

**L2383 Rev. E 10/13**

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Repair Parts Sheets for this product are available from the Enerpac web site at [www.enerpac.com](http://www.enerpac.com), or from your nearest Authorized Enerpac Service Center or Enerpac Sales office.

**1.0 IMPORTANT RECEIVING INSTRUCTIONS**

Visually inspect all components for shipping damage. Shipping damage is not covered by warranty. If shipping damage is found, notify carrier at once. The carrier is responsible for all repair and replacement costs resulting from damage in shipment.

**SAFETY FIRST**

**2.0 SAFETY ISSUES**



Read all instructions, warnings, and cautions carefully. Follow all safety precautions to avoid personal injury or property damage during system operation. Enerpac cannot be responsible for damage or injury resulting from unsafe product use, lack of maintenance or incorrect product and/or system operation.

Failure to comply with the following cautions and warnings could cause equipment damage and personal injury.

A **CAUTION** is used to indicate correct operating or maintenance procedures and practices to prevent damage to, or destruction of equipment or other property.

A **WARNING** indicates a potential danger that requires correct procedures or practices to avoid personal injury.

A **DANGER** is used when your action or lack of action may cause serious injury or even death.

Contact Enerpac when in doubt as to the safety precautions and applications.



**WARNING:** Wear proper personal protective gear when operating hydraulic equipment.



**WARNING: Stay clear of loads supported by hydraulics.** A cylinder, when used as a load lifting device, should never be used as a load holding device. After the load has been raised or lowered, it must always be blocked mechanically.



**DANGER:** To avoid personal injury keep hands and feet away from cylinder and workpiece during operation.



**WARNING:** Do not exceed equipment ratings. Never attempt to lift a load weighing more than the capacity of the cylinder. Overloading causes equipment failure and possible personal injury. The workholding cylinders are designed for a max. pressure of 350 bar [5,000 psi]. Do not connect a jack or cylinder to a pump with a higher pressure rating.



**Never** set the relief valve to a higher pressure than the maximum rated pressure of the pump. Higher settings may result in equipment damage and/or personal injury.



**WARNING:** The system operating pressure must not exceed the pressure rating of the lowest rated component in the system. Install pressure gauges in the system to monitor operating pressure. It is your window to what is happening in the system.



**CAUTION: Avoid damaging hydraulic hose.** Avoid sharp bends and kinks when routing hydraulic hoses. Using a bent or kinked hose will cause severe back-pressure. Sharp bends and kinks will internally damage the hose leading to premature hose failure.



**Do not** drop heavy objects on hose. A sharp impact may cause internal damage to hose wire strands. Applying pressure to a damaged hose may cause it to rupture.



**IMPORTANT:** Do not lift hydraulic equipment by the hoses or swivel couplers. Use the carrying handle or other means of safe transport.



**CAUTION: Keep hydraulic equipment away from flames and heat.** Excessive heat will soften packings and seals, resulting in fluid leaks. Heat also weakens hose materials and packings. For optimum performance do not expose equipment to temperatures of 65°C [150°F] or higher. Protect hoses and cylinders from weld spatter.



**DANGER:** Do not handle pressurized hoses. Escaping oil under pressure can penetrate the skin, causing serious injury. If oil is injected under the skin, see a doctor immediately.



**WARNING:** Only use hydraulic cylinders in a coupled system. Never use a cylinder with unconnected couplers. If the cylinder becomes extremely overloaded, components can fail catastrophically causing severe personal injury.



**IMPORTANT:** Hydraulic equipment must only be serviced by a qualified hydraulic technician. For repair service, contact the Authorized ENERPAC Service Center in your area. To protect your warranty, use only ENERPAC oil.



**WARNING:** Immediately replace worn or damaged parts by genuine ENERPAC parts. Standard grade parts will break causing personal injury and property damage. ENERPAC parts are designed to fit properly and withstand high loads.

