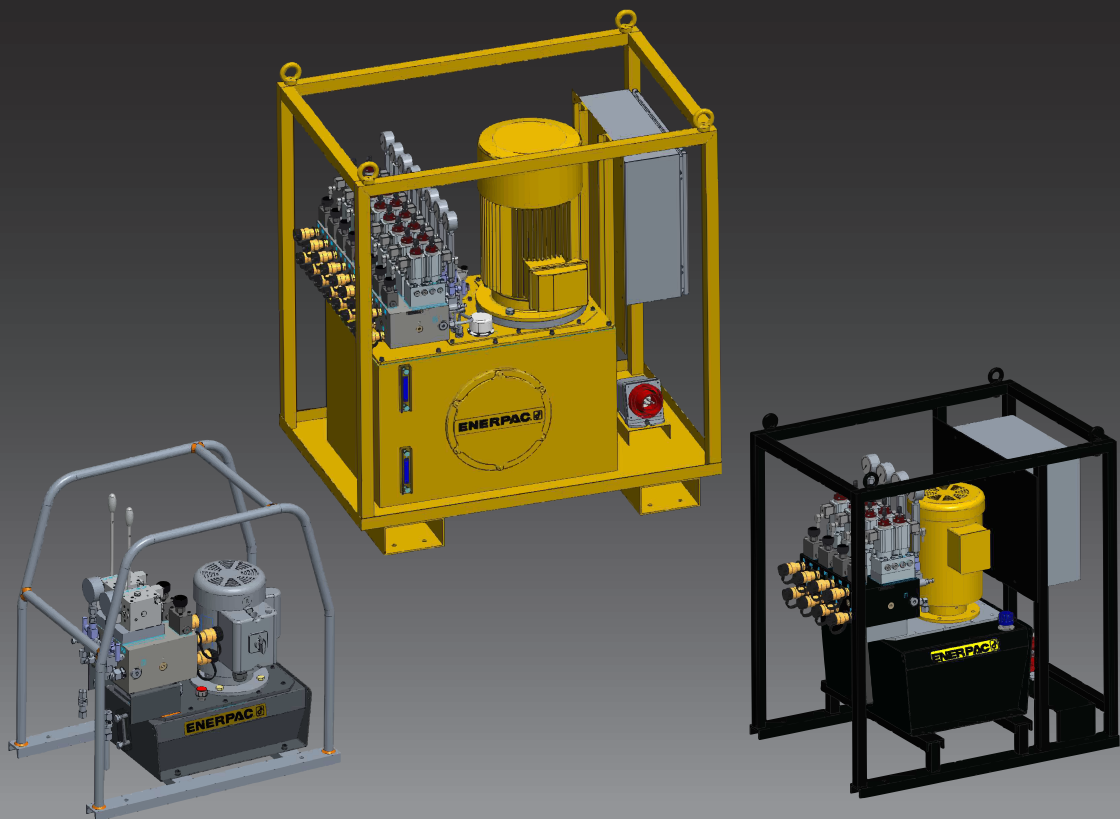


HYDRAULIC SPLIT FLOW PUMP INSTRUCTION SHEET

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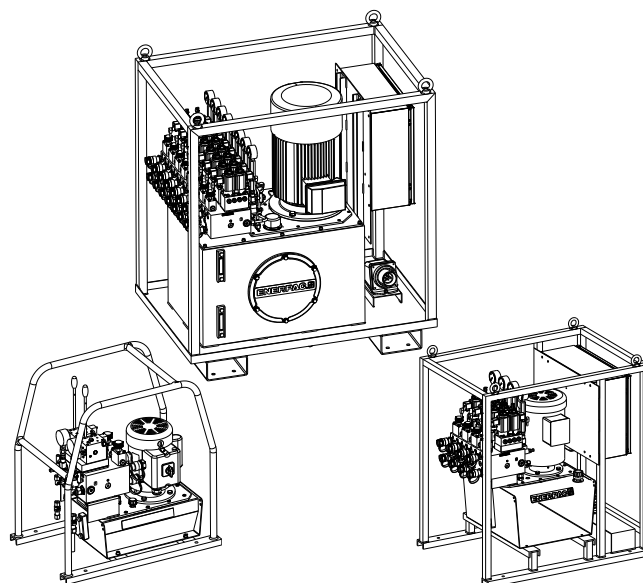
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ENGLISH (EN)



SPLIT FLOW PUMP

SFP SERIES



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1.0 INTRODUCTION

Overview

Enerpac is a global market leader in high pressure hydraulic tools, controlled force products and solutions for precise positioning of heavy loads.

