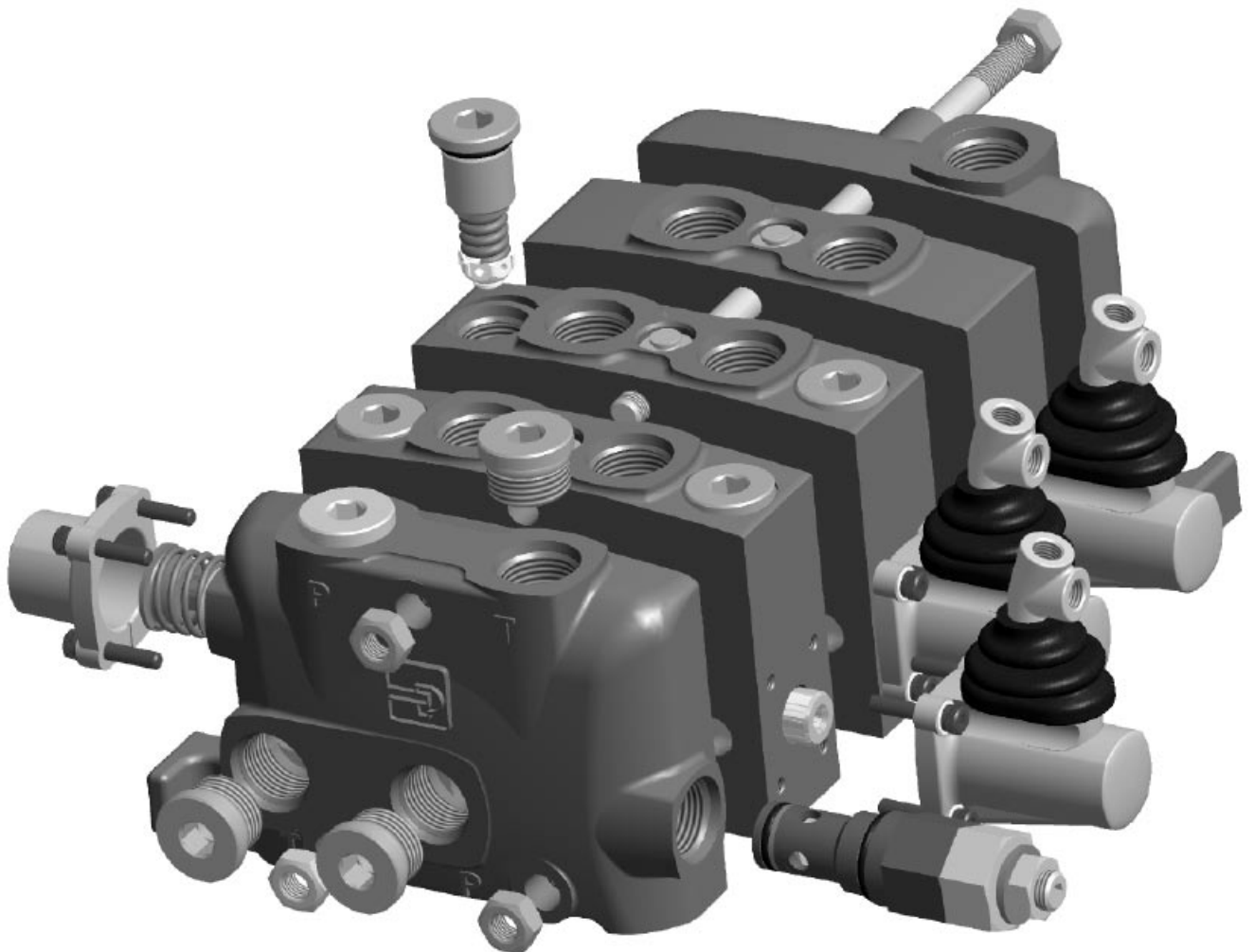




Bulletin HY17-8505-B2/UK

# VO40 Open-Center Directional Control Valve Build Program

Effective: March 1, 2007



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 **WARNING**

**FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.**

This document and other information from Parker Hannifin Corporation, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application, including consequences of any failure, and review the information concerning the product or system in the current product catalogue. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the application are met.

The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

**Offer of Sale**

Please contact your Parker representation for a detailed "Offer of Sale".

