



Operation and Maintenance Manual

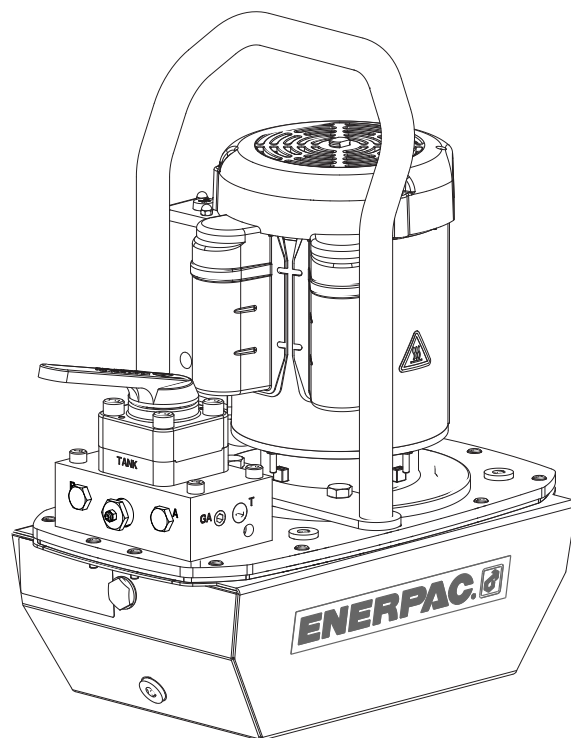
Electric Hydraulic Pumps ZE2-Series and ZW2-Series

Document Number: L4555

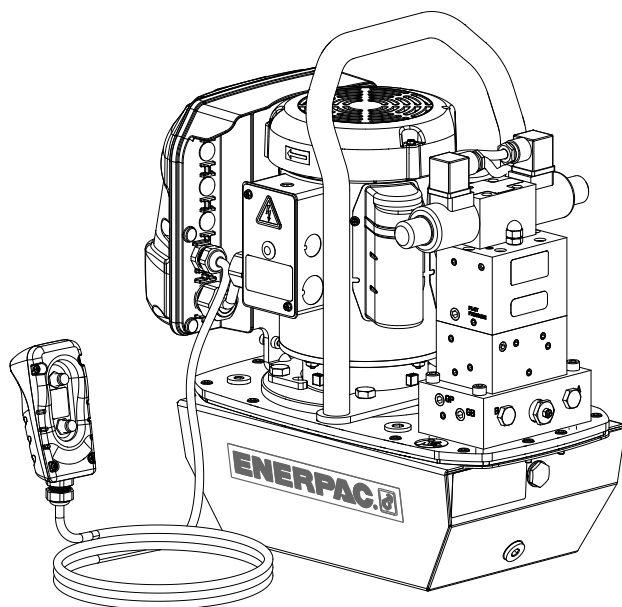
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Manual Valve Models



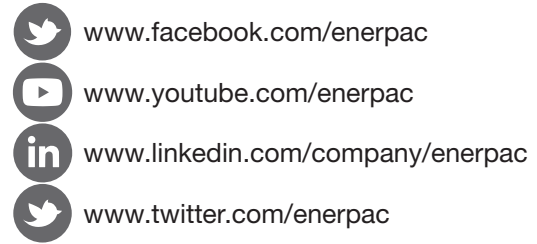
Electric Valve Models



To reduce the risk of injury, user must read and understand this document before use.

ABOUT US

Enerpac is a global market leader in high pressure hydraulic tools, controlled force products, portable machining, on-site services and solutions for precise positioning of heavy loads. As a leading innovator with over a 100 year legacy, Enerpac has helped move and maintain some of the largest structures on earth. When safety and precision matters, elite professionals in industries such as aerospace, infrastructure, manufacturing, mining, oil & gas and power generation rely on Enerpac for quality tools, services and solutions. For additional information, visit www.enerpac.com.

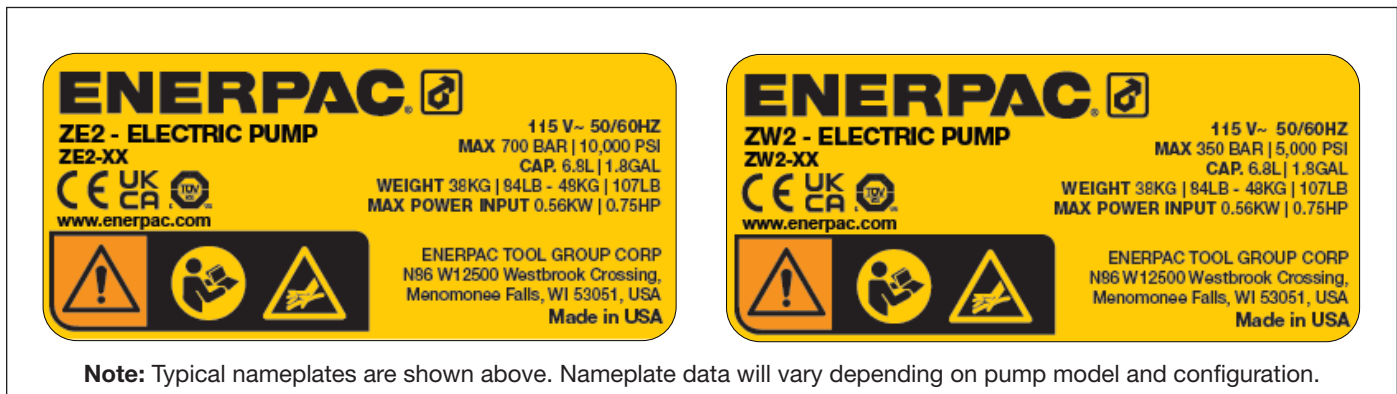


WARRANTY

Refer to the Enerpac Global Warranty document for terms and conditions of the product warranty. Such warranty information can be found at www.enerpac.com.

NAMEPLATE

Refer to the pump nameplate for the product model number, serial number and other applicable information.



AVAILABLE LANGUAGES

An electronic copy of this document is available online in multiple languages:

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- [CS]** Čeština - Další jazyky naleznete na adrese www.enerpac.com.
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1.0 SAFETY

Read all instructions carefully. Follow all recommended safety precautions to avoid personal injury as well as damage to the product and / or damage to other property. Enerpac cannot be responsible for any damage or injury from unsafe use, lack of maintenance, or incorrect operation. Do not remove warning labels, tags, or decals. In the event that any questions or concerns arise, contact Enerpac or a local Enerpac distributor for clarification.

Save these instructions for future use.

Appropriate training in the safe use of high pressure, high force hydraulic tools is required prior to the operation of the pump. If training is needed, contact your local Enerpac distributor or authorized service center for information about an Enerpac hydraulic safety training course.

This manual follows a system of safety alert symbols, signals, words, and safety messages to warn the user of specific hazards. Failure to comply with these warnings could result in death or serious personal injury, as well as damage to the equipment or other property.



The Safety Alert Symbol appears throughout this manual. It is used to alert you to potential physical injury hazards. Pay close attention to Safety Alert Symbols and obey all safety messages that follow this symbol to avoid the possibility of death or serious injury.

Safety Alert Symbols are used in conjunction with certain Signal Words that call attention to safety messages or property damage messages and designate a degree or level of hazard seriousness. The Signal Words used in this manual are WARNING, CAUTION and NOTICE.

WARNING Indicates a hazardous situation that, if not avoided, could result in death or serious personal injury.

CAUTION Indicates a hazardous situation that, if not avoided, could result in minor or moderate personal injury.

NOTICE Indicates information considered important, but not hazard related (e.g. messages related to property damage). Please note that the Safety Alert Symbol will not be used with the signal word.

1.1 Hydraulic Safety Precautions

1.1.1 General Hydraulic Safety Precautions (All ZE2 and ZW2-Series Pumps)

WARNING Failure to observe and comply with the following precautions could result in death or serious personal injury. Property damage could also occur.

- Do not remove or disable the pressure relief valve.
- Never set the pressure relief valve to a higher pressure than the maximum rated pressure of the pump.
- Do not pressurize disconnected couplers.
- Do not handle pressurized hydraulic hoses. Escaping oil under pressure can penetrate the skin. If oil is injected under the skin, see a doctor immediately.

- The system operating pressure must not exceed the pressure rating of the lowest rated component in the system. Install pressure gauge(s) in the system to monitor operating pressure. It is your window to see what is happening in the system.
- Wear personal protective equipment (P.P.E.) when operating hydraulic equipment. Always wear eye protection. Safety equipment such as dust mask, non-skid safety shoes, hard hat, or hearing protection used for appropriate conditions will reduce personal injuries.
- Immediately replace worn or damaged parts with genuine Enerpac parts. Enerpac parts are designed to fit properly and to withstand high loads. Non-Enerpac parts may break or cause the pump to malfunction.

CAUTION

Failure to observe and comply with the following precautions could result in minor or moderate personal injury. Property damage could also occur.

- Do not use or repair damaged hydraulic hoses. 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 hydraulic hoses. A sharp impact may cause internal damage to hose wire strands. Applying pressure to a damaged hose may cause it to rupture.
- Do not lift hydraulic equipment by the hoses or swivel couplers. Use the carrying handle or strap.
- 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.
- Protect all hydraulic equipment from weld spatter.

NOTICE Hydraulic equipment must only be serviced by a qualified hydraulic technician. For repair service, contact the Enerpac Authorized Service Center in your area.

1.1.2 Lifting Pump Safety Precautions (All ZE2-Series Pumps)

WARNING

Failure to observe and comply with the following precautions could result in death or serious personal injury. Property damage could also occur.

- Do not allow persons to be under a hydraulically supported load. Always support the load with stands, blocking or other suitable supports before allowing persons to enter the work area below the load.
- Stay clear of cylinders and tools while they are being pressurized or in operation. To avoid personal injury, keep hands and feet away from pinch point areas.

- Never use a double-acting cylinder or tool with uncoupled couplers. If the cylinder or tool becomes extremely overloaded, components can fail catastrophically.
- Use only rigid pieces to hold loads. Carefully select steel or wood blocks that are capable of supporting the load.
- Never use a hydraulic cylinder or tool as a shim or spacer in any application.
- Avoid situations where loads are not directly centered on the cylinder plunger. Off-center loads produce considerable strain on cylinders and plungers. In addition, the load may slip or fall.
- 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.
- Be sure setup is stable before lifting load. Cylinders should be placed on a flat surface that can support the load. Where applicable, use a cylinder base for added stability. Do not weld or otherwise modify the cylinder to attach a base or other support.

