



Operation and Maintenance Manual

Enerpac SFP-Series

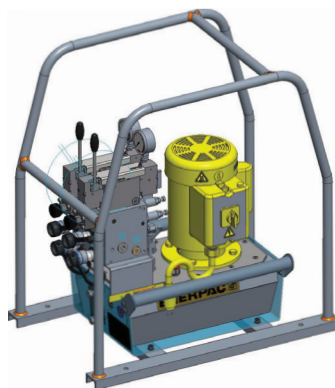
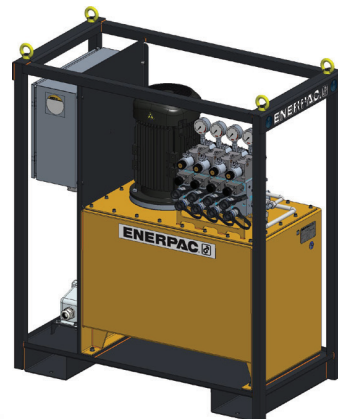
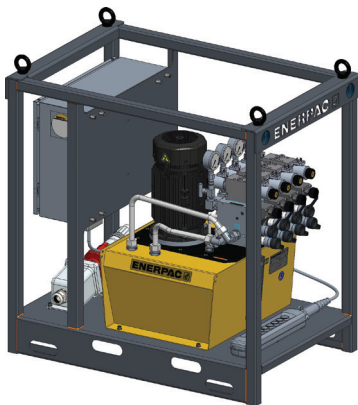
Split Flow Hydraulic Pump

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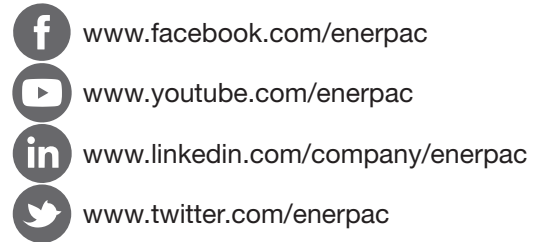
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To reduce the risk of injury, user must read and understand this document before use.

ABOUT US

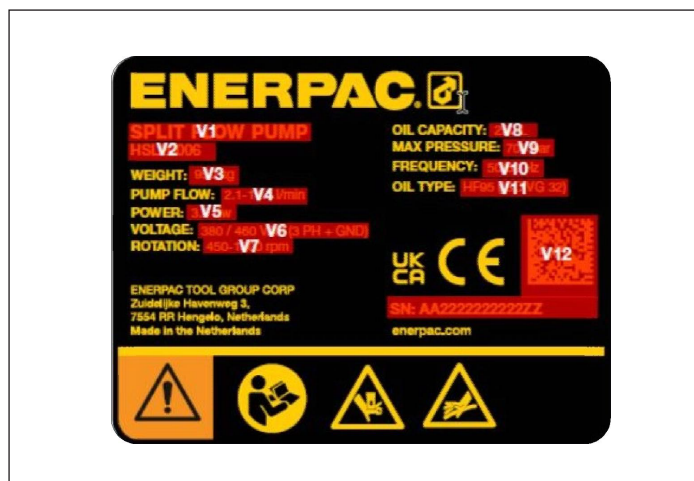
Enerpac is a global market leader in high pressure hydraulic tools, controlled force products, portable machining, on-site services and solutions for precise positioning of heavy loads. As a leading innovator with a 110-year legacy, Enerpac has helped move and maintain some of the largest structures on earth. When safety and precision matters, elite professionals in industries such as aerospace, infrastructure, manufacturing, mining, oil & gas and power generation rely on Enerpac for quality tools, services and solutions. For additional information, visit www.enerpac.com.



WARRANTY

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

NAMEPLATE



AVAILABLE LANGUAGES

L4447 is available in the following languages, visit www.enerpac.com for a copy.

- Weitere Sprachen finden Sie unter www.enerpac.com.
- Voor meer talen zie www.enerpac.com.
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1. Safety

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

Save these instructions for future use.

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 DANGER, 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 related to property damage). Please note that the Safety Alert Symbol will not be used with the signal word.

1.1 Safety Precautions



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

- Always wear protective head-wear, ear protectors, footwear and gloves (at a minimum rigger type gloves) suitable for safe operation of the tool. The protective clothing must not interfere with safe operation of the tool or restrict the ability to communicate with co-workers.
- Be sure your workplace is safe. Follow the instructions in your workplace's standard operating procedures and be sure to observe all communicated safety precautions.
- Read and completely understand the safety precautions and instructions in this manual before operating the system 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).
- Never set the relief valve to a higher pressure than the maximum rated pressure of the system. Higher settings may result in equipment damage and/or personal injury.
- Do not overload equipment. Never attempt to move a load weighing more than the capacity of the system. Overloading causes equipment failure and possible personal injury.
- Be sure setup is stable before moving load.
- Always perform a visual inspection of the system before placing it into operation. If any problems are found, do not use the tool. Have the tool repaired and tested by an Enerpac Authorized Service Center before it is returned to service.
- Never use a tool that is leaking oil. Do not use the equipment if it is damaged, altered or in need of repair.
- Be sure the operator has completed safety induction training, specific to the work surroundings. The operator should be thoroughly familiar with the controls and the proper use of the tool.
- The operator must be of at least the minimum age required by applicable local regulations, laws and the facility standard operating procedures.
- Never attempt to relieve hydraulic pressure by loosening a coupler.
- Never use force to unseat a coupler check ball that is under hydraulic pressure.
- Take every precaution to prevent oil leaks from occurring. High pressure oil leaks can penetrate the skin, resulting in serious injury.
- Do not over-tighten connections; connections need only be secure and leak free. Over tightening can cause premature thread failure.

- Loose or cross threaded fittings can be potentially dangerous if pressurized. Never stand directly in line with any hydraulic connection while pressurizing.
- Never strike the equipment while it is pressurized or moving load. Components under tension may become dislodged, allowing them to become dangerous projectiles. Uncontrolled release of pressurized hydraulic oil could also occur.
- Avoid striking the equipment at any time, even when it is not pressurized or moving load. Striking the tools could cause permanent damage to system components and may affect its functioning.
- Be certain that no one is working on or near any tool before moving of the load begins. Alert all personnel in advance that the procedure is about to occur.
- Always maintain communication with the operator during procedure to avoid accidents. Use hand signals, two- way radios or other appropriate forms of communication (as required by applicable laws and regulations) if the load is not visible to the operator.
- Operate Split Flow Pump (SFP) as required to ensure that the load is moved evenly and at a controlled rate.
- Closely watch the load at all times during operation. Stop work immediately if the load becomes unstable or appears to be moving unsteadily.
- 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.
- To minimize risk of personal injury keep hands and feet away from the tool and workpiece during operation.
- High voltage is present inside the pump even when motor is off. 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 unplug the pump by pulling on the cord. To unplug, grasp the plug, not the cord.
- 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.
- 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.

⚠ 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.
- 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 hydraulic equipment to temperatures of 150°F [65°C] or higher. Protect all hydraulic equipment from weld spatter.
- To prevent damage to pump electric motor, check specifications. Use of incorrect power source will damage the motor.
- 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
- Protect hoses and cylinders from weld spatter.
- Avoid damaging the 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.
- 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 hose or couplers. Use the lifting handles provided on cylinders and clamp assemblies.
- Do not pull on a hose that is connected. If pulling forces are exerted on a hydraulic coupling the hose and coupling interface will weaken which may result in the hose bursting out of the coupling.
- Always lift a hose by the hose itself, whilst supporting the coupling.
- 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.
- During assembly the hose must be supported by necessary use bend guides to prevent twisting of the hose.
- Change worn or damaged hoses immediately.
- Do not use dirty or corroded couplings.

NOTICE

Failure to observe and comply with the following precautions could result in property damage and/or void the product warranty.

- In severe service conditions, be aware that the SFP system must be inspected, cleaned and lubricated more frequently than normal.
- If oil leakage is present, replace seals as required before placing the tool back into service.
- If any tool is dropped from a significant height, have it inspected and checked for proper operation before placing it back into service.
- While moving the hoses, prevent the couplings being dragged over the ground.
- Always follow the inspection and maintenance instructions contained in this manual. Perform maintenance and inspection activities at the specified time intervals.
- Hydraulic equipment must only be serviced by a qualified hydraulic technician. For repair service, contact the Enerpac Authorized Service Center in your area.
- To help ensure proper operation and best performance, use of Enerpac oil is strongly recommended.

2. Compliance Statement

2.1 EU Declaration of Conformity

•SFP202 •SFP403 •SFP409 •SFP414 • SFP421 •SFP613
•SFP803 •SFP813



These tools conform with the requirements for CE and UKCA.

Enerpac declares that the product(s) have been tested and conforms to applicable standards and the product(s) are compatible to all EU and UK Requirements.

Copies of the EU Declaration as well as the UK Self-Declaration are enclosed with each shipment.

2.2 UL Certification



Industrial Control Panel Fabricator

Enerpac declares that all electrical components used on Enerpac SFP202, SFP403, SFP409, SFP414, SFP421, SFP613, SFP803 and SFP813 carry the UL508A Industrial Control Panels.

3. Introduction

3.1 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.

3.2 Application

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.

3.3 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.

4. Transport

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

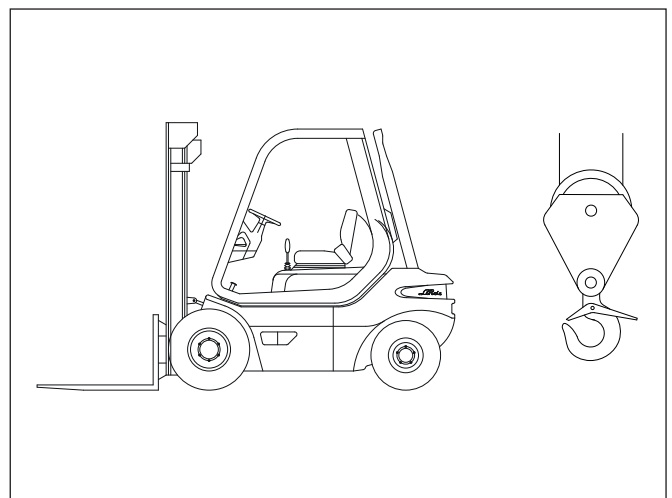


Figure 1: Transport Frame

5. Features & Components

5.1 Hydraulic Power Unit

5.1.1 Split Flow Pump 10 Liters

- | | | |
|----------------------|--------------------------|--------------------|
| 1. Assembly manifold | 4. Sight glass | 7. Pump set |
| 2. Frame | 5. Reservoir cover plate | 8. Breather filter |
| 3. Reservoir | 6. Motor | 9. Motor gasket |

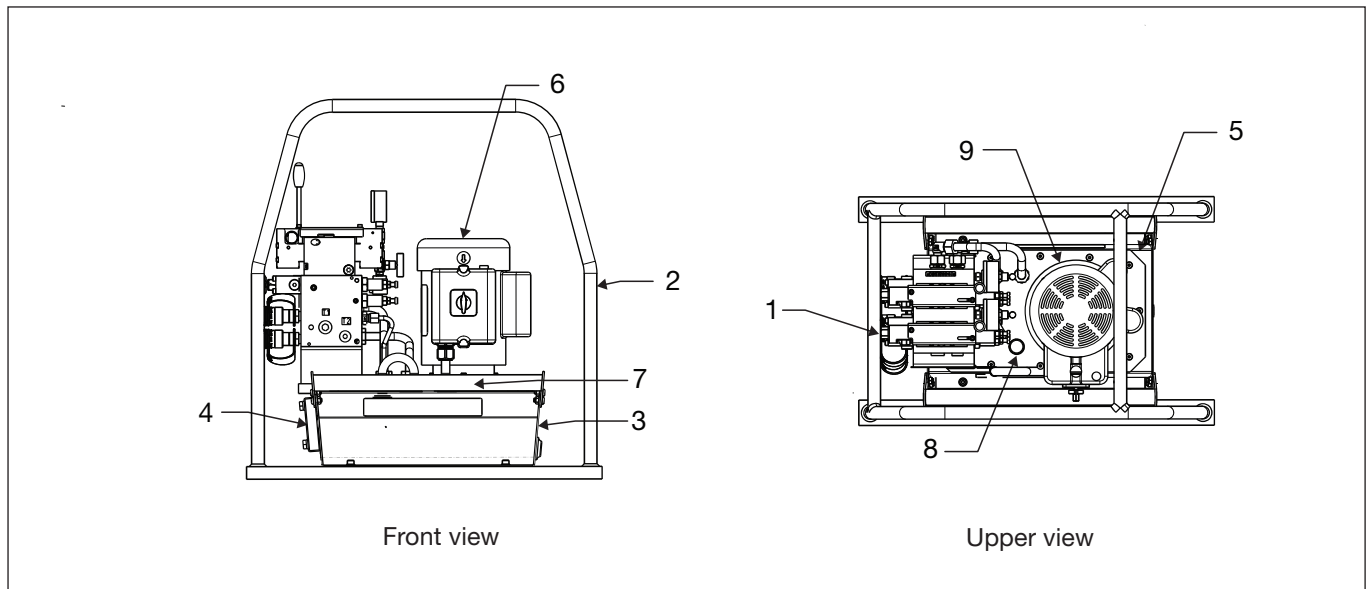


Figure 2: Major Features and Components of Split Flow Pump (10 liters)

