

V040 Open-Center Directional Control Valve

Build Program

Bulletin HY14-2720-B2/US

Refer to PL HY14-2700/US
for current pricing information

aerospace
climate control
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filtration
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ENGINEERING YOUR SUCCESS.

Technical Information

General Description..... 1

Operation..... 1

Benefits 1

Specifications 2

Ordering Information

Inlet Covers 3

Main Inlet Relief Options 3

Outlet Covers..... 3

Outlet Cover Option Kits..... 3

Parallel Work Sections with Machined Upper Option Cavities..... 4

Parallel Work Sections without Machined Upper Option Cavities..... 4

Tandem Work Sections with Machined Upper Option Cavities..... 5

P.O. Check (Lock Out) Work Section 5

Spool Positioners/Actuators 6

Handle Option Kits 6

Mechanical Joysticks..... 6

Section Stud Assembly Kits..... 7

Direct-Acting Workport Relief Options..... 7

Offer of Sale 8



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Bulletin HY14-2720-B2.indd, dd



General Description

The VO40 Build Program is designed to help a stocking distributor increase the value and services offered to their customers. This is accomplished by having the in-house capability of being responsive to your customer's needs. Its stackable design and modularity enables the distributor to build an almost unlimited number of assemblies with a limited level of inventory. A wide variety of sections and kits facilitate conversion and customization of valve stack assemblies for your customers.

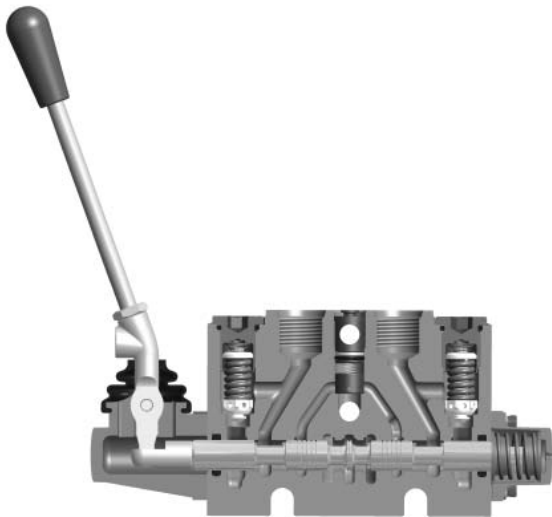
Valve assemblies are comprised of an inlet cover plus main relief options, work sections plus relief and positioner options, an outlet cover plus conversion options, and a stacking kit. All of these components are available in the Build Program, giving you the flexibility to build just about any arrangement imaginable.

The basic kits for the program are:

- Inlet covers
- Inlet cover relief valve options
- Work sections
- Work section relief valve options
- Work section positioner options
- Outlet covers
- Outlet conversion kits
- Handle kits
- Tie bolt stacking kits