The SFP-Series electrically driven Split Flow Hydraulic Pumps are Enerpac's new solution for multi-point lifting and lowering applications where uneven loads need to be positioned equally. They are a far better alternative to using separately operated pumps or manifolds with needle valves. Split Flow Pumps are a safe and economical solution which can achieve lifting accuracy of 4% across lifting points.

The Split Flow Pump has manual valves with joysticks or solenoid valves with a pendant to enable controlled movement of the load. The load can be lifted/lowered simultaneously using single or double-acting cylinders. Depending on the application, the lifting points can be operated individually or simultaneously.

Application

The Split Flow Pumps can be used in a wide variety of lifting, lowering and pushing applications, such as: bridge deck lifting for bearing maintenance, machinery lifting and moving, skidding to move structures and buildings, and shipbuilding applications.

Delivery Instructions

Upon delivery all components must be inspected for damage incurred during shipping. If damage is found the carrier should be notified at once. Shipping damage is not covered by the Enerpac warranty. The carrier is responsible for all repair and replacement costs resulting from damage in shipment.

Warranty

- Enerpac guarantees the product only for the purpose for which is intended.
- Refer to the Enerpac Global Warranty document for terms and conditions of the product warranty.

Any misuse or alteration invalidates the warranty.

- Observe all instructions as communicated in this manual.
- When replacement parts are needed, use only genuine Enerpac replacement parts.

Modification to any part of the equipment outlined in this manual should not be attempted, nor any component part be replaced without first consulting Enerpac. Modifications may render the equipment dangerous. Component parts are each rated to suit the demands of the overall equipment design and replacement with similar items without provenance may lead to unexpected and dangerous accidental features.

If any equipment abuse is evident, the warranty will be invalidated and Enerpac will not be made responsible for an injury due to misuse or failure to comply with the above safety notes.

EU Declaration of Conformity



SFP Series

These tools conform with the requirements for CE.

Enerpac declares that this product has been tested and conforms to applicable standards and is compatible to all CE requirements.

A copy of an EU Declaration of Conformity is enclosed with each shipment of this product.

2.0 SAFETY

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

If you have never been trained on high-pressure hydraulic safety, consult your distributor or service center for information about Enerpac Hydraulic Safety Courses.

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



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

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

⚠ DANGER Indicates a hazardous situation that, if not avoided, will result in death or serious personal injury.

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

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

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

2.1 Safety Precautions

WARNING

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

- Read and completely understand the safety precautions and instructions in this manual before operating the Split Flow Pump or preparing it for use. Always follow all safety precautions and instructions, including those that are contained within the procedures of this manual.
- Ensure all hydraulic components are rated to a safe working pressure of 700 bar (10,150 psi).
- These pumps have internal factory adjusted relief valves, which must not be repaired or adjusted except by an Authorized Enerpac Service Center.
- Do not connect a jack or cylinder to a pump with a higher pressure rating. Never set the relief valve to a higher pressure than the maximum rated pressure of the pump. Higher settings may result in equipment damage and/or personal injury.
- The system operating pressure must not exceed the pressure rating of the lowest rated component in the system. Visualize pressure gauges in the system to monitor operating pressure. It is your window to what is happening in the system.
- If alternative hydraulic pumps are used, ensure that there are adequate systems to limit the working pressure to 700 bar (10,150 psi).
- Do not overload equipment. 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 gear when operating hydraulic equipment. Always wear eye protection. Safety equipment such as dust mask, non-skid safety shoes, hard hats, gloves or hearing protection (used as appropriate) 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.
- When working with manual valves, start the pump with the valve in the neutral position to prevent accidental cylinder operation. Keep hands clear of moving parts and pressurized hoses.
- Immediately replace worn or damaged parts. Use only genuine Enerpac parts from approved distributors or service centers. Standard grade parts will break causing personal injury and property damage. ENERPAC parts are designed to fit properly and withstand high loads.
- Do not handle pressurized hoses; escaping oil under pressure can penetrate the skin, causing serious injury. Seek medical attention immediately if oil penetration is suspected.