## 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.

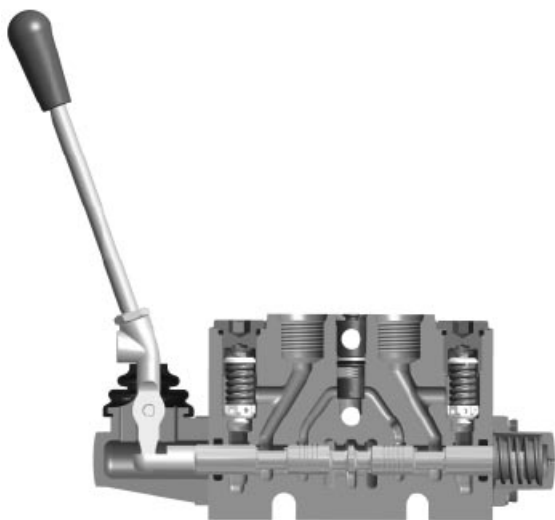
Valve assemblies are comprised of an inlet cover plus main relief options, work sections plus relief and positioner options, an outlet cover plus conversion options, and a stacking kit. All of these components are available in the Build Program, giving you the flexibility to build just about any arrangement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

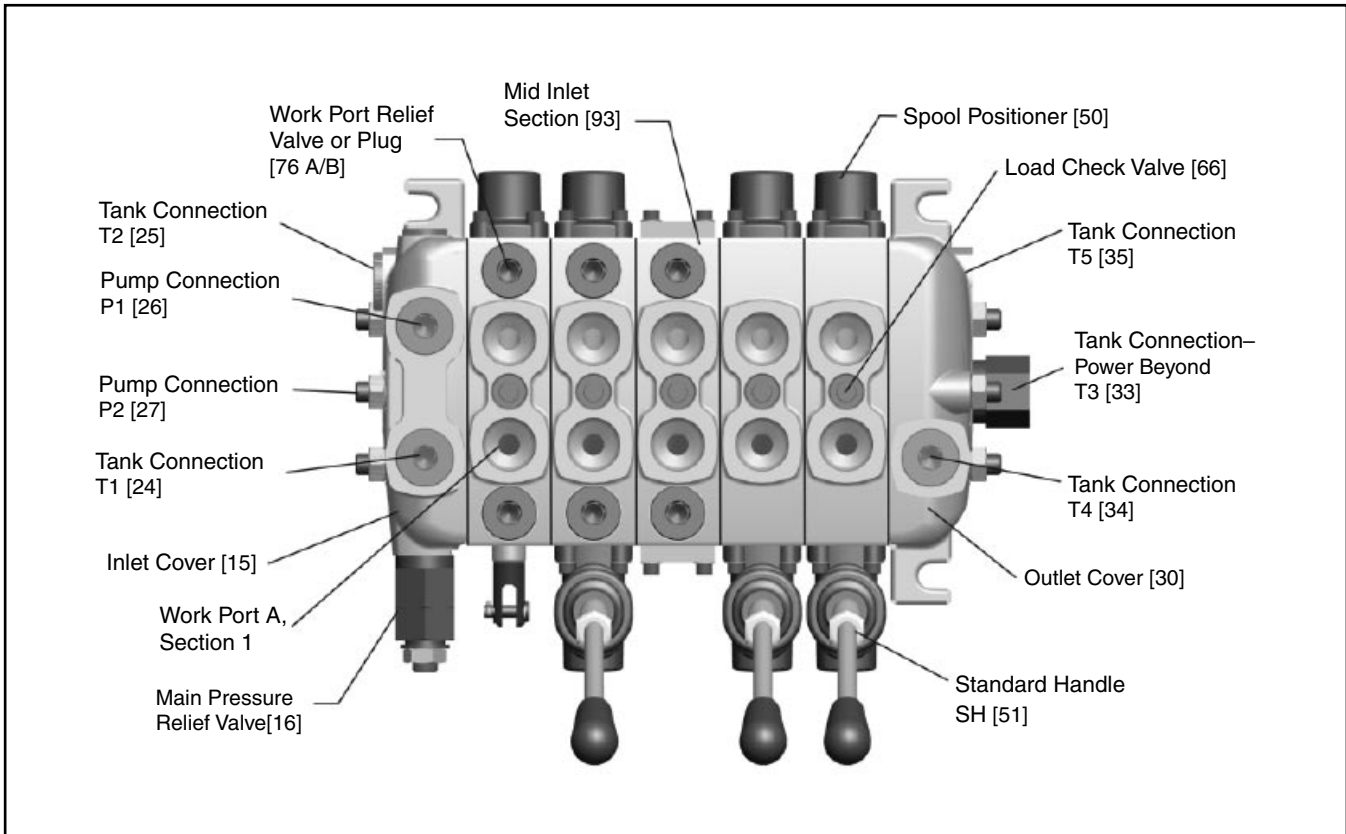
## Operation

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 through 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**

<b>Pressures</b>	Inlet Port: 300 Bar (4350 PSI) Tank Port: 50 Bar (725 PSI) Work Ports: 300 Bar (4350 PSI)
<b>Flow Rates          (maximum recommended)</b>	40 LPM (10.6 GPM)
<b>Spool Leakage from work port to tank</b>	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**

Connection	Location	BSP
P1, P2	Inlet	3/8-19
T1, T2	Inlet	3/8-19
P3	Outlet	3/8-19
T3	Outlet	3/8-19
PB1	Outlet	3/8-19
Work Ports	Work Sections	3/8-19
GAGE PORT	Inlet	1/4
PC (Hyd. Conn.)	Work Sections	1/4
ACP (Pneu.Conn.)	Work Sections	1/8 NPT

**Inlet Covers**



Item No.	Part Number	End Inlet	End Outlet	Top Inlet	Top Outlet	BSP Ports
1	VO40-I-G	•	•	•	•	•

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

**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 @ 172 bar C/P (2500 PSI)

NOTE: CRV-15B-2500 Relief Valve is screw adjustable from 50-300 bar (725-4350 PSI).

