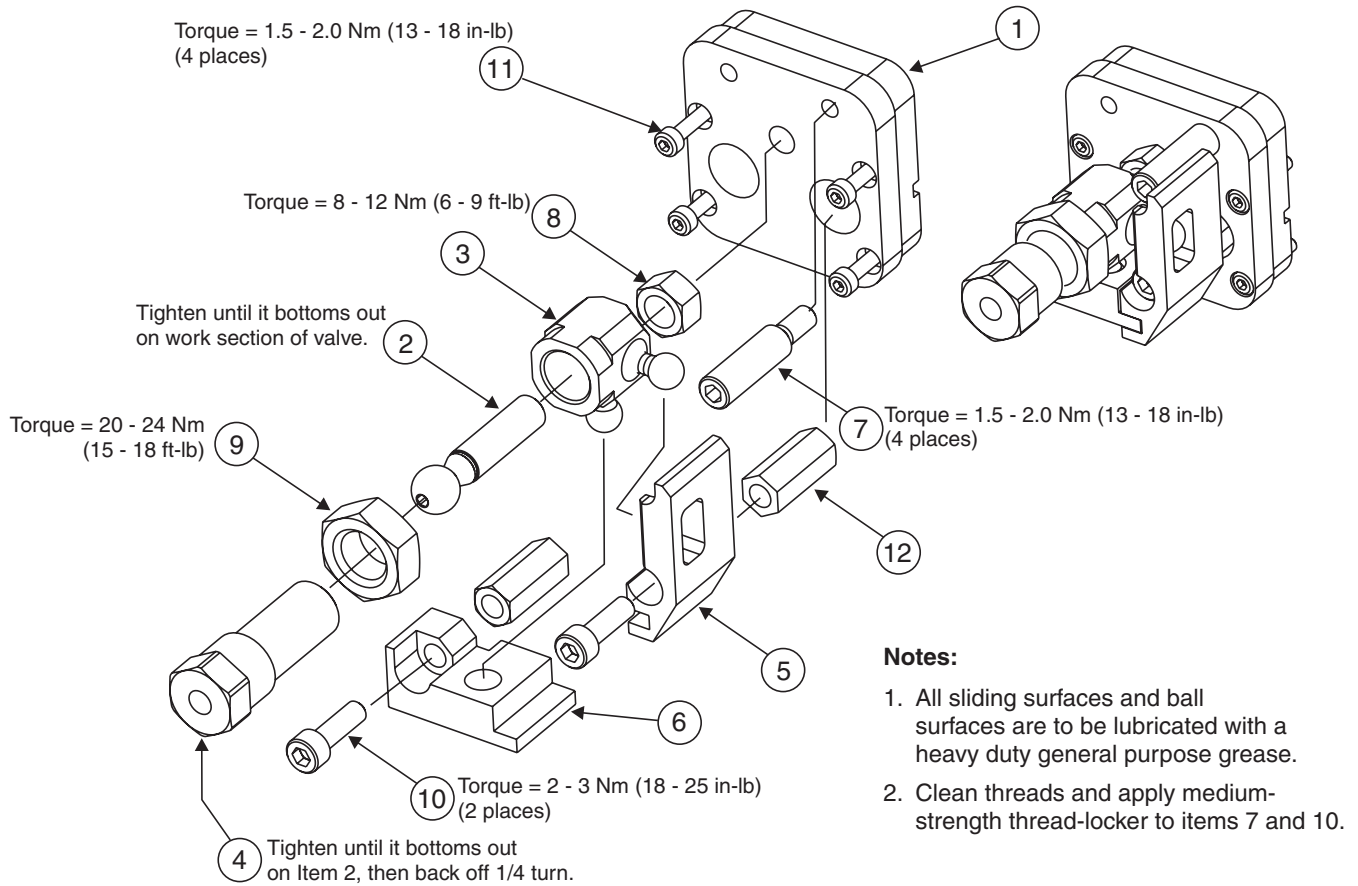


Figure 17

Item	Description	Qty.
1	Mounting Plate	1
2	Screw Handle Pivot	1
3	Main Pivot	1
4	Screw Handle	1
5	Vertical Slide - Left Hand	1
6	Horizontal Slide - Left Hand	1
7	Slide Bar	1
8	3/8 Nut	1
9	5/8 Nut	1
10	M6 Socket Head Cap Screw	2
11	M4 Socket Head Cap Screw	4
12	Spacer	2
—	Joystick Boot (not shown)	1

Note:

