



Instruction Sheet

E-Series Electric Dump and Hold Pump

L4351

Rev. C

01/20

EN

To protect your warranty, use only ENERPAC hydraulic oil.

- EP3304S Models

For use with single-acting
hydraulic cylinders and
tools.

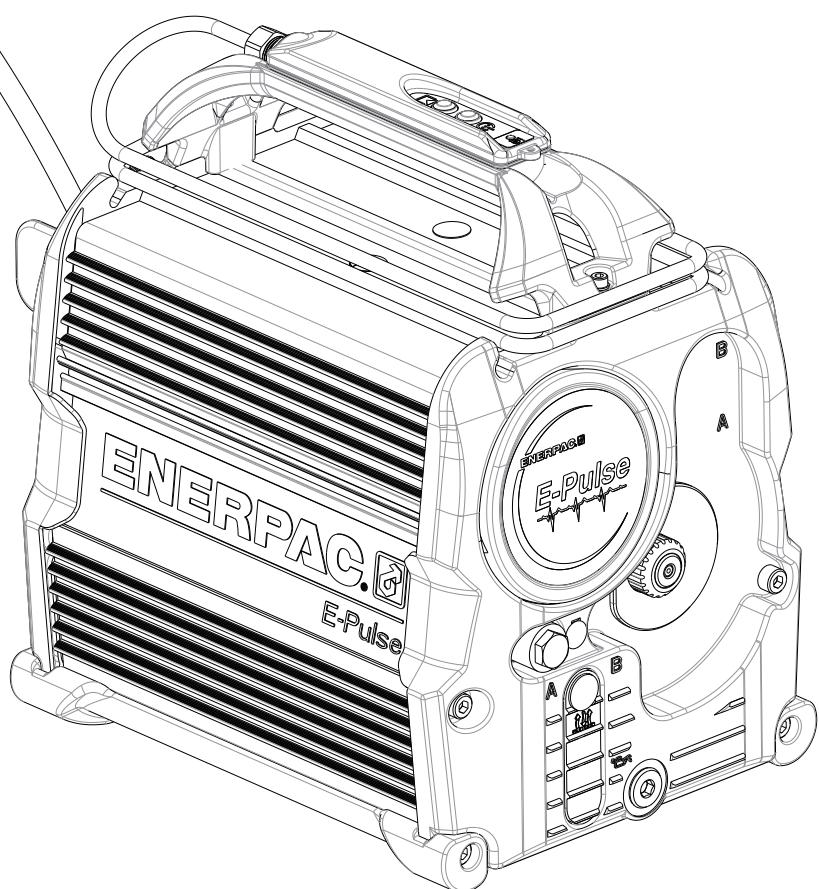


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1.0 SAFETY

1.1 Important Safety Instructions

Read all instructions carefully. Follow all recommended safety precautions to avoid personal injury as well as damage to the pump 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 any questions or concerns arise, contact Enerpac or a local Enerpac distributor for clarification.

SAVE THIS INSTRUCTION SHEET 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, signal 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 personal 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**.



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



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



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

1.2 General Hydraulic Safety Precautions



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.
- 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.

- 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.
- Do not pressurize disconnected couplers.
- 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.
- 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.
- 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.
- 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.
- 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.
- Immediately replace worn or damaged parts with genuine ENERPAC parts. Standard grade parts will break causing personal injury and property damage.



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.
- 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.

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

1.3 Electrical Safety

1.3.1 Electrical Safety Precautions

WARNING

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

- 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 1.3.6 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 pendant. Pump must be repaired before use.
- Make sure the pump cooling 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.

1.3.2 Use and Care

WARNING

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

- 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.

1.3.3 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.

1.3.4 Grounding Instructions

WARNING

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

- 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.

1.3.5 Use Of Extension Cords

⚠️ WARNING

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

- 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."

1.3.6 Opening the Pump Case (E-Series Pumps)

⚠️ WARNING

High voltage is present inside the pump even when motor is off. Before opening the pump case, always disconnect the pump power cord from the electrical outlet and wait at least 2 minutes for residual (stored) electrical energy to discharge. Do not reconnect the power cord while pump case is open.

Failure to observe these precautions could result in a dangerous and potentially lethal electric shock. Death or serious personal injury could occur.

The pump contains no user serviceable electronic or electrical components. Servicing of these items must be performed only by an Enerpac Authorized Service Center or other qualified service facility.

The following safety information is provided for service technician use:

- Residual (stored) electrical energy may remain present in the pump electronics for up to 2 minutes after the power cord is disconnected. There is a risk of electric shock if the case halves (at top of pump) are opened during this time.
- Before opening the case halves, always disconnect pump power cord from electrical outlet and wait at least 2 minutes to allow full discharge of residual (stored) electrical energy in the pump electronics.
- Take precautions to ensure that power remains disconnected while the case halves are open. If power is reconnected, high voltage will be immediately present at the application board heat sink (electrical shock hazard).
- Do not operate the pump with the case halves open. Always close and secure the case halves before reconnecting power cord.

1.4 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.

1.5 IP Ratings (Ingress Protection, IEC standard 60529)

- The pump IP rating is IP54.
- The pendant IP rating is IP67.
- Outdoor use is permitted.
- 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.

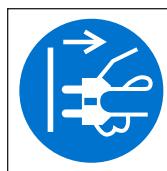
1.6 Safety Hazard Alert Symbols

⚠️ WARNING Failure to observe and comply with the safety hazard alert symbols affixed to the pump could result in death or serious personal injury.

Safety hazard alert symbols (decals, labels, etc.) are affixed to the pump. Observe these symbols and understand their meaning 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. (Figure 1, item A)



Disconnect Electrical Power: To avoid the possibility of a dangerous and potentially lethal electrical shock, disconnect pump power cord from AC electrical power supply and wait at least 2 minutes before opening the pump case. (Figure 1, Item B)

Make sure the safety hazard alert symbols are legible and securely affixed to the pump. If worn or missing, obtain replacements from Enerpac. Refer to Figure 1 for locations

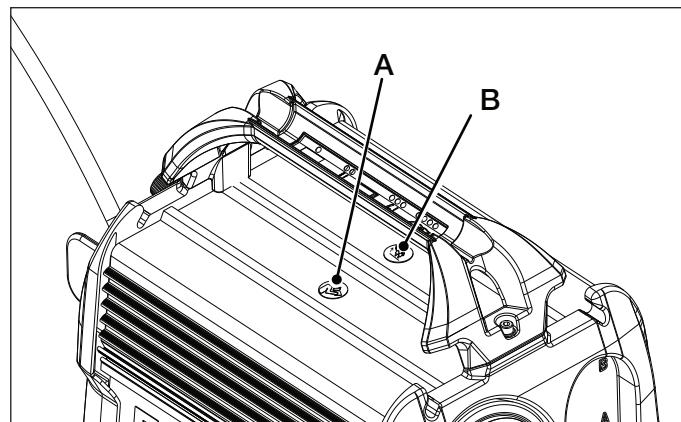


Figure 1, Locations of Safety Hazard Alert Symbols

2.0 PRODUCT DATA

2.1 Specifications

Pump Model Number	Control Valve Description	For Use With:	Hydraulic Connections	Weight*		Usable Oil Capacity**		Oil Type
				lb	kg	gal.	l	
EP3304S_	3-way, 2-position Advance / Hold / Retract (solenoid-operated dump)	Single-acting hydraulic cylinders and tools	3/8" NPTF	40.1	18.2	0.8	3.0	Enerpac HF

* Approximate weight of pump including oil.
** Approximate usable oil capacity of pump hydraulic reservoir.
Pump total oil capacity (including reservoir and pump element housing) is approximately 1.14 gallons [4.33 liters].

Pump Model Number	Pump Type	Maximum Hydraulic Working Pressure *		Flow Rate at Maximum Speed								Motor Speed Range **
				At 14.5 psi [1 bar]		At 2538 psi [175 bar]		At 5075 psi [350 bar]		At 10,000 psi [700 bar]		
		psi	bar	in ³ /min	l/min	in ³ /min	l/min	in ³ /min	l/min	in ³ /min	l/min	
EP3304S_	2 Stage	10,000	700	220	3.61	130	2.13	58	0.95	32	0.52	600-2400

* Maximum pressure setting of pump is limited to approximately 10,300 -10,800 psi [710-745 bar].
** Refer to Section 6.5 for additional information.

