

ZC-Series Cordless Electric Rail Puller Pumps Models ZC3404JB-RS and ZC3404JE-RS

L4267

Rev. B

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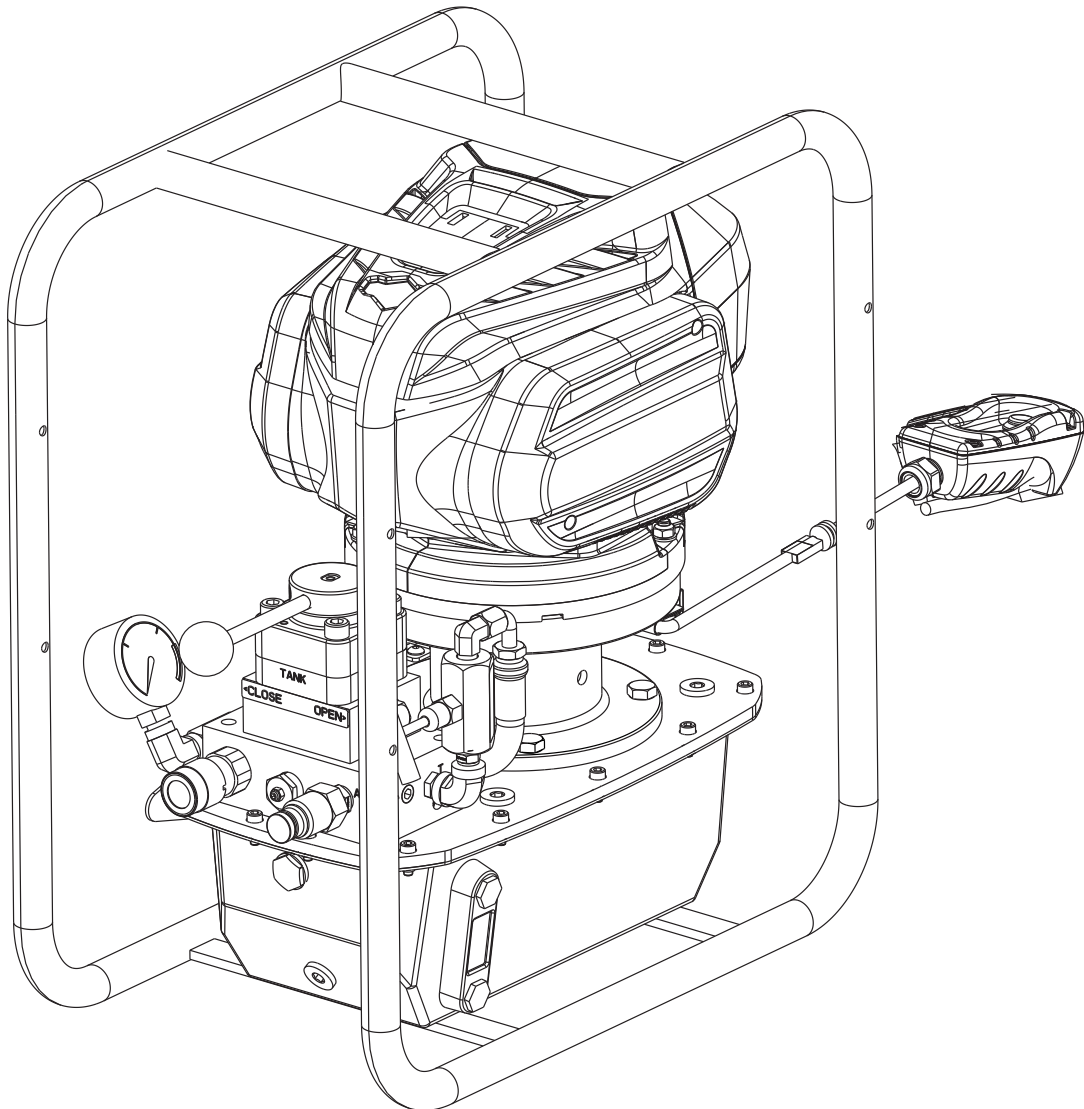


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1.0 SAFETY

1.1 Introduction

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

If you have never been trained on high-pressure hydraulic safety, consult your distributor or service center for information about an Enerpac hydraulic safety 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 loads supported by hydraulics. To avoid personal injury, keep hands and feet away from rail puller and surrounding area during operation.
- Do not handle pressurized 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.
- Only use hydraulic cylinders in a coupled system. Never use a cylinder with uncoupled couplers. If the cylinder becomes extremely overloaded, components can fail catastrophically.
- 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. Overloading can result in 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.
- 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 hose. Avoid sharp bends and kinks when routing hydraulic hoses. Using a bent or kinked hose will cause severe back-pressure. Sharp bends and kinks will internally damage the hose, leading to premature hose failure.

- Do not drop heavy objects on hose. A sharp impact may cause internal damage to hose wire strands. Applying pressure to a damaged hose may cause it to rupture.
- 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. For optimum performance, do not expose equipment to temperatures of 150°F [65°C] or higher. 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 Battery Operated Pump 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 use the pump if the remote pendant button will not start or stop the pump. Make repairs before resuming use.
- Do not operate the pump near combustible materials, such as flammable liquids, gases, or dust.
- Remove the battery from the pump before cleaning, making adjustments, performing maintenance or repair procedures, or storing the pump.
- Do not attempt to disable or modify the safety key interlock feature.
- Remove safety key when pump is unattended to prevent unauthorized persons from operating pump.
- Use the pump only with the specified Briggs & Stratton 82V lithium-ion batteries. Refer to Section 3.1 for model numbers of compatible batteries.
- Pump motor assembly (“powerhead”) is not serviceable and should not be opened. Electric shock may result.
- Do not use the pump if the powerhead is loose or damaged. Have the powerhead inspected and repaired by an Enerpac Authorized Service Center before using the pump.

1.4 Battery First Aid Instructions



Failure to observe and comply with the following instructions and precautions could result in serious personal injury.

- If battery fluid leaks and gets into your eyes or contacts your skin, flush immediately with clean water for at least 15 minutes. Get immediate medical attention! Do not rub the eyes.

1.5 Battery and Battery Charger Safety Precautions



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

- Recharge battery only with the charger model(s) specified by Briggs & Stratton for the battery being used.
- Do not allow metal items or material such as steel wool, aluminium foil or other foreign objects to contact the battery or charger terminals. Do not allow these items to enter the battery cavity of the powerhead or charger.
- Handle the battery carefully. Do not knock, strike, step-on crush, or burn the battery.
- Do not attempt to short circuit any terminals on the battery or charger.
- Do not allow liquid or debris to enter the battery or charger.
- Do not expose the battery or charger to wet conditions or excessive humidity. Do not charge the battery in rain or in wet conditions.
- Do not use a damp cloth or detergent on the battery or battery charger
- Do not immerse the pump, battery or charger in water or in any other liquid.
- Do not insert battery into pump or charger if battery case is cracked or damaged. Replace with a new battery.
- Do not attempt to modify the battery or charger.
- Do not solder onto the battery or pierce the battery with nails or other objects.
- Do not probe the battery or charger with conductive materials.
- Do not cover the ventilation slots in battery or charger.
- Do not place battery or charger on a soft surface, such as a blanket or pillow.
- Do not place the battery in high temperature locations, such as near fire or a heater. Avoid placing the battery in direct sunlight.
- Do not allow the battery or charger to overheat. If battery and/or charger are warm, allow time for them to cool down before charging.
- Discontinue use of the battery if it emits an unusual smell, feels hot, changes color, changes shape or appears abnormal in any other way.
- Unplug the charger when it is being cleaned or not in use.
- Store the battery and charger in a cool, dry place. Keep these items in a secured location, away from children and pets.
- Battery and charger may under no circumstances be opened. These items contain no user-serviceable components.
- If battery housing cracks or breaks, with or without fluid leaks, do not recharge or use the battery. Dispose of it and replace it with a new battery.
- For damaged or worn out batteries, follow safe disposal procedures as described in the battery manufacturer's manual.
- Do not attempt to repair a damaged battery. Do not attempt to open or disassemble the battery. Do not attempt to remove or destroy any of the battery's components.