1. Protective boot (Part No. 24080002) for joystick assembly not shown for clarity.

**Handle Assembly:
K-VO40-H1 – Straight Lever
K-VO40-H2 – Offset Handle**

Repair Kit
1715039 – Items 2, 3, 4, 5, 6 and 7

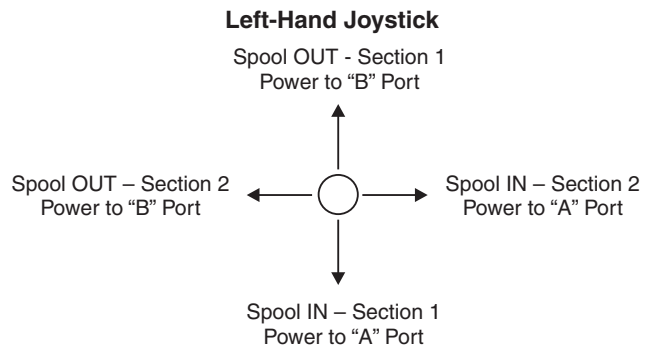


Figure 18

Work Sections – Actuators

Right-Hand Mechanical Joystick

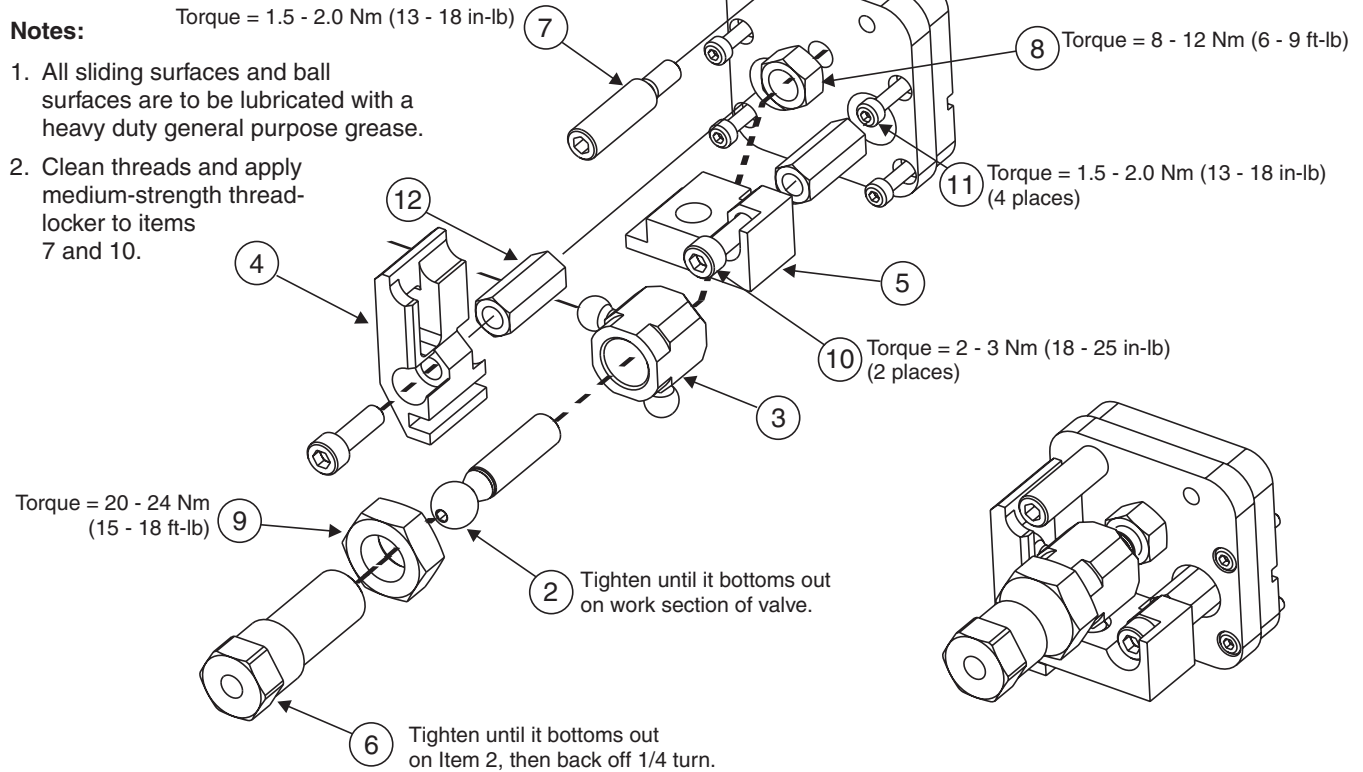


Figure 19

Item	Description	Qty.
1	Mounting Plate	1
2	Screw Handle Pivot	1
3	Main Pivot	1
4	Vertical Slide - Right Hand	1
5	Horizontal Slide - Right Hand	1
6	Screw Handle	1
7	Slide Bar	1
8	3/8 Nut	1
9	5/8 Nut	1
10	M6 Socket Head Cap Screw	2
11	M4 Socket Head Cap Screw	4
12	Spacer	2
—	Joystick Boot (not shown)	1

Handle Assembly:
 K-VO40-H1 – Straight Lever
 K-VO40-H2 – Offset Handle

Repair Kit
 1715040 – Items 2, 3, 4, 5, 6 and 7

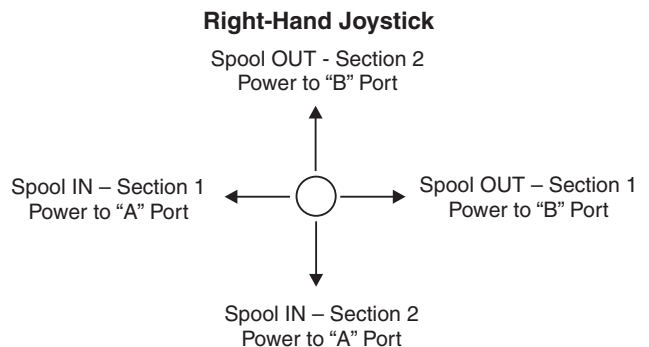


Figure 20

Note:

- Protective boot (Part No. 24080002) for joystick assembly not shown for clarity.