Pump Model Number Ending In:	Input Power Specifications					Plug Type	Motor Output Rating		Operating Temp Range *		Sound Level LWA **	
	Nominal Voltage Range	Phase	Hz	Max. Amps	Max. kW		hp	kW	°F	°C	dB	
							hp	kW	°F	°C	dB	
B and B-G	100-120 VAC	1	50-60	12.0	1.12	NEMA 5-15	0.85	0.63	-22 to +122	-30 to +50	70-85	
I and I-G	200-250 VAC	1	50-60	7.0	1.26	NEMA 6-15	0.85	0.63	-22 to +122	-30 to +50	70-85	
E and E-G	200-250 VAC	1	50-60	7.0	1.26	Schuko CEE 7/7	0.85	0.63	-22 to +122	-30 to +50	70-85	

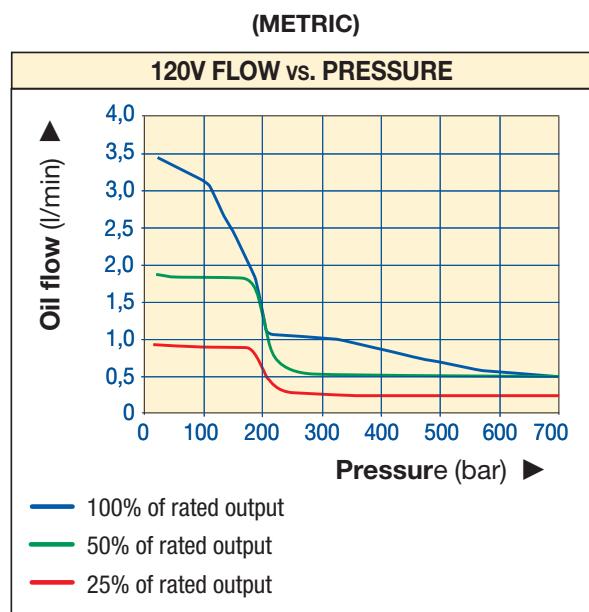
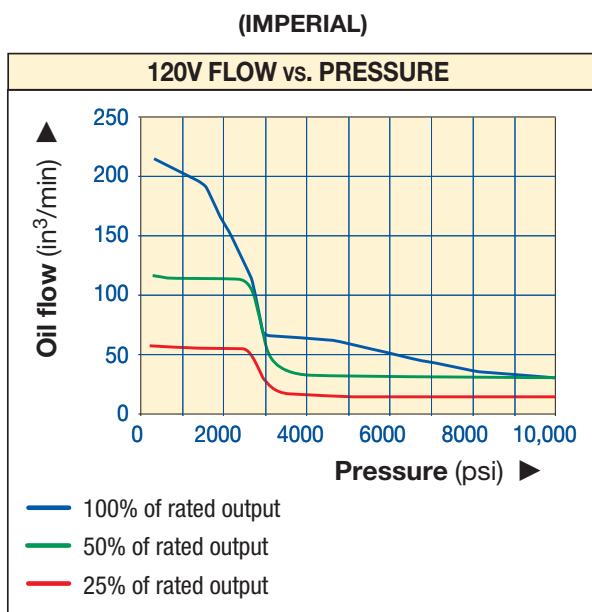
* At 85% relative humidity. ** Sound level will vary depending on pump speed and load.
Note: Models with “-G” suffix are equipped with hydraulic pressure gauge (optional accessory).

2.2 External Dimensions

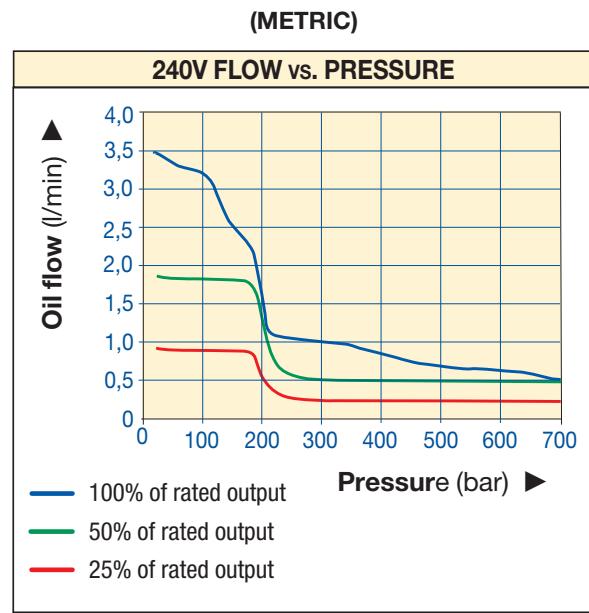
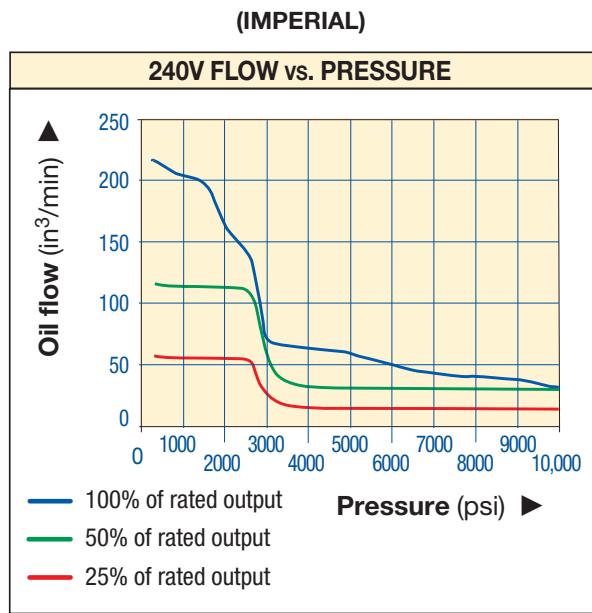
Item	Dimension		A	B	C	D	E
	inch	mm					
A	10.2	258					
B	14.2	361					
C	14.0	356					
	ft	m					
D (pendant cable)	10	3.0					
E (power cord)	2.0	0.6					
Note: Dimensions shown are applicable to all pump models included in this document.			A	B	C	D	E

2.3 Pump Performance Curves

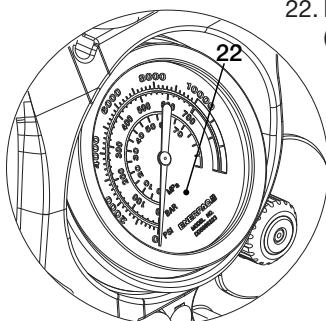
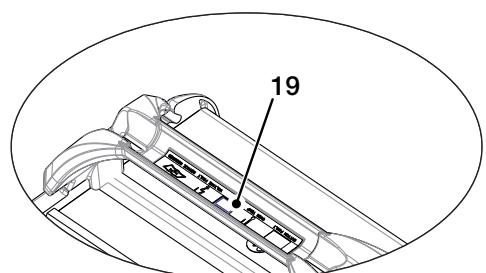
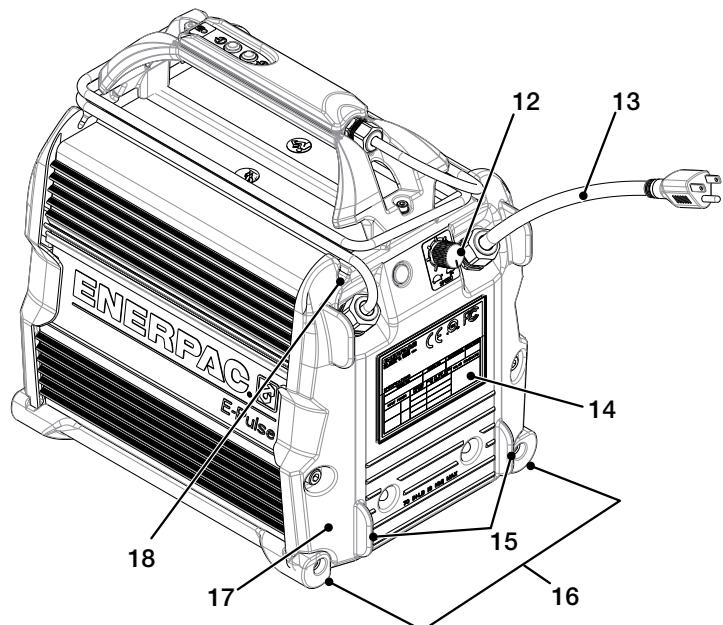
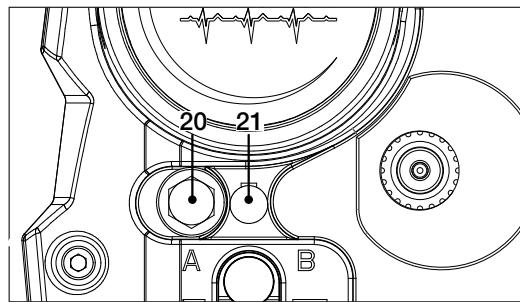
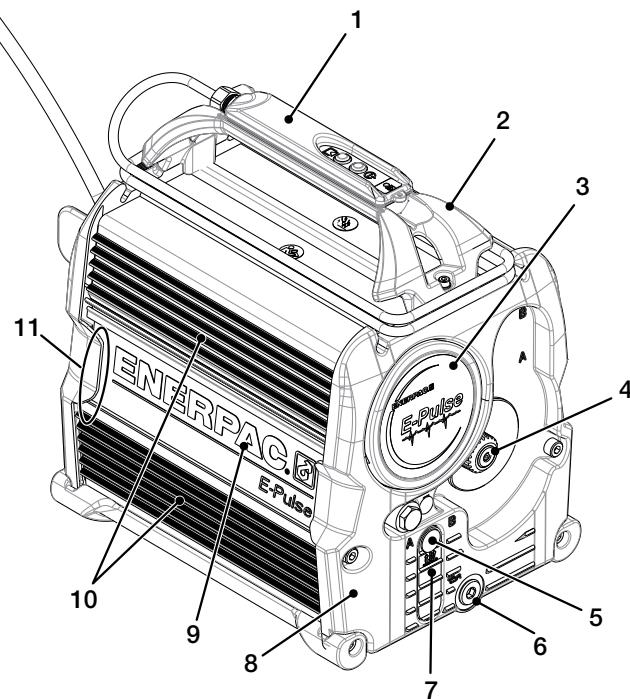
Pump model numbers ending in “B” and “B-G”