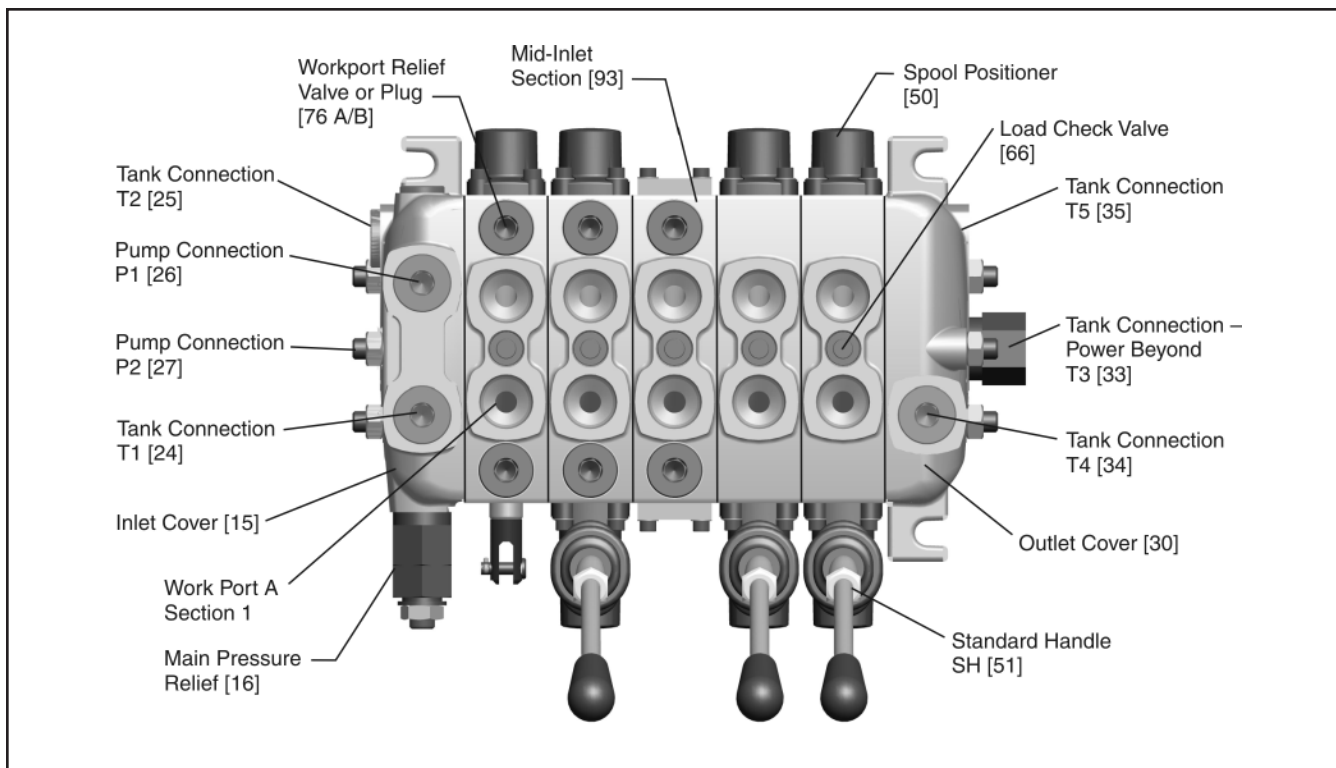
Operation

The VO40 valve 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



VO40 Inlet Covers

Item No.	Part Number	End Inlet	End Outlet	Top Inlet	Top Outlet	SAE 8 Ports
1	VO40-LC-08	•	•	•	•	•

NOTE: A SAE 4 gage port (plugged) is located on the end, opposite the main RV.
 Two SAE port plugs are installed in the top ports.

VO40 Main Relief Options



Item No.	Part Number	Description
1	RCP-15A	No Relief Plug Kit
2	CRV-15B-2500	Pilot-Operated Relief Valve Cartridge Set @ 2500 PSI C/P
3	CRV-15F-2500	Direct-Acting Relief Valve Cartridge Set @ 2500 PSI C/P

NOTE: CRV-15B Relief Valve is screw adjustable from 725-4350 PSI.
 CRV-15F Relief Valve is screw adjustable from 900-3000 PSI.

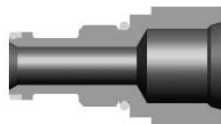
VO40 Outlet Covers



Item No.	Part Number	Top Outlet	End Outlet	SAE 8	Machined for Power Beyond
1	VO40-RC-08	•	•	•	•

NOTE: Two SAE port plugs are installed, one top port and one side port.

VO40 Outlet Cover Conversion Kits



Item No.	Part Number	Description
1	K-PB-08	SAE 8 Power Beyond Sleeve
2	K-CC-PLUG	Closed Center Plug

VO40 Parallel Work Sections with Machined Upper Option Cavities



Item No.	Part Number	SAE 6	SAE 8	3-Way 3-Pos	4-Way 3-Pos	4-Way 3-Pos Free Flow	4-Way 4-Pos Float	Spring Return to Neutral	Enclosed Handle Bracket	Less Handle Bracket
1	VO40-06-03	•		•				•	•	
2	VO40-06-04	•			•			•	•	
3	VO40-06-F4	•				•		•	•	
4	VO40-06-K4	•					•	•	•	
5	VO40-08-03		•	•				•	•	
6	VO40-08-04		•		•			•	•	
7	VO40-08-F4		•			•		•	•	
8	VO40-08-K4		•				•	•	•	

The work sections listed above all have the upper work port relief option cavities machined and plugged. Work sections marked “-LB” (Less Handle Bracket) have a spool with a female clevis. Handle rod/knob sold separately as shown on page 6.