Work Sections – Actuators

Pneumatic Actuator

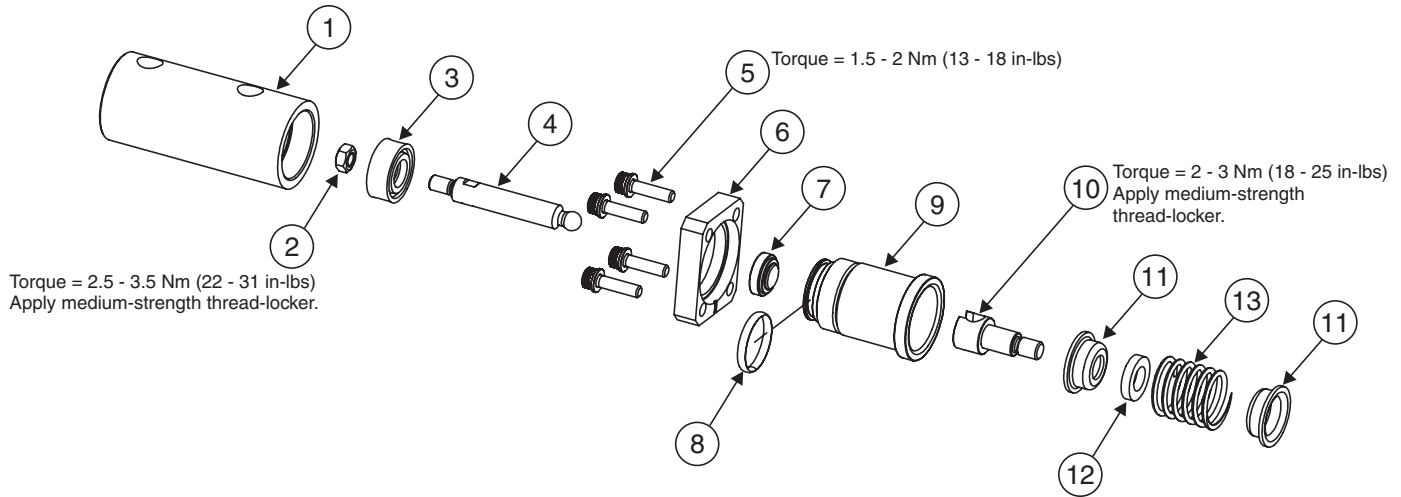


Figure 21

Item	Description.	Qty.
1	Sleeve	1
2	Nut	1
3	Piston	1
4	Rod	1
5	M4 Screw	4
6	Adapter Plate	1
7	Rod Seal	1
8	O-ring Seal	1
9	Spacer	1
10	Spool/Rod Adapter	1
11	Spring Collar	1
12	Stop Ring	1
13	Spring	1

To assemble the pneumatic actuator:

- Place the spool in the valve body.
- Place seals (7) and (8) onto the spacer (9); place the piston (3) on the rod (4), and fix it with the nut (2).
- Attach items (10), (11), (12) and (13) on the spool.
- Put the rod (4) through the spacer (9) and insert it into the spool adapter (10).
- Place the plate (6) and thread it with screws (5).
- Slide the sleeve (1) on and thread it onto the spacer (9).

Notes:

- Air pressure requirements:
 Minimum 5.5 Bar (80 PSI)
 Maximum 10 Bar (145 PSI)
- Lubricate all seals prior to assembly of actuator parts.
- Nitrile rubber seals are standard with all VO40 valves; however, fluorocarbon variants are also available. Consult factory for availability.

Work Section Relief Valves

For VO40 work sections, use the PLC051 relief valves. They are direct relief valves with anti-cavitation function. They are compact, having fast response and low leakage. The valves are factory pre-set, and it is not possible to change the setting.

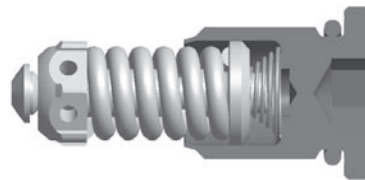


Figure 22

VO40 Direct-Acting Workport Relief Options

Item No.	Part Number	Set @ 2.5 GPM	Relief Valve Anti-Cav	Straight Anti-Cav	No Relief Plug
1	VO40 RV/AC-500	500 PSI	•		
2	VO40 RV/AC-750	750 PSI	•		
3	VO40 RV/AC-1000	1000 PSI	•		
4	VO40 RV/AC-1250	1250 PSI	•		
5	VO40 RV/AC-1500	1500 PSI	•		
6	VO40 RV/AC-1750	1750 PSI	•		
7	VO40 RV/AC-2000	2000 PSI	•		
8	VO40 RV/AC-2250	2250 PSI	•		
9	VO40 RV/AC-2500	2500 PSI	•		
10	VO40 RV/AC-2750	2750 PSI	•		
11	VO40 RV/AC-3000	3000 PSI	•		
12	VO40 RV/AC-3250	3250 PSI	•		
13	VO40 RV/AC-3500	3500 PSI	•		
14	VO40 RV/AC-3750	3750 PSI	•		
15	VO40 RV/AC-4000	4000 PSI	•		
16	VO40 RV/AC-4250	4250 PSI	•		
17	VO40-AC			•	
18	VO40-NR				•

Relief Plugs and Kits

Item	Kit/Part Number	Description
1	See Above	Direct Relief Valve
	VO40-NR	NR Plug Assy
	VO40-AC	Anti-Cavitation Valve Assy
2	1716015	Seal Kit - Relief Valve/Anti-Cavitation Valve
	1716016	Seal Kit - NR Plug

Notes:

1. Torque relief valve or NR plugs to 24-30 Nm (18-22 ft.lbs.)
2. Lubricate o-rings prior to installing relief valve or plug.
3. Nitrile rubber seals are standard with all VO40 valves; however, fluorocarbon variants are also available. Consult factory for availability.