Pump model numbers ending in “E”, “E-G”, “I” and “I-G”



3.0 MAJOR FEATURES AND COMPONENTS



Key:

1. Pendant and Cable
2. Carrying Handle and Pendant Cable Storage
3. Cover Plate
4. Control Valve Manual Override
5. Hyd. Reservoir Air Breather and Filter
6. Hyd. Reservoir Oil Drain/Fill Plug
7. Oil Level indicator
8. Front Cover/Panel
9. Accessory Channel
10. Cooling Fins
11. Cooling Vent (4 places)
12. Speed Control
13. Power Cord
14. Data Plate
15. Support Feet (rear)
16. Support Feet (bottom)
17. Rear Cover/Panel
18. Cord Retaining Pocket (4 places)
19. Pendant Storage Pocket and Fault Code Decal
20. Hyd. Hose Port A
21. User-Adjustable Relief Valve (under cover)
22. Hyd. Pressure Gauge (optional accessory)

Figure 2, Major Features and Components, E-Series Electric Dump and Hold Pump

4.0 PRODUCT DESCRIPTION

4.1 Introduction

The Enerpac E-Series electric dump and hold pump is designed for use with single-acting hydraulic cylinders and tools rated at 10,000 psi [700 bar] working pressure.

Features include:

- Solenoid-operated 3-way 2-position dump valve with convenient hold feature.
- Remote control 2-button *Smart IQ* pendant with LED status and diagnostic indicator.
- Variable speed permanent magnet direct drive motor with unique *constant power* mode.
- Durable and lightweight all aluminum chassis construction.
- Two-stage pump design for fast system fills and controlled flow at high pressures.
- Six discreet pump elements provide even flow and smooth operation.
- Built-in user and service center diagnostic features.

Refer to Figure 2 for a diagram of the pump's major features and components.

4.2 Intended Use

The E-Series electric dump and hold pump (EP3304S models) is intended for use with single-acting hydraulic cylinders and tools in applications where a hydraulic hold function is required. The hold function is designed to keep the load stationary after lifting or pressing operations have been completed.

The hold function can be used while mechanical load holding devices are being placed under the load. However, the pump contains no safety locking valve and should not be used to hydraulically support a load while persons are working below. Refer to Section 7.6 of this manual for additional load support information and precautions.

WARNING Never allow any personnel to be under an object that is being supported only by the pump hydraulics. Death or serious personal injury could result if hydraulic pressure is relieved or if leakage occurs and load drops on persons below.

4.3 Conformance to National & International Standards

 Enerpac declares that the E-Series pumps have been tested and conform to applicable standards and are approved to carry the CE, TUV C and US, and FCC certification marks. An EU declaration of conformity is included in the shipment.

4.4 Electromagnetic Compatibility (EMC)

Enerpac E-Series pumps have been tested and certified to conform to CE-EMC Emission and Immunity standards and to FCC emission standards.

5.0 PREPARATION FOR USE

5.1 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.

To help prevent oil leakage during transit, a shipping plug with built-in absorbent pad is installed over the reservoir air breather (located at the top of the oil level indicator). The plug is retained by a rubber band that is stretched around the pump housing.

After unpacking the pump, remove the rubber band and shipping plug. Never operate pump with shipping plug installed.

5.2 Hydraulic Connections

As hydraulic hoses, fittings and components are assembled, apply 1-1/2 wraps of PTFE thread sealing tape to all threaded NPT or NPTF fittings, leaving the first complete thread free of tape as shown in Figure 3. Use care to prevent pieces of tape from entering the hydraulic system.

All hoses, fittings and components used with the pump must be rated for at least 10,000 psi [700 bar] operation.

WARNING Avoid kinking or tightly bending hoses. Do not exceed the hose manufacturer's stated minimum bend radius. If a hose becomes kinked or otherwise damaged, it must be replaced. Damaged hoses may rupture at high pressure. Serious personal injury may result.

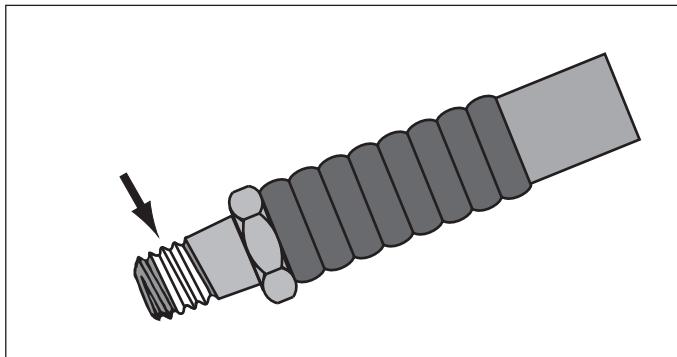


Figure 3, Hydraulic Sealing Tape Application

Hydraulic hose port "A" is a 3/8" -18 NPTF female connection. Port "B" is not used on this pump model. See Figure 4.

Make hydraulic connections as described in the following steps:

1. To prevent the pump from starting, be sure that the pump AC power cord is disconnected from the electrical outlet.

WARNING A small amount of oil leakage or spray may occur when plug is loosened in the following step. To prevent eye injury, keep face away from this area when plug is loosened.

2. Remove the plug from hydraulic hose port "A".
3. As required, install hydraulic fitting(s) or coupler in hose port "A". Tighten until finger tight. Then tighten an additional 1.5 to 3.0 turns or torque to 40 ft. lb [54.2 Nm].
4. Connect the hydraulic hose from cylinder or tool to pump.

NOTICE Hydraulic fittings, couplers and hoses are user-supplied and not included with the pump. Installation of a pressure gauge (user-supplied) is strongly recommended.

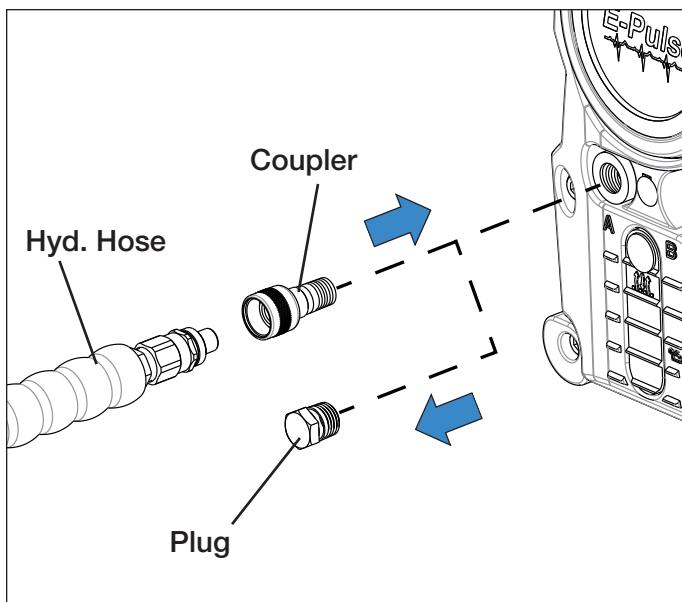


Figure 4, Hydraulic Connections (typical)

5.3 Hydraulic Reservoir

For most shipping destinations, the hydraulic reservoir is pre-filled at the factory with Enerpac HF hydraulic oil.

However, as a precaution, always check the oil level before starting the pump. The oil level indicator is located on the pump front panel. Refer to Figure 11 for oil level diagram.

Verify that the oil level is up to the FULL mark. If the oil level is low, add additional oil as required as described in Section 10.3.

5.4 Hydraulic Reservoir Air Breather/Filter

The hydraulic reservoir air breather is located just above the oil level indicator. It is composed of a porous stainless steel filter disc and a pre-loaded two-way vent. The vent allows air exchange while maintaining a small positive pressure or vacuum in the reservoir.

Air breather components are factory pre-installed and require no user assembly or adjustment.

Before operating the pump, be sure to remove the shipping plug covering the air breather. Refer to Section 5.1 for additional information.

Note that a small amount of oil may collect on the air breather surface while the pump is being transported. This is normal. However, to prevent possible oil leakage through the air breather, avoid tilting the pump forward while the pump is being operated, transported or stored.

5.5 Power Requirements

The EP3304S dump and hold pump is available in a choice of three different electrical power configurations:

- EP3304SB models are designed to operate at a nominal voltage of 100-120 VAC. This pump version contains a USA style NEMA 5-15 power plug.
- EP3304SI models are designed to operate at a nominal voltage of 200-250 VAC. This pump version contains a USA style NEMA 6-15 power plug.
- EP3304SE models are designed to operate at a nominal voltage of 200-250 VAC. This pump version contains a European style "Schuko" power plug.

All configurations are single-phase, 50-60 Hz.

Before connecting the pump to the electrical outlet, refer to the pump data plate to verify that input power is correct for your pump configuration. Also refer to Section 1.3 for important electrical safety information and precautions.

⚠️ WARNING

Failure to follow the electrical safety precautions contained in Section 1.3 of this manual could result in electric shock. Death or serious personal injury could occur.