VO40 Parallel Work Sections without Upper Option Cavities



Item No.	Part Number	SAE 6	SAE 8	3-Way 3-Pos	4-Way 3-Pos	4-way 3-Pos Free Flow	4-Way 4-Pos Float	Spring Return to Neutral	Enclosed Handle Bracket	Less Handle Bracket
1	VO40-06-N-03	•		•				•	•	
2	VO40-06-N-04	•			•			•	•	
3	VO40-06-N-F4	•				•		•	•	
4	VO40-06-N-K4	•					•	•	•	
5	VO40-08-N-03		•	•				•	•	
6	VO40-08-N-04		•		•			•	•	
7	VO40-08-N-F4		•			•		•	•	
8	VO40-08-N-K4		•				•	•	•	

The “N” in the work sections listed above designates that the the upper work port relief option cavities are NOT machined. Work sections marked “-LB” (Less Handle Bracket) have a spool with a female clevis.

If the application requires work port option cartridges (i.e. reliefs or anti-cavitation checks) do not select from this group.

Handle rod/knob sold separately as shown on page 6.

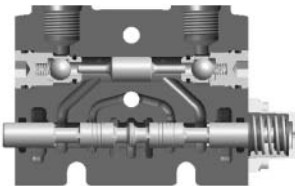
VO40 Tandem Work Sections with Machined Upper Option Cavities



Item No.	Part Number	SAE 6	SAE 8	3-Way 3-Pos	4-Way 3-Pos	4-Way 3-Pos Free Flow	4-Way 4-Pos Float	Spring Return to Neutral	Enclosed Handle Bracket	Less Handle Bracket
1	VO40T-06-03	•		•				•	•	
2	VO40T-06-04	•			•			•	•	
3	VO40T-06-F4	•				•		•	•	
4	VO40T-06-K4	•					•		•	
5	VO40T-08-03		•	•				•	•	
6	VO40T-08-04		•		•			•	•	
7	VO40T-08-F4		•			•		•	•	
8	VO40T-08-K4		•				•		•	

The work sections listed above all have the upper work port relief option cavities machined and plugged. Work sections marked “-LB” (Less Handle Bracket) have a spool with a female clevis. Handle rod/knob sold separately as shown on page 6.

VO40 P.O. Check (Lock Out) Work Section



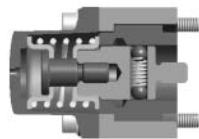
Item No.	Part Number	SAE 6	SAE 8	4-Way 3-Pos	Pilot Operated Checks	Spring Return to Neutral	Enclosed Handle Bracket	Less Handle Bracket
1	VO40-06-L04	•		•	•	•	•	
2	VO40-08-L04		•	•	•	•	•	

Work sections marked “-LB” (Less Handle Bracket) have a spool with a female clevis. Handle rod/knob sold separately as shown on page 6.

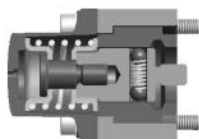
VO40 Spool Positioners/Actuators



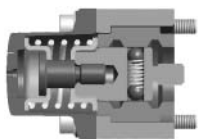
K-VO40-D



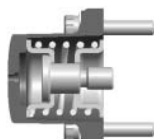
K-VO40-RI



K-VO40-RO



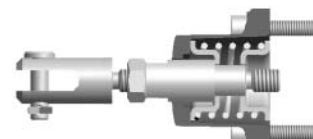
K-VO40-RIO



K-VO40-S



K-VO40-PA1



K-VO40-2C

Item No.	Part Number	Description
1	K-VO40-D	3-Position detent positioner kit
2	K-VO40-RI	Spool "in" detent, with spring return to neutral positioner kit
3	K-VO40-RO	Spool "out" detent, with spring return to neutral positioner kit
4	K-VO40-RIO	Spool "in & out" detent, with spring return to neutral positioner kit
5	K-VO40-S	Spring return to neutral positioner kit
6	K-VO40-PA1	Pneumatic spool actuator kit
7	K-VO40-2C	Dual clevis extension kit

VO40 Handle Option Kits



Item No.	Part Number	Description
1	K-VO40-H1	Straight Handle Lever Kit
2	K-VO40-H2	Offset Handle Lever Kit

Not included with valve work-section assemblies.