Work Sections – Work Port Options

Pilot-Operated Checks (Lockouts)

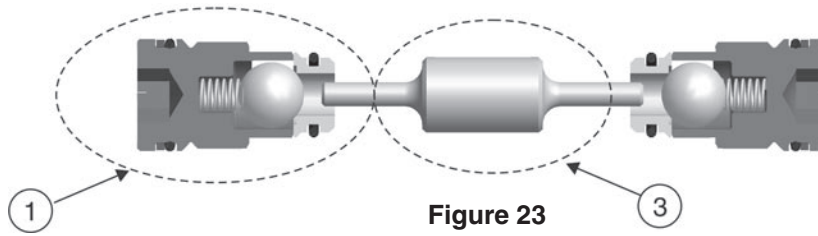


Figure 23

Item	Kit/Part Number	Description
1	1715020	P.O. Check Assy
	1715021	P.O. Plug Assy
2	1716020	Seal Kit- P.O. Check/Plug
3	1310337	Piston

Note: P.O. Check Seal Kit provides seals for one side of a check assembly.

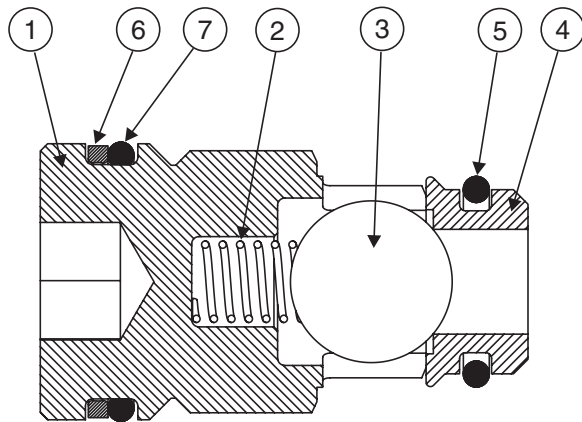


Figure 24
 1715020

Pilot-Operated Checks (Lockouts) Assembly

Item	Description
1	Plug- Lockout Valve
2	Spring
3	Ball
4	Seat - Lockout Valve
5	O-ring
6	Backup Ring
7	O-Ring

Pilot-Operated Check Seal Kit – 1716020
 (Includes items 5, 6, 7 from above)

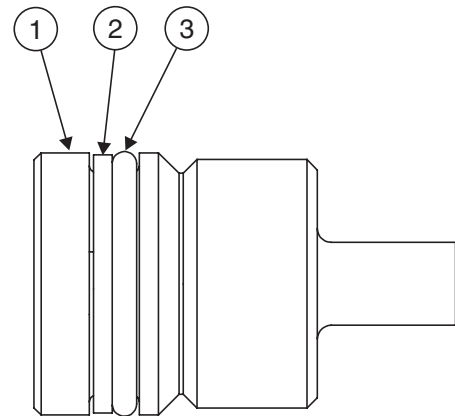


Figure 25
 1715021

Pilot-Operated Check (Lockout) Plug

Item	Description
1	Lockout Plug
2	Backup Ring
3	O-ring

Pilot-Operated Check Plug Seal Kit – 1716020
 (Includes items 2 and 3 from above)

Notes:

1. Torque P.O. check/plug to 24-30 Nm (18-22 ft.lbs.).
2. Lubricate all o-rings prior to installing plugs and pilot-operated checks.
3. Nitrile rubber seals are standard with all VO40 valves; however, fluorocarbon variants are also available. Consult factory for availability.

Work Sections – Load Check

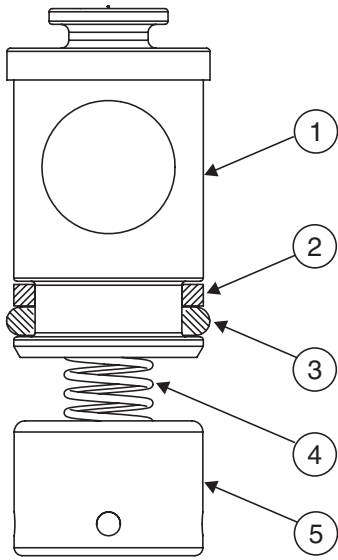


Figure 26
1715007
Load Check Valve Assembly

Item	Description
1	Plug
2	Backup Ring
3	O-ring
4	Spring
5	Piston

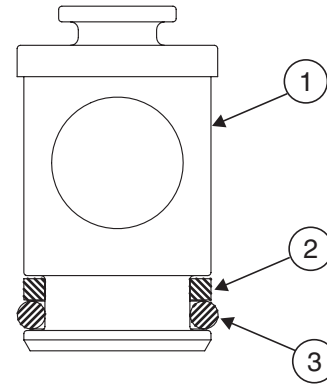


Figure 27
1715006
Load Check Plug Assembly

Item	Description
1	Plug
2	Backup Ring
3	O-ring

Load Check Seal Kit – 1716014
(Includes items 2 and 3 from above)