- To minimize risk of personal injury keep hands and feet away from the tool and workpiece during operation.
- Only pressurize complete and fully connected hydraulic systems. Do not pressurize systems that contain unconnected couplers. If the system becomes extremely overloaded, components can fail catastrophically causing severe personal injury.
- Enerpac does not recommend the use of the SFP Series pump with multiple telescopic cylinders (such as the Enerpac RT and RLT Series). In a multi-point application, the plunger stages of each telescopic cylinder will extend and retract at slightly different speeds. The cylinders will never be exactly synchronized and uneven lifting will result.

CAUTION

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

- Ensure components are protected from external sources of damage, such as moving machine parts, sharp edges, weld spatter, corrosive chemicals and excessive heat or flame. Excessive heat will soften packings and seals, resulting in fluid leaks. Heat also weakens hose materials and packings. For optimum performance do not expose equipment to temperatures of 65°C [150°F] or higher.
- Do not use electric pumps in an explosive atmosphere. Adhere to all local and national electrical codes. A qualified electrician must do installation and modification.
- Take care to avoid sharp bends and kinks in hydraulic hoses. Bends and kinks can cause severe back-up pressure and cause hose failure. Protect hoses from dropped objects; a sharp impact may cause internal damage to hose wire strands. Protect hoses from crush risks, such as heavy objects or vehicles; crush damage can cause hose failure.
- Do not lift hydraulic equipment by the hoses or couplers. Use only the designated carrying handles.
- Avoid situations where loads are not directly centered across the entire saddle surface. Off-center loads produce considerable strain on cylinders and plungers. In addition, the load may slip or fall, causing potentially dangerous results.
- Always use a saddle to protect the plunger.
- To prevent damage to pump electric motor, check specifications. Use of incorrect power source will damage the motor.
- Check motor rotation direction to prevent damage to hydraulic pump (see paragraph 4.0)
- Lubricate tools as directed in this manual prior to operation. Use only approved lubricants of high quality, following the lubricant manufacturers instructions.

NOTICE

- Hydraulic equipment must only be serviced by a qualified hydraulic technician. For repair service, contact the Enerpac Authorized Service Centre in your area.
- To help ensure proper operation and best performance, the use of Enerpac oil is strongly recommended.

3.0 SPECIFICATIONS

The split flow pump utilizes a single electric motor to drive a hydraulic pump with multiple outlets. There are different pump models depending on the number of outlets and flow. The table below provides specifications for each pump model (see Table 2).

4.0 INSTALLATION

Install or position the pump to ensure that air flow around the motor and pump is unobstructed. Keep the motor clean to ensure maximum cooling during operation.

CAUTION

Eliminate the presence of side load forces when using hydraulic cylinders. Side load can occur through:

1. An eccentric load on the plunger.
2. An horizontal load on a structure.
3. A structure and/or cylinder misalignment.
4. Non synchronized lifting actions.
5. Non stable cylinder base support.

Always use a flat, hard surface as a cylinder support plate. Use a low friction material on top of the saddle. To reduce cylinder offset loading, optional CATG-swivel saddles are available. Always use grease underneath swivel saddles.

NOTICE

It is mandatory that the operator has a full understanding of all instructions, safety regulations, cautions and warnings, before starting to operate high force tool equipment. In case of doubt, contact Enerpac.

4.1 Transportation

The frame has two forklift truck pockets for forklift lift, and four hoisting certified eyes for lifting with cranes.