**Outlet Covers**



Item No.	Part Number	Top Outlet	End Outlet	BSP	Machined for Power Beyond
1	VO40-US-G	•	•	•	•

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

**Outlet Cover Option Kits**



Item No.	Part Number	Description
1	VO40-PB-G	BSP Power Beyond Sleeve
2	VO40-CC-G	Closed Center Plug



**Parallel Work Sections with Machined Upper Option Cavities**



“-LB” (Less Handle Bracket)

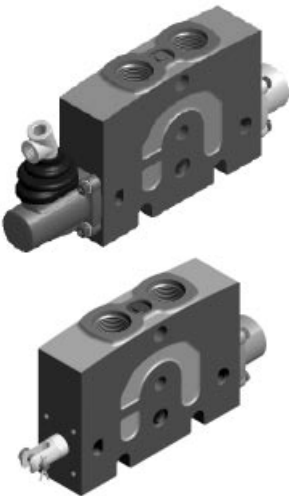
Item No.	Part Number	BSP	EA spool	D spool	M spool	DM spool	F spool	Spool actuator C	Spool actuator CB	Enclosed Handle Bracket	Less Handle Bracket
1	VO40-G-E	•	•					•		•	
2	VO40-G-D	•		•				•		•	
3	VO40-G-M	•			•			•		•	
4	VO40-G-F	•					•		•	•	
5	VO40-G-DM	•				•		•		•	
6	VO40-G-E-LB	•	•					•			•
7	VO40-G-D-LB	•		•				•			•
8	VO40-G-M-LB	•			•			•			•
9	VO40-G-F-LB	•					•		•		•
10	VO40-G-DM-LB	•				•		•			•

The work sections listed above all have the upper work port relief option cavities machined and plugged with Y-plug. Work sections with EA spool have the B port and the B cavitations for port relief valve plugged with STD steel plug. Each work port that requires port relief and/or anti-cavitation valve shall be equipped with suitable cartridge from page 6.

Work sections marked “-LB” (Less Handle Bracket) have a spool with a female clevis.

Handle rod/knob sold separately as shown on page 5.