1.1.3 Workholding Pump Safety Precautions (All ZW2-Series Pumps)



Failure to observe and comply with the following precautions could result in death or serious personal injury. Property damage could also occur.

- Although hydraulic operation moves the control of the clamping fixture to an area of greater safety, operators must still remain alert and use common sense practises during their work.
- Use care when selecting components for the workholding application so that safe operation is ensured. Be certain that all components and devices are of adequate rated capacity to perform their intended functions. Do not exceed equipment ratings.
- Verify that all appropriate safety measures have been taken to avoid the risk of injury and property damage from your application or system.
- Be sure that all personnel involved with operating or servicing the workholding devices read and understand the information contained in the manuals included with these devices. Observe and follow all safety instructions and precautions contained in the manuals.
- Design the control units of power operated clamping systems to avoid inadvertent or unauthorized activation.
- Be sure that clamping cylinders and other similar workholding devices are properly positioned before clamping forces are applied.
- Maintain a safe distance from clamping elements and workpiece to avoid personal injury. Stay clear of pinch points. Keep your hands, feet and body away from the clamping area.

- Use mechanical devices and not fingers to hold a part in place until the clamping hydraulics are activated. Do not remove or disable the pressure relief valve.

1.2 Electrical Safety Precautions

1.2.1 Avoiding Electrical Shock



Risk of electric shock! Failure to observe the following instructions and precautions may result in serious personal injury or death.

- Connect the pump power cord only to a grounded electrical outlet. Use only a power cord with a ground pin.
- Unplug pump power cord from outlet before performing cleaning, maintenance or repairs.

1.2.2 Electrical Safety



Failure to observe and comply with the following precautions may result in death or serious personal injury. Property damage could also occur.

- High voltage is present inside the pump even when motor is off. Before opening the pump housing or performing any maintenance or repairs, be sure that the pump power cord is disconnected from the electrical outlet or other electrical power source (refer to additional safety information in Section 1.2.6 of this manual).
- Always be certain that the pump is stopped and disconnected from AC power supply before performing any inspection, maintenance or repair procedures.
- Do not leave the pump unattended in the workplace when connected to AC power supply. Take all reasonable precautions to avoid unauthorized use.
- Take precautions so that the pump is not switched on accidentally.
- If it is not possible to unplug the pump power cord from the AC power outlet, the power must be turned off and locked out at the AC power supply.
- Always disconnect the pump from AC power supply before transporting it.
- Do not use the pump if it cannot be switched on and off using the pump on-off switch or pendant buttons (as applicable for your pump model). Pump must be repaired before use.
- Make sure the pump motor fan vents are unobstructed and free of dirt or dust.
- Do not service or clean the pump while the pump is operating and/or if pump is connected to AC power supply.
- Keep the pump out of the reach of children. Do not allow inexperienced users or users who have not read the instructions to operate them.

1.2.3 Use and Care

WARNING

Failure to observe the following instructions and precautions may result in serious personal injury or death.

- Do not service or clean the pump while it is operating or if it is connected to AC power supply.
- Store the pump indoors. Keep in a secured area to prevent use by unauthorized personnel.
- Do not clean the pump with a water spray or the like.
- Do not operate the pump with a damaged cord or plug, or after the pump malfunctions or is dropped or damaged in any manner. Return the pump to the nearest Enerpac authorized service center for examination, repair, or electrical or mechanical adjustment.

1.2.4 Grounding Instructions

WARNING

Failure to observe the following instructions and precautions may result in serious personal injury or death.

- The pump must be properly grounded. In the event of malfunction or breakdown, grounding provides a path of least resistance for electric current to reduce the risk of electric shock. The pump is equipped with a cord having an equipment grounding conductor.
- A grounding plug is included with the cord. The plug must be plugged into an appropriate outlet that is properly installed and grounded in accordance with all local codes and ordinances.
- Improper connection of the pump grounding conductor can result in electric shock. The conductor with insulation having an outer surface that is green with or without yellow stripes is the pump grounding conductor.
- If the cord and/or plug are damaged, do not connect the pump to a live electrical outlet. Repair or replace the damaged items as required and be sure the grounding conductor is properly wired before reconnecting the pump to the outlet. Consult a qualified electrician if grounding conductor wiring procedures are not completely understood or if there is any doubt as to whether the pump is properly grounded.
- Do not modify the plug provided with the pump. If the plug will not fit in the outlet, have a proper outlet installed by a qualified electrician.
- A qualified electrician should be consulted if there is any doubt as to whether an outlet box is properly grounded.
- The pump is equipped with an electric power cord and plug specific to its rated single-phase voltage. No adapter should be used with the plug.

- If the pump must be reconnected for use on a different type of electric circuit, the reconnection should be made by a qualified electrician. After the reconnection, the pump should comply with all local codes and ordinances.

1.2.5 Use of Extension Cords

WARNING

Failure to observe the following instructions and precautions may result in serious personal injury or death.

- Use the proper size extension cord with the pump power cord when use of an extension cord is necessary. A qualified electrician should be consulted to help specify and select the proper size extension cord. The marked electrical rating of the extension cord should be at least as great as the electrical rating of the pump.
- The extension cord should be a grounding-type 3-wire cord for single-phase power.
- A long extension cord should be arranged so that it will not drape over any working area where it can be tripped over, snagged, or pulled on unintentionally.
- If the pump is to be operated outdoors and an extension cord is needed, use only an outdoor-use extension cord. An outdoor-use extension cord will be clearly marked with the suffix letter “W” and the statement “Suitable for Use with Outdoor Appliances.”


1.2.6 Disconnecting Power


WARNING

Failure to observe and comply with the following precautions could result in death or serious personal injury. Property damage could also occur.

- Be sure that the pump is off before removing plug from electrical outlet.
- Do not unplug the pump by pulling on the cord. To unplug, grasp the plug, not the cord.
- Remove plug from electrical outlet when the pump is not in use and before servicing or cleaning the pump.

1.3 Additional Precautions

 **WARNING** Do not use electric pumps in an explosive atmosphere. Sparks and electrical arcing could ignite combustible vapors or airborne dust

 **CAUTION** Check electrical power requirements on pump data plate. Power of incorrect specifications may damage the motor.

1.4 Ingress Protection Rating



Failure to operate pump in accordance with the stated ingress protection (IP) rating could result in death, electric shock or serious personal injury. Damage to the pump could also occur.

- The pump IP rating is IP54.
- The remote pendant IP rating (if equipped) is IP54.
- Outdoor use is permitted.
- Limited exposure to dust and moisture is permitted in accordance with the stated IP rating. However, the pump should be stored in a dry and protected environment when not in use.
- Do not immerse the pump in water or other liquids.
- Do not allow water jets to contact the pump.

1.5 Labels

Various labels (decals, labels, symbols etc.) are affixed to the pump. In some instances, these labels advise the user of potentially hazardous situations. These labels typically contain symbols instead of text. Understand the meaning of each symbol before using the pump.



Read Instructions: Read the product instruction sheet before operating the product and before performing any inspection, adjustment, maintenance or repair procedures.



Dangerous Voltages/Shock Hazard: To avoid the possibility of a dangerous and potentially lethal electrical shock, disconnect pump power cord from electrical outlet before opening the pump case.



Hot Surfaces Hazard: Hot surfaces can cause burns. Keep away from hot surfaces.

Make sure all labels are legible and securely affixed to the pump. If worn or missing, obtain replacements from Enerpac.

2.0 COMPLIANCE

2.1 Compliance Statements

Enerpac ZE2 & ZW2-Series Electric Hydraulic Pumps
(all models)



Enerpac declares that the Enerpac ZE2 and ZW2-Series electric hydraulic pumps have been tested and conform to applicable standards and are approved to carry the CE, TÜV and UKCA certification marks.

NOTICE For all pumps, a copy of the product EU Declaration of Conformity is enclosed with each shipment. A copy of the UK Self Declaration of Conformity is also enclosed