5.1.2 Split Flow Pump 40 Liters

- | | | |
|--|------------------|---------------------------|
| 1. Electric cabinet (electric valves)
Starter (manual valves) | 4. Sight glass | 8. Breather filter |
| 2. Frame | 5. Electric plug | 9. Motor gasket |
| 3. Reservoir | 6. Motor | 10. Assembly manifold |
| | 7. Pump set | 11. Reservoir cover plate |

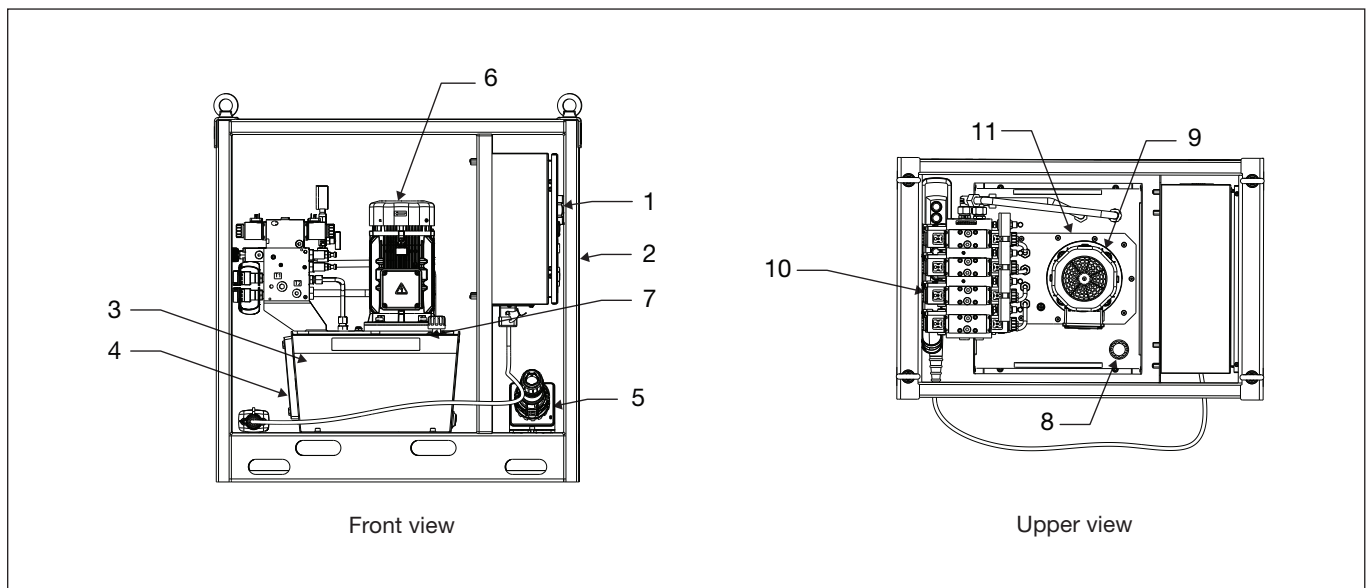


Figure 3: Major Features and Components of Split Flow Pump (40 liters)

5.1.3 Split Flow Pump 150 Liters

- | | | |
|--|--------------------|---|
| 1. Electric cabinet (electric valves)
Starter (manual valves) | 5. Electric plug | 10. Assembly manifold |
| 2. Frame | 6. Motor | 11. Clogging filter indicator, return filter
element and return filter housing |
| 3. Reservoir | 7. Pump set | |
| 4. Sight glass | 8. Breather filter | |
| | 9. Motor gasket | |

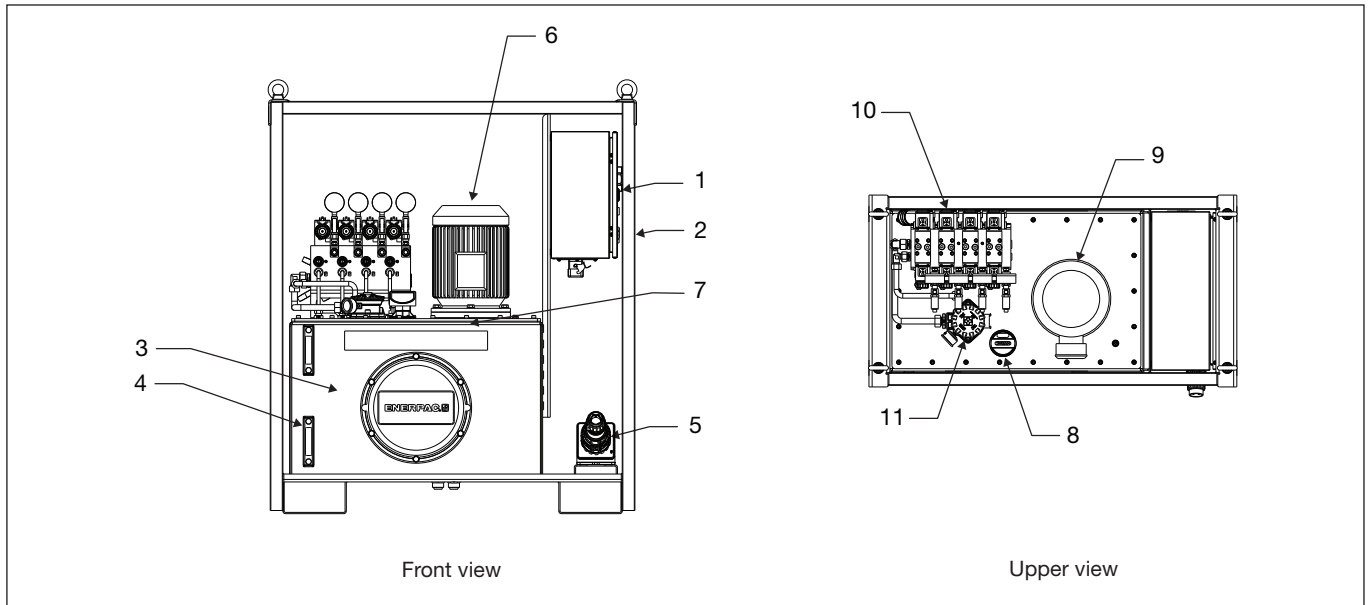


Figure 4: Major Features and Components of Split Flow Pump (150 liters)

5.2 Hydraulic Manifold

5.2.1 Manual Valves

- | | | |
|------------------------|------------------------------|-----------------------|
| 1. Gauge | 4. Manual distribution valve | 7. Hydraulic manifold |
| 2. Port B relief valve | 5. Flow control valve | |
| 3. Port P relief valve | 6. Female copupler | |

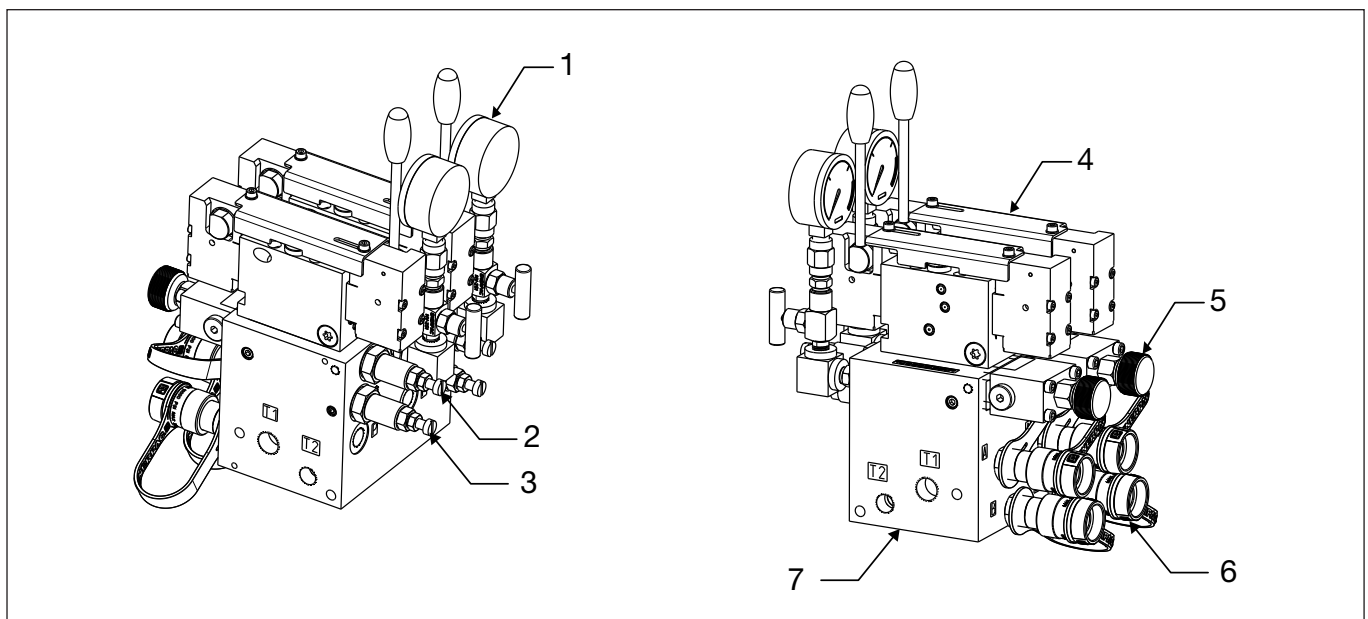


Figure 5: Hydraulic manifold with manual valves

5.2.2 Solenoid Valves

1. Gauge
2. Port B relief valve
3. Port P relief valve
4. Solenoid distribution valve
5. Flow control valve
6. Female copupler
7. Hydraulic manifold

