

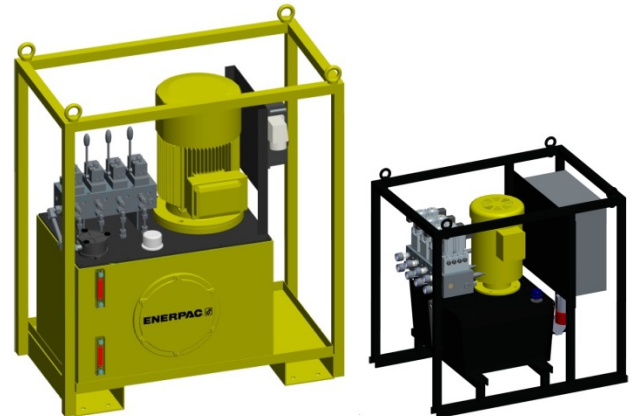
L14004710

rev: preliminary F

03/07/14

**Index:**

1.0 SAFETY & GENERAL INFORMATION.....	1
2.0 SAFETY PRECAUTIONS.....	1
3.0 SPECIFICATIONS.....	2
4.0 INSTALLATION .....	3
5.0 OPERATION.....	4
6.0 MAINTENANCE.....	5
7.0 TROUBLESHOOTING GUIDE .....	5
8.0 ATTACHED DOCUMENTATION TABLE .....	6



## 1.0 SAFETY & GENERAL INFORMATION



Read all instructions, warnings and cautions carefully. Follow all safety precautions to avoid personal injury or property damage during system operation.

Enerpac cannot be responsible for damage or injury resulting from unsafe product use, lack of maintenance or incorrect product and/or system operation. Contact Enerpac when in doubt as to the safety precautions and operations. If you have never been trained on high-pressure hydraulic safety, consult your distribution or service center for a free Enerpac Hydraulic safety course.

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

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

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

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

## 2.0 SAFETY PRECAUTIONS



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



**WARNING:** 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 as a shim or spacer in any lifting or pressing application.



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



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



**WARNING:** Do not exceed equipment ratings. Never attempt to lift a load weighing more than the capacity of the cylinder. Overloading causes equipment failure and possible personal injury.



**CAUTION:** Do not connect a jack or cylinder to a pump with a higher pressure rating. Never set the relief valve to a higher pressure than the maximum rated pressure of the pump. Higher settings may result in equipment damage and/or personal injury.



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



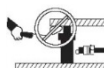
**CAUTION:** Avoid damaging hydraulic hose. Avoid sharp bends and kinks when routing hydraulic hoses. Using a bent or kinked hose will cause severe backpressure. Sharp bends and kinks will internally damage the hose leading to premature hose failure.



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



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



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



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



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



**WARNING:** 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.



**CAUTION:** 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, causing potentially dangerous results.



**CAUTION:** Distribute the load evenly across the entire saddle surface. Always use a saddle to protect the plunger.



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



**WARNING:** In case of leakage contact ENERPAC parts. Standard grade parts will break causing personal injury and property damage. ENERPAC parts are designed to fit properly and withstand high loads.



**WARNING:** 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.



**WARNING:** Start the pump with the valve in the neutral position to prevent accidental cylinder operation. Keep hands clear of moving parts and pressurized hoses.



**WARNING:** These pumps have internal factory adjusted relief valves, which must not be repaired or adjusted except by an Authorized Enerpac Service Center.



**CAUTION:** To prevent damage to pump electric motor, check specifications. Use of incorrect power source will damage the motor.



**CAUTION:** Check motor rotation direction to prevent damage to hydraulic pump (See 4.0 installation).

### 3.0 SPECIFICATIONS

The system is composed by a powerpack which commands 4 double acting cylinders.

There are different models of powerpack depending on the number of outlets and flow. Check in the next table the features of the powerpack concerning to the equipment acquired

PUMP MODEL	SFP213SW SFP213MW	SFP404SW SFP404MW	SFP604SW SFP604MW	SFP228SW SFP228MW	SFP242SW SFP242MW	SFP409SW SFP409MW	SFP414SW SFP414MW	SFP421SW SFP421MW
RESERVOIR CAPACITY (L)	40			150				
OUTLETS (points)	2	4	6	2		4		
FLOW (l/min) at 700 BAR	1,3	0,45	0,45	2,8	4,2	0,9	1,4	2,1
MOTOR POWER KW	5,5			7,5	11	5,5	7,5	11
WEIGHT (Kg)	240			488	526	475	488	526

## 4.0 INSTALLATION

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.

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.