3.0 SPECIFICATIONS AND PRODUCT DATA

3.1 Model and Feature Overview

Pump Model No.	Control Valve Description	Max Hyd. Working Pressure	For Use With:	Additional Features	Pump Weight	
					lb	kg
ZE2108D_	VE32D 3-way, 2-position Dump Valve	10,000 psi [700 bar]	Single-acting hydraulic cylinders or tools.	<ul style="list-style-type: none"> One-button remote pendant. Pendant button starts & stops motor. Electrically operated dump valve. 	93.5	42.4
ZE2208M_	VM32 3-way, 2-position Manual Valve	10,000 psi [700 bar]	Single-acting hydraulic cylinders or tools.	<ul style="list-style-type: none"> No remote pendant. Rotary motor power switch.❖ Manually operated control valve. 	83.3	37.8
ZE2308M_	VM33 3-way, 3-position Tandem Center Manual Valve	10,000 psi [700 bar]	Single-acting hydraulic cylinders or tools.	<ul style="list-style-type: none"> No remote pendant. Rotary motor power switch.❖ Manually operated control valve with hold. 	84.2	38.3
ZE2408M_	VM43 4-way, 3-position Tandem Center Manual Valve	10,000 psi [700 bar]	Double-acting hydraulic cylinders or tools.	<ul style="list-style-type: none"> No remote pendant. Rotary motor power switch.❖ Manually operated control valve with hold. 	84.2	38.3
ZE2208P_	VM32 3-way, 2-position Manual Valve	10,000 psi [700 bar]	Single-acting hydraulic cylinders or tools.	<ul style="list-style-type: none"> One-button remote pendant. Pendant button starts & stops motor. Manually operated control valve. 	91.1	41.3
ZE2308P_	VM33 3-way, 3-position Tandem Center Manual Valve	10,000 psi [700 bar]	Single-acting hydraulic cylinders or tools.	<ul style="list-style-type: none"> One-button remote pendant. Pendant button starts & stops motor. Manually operated control valve with hold. 	91.9	41.7
ZE2408P_	VM43 4-way, 3-position Tandem Center Manual Valve	10,000 psi [700 bar]	Double-acting hydraulic cylinders or tools.	<ul style="list-style-type: none"> One-button remote pendant. Pendant button starts & stops motor. Manually operated control valve with hold. 	91.9	41.7
ZE2308E_	VE33 3-way, 3-position Tandem Center Electric Solenoid Valve	10,000 psi [700 bar]	Single-acting hydraulic cylinders or tools.	<ul style="list-style-type: none"> Two-button remote pendant. Rocker type motor power switch (on/off/reset). Tandem center w/locking feature. 	108.1	49.0
ZE2408E_	VE43 4-way, 3-position Tandem Center Electric Solenoid Valve	10,000 psi [700 bar]	Double-acting hydraulic cylinders or tools.	<ul style="list-style-type: none"> Two-button remote pendant. Rocker type motor power switch (on/off/reset). Electrically operated control valve. Tandem center w/locking feature. 	108.1	49.0
ZW2108D_	VE32D 3-way, 2-position Dump Valve	5,000 psi [350 bar]	Single-acting hydraulic cylinders or workholding devices.	<ul style="list-style-type: none"> One-button remote pendant. Pendant button starts & stops motor. Electrically operated dump valve. For workholding applications. 	94.8	43.0
ZW2708M_	VM22 3-way, 2-position Manual Valve	5,000 psi [350 bar]	Single-acting hydraulic cylinders or workholding devices.	<ul style="list-style-type: none"> No remote pendant. Rotary motor power switch.❖ Manually operated control valve with hold. For workholding applications. 	84.7	38.5
ZW2408M_	VM43 4-way, 3-position Tandem Center Manual Valve	5,000 psi [350 bar]	Double-acting hydraulic cylinders or workholding devices.	<ul style="list-style-type: none"> No remote pendant. Rotary motor power switch.❖ Manually operated control valve with hold. For workholding applications. 	85.5	38.8
ZW2408E_	VEW43 4-way, 3-position Float Center Electric Solenoid Valve	5,000 psi [350 bar]	Double-acting hydraulic cylinders or workholding devices.	<ul style="list-style-type: none"> Two-button remote pendant. Pendant buttons start & stop motor. Electrically operated control valve. For workholding applications. 	99.0	44.9
Pump Type: "M_" = Manual Valve "D_" = Dump Valve "P_" = Manual Valve with Jog pendant "E_" = Electric Solenoid Valve				❖ Pump equipped with rocker type motor switch if pressure switch option is ordered.		
Note: This table contains model numbers for standard production ZE2 and ZW2-Series pumps. Model number endings ("_") will vary, depending on your pump's power requirements and factory installed options. Refer to sections 3.4 and 3.5 for additional information.						

3.2 Hydraulic Oil Requirements

Pump Series	Reservoir Usable Oil Capacity		Oil Type
	gal	l	
ZE2 and ZW2	1.8	6.8	Enerpac HF

3.3 Pressure and Flow

Pump Series	Pump Type	Maximum Hydraulic Working Pressure *		Flow Rate at Maximum Speed								Relief Valve Adjustment Range		
				Hz	At 100 psi [7 bar]		At 700 psi [50 bar]		At 5000 psi [350 bar]		At 10,000 psi [700 bar]			
					in ³ /min	l/min	in ³ /min	l/min	in ³ /min	l/min	in ³ /min			l/min
ZE2	1 Stage	10,000	700	50	52.5	0.86	34.2	0.56	17.1	0.28	16.7	0.27	1,000 - 10,000	69-700
				60	63	1.0	41.0	0.7	20.5	0.34	20.0	0.33		
	2 Stage	10,000	700	50	166.7	2.7	158.3	2.6	17.1	0.28	16.7	0.27	1,000 - 10,000	69-700
				60	200	3.3	190.0	3.1	20.5	0.34	20.0	0.33		
ZW2	1 Stage	5,000	350	50	63.3	1.0	36.6	0.6	33.3	0.54	---	---	1,000 - 5,000	69-350
				60	76	1.2	44.0	0.7	40.0	0.65	---	---		
	2 Stage	5,000	350	50	166.7	2.7	158.3	2.6	33.3	0.54	---	---	1,000 - 5,000	69-350
				60	200	3.3	190.0	3.1	40.0	0.65	---	---		

* Maximum system pressure of ZE-Series pump is limited to approximately 10,650 -10,950 psi [725-745 bar] by an internal safety relief valve. Maximum system pressure of ZW-Series pump is limited to approximately 5,500 -5,800 psi [374-394 bar] by an internal safety relief valve.

3.4 Electrical Specifications

Model Number Ending In:	Input Power Specifications			Plug Type	Motor Speed	Motor Output Rating		Operating Temp Range *		Sound Level LWA **
	Volts AC	Phase	Hz			hp	kW	°F	°C	dBA
E	230	1	50-60	NEMA 6-15	1725 (60 Hz) 1425 (50 Hz)	0.75	0.56	-20 to +122	-29 to +50	79
I	230	1	50-60	Schuko CEE 7/7	1725 (60 Hz) 1425 (50 Hz)	0.75	0.56	-20 to +122	-29 to +50	79

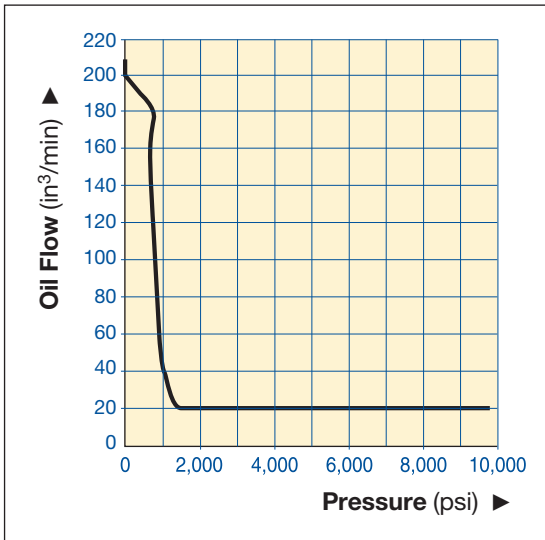
* At 85% relative humidity. ** Typical. Sound level will vary depending on pump speed and load.

3.5 Options

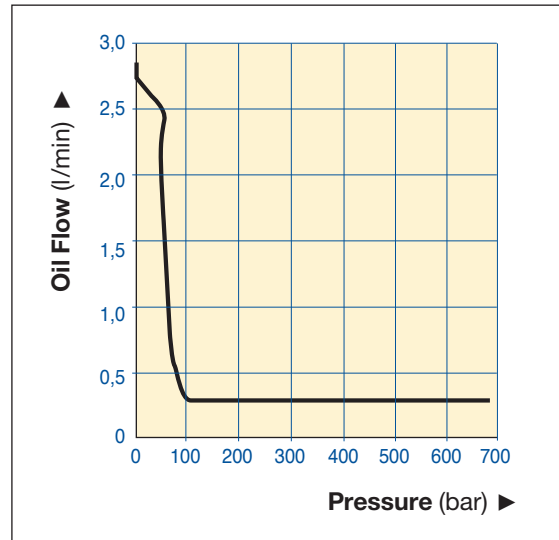
Model No. Suffix	Option Description	Notes:
-F	Return Line Oil Filter Accessory	Available on all models.
-G	Hydraulic Pressure Gauge Accessory 0-15,000 psi [0-1000 bar] range	Available on all models. Standard on pumps equipped with hydraulic pressure switch.
-P	Hydraulic Pressure Switch	Available only on models equipped with VM-Series manual valves.
-S	Single Stage Pump Element	Available on all models.

3.6 Performance Charts

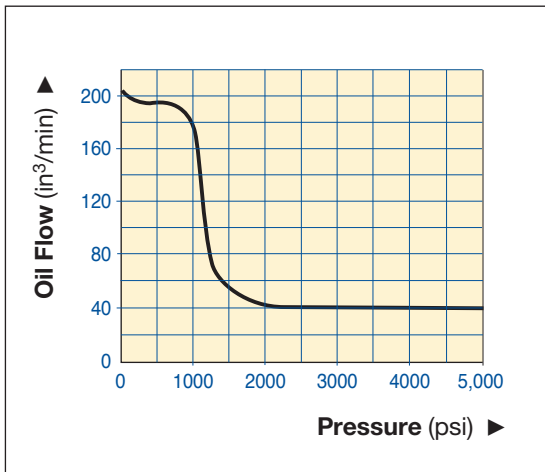
ZE2-SERIES (IMPERIAL)



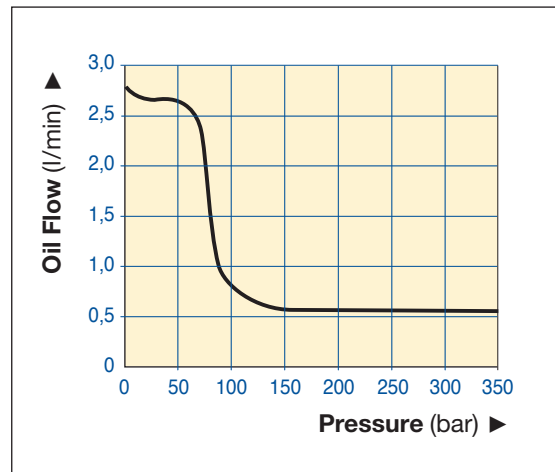
ZE2-SERIES (METRIC)