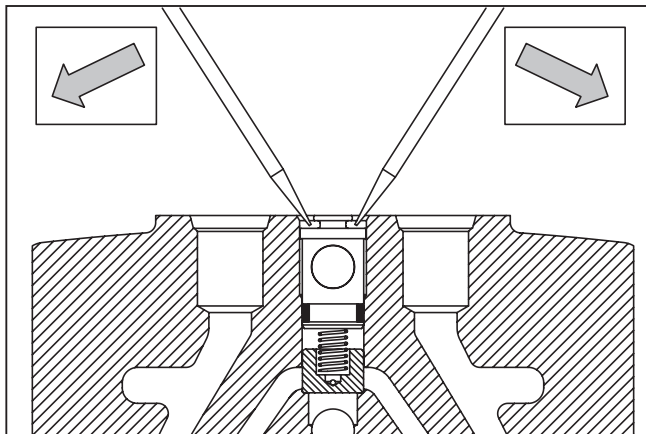


Figure 28

Load check replacement instructions:

- 1) Remove top tie rod only
- 2) Insert 2 screw driver heads under the lip of the load check plug, as shown in Figure 28.
- 3) Gently lift the plug up out of the cavity.
- 4) Lubricate o-rings prior to installing load check plug.
- 5) When installing load check plug, ensure thru hole in plug lines up with the tie-rod hole.

Note: Nitrile rubber seals are standard with all VO40 valves; however, fluorocarbon variants are also available. Consult factory for availability.

Positioners

B2A – Spring-Centered In-Detent

B2B – Spring-Centered Out-Detent

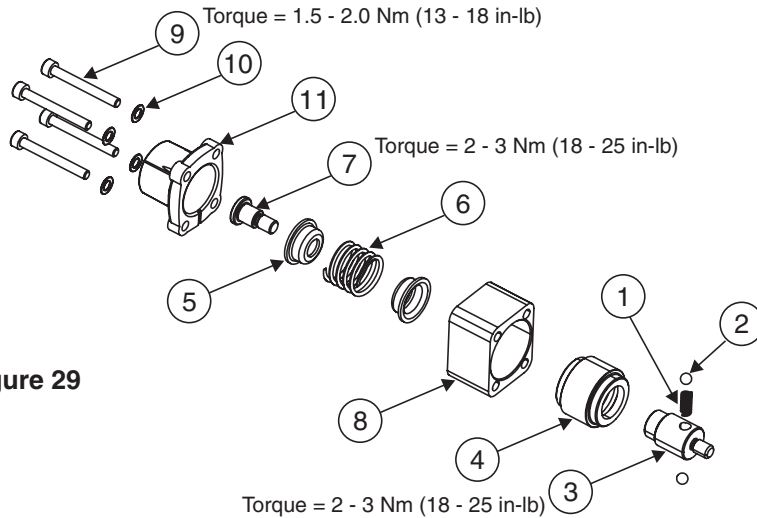


Figure 29

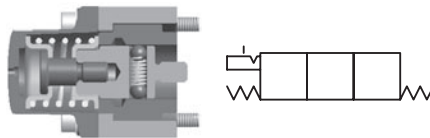
Item	Description	Qty.
1	Spring	1
2	Ball	2
3	Ball Holder	1
4	Detent Sleeve	1
5	Spring Collar	2
6	Spring	1
7	Positioner Screw	1
8	Spacer	1
9	Screw	4
10	Washer	4
11	Bonnet	1

Bonnet Kit 1716023 – Items 9, 10, 11 only

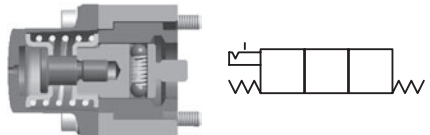
Positioner Kit K-VO40-RI – Items 1-11
Positioner Kit K-VO40-RO – Items 1-11

1. Clean threads and apply medium-strength thread-locker to Items 3 and 7.
2. Apply heavy duty general purpose grease to Item 2.

**Figure 35a
B2A Positioner**



**Figure 35b
B2B Positioner**



B2C – 2-Position Detent (Spool In and Spool Out)

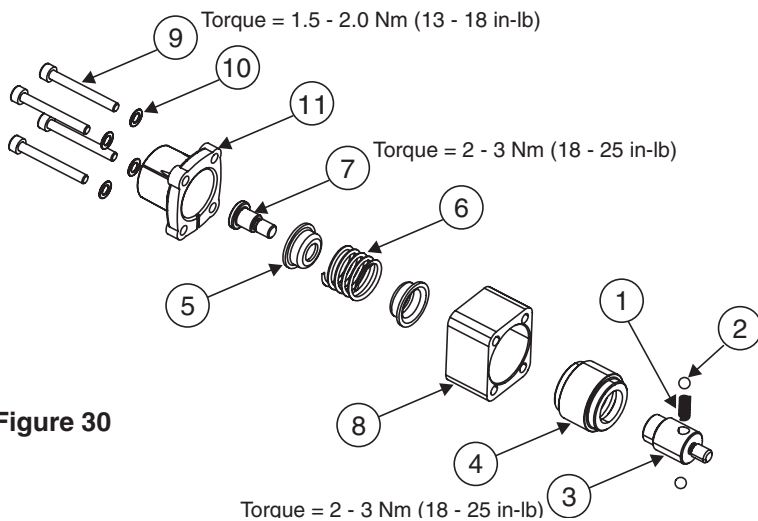


Figure 30

Item	Description	Qty.
1	Spring	1
2	3/16" Ball	2
3	Detent Screw	1
4	Sleeve	1
5	Spring Collar	2
6	Spring	1
7	Spool Screw	1
8	Spacer	1
9	Screw	4
10	Washer	4
11	Bonnet	1

Bonnet Kit 1716023 – Items 9, 10, 11 only

Positioner Kit K-VO40-RIO – Items 1-11

1. Clean threads and apply medium-strength thread-locker to Items 3 and 7.
2. Apply heavy duty general purpose grease to Item 2.