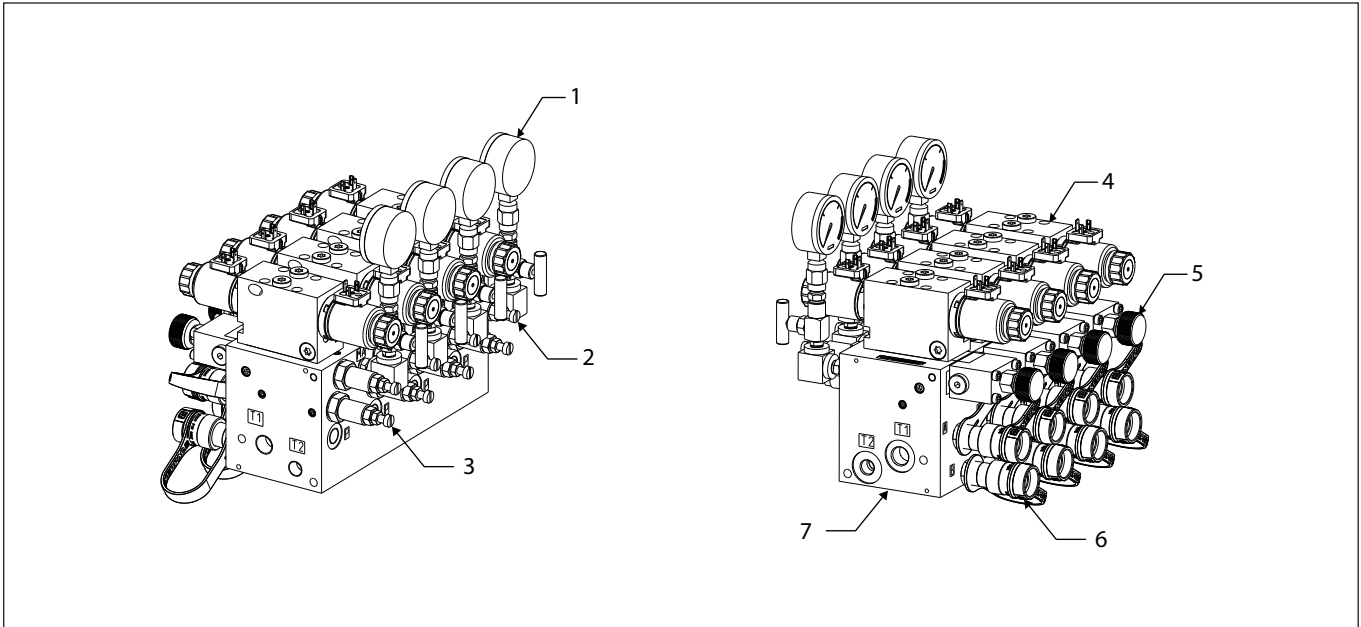


Figure 6: Hydraulic manifold with solenoid valves

5.3 Starter

1. Start motor button
2. Stop motor button

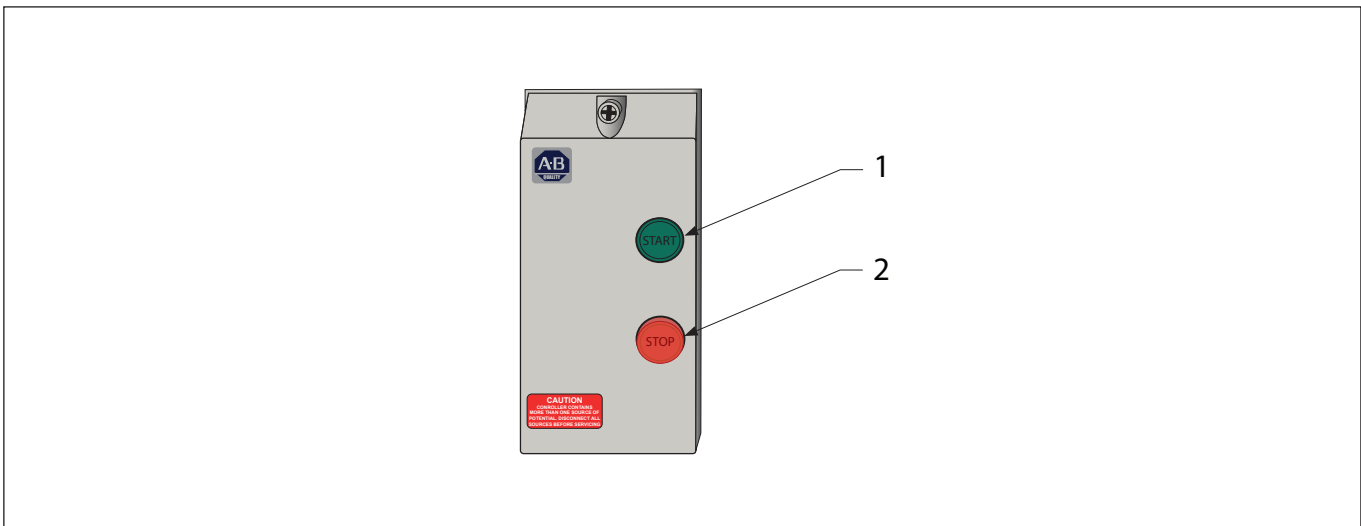


Figure 7: Starter

5.4 Electric Panel

- | | | |
|-----------------------|---------------------------------|-------------------------|
| 1. Main switch | 4. Reset push-button | 7. Pendant control plug |
| 2. Power on led. | 5. Start/Stop motor push-button | 8. Communication plug |
| 3. System alarm light | 6. Decompress push-button | 9. Power supply plug |

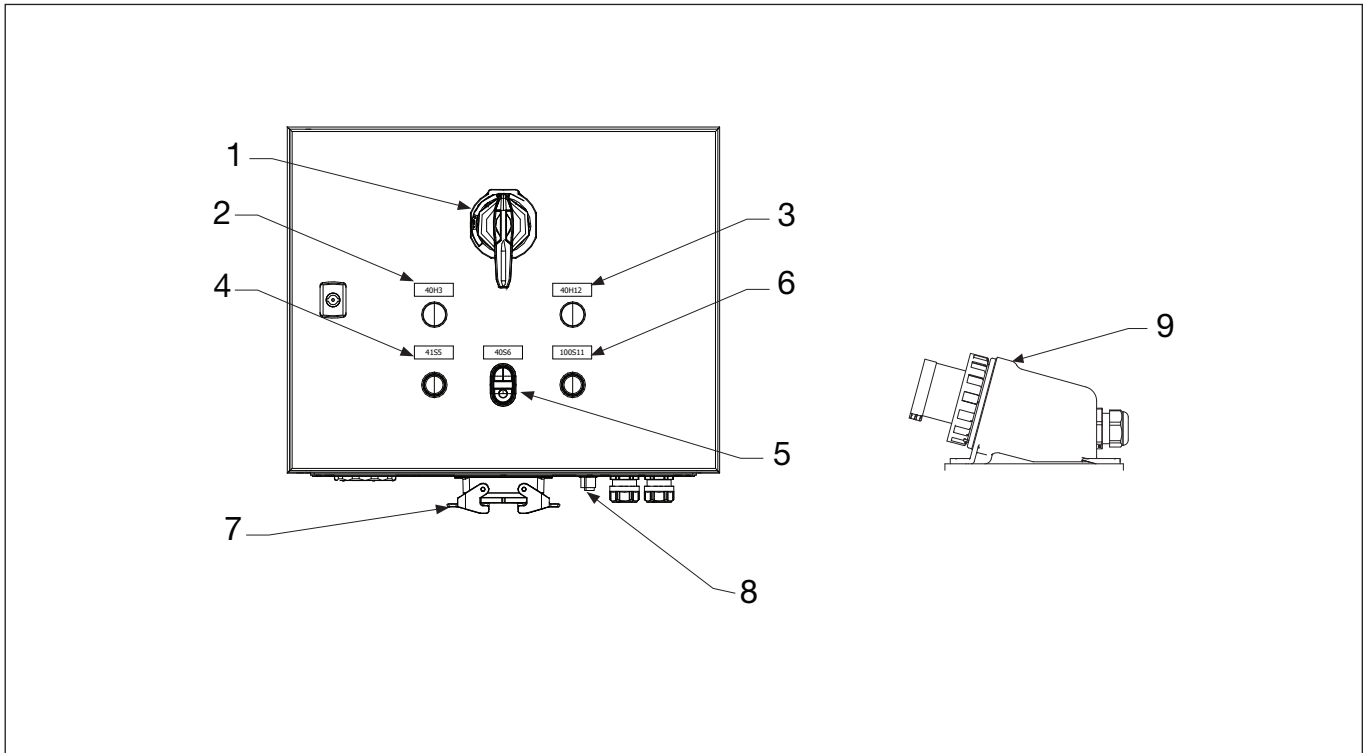


Figure 8: Electric panel

5.5 Pendant Control

- | | |
|----------------------------|------------------------|
| 1. Cylinder Switch buttons | 3. Retract push-button |
| 2. Extend push-button | 4. Safety push-button |

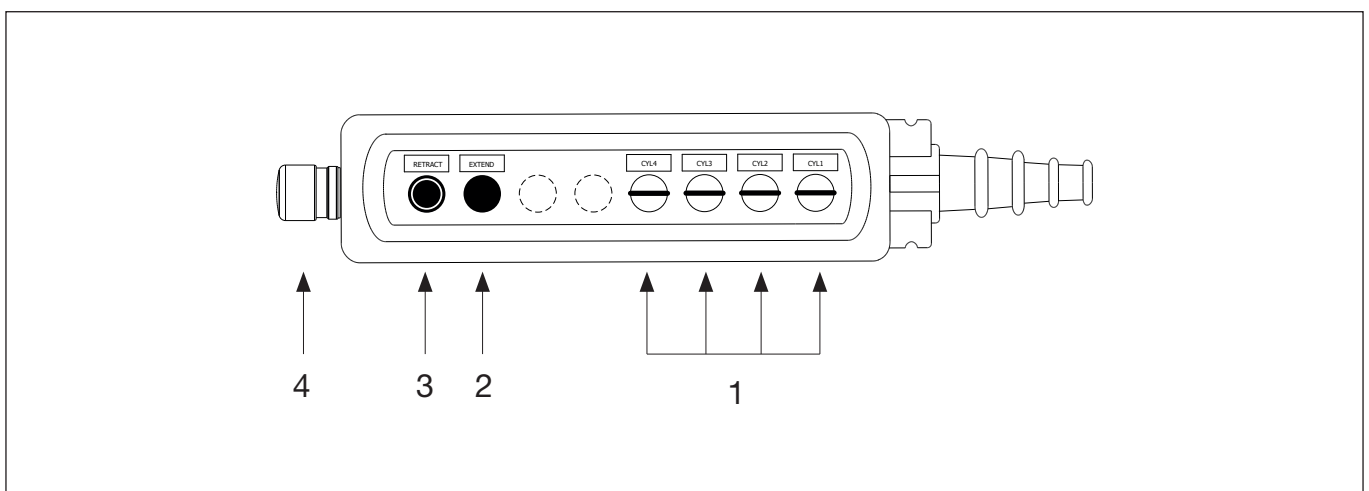


Figure 9: Pendant Control

5.6 Hydraulic Scheme

5.6.1 SFP with 2 outlets

- | | | |
|---------------------|---|------------------------------------|
| 1. Hydraulic oil | 6. Pump set | 11. Compensated flow control valve |
| 2. Reservoir | 7. Assembly manifold (2 outputs) | 12. Gauge |
| 3. Visual oil level | 8. P line relief valve | 13. Needle valve |
| 4. Plug | 9. Manual/solenoid distribution valve 4/3 | 14. Hydraulic coupler |
| 5. Electric motor | 10. Plug | 15. B line relief valve |