NOTICE Battery and charger are manufactured by Briggs & Stratton Corporation. For complete operation, maintenance and safe disposal information, refer to the Briggs & Stratton user's manual provided with the battery or charger. If this manual is missing, go to the Briggs & Stratton website to obtain an electronic version of the manual.

All personnel should read and understand the information contained in the Briggs & Stratton user's manual before operating the pump.

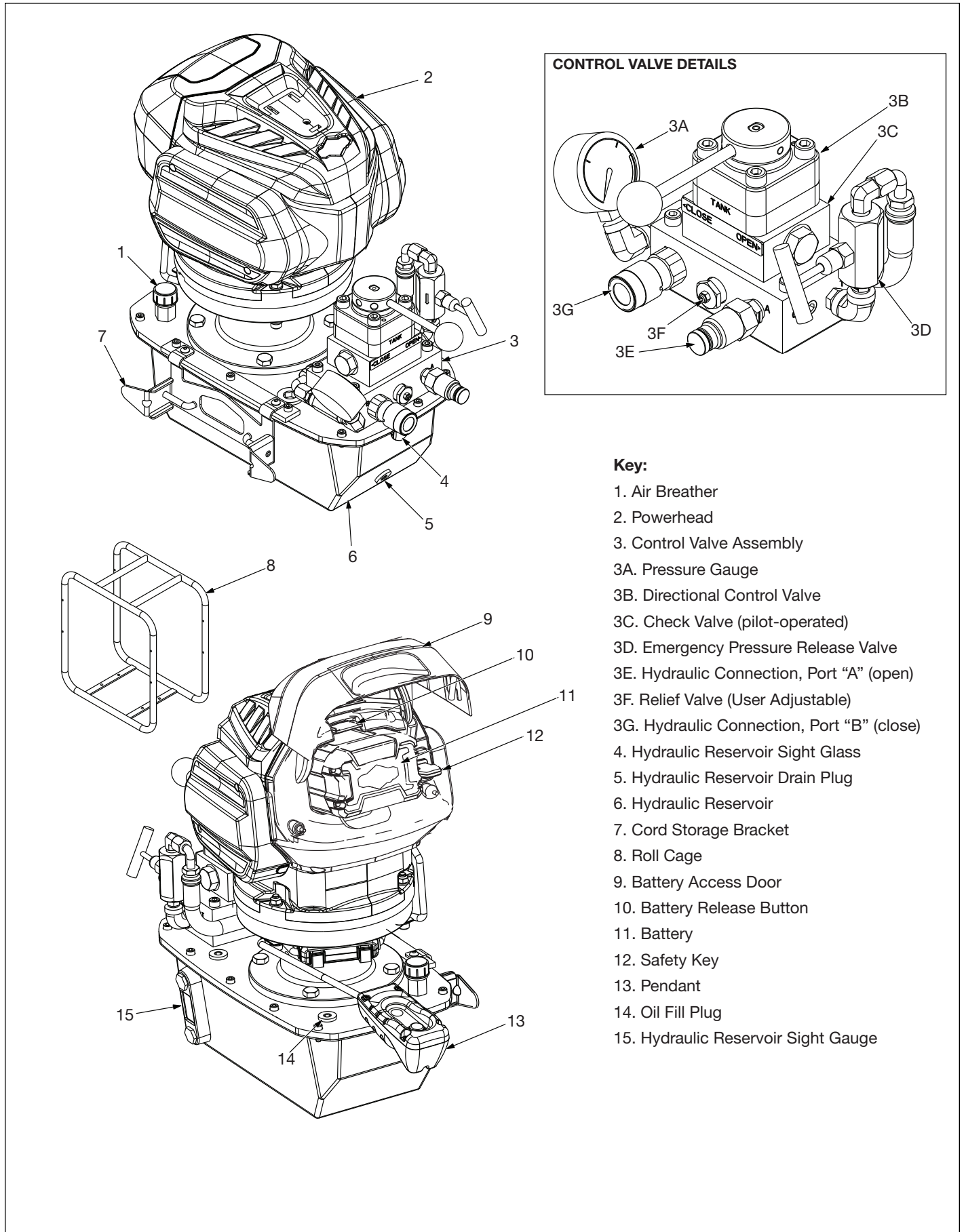
1.6 General Rail Puller Safety Precautions



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

- Never exceed the rail puller's rated maximum input pressure.
- Always inspect all system parts before each use for wear, distortion, cracks or improper fit.
- Never use the rail puller if it is leaking oil. Replace any leaking components and make required repairs before use.
- Be sure that non-operating personnel stand clear of the direction of force (directly in front of or behind the rail puller) during the pull.
- Always be aware of pulling force and system pressure during the pull by monitoring the tonnage (pressure) gauge while operating the system.
- Always re-install dust caps to couplers when not in use.
- Always release any trapped pressure from rail puller by shifting the control valve on the pump before connecting or disconnecting hydraulic hoses. Never disconnect any other hydraulic connections on the rail puller to release trapped pressure.
- Refer to instructions in Section 8.7 of this manual for correct procedure to release trapped pressure in the rail puller hydraulic circuit.
- Always review and understand proper use of all safety equipment before attempting to operate the rail puller.
- During transit and while using the pump, use care to keep the rail puller away from all electrified lines.
- Always ensure that all hydraulic components and couplers are clean. Retract the rail puller cylinders and reinstall all dust caps after use.
- Lift the rail puller evenly, in accordance with the instructions in the puller manual.
- Always use a hydraulic pump that is fully compatible with the rail puller.
- Always consult the operation manual supplied with the rail puller for additional information.
- Be sure that the pump reservoir is filled with new Enerpac HF hydraulic oil.
- Be sure that the pump and rail puller are properly maintained and that they do not contain contaminated oil. No liability will be accepted for failure or malfunction of the equipment if this condition is not met.

2.0 MAJOR FEATURES AND COMPONENTS



Key:

- 1. Air Breather
- 2. Powerhead
- 3. Control Valve Assembly
- 3A. Pressure Gauge
- 3B. Directional Control Valve
- 3C. Check Valve (pilot-operated)
- 3D. Emergency Pressure Release Valve
- 3E. Hydraulic Connection, Port "A" (open)
- 3F. Relief Valve (User Adjustable)
- 3G. Hydraulic Connection, Port "B" (close)
- 4. Hydraulic Reservoir Sight Glass
- 5. Hydraulic Reservoir Drain Plug
- 6. Hydraulic Reservoir
- 7. Cord Storage Bracket
- 8. Roll Cage
- 9. Battery Access Door
- 10. Battery Release Button
- 11. Battery
- 12. Safety Key
- 13. Pendant
- 14. Oil Fill Plug
- 15. Hydraulic Reservoir Sight Gauge

Figure 1, Major Features and Components, ZC-Series Rail Puller Pumps

3.0 PRODUCT DATA

3.1 Specifications

Pump Model Number	Control Valve Model Number and Function	For Use With:	Hydraulic Connections*	Operating Temp Range		Motor Rating		Sound Level
				°F	°C	hp	kW	dBA
ZC3404JB-RS and ZC3404JE-RS	Enerpac VM43 Special Rail Puller Version (Open - Neutral/Hold - Close)**	Rail Puller Applications (double-acting)	3/8" NPTF	+40 to +120	+4 to +49	1.4	1.0	75

* Enerpac FH604 coupler installed in A port, Enerpac FR400 coupler installed in B port.