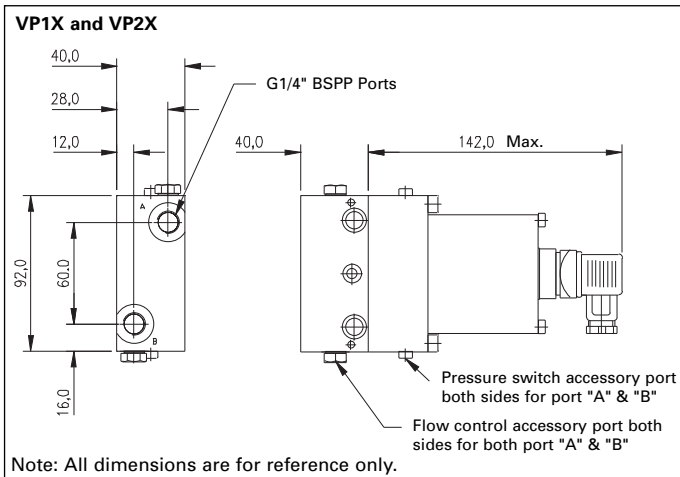
### 3.0 GENERAL DESCRIPTION OF VALVES AND ACCESSORIES

Enerpac's complete line of global valves and accessories are specifically designed to meet all of your application needs. These compact, leakage-free valves can be remote mounted or mounted to the Global Workholding and AHP Series Pumps. The accessories take care of your flow control, pressure sensing, pressure reducing and auxiliary porting requirements.

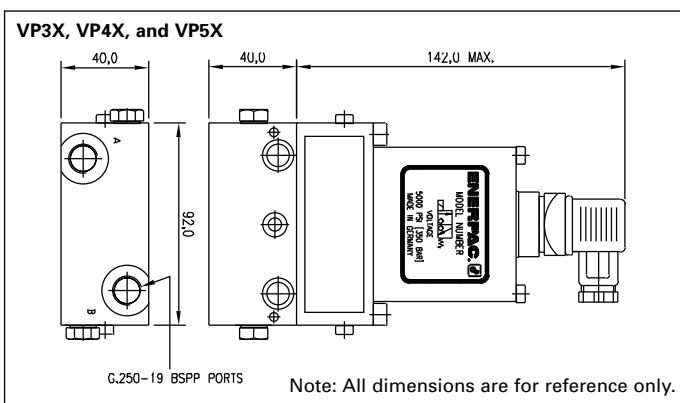
### 4.0 VP VALVES

The VP valves come in five configurations: 4/3 with a closed center; 4/3 with a float center; dual 3/2 valves normally closed; dual 3/2 valves normally open; and dual 3/2 valves one normally open, one normally closed. The valves can be manually actuated by pressing the indented gold-colored areas on either side of the DIN electrical connector.

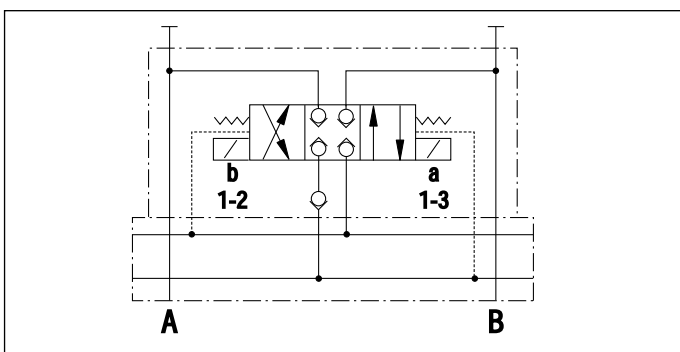
VP DIRECTIONAL VALVE SPECIFICATIONS	
Fluid Temperature Range	-13°-176°F [-25°-80°C]
Viscosity Range	150-165 S.U.S. [15-250c.St]
Hydraulic Oil	HLP 23 ISO 3448-1975
Flow Rate	427 CU.IN/MIN [7,0 L/M] MAX
Operating Pressure	5,000 PSI [350 Bar] {35 MPa}
Electrical Connection	Socket Shape A 3-pin +ground DIN 43650
Weight	6.50 LB [3,0 kg]