6.0 FEATURES AND CONTROLS

6.1 Carrying Handle

Always use the carrying handle when transporting the pump to its desired location or when it is necessary to reposition the pump while it is in use.

The top of the carrying handle contains a storage pocket for the pendant. The base of the carrying handle contains a storage area for the pendant cable.

A fault code reference diagram is located inside the pendant storage pocket.

NOTICE To prevent possible damage, never attempt to carry or reposition the pump by dragging it by the hydraulic hose, AC power cord or pendant cable.

6.2 Ventilation System

Air vents are located on the inner edges of the pump front and rear covers. These vents combine with the cooling fins on the sides of the pump housing to help maintain allowable operating temperatures. Before start-up, check that the cooling fins and vents are not covered by dirt or other obstructions.

6.3 Pendant

A remote control pendant with a 10 foot [3 m] cable is standard equipment on all models. The back of the pendant housing contains a strong rare earth magnet, allowing the pendant to be positioned against most iron and ferrous metal surfaces.

Pump operation is controlled using the two buttons on the pendant. In addition, the pendant also contains a multi-color LED indicator which communicates the pump status via a series of steady or blinking lights.

Pendant LED Indicator (Fig. 5, Item 1)

- Steady green: READY (motor off)
- Blinking green: PUMP ON (motor running)
- Blinking red and/or yellow: Fault code activated (motor off)

The pendant LED indicator will glow steady green approximately 3 seconds after power is connected, indicating that the electronic controls have powered-up and that the pump is ready for use.

NOTICE A fault code indicates an abnormal condition that will result in immediate pump motor shutdown. Refer to Table 2 in Section 15.0 for a description of the pump's user-level fault codes.

Pendant Jog Button (Fig. 5, Item 2)

- Press the jog button and hold it down to start the motor and advance the cylinder or tool.
- Release the jog button to stop the motor and hold the load.

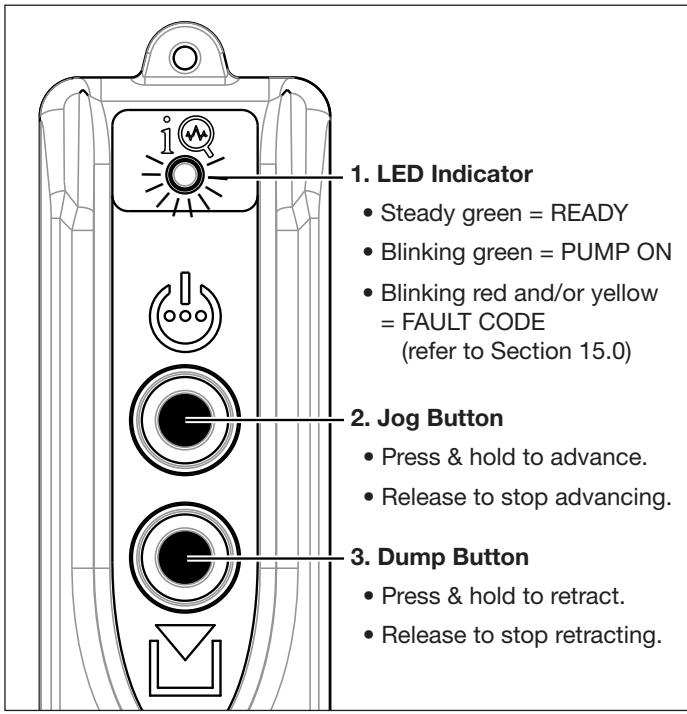


Figure 5, Pendant Features and Controls

Pendant Dump Button (Fig. 5, Item 3)

- Press and *hold* the dump button to retract the cylinder or tool and relieve hydraulic pressure.
- Release the dump button to stop retracting the cylinder or tool before it is fully retracted.
- Pump motor will *not* start when the dump button is pressed. However, the pump must be connected to electrical power to operate the dump/retract function.

Pendant Haptic Pulse Feature

- To provide positive confirmation of pump status, the pendant will vibrate haptic pulses as the pendant buttons are depressed and released.
- One haptic pulse indicates that the motor has started. Two haptic pulses indicate that the motor has stopped.
- The pendant will vibrate haptic pulses in conjunction with the flashing LED indicator to signal when a fault code has been triggered. Refer to Section 15.0 for additional information.

6.4 Solenoid Operated Control Valve

The pump features an internal solenoid-operated 3-way control valve with "A" Advance and "T" Tank (oil return) positions. The valve operates automatically as the pump motor is started and stopped via the pendant jog button.

- When the pump motor is started, hydraulic oil flows from the pump reservoir to the cylinder or tool. The control valve spool remains in the "A" position.
- When the pump motor is stopped, hydraulic oil is prevented from flowing back to the reservoir by an internal check valve. This check valve provides the *hold* function.
- When the pendant dump button is pressed, an electric solenoid is energized, which shifts the control valve spool to the "T" position. Hydraulic oil then bypasses the check valve and flows from cylinder or tool back to the pump reservoir. When the dump button is released, the electric solenoid is de-energized and the valve spool returns to the "A" position.

- The control valve does not contain a venturi valve. Flow control devices (user-supplied) must be installed in the system if flow metering is desired.
- The pump is equipped with a hold holding feature but contains no safety locking valve. After lifting, the load must be supported by suitable mechanical load holding devices. Refer to additional information and precautions in Section 7.6 of this manual.

6.5 Variable Speed Control

A rotary knob mounted on the pump rear panel controls the motor speed. See Figure 6.

The adjustable speed range is approximately 25 to 100% of full rated output, or about 600 to 2400 RPM.

- Knob turned fully counterclockwise equals approximately 25% of rated output. This is the lowest possible setting.
- Midpoint setting of knob equals approximately 50% of rated output.
- Knob turned fully clockwise equals 100% full rated output or maximum possible speed as determined by the pump internal controls, based on operating conditions.

6.6 Constant Speed and Constant Power Modes

- When the speed control knob is set between the full counterclockwise (25%) and midpoint (50%) positions, the pump operates in *constant speed mode*. In this mode, the motor speed will *not* automatically increase or decrease to compensate for changes in load. The user can precisely regulate the amount of hydraulic flow and can manually reduce the flow rate, as needed, to provide increased control and slower movement.
- When the speed control knob is set between the mid point (50%) and full clockwise (100%) positions, the pump operates in *constant power mode*. In this mode, the pump motor will run at the set speed until maximum power is delivered. If the load further increases, the motor will automatically reduce speed to maintain peak torque (and hydraulic force) under demanding conditions.

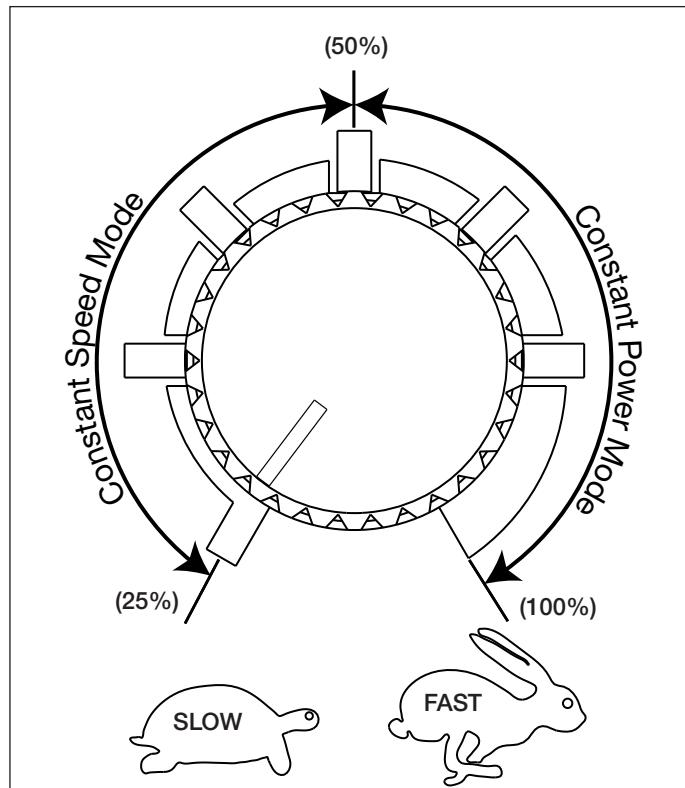


Figure 6, Speed Control Knob

7.0 OPERATION

7.1 Before Start-up

1. Check the hydraulic oil level. Add oil if necessary. Refer to Sections 10.1 through 10.3.
2. Connect hydraulic hose to pump as described in Section 5.2.
3. Connect pump to a compatible AC power supply of the proper voltage. Input power specifications are listed on the pump data plate and also in Section 2.1.
4. Remove air from system before placing pump into operation. Refer to instructions in Section 7.3.
5. Check all hydraulic hoses, couplers and fittings to be sure they are tight and leak free.

7.2 Pump Operating Positions

During operation, the pump can be positioned in the normal horizontal position or vertically on its back cover as shown in Figure 7.

If needed, the pump can be tilted rearward on an angle, provided that it is adequately supported so that it does not slide, tip over or drop.