**Parallel Work Sections without Upper Option Cavities**



“-LB” (Less Handle Bracket)

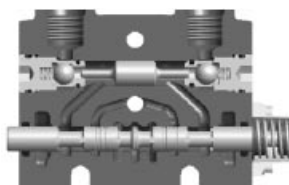
Item No.	Part Number	BSP	EA spool	D spool	M spool	DM spool	F spool	Spool actuator C	Spool actuator CB	Enclosed Handle Bracket	Less Handle Bracket
1	VO40-G-N-E	•	•					•		•	
2	VO40-G-N-D	•		•				•		•	
3	VO40-G-N-M	•			•			•		•	
4	VO40-G-N-F	•					•		•	•	
5	VO40-G-N-DM	•				•		•		•	
6	VO40-G-N-E-LB	•	•					•			•
7	VO40-G-N-D-LB	•		•				•			•
8	VO40-G-N-M-LB	•			•			•			•
9	VO40-G-N-F-LB	•					•		•		•
10	VO40-G-N-DM-LB	•				•		•			•

The “N” in the work sections listed above designates that the the upper work port relief option cavities are NOT machined. If the application requires work port option cartridges (i.e. reliefs or anti-cavitation checks) do not select from this group.

Work sections marked “-LB” (Less Handle Bracket) have a spool with a female clevis.

Handle rod/knob sold separately as shown on page 5.

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



Item No.	Part Number	BSP	D spool	Pilot Operated Checks	Spool actuator C	Enclosed Handle Bracket	Less Handle Bracket
1	VO40-G-PO-M	•	•	•	•	•	
2	VO40-G-PO-M-LB	•	•	•	•		•

Work sections marked “-LB” (Less Handle Bracket) have a spool with a female clevis.

Handle rod/knob sold separately as shown on page 5.

**Spool Positioners/Actuators**



**VO40-CHB3**

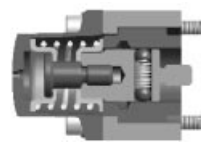


**VO40-CHA2**

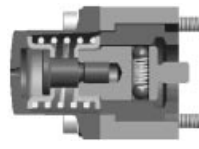
Item No.	Part Number	Description
1	VO40-CHB3	3-Position detent positioner kit
2	VO40-CHA2	2-Position detent positioner kit: Neutral and spool "in" kit
3	VO40-CHB2	2-Position detent positioner kit: Neutral and spool "out" kit
4	VO40-B2A	Spool "in" detent, with spring return to neutral positioner kit
5	VO40-B2B	Spool "out" detent, with spring return to neutral positioner kit
6	VO40-B2C	Spool "in & out" detent, with spring return to neutral positioner kit
7	VO40-C	Spring return to neutral positioner kit. Incl. in Build Program work sections.
8	VO40-ACP	Pneumatic spool actuator kit
9	VO40-PC	Hydraulic remote spool actuator kit
10	VO40-CD	Dual clevis extension kit with spring return to neutral
11	VO40-CB	Spring centered with detent in fourth position, only used with float spool.



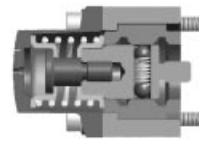
**VO40-CHB2**



**VO40-B2A**



**VO40-B2B**



**VO40-B2C**



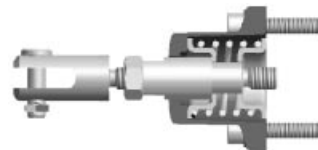
**VO40-C**



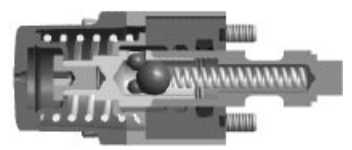
**VO40-ACP**



**VO40-PC**



**VO40-CD**



**VO40-CB**

**Handle Option Kit**



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

Included in complete valves on page 7 but not included with valve work-section assemblies.

**Mechanical Joystick**



Item No.	Part Number	Description
1	VO40-MJL	Mechanical Joystick - Left Handed. Bracket and boot kit. <i>In development</i>
2	VO40-MJR	Mechanical Joystick - Right Handed. Bracket and boot kit. <i>In development</i>
3	K-VO40-H1	Straight Handle Lever Kit

Remove bracket and spool clevis before assemble the joystick.