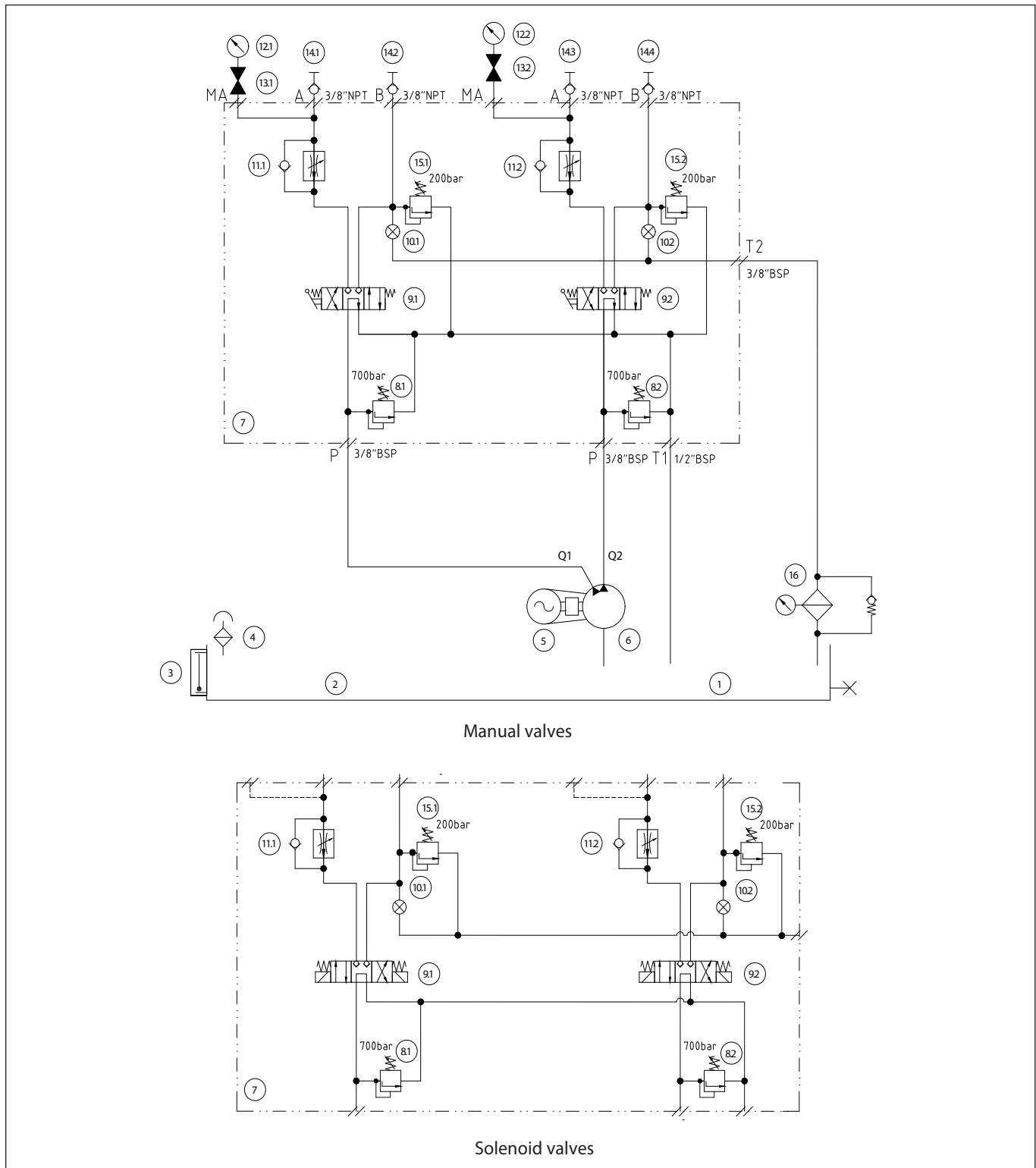


Figure 10: SFP with 2 Outlets Hydraulic Scheme

5.6.2 SFP with 4 outlets

- | | | |
|-------------------------|--|---|
| 1. Hydraulic oil | 8. Assembly manifold (4 outputs) | 14. Needle valve |
| 2. Reservoir | 9. P line relief valve | 15. Hydraulic coupler |
| 3. Visual oil level | 10. Manual/solenoid distribution valve | 16. Return filter (only for 150 l reservoirs) |
| 4. Plug | 11. Plug | 17. B line relief valve |
| 5. Electric motor | 12. Compensated flow control valve | |
| 6. Housing and coupling | 13. Gauge | |
| 7. Pump | | |

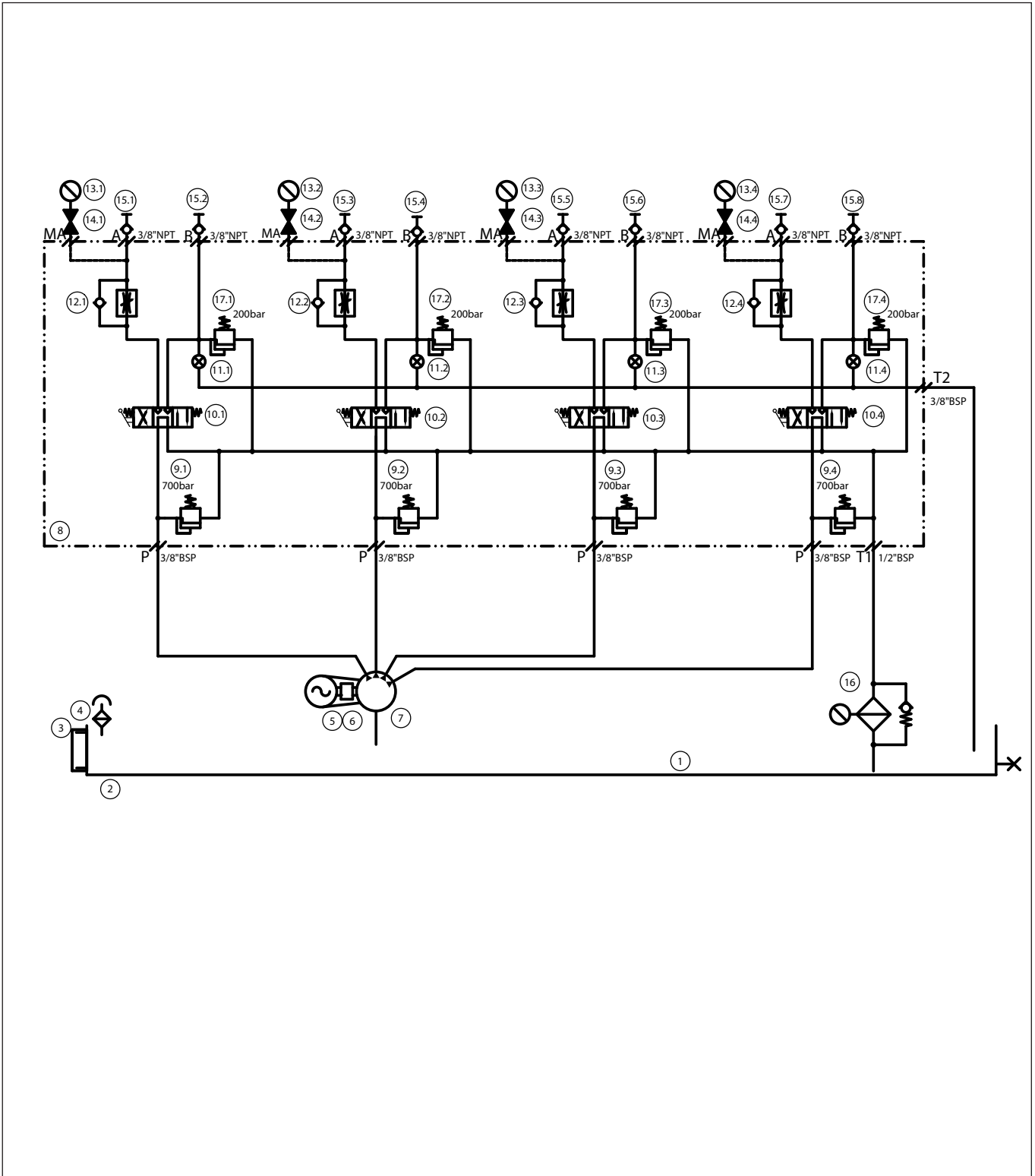


Figure 11: SFP with 4 Outlets Hydraulic Scheme

5.6.3 SFP with 6 outlets

- | | | |
|-------------------------|--|------------------------------------|
| 1. Hydraulic oil | 7. Pump | 12. Compensated flow control valve |
| 2. Reservoir | 8. Assembly manifold (4 outputs and 2 outputs) | 13. Gauge |
| 3. Visual oil level | 9. P line relief valve | 14. Needle valve |
| 4. Plug | 10. Solenoid distribution valve 4/3 | 15. Hydraulic coupler |
| 5. Electric motor | 11. Plug | 16. Return filter |
| 6. Housing and coupling | | 17. B line relief valve |

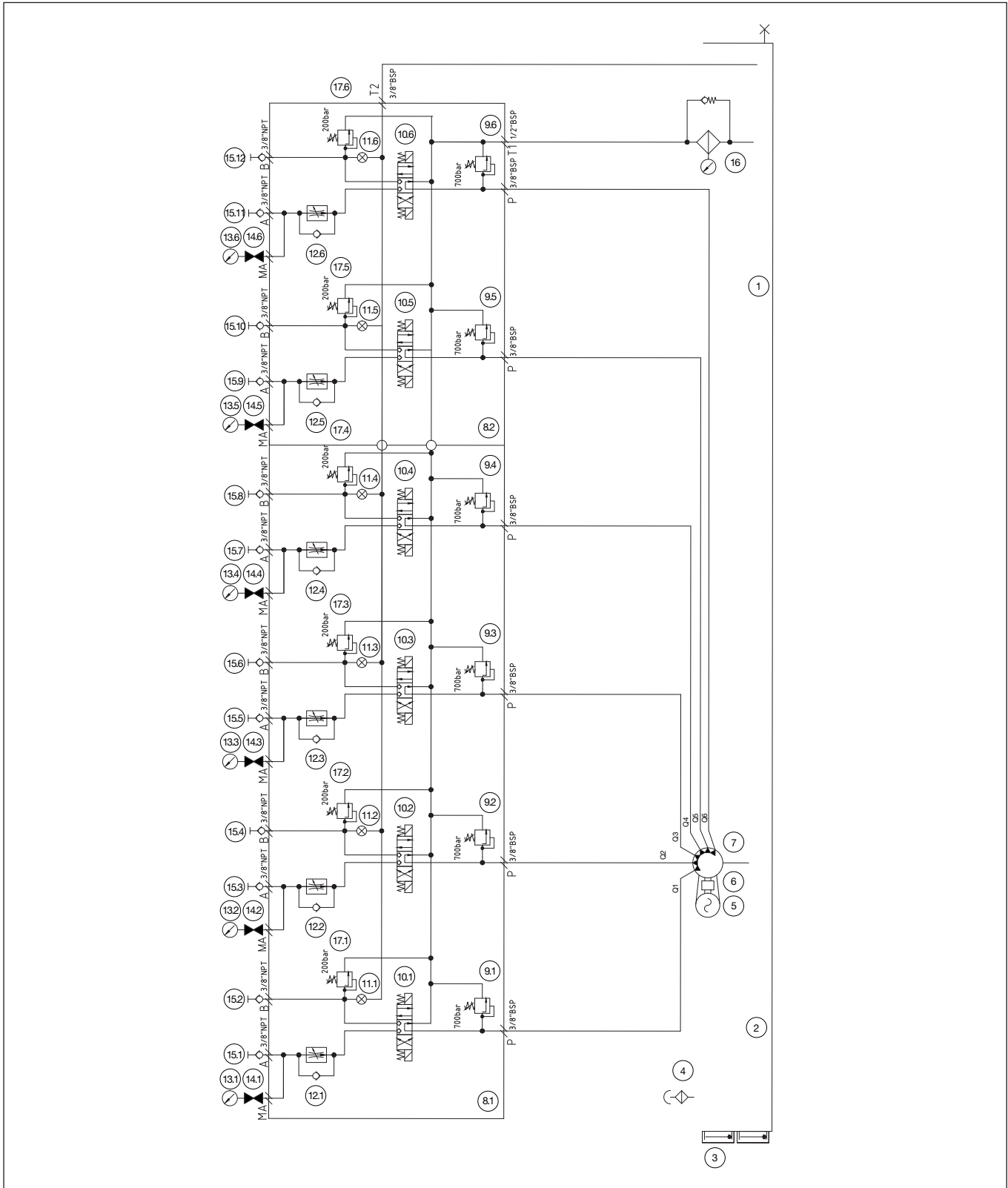


Figure 12: SFP with 6 Outlets Hydraulic Scheme

5.6.4 SFP with 8 outlets

- | | | |
|-------------------------|--|------------------------------------|
| 1. Hydraulic oil | 7. Pump | 12. Compensated flow control valve |
| 2. Reservoir | 8. Assembly manifold (4 outputs and 4 outputs) | 13. Gauge |
| 3. Visual oil level | 9. P line relief valve | 14. Needle valve |
| 4. Plug | 10. Solenoid distribution valve 4/3 | 15. Hydraulic coupler |
| 5. Electric motor | 11. Plug | 16. Return filter |
| 6. Housing and coupling | | 17. B line elief valve |