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

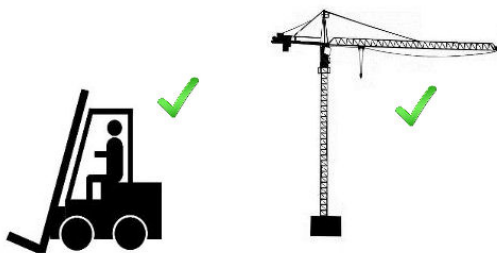
1. An eccentric load on the plunger.
2. A horizontal load on a structure.
3. A structure and/or cylinder misalignment.
4. Non synchronized lifting actions.
5. Non stable cylinder base support.

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.

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

### 4.1 Transportation

For transportation the frame has two forklift truck pockets that make available for forklift lift, and four hoisting certified eyes for lifting with cranes.



dwg 1

### 4.2 Electric connections



The pump is factory equipped with a 3 phase electrical plug for the given voltage, altering the plug type should only be done by a qualified electrician, adhering to all applicable local and national codes.

The plug supplied is set as follow: 3+N+PE 380V 16 A

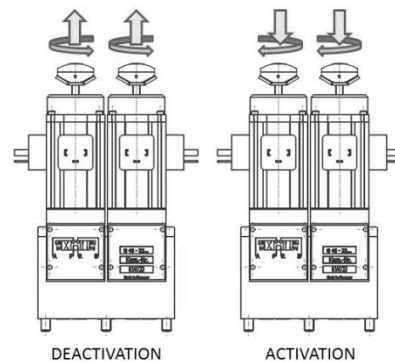
1. The disconnection and line circuit protection to be provided by customer. Line circuit protection to be 115% of motor full load current at maximum pressure of application.

**IMPORTANT:** The pumps with reservoir of 40 L. have the motor rotation direction sense. When connect the male plug to the electric main power, be sure that there is in the correct phase. If not, change the phase of the motor.

### 4.3 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.

**IMPORTANT:** To decompress ports prior to connecting hoses, move the manual valve several times in position advance and retract with the motor switched off (manual valves). For solenoid valves turn clockwise completely the valve handler in every valve as showed in the picture (previous unlock the locknut) and leave finally valves deactivated.



Connect the hydraulic hoses using the following diagram.

Port A to the advance side of the cylinder

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 correctly connect the hoses:

1. Keep cylinder connected to a hydraulic system with a fluid cleanliness level minimum 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.

## 4.4 Flow level

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

**IMPORTANT:** 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 2, 4 or 6 manual valves, one per output (depend on the model type):

To move the cylinder moves the handler of the valve according to the desired movement. The movement advance or retract is described in a label on the valve.

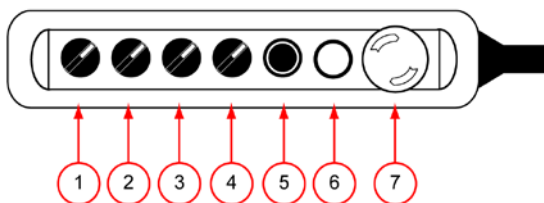


dwg 2

### 5.2 Pendant Control

Some machines (models with solenoid valves) have been designed to be operated by a remote control connected to the electric cabinet with a 10 m cable in the connector Nr 6 (see dwg 3).

Through this device the operator can operate every cylinder (2, 4 or 6 cylinders depending on model). Therefore it is important to familiarize yourself with every button. See the next explanation for it:

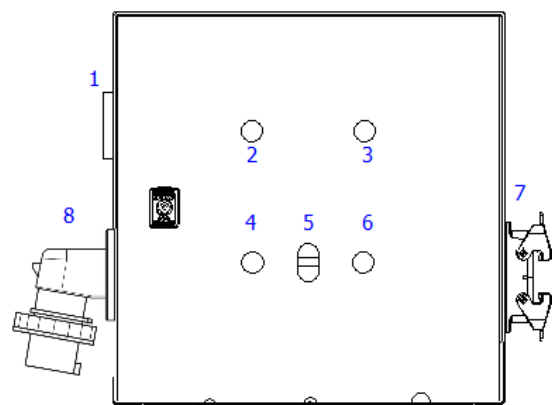


dwg 3

1. Cylinder 4 selector: This selector activates the movement of cylinder 4
2. Cylinder 3 selector: This selector activates the movement of cylinder 3
3. Cylinder 2 selector: This selector activates the movement of cylinder 2
4. Cylinder 1 selector: This selector activates the movement of cylinder 1
5. Retracting plunger: Pushing this button the flow of the port A goes to tank, therefore in a general purpose cylinder the plunger goes in.
6. Advancing plunger: Pushing this button the flow of the port A goes to the cylinder, therefore in a general purpose cylinder the plunger goes out.
7. Emergency button: Pushing this button the machine stops all the movements.