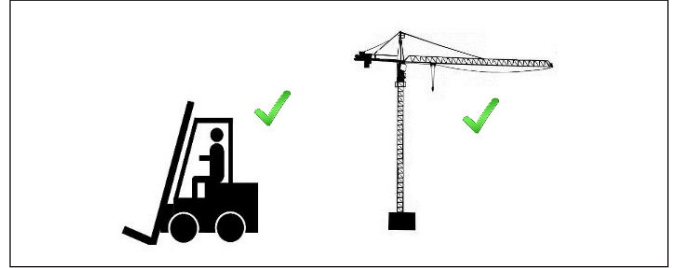


Figure 1: Equipment transportation

4.2 Electric connections

All models, except for model SFP202MB (monophasic), are factory equipped with a 3 phase electrical plug for the given voltage. Model SFP202MB is equipped with a 1 phase electrical plug as showed in Table 1.

Altering the plug type should only be done by a qualified electrician, adhering to all applicable local and national codes.

The disconnection and line circuit protection will be provided by the customer. Line circuit protection will be 115% of motor full load current at maximum pressure of application.

The plug supplied is set as follows:

		Electric plug
Motor size KW	0,75	1Ph 115V
		3Ph 400V
	5,5	3Ph + PE 400V 30A
	7,5	
Motor size Hp	11	3Ph + PE 400V 30A
	1	1Ph 115V
	5,5	3Ph + PE 480V 30A
	7,5	
	15	3Ph + PE 480V 60A

Table 1: Plug specifications

PUMP MODEL Electric power B = 115V-1Ph-60Hz J = 460V-3Ph-60Hz W = 400V-3Ph-50Hz	SFP202M	SFP213S	SFP213M	SFP404S	SFP404M	SFP604S	SFP604M	SFP228S	SFP228M	SFP242S	SFP242M	SFP409S	SFP409M	SFP414S	SFP414M	SFP421S	SFP421M	SFP613S	SFP813S		
	B	J/W						J/W													
	Reservoir size (gal)/ l	2,6/10	10/40						40/150												
	Split flow outlets	2	2	4	6	2			4						6	8					
	Flow per outlet in³/min (10,150 psi) l/min (700 bar)	20/0,2	94/1,3	33/0,45	33/0,45	203/2,8		305/4,2		65/0,9		101/1,4		153/2,1		94/1,30		94/1,30			
Motor size (Hp) / kW	1/0,7	7,5/5,5						10/7,5		15/11		7.5/5,5		10/7,5		15/11		15/11		20/15	
Weight (lbs) / kg	190/86	529/240						1076/488		1160/526		1047/475		1076/488		1160/526		1213/550		1300/590	

Table 2: SFP models and specifications

NOTICE

The pumps with reservoir of 10 l. (2.6 gal) and 40 l. (10 gal) require to verify motor rotation. After connecting the male plug to the electric main power, start the motor and check rotation according to the arrow label on the motor and correct phase if required.

4.3 Electric panel description

The electric panel (models with solenoid valves) includes the controls to switch the machine on.