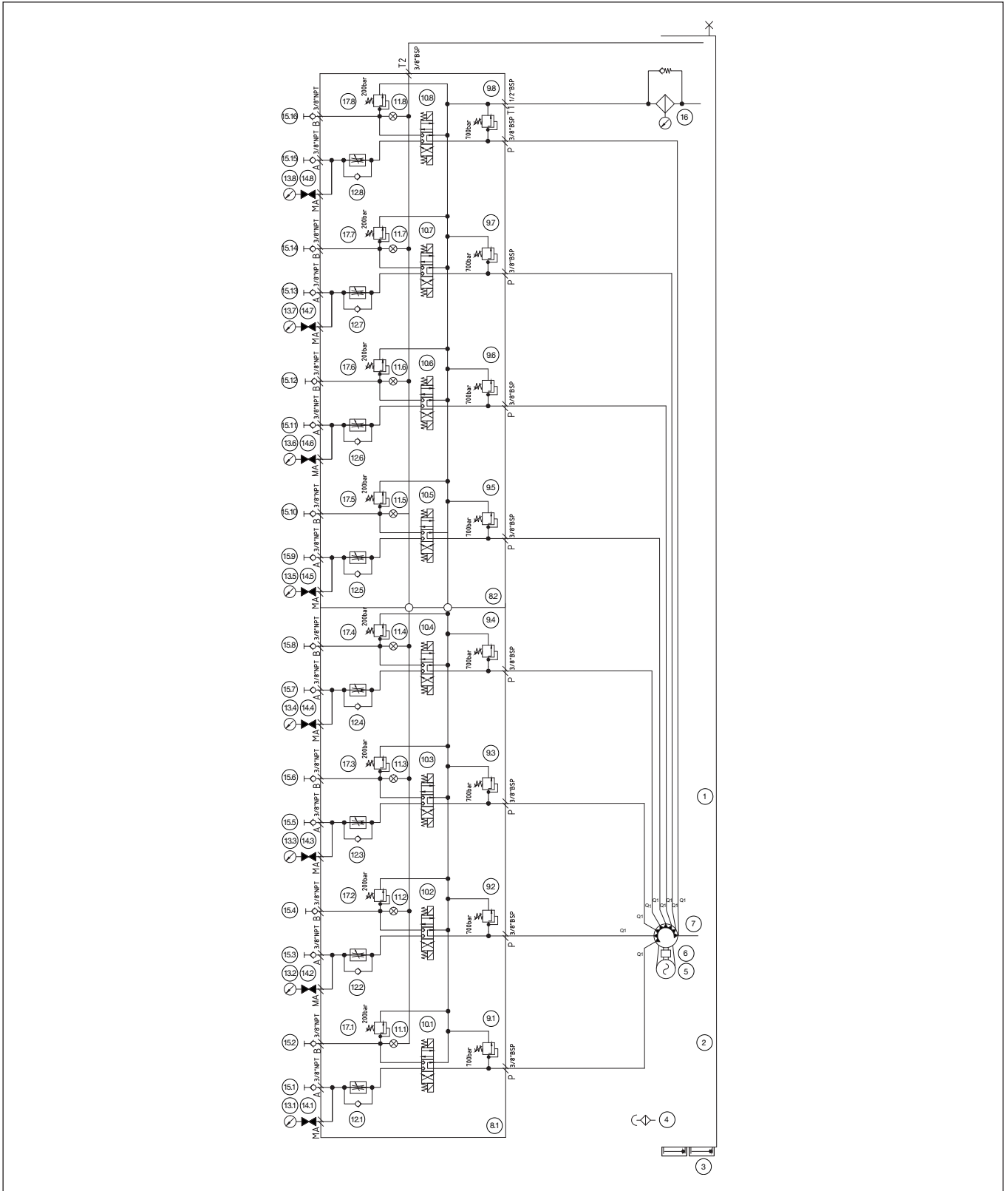


Figure 13: SFP with 8 Outlets Hydraulic Scheme

6. Technical Product Data

6.1 Dimensional Callout Art

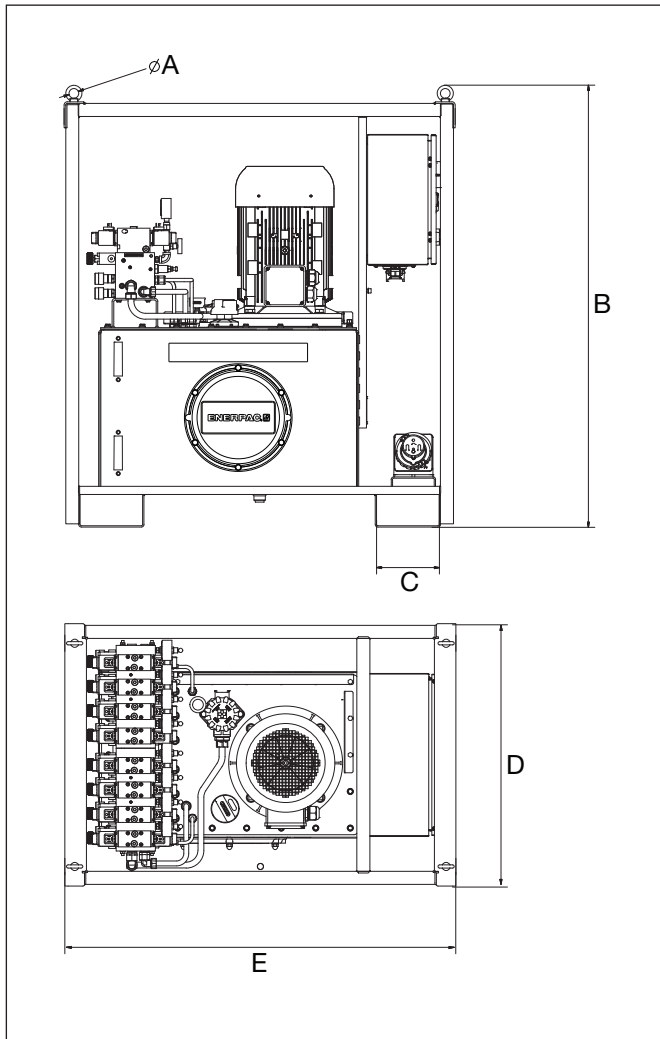


Figure 14: Split Flow Pump Dimensions

6.2 Dimensional Table

Model		Dimension	mm	in
10 l	SFP202	A	-	-
		B	748	29.44
		C	-	-
		D	450	17.72
		E	700	27.56
40 l	SFP403	A	30	1.18
		B	1,028	40.47
		C	-	-
		D	640	25.2
		E	970	38.18
	SFP803	A	30	1.18
		B	1,113	43.82
		C	-	-
		D	810	31.89
		E	1,113	43.82
150 l	SFP409 SFP414 SFP421	A	30	1.18
		B	1,368	53.86
		C	192	7.56
		D	605	23.82
		E	1,163	45.79
	SFP613 SFP813	A	30	1.18
		B	1,368	53.86
		C	192	7.56
		D	805	31.69
		E	1,250	49.21

6.3 SFP Capabilities

The split flow pump uses a single electric motor to drive a hydraulic pump with multiple outlets.

There are different split flow pump models with different number of outlets and flow.

Refer to the table below for detailed information about each pump model.

PUMP MODEL Electric power B = 115V-1Ph-60Hz J = 460V-3Ph-60Hz W = 400V-3Ph-50Hz	SFP202M		SFP403S	SFP403M	SFP403S	SFP403M	SFP803S	SFP803S	SFP409S	SFP409S	SFP409M	SFP414S	SFP414S	SFP414M	SFP421S	SFP421S	SFP421M	SFP613S		SFP813S	
	B	W	J	W	J	W	J	W	J	W	J	W	J	W	J	W	J	W	J	W	
Reservoir size gal l	2.6 10		10 40				40 150 (Usable oil capacity of reservoir is 135 liters.)														
Split flow outlets	2		4		8		4						6		8						
Flow per outlet in ³ /min (10,150 psi) l/min (700 bar)	16.48 0.27	21.97 0.36	18.31 0.3	21.97 0.36	18.31 0.3	65.9 1.08	65 0.9	102.5 1.68	101 1.4	153.8 2.52	153 2.1	95.19 1.56	94 1.30	95.19 1.56	94 1.30						
Motor size Hp kW	1 0.75	3.5 2.6	3 2.2	6.4 4.8	5.4 4	8.9 6.6	7.5 5.5	12 9	10 7.5	17.7 13.2	15 11	17.7 13.2	15 11	24.1 18	20 15						
Weight lbs kg	254 115	331 150	595.3 270		771.6 350		1047 475		1314 596		1323 600		1239 562		1653 750						

7. Initial Setup

7.1 Instalation

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



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 swivel saddles are available. Always use grease underneath swivel saddles.



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.

7.2 Electric Connections

All models, except SFP202MB and SFP202MW (single-phase), are factory equipped with 3 phase electrical plug for the given voltage. Models SFP202MB and SFP202MW are equipped with a 1 phase electrical plug as showed in the table below.

Altering the plug type should only be done by a qualified electrician. Connect the equipment to power 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 or 1Ph 230V 3Ph 400V
	2.2 -15	3Ph + PE 400V 30A
Motor size Hp	1	1Ph 115V
	2.95 - 12	3Ph + PE 480V 30A
	15 - 20	3Ph + PE 400V 30A

Pumps with 10 l. (2.6 gal) and 40 l. (10 gal) reservoir require motor rotation verification. After connecting the system to power supply, the operator must start the motor and check it rotates in the direction indicated by the motor's label arrow (correct phase if required).



Electric schemes for SFPs are available in L4639.

7.3 Electric Panel

The electric panel includes the controls to switch on the machine (see Figure 8).

1. Main switch: Switch to the right to turn on the equipment. Then, switch to the left to the original position to turn off the system.
2. Power on led: This light is on when the system is connected to power.
3. System alarm light: This light is on when an alarm is active in the the system.
4. Reset push-button: The operator must push this button to reset an alarm once the reason of the alarm has been solved.
5. Start/Stop motor push-button: Pushing these buttons, the motor of the SFP will be switched on/off.
6. Decompress push-button: Push this button to decompress the system.
7. Pendant control plug: The operator must connect the pendant control to this connector to work with solenoid valves.
8. Communication plug: This connector allows communication with the controller in synchronized applications (refer to instruction sheet L4476).
9. Power supply connector: This is the electric plug to connect the system to power.

7.4 Hydraulic Connections

SFPs can be connected to double or single acting cylinders. Be certain that all couplers are fully connected, so that hydraulic flow is not blocked or restricted. Check for leaks in the system and have it repaired by qualified personnel.



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. Remove dust covers/rubber plugs from oil ports.
2. Inspect all threads and fittings for signs of wear or damage and replace as needed.
3. Clean all threads and fittings.
4. Connect A output to the cylinder's advance chamber.
5. Connect B output to the cylinder's return chamber (only for double acting cylinders, for single acting cylinders leave it disconnected).

6. Fully hand-tighten all couplers. Loose coupler connections will block the flow of oil between the SFP and the cylinder.
7. Check for leaks in system and have repaired by qualified personnel.
8. Keep cylinders connected to a hydraulic system with a minimum cleanliness level of NAS 1638 Class 6.

7.5 Hydraulic Oil Requirements

Use of Enerpac HF Series ISO 32 hydraulic oil is recommended. Enerpac HF oil is available at your local Enerpac Distributor or Authorized Service Center:

- Failure to use the correct oil type (high-quality ISO 32 hydraulic oil) may result in damage to hydraulic components and will void the product warranty.
- Be sure that oil is clean. The oil cleanliness should be maintained to a maximum level of 18/16/13 per the ISO4406 standard. If oil develops a milky, cloudy or dark appearance, it should be changed immediately.
- To avoid overfilling and possible equipment damage, add oil to the pump reservoir only after all cylinder plungers are completely retracted and system pressure is released.

8. Operation

8.1 Switching ON the System.

8.1.1 Pumps with manual valves

Follow the next steps to switch on the system:

1. Press the start motor button for 3 seconds (Figure 7, item 1).
2. Once the electric motor is on, use the manual valves to move the cylinders as explained in paragraph 8.1.
3. To stop the motor, press the stop motor button for 3 seconds (Figure 7, item 2).

8.1.2 Pumps with solenoid valves

Follow the next steps to switch on the system:

1. Turn ON the main switch in the SFP's electric cabinet (Figure 8, item 1).
2. Check if the green light of the "power on led" is on (Figure 8, item 2). If so, the connection with the system is correct.
3. Deactivate the safety push-button (Figure 9, item 4).
4. Push the reset alarm button in the electric cabinet to reset the security system after the emergency button has been de-activated (Figure 8, item 4).
5. Press the start motor push-button for 3 seconds (Figure 8, item 5).
6. Once the electric motor is on, use the pendant control to move the cylinders as explained in paragraph 8.1.

8.2 Manual Valve Control

Some models have been designed to be operated with 2, 4, 6 or 8 manual valves, one per output depending on the model type. To move the cylinders, the operator must move the valve's handle according to the desired direction. The advance or retract movement occurs as labeled on the valve.

8.3 Pendant Control

Models with solenoid valves are operated from a remote pendant control (Figure 9) connected to the electric cabinet with a 5 m. (15 ft) cable (Figure 8, item 7).

Through this device the operator can operate all cylinders connected to the SFP (2, 4, 6 or 8 cylinders, depending on the model).

Follow the next steps to move the cylinders:

1. Cylinder switch buttons: Through these buttons, the operator can select the cylinders to work with.
2. Extend push-button: When this button is pushed, oil flows from A port to the cylinder. Therefore, in a general purpose cylinder, the plunger moves outward.
3. Retract push-button: When this button is pushed, oil flows from the cylinder back to tank, so the plunger moves inward.
4. Safety push-button: When this button is pushed, the cycle previously selected in the touch screen stops, the pump stops the movement of all cylinders.