### 5.3 Electric panel description

On the electric panel (models with solenoid valves) there are the necessary controls to switch on the machine.



dwg 4

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. Power supply connector

### 5.4 Turning the powerpack on

#### 5.4.1 Pumps with manual valves

To turn the motor on following the next steps:

1. Turn the main switch to the right on the electrical cabinet
2. Press the motor starter button for 3 seconds.

Now the machine is able to work. Use the manual valves to move the cylinders as explained in the paragraph 5.1.

### 5.4.2 Pumps with solenoid valves

To turn the motor on following the next steps:

1. Turn the main switch (Nr 1) to the right on the electrical cabinet
2. Deactivate the emergency stop button (on the pendant).
3. Press the reset button to reset the security system after the emergency button have been activated (Nr 4)
4. Press the motor starter button for 3 seconds (Nr 3)

Now the machine is able to work with the pendant. Use the pendant to move the cylinders as explained in the paragraph 5.2.

### 5.5 Setting up the relief valve



The powerpack has been designed to set the relief valves up by the operator. The maximum pressure of the relief valve is between 10 and 700 bar. For this propose the operator needs the next tools:

1. Plain slot screwdriver (1 unit)
2. Spanner of 13 mm (1 unit)
3. Manometer 0-1000 bar (for pressures up to 700 bar) (4 units).

Manometers must be connected to the MP port (1/4" NPT), in order to know the pressure in each line.

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

1. Connect the output to one cylinder
2. Unblock the hexagonal nut of the relief valve.
3. Turn the bolt with the screwdriver totally (counter clockwise)
4. Turn the bolt a quarter turn in order to open the relief valve (clockwise)
5. Press the motor starter button for 3 seconds (Nr 3)
6. Extract the cylinder plunger up to final. (When the plunger reaches the final of the stroke the pressure gets up. See in the manometer the maximum pressure reached).
7. Turn the bolt (counter clockwise to decrease the pressure, or clockwise to increase the pressure) with the screw driver to reach the desired pressure.
8. Block the nut with the spanner to block the relief valve.

### 5.6 Decompressing system

With the motor switched off:

1. Select cylinders to decompress in the pendant

2. Push decompress button in the electric cabinet
  3. Push at the same time the button up in the pendant
- The solenoid valve will move to leave free way to the pressurized line.

## 6.0 MAINTENANCE

### 6.1 Check Oil Level

Check the oil level of the pump prior to start-up, and add oil, if necessary, by removing the fill port cap. 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. As a general rule, completely drain and clean the reservoir every 250 hours, or more frequently if used in dirty environments.

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

1. 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.
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
5. Fill the reservoir with clean Enerpac hydraulic oil. The reservoir is full when oil level is in middle 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. 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 (see in the hydraulic diagrams num 8).

## 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	POSSIBLE CAUSE	SOLUTION
Cylinder does not advance, advances slowly or in spurts	A. Oil level in pump reservoir is low. B. Release valve open. C. Loose hydraulic coupler.  D. Air trapped in system. E. Cylinder plunger binding	A. Add oil to pump. B. Close pump release 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	A. Drain oil level to full mark. B. Check that coupler(s) are fully tightened. C. Remove air. D. Check that coupler(s) are correctly connected fully tightened and valving is functioning properly. E. Use a larger diameter hose. F. CLL and CLS cylinders are load return. Apply load force to completely retract the cylinder
Wrong motor rotation direction	A. The phase of the motor is wrong	A change the phase of the motor
Alarm light switched on	A. Thermic protection is down.  B. DC protection is down.	A. Open the electric cabinet and switch up the thermic protection B. Have pump serviced by an authorized Enerpac service center.

## 8.0 ATTACHED DOCUMENTATION TABLE

In this manual other documents have been attached which are necessary to interpret this manual. In the next table there is an index to facilitate finding these documents. Push on the paper icon  to show them.

	150 L RESERVOIR										40 L RESERVOIR					
	MANUAL VALVES					SOLENOID VALVES					MAN. VALVES			SOLEN. VALVES		
PUMP MODEL	SFP228MW	SFP242MW	SFP409MW	SFP414MW	SFP421MW	SFP228SW	SFP242SW	SFP409SW	SFP414SW	SFP421SW	SFP213MW	SFP404MW	SFP604MW	SFP213SW	SFP404SW	SFP604SW
ASSEMBLY DRAWING																
HYDRAULIC SCHEME																
SPARE PARTS																
CE DECLARATION	