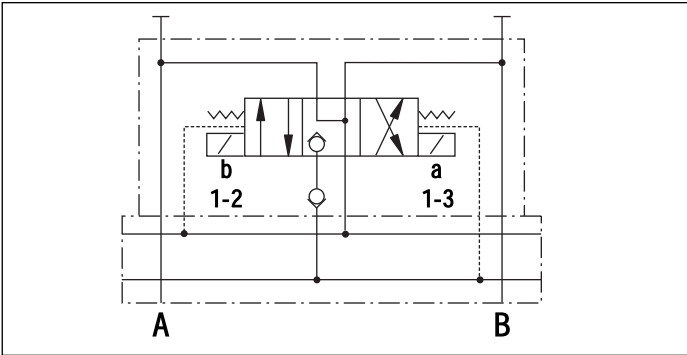
**Figure 1a. SPECIFICATIONS AND DIMENSIONS**



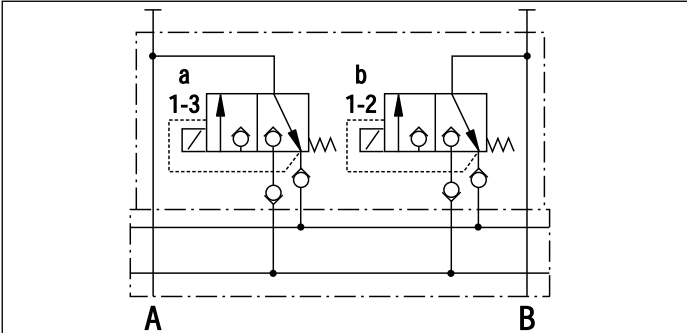
**Figure 1b. SPECIFICATIONS AND DIMENSIONS**



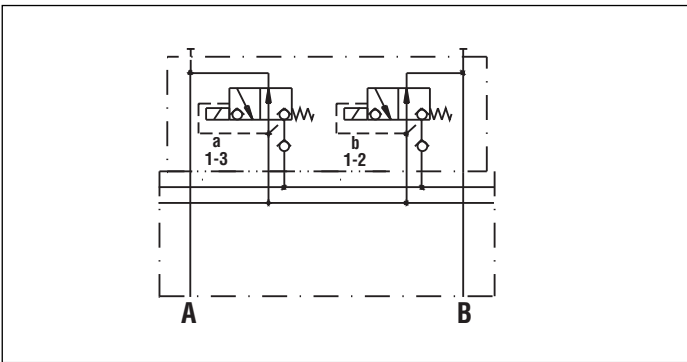
**Figure 2. VALVE FUNCTIONS, VP11, VP12 AND VP13**



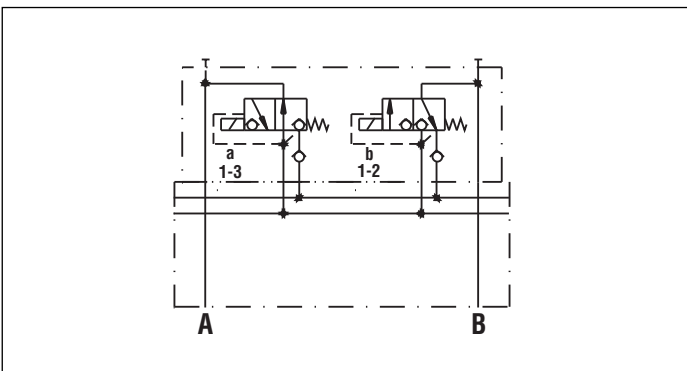
**Figure 3. VALVE FUNCTIONS, VP21, VP22 AND VP23**