8.4 Pressure Relief Valves Setting

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

SFP's relief valves can be set up by the operator. For this purpose, the following tools are needed:

1. Two units of 13 mm Spanner.

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

1. Disconnect hoses and cylinders.



Never stand directly in line with any hydraulic connection while pressurizing. Components under tension may become dislodged, allowing them to become dangerous projectiles. Uncontrolled release of pressurized hydraulic oil could also occur.

2. Loosen relief valve's hexagonal nut.
3. Fully turn the bolt with the spanner (counter-clockwise) to open the relief valve for a start reference point.
4. Switch on the motor and perform an extend movement in each point. Pressure will build up. Use A line manometer to check the pressure reached.
5. Use the spanner to turn the bolt and adjust the desired pressure. Turn clockwise to increase the pressure and counter-clockwise to decrease it.
6. Use the spanners to tighten the nut and lock the relief valve bolt.

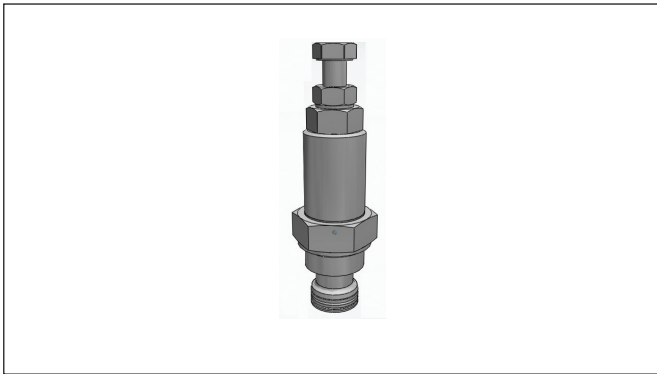


Figure 15: Relief Valve

8.5 Relieving Hydraulic Pressure

With the motor switched off (solenoid valves):

1. Use the pendant control to select the cylinders to be decompressed (Figure 4, No 1).
2. Push decompress button in the electric cabinet (Figure 8, item 6.)
3. Push at the same time retract or advance button in the pendant control (Figure 9, items 2 or 3).

Solenoid valves will direct flow to tank relieving the pressurized line.

8.6 A Line Flow Control

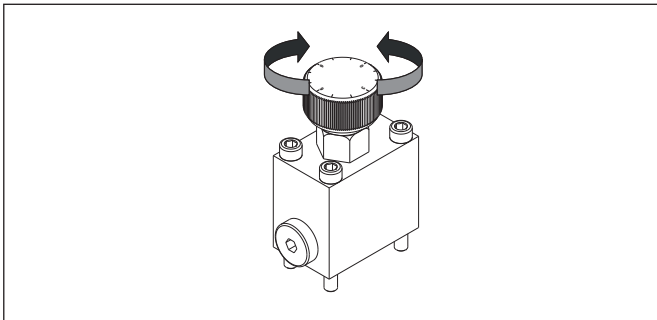


Figure 16: Flow Control Valve

SFPs have flow control valves installed on top of A line 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 counter-clockwise will increase the flow speed.

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



By adjusting the flow control valve to reduce the flow rate, the operator may inadvertently cause a restriction that causes the pressure in the cylinder to increase above maximum system rating. Monitor the pressure during lowering via manometer on A line (see Figure 10, item 11; and Figures 11, 12 and 13, item 12).

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

9. Maintenance

In order to anticipate any kind of breakdown, it is necessary to carry out predictive maintenance, forecasting the wear and tear of the basic elements. The most important points to take into account when performing predictive maintenance are:

9.1 Check Oil Level

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

NOTICE

Always be sure cylinder is fully retracted before adding fluid to the reservoir.

9.2 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. Replace oil and return filter cartridge when return filter is clogged.

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

NOTICE

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

1. For 10 and 40 liters 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 150 liters models, unscrew the front lid to access 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 10 l. and 40 l. models or restore the service lid in the into the reservoir in 150 l. models.
5. Remove the bleeder screw. Refer to paragraph 9.3 for further information.

6. Fill the reservoir with clean Enerpac hydraulic oil. The reservoir is full when the oil level is on top of the sight gauge, but leaving some visible part without oil.
7. Leave the pump two hours quiet to purge the air.
8. Close the pump's purge plug.

9.3 Bleeding the Pump

The pump has to be bled prior to initial operation and after every fluid service to prevent intake problems and air to be fed into the hydraulic system. The coupling must not get in contact with the pressure fluid:

1. Remove the bleeder screw (located on the cover plate beneath the dipstick or the breather) prior to filling the tank.
2. Fill the reservoir and leave the bleeder screw open.
3. Turn on the pump for 15 seconds and turn off again.
4. Repeat the previous point 5 times or until the fluid without bubbles comes out.
5. The fluid must come out without bubbles when the complete air is purged.
6. Reinstall and tighten the bleeder screw.

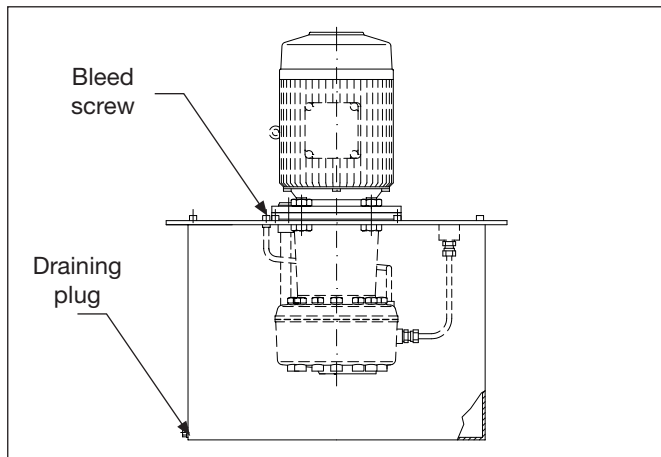


Figure 17: Motor and pump detail

9.4 Filter Cartridge Replacement

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

In 150l models, the filter 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 section 5).

10 and 40l 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.

9.5 Using Single Acting Cylinders with Solenoid Valve Operated Pumps

All SFP-Series pumps are set up from the factory to operate double acting cylinders and supply pressure to both hydraulic ports to either extend or retract the cylinder. When using a solenoid operated pump, the motor must be turned on to shift the valve to retract position.

Therefore, when using single acting cylinders, the pressure on the retract port (B) must be turned down to avoid undue wear on the pump, heat build up and risk of internal leakage.

To reduce the pressure on the retract port (B), follow the instructions in section 8.4. Reduce the pressure on the retract port (B) to a minimal value, no more than 30 bar (450 psi). Refer to section 5.2 for location of the retract port (B) relief valve on the manifold. Be sure to adjust the correct valve and be sure to adjust the pressure on each valve station.

In order to use double acting cylinders again, adjust the same retract port (B) relief valves to the nominal value shown on the hydraulic schematic in section 5.6.

10. ALARM GUIDE

Only qualified hydraulic technicians should service the pump or system components. To determine the cause of the problem, the complete system must be included in any diagnostic procedure.

Refer to the alarm chart for a list of alarms and possible causes. The alarm 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.

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.

11. Parts List

Product Date Code Beginning With: B

11.1 SFP 10 Liters

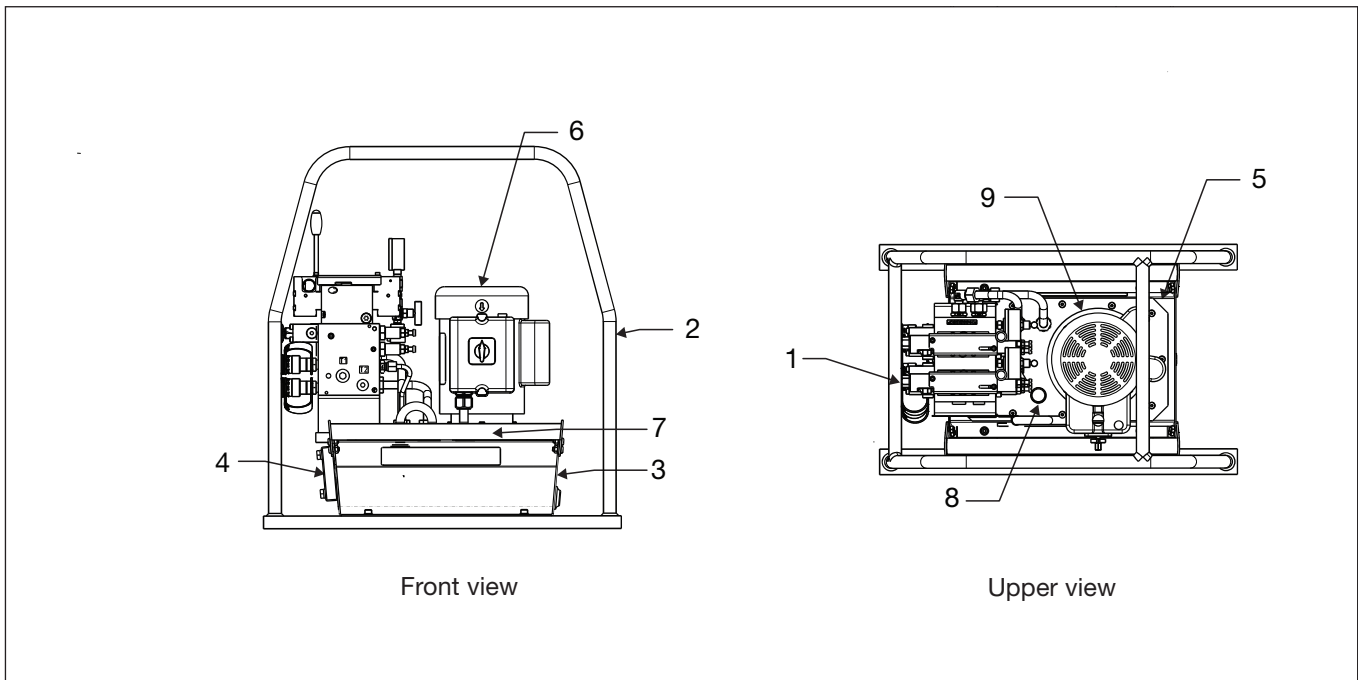


Figure 18: SFP 10 Liters Powerpack Components

11.1.1 SFP 10 Liters Table of Parts

Repair Parts List - Figure 18			
Item	Description	Qty.	Part number
			SFP202M
1	Assembly manifold	1	DB9488900
2	Frame	1	DB0083201A
3	SFP 10 liters reservoir	1	DC9970025-P01
4	Sight glass	4	DD1366223
5	SFP reservoir cover plate 10 l. 2P	1	SFP10L-2P-020
6	Motor	1	DC9824900
7	Pump set	1	DQ2131900
8	Breather filter	1	DC8250006
9	Motor Gasket	1	DC9551920