Positioners

CHA2 – 2-Position, Spool-In Detent

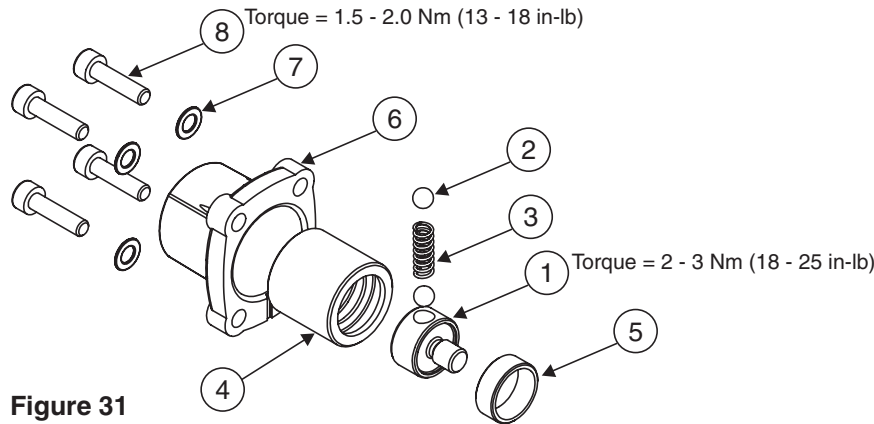


Figure 31

Item	Description	Qty.
1	Ball Holder	1
2	Ball	2
3	Spring	1
4	Detent Sleeve	1
5	Stop Ring	1
6	Bonnet	1
7	Washer	4
8	Screw	4

Bonnet Kit 1716022 – Items 6, 7, 8 only
Positioner Kit K-VO40-DI – Items 1-8

1. Clean threads and apply medium-strength thread-locker to Item 1.
2. Apply heavy duty general purpose grease to Item 2.

CHB2 – 2-Position, Spool-Out Detent

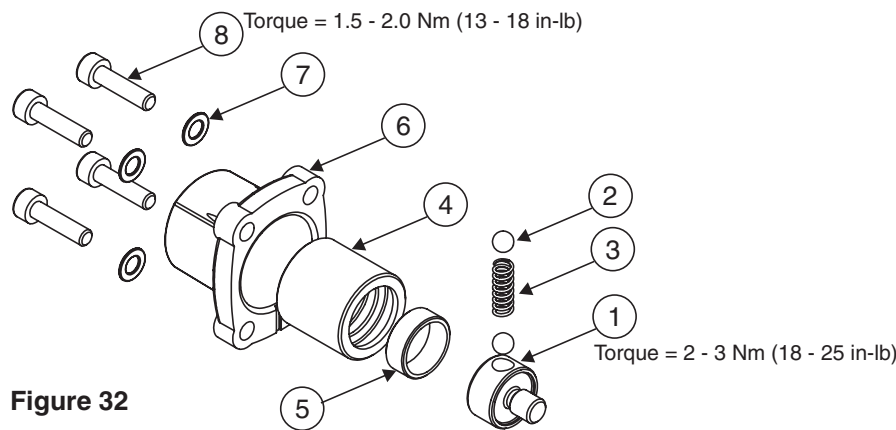


Figure 32

Item	Description	Qty.
1	Ball Holder	1
2	Ball	2
3	Spring	1
4	Detent Sleeve	1
5	Stop Ring	1
6	Bonnet	1
7	Washer	4
8	Screw	4

Bonnet Kit 1716022 – Items 6, 7, 8 only
Positioner Kit K-VO40-DO – Items 1-8

1. Clean threads and apply medium-strength thread-locker to Item 1.
2. Apply heavy duty general purpose grease to Item 2.

CHB3 – 3-Position Detent

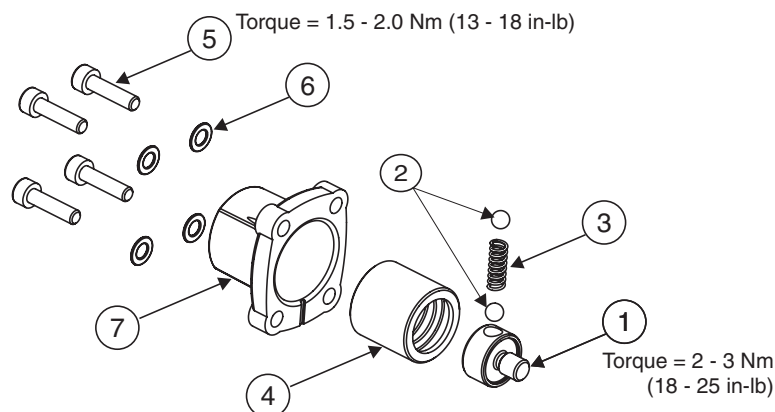


Figure 33

Item	Description	Qty.
1	Detent Screw	1
2	Ball	2
3	Spring	1
4	Sleeve	1
5	Screw	4
6	Washer	4
7	Bonnet	1

Bonnet Kit 1716022 – Items 5, 6, 7 only
Positioner Kit K-VO40-D – Items 1-7

1. Clean threads and apply medium-strength thread-locker to Item 1.
2. Apply heavy duty general purpose grease to Item 2.