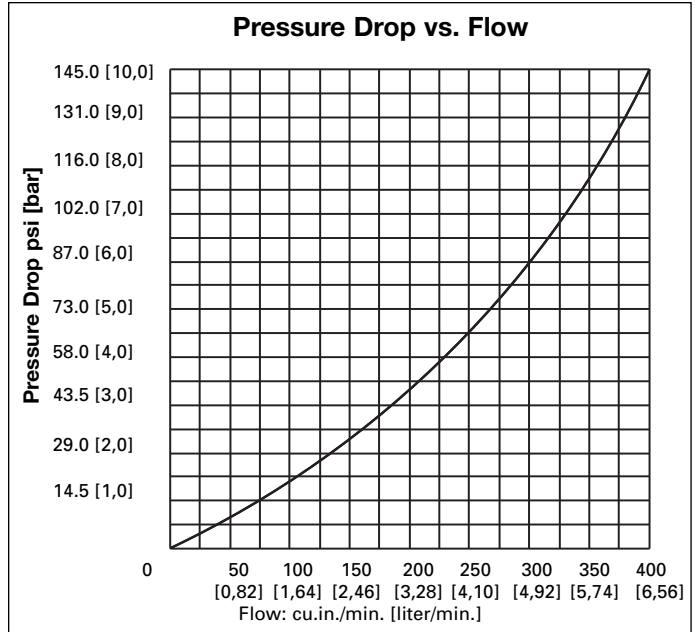
**Figure 4. VALVE FUNCTIONS, VP31, VP32 AND VP33**



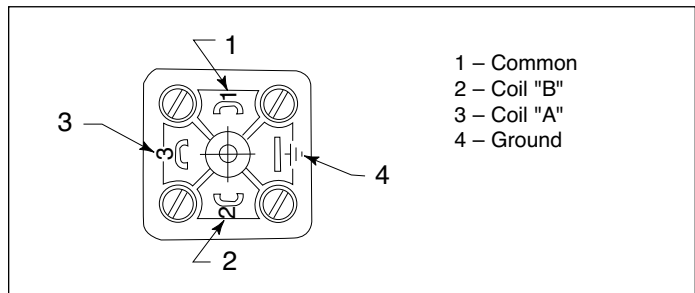
**Figure 5. VALVE FUNCTIONS, VP41, VP42 AND VP43**



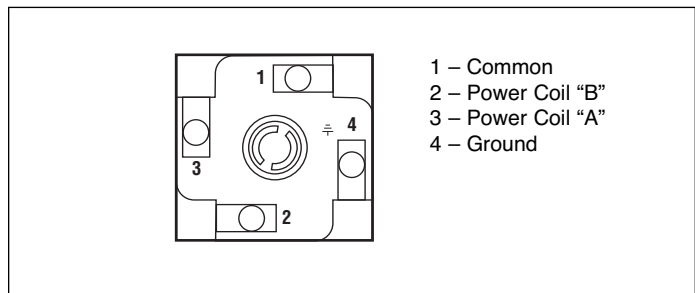
**Figure 6. VALVE FUNCTIONS, VP51, VP52, AND VP53**



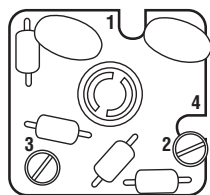
VP VALVE ELECTRICAL SPECIFICATIONS			
Model #	Voltage	Amps	Watts
VP11, VP21, VP31	24 VDC	1.13	27
VP12, VP22, VP32	110 VAC	.50	26
VP13, VP23, VP33	230 VAC	.25	26