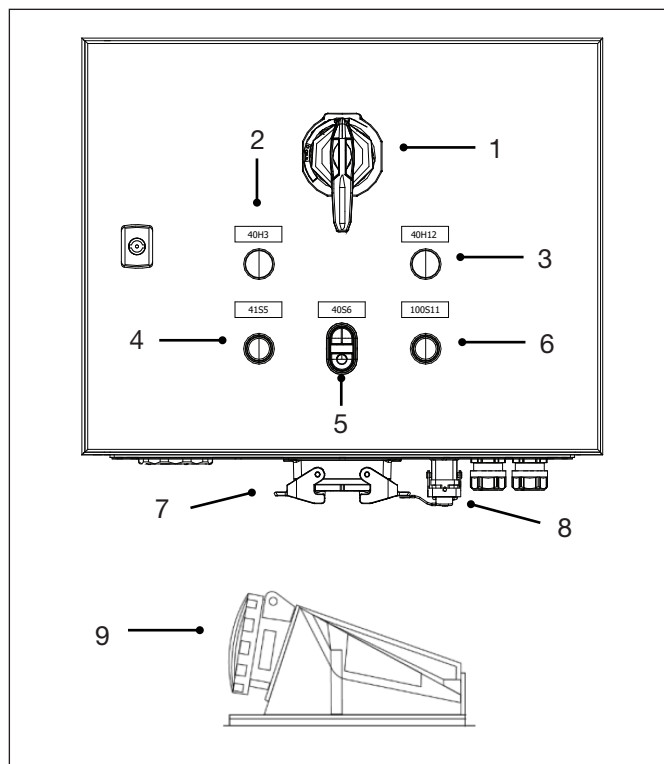


Figure 2: Electric panel and plug

1. Main electrical switch.
2. Power on led.
3. System alarm light.
4. Reset pushbutton.
5. Start/Stop motor pushbutton.
6. Decompress pushbutton.
7. Pendant control connector.
8. Communication connector.
9. Power supply connector.

4.4 Hydraulic connections

WARNING

On double-acting cylinders be certain that hoses are connected to BOTH couplers. Never attempt to pressurize a double-acting cylinder if only one hose is connected.

Connect the hydraulic hoses as follows:

1. Port A to the advance side of the cylinder.
2. Port B to the retract side of the cylinder (only for

double acting cylinders, for single acting cylinder leave it disconnected).

Follow the next steps to connect the hoses correctly:

1. Keep cylinder connected to a hydraulic system with a minimum cleanliness level of NAS 1638 Class 6.
2. Remove dust covers/rubber plugs from oil ports.
3. Inspect all threads and fittings for signs of wear or damage and replace as needed.
4. Clean all threads and fittings.
5. Make hydraulic connections for double-acting cylinders using two hoses.
6. Fully hand-tighten all couplers. Loose coupler connections will block the flow of oil between the pump and the cylinder.
7. Check for leaks in system and have repaired by qualified personnel.

4.5 Oil level

Check the oil level of the pump prior to start-up, if necessary add oil by removing the cap from the top of the reservoir. The reservoir is full when the oil level reaches the top of the sight glass.

CAUTION

Add oil only when all system components are fully retracted, otherwise the system will contain more oil than the reservoir can hold.

5.0 OPERATION

5.1 Manual valve control

Some models have been designed to be operated with 2, 4 or 6 manual valves, one per output depending on the model type. To move the cylinder, move the handle of the valve according to the desired direction. The advance or retract movement occurs as labeled on the valve.



Figure 3: Manual valves

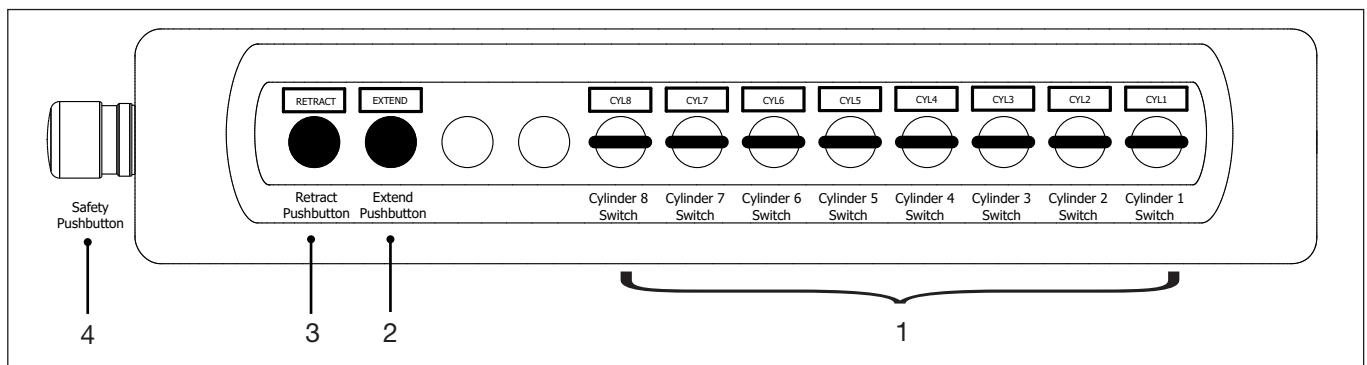


Figure 4: Pendant control

5.2 Pendant Control

Some pumps (models with solenoid valves) have been designed to be operated by a remote control connected to the electric cabinet with a 5 m (15 ft) cable in the connector Nr 7.