11.2 SFP 40 Liters

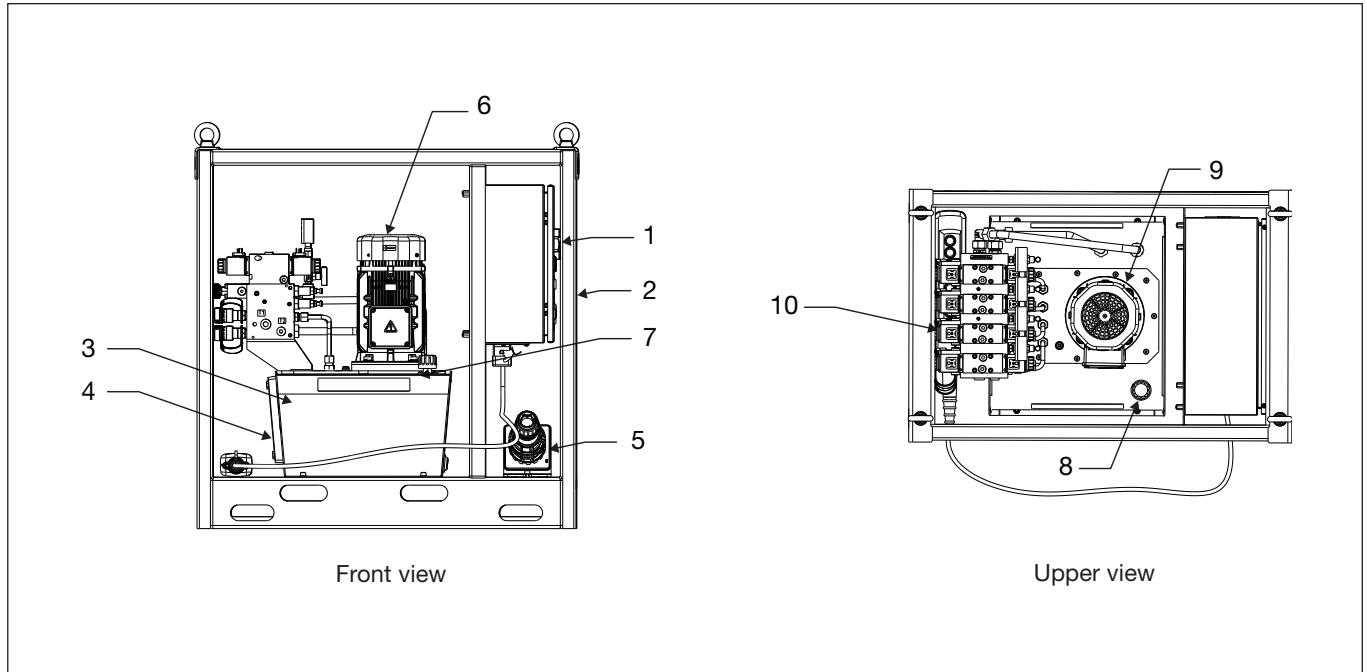


Figure 19: SFP 40 Liters Powerpack Components

11.2.1 SFP 40 Liters Table of Parts

Repair Parts List - Figure 19					
Item	Description	Qty.	Part number	Qty.	Part number
			SFP403M SFP403S		SFP803S
1	Electric starter Electric cabinet	1	DB06960380 ▲	1	- ▲
2	SFP frame 40 l	1	DB0108201-99	1	DB0108201-99
3	SFP Reservoir 40L	1	DB0139025	1	DB0118025-99
4	Sight glass	1	DC9969223	1	FSA254-1
5	Electric Plug	1	▲	1	▲
6	Motor	1	DB4684259	1	DB4625259
7	Pump	1	DB4666221	1	DB4680221
8	Breather filter	1	024-ELFP10F3W1-0	1	DB4508118
9	Housing	1	D64673001	1	DB4659001
10	Assembly manifold SFP 4P Manual Assembly manifold SFP 4P Solenoid	1	D69479900 DB9478900	2	- DB9478900

NOTE: ▲ The electronic parts of this item can be identified following the same procedure showed on paragraph 11.6

11.3 SFP 150 Liters

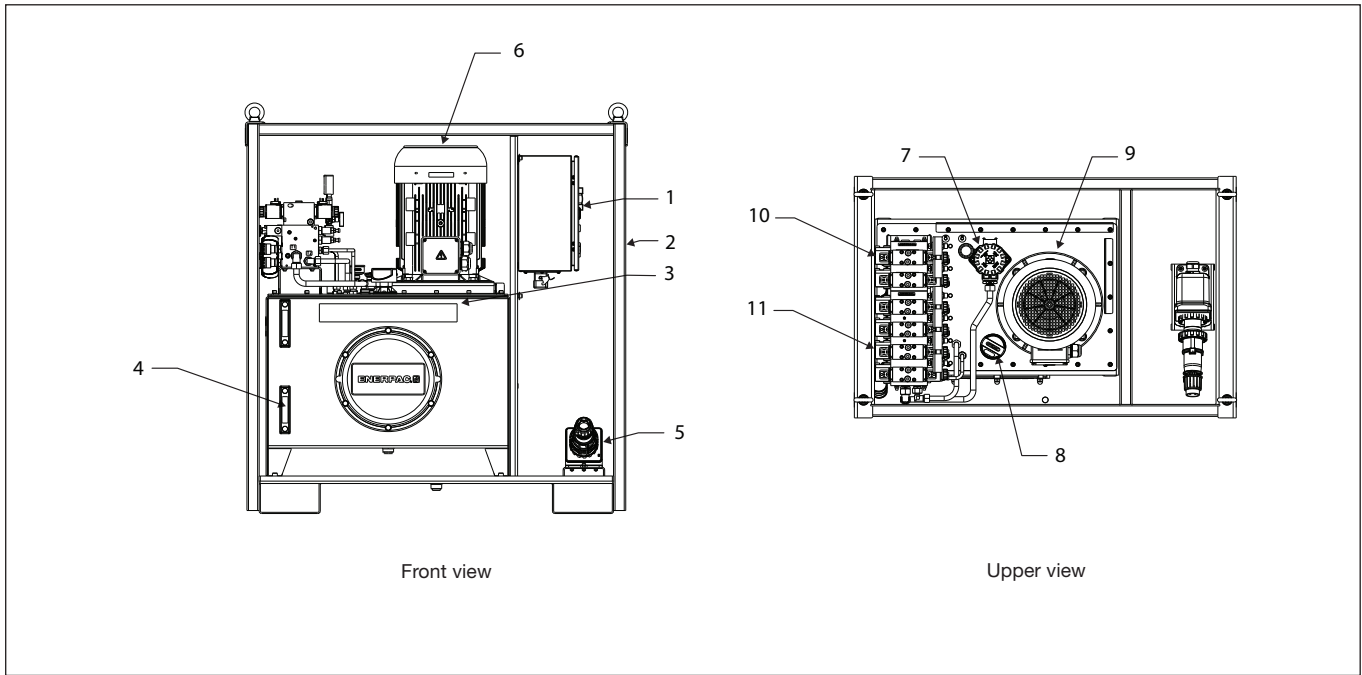


Figure 20: SFP 150 Liters Powerpack Components

11.3.1 SFP 150 Liters Table of Parts

Repair Parts List - Figure 20					
Item	Description	Qty.	Part number		
			SFP409M SFP409S	SFP414M SFP414S	SFP421M SFP421S
1	Electric starter Electric cabinet	1	DB06960380 ▲	DB06960380 ▲	DB06960380 ▲
2	SFP frame 150 l	1	DB0106201-99	D80106201-99	D80106201-99
3	Pump	1	R0.9-0.9-0.9-0.9	R1.4-1.4-1.4-1.4	R0.9-0.9-0.9-0.9
4	Visual level	2	DB4405022	DB4405022	DB4405022
5	Electric plug	1	▲	▲	▲
6	Electric motor	1	DB4623259	DB4622259	DB4623259
7	Return filter housing	1	DB4678118	DB4678118	DB4678118
	Return filter element	1	DB4604175	DB4604175	DB4604175
	Clogging filter indicator	1	DB4605118	D84605118	D84605118
8	Breather filter	1	DB4368118	DB4368118	DB4368118
9	Housing	1	DB4606001	DB4606001	DB4606001
	Coupling	1	DB4607034	DB4607034	DB4607034
10	Assembly manifold 2P solenoid	0	-	-	-
11	Assembly manifold 4P manual	1	DB9479900	DB9479900	DB9479900
	Assembly manifold 4P solenoid		DB9478900	DB9478900	DB9478900

NOTE: ▲ The electronic parts of this item can be identified following the same procedure showed on paragraph 11.6

Repair Parts List - Figure 20					
Item	Description	Qty.	Part number	Qty.	Part number
			SFP613S		SFP813S
1	Electric starter Electric cabinet	1	- ▲	1	- ▲
2	SFP frame 150 l	1	D80106201-99	1	D80106201-99
3	Pump	1	DB4480221	1	DB4500221
4	Visual level	2	DB4405022	2	DB4405022
5	Electric plug	1	▲	1	▲
6	Electric motor	1	DB9597900	1	DB9588900
7	Return filter housing	1	DB4678118	1	DB4678118
	Return filter element	1	DB4604175	1	DB4604175
	Clogging filter indicator	1	D84605118	1	D84605118
8	Breather filter	1	DB4368118	1	DB4368118
9	Housing	1	DB4606001	1	DB4606001
	Coupling	1	DB4607034	1	DB4607034
10	Assembly manifold 2P solenoid	1	DB9487900	0	-
11	Assembly manifold 4P solenoid	1	DB9478900	2	DB9478900

NOTE: ▲ The electronic parts of this item can be identified following the same procedure showed on paragraph 11.6