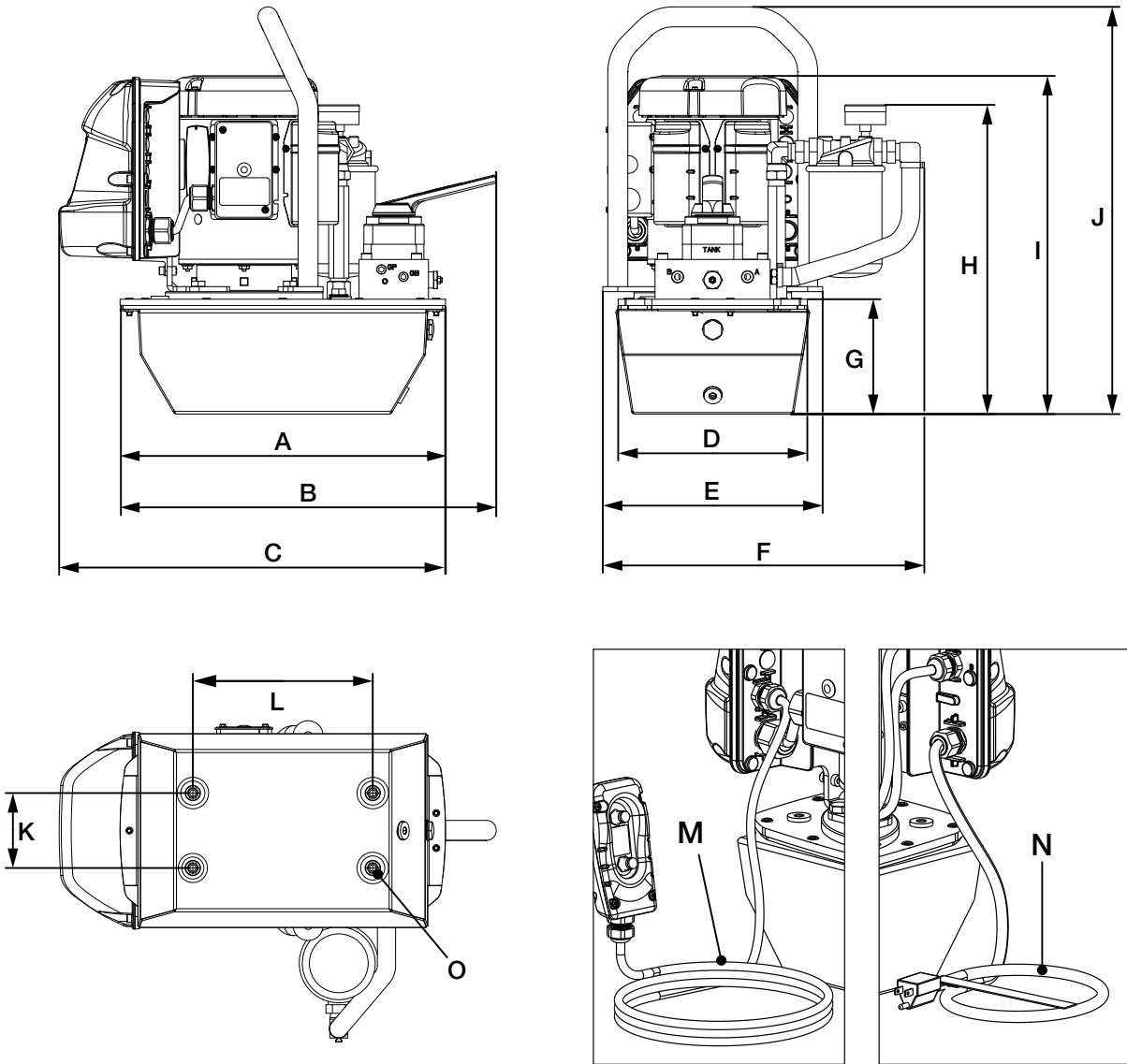
ZW2-SERIES (IMPERIAL)



ZW2-SERIES (METRIC)



3.7 External Dimensions

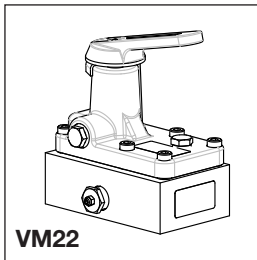


Item	Dimension	
	inch	mm
A	16.3	414
B	18.8	478
C	19.3	491
D	9.5	240
E	11.0	279
F	16.1	409
G	5.7	146
H	15.5	393
I	16.9	430

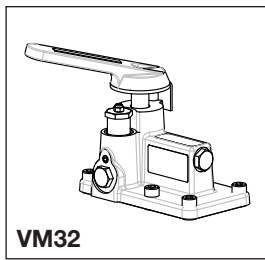
Item	Dimension	
	inch	mm
J	20.4	518
K	3.75	95
L	9.00	229
Item	ft	m
M	20.0	6.0
N	6.5	2.0
Item	Thread Description	
O	M8 x 1.25 thread size 0.25 inch [6.0 mm] thread depth	

Note: External dimensions are typical, but may vary slightly from pump to pump.

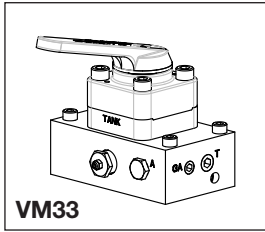
4.0 FEATURES AND COMPONENTS



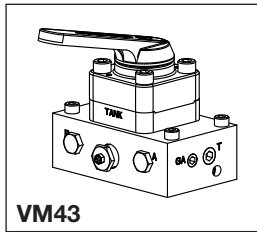
VM22



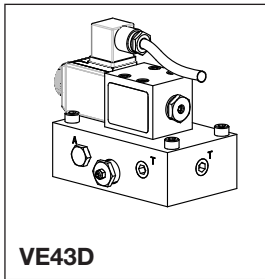
VM32



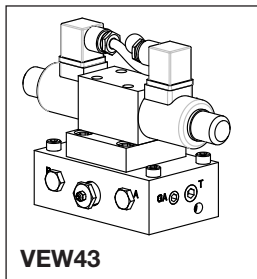
VM33



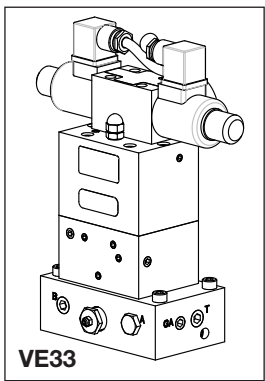
VM43



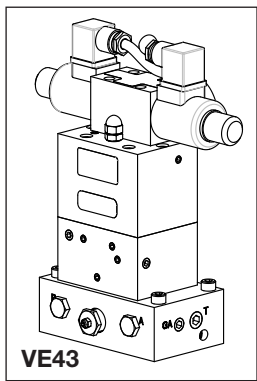
VE43D



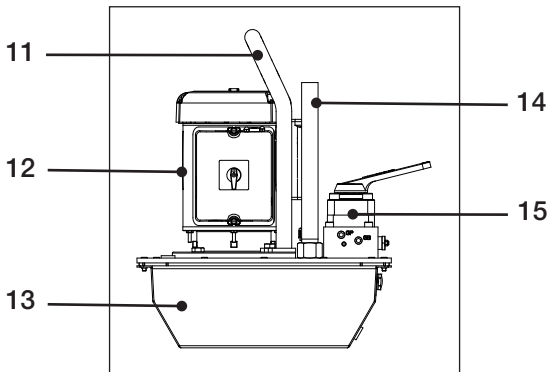
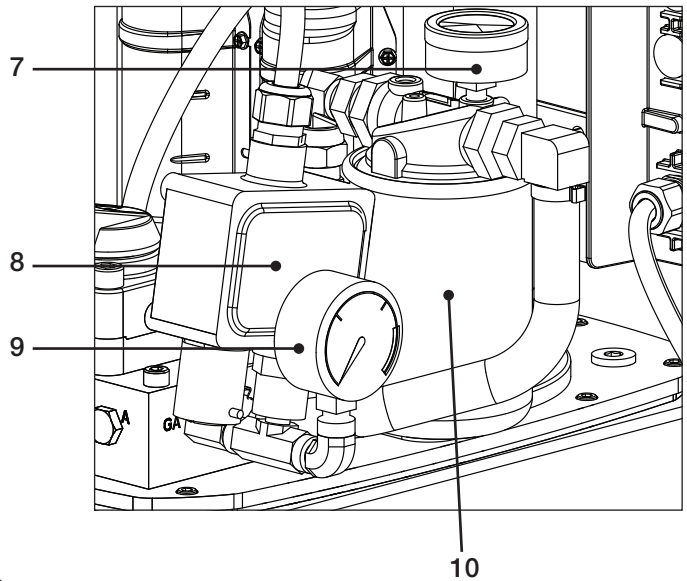
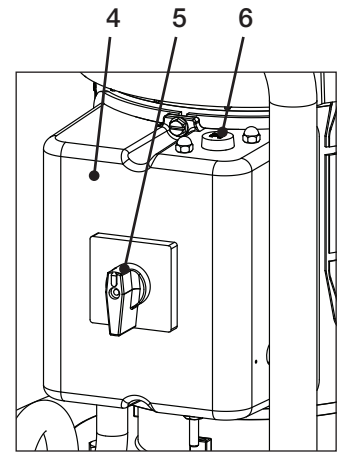
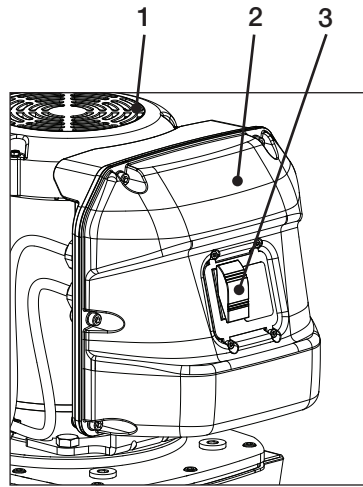
VEW43



VE33



VE43



Key:

- 1. Fan Vents
- 2. Electrical Enclosure
- 3. Rocker Power Switch
- 4. Electrical Enclosure
- 5. Rotary Power Switch
- 6. Circuit Breaker
- 7. Filter Replacement Indicator*
- 8. Hyd. Pressure Switch*
- 9. Hyd. Pressure Gauge**
- 10. Oil Filter*
- 11. Carrying Handle
- 12. Electric Motor
- 13. Hyd. Reservoir
- 14. Oil Fill Extension Tube***
- 15. Control Valve
- 16. Remote Pendant

* Optional equipment. ** Included on pumps equipped with pressure switch. Optional on all other pumps. *** ZW2 models only.

Note: Features and components will vary, depending on pump model and optional equipment ordered.

Figure 1: ZE2 and ZW2-Series Pumps

5.0 DESCRIPTION

The ZE2-Series pump is part of the proven Enerpac ZE-Series product line and utilizes many of the same design elements as the larger ZE-Series pumps.

Ideal for manufacturing or shop environments, multiple valve and control options provide the flexibility to match the pump to a wide range of pressing and punching operations.

In addition, the companion ZW2-Series pump provides similar benefits for machining center workholding applications.

Major features include:

- 0.75 hp [0.56 kW] induction motor for long life and quiet operation.
- 75 dBa sound level across pressure range.
- 1.8 gallon [6.8 liter] steel hydraulic oil reservoir provides ample capacity for a wide range of applications.
- Pump mounted rocker or rotary power switch for simplified control of motor operation.*
- Low-voltage one or two button pendant provides additional safety and convenience for the operator.*
- High-strength molded electrical enclosure protects pump electronics and power supply from harsh industrial environments.*
- High-efficiency Z-Class pump design offers higher oil flow and by-pass pressure, cooler running and less current draw than many comparable pumps.
- IP54 protection and isolation class for superior dust and water protection.