Positioners

C – Spring Centered

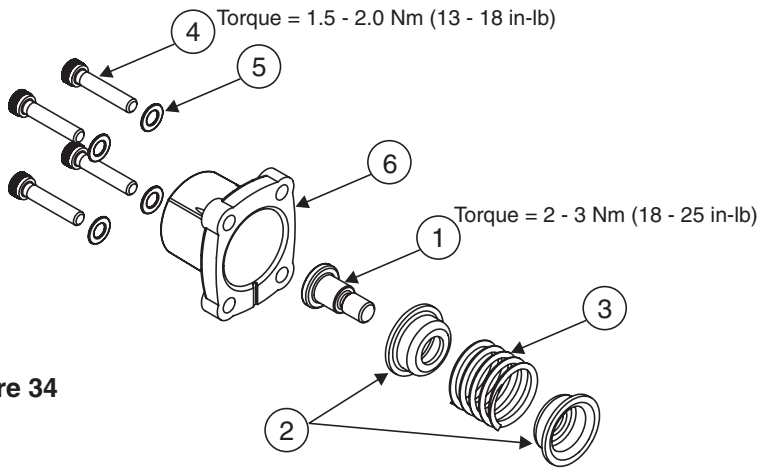


Figure 34

Item	Description	Qty.
1	Spool Screw	1
2	Spring Collar	2
3	Spring	1
4	Screw	4
5	Washer	4
6	Bonnet	1

Bonnet Kit 1716022 – Items 4, 5, 6 only

Positioner Kit K-VO40-S – Items 1-6

Clean threads and apply medium-strength thread-locker to Item 1.

CD – Dual Actuated

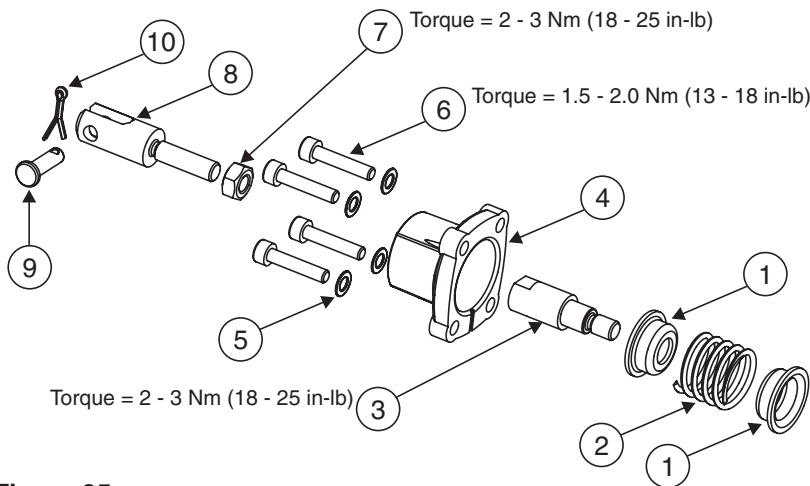


Figure 35

Item	Description	Qty.
1	Spring Collar	2
2	Spring	1
3	Adapter Screw	1
4	Bonnet	1
5	Washer	4
6	Screw	4
7	M6 Nut	1
8	Clevis	1
9	Pin	1
10	Cotter Pin	1

Bonnet Kit 1716026 – Items 4, 5, 6 only

Positioner Kit K-VO40-2C – Items 1-10

Clean threads and apply medium-strength thread-locker to Item 3.