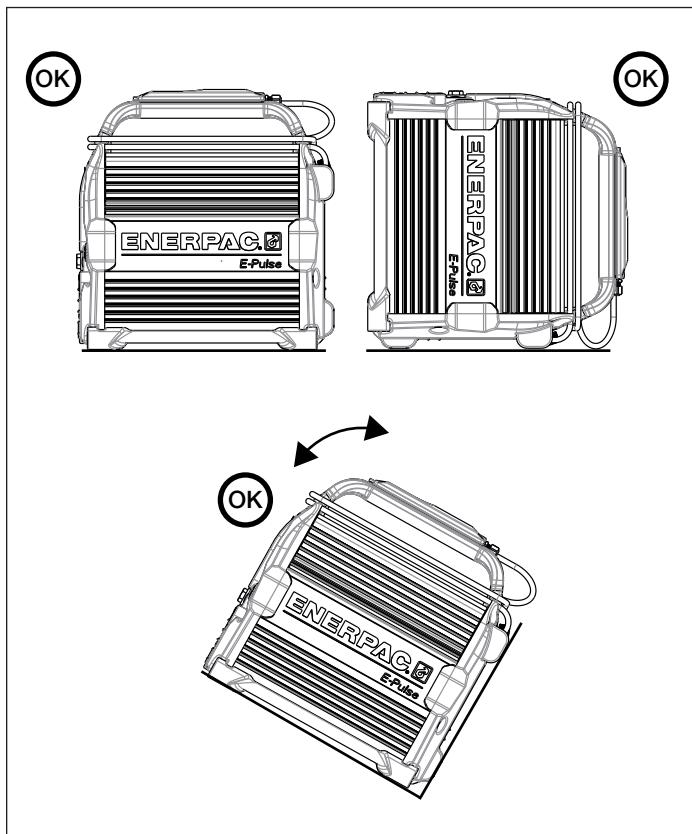


Figure 7, Allowable Pump Operating Positions

To prevent oil leakage and/or damage to pump:

- Never operate the pump while it is positioned on its right or left side, or in an inverted (upside-down) position.
- Never operate the pump in the tilted forward position. Oil leakage and/or damage to pump may result.

See Figure 8.

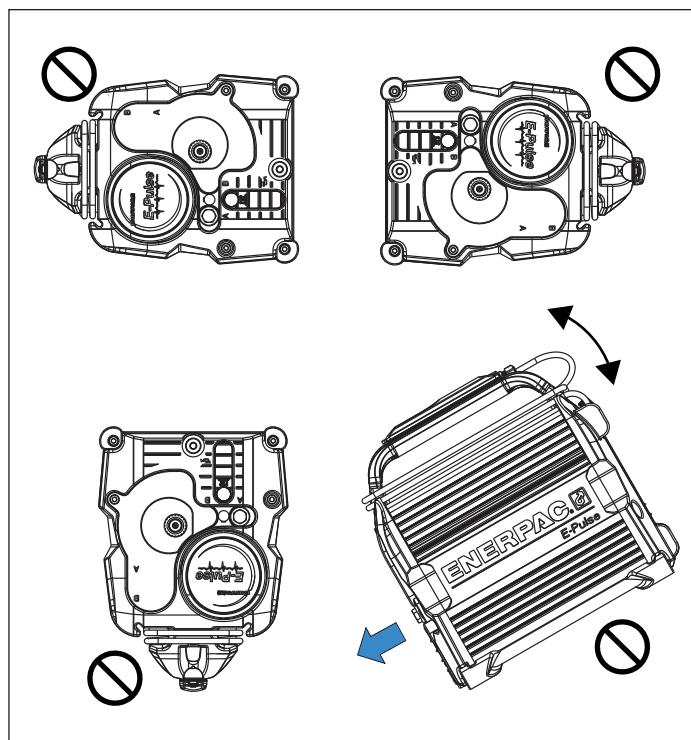


Figure 8, Pump Operating Positions - NOT ALLOWED

7.3 Air Removal

When hydraulic components are connected for the first time, air may be trapped in the system. To ensure smooth, safe operation, run the cylinder or tool through several complete advance-retract cycles before placing the pump into service. Do this with no load on the cylinder or tool and with the pump positioned *higher* than the cylinder or tool.

When the cylinder or tool advances and retracts smoothly and without hesitation, the air has been vented from the system.

NOTICE If cylinder or tool fails to operate smoothly after being cycled, perform the pump priming/air purging procedure. Refer to Section 10.5.

7.4 Operating Precautions

WARNING

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

- Keep persons away from the work area during pump operation.
- Continuously monitor the cylinder or tool being operated. Be prepared to stop the pump immediately if a problem or potentially dangerous situation occurs.
- Whenever possible, the pump speed should be set *before* the pump is operated. Speed adjustments during operation should be minimized so that the operator's complete attention is focused on the lifting or lowering operation being performed.
- Because the time for the motor to stop can vary depending on load conditions, the cylinder or tool may not stop advancing immediately when the user releases the pendant jog button. There may be a small continued movement of the cylinder or tool while the motor is stopping.
- Avoid continuing to pressurize the cylinder or tool after it has reached its maximum stroke.

7.5 Pump Operation

- Press and hold the pendant jog button to start the pump motor and begin advancing the cylinder or tool.
- When the cylinder or tool has advanced the desired amount, release the pendant jog button. The cylinder or tool will stop advancing immediately and the hydraulic hold feature will keep the cylinder or tool stationary. The pump motor will stop.
- To retract the cylinder or tool, press and *hold* the pendant dump button. The cylinder or tool will begin retracting immediately and will continue retracting for as long as the button is held down, or until the cylinder or tool is fully retracted.
- To stop the cylinder or tool before it has fully retracted, release the pendant dump button.

NOTICE

- Refer to Sections 6.3 and 6.4 of this manual for detailed descriptions of the pendant controls and control valve functions.
- Additional flow control devices (optional accessories - refer to Enerpac catalog) may be required to more precisely control the rate of retraction.
- Single-acting cylinder or tools not equipped with a return spring may need to be manually retracted after all hydraulic pressure is relieved.
- Pull type hydraulic cylinders and tools will retract when pendant jog button is pressed and advance when pendant dump button is pressed (opposite of typical operation).

7.6 Supporting the Load

⚠ WARNING

Failure to observe the following precautions and instructions could allow the load to drop and/or become unsupported. Death or serious personal injury could result if the load falls on or crushes persons in the work area.

- After completing a lifting procedure, always immediately support the load with cribbing, metal support stands, jack stands, hoist or other appropriately rated mechanical load support devices. Do not rely on the pump hydraulics to hold lifted loads in place.
- The pump control valve does NOT contain a safety locking valve. Never allow persons to be underneath a lifted load that is supported only by the pump hydraulics.
- Additional flow control devices (optional accessories) may be required to safely hold the cylinder(s) in a stationary position as mechanical load support devices are being installed or removed. Refer to the Enerpac catalog for additional information.
- Although in most applications the pump hydraulics will temporarily hold the load, be aware that a load supported only by hydraulics can move downward or drop suddenly at any time without warning, due to equipment failure or accidental activation of controls.
- When pushing or separating objects, always secure the load with appropriately rated mechanical blocking equipment before allowing persons to reach or work inside the danger zone between the objects. Never rely on hydraulics to hold apart pushed or separated objects while persons are inside the danger zone.

8.0 RELIEVING HYDRAULIC PRESSURE

Relieve hydraulic pressure by pressing and *holding* the pendant dump button until the cylinder or tool is fully retracted and zero (0) psi/bar is indicated on the hydraulic pressure gauge (user-supplied).

Always verify that all hydraulic pressure has been completely relieved before disconnecting hydraulic hoses, loosening hydraulic fittings or performing maintenance procedures. All pressure gauges in the circuit (user-supplied) must indicate zero (0) psi/bar. Hydraulic hose(s) must not be stiff. There must be no other indications of pressure in the system.

In the event of a power outage or pump malfunction, hydraulic pressure can be relieved manually by turning the pump relief valve screw fully counterclockwise to its lowest setting or by using the manual override feature. Refer to Sections 9.0 and 11.0 for additional information.

NOTICE If the pump does not relieve hydraulic pressure when the dump button is pressed and held (with AC power connected), discontinue use and take the pump to an Enerpac Authorized Service Center for diagnosis and repair.

9.0 PRESSURE RELIEF VALVE ADJUSTMENT

⚠ WARNING

Maximum pump hydraulic pressure is limited by a mechanical stop to approximately 10,300 to 10,800 psi [710 to 745 bar]. Be certain that the relief valve pressure setting does not exceed the maximum rated pressure of the cylinder or tool being used. Failure to observe this precaution may result in catastrophic failure of cylinder or tool and related components. Death or serious personal injury could occur.

The pump contains a user-adjustable pressure relief valve that controls system pressure. This valve is factory set at approximately 10,000 psi [700 bar]. However, the valve setting can be adjusted by the user if needed, as described in the following procedure.