*Standard equipment on selected models.

6.0 INSTALLATION AND SETUP

6.1 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.

6.2 Air Flow

Install or position the pump to ensure that air flow around the pump is unobstructed. Keep the motor fan vents clean to ensure maximum cooling during operation. Be sure that motor housing remains free of built-up dust and dirt.

6.3 Oil Level

Always check the hydraulic reservoir oil level before starting the pump. The reservoir is full when the oil level is about halfway up the sight glass window, as shown in Figure 2.

NOTICE To prevent overfilling, always check oil level with all connected cylinders or tools fully retracted.

If oil level is low, remove the oil fill plug (A) from the pump cover plate and add oil as required. See Figure 3. Note that ZW2 models include an oil fill extension tube which is shown in Figure 1.

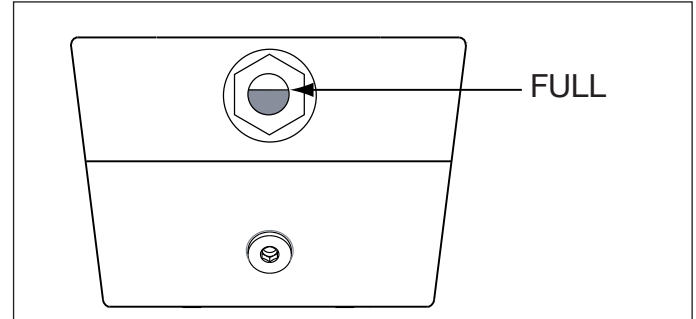


Figure 2: Oil Level Sight Glass

6.4 Hydraulic Reservoir Air Breather

A shipping plug (B) is installed in the pump coverplate. See Figure 3.

Before using the pump, replace the shipping plug (B) with the reservoir air breather (C) and adapter fitting (D). These parts are shipped loose with the pump. Save the shipping plug (B) for future use, such as when transporting the pump.

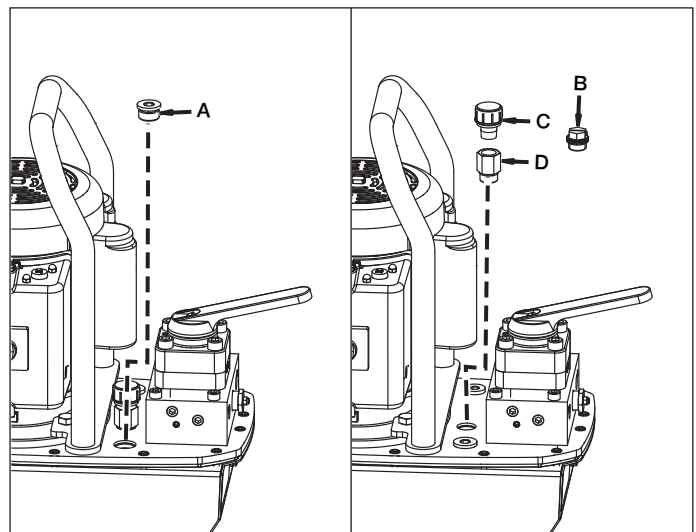


Figure 3: Reservoir Oil Fill Plug and Air Breather

6.5 Hydraulic Connections

Apply 1-1/2 wraps of PTFE sealing tape or other suitable sealant to the hydraulic hose fitting, leaving the first complete thread free of tape or sealant as shown in Figure 4.

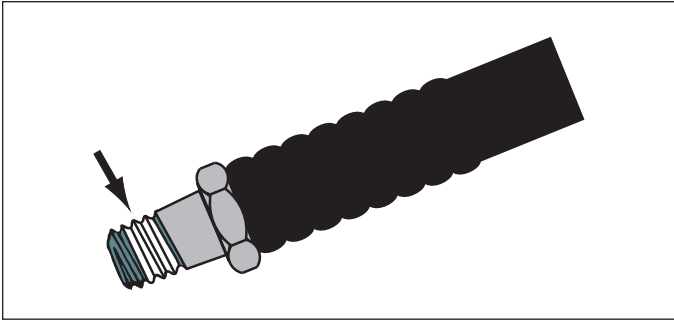


Figure 4: Thread Sealant or Tape

Connections:

- Valve “A” and “B” ports are 3/8” NPTF.
- All valve auxiliary ports are 1/4” NPTF.

Hose installation:

- See valve body for port identification.
- Connect advance hose to valve port “A”.
- Connect retract hose to valve port “B” (if applicable).
- Connect pressure gauge to valve auxiliary port “GA”, “GB” or “GP”.

NOTICE “GA” measures “A” port pressure, “GB” measures “B” port pressure, “GP” measures pump pressure down stream of system check valve. Available auxiliary ports will vary, depending on valve model.

6.6 Electrical Connections

THE PUMP IS FACTORY EQUIPPED WITH THE COMMON ELECTRICAL PLUG FOR A GIVEN VOLTAGE, ALTERING THE PLUG TYPE SHOULD ONLY BE DONE BY A QUALIFIED ELECTRICIAN, ADHERING TO ALL APPLICABLE LOCAL AND NATIONAL CODES.

- The disconnect and line circuit protection to be provided by customer. Line circuit protection to be 115% of motor full load current at maximum pressure of application.
- For power rating information, refer to pump name plate.

7.0 OPERATION

For all pumps equipped with VM-Series control valves, oil flow is controlled by a manual valve. For pumps equipped with VE-Series control valves, the valve is operated via one or two electric solenoids, depending on model.

Depending on pump model, the motor is controlled either by a pump mounted switch or by a corded remote pendant.

Refer to sections 7.3, 7.4 and 7.5 for detailed operating instructions.

NOTICE The ZE2 and ZW2-Series pumps are designed for intermittent duty only. Allow pump to cool periodically after extended use at high pressure.

7.1 Max. Hydraulic Working Pressure


- **ZE2 models** are rated at a maximum hydraulic working pressure of 10,000 psi [700 bar]. Maximum system pressure is limited by an internal safety relief valve to approximately 10,650-10,950 psi [725-745 bar].
- **ZW2 models** are rated at a maximum hydraulic working pressure of 5,000 psi [350 bar]. Maximum system pressure is limited by an internal safety relief valve to approximately 5,500 to 5,800 psi [375-394 bar].

WARNING Do not attempt to operate the pump at above its rated maximum working pressure. Serious personal injury, component failure and property damage could occur.

WARNING Maximum working pressure should never be higher than the lowest rated component in the system. Refer to Section 1.1.1 for additional related hydraulic safety information.

7.2 Initial Start-Up

WARNING Pumps equipped with optional pressure switch: be certain that pump power switch is in the OFF position to prevent accidental startup from occurring when power is connected.

1. Check the oil level in the pump reservoir. Add oil if necessary. Refer to Section 6.3.
2. Make sure that the reservoir air breather has been installed. Refer to Section 6.4.
3. If there is no hydraulic pressure gauge in the system, connect a suitable 0-15,000 psi [0-1000 bar] gauge.
4. If the pump is equipped with the optional pressure switch, adjust the switch setting. Refer to Section 7.6.
5. If the pump is equipped with a manual valve, be sure that the control valve lever is in the proper position:
 - VM22 and VM32: *Retract* position.
 - VM33 and VM43: *Neutral* position.
6. Connect pump AC power cord to electrical outlet.
7. On pumps equipped with a rocker type power switch, depress the bottom RESET  section of the switch to energize pump electrical components. Refer to Section 7.3.2 for additional information.
8. For valve and motor operation instructions, refer to sections 7.3, 7.4 and 7.5. When pump is first started, check that motor fan rotates in the proper direction. See arrow on fan shroud.
9. Before placing the pump into service, cycle the cylinder or tool several times under no load to bleed any trapped air from the hydraulic circuits. Air is removed when cylinder or tool moves smoothly in both directions.

7.3 Motor Power Switch

Many pump models are equipped with a pump-mounted motor power switch. This can be either a rotary or rocker type switch depending on pump model and configuration.

NOTICE If your pump does not contain a pump mounted motor power switch, then motor operation is controlled only by the remote pendant.

7.3.1 Rotary Switch (on-off)

See Figure 5 for switch positions.

On models with a rotary switch, turn the knob clockwise to the ON position to start the motor. Turn the knob counter-clockwise to the OFF position to stop the motor.

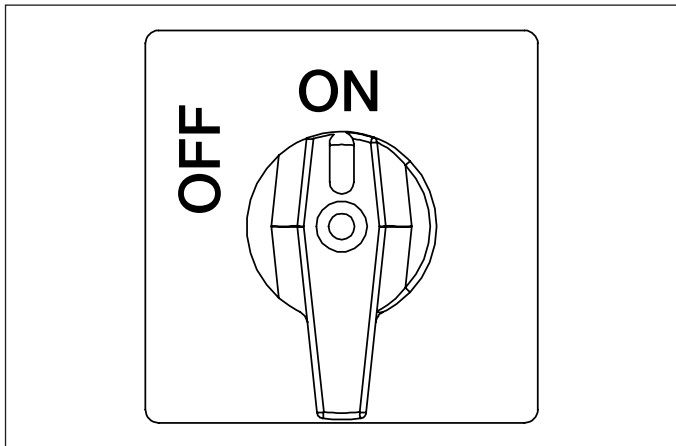


Figure 5: Rotary Switch

7.3.2 Rocker Switch (on-off-reset)

See Figure 6 for switch positions.

- Press the top ON **I** section of the switch to start the motor.
- Press the center OFF **O** section of the switch to stop the motor.
- In the event that a power interruption has occurred, press and release the bottom RESET **C** section of the switch to reset the pump's electrical circuits.

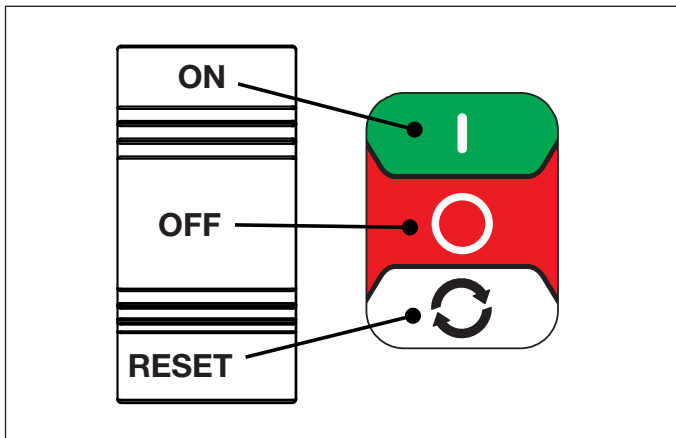


Figure 6: Rocker Switch

When the pump is first connected to electrical power, or if the electrical power has been interrupted and reconnected, it will first be necessary to press the reset section of the switch before operating the pump.