**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
7	K-VO40-7	Stud Kit for (7) Work Sections
8	K-VO40-8	Stud Kit for (8) Work Sections
9	K-VO40-9	Stud Kit for (9) Work Sections
10	K-VO40-10	Stud Kit for (10) 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)

**Direct-Acting Work port Relief Options**



Item No.	Part Number	Set @ 10 lpm	Relief Valve Anti-Cav	Straight Anti-Cav	No Relief Plug (Y)
1	VO40 RV-50	50 bar	•		
2	VO40 RV-63	63 bar	•		
3	VO40 RV-80	80 bar	•		
4	VO40 RV-100	100 bar	•		
5	VO40 RV-125	125 bar	•		
6	VO40 RV-140	140 bar	•		
7	VO40 RV-160	160 bar	•		
8	VO40 RV-175	175 bar	•		
9	VO40 RV-190	190 bar	•		
10	VO40 RV-210	210 bar	•		
11	VO40 RV-230	230 bar	•		
12	VO40 RV-240	240 bar	•		
13	VO40 RV-250	250 bar	•		
14	VO40 RV-260	260 bar	•		
15	VO40 RV-280	280 bar	•		
16	VO40 RV-300	300 bar	•		
17	VO40-AC	N/A		•	
18	VO40-RV-Y	N/A			•*

\* NOTE: The no relief plug is included with all work sections with machined upper option cavities.



**Complete valves**

The complete valves in the VO40 series are an entry-level range with 1 to 6 work sections, ready for use in more straightforward applications. They can easily be supplemented with direct acting port relief valves and/or anti-cavitation valves for example (page 6), and fitted with other spool actuators (page 5).

A power beyond sleeve can be added to the outlet cover if desired (page 3). It is relatively easy to convert the valves, for example by changing one or more work sections with sections providing different spool functions (page 4). Suitable connections can be found on page 8.

The complete valves consists of:

**Inlet cover** VO40-I-G with adjustable pilot operated main relief valve CRV-15B-2500 set at 172 bar with adjustment range from 50 to 300 bar.

**Outlet cover** VO40-US-G

**Work sections** VO40-G-D 1 to 6 pcs. The sections include double acting spool (D), spool actuator with spring return to neutral (C), enclosed handle bracket with handle lever and Y-plugs in all cavitations for port relief valve.

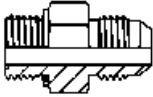

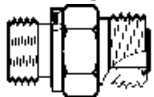
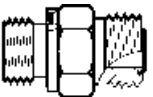



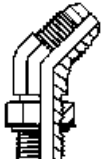
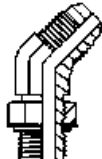
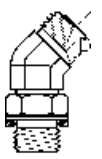

**Complete valves with upper cavities for work-port relief option at all work ports**

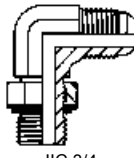
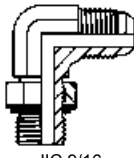
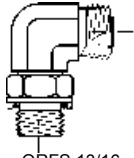
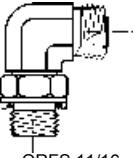
Item No.	Part Number	Number of work sections	BSP	Adjustable pilot-operated main relief valve	D spool	Spool actuator C	Enclosed Handle Bracket	Y-plug. Cavities for port relief valve plugged
1	VO40-01-2013	1	•	•	•	•	•	•
2	VO40-02-2014	2	•	•	•	•	•	•
3	VO40-03-2015	3	•	•	•	•	•	•
4	VO40-04-2016	4	•	•	•	•	•	•
5	VO40-05-2017	5	•	•	•	•	•	•
6	VO40-06-2018	6	•	•	•	•	•	•

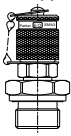
The work sections listed above all have the upper work port relief option cavities machined and plugged with Y-plug. Each work port that requires port relief and/or anti-cavitation valve shall be equipped with suitable cartridge from page 6.