1. Be sure that pump is off and that all hydraulic pressure is completely relieved. Refer to information in Section 8.0.
2. Disconnect the hydraulic hose from the pump "A" port.
3. **Pumps equipped with built-in pressure gauge:** Install a 3/8" NPTF pipe plug in the pump "A" port. Tighten until finger tight. Then tighten an additional 1.5 to 3.0 turns or torque to 40 ft-lb [54.2 Nm].
4. **Pumps NOT equipped with built-in pressure gauge:** Install a 0-15,000 psi [0-1000 bar] hydraulic pressure gauge in the pump "A" port. See Figure 9.
5. Insert a flat blade screwdriver into the notch above the relief valve access hole. Remove the protective cover. See Figure 10.

NOTICE Use only a flat blade screwdriver of appropriate size to adjust the relief valve pressure. The relief valve screw has a stop at the fully clockwise and fully counterclockwise positions. To prevent damage, do not continue to apply force when the screw stops turning.

6. Insert the screwdriver into the relief valve access hole. Gently engage the screwdriver blade with the slot in the relief valve screw. Use a flashlight if extra light is needed to view the screw.
7. Start and run the pump. Allow pressure to build.

NOTICE The pump automatically shifts from first to second stage operation at approximately 3000 psi [207 bar]. To prevent erratic operation and/or pump chatter, avoid setting the relief valve pressure within the range of 2900 to 3100 psi. [200 to 214 bar].

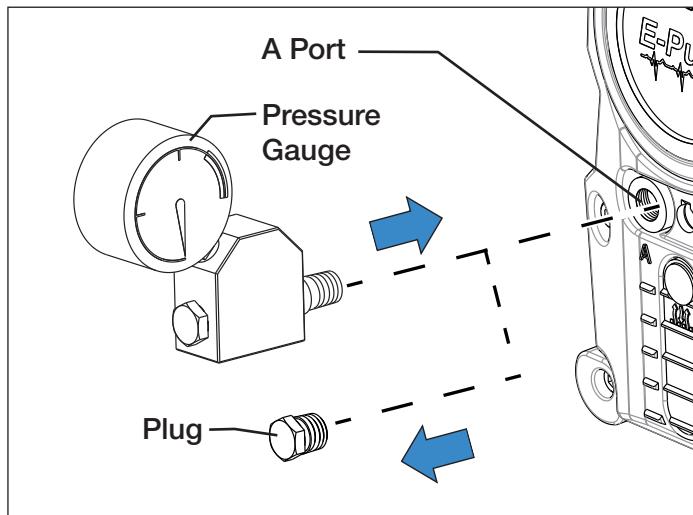


Figure 9, Pressure Gauge Installation

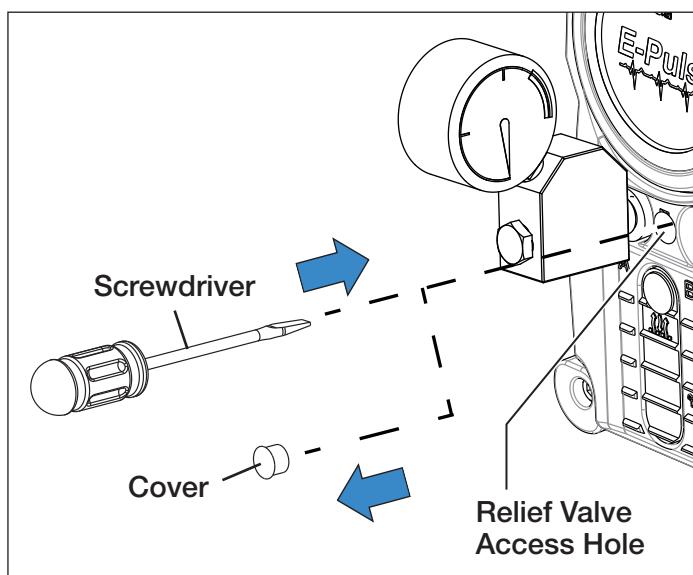


Figure 10, Pressure Relief Valve Adjustment

7. To **increase** the relief valve setting: With the pump running and while watching the pressure gauge, SLOWLY turn the relief valve screw clockwise until pressure increases to the desired setting.
8. To **decrease** the relief valve setting:
 - a. Turn the relief valve screw counter-clockwise one turn. If a very low pressure setting is desired, turn the relief valve screw additional turns until it becomes loose.
 - b. With the pump running and while watching the pressure gauge, SLOWLY turn the relief valve screw clockwise until the "A" port pressure increases to the desired setting.
9. When the desired pressure setting is reached, remove the screwdriver.
10. Stop the pump.
11. Check that pressure gauge indicates zero (0) psi/bar.
12. Start the pump again and watch the pressure gauge. Verify that the desired pressure is shown on the gauge.
- If the pressure setting is correct, continue with steps 13-16.
- If the pressure setting is NOT correct, repeat steps 5 through 12.

13. Stop the pump. Check that pressure gauge indicates zero (0) psi/bar.
14. Remove pressure gauge (or pipe plug if pump is equipped with built-in pressure gauge) from the pump "A" port.
15. Reconnect hydraulic hose to the pump "A" port.
16. Reinstall protective cover over the relief valve access hole.

10.0 HYDRAULIC SYSTEM MAINTENANCE

WARNING

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

- To avoid accidental starting, be certain that the pump AC power cord is disconnected from the electrical outlet before performing any maintenance procedures.
- Be certain that all system hydraulic pressure is completely relieved before performing any maintenance procedures. Refer to information in Section 8.0.

10.1 Hydraulic Oil Information

Enerpac HF hydraulic oil (ISO Grade 32) is the recommended oil for all E-Series pumps. This oil is suitable for most applications and working environments.

NOTICE

- Use of oils other than Enerpac HF may result in damage to pump hydraulic components and will void the Enerpac product warranty. Enerpac recommends using only Enerpac HF oil in the E-Series pumps.
- Never mix oils of different viscosities. Mixing oil viscosities may result in damage to pump components and will void the Enerpac product warranty.

10.2 Checking the Oil Level

1. Be sure that hydraulic cylinder or tool is fully retracted.
2. Be certain that pump is stopped and all hydraulic pressure is fully relieved before continuing this procedure. Refer to Section 8.0.
3. Be sure that the pump is placed on a level surface.
4. Check the oil level indicator. Verify that the oil level is up to the full mark. Refer to Figure 11.

If oil level is low: Add oil as described in Section 10.3. Refer to Section 10.1 for oil specifications.

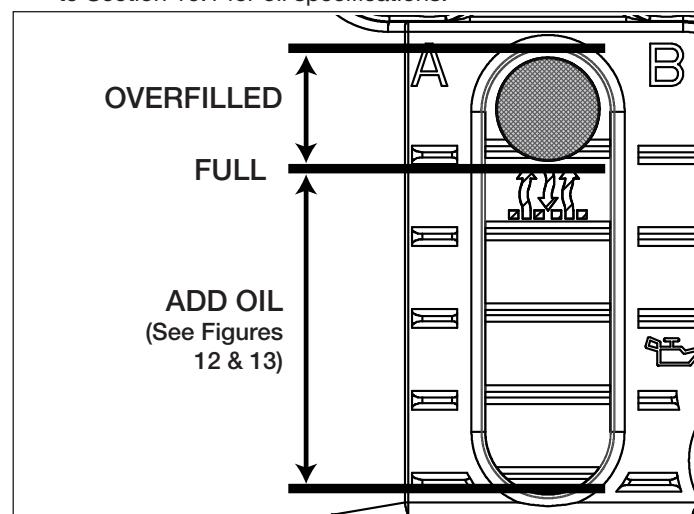


Figure 11, Oil Level Indicator

NOTICE Be sure that the oil is clean. If the oil has a milky, cloudy or dark appearance, it should be changed immediately as described in Section 10.4.

10.3 Adding Oil

1. Be sure that hydraulic cylinder or tool is fully retracted.
2. Be certain that pump is off and that all hydraulic pressure is fully relieved. Refer to Section 8.0 for additional information.
3. Disconnect pump AC power cord from electrical outlet.
4. Disconnect hydraulic hose from pump.
5. With the pump in the normal (horizontal) operating position, check the oil level in the oil level indicator. Use the diagram in Figure 13 to determine the approximate amount of additional oil that must be added.
6. Place the pump on a stable and level work surface, with the front cover facing UP, and the rear cover supported by the work surface. See Figure 12.
7. Using a clean rag, remove any dirt from the area around the hydraulic reservoir drain/fill plug. Remove the drain/fill plug.

NOTICE

- Refer to Section 10.1 for oil specifications. Use only new oil poured from a clean container.
- Always use a funnel when adding oil. To avoid spillage and to ensure that pump internal venting functions properly during filling, funnel neck outer diameter must not exceed $\frac{1}{2}$ inch [12 mm] or be less than $\frac{1}{4}$ " [6.3 mm]. Refer to Figure 12.
- Add oil only with the pump front panel facing up, and with the pump positioned on a level surface.
- When the maximum oil level is achieved, an internal overflow tube will direct oil to the concentric vents located around the oil drain/fill port. Stop adding oil immediately when oil begins flowing from these vents. Wipe up any spilled oil with a clean rag.
- Do not tilt or reposition the pump when adding oil. Overfilling and oil leakage will result.
- Remove and dispose of any spilled oil in accordance with all applicable laws and regulations.
- 8. Slowly pour new oil into the reservoir through the oil drain/fill port. Continue pouring until excess oil begins flowing from the concentric vents around the oil drain/fill port. This indicates that the reservoir is full.