** For most systems, the *open* side of the valve = advance and the *close* side of the valve = retract.

Pump Model Number	Maximum Hydraulic Pressure		Flow Rate (Refer to Section 3.2)						Reservoir Size*		Pump Weight**		Hydraulic Oil Type
			At No Load		At 4,000 psi [276 bar]		At 10,000 psi [700 bar]						
	psi	bar	in ³ /min	l/min	in ³ /min	l/min	in ³ /min	l/min	gal	l	lb	kg	
ZC3404JB-RS and ZC3404JE-RS	10,000 [+300 / -50]	700 [+20.7 / -3.4]	310	5.0	80	1.3	32	0.52	1.0	4.0	85.7	38.9	Enerpac HF

* Approximate usable capacity of oil reservoir.

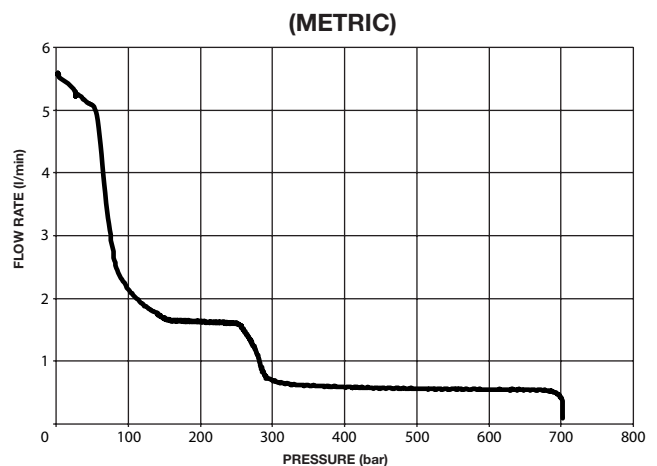
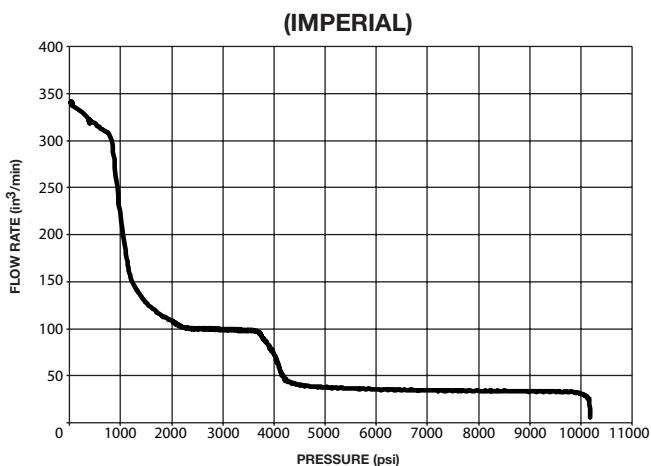
** Approximate weight of pump with oil in reservoir and with battery installed. Weight of battery is approximately 5.7 lb [2.6 kg].

Pump Model Number	Item*	Model Numbers**	
		Enerpac	Briggs & Stratton
ZC3404JB-RS and ZC3404JE-RS	Battery Charger, 115V AC, 50/60 Hz Input NA	ZC115VC	1760263
	Battery Charger, 230V AC, 50/60 Hz Input EU/AU	ZC230VC	1760264
	Battery, Lithium Ion, 82V, 4Ah, NA	ZC82V4NA	1760265
	Battery, Lithium Ion, 82V, 4Ah, EU/AU	ZC82V4EUAU	1760515

* Maximum initial battery voltage (measured without a workload) is 82 volts. Nominal voltage is 72.

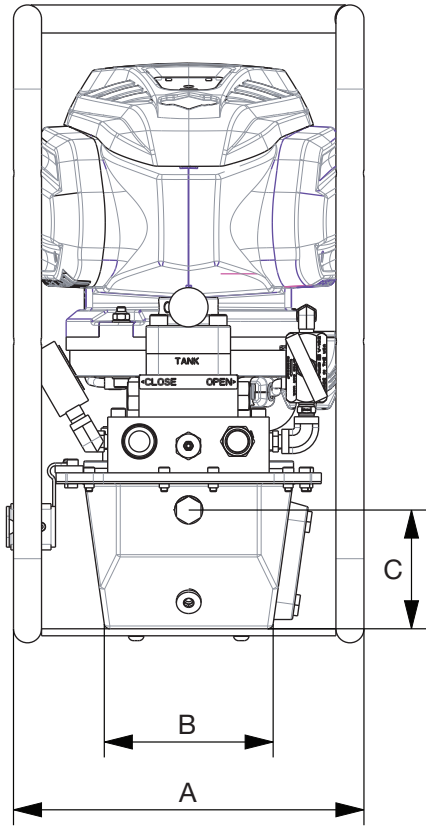
** Batteries and chargers can be purchased from an Enerpac distributor or Briggs & Stratton retailer. Battery nomenclature may vary depending on country and/or region.

3.2 Performance Curves - Flow Rate vs. Pressure

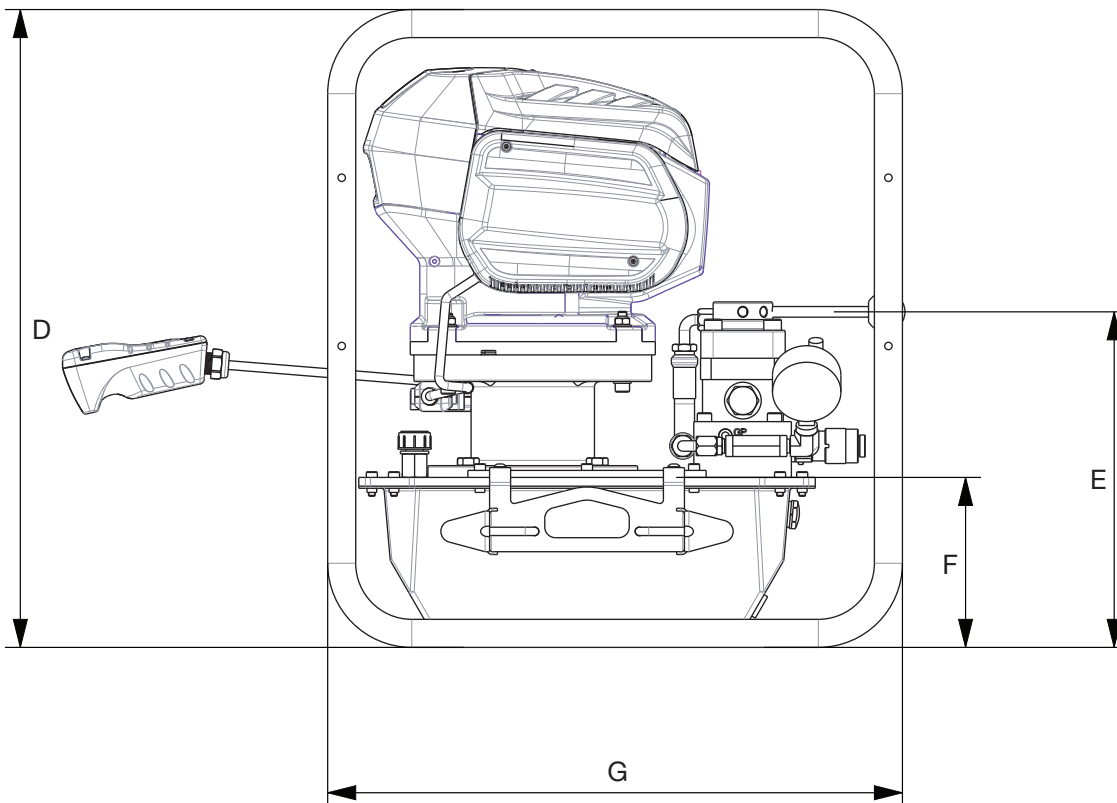


NOTE: All product data is subject to change without notice. Graphs in Section 3.2 show typical pump flow/pressure curves.