Through this device the operator can operate every cylinder (2, 4, 6 or 8 cylinders depending on model)

Therefore it is important to familiarize yourself with every button (Figure 4):

1. Cylinder switch buttons: Through these buttons, the operator can select the cylinders to work with.
2. Extend pushbutton: When this button is pushed the oilflow of port A goes to the cylinder. Therefore in a general purpose cylinder, the plunger moves outward.
3. Retract pushbutton: When this button is pushed the oilflow of port A goes to the tank. Therefore in a general purpose cylinder, the plunger moves inward.
4. Safety pushbutton: When this button is pushed, the pump stops the movement of all cylinders.

5.3 Turning the powerpack on

5.3.1 Pumps with manual valves

Turn the motor on using the following steps (Figure 5):

1. Press the motor start button (Nr 1) for 3 seconds.
2. After the electric motor starts use the manual valves to move the cylinders as explained in the paragraph 5.1.
3. To stop the motor press the stop button (Nr 2)

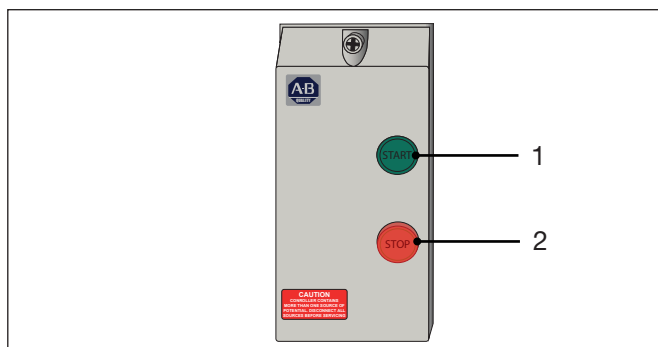


Figure 5: Manual starter

5.3.2 Pumps with solenoid valves

Turn the motor on using the following steps (see Figure 2 and Figure 4):

1. Turn the main switch (Figure 2, Nr 1) to the "On" position located on the electrical cabinet, ensure the Power On Led (Figure 2, Nr 2) activates.
2. Deactivate the emergency stop button (Figure 4, Nr 4).
3. Press the reset button to reset the security system after the emergency button has been de-activated (Figure 2, Nr 4)
4. Press the motor start button for 3 seconds (Figure 2, Nr 5)

After the electric motor starts, use the pendant to move the cylinders as explained in paragraph 5.2

5.4 Setting the pressure relief valves

The relief valves are factory set at 700 bar/ 10,150 psi). Their maximum pressure is between 10 and 700 bar (145 psi and 10,150 psi).



Figure 6: Relief valve

The powerpack has been designed to set the relief valves up by the operator. For this purpose the operator needs the following tools:

1. Flat screwdriver (1 unit).
2. 13 mm Spanner (1 unit).

To set the relief valve up, follow the next steps:

1. Connect the output to one cylinder.
2. Loosen the hexagonal nut of the relief valve.
3. Turn the bolt with the screwdriver fully (counterclockwise) for a start reference point.
4. Turn the bolt a quarter turn (counterclockwise) in order to open the relief valve.
5. Press the motor start button for 3 seconds (Figure 2, Nr 3).
6. Extend the cylinder plunger to its full stroke. When the plunger reaches the end of its stroke the pressure will build. Note in the manometer the maximum pressure reached.
7. Turn the bolt with the screw driver to adjust the desired pressure (clockwise to decrease the pressure, or clockwise to increase the pressure).
8. Tighten the nut with the spanner to lock the relief valve bolt.

5.5 Decompressing system (Relieving hydraulic pressure)

With the motor switched off (see Figure 2 and Figure 4):

1. Using the pendant select the cylinders to decompress (Figure 4, Nr 1).
2. Push decompress button on the electric cabinet (Figure 2, Nr 6.)
3. Push at the same time the pendant retract or advance button (Figure 4, Nr 2 or 3).