**Figure 7. ELECTRICAL CONNECTIONS ON VALVE**



**Figure 8. ELECTRICAL DIN CONNECTIONS FOR VP11, VP21, VP31, VP41, VP51**



- 1 – Common
- 2 – Power Coil “B”
- 3 – Power Coil “A”
- 4 – Ground

**Note:** Screw terminals 1 and 4 are underneath circuit board.

**Figure 9. ELECTRICAL DIN CONNECTIONS FOR VP12, VP22, VP32, VP33, VP42, VP43, VP52 AND VP53**

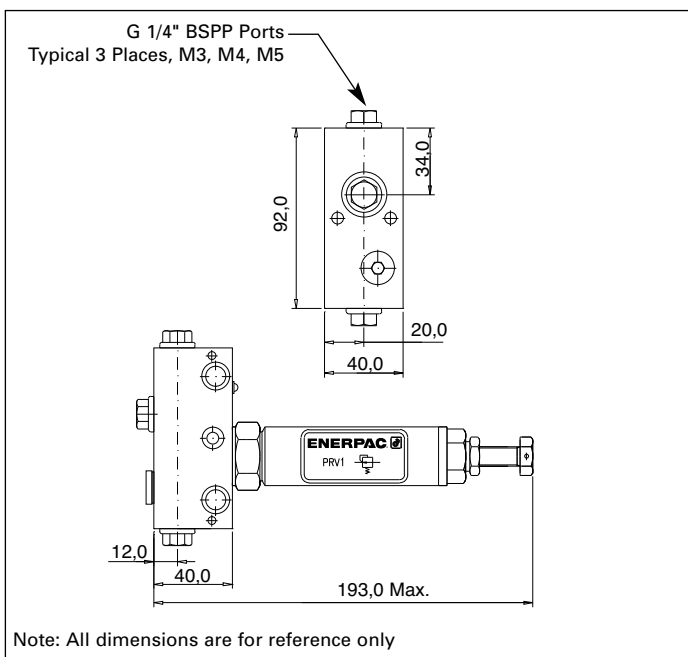
## 5.0 PRV1 AND PRV5 PRESSURE REDUCING VALVE

The 2-way pressure reducing valve regulates system pressure for all subsequent valves including their consumers according to the set pressure (serial connection). The PRV1 and PRV5 have a check valve that prevents a pressure drop on the secondary side, if pressure on the primary side drops below the set pressure of the pressure reducing valve, due to e.g., switching operations of primary side consumers. The pressure reducing valve can be adjusted by turning adjustment screw in or out. Pressure for secondary hydraulic circuit should be set using a pressure gage.

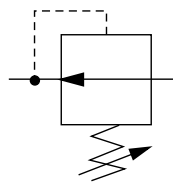
When desired setting is achieved, the lock-nut should be tightened.

### PRESSURE REDUCING VALVE SPECIFICATIONS

Fluid Temperature Range	-13°-176°F [-25°-80°C]
Viscosity Range	150-165 S.U.S. [15-250c.St]
Hydraulic Oil	HLP 23 ISO 3448-1975
Flow Rate	427 CU.IN/MIN [7,0 L/M] MAX
Operating Pressure	5,000 psi [350 Bar] {35 MPa}
Adjustable Range PRV1	435-4,350 psi [30-300 Bar] {3-30 MPa}
Adjustable Range PRV5	75-2000 psi [5-130 Bar] {0.5-13 MPa}
Weight	3.50 LB [1,6 kg]



**Figure 10. PRV1 AND PRV5 PRESSURE REDUCING VALVE**



**Figure 11. PRESSURE REDUCING VALVE FUNCTION**

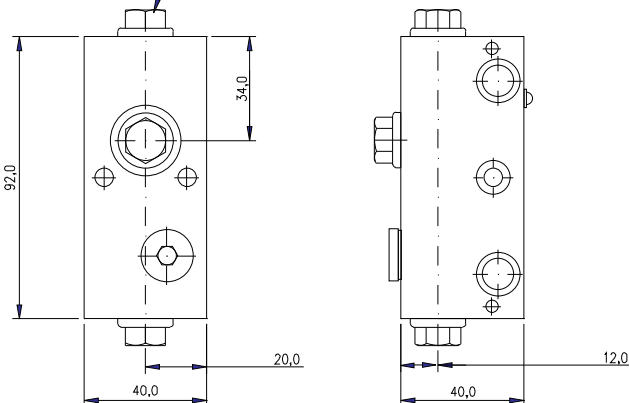
## 6.0 PB1 PORTING BLOCK

PB1 is a porting manifold that provides three G1/4" BSPP pressure ports for auxiliary pressure lines or accessories e.g., a pressure gage.