3.3 External Dimensions



Item	Dimension	
	in	mm
A	12.50	318
B	6.02	153
C	4.24	108
D	22.75	578
E	11.97	304
F	6.06	154
G	20.50	521



4.0 PRODUCT DESCRIPTION

4.1 Introduction

The Enerpac ZC-Series rail puller pump combines the high performance of an electric AC-powered pump with the convenience of a cordless, battery powered pump. It is an ideal solution for remote rail maintenance locations, where electrical or pneumatic power sources are either inconvenient to use or unavailable.

Major features include a brushless DC electric motor, three-stage pump element and 1.0 gallon [4.0 liter] hydraulic reservoir. Three different control valves are available.

Power is supplied by a rechargeable 82V lithium-ion battery, manufactured by Briggs & Stratton Corporation. See Figure 2. The lithium-ion battery is capable of providing impressive run times, even under extreme job site conditions.

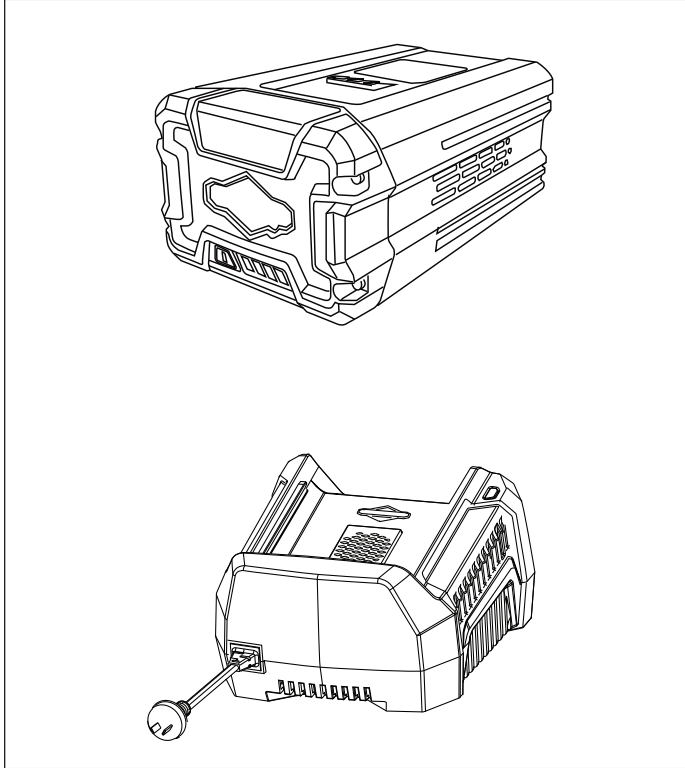


Figure 2, Battery and Charger

4.2 Additional Information - Battery and Charger

- The Briggs & Stratton logo is trademarked and intellectual property of Briggs & Stratton.
- Portions of this publication are subject to copyright of Briggs & Stratton Corporation.

4.3 Conformance to National and International Standards

Enerpac declares that the ZC-Series rail puller pump has been tested and conforms to applicable standards and is approved to carry the CE, TUV C and US certification marks. An EU Declaration of Conformity is enclosed separately.



4.4 Electromagnetic Compatibility (EMC)

The ZC-Series rail puller pump has been tested and certified to conform to CE-EMC emission and immunity standards.

5.0 SETUP

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.

5.2 Hydraulic Reservoir Air Breather

A shipping plug is installed in the breather port on the top of the reservoir. Before using the pump, replace the shipping plug with the adapter fitting and breather. See Figure 3.

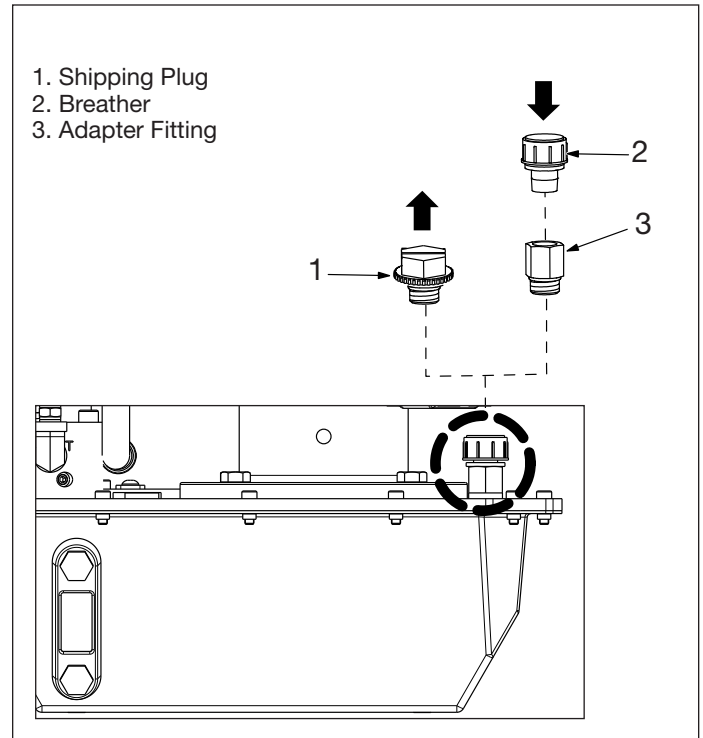


Figure 3, Hydraulic Reservoir Air Breather

5.3 Oil Level (new pumps)

For most shipping destinations, the reservoir is filled with Enerpac HF oil at the factory, prior to shipment. However, as a precaution, always check the oil level to verify that the reservoir is filled. Refer to Section 9.1 for additional instructions.

6.0 HYDRAULIC CONNECTIONS

⚠ WARNING To ensure proper operation, avoid kinking or tightly bending hydraulic hoses. If a hose becomes kinked or otherwise damaged, it must be replaced. Damaged hoses may rupture at high pressure. Serious personal injury may result.

The pump is equipped with an Enerpac 4-way, 3-position control valve specifically engineered for hydraulic rail puller use.

The control valve manifold is equipped with Enerpac FR Series “flat face” quick-disconnect couplers. Other hoses, fittings and couplers must be user-supplied. Refer to Figure 4 for a connection diagram of a typical setup.

NOTICE Use of a load lock valve (user-supplied) is strongly recommended. All hoses, couplers and fittings must be rated to at least 10,000 psi [700 bar].

Make hydraulic connections as described in the following steps.

1. To prevent the pump from starting, be sure that the battery is removed from the pump.
2. Remove the plugs from the couplings on pump ports “A” and “B”.
3. Connect the hydraulic hoses:
 - Connect the hose from pump port “A” to the open port on each rail puller cylinder.
 - Connect the hose from pump port “B” to the close port on each rail puller cylinder.
 - Be certain that coupling halves are fully engaged and that each threaded collar is fully threaded onto the male coupling half.