Positioners

CB – 4-Position Float

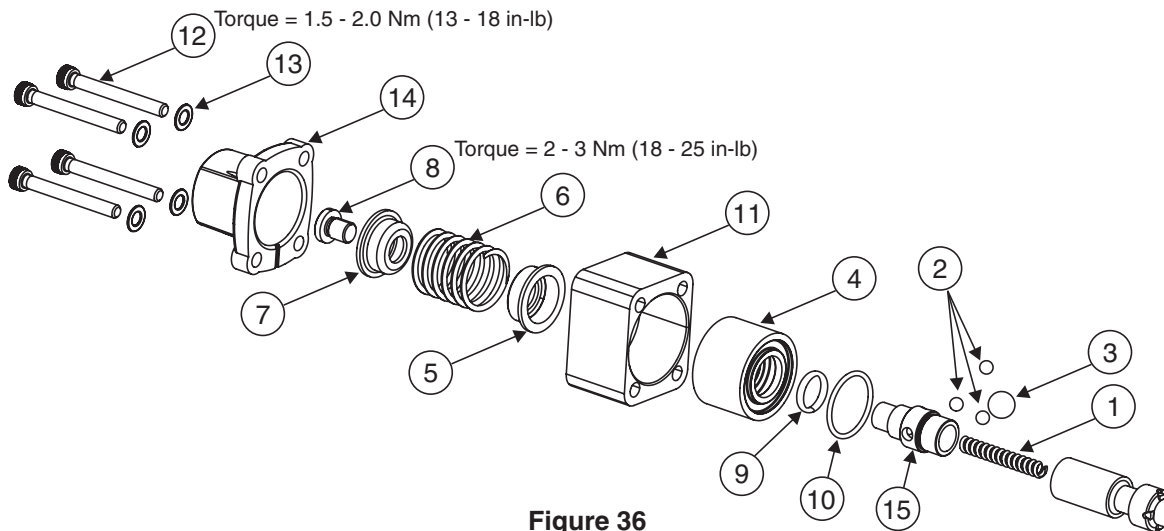


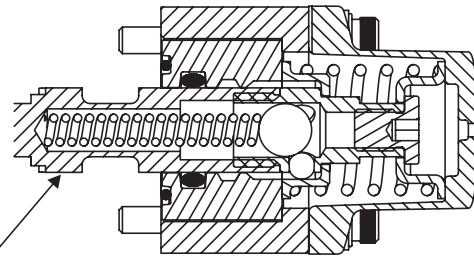
Figure 36

Item	Description	Qty.
1	Spring	1
2	5/32" Ball	3
3	5/16" Ball	1
4	Detent Sleeve	1
5	Float Collar Ring	1
6	Spring	1
7	Spring Collar	1
8	Detent Screw	1
9	O-ring	1
10	O-ring	1
11	Spacer	1
12	Screw	4
13	Washer	4
14	Bonnet	1
15	Ball Holder	1

Bonnet Kit 1716023 – Items 12, 13, 14 only

Positioner Kit 1715013 – Items 1-15

Clean threads and apply medium-strength thread-locker to Items 8 and 15.



Note: Spool seal not installed on positioner end of work section.

Figure 37

To assemble the float positioner:

- Place the spool inside the body and the o-ring (9) inside the float detent sleeve (4).
- Place the detent sleeve (4) over the spool and o-ring (10) on the face of the detent sleeve.
- Place the spring (1) into the spool hole.
- Put the large ball (3) inside the ball holder (15) and thread it 1 turn in the spool.
- Put the small balls (2) in place (use heavy grease to keep the balls in place) and slide the float collar (5) over the ball holder.
- Place all other parts and thread the assembly together torquing the detent screw (8).

Note: Nitrile rubber seals are standard with all VO40 valves; however, fluorocarbon variants are also available. Consult factory for availability.

SHEET 1 DE 1

REVISION	
Date	
App.	
Replace	

PARKER HANNIFIN CORPORATION - HYDRAULIC GROUP
 VO40 - DIRECTIONAL STACK VALVE - DATA SHEET



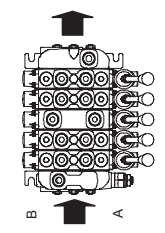
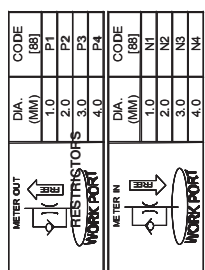
CITY:		STATE:		FILLED BY:	
DATE:		CUSTOMER NUMBER:		APPLICATION	
[04] CONNECTIONS THREAD		MAXIMUM FLOW (GPM)		MAXIMUM PRESSURE (PSI)	
[05] SYSTEM VOLTAGE		[06] CUSTOMER DESIGNATED ID:		[07] PAINTING	
[08] CUSTOMER DESIGNATED ID:		[09] PAINTING		[10] CUSTOMER DESIGNATED ID:	

P/N

STACK POS	# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	# 10	# 11	# last
INLET	pos	WORK SECTION										
	description	description										
12	Max. Inlet flow (GPM)	47	Circuit type									
15	Type of Inlet	50	Spool actuator									
16	Main relief valve	51	Lever Bracket / handle									
17	Pressure setting (PSI)	51C	Clevis or Handle location									
17C	Relief Flow Setting (GPM)	52	Spool pos. indication									
24	Tank connection T1	60	Spool function									
25	Tank connection T2	62	Piston head side									
26	Pump connection P1	76A	Port A valve									
27	Pump connection P2	76B	Port B valve									
P/M SECTION		88A	Restrictor on port A									
P/M MCH. CAST		88B	Restrictor on port B									
METER OUT		SPACER SECTION										
DIA. (MM)	CODE (88)	90	Spacer Section									
1.0	P1	MID INLET										
2.0	P2	Mid Inlet type										
3.0	P3	Main relief valve										
4.0	P4	Pressure setting (PSI)										
METER IN		Relief Flow Setting (GPM)										
DIA. (MM)	CODE (88)	P/M SECTION										
1.0	N1	P/M MACH. CAST										
2.0	N2	(Leave blank if not sure)										
3.0	N3	P/M ACCESSORIES										
4.0	N4	CONNECTION PORT A										
WORK PORT		CONNECTION PORT B										
WORK PORT		ASSEMBLING KIT										
WORK PORT		PAINTING										

TEST STANDARD:

REMARKS:



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7. Special Tooling: A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture items sold pursuant to this contract. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the items sold hereunder, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter,

discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

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9. Taxes: Unless otherwise indicated on the face hereof, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of the items sold hereunder. If any such taxes must be paid by Seller or if Seller is liable for the collection of such tax, the amount thereof shall be in addition to the amounts for the items sold. Buyer agrees to pay all such taxes or to reimburse Seller therefore upon receipt of its invoice. If Buyer claims exemption from any sales, use or other tax imposed by any taxing authority, Buyer shall save Seller harmless from and against any such tax, together with any interest or penalties thereon which may be assessed if the items are held to be taxable.

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9/91-P

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