### PORTING BLOCK SPECIFICATIONS

Fluid Temperature Range	-13°-176°F [-25°-80°C]
Viscosity Range	150-165 S.U.S. [15-250c.St]
Hydraulic Oil	HLP 23 ISO 3448-1975
Flow Rate	427 CU.IN/MIN [7,0 L/M] MAX
Operating Pressure	5,000 psi [350 Bar] {35 MPa}
Weight	2.0 LB [0,9 kg]

G 1/4" BSPP  
Ports M3, M4  
and M5



Note: All dimensions are for reference only

**Figure 12. PORTING BLOCK**

7.0 WM10 REMOTE MANIFOLD

The WM10 Remote Manifold allows mounting of the valve stack at a location removed from the pumping unit. The manifold has a built in relief valve.

7.1 Relief Valve Adjustment

- 1. Loosen lock nut counter-clockwise.
- 2. Turn adjustment screw clockwise to increase or counter-clockwise to decrease pressure.
- 3. Tighten lock nut (3 ft.-lbs. [4-Nm]) clockwise while holding pressure setting.

**NOTE:** Valves may be mounted to Global Workholding Pump with the "WM12" manifold in place of "WM 10" remote manifold.

REMOTE MANIFOLD SPECIFICATIONS	
Fluid Temperature Range	-13°-176°F [-25°-80°C]
Viscosity Range	150-165 S.U.S. [15-250c.St]
Hydraulic Oil	HLP 23 ISO 3448-1975
Flow Rate	427 CU.IN/MIN [7,0 L/M] MAX
Operating Pressure	5,000 psi [350 Bar] {35 MPa}
Relief Valve Adjustment	0-5,000 psi [350 Bar] Range {35 MPa}
Weight	2.50 LB [1,1 kg]

8.0 TIE ROD KITS AND VALVE ASSEMBLY

The valve stacks are held together by tie rods. The tie rods when secured in place are designed to hold the stack together and provide a leak-free seal between valves. The tie rod kits can accommodate valve stacks ranging from one to eight valves.

8.1 Valve Assembly

- 1. Position valve manifold "WM10" with valve locator pins facing up, (see Item 1, Figure 15). Screw both tie rods into manifold (end with short thread length).
- 2. Stack desired valves and accessories (see Items 2, 3, and 4, Figure 15). Make sure that locator pins and mating holes line up.
- 3. Install end plate over tie rods (see Item 5, Figure 15).
- 4. Install seal washer over each tie rod (see Item 8, Figure 15).
- 5. Install 10mm cap nut over each tie rod (see Item 9, Figure 15). Torque to 5.5 ft. lbs. (7,5 Nm).