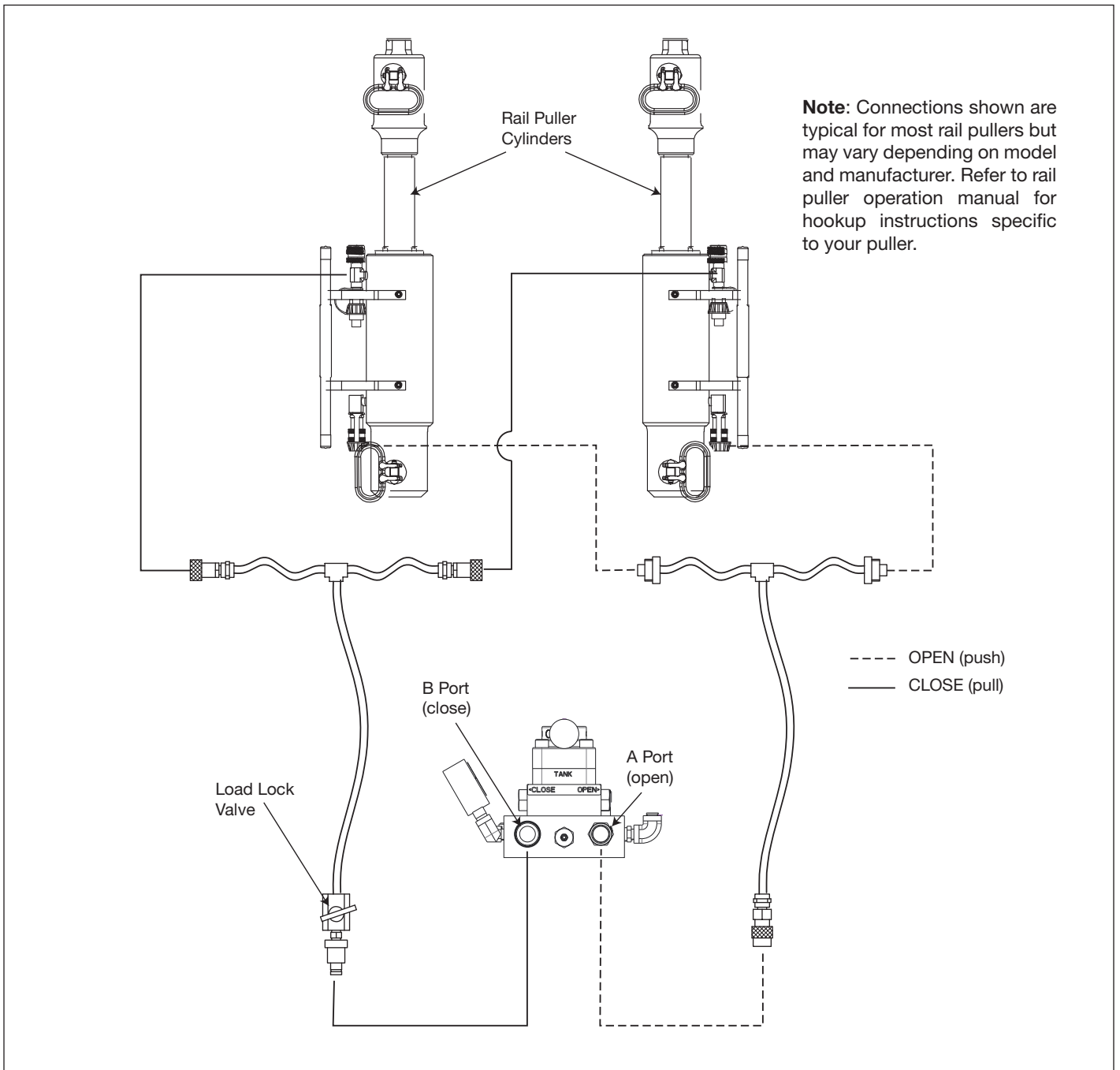


Figure 4, Hydraulic Hose Arrangement (typical)

7.0 BATTERY

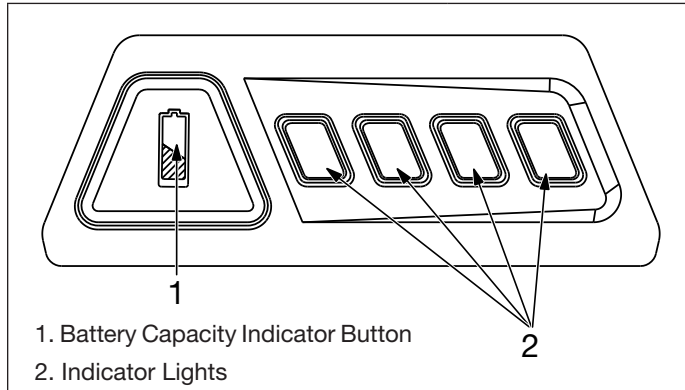
7.1 Battery Capacity Indicator

New batteries should be charged before use. Each battery contains four indicator lights. The battery capacity indicator lights show the approximate battery capacity level.

Press the battery capacity indicator button to display the lights. The battery capacity indicator lights will stay lit for two seconds after the button is pressed. Refer to Figure 5 to determine the level of charge.

NOTICE Run time between battery charges is dependent on the application, pump run time, pressure setting and other factors.

NOTICE If none of the battery capacity indicator lights illuminate when the battery capacity indicator is pressed, place the battery on the charger and charge as needed.



When Battery Capacity Indicator Button is pressed:	Percent Charge: (approximate)
4 Lights ON	80 - 100%
3 Lights ON	60 - 80%
2 Lights ON	40 - 60%
1 Lights ON	25 - 40%
0 Lights ON	< 25%

Figure 5, Battery Capacity Indicator

7.2 Battery Installation

1. Be sure that pump motor is not running.
2. Lift battery door and hold it open. See Figure 6.
3. Align ribs on battery and battery bracket. Then, slide the battery fully into the battery compartment until it stops.
4. Ensure battery release button snaps in place and that the battery is fully seated and secured before beginning operation.
5. Close the battery door.

NOTICE To ensure compatibility and proper operation, use only Briggs & Stratton 82V lithium-ion batteries with the pump. Refer to Section 3.1 for battery model number information.

7.3 Battery Removal

1. Ensure pump motor is switched off.
2. Lift the battery door and hold it open.
3. Press the battery release button located above battery.
4. Slide the battery outwards and remove it from the battery compartment. See Figure 6.

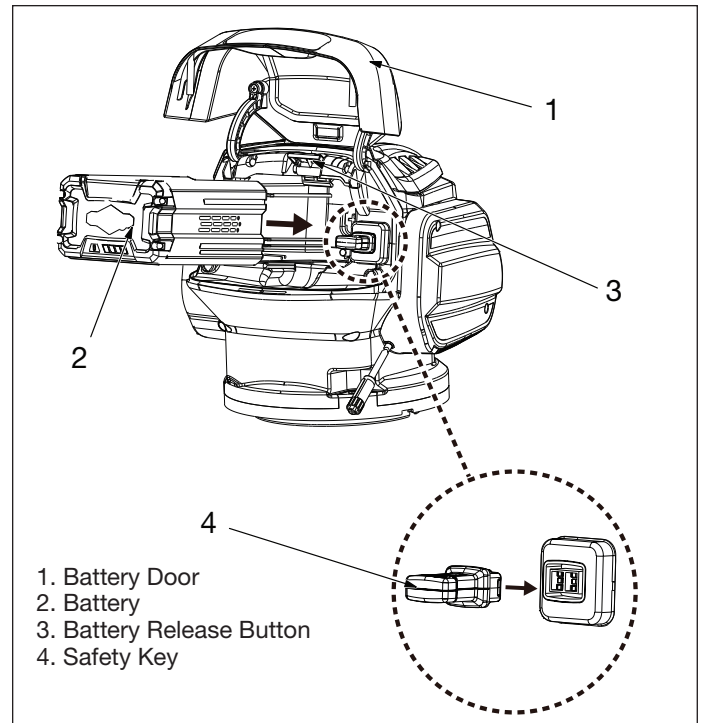


Figure 6, Battery Installation

7.4 Battery Management System

The battery management system monitors and controls battery operation:

- A low voltage cut-off feature will shut down the battery when the battery voltage drops to below acceptable limits.
- A high temperature shut down feature will shut down the battery if its internal temperature rises to above acceptable limits.
- If the low voltage cut-off or high temperature shut down feature is activated while the pump is operating, the pump motor will emit a beeping sound and the pump will stop.
- If the high temperature shut down feature is activated, the battery must cool down to an acceptable internal temperature before the pump can be restarted.