The solenoid valve will direct flow to tank relieving the pressurized line.

5.6 Controlling the hydraulic flow of line A

The powerpack has flow control valves installed on top of the outlets. These valves can be used to manually change the load lowering speed of fluid in a circuit by increasing or decreasing the pinch off point.

Turning in clockwise will reduce the flow for slower flow speeds and turning anti-clockwise will increase the flow speed.

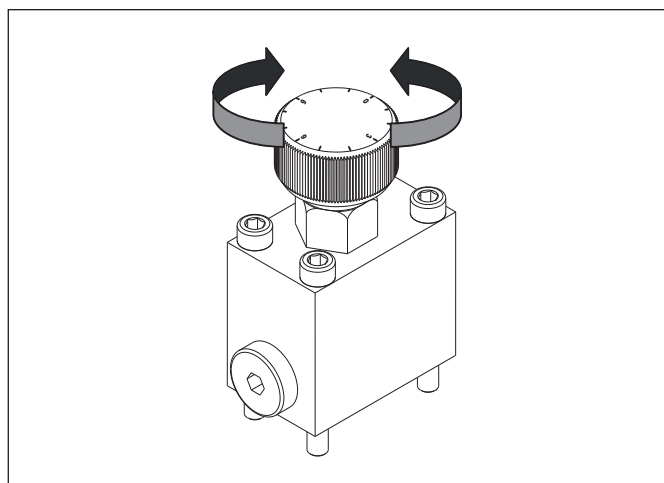


Figure 7: Flow control valve

The manual adjust knob has a total of 5 full turns. The last two turns do not restrict the flow rate (see Table 3). There is a reference line on the right side of the valve.

Table 3: Flow control valve regulation

Rotation	Flow rate (lpm)
0,5	0,15
1,0	0,45
1,5	0,75
2,0	1,05
2,5	1,4
3,0	2,1
3,5	4,1
4,0	29,5
4,5	29,5
5,0	29,5

6.0 MAINTENANCE

6.1 Check Oil Level

Check the oil level of the pump prior to start-up. If necessary, add oil by removing the fill port cap.

NOTICE

Always be sure cylinders are fully retracted before adding fluid to the reservoir.

6.2 Change Oil and Clean Reservoir

Enerpac HF oil is a crisp blue color. Frequently check oil condition for contamination by comparing pump oil to new Enerpac oil.

Enerpac recommends to completely drain and clean the reservoir every 250 hours, or more frequently if used in dirty environments.

For 10I and 40I models, this procedure requires to remove the pump from the reservoir. In the case of the 150I model, the reservoir can be drained and cleaned through the opening on the front.

NOTICE

Work on a clean bench and dispose of used oil according to local codes.

1. For 10I and 40I models, unscrew the bolts holding the cover plate to the reservoir and lift the pump unit out of the reservoir (be careful not to damage the filter screen). For 150I model, unscrew the opening to access the inside of the reservoir.
2. Pour all oil out of the reservoir.
3. Thoroughly clean the reservoir and reservoir magnet with a suitable cleaning agent.
4. Reassemble the pump and reservoir in 10I and 40I models or restore the opening in 150I model.
5. Fill the reservoir with clean Enerpac hydraulic oil. The reservoir is full when oil level is at the top of the sight gauge.

6.3 Changing the Filter Element

The filter element should be replaced every 250 hours, or more frequently in dirty environments.

In 150I model, the filter manifold is equipped with a 25 psi (1,7 bar) bypass to prevent over pressure rupture if filter plugging occurs and with a small gauge that shows the pressure when the filter is dirty (consult the hydraulic diagrams on Table 5). 10I and 40I models do not have this security system. In these models the filter is installed in the suction of the pump, so the filter is changed when changing the oil.