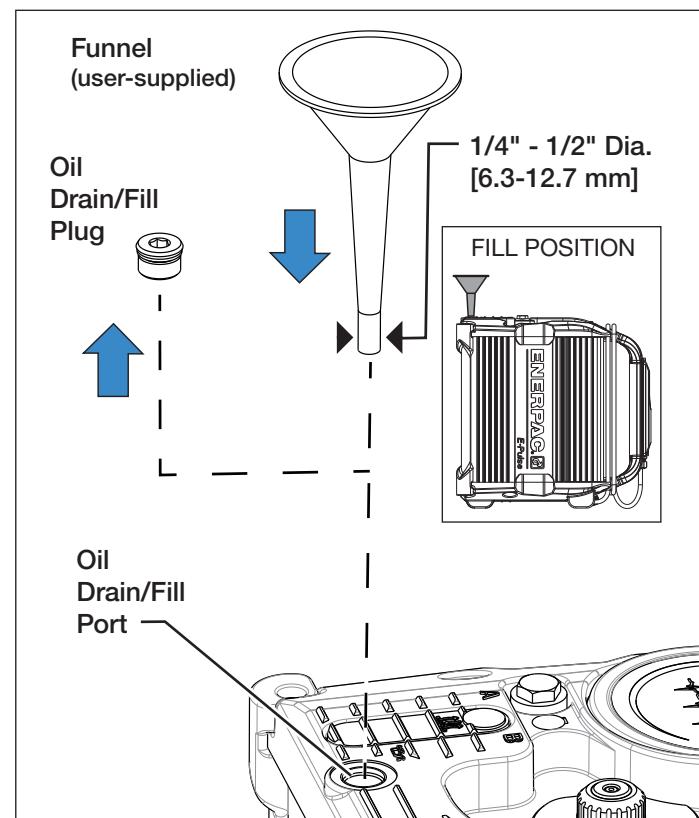


Figure 12, Adding Oil

9. After adding oil, wipe the oil drain/fill plug with a clean rag and reinstall it. Torque to 13-16 ft-lb [17.6-21.7 Nm].
10. Place the pump in the normal (horizontal) operating position, with the carrying handle facing up.
11. Check the oil level indicator. Verify that the oil level is up to the FULL mark and that the reservoir is not overfilled. Refer to Figure 11.

NOTICE

- If the pump was previously operated with a very low oil level or run until the reservoir was emptied, perform the pump priming/air purging procedure before using the pump. Refer to Section 10.5.

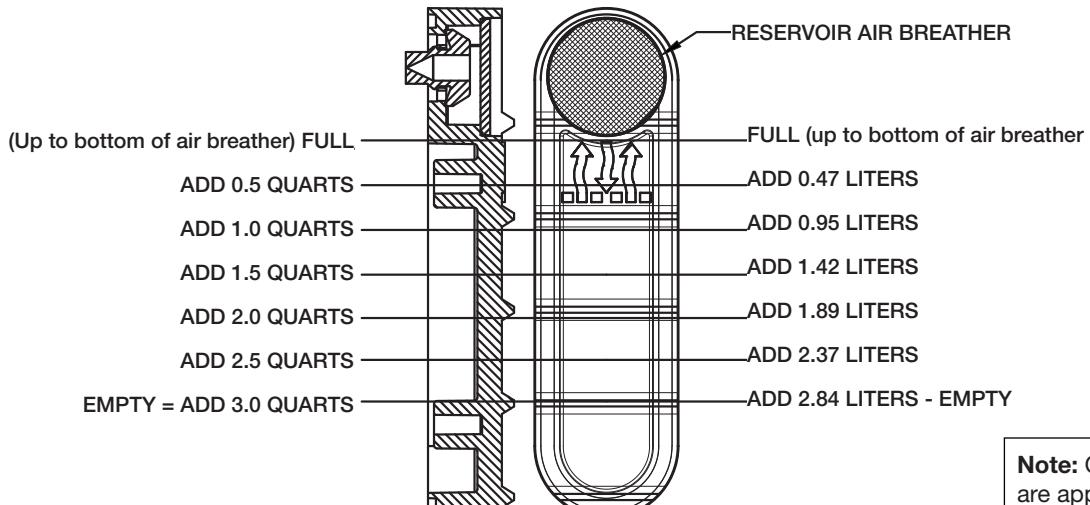


Figure 13, Reservoir Oil Fill Guide

- If reservoir is accidentally overfilled (oil level above full mark), drain excess oil before using the pump. Oil may leak from the reservoir air breather if overfilling occurs.

10.4 Oil Change

1. Be sure that hydraulic cylinder or tool is fully retracted.
2. Be certain that pump is off and that all hydraulic pressure is fully relieved. Refer to Section 8.0 for additional information.
3. Disconnect pump AC power cord from electrical outlet.
4. Disconnect hydraulic hose from pump.
5. Place the pump on a stable and level work surface.
6. Place a suitable pan or container of appropriate capacity under the oil drain/fill plug.

NOTICE

- Pump total oil capacity (including reservoir and pump element housing) is approximately 1.14 gallons [4.33 liters]. Be sure the pan or container used is large enough to hold all the drained oil.
- DO NOT operate the pump motor to drain the oil. Serious permanent damage to pump internal components may result. Such damage is not covered under warranty.
- Remove and dispose of used hydraulic oil in accordance with all applicable laws and regulations.

7. Remove the oil drain/fill plug. Allow all used oil to drain completely from the reservoir into the pan or container. It may be necessary to tilt the pump slightly forward to drain all the used oil.
8. Refill the reservoir with new hydraulic oil as described in Section 10.3.
9. Perform the pump priming/air purging procedure. Refer to the instructions in Section 10.5.

10.5 Pump Priming/Air Purgung

Always perform the pump priming/air purging procedure after completing an oil change.

This procedure should also be performed if the pump reservoir has been refilled with oil after being accidentally run dry (with little or no oil remaining in reservoir).

NOTICE The pump will typically make a slapping, sloshing or whirring noise if air pockets are present inside the pump element housing. If the pump is not primed, there will be either very little noise or an erratic sounding noise.

Perform the pump priming/air purging procedure as described in the following steps:

1. Be certain that the pump is off and that all hydraulic pressure is fully relieved. Refer to Section 8.0 for additional information.
2. Disconnect pump AC power cord from electrical outlet.
3. Disconnect hydraulic hose from pump.
4. **Pumps equipped with built-in pressure gauge:** Install a 3/8" NPTF pipe plug in the pump "A" port. Tighten until finger tight. Then tighten an additional 1.5 to 3.0 turns or torque to 40 ft. lb [54.2 Nm].

Pumps NOT equipped with built-in pressure gauge: Install a 0-15,000 psi [0-1000 bar] hydraulic pressure gauge in the pump "A" port.

5. Reconnect pump AC power cord to electrical outlet.
6. Start and run the pump for approximately 10 seconds at a pressure setting of 3250 psi [225 bar] or higher. This will remove any air trapped in the pump element housing.

7. Stop the pump. Verify that hydraulic pressure gauge indicates zero (0) psi/bar.
8. Repeat steps 6 and 7 as needed (typically 2-3 times).
9. Reconnect hydraulic hose. Verify that pump operates without making abnormal noises and that cylinder or tool movement is smooth.

11.0 CONTROL VALVE MANUAL OVERRIDE

The control valve manual override button is located on the pump front panel. This feature allows the valve to be operated manually in the event of an electrical power outage, solenoid coil failure or other similar problem.

WARNING Cylinder or tool will retract immediately when manual override button is pressed. Be sure no persons are working under the load before using the manual override.

To manually operate the control valve, insert a small screwdriver or Allen head wrench into the recessed center area of the manual override button. Push firmly until spring tension is felt and pressure is relieved. Approximately 11/32" [9 mm] of travel will be required. To prevent damage use only hand force.

The button may remain slightly depressed after the manual override is used and might not return to the fully outward position until the valve is electrically operated. This is normal.

The manual override feature is intended for emergency use only. If the control valve will not operate electrically via the pendant controls, take the pump to an Enerpac service center for diagnosis and repair.

12.0 CLEANING AND INSPECTION

- Periodically clean the cooling fins on the pump side surfaces to remove any accumulated dust or dirt.
- Remove any dust or dirt from the pump front and rear covers and the pump top and bottom surfaces. Be sure that all four air vents are unobstructed.
- Periodically wipe the air breather/filter surface with a clean rag to remove any loose dirt or oil sediment. The air breather/filter must remain unobstructed to allow proper reservoir venting.
- Be sure that pendant and controls are free of dust or dirt.
- To prevent contamination, always remove any dirt from around the oil drain/fill plug before removing it. Wipe the drain/fill plug with a clean rag before reinstalling it.
- Check for loose, missing or damaged parts. Make repairs as required before returning the pump to use.

13.0 STORAGE

Store the pump in a clean, dry and secure location.

To prevent possible damage to pump components, storage area ambient temperature must not be less than -22°F [-30°C] and must not exceed +149°F [+65°C].

14.0 TROUBLESHOOTING

The Troubleshooting Guide (Table 1) is intended as an aid to help diagnose and correct various possible problems that may occur. For repair service, contact your nearest Enerpac Authorized Service Center. Only an Enerpac Authorized Service Center should be permitted to service the pump and its components.