7.5 Additional Battery and Charger Information

- It is recommended that battery be fully charged before first use to ensure maximum run time can be achieved.
- The battery should be charged at normal room temperature whenever possible. If the surrounding air temperature is not normal room temperature, move the battery and charger to a location with a temperature of between 43°F [6°C] and 104°F [40°C].
- The battery is a lithium-ion device. It will not develop a memory and may be charged at any time.
- If the battery charger light glows green and blinks when the battery is placed in the battery charger, this indicates that the battery is being charged. A solid green light indicates that the battery is fully charged. A blinking red light indicates a charging fault.
- If the battery charger light glows solid red when the battery is placed in the battery charger, this indicates that the battery temperature is above acceptable limits. Remove the battery from the charger and allow time (up to 30 minutes) for the battery to cool. Charging should resume after the battery has cooled and been inserted into the charger.

- If the battery has been stored with little to no charge for a long period of time, the charger will go into recovery mode, which will take 20 hours to fully charge the battery. This will enhance the life of the battery. Once the battery is fully charged, the next charge will return to standard charging.

8.0 OPERATION

8.1 Before Start-up

1. Check all hydraulic fittings and connections to be sure they are tight and leak free.
2. Install hydraulic reservoir breather. Refer to Section 5.1.
3. Check the hydraulic oil level. Add oil if necessary. Refer to sections 9.1 through 9.4.
4. Install a fully charged battery on the pump. Refer to Section 7.2.
5. Verify safety key is installed.
6. Connect hydraulic hoses to pump as described in Section 6.0. Remove air from system before placing pump into operation. Refer to instructions in Section 8.6.

8.2 Transporting and Positioning the Pump

To prevent damage, always use the roll cage when transporting or positioning the pump. Never attempt to transport or position the pump by dragging it by the hoses or by the pendant cable. Never attempt to lift the pump using the powerhead. Serious damage to the pump, hoses and/or pendant cable may result.

8.3 Starting and Stopping the Pump Motor

1. Before starting the pump motor:
 - Place control valve lever in the neutral/hold (“3”) position. Refer to Section 8.5 for control valve positions.
 - Be sure that the emergency pressure release valve is fully closed. Refer to Section 8.8 for additional information.
2. Use the on-off button on the remote pendant:
 - To start the pump motor, press and hold the motor on-off button.
 - To stop the pump motor, release the motor on-off button.

NOTICE A motor start delay of up to 5 seconds (safety feature) is built into the pump motor circuitry. For this reason, the pump motor cannot be rapidly jogged on and off. The ZC-Series rail puller pump is not intended for use as a jog pump.

NOTICE In an emergency, the pump motor can also be stopped by removing either the safety key or the battery.

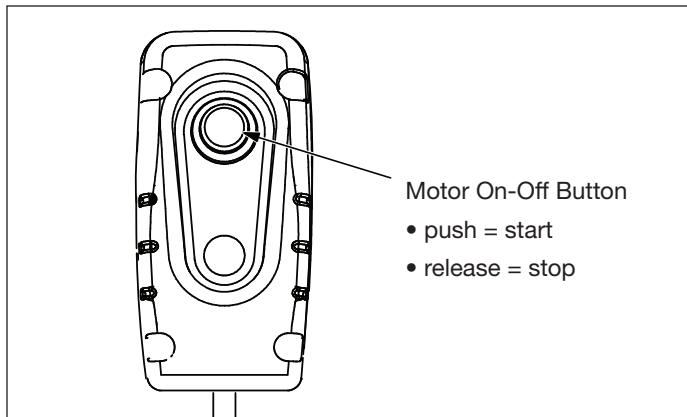


Figure 7, Remote Pendant

8.4 Operating Precautions



Failure to observe the following precautions and instructions could allow load to drop on persons working in the area. Death or serious personal injury could result.

- Be sure that persons remain outside of the rail puller structure and away from the direction of force area (directly in front of or behind the rail puller) during the pull.
- ZC-Series rail puller pumps are designed exclusively for use with compatible rail pullers. To prevent serious personal injury, do not use the ZC-Series rail puller pumps for lifting tasks or for any other non-rail puller applications.

8.5 Control Valve Operation

The pump control valve is operated by a rotary lever located at the front of the pump. Refer to Figure 8 for control valve positions.

To open the rail puller:

1. Be sure that the control valve lever is in the neutral/hold (“3”) position.
2. Push and hold the motor on-off button to start the pump.
3. Move control valve lever to the open (“1”) position. The puller cylinders will advance.
4. To stop cylinder movement, release the motor on-off button or move the control valve lever to the neutral/hold (“3”) position.

To close the rail puller:

1. Be sure that the control valve lever is in the neutral/hold (“3”) position.
2. Press and hold the motor on-off button. Pump must be on to retract cylinders.
3. Move control valve lever to the close (“2”) position. The puller cylinders will retract.
4. To stop cylinder movement, release the motor on-off button or move the control valve lever to the neutral/hold (“3”) position.

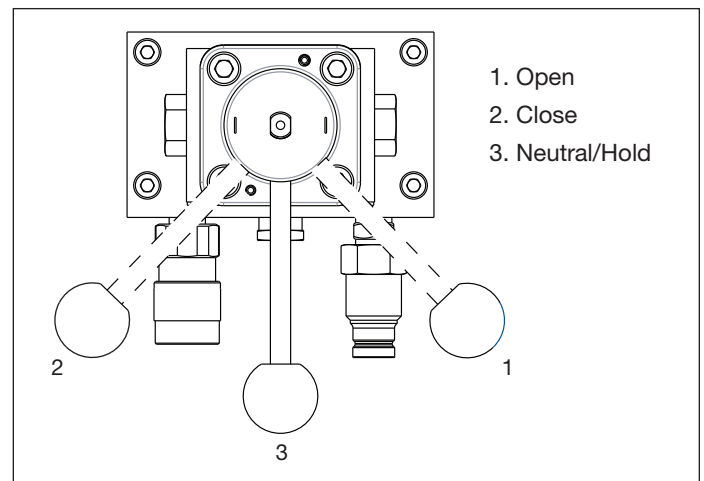


Figure 8, Control Valve Positions

NOTICE The control valve will block hydraulic flow in the cylinder hoses when the lever is moved to the neutral/hold (“3”) position. However, use of a separate load lock valve in the pulling (close) circuit is strongly recommended, as shown in Figure 4.

8.6 Air Removal

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

When the cylinders advance and retract smoothly and without hesitation, the air has been vented from the system.

NOTICE Trapped air purged from system components will return to reservoir. Oil level may drop. Add additional oil (if required) to reservoir after purging air. Refer to Section 9.4.

8.7 Relieving Trapped Pressure

To relieve trapped pressure in the circuit

1. Be sure that pump is off and that puller is not under load.
2. Rapidly move the control valve lever back and forth through all three positions.
3. Be certain that pressure gauge(s) indicates zero (0) psi/bar. Be sure there are no indications of any remaining pressure being trapped in the system, such as a stiff hose.

8.8 Emergency Pressure Release Valve

In the event of a pump malfunction or other condition that prevents pressure from being relieved in the normal way (see Section 8.7), the emergency pressure release valve can be used. See Figure 9.