VO40 Section Stud Assembly Kits



Item No.	Part Number	Description
1	K-VO40-1	Stud Kit for (1) Work Section
2	K-VO40-2	Stud Kit for (2) Work Sections
3	K-VO40-3	Stud Kit for (3) Work Sections
4	K-VO40-4	Stud Kit for (4) Work Sections
5	K-VO40-5	Stud Kit for (5) Work Sections
6	K-VO40-6	Stud Kit for (6) Work Sections

NOTE: Each stud kit includes (3) studs and (6) nuts (sect. seals are included with sections).
Stud Bolt Torque: 11-14 Ft Lbs (15-19 Nm)

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-AC	N/A		•	
12	VO40-NR	N/A			•

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11. **Improper Use and Indemnity.** Buyer shall indemnify, defend, and hold Seller harmless from any claim, liability, damages, lawsuits, and costs (including attorney fees), whether for personal injury, property damage, patent, trademark or copyright

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14. **Force Majeure.** Seller does not assume the risk and shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter "Events of Force Majeure"). Events of Force Majeure shall include without limitation: accidents, strikes or labor disputes, acts of any government or government agency, acts of nature, delays or failures in delivery from carriers or suppliers, shortages of materials, or any other cause beyond Seller's reasonable control.

15. **Waiver and Severability.** Failure to enforce any provision of this agreement will not waive that provision nor will any such failure prejudice Seller's right to enforce that provision in the future. Invalidation of any provision of this agreement by legislation or other rule of law shall not invalidate any other provision herein. The remaining provisions of this agreement will remain in full force and effect.

16. **Termination.** Seller may terminate this agreement for any reason and at any time by giving Buyer thirty (30) days written notice of termination. Seller may immediately terminate this agreement, in writing, if Buyer: (a) commits a breach of any provision of this agreement (b) appointments a trustee, receiver or custodian for all or any part of Buyer's property (c) files a petition for relief in bankruptcy on its own behalf, or by a third party (d) makes an assignment for the benefit of creditors, or (e) dissolves or liquidates all or a majority of its assets.

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19. **Entire Agreement.** This agreement contains the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of sale. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter are herein merged.

20. **Compliance with Law, U. K. Bribery Act and U.S. Foreign Corrupt Practices Act.** Buyer agrees to comply with all applicable laws and regulations, including both those of the United Kingdom and the United States of America, and of the country or countries of the Territory in which Buyer may operate, including without limitation the U. K. Bribery Act, the U.S. Foreign Corrupt Practices Act ("FCPA") and the U.S. Anti-Kickback Act (the "Anti-Kickback Act"), and agrees to indemnify and hold harmless Seller from the consequences of any violation of such provisions by Buyer, its employees or agents. Buyer acknowledges that they are familiar with the provisions of the U. K. Bribery Act, the FCPA and the Anti-Kickback Act, and certifies that Buyer will adhere to the requirements thereof. In particular, Buyer represents and agrees that Buyer shall not make any payment or give anything of value, directly or indirectly to any governmental official, any foreign political party or official thereof, any candidate for foreign political office, or any commercial entity or person, for the purpose of influencing such person to purchase products or otherwise benefit the business of Seller.

02/12

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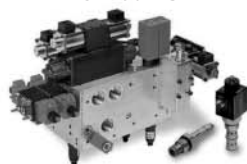
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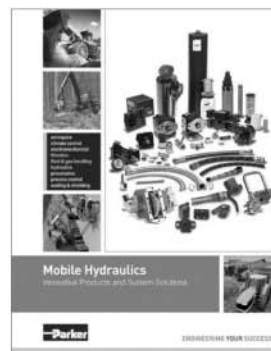
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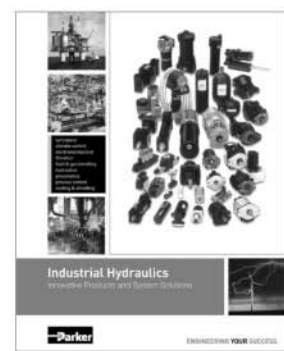
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