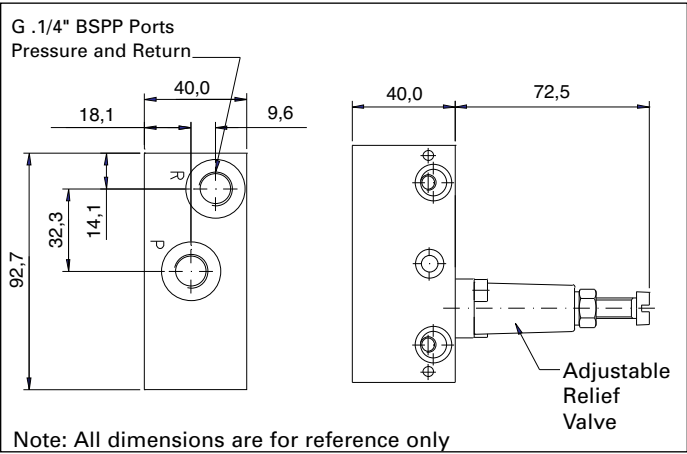
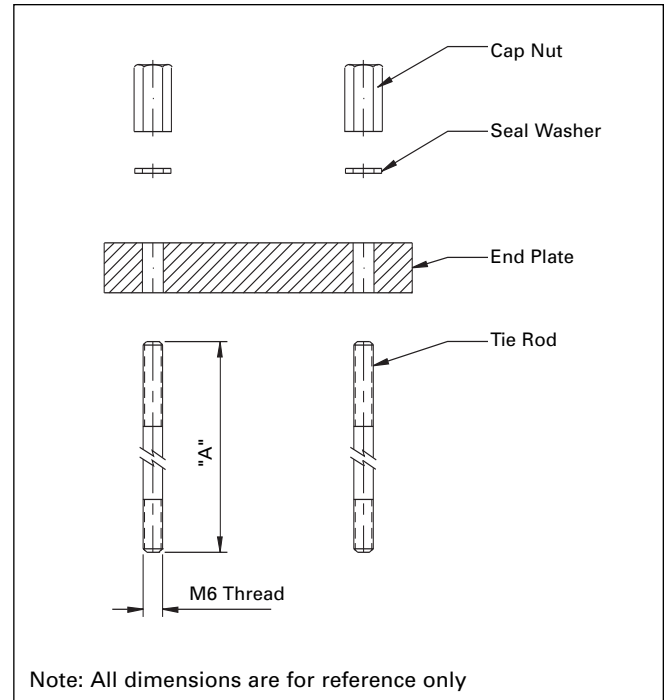
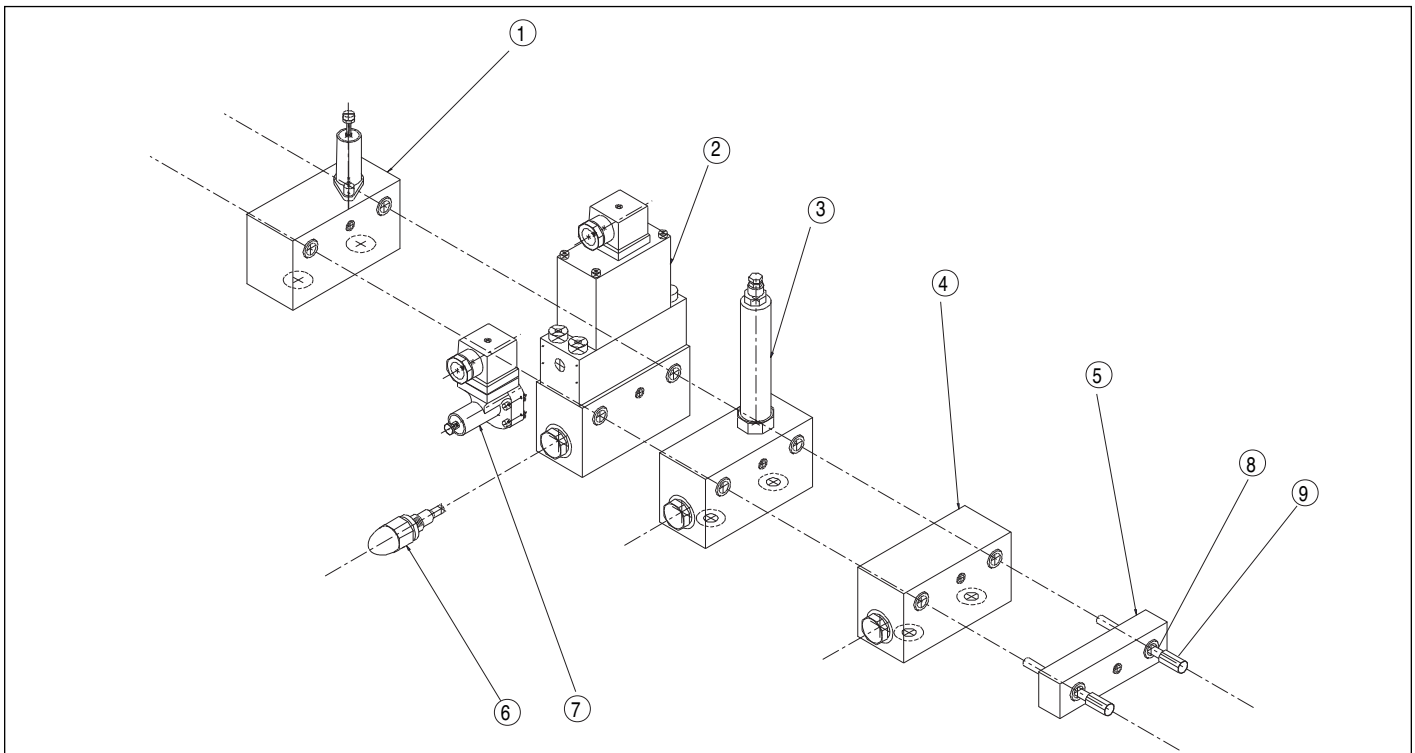