On models equipped with the optional pressure switch the motor will not start unless the pressure system hydraulic pressure has dropped below the pressure setting of the switch. Refer to instructions in Section 7.6 for additional information.

WARNING All users must be aware that pumps equipped with the pressure switch option may start and stop at any time when the rocker switch is in the ON position. Refer to Section 7.6 for additional information.

7.4 Manual Control Valve Operation

WARNING An unexpected component failure or accidental activation of controls can allow a hydraulically supported load to drop without warning. To prevent serious personal injury, always support the load with stands, blocking or other suitable mechanical supports before placing hands, feet or other parts of your body under the load.

7.4.1 VM22 and VM32 Control Valves

See Figure 7 for lever positions.

1. Advance
2. Retract

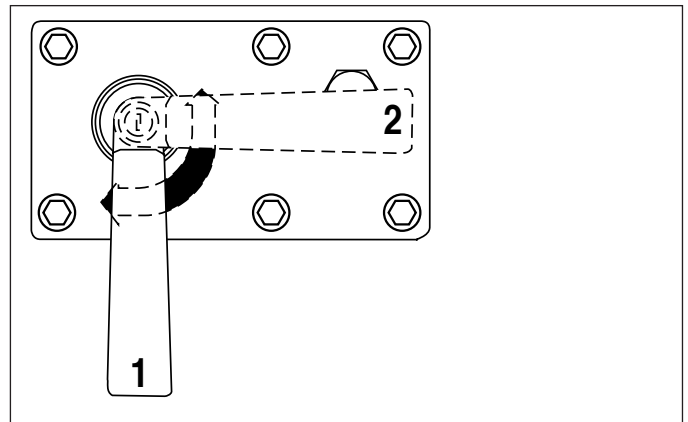


Figure 7: Lever Positions, VM22 & VM33

- Turn motor on or off using switch on pump.
- Jogging the valve lever from advance to retract position with the motor off will relieve hydraulic pressure.

7.4.2 VM33 and VM43 Control Valves

See Figure 8 for lever positions.

1. Advance
2. Retract
3. Neutral/Hold

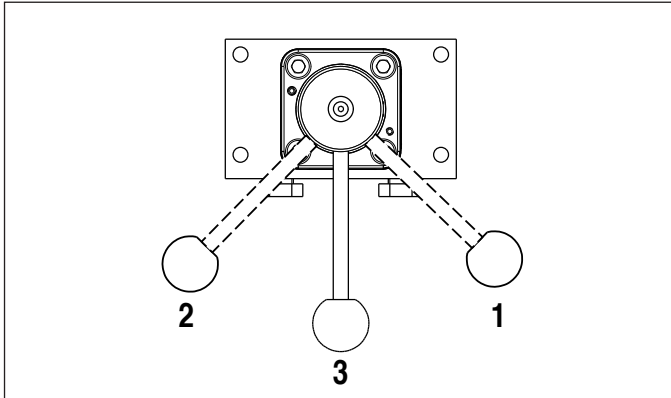


Figure 8: Lever Positions, VM33 & VM43

- Turn motor on or off using switch on pump (standard manual valve pumps) or button on pendant (jog pumps).
- Motor must be operated in both advance and retract directions for VM43 control valves.
- Jogging the valve lever from advance to retract position with the motor off will relieve hydraulic pressure.

NOTICE If desired, lever location for the VM33 and VM43 control valves can be changed. The lever can be reinstalled in any one of the three threaded holes at the top rotating hub of the valve.

7.5 Remote Pendant Operation

WARNING An unexpected component failure or accidental activation of controls can allow a hydraulically supported load to drop without warning. To prevent serious personal injury, always support the load with stands, blocking or other suitable mechanical supports before working on the load or placing hands, feet or other parts of your body under the load.

7.5.1 ZE2-Series jog pumps equipped with VM32, VM33 or VM43 manual control valves

- Place control valve lever in advance position. Press and hold pendant *on/advance* button to start the motor and advance the cylinder.
- Release pendant *on/advance* button to stop the motor and hold the cylinder in a stationary position.
- Pumps with VM43 control valves only: Place control valve lever in retract position. Press and hold pendant *on/advance* button to start the motor and retract the cylinder.

NOTICE Pumps with VM32 and VM33 control valves: It is not necessary to run the motor when retracting cylinder.

7.5.2 ZE2 and ZW2-Series dump pumps equipped with VE32D dump valve

See Figure 9.

- Press and hold pendant *on/advance* button to start the motor and advance the cylinder or tool.
- Release pendant *on/advance* button to stop the motor and relieve hydraulic pressure. Cylinder or tool will retract immediately.

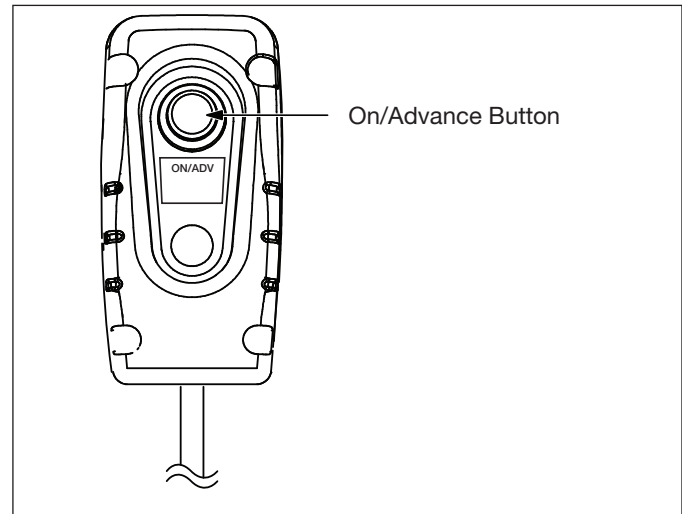


Figure 9: One Button Pendant

7.5.3 ZE2-Series pumps equipped with VE33 or VE43 electric control valves

See Figure 10.

- Start motor using switch at rear of pump.
- Press and hold pendant *advance* button to advance the cylinder.
- Press and hold pendant *retract* button to retract the cylinder.
- Release either pendant button to hold the cylinder in a stationary position. Motor will remain running after button is released.

7.5.4 ZW2-Series pumps equipped with VEW43 electric control valve

See Figure 10.

- Press and hold pendant *advance* button to start motor and advance cylinder.
- Press and hold pendant *retract* button to start motor and retract cylinder.
- Motor will stop when either pendant button is released.
- The VEW43 control valve does NOT have a hydraulic hold feature. When either pendant button is released, hydraulic pressure will be relieved and the cylinder will NOT be held stationary.

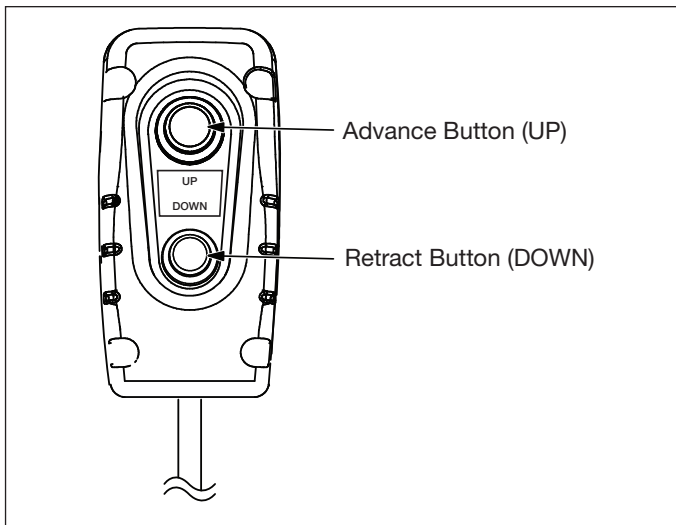


Figure 10: Two Button Pendant

7.6 PRESSURE SWITCH OPTION

7.6.1 Description

Selected ZE2 and ZW2-Series pumps are available with an optional factory-installed pressure switch.

With this option, the pump motor will stop automatically when the “A” port hydraulic pressure rises to a user-defined setting.

The pump will restart automatically when “A” port pressure drops to approximately 115 - 550 psi [7.8 - 37.4 bar] below this setting.

All pumps ordered with the pressure switch option are equipped with a three position rocker switch in place of the rotary power switch. In addition, a hydraulic pressure gauge is also included as standard equipment on these pump versions.

⚠ WARNING All users must be aware that pressure switch equipped pumps can start and stop automatically at any time when the pump power switch is in the ON position.

⚠ WARNING When using pumps equipped with pressure switches, be certain that pump power switch is in the OFF position before handling the load or before performing any inspections or adjustments. Failure to observe these precautions may result in possible death or serious personal injury if pump restarts unexpectedly while persons are making contact with the cylinder, tool or load.

NOTICE Pressure switch setting must be adjusted by user BEFORE pump is used. Refer to instructions in Section 7.6.2.

7.6.2 Pressure Switch Setting Adjustment

1. Prepare pump for operation as described in Section 7.2 of this manual.
2. Install a metal plug in the valve manifold “A” port. If present, also install a metal plug in the manifold “B” port.