To relieve pressure, turn the valve knob counter clockwise until pressure is relieved and gauge indicates zero psi/bar.

After relieving pressure, turn the knob clockwise until it is firmly closed. Use hand force only. **DO NOT USE TOOLS!**

NOTICE The emergency pressure release valve is intended for emergency use only and should not be used to relieve pressure during routine pump operation.

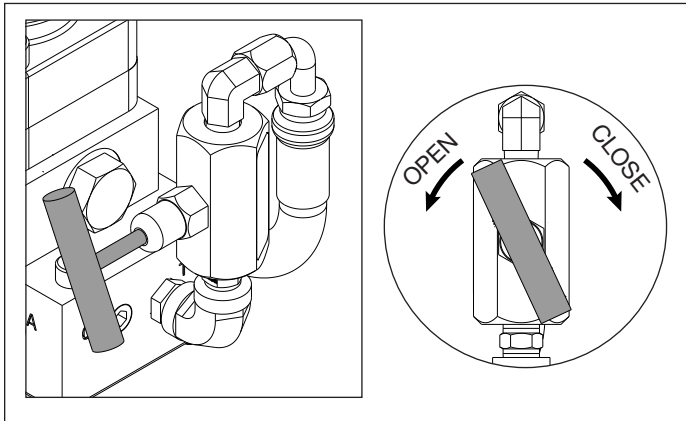


Figure 9, Emergency Pressure Release Valve

8.9 Disconnecting Hydraulic Hoses

Disconnect hydraulic hoses after use as described in the following steps:

1. Fully retract the rail puller cylinders. Be sure that the load is completely removed from the device.
2. Move the control valve lever back and forth between the open ("1") and close ("2") positions several times to relieve any trapped pressure.

3. Verify that the hydraulic pressure gauge indicates zero (0) psi/bar.
4. Disconnect hydraulic hoses from rail puller.
5. To prevent contamination, cap or plug all open hydraulic couplings and ports.

9.0 MAINTENANCE

9.1 Check Oil Level

1. Be sure rail puller hydraulic cylinders are fully retracted.
2. Rotate the control valve lever back and forth several times between the open and close positions ("1" and "2") to remove any trapped pressure.
3. Remove the battery from the pump. Refer to Section 7.2.
4. Place the pump on a level surface.
5. Visually check the oil level by looking through the hydraulic reservoir sight glass. Reservoir is FULL when oil level is about halfway between the top and bottom of the sight glass. Refer to Figure 10.

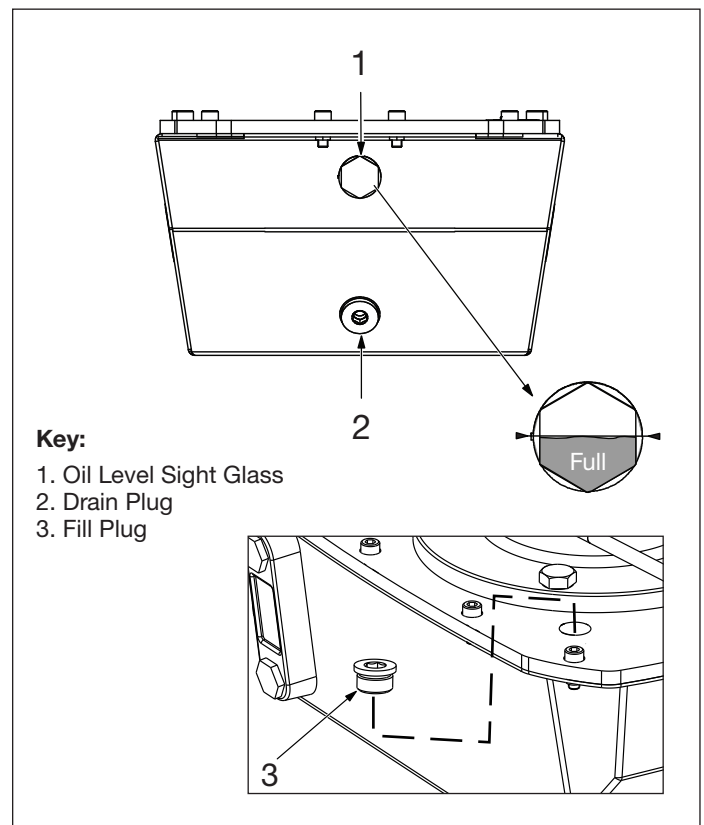
If oil level is low:

Add oil as described in Section 9.4. Refer to Section 9.2 for oil requirements.

9.2 Hydraulic Oil Information

Use only Enerpac HF hydraulic oil when adding additional oil or when performing an oil change. Enerpac HF hydraulic oil is available from Enerpac distributors and Enerpac authorized service centers.

NOTICE Use of other oils may result in damage to pump components. Such damage is not covered under the Enerpac product warranty.



Key:

1. Oil Level Sight Glass
2. Drain Plug
3. Fill Plug

Figure 10, Hydraulic Reservoir

9.3 Oil Level Sight Gauge

An oil level sight gauge is located on one side of the reservoir. See Figure 11. The sight gauge allows the operator to view the reservoir oil level at a glance. For most rail puller applications if the oil level is 1/4 to 1/2 inch [6.4 to 13.0 mm] below the top of the sight gauge, the amount of oil in the reservoir will be sufficient.

Note that larger rail pullers may require that the reservoir be filled to its full capacity, as described in Section 9.4 (and shown in Figure 10).

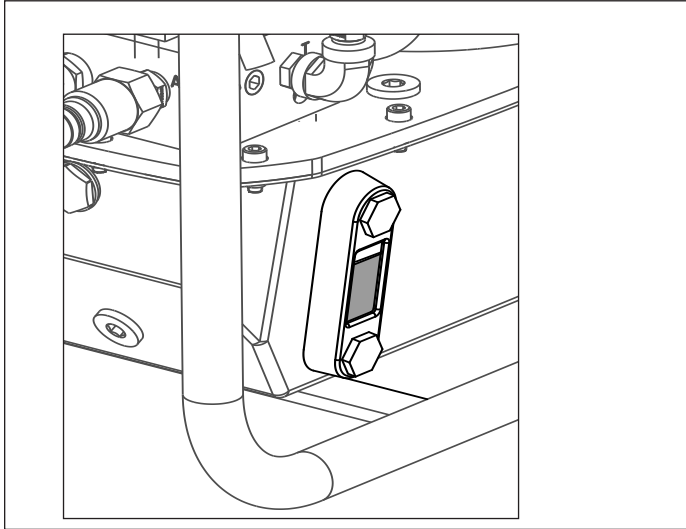


Figure 11, Oil Level Sight Gauge

9.4 Adding Oil

1. Be sure that rail puller cylinders are fully retracted.
2. Rotate the control valve lever back and forth several times between the open and close positions (“1” and “2”) to remove any trapped pressure.
3. Disconnect hydraulic hoses.
4. Remove the battery from the pump. Refer to Section 7.3.
5. Place the pump on a level work surface.
6. Remove the oil fill plug from cover plate. Refer to Figure 10.
7. Slowly fill the reservoir with new oil until level is about halfway between the top and bottom of the hydraulic reservoir sight glass, as shown in Figure 10. Refer to Section 9.2 for oil requirements.

NOTICE Do NOT overfill. Be certain that puller hydraulic cylinders are fully retracted before adding any oil. Over filling the hydraulic reservoir may cause damage to the pump.

9.5 Oil Change

Change the hydraulic oil in the pump reservoir at least once a year. Oil should be changed immediately if it is suspected that the oil has become contaminated.

To properly drain and refill the reservoir, change the oil as described in the following steps. Refer to Figure 10.