Figure 13. REMOTE MANIFOLD

TIE ROD KIT SPECIFICATIONS		
MODEL #	DIMENSION "A" (mm)	NO. OF VALVES/ ACCESSORIES
TRK 1	85mm	1
TRK 2	125mm	2
TRK 3	165mm	3
TRK 4	205mm	4
TRK 5	245mm	5
TRK 6	285mm	6
TRK 7	325mm	7
TRK 8	365mm	8



**Figure 14. TIE ROD KIT**



**Figure 15. EXAMPLE VALVE STACK ASSEMBLY**

**VALVE STACK ASSEMBLY:**

- |  |                      |                                |
|--|----------------------|--------------------------------|
| 1. WM-10 remote manifold with relief valve | 4. PB1 porting block | 7. PSCK8/PSCK9 pressure switch |
| 2. VP directional valve                    | 5. TRK3 tie rod kit  | 8. Seal washer                 |
| 3. PRV1 pressure reducing valve            | 6. VFC3 flow control | 9. Cap nut                     |

## 9.0 TROUBLESHOOTING

PROBLEM	POTENTIAL CAUSE/SOLUTION
<b>Valve solenoid does not shift</b>	<ol style="list-style-type: none"> <li>1. Insufficient electrical signal. Check electrical connections. Ensure that proper voltage is supplied.</li> <li>2. Electrical connections damaged or corroded. Check connections and clean with proper electrical cleaning solution.</li> <li>3. If necessary, valve is equipped with manual emergency override. Use a thin rounded piece of metal and depress bronze actuators on either side of DIN connector plug. If solenoids are damaged, contact authorized Enerpac Service Center for replacement parts.</li> </ol>
<b>Valve does not hold pressure</b>	<ol style="list-style-type: none"> <li>1. Possible contamination holding seat open. Flush valve with clean fresh oil a few times to try to dislodge contamination. If contamination was present, inspect system, possibly changing filtration or changing out oil and flushing system completely.</li> <li>2. Insufficient electrical signal. Check electrical connections. Ensure that proper voltage is supplied.</li> <li>3. External leak. Check all hydraulic connections in suspect portion of circuit.</li> <li>4. Internal leak in valve. Consult Enerpac for evaluation.</li> </ol>
<b>Valve leaks oil in between valve sections</b>	<ol style="list-style-type: none"> <li>1. Improper torque on tie rod connection kits. Check to ensure proper torque is applied.</li> <li>2. O-rings between sections are "pinched" or otherwise damaged. Contact Enerpac for replacement seals.</li> <li>3. Surface is damaged between valve sections, preventing O-rings from sealing properly. If due to contamination, clean surfaces. If damage is permanent, consult Enerpac for replacement.</li> </ol>
<b>Flow is diminished through valve</b>	<ol style="list-style-type: none"> <li>1. Possible clogged filter. Check all filter elements in system. Clean if necessary.</li> <li>2. If using optional flow control, VFC3, check setting on flow control. Make sure the flow is not set too low for your desired application.</li> <li>3. Improperly sized power unit or hydraulic tubing. Consult Enerpac for application assistance.</li> </ol>