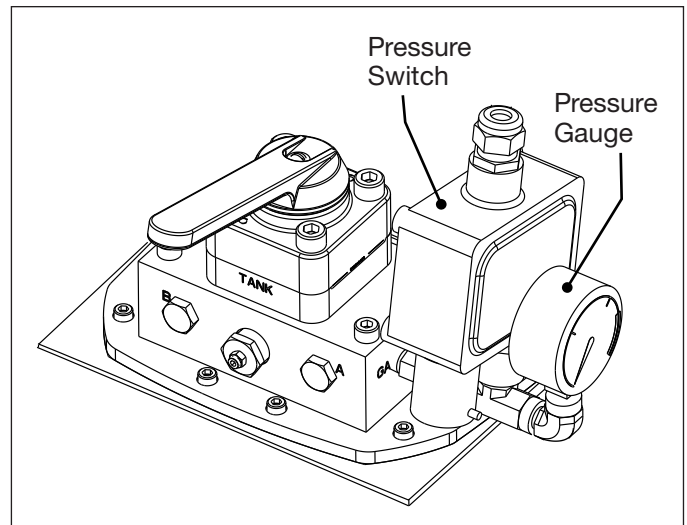


Figure 11: Pressure Switch and Gauge

3. Before continuing, be sure that the pump pressure relief valve setting is HIGHER than the desired pressure switch setting. Refer to procedure in Section 8.0.
4. Loosen pressure switch setscrew with a #10 Allen wrench. See Figure 12.
5. Place the control valve lever in the advance (A) position.
6. Start the pump motor. Allow system pressure to build while observing the pressure gauge. Continue running the pump until the desired pressure value is shown on the gauge.

NOTICE If motor does not start when pump power switch is moved to the ON position, it may be necessary to decrease the pressure switch setting.

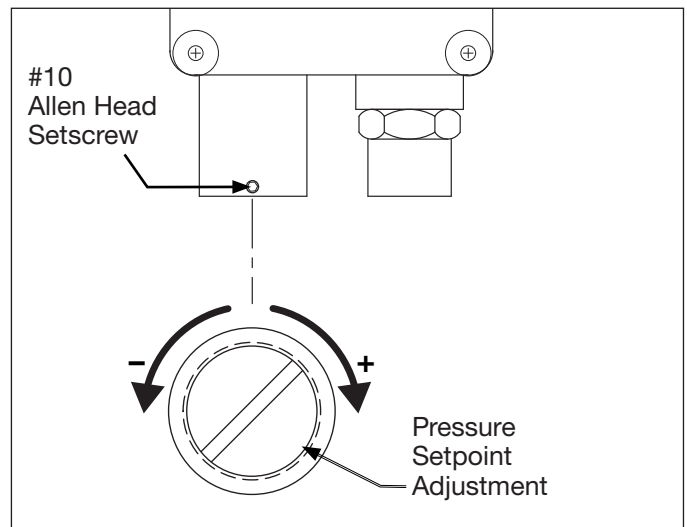


Figure 12: Pressure Switch Setting Adjustment

7. Using a flat blade screwdriver, turn pressure switch adjustment screw clockwise to increase the switch setting and counter-clockwise to decrease it. See Figure 12. Verify that switch opens and pump motor stops at the desired pressure setting.

- Allow time for system pressure to drop after pump has stopped. Verify that the pump motor restarts after pressure has dropped (see NOTICE statement following this step).

NOTICE The range between the pump stop and restart pressures is approximately 115 - 550 psi [7.8 - 37.4 bar] and will vary depending on the pressure switch setting. This range is not user-adjustable.

- Stop the pump and fully relieve hydraulic pressure. Then, restart the pump and allow pressure to build. Check again that the pump stops at the desired setpoint. Readjust switch pressure setting if incorrect.
- After verifying that the setting is correct, tighten the pressure switch setscrew with a #10 Allen wrench to lock in the setting.

7.7 Circuit Breakers


The pump is protected from electrical shorts and overloads by a built-in circuit breaker. The type of circuit breaker used will vary, depending on the pump model and configuration.

NOTICE If the circuit breaker trips, verify that the AC power specifications are correct for the pump model being used (refer to pump nameplate). If the circuit breaker trips repeatedly, stop using the pump and take it to an Enerpac Authorized Service Center for inspection and repair.

7.7.1 Internal Circuit Breaker

All pumps equipped with a remote pendant contain a self resetting internal circuit breaker.

In most cases, the circuit breaker will cool and reset automatically within a few minutes after it has tripped.

Pumps with rocker style power switch only: To restore power to the pump after the circuit breaker has cooled, press and release the bottom RESET  section of the pump rocker switch. This action must be performed whenever AC electrical power to the pump has been interrupted for any reason.

7.7.2 Manual Reset Circuit Breaker

A manual reset circuit breaker is standard on all pumps equipped with a rotary power switch.

The reset button is located on the top surface of the motor switch enclosure.

After the circuit breaker trips, wait about 1 minute to allow it to cool. Then, press the reset button.

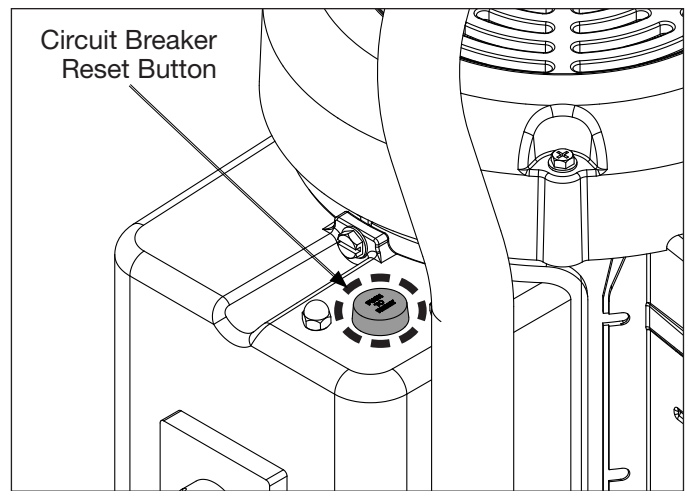


Figure 13: Circuit Breaker Reset Button (pumps with rotary power switch only)

8.0 RELIEF VALVE PRESSURE ADJUSTMENT

All ZE2 and ZW2-Series pumps are equipped with a user adjustable relief valve.

Adjustment procedure details will vary, depending on the operational characteristics of the pump and whether the pump is equipped with an electric or manual valve.

NOTICE To help ensure an accurate setting it is recommended that the pump be operating as the setting is adjusted. Some pump models have a separate power on-off switch while others will start and stop automatically as the pendant buttons are pressed and released. Refer to Section 7.0 for detailed pump operation instructions.

Adjust the relief valve pressure setting as described in the following steps:

- Install a 0-15,000 psi [0-1000 bar] gauge in the “A” port.
- Valves with “B” port: install a metal plug in the “B” port (if not already installed).
- Loosen the relief valve locknut to permit adjustment of set screw.
- On pumps equipped with an on-off switch, start the pump motor. Allow time for the oil to warm.
- Shift the control valve and build pressure in the system at the “A” port. Observe the reading on the pressure gauge.
- Using a #10 Allen wrench, SLOWLY turn the setscrew counter-clockwise to decrease pressure and clockwise to increase pressure.

NOTICE To obtain an accurate setting, decrease the pressure to a point *below* the desired setting. Then, SLOWLY increase the pressure until it reaches the desired setting.

NOTICE On valve models equipped with a built-in check valve, it will be necessary to turn the relief valve setscrew one full turn counter-clockwise before adjusting the pressure upwards to the desired setting.

7. Tighten the locknut when the desired pressure setting is reached.
8. Shift the control valve so that the system pressure returns to 0 psi/bar.
9. Shift the control valve again and repressurize the system. Observe the pressure gauge and verify that the setting is correct.
10. Fully relieve hydraulic pressure before removing gauge and plug (if installed in step 2) from ports.

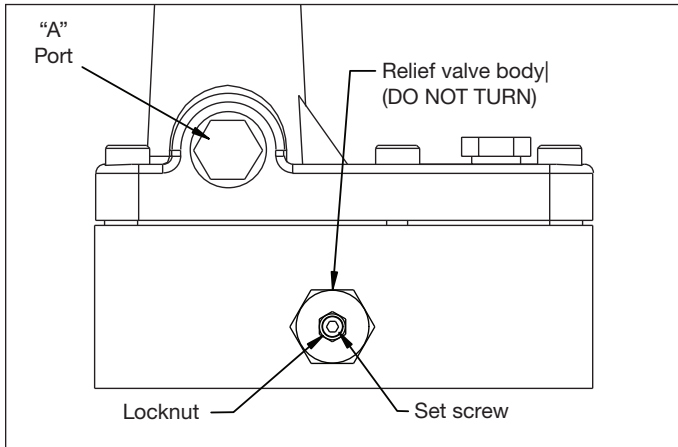


Figure 14: Relief Valve - VM22

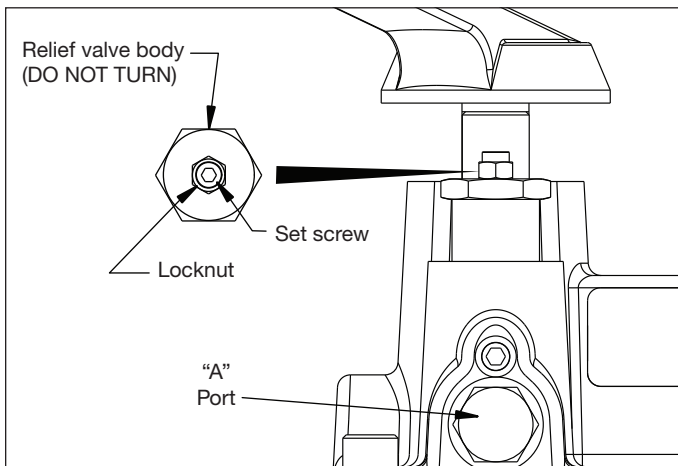


Figure 15: Relief Valve - VM32

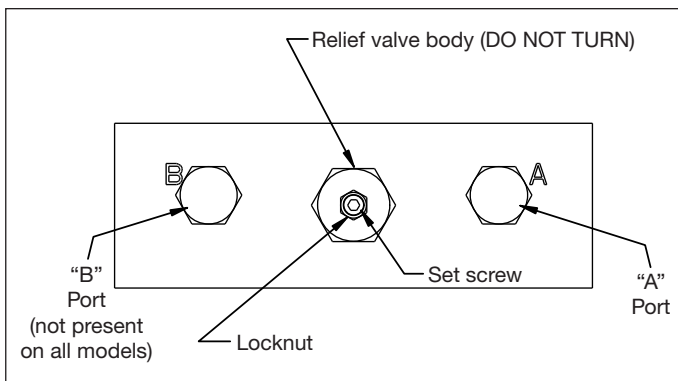


Figure 16: Relief Valve - VM, VE and VEW 33 & 43 Series

9.0 MAINTENANCE

Frequently inspect all system components for leaks or damage. Repair or replace damaged components. Note that electrical components, for example, the power cord, may only be repaired or replaced by a qualified electrician, adhering to all applicable local and national codes.