1. Be sure that rail puller cylinders are fully retracted.
2. With the pump off, rotate the control valve lever back and forth several times between the open and close positions (“1” and “2”) to remove any trapped pressure.
3. Remove the battery from pump.
4. Disconnect hydraulic hoses from pump.

NOTICE The pump is equipped with a 1.0 gallon [4.0 liter] hydraulic reservoir. Be sure the pan or container used in the next step is large enough to hold all the drained oil.

5. Place a suitable pan or container of appropriate capacity under the hydraulic reservoir drain plug.
6. Remove hydraulic reservoir drain plug. Allow used oil to drain completely from reservoir.
7. Clean hydraulic reservoir drain plug and remove any metal shavings (plug is magnetic).
8. Reinstall hydraulic reservoir drain plug.

NOTICE Dispose of used oil in accordance with all applicable laws and regulations.

10. Refill hydraulic reservoir with new oil. Refer to Section 9.4.

10.0 PRESSURE RELIEF VALVE ADJUSTMENT

WARNING

Never adjust the pressure relief valve setting above 10,000 psi [700 bar]. Be certain that the pressure setting does not exceed the maximum rated pressure of rail puller being used. Failure to observe these precautions may result in catastrophic failure of rail puller and related components. Death or serious personal injury could occur.

Adjust the relief valve setting as described in the following steps. Refer to Figure 11 for relief valve and manifold details. Refer to Figure 8 for valve lever positions.

1. Install a 0-15,000 psi [0-1000 bar] gauge in the “B” port.
2. Install a 3/8” pipe plug in the “A” port and torque to 25 ft-lbs [33 Nm].
3. Loosen the relief valve locknut to permit adjustment of set screw.
4. Rotate the control valve lever to the neutral/hold position (“3”).
5. Start the pump and allow the oil to warm.
6. Rotate the control valve lever to the close position (“2”). Allow pressure to build.
7. To increase pressure: SLOWLY turn the relief valve set screw clockwise until pressure increases to the desired setting.

NOTICE An internal check valve in the manifold will prevent the pressure from dropping when the set screw is turned counter-clockwise. To lower the pressure setting, follow steps 8a through 8e.

8. To decrease pressure:
 - a. Be sure the pump is running.
 - b. Rotate the control valve lever to the open position (“1”) to relieve pressure on the “B” port.
 - c. Turn the relief valve set screw counter-clockwise one turn.
 - d. Rotate the control valve lever to the close position (“2”).
 - e. SLOWLY turn the relief valve set screw clockwise until “B” port pressure increases to the desired setting.

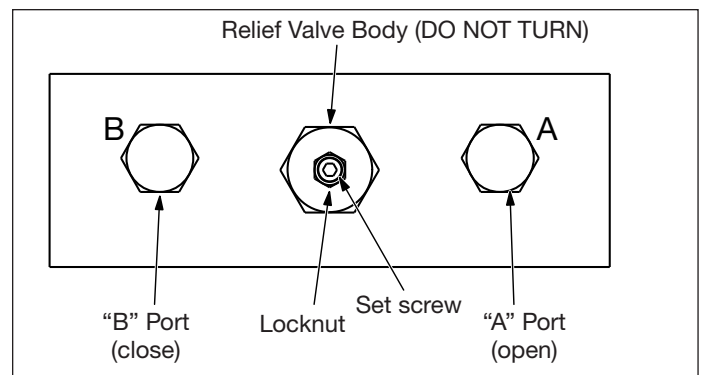


Figure 12, Relief Valve



9. When the desired pressure setting is reached, lock the set screw with the locknut. DO NOT overtighten.
10. Before turning off pump, rotate the control valve lever momentarily to the open position (“1”) to relieve pressure at the “A” port. Then, rotate the lever to the neutral/hold position (“3”). Check that gauge indicates zero (0) psi/bar.
11. Shut off the pump.

11.0 TROUBLESHOOTING

The information in the Troubleshooting Guide 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.

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 remove battery from pump before performing any maintenance or repair procedures.

TROUBLESHOOTING GUIDE		
Symptom	Possible Cause	Solution
1. Pump will not start.	a. Battery is not installed.	Install battery.
	b. Safety key is not inserted.	Insert safety key.
	c. Battery is discharged.	Charge battery.
	d. Safety time delay activated.	The motor circuitry contains a safety time delay feature that briefly delays motor start-up after the pendant switch is placed in the ON position. This delay may last up to 5 seconds. Wait at least 5 seconds before restarting the pump motor after stopping it. Do not attempt to rapidly jog the pump motor on and off.
	e. Electrical contacts are dirty or corroded.	Clean contacts on the battery, pump and charger.
2. Pump clicks when remote pendant switch is on, but does not start.	a. Battery is discharged.	Charge battery.
	b. Battery is damaged or not functioning.	Replace battery.
	c. Electrical contacts are dirty or corroded.	Clean contacts on the battery, pump and charger.
	d. Pump is jammed due to obstruction. Possible internal damage to pump.	Contact Enerpac Authorized Service Center.
3. Low fluid output.	a. Pump needs priming.	To prime the pump, be sure that the pump reservoir is filled with oil. Then, run the pump with the control valve in the neutral/hold position (“3”) while gently rocking the pump from side-to-side.
	b. Bypass valve malfunction.	Contact Enerpac Authorized Service Center.
	c. Oil intake screen is clogged with debris.	Contact Enerpac Authorized Service Center.
	d. Internal damage to pump.	Contact Enerpac Authorized Service Center.
4. Pump does not build pressure.	Pressure relief valve setting too low.	Adjust pressure relief valve setting. Refer to Section 10.

(continued on next page)

TROUBLESHOOTING GUIDE (continued)		
Symptom	Possible Cause	Solution
5. Noisy and/or vibrating pump operation.	a. Pump element piston is sticking.	Contact Enerpac Authorized Service Center.
	b. Motor is damaged.	Contact Enerpac Authorized Service Center.
6. Battery charge is reduced after more than one month of use.	The battery has automatically performed self-maintenance to extend its life.	Fully recharge battery before use.
7. Puller cylinders will not advance or retract when pump is started.	a. Control valve lever is in neutral/hold ("3") position.	Move valve lever to the open ("1") or close ("2") position as required. Pump motor must be running to advance or retract cylinders.
	b. Low oil level.	Add oil as required.
	c. Pump needs priming.	To prime the pump, be sure that the pump reservoir is filled with oil. Then, run the pump with the control valve in the neutral/hold position ("3") while gently rocking the pump from side-to-side.
	d. Oil intake screens clogged with debris.	Contact Enerpac Authorized Service Center.
	e. Internal damage to control valve or pump.	Contact Enerpac Authorized Service Center.
8. Pump slows down and stops.	Battery is discharged.	Charge battery.
9. Puller cylinders advance and retract erratically.	a. Air in the system.	Advance and retract the puller cylinders until operation is smooth.
	b. External hydraulic leak.	Tighten connections. Replace damaged components.
	c. Internal leakage in valve.	Contact Enerpac Authorized Service Center.
	d. Internal damage to valve.	Contact Enerpac Authorized Service Center.
	e. Internal damage to pump.	Contact Enerpac Authorized Service Center.

12.0 SAFE DISPOSAL PROCEDURE

When the pump has reached the end of its useful life, dispose of it as described in the following steps:

1. Be certain that all hydraulic pressure is completely relieved.
2. Disconnect hydraulic hoses from pump.
3. Remove battery from pump. Dispose of battery in accordance with battery manufacturer's instructions. Refer to Briggs & Stratton battery user's manual.
4. Drain all hydraulic oil from pump reservoir. Dispose of oil in accordance with all applicable laws and regulations.
5. Take the pump to an approved industrial recycling facility for disposal.

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