7.0 TROUBLESHOOTING GUIDE

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

Refer to the troubleshooting chart for a list of typical cylinder problems and possible causes. The troubleshooting chart is not all-inclusive, and should be considered only as an aid to help diagnose the most common problems. For repair service, contact your local Authorized Enerpac Service Center.

7.1 Troubleshooting chart

PROBLEM	POSIBLE CAUSE	SOLUTION
Cylinder does not advance, advances slowly or in spurts	A. Oil level in pump reservoir is low. B. Relief valve open. C. Loose hydraulic coupler. D. Air trapped in system. E. Cylinder plunger binding.	A. Add oil to pump. B. Close pump relief valve. C. Check that all couplers are fully tightened. D. Remove air. E. Check for damage to cylinder. Have cylinder serviced by an authorized Enerpac service center.
Cylinder advances, but does not hold pressure.	A. Leaking oil connection. B. Leaking seals. C. Internal leakage in pump.	A. Check that all connections are tightened. B. Locate leak(s) and have equipment serviced by an Enerpac service center. C. Have pump serviced by an authorized Enerpac service center.
Cylinder does not retract.	A. Pump reservoir overfilled. B. Loose hydraulic coupler. C. Air trapped in system. D. Oil flow to cylinder blocked. E. Hose internal diameter too narrow. F. No load on a load return cylinder. G. Flow control valve closed.	A. Drain oil level to full mark. B. Check that coupler(s) are fully tightened. C. Remove air. D. Check that couplers are correctly connected, fully tightened and valving is working properly. E. Use a larger diameter hose. F. CLL and CLS cylinders are load return. Apply load force to completely retract the cylinder. G. Open flow control valve.
Wrong motor rotation direction.	A. The motor phases are wrong.	A. swap two motor phases.
Alarm light switched on.	A. Thermal over load protection device is tripped. B. DC protection device is tripped.	A. Open the electric cabinet and reset the thermal overload protection device. B. Open the electric cabinet and reset the DC protection device. If problem persists, have pump serviced by an authorized Enerpac service center.
Manometer does not read pressure.	A. Needle valve closed.	A. Open the needle valve to allow pressure into the manometer.

Table 4: Troubleshooting chart

8.0 TECHNICAL DATA

In this manual other documents have been attached which are necessary to interpret this manual. In the next tables there is an index to facilitate finding these documents. Click on the icons below  to open attachments.

RESERVOIR SIZE	10 l / 2,6 gal	150 l / 40 gal											40 l / 10 gal						
VALVES TYPE	Manual valves						Solenoid valves						Man. valves		Solen. valves				
PUMP MODEL Electric power B = 115V-1Ph-60Hz J = 460V-3Ph-60Hz W = 400V-3Ph-50Hz	SFP202M	SFP228M	SFP242M	SFP409M	SFP414M	SFP421M	SFP228S	SFP242S	SFP409S	SFP414S	SFP421S	SFP613S	SFP813S	SFP213M	SFP404M	SFP604M	SFP213S	SFP404S	SFP604S
	B / W	J			W			J			W			J	W		J	W	
ASSEMBLY DRAWING																			
HYDRAULIC SCHEME																			
SPARE PARTS																			
CE DECLARATION																			

Table 5: Power packs

SFP213	MJ	n.a.	SFP404	MJ	n.a.	SFP421	MJ	n.a.	SFP202	MB	n.a.
	MW	n.a.		MW	n.a.		MW	n.a.		MW	n.a.
	SJ			SJ			SJ		SFP613	SJ	
	SW			SW			SW			SW	
SFP228	MJ	n.a.	SFP409	MJ	n.a.	SFP604	MJ	n.a.	SFP813	SJ	
	MW	n.a.		MW	n.a.		MW	n.a.		SW	
	SJ			SJ			SJ				
	SW			SW			SW				
SFP242	MJ	n.a.	SFP414	MJ	n.a.						
	MW	n.a.		MW	n.a.						
	SJ			SJ							
	SW			SW							

Table 6: Electric diagrams. Powerpacks

WORKING CYLINDERS	ELECTRIC DIAGRAMS
2	
4	
6	
8	

Table 7: Electric diagrams. Pendant control.

NOTES



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