9.1 Check Oil Level

Check the reservoir oil level prior to start-up. If oil level is low, remove the oil fill plug and add additional oil to the reservoir as needed. Always be sure cylinders are fully retracted before adding oil to the reservoir. See Figure 2 earlier in this manual for oil level diagram. See Figure 3 for fill plug location.

9.2 Change Oil and Clean Reservoir

Frequently check oil condition for contamination by comparing the color of the oil in the pump reservoir to new unused Enerpac oil. Enerpac HF oil is a crisp blue color.

As a general rule, completely drain and clean the reservoir every 250 hours, or more frequently if used in dirty environments.

NOTICE This procedure requires that you remove the pump from the reservoir. Work on a clean bench and dispose of used oil according to local regulations.

1. Remove the reservoir drain plug and drain all oil from the reservoir.
2. Clean and reinstall the drain plug. Drain plug is magnetic and may contain metal particles which must be removed before plug is reinstalled.
3. Remove the 13 bolts and copper gaskets securing the coverplate to the reservoir.
4. Attach a suitable hoist and slings to the pump carrying handle.

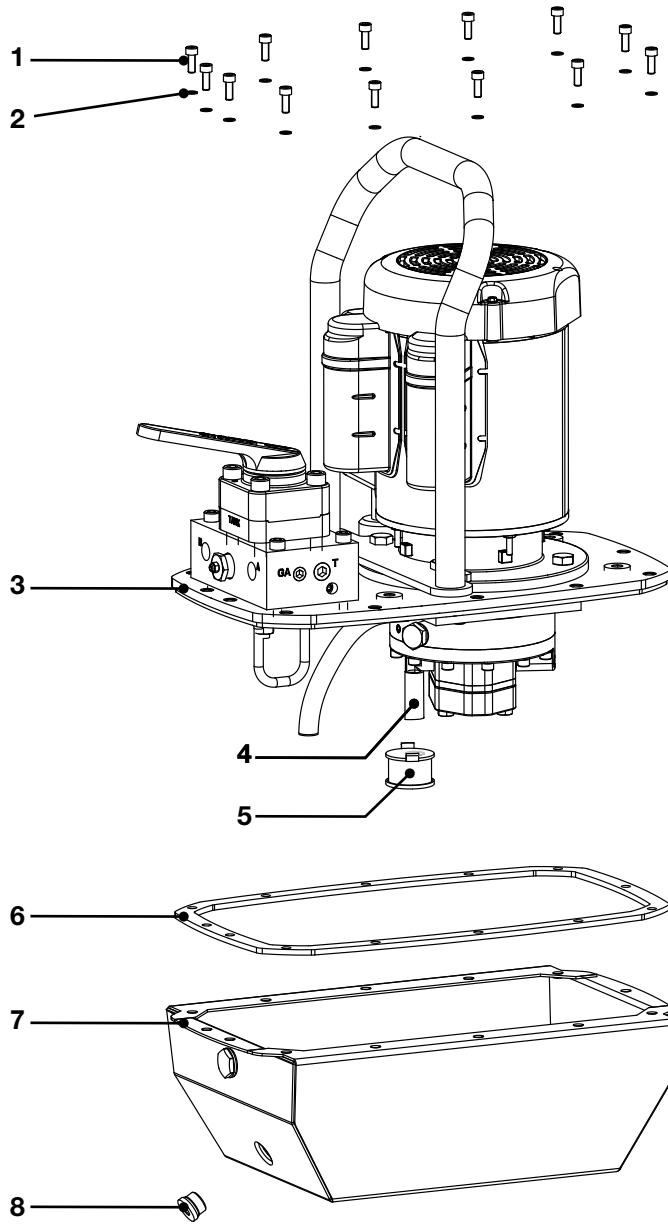
NOTICE In the next step, be sure the pump is lifted evenly and does not drop. As the pump is being lifted, have a second person separate the pump coverplate from the mating surface of the reservoir using a screwdriver or other suitable tool.

5. Carefully lift the pump unit out of the reservoir. Use caution not to damage the pump element or oil intake filter.
6. Thoroughly clean the reservoir interior with a suitable cleaning agent.

WARNING When using cleaning agents and solvents, always read, understand and follow manufacturer's safety and use instructions. Failure to observe this precaution may result in serious personal injury.

7. Remove the oil intake filter. Pull it straight down to separate it from the intake tube.

NOTICE Replacement of the oil intake filter is strongly recommended whenever the reservoir interior is cleaned. However, if desired, an existing intake filter in good condition can be back flushed and reinstalled.



Key:

- 1. Capscrews
- 2. Copper Gaskets
- 3. Pump & Coverplate Assy.
- 4. Oil Intake Tube
- 5. Oil Intake Filter
- 6. Reservoir Gasket
- 7. Hydraulic Reservoir
- 8. Oil Drain Plug

Figure 17: Reservoir Inspection and Oil Change

8. Reassemble the pump and reservoir, installing a new reservoir gasket.
9. If the pump is equipped with the optional return oil filter, replace the oil filter element.
10. Inspect the reservoir air breather, If it is clogged or damaged, replace it with a new one. Refer to diagram in Figure 3.
11. Fill the reservoir with new Enerpac hydraulic oil. The reservoir is full when oil level is as shown in Figure 2.
12. Make hydraulic connections to valve ports “A” and “B”. Start the pump and cycle it through all valve positions under no load until all trapped air is removed from the system, and operation of cylinder or tool is smooth.

9.3 Filter Element

For pumps equipped with the return line oil filter (optional accessory), the filter element should be replaced every 250 hours, or more frequently in dirty environments.

The filter manifold is equipped with a 25 psi [1,7 bar] bypass valve to prevent over pressure rupture if filter plugging occurs.

Replace filter element immediately if filter indicator gauge moves into the REPLACE zone while the pump is running. Filter element replacement is Enerpac part number PF25.

NOTICE Always disconnect pump AC power cord from electrical outlet and relieve hydraulic pressure before replacing filter element.

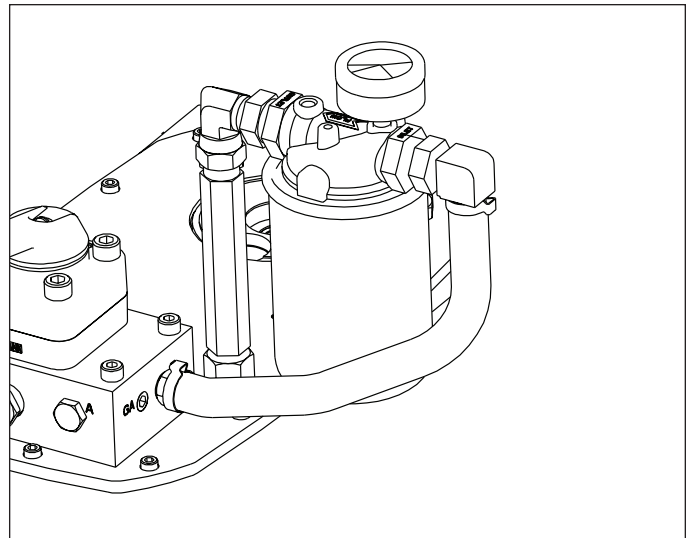


Figure 18: Return Line Oil Filter (optional)

10.0 TROUBLESHOOTING

Only qualified hydraulic technicians should service the pump or system components. A system failure may or may not be the result of a pump malfunction. To determine the cause of the problem, the complete system must be included in any diagnostic procedure.

The following information is intended to be used only as an aid in determining if a problem exists. For repair service, contact your Enerpac Authorized Service Center.

Troubleshooting Guide		
Problem	Possible Cause	Action
1. Pump will not start.	a. No AC power.	Connect AC power.
	b. Power interruption. (models equipped with rocker power switch only)	Press bottom section of rocker switch to reset pump electrical circuits.
	c. Circuit breaker tripped.	Models with rotary power switch: Push circuit breaker reset button. Models with rocker power switch: Wait about 1 minute for circuit breaker to cool and self reset. Then, press bottom section of rocker switch to reset pump electrical circuits.
	d. Low voltage.	Turn off other electric loads. Use heavier gauge extension cord.
	e. Electrical problem.	See authorized service center.
	f. Motor or pump element jammed.	See authorized service center.
2. Pendant does not function.	a. Power interruption. (models equipped with rocker power switch only)	Press bottom section of rocker switch to reset pump electrical circuits after a power interruption.
	b. Pendant damage.	Repair or replace pendant. See authorized service center.
3. Motor stops under load.	Low voltage.	Turn off other electric loads. Use heavier gauge extension cord.
4. Pump fails to build pressure or less than full pressure.	a. Low oil level.	Add oil per Section 6.3.
	b. Relief valve set too low.	Adjust per Section 8.0.
	c. External system leak.	Inspect and repair or replace components as required.

(continued on next page)

Troubleshooting Guide (continued)		
Problem	Possible Cause	Action
4. Pump fails to build pressure or less than full pressure. (continued)	d. Internal leak in pump.	See authorized service center.
	e. Internal leak in valve.	See authorized service center.
	f. Internal leak in system component.	See authorized service center.
5. Pump builds full pressure, but load does not move.	a. Load greater than cylinder capacity at full pressure.	Reduce load or add cylinder capacity.
	b. Flow to cylinder blocked.	Check hydraulic couplers for full engagement.
6. Cylinder drifts back on its own.	a. External system leak.	Inspect all hydraulic connections and replace or repair.
	b. Internal leak in a system component.	See authorized service center.
	c. Non-load holding valve used.	See authorized service center.
7. Single-acting cylinder will not return.	a. No load on a "load return" cylinder.	Add load.
	b. Return flow restricted or blocked.	Check couplers for full engagement.
	c. Locking valve used. (VE33 and VE43 control valves only)	Run motor while retracting.
	d. Valve malfunction.	See authorized service center.
	e. Cylinder return spring broken.	Repair or replace cylinder.
8. Double-acting cylinder will not return.	a. Return flow restricted or blocked.	Check couplers for full engagement.
	b. Locking valve used. (VE33 and VE43 control valves only)	Run motor while retracting.
	c. Valve malfunction.	See authorized service center.
9. Pump runs hot.	a. Motor fan vents blocked.	Remove dirt or other obstructions from fan vents on top of motor.
	b. Advance or retract flow restricted.	Check couplers for full engagement.
	c. High ambient temperature.	Install heat exchanger for hydraulic oil.



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