**Port fittings for valves with BSP connections**

		<b>Straight fitting hose/pipe</b>				
						
		JIC 3/4	JIC 9/16	ORFS 13/16	ORFS 11/16	BSP 60° 3/8
Port connection	BSP					
P1, P2	3/8-19	8F42EDMXS	6-6F42EDMXS	8F42EDOMLOS	6-6F4OMLOS	6HMK4S+Tredo16
T1, T2	3/8-19	8F42EDMXS	6-6F42EDMXS	8F42EDOMLOS	6-6F4OMLOS	6HMK4S+Tredo16
P3	3/8-19	8F42EDMXS	6-6F42EDMXS	8F42EDOMLOS	6-6F4OMLOS	6HMK4S+Tredo16
T3	3/8-19	8F42EDMXS	6-6F42EDMXS	8F42EDOMLOS	6-6F4OMLOS	6HMK4S+Tredo16
PB1	3/8-19	8F42EDMXS	6-6F42EDMXS	8F42EDOMLOS	6-6F4OMLOS	6HMK4S+Tredo16
Work port connection	3/8-19	8F42EDMXS	6-6F42EDMXS	8F42EDOMLOS	6-6F4OMLOS	6HMK4S+Tredo16
Port connection		JIC 9/16	JIC 7/16	ORFS 11/16	ORFS 9/16	BSP 60° 1/4
PC	1/4 BSP	6F42EDMXS	4-4F42EDMXS	6F42EDMLOS	4-4F42EDMLOS	4HMK4S+Tredo14
PT	1/8 NPT	6-2 FTX-S	4FMTXS	-	4 FLO-S	-

		<b>45° fitting hose/pipe*</b>			
					
		JIC 3/4	JIC 9/16	ORFS 13/16	ORFS 11/16
Port connection	BSP				
P1, P2	3/8-19	8V4OMXS	6-6V4OMXS	8V4OMLOS	6-6V4OMLOS
T1, T2	3/8-19	8V4OMXS	6-6V4OMXS	8V4OMLOS	6-6V4OMLOS
P3	3/8-19	8V4OMXS	6-6V4OMXS	8V4OMLOS	6-6V4OMLOS
T3	3/8-19	8V4OMXS	6-6V4OMXS	8V4OMLOS	6-6V4OMLOS
PB1	3/8-19	8V4OMXS	6-6V4OMXS	8V4OMLOS	6-6V4OMLOS
Work port connection	3/8-19	8V4OMXS	6-6V4OMXS	8V4OMLOS	6-6V4OMLOS
* max operating pressure 250 bar					
Port connection		JIC 9/16	JIC 7/16	ORFS 11/16	ORFS 9/16
PC	1/4 BSP	6V4OMXS	4-4V4OMXS	6V4OMLOS	4-4V4OMLOS
PT	1/8 NPT	6-2 VTX-S	4 VTX-S	-	-

		<b>90° fitting hose/pipe*</b>			
					
		JIC 3/4	JIC 9/16	ORFS 13/16	ORFS 11/16
Port connection	BSP				
P1, P2	3/8-19	8C4OMXS	6-6C4OMXS	8C4OMLOS	6-6C4OMLOS
T1, T2	3/8-19	8C4OMXS	6-6C4OMXS	8C4OMLOS	6-6C4OMLOS
P3	3/8-19	8C4OMXS	6-6C4OMXS	8C4OMLOS	6-6C4OMLOS
T3	3/8-19	8C4OMXS	6-6C4OMXS	8C4OMLOS	6-6C4OMLOS
PB1	3/8-19	8C4OMXS	6-6C4OMXS	8C4OMLOS	6-6C4OMLOS
Work port connection	3/8-19	8C4OMXS	6-6C4OMXS	8C4OMLOS	6-6C4OMLOS
* max operating pressure 250 bar					
Port connection		JIC 9/16	JIC 7/16	ORFS 11/16	ORFS 9/16
PC	1/4 BSP	6C4OMXS	4-4C4OMXS	6V4OMLOS	4-4C4OMLOS
PT	1/8 NPT	6-2 CTX-S	4 CTX-S	-	4 CLO-S

		Measure nipple M16X2 
Port connection	BSP	
Gage port	1/4	EMA3/1/4EDCF

# Extensive Hydraulic Product Offering

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*Piston, bladder and diaphragm type accumulators, gas bottles and KleenVent reservoir isolators.*

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*Self-contained with a motor, gear pump, reservoir, internal valving, load hold checks and relief valves.*

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*Standard and custom hydraulic cylinders for industrial and mobile applications.*

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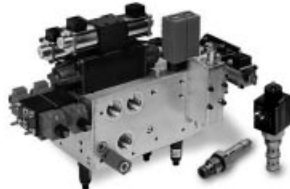
*Parker's unique IQAN approach combines sturdy, well-tested hardware with intelligent, flexible computing power.*

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