WARNING

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

- Never tighten or loosen hydraulic fittings while the pump hydraulic system or connected components are pressurized. Escaping oil under pressure can penetrate the skin, causing serious personal injury.
- Keep hands, fingers and other body parts clear of pinch points and moving parts when observing operation during troubleshooting.
- To prevent accidental start-up of pump during servicing, always unplug the pump AC power cord from the electrical outlet before performing any maintenance or repair procedures.

Table 1 - Troubleshooting Guide

Problem	Possible Cause	Action
1. Pump will not start.	a. No power.	Be sure that the pump AC power cord is connected to the electrical outlet.
	b. Pump fault triggered.	Refer to Table 2, Pump Fault Codes, for additional information.
2. Pump stops under load.	a. Pump fault triggered.	Refer to Table 2, Pump Fault Codes, for additional information.
	b. Pump bypass valve out of adjustment or malfunctioning.	Contact Enerpac Authorized Service Center.
	c. Pump jammed due to obstruction.	Contact Enerpac Authorized Service Center.
	d. Internal damage to pump and/or motor.	Contact Enerpac Authorized Service Center.
3. Pump fails to build pressure or builds less than full pressure.	a. Low oil level.	Add oil to reservoir as required. Refer to Section 10.3. Follow priming procedure in Section 10.5 if pump reservoir was emptied during operation or while pump was being serviced.
	b. Relief valve open or set too low.	Raise relief valve pressure setting. Refer to Section 9.0.
	c. Oil needs changing.	Completely drain and refill reservoir per instructions in Section 10.4. NOTICE Use only Enerpac HF hydraulic oil. Use of other oils may result in damage to pump components and will void the Enerpac product warranty.
	d. External system leak.	Repair or replace components as required.
	e. Pump oil intake suction filter is dirty.	Contact Enerpac Authorized Service Center.
	f. Pump bypass valve out of adjustment or malfunctioning.	Contact Enerpac Authorized Service Center.
	g. Pump internal leakage.	Contact Enerpac Authorized Service Center.
	h. Pump seals worn or damaged.	Contact Enerpac Authorized Service Center.
	i. Internal damage to pump and/or motor.	Contact Enerpac Authorized Service Center.

(Continued on next page)

Table 1 - Troubleshooting Guide (continued)

Problem	Possible Cause	Action
4. Low fluid output.	a. Pump speed too low. b. AC line voltage too low. c. External system leak. d. Pump needs priming. e. Pump bypass valve malfunction. f. Pump oil intake suction filter is dirty. g. Pump internal leakage. h. Pump seals worn or damaged. i. Internal damage to pump and/or motor.	Increase pump speed by adjusting knob at rear of pump. Low AC line voltage may result in lower motor speeds and reduced hydraulic output. Repair or replace leaking components as required. Refer to Section 10.5 for priming procedure. Contact Enerpac Authorized Service Center. Contact Enerpac Authorized Service Center. Contact Enerpac Authorized Service Center. Contact Enerpac Authorized Service Center. Contact Enerpac Authorized Service Center.
5. Pump builds to full pressure, but hydraulic cylinder or tool does not advance or advances erratically.	a. Low oil level. b. Pump needs priming. c. Load greater than hydraulic cylinder or tool capacity at full pressure. d. Flow is restricted or blocked. e. Control valve malfunction. f. Internal damage to pump.	Add oil to reservoir as required. Refer to Section 10.3. Refer to Section 10.5 for priming procedure. Reduce load or use a cylinder or tool of larger capacity. Check hydraulic couplers for full engagement. Check hose for blockage or kinks. Contact Enerpac Authorized Service Center. Contact Enerpac Authorized Service Center.
6. Hydraulic cylinder or tool retracts erratically or does not fully retract.	a. Pendant dump button not held down. b. Flow is restricted or blocked. c. Single-acting cylinder or tool not equipped with a return spring. d. Control valve malfunction.	Dump button must be pressed and held down until cylinder is fully retracted and pressure is fully relieved. Check hydraulic couplers for full engagement. Check hose for blockage or kinks. Some single-acting tools not equipped with a return spring may need to be manually retracted after pressure is relieved. Contact Enerpac Authorized Service Center.
7. Pressure is not relieved when pendant dump button is pressed and held down. Cylinder or tool does not retract.	a. Flow is restricted or blocked. b. Pendant dump button malfunction or loose or broken pendant wiring. c. Control valve solenoid coil disconnected or open. d. Control valve malfunction.	Check hydraulic couplers for full engagement. Check hose for blockage or kinks. Contact Enerpac Authorized Service Center. Contact Enerpac Authorized Service Center.
8. Pump does not hold load when motor is stopped.	a. Internal check valve leakage or malfunction. b. Control valve leakage or malfunction.	Contact Enerpac Authorized Service Center. Contact Enerpac Authorized Service Center.

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Table 1 - Troubleshooting Guide (continued)

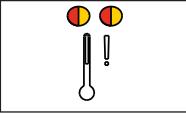
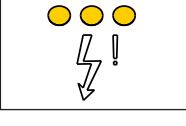
Problem	Possible Cause	Action
9. Noisy pump operation.	a. Pump needs priming. b. High oil flow over relief valve. c. Relief pressure setting too close to pump bypass valve setting. d. Damaged and/or loose components inside pump, vibrating and/or making contact. e. Pump elements worn or damaged. f. Motor worn or damaged.	Refer to Section 10.5 for priming procedure. The user-adjustable relief valve may create a high pitched noise when relieving high oil flow. Avoid setting relief valve at the pump bypass setting of 3000 psi [207 bar] whenever possible. Contact Enerpac Authorized Service Center. Contact Enerpac Authorized Service Center. Contact Enerpac Authorized Service Center.
10. Pump runs hot.	a. Low oil level. b. Flow is restricted or blocked. c. Oil flowing over the relief valve for long periods of time. d. Pump air vents and/or cooling fins covered with dirt. e. Pump speed too fast. f. Low voltage.	Check oil level with pump stopped and cylinder or tool fully retracted. Add oil if low. Check hydraulic couplers for full engagement. Check hydraulic hose(s) for blockage or kinks. Reduce the amount of motor running time while oil is flowing over the relief valve. Remove any dirt from pump air vents and cooling fins. Be sure that all four air vents are unobstructed. Reduce pump speed. Check AC line voltage. Pump can operate during a limited low voltage condition but overheating may result.
11. Pendant LED indicator flashes randomly at start-up. Pump does not operate when pendant buttons are pressed.	a. Service center diagnostic mode activated. b. Pump electrical and/or mechanical problems.	<p>NOTICE The service center diagnostic mode can be accidentally activated if the pendant jog button is pressed down while the pump AC power cord is being plugged into the electrical outlet.</p> <p>If the pendant LED indicator blinks randomly yellow or red/yellow, it indicates that the pump may be in diagnostic mode.</p> <p>To exit diagnostic mode, disconnect and reconnect AC electric power. Be sure no pendant buttons are being pressed as the pump AC power cord is being plugged into the electrical outlet.</p> <p>The pendant LED indicator should appear solid green approximately 3 seconds after power has been reconnected. This indicates that the pump is in normal operational mode.</p> <p>Contact Enerpac Authorized Service Center.</p>

15.0 PUMP FAULT CODES (user-level)

Pump fault codes are displayed by the pendant LED indicator.

- Refer to Table 2 for pump fault code information.
- See Figure 5 for location of pendant LED indicator.

Table 2 - Pump Fault Codes (user-level)

Fault	Pendant LED Indicator	Cause	Action
BUTTON FAULT 	1 red blink followed by a 1 second pause. Sequence repeats until problem is corrected.	Pendant buttons pressed while AC power cord is connected to outlet.	<ul style="list-style-type: none"> • Disconnect power. • Ensure that pendant buttons are not being pressed. • Reconnect power and try to start pump again. • If problem persists, contact Enerpac Authorized Service Center.
		Damage to pendant and/or cable wiring.	<p>Check pendant and pendant cable for obvious signs of damage or wear.</p> <p>Contact Enerpac Authorized Service Center if repairs are needed.</p>
TEMPERATURE FAULT 	2 fast red/yellow blinks followed by a 1 second pause. Sequence repeats until pump cools to an acceptable temperature.	Motor, electrical or internal ambient temperature too high.	Allow time for pump temperature to decrease (as required).
VOLTAGE FAULT 	3 yellow blinks followed by a 1 second pause. Sequence repeats until problem is corrected.	Voltage above or below acceptable voltage range for your pump model.	Check AC power supply for correct voltage.
SERVICE REQUIRED FAULT 	4 red blinks followed by a 1 second pause. Sequence repeats until problem is corrected.	Mechanical or electrical failure.	<p>Additional diagnostic procedures required to determine problem.</p> <p>Contact Enerpac Authorized Service Center.</p>
Notes:			
<ul style="list-style-type: none"> • The pendant LED indicator will continue to repeat the fault code until the problem is corrected. A 1 second pause will occur in between the repeated fault codes. • Pendant haptic pulses (vibration) will occur simultaneously when the LED indicator begins flashing a fault code. After the LED indicator has repeated the fault code 3 times, the haptic pulses will stop. 			

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