11.4 Hydraulic Manifold Manual Valves

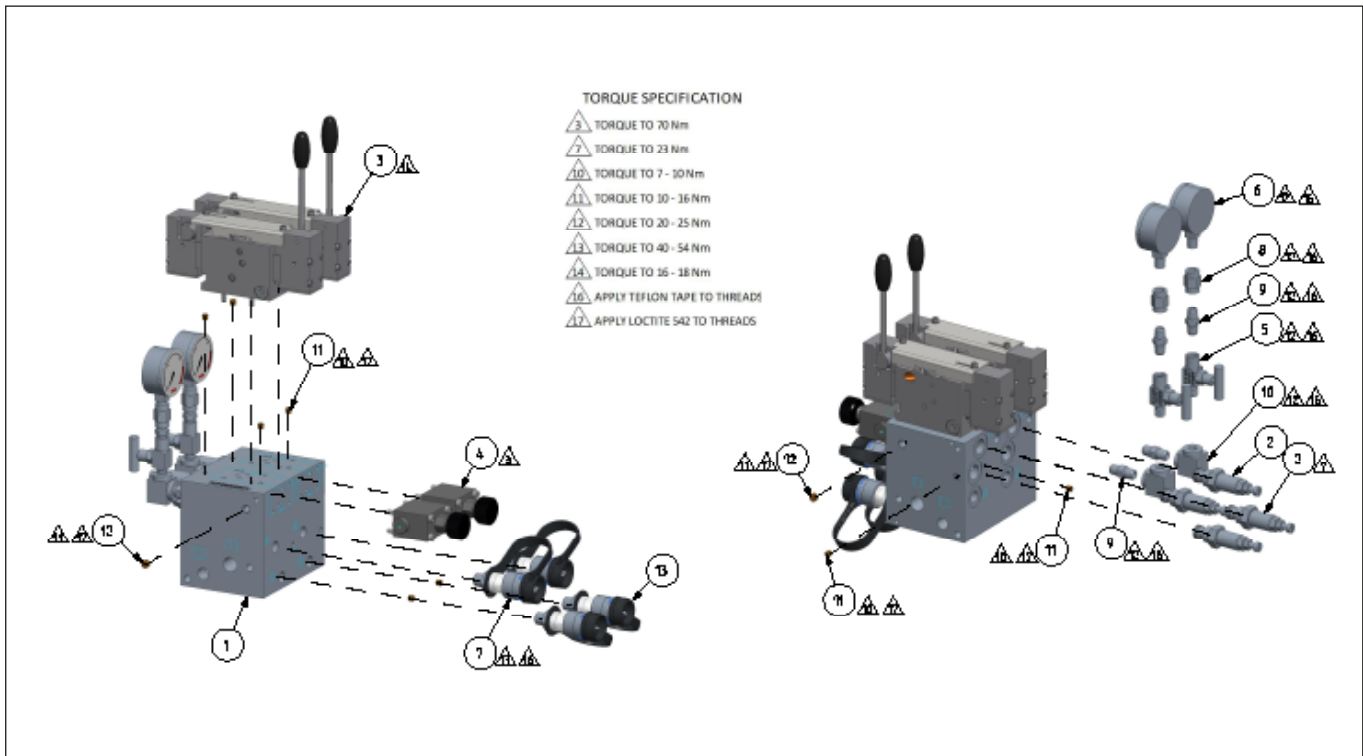


Figure 21: SFP Hydraulic Manifold DB9488900

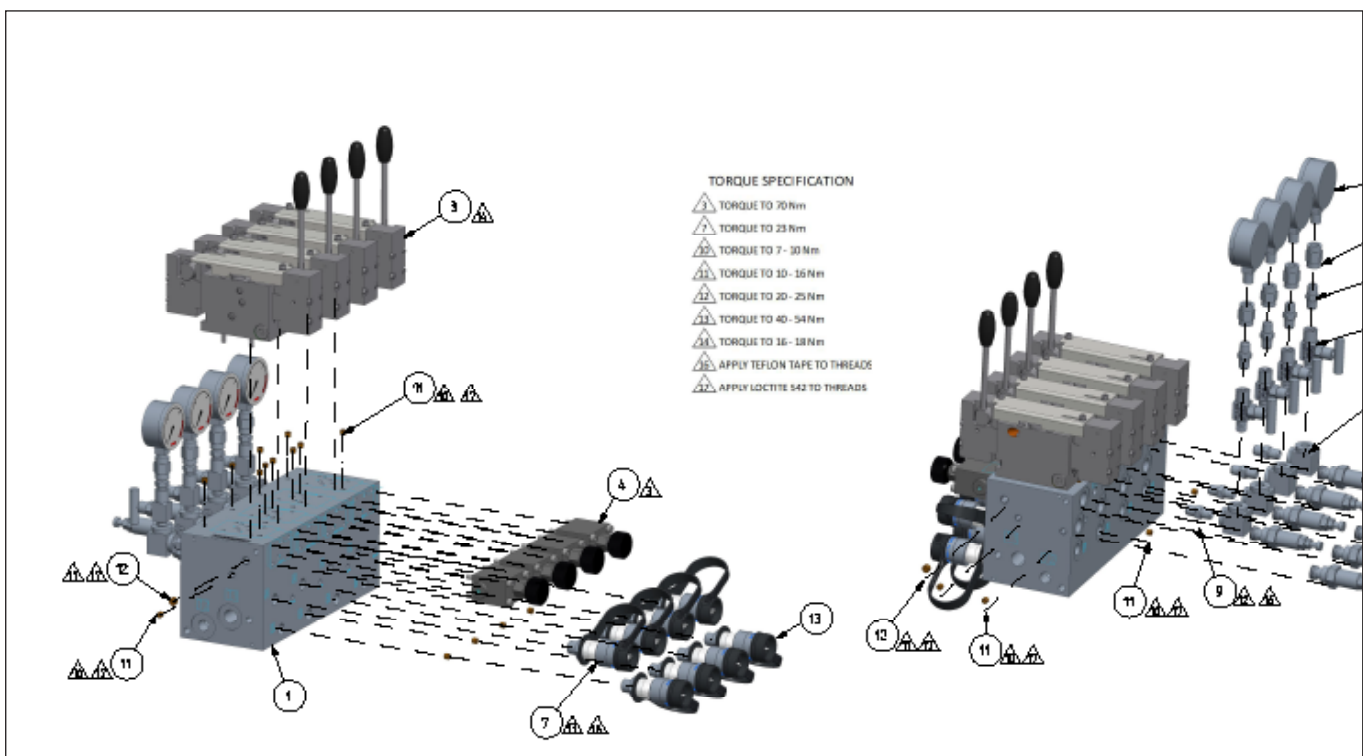


Figure 22: SFP Hydraulic Manifold DB9479900

11.4.1 DB9488900 Table of Parts

Repair Parts List - Figure 21			
Item	Description	Qty.	Part Number
1	Manifold SFP 2P relief in B	1	DB5158840
2	Safety valve MVE4A	4	DB1062663
3	Manual operated valve 4/3	2	DD7581660
4	Compensated flow control	2	DB1105662
5	1/4" NPT M/F needle valve	2	NV251
6	Gauge	2	G2536L
7	Cylinder half-female C604	4	CR400
8	1/4" coupling	2	FZ1605
9	1/4" HEX nipple	4	FZ1608
10	Elbow 1/4"	2	FZ1638
11	Plug-flush	8	A1006245
12	Plug-flush	2	A1007245
13	Dust cap	4	DD1782020

11.4.2 DB9479900 Table of Parts

Repair Parts List - Figure 22			
Item	Description	Qty.	Part Number
1	Manifold SFP 4P relief in B	1	DB5155840
2	Safety valve MVE4A	8	DB1062663
3	Manual operated valve 4/3	4	DD7581660
4	Compensated flow control	4	DB1105662
5	1/4" NPT M/F needle valve	4	NV251
6	Gauge	4	G2536L
7	Cylinder half-female C604	8	CR400
8	1/4" coupling	4	FZ1605
9	1/4" HEX nipple	8	FZ1608
10	Elbow 1/4"	4	FZ1638
11	Plug-flush	19	A1006245
12	Plug-flush	2	A1007245
13	Dust cap	8	DD1782020

11.5 Hydraulic Manifold Solenoid Valves

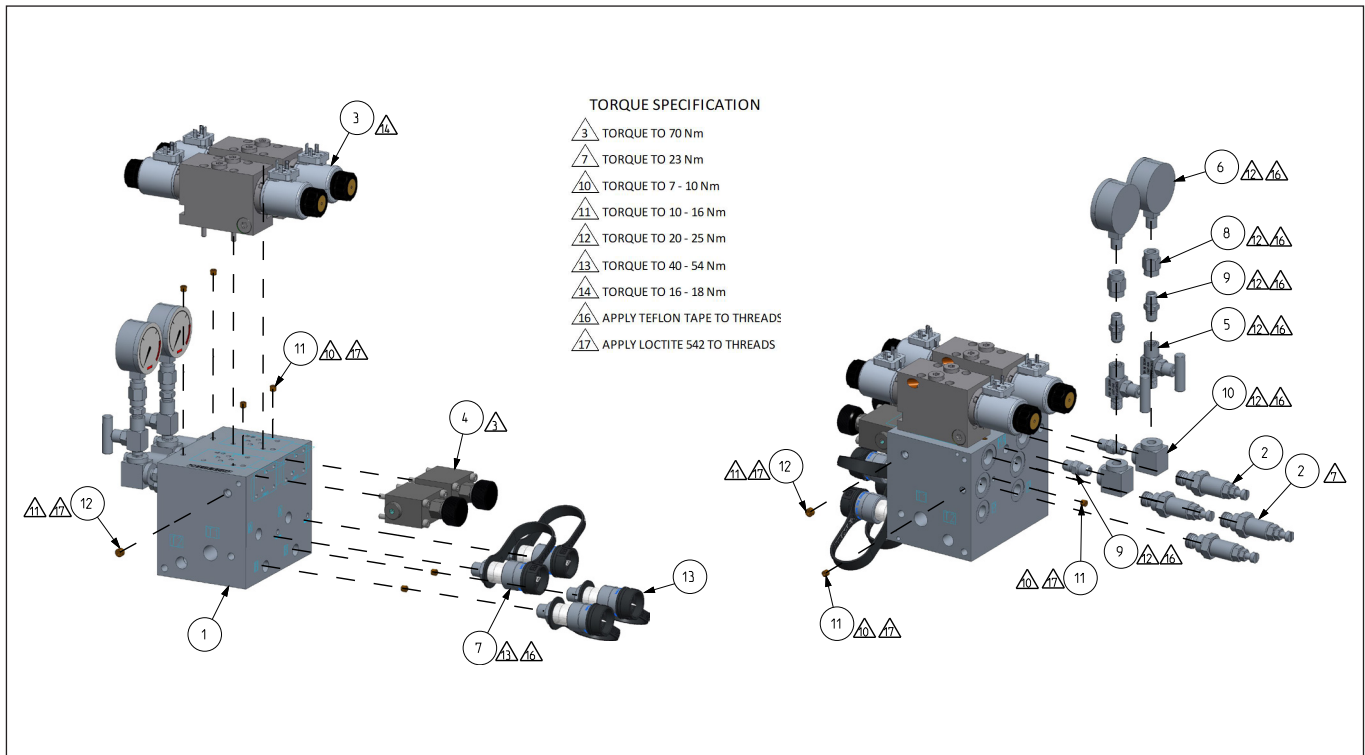


Figure 23: SFP Hydraulic Manifold DB9487900

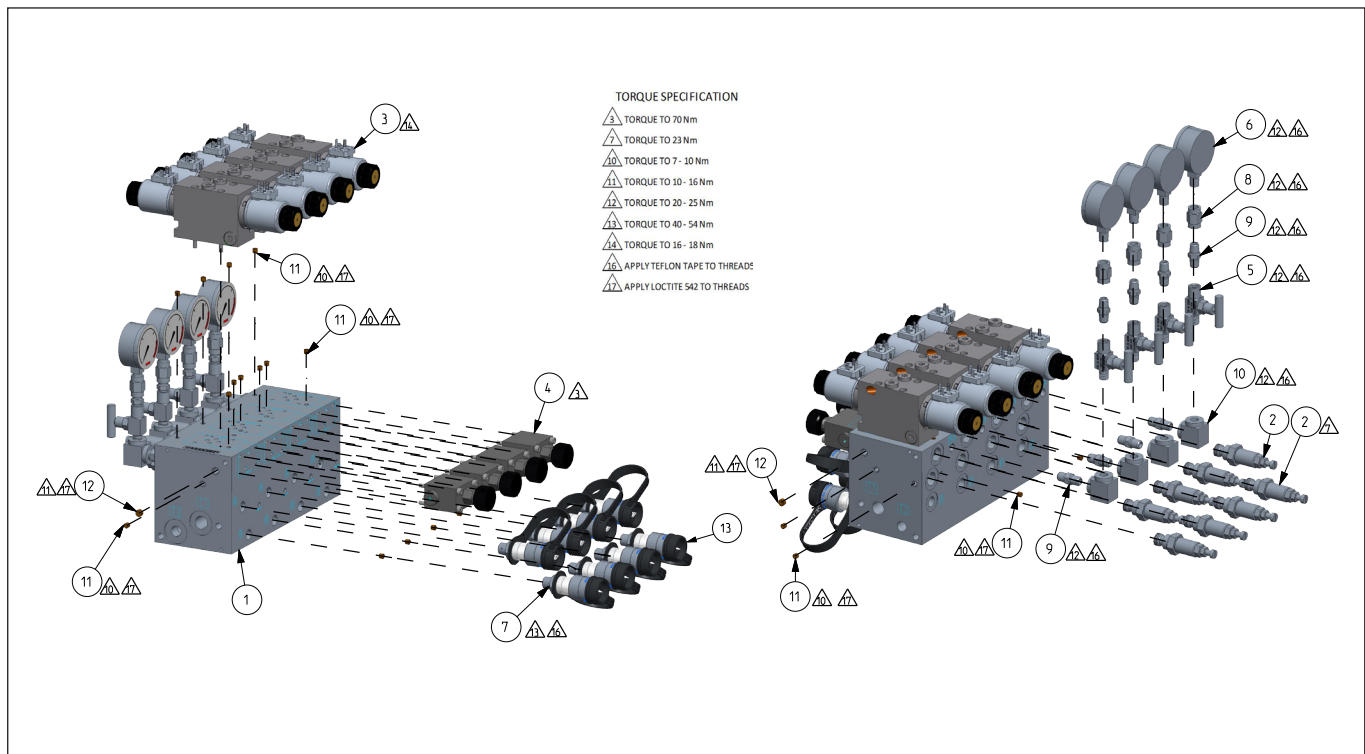


Figure 24: SFP Hydraulic Manifold DB9478900

11.5.1 DB9487900 Table of Parts

Repair Parts List - Figure 23			
Item	Description	Qty.	Part Number
1	Manifold SFP 2P relief in B	1	DB5158840
2	Safety valve MVE4A	4	DB1062663
3	Manual operated valve 4/3	2	DD7581660
4	Compensated flow control	2	DB1105662
5	1/4" NPT M/F needle valve	2	NV251
6	Gauge	2	G2536L
7	Cylinder half-female C604	4	CR400
8	1/4" coupling	2	FZ1605
9	1/4" HEX nipple	4	FZ1608
10	Elbow 1/4"	2	FZ1638
11	Plug-flush	8	A1006245
12	Plug-flush	2	A1007245
13	Dust cap	4	DD1782020

11.5.2 DB9478900 Table of Parts

Repair Parts List - Figure 24			
Item	Description	Qty.	Part Number
1	Manifold SFP 4P relief in B	1	DB5155840
2	Safety valve MVE4A	8	DB1062663
3	Manual operated valve 4/3	4	DD7581660
4	Compensated flow control	4	DB1105662
5	1/4" NPT M/F needle valve	4	NV251
6	Gauge	4	G2536L
7	Cylinder half-female C604	8	CR400
8	1/4" coupling	4	FZ1605
9	1/4" HEX nipple	8	FZ1608
10	Elbow 1/4"	4	FZ1638
11	Plug-flush	19	A1006245
12	Plug-flush	2	A1007245
13	Dust cap	8	DD1782020

11.6 Electrical Schemes

If electrical schemes of the machine are required, contact your Local Enerpac Distributor and provide a picture of the UL Decal located in the upper right corner of the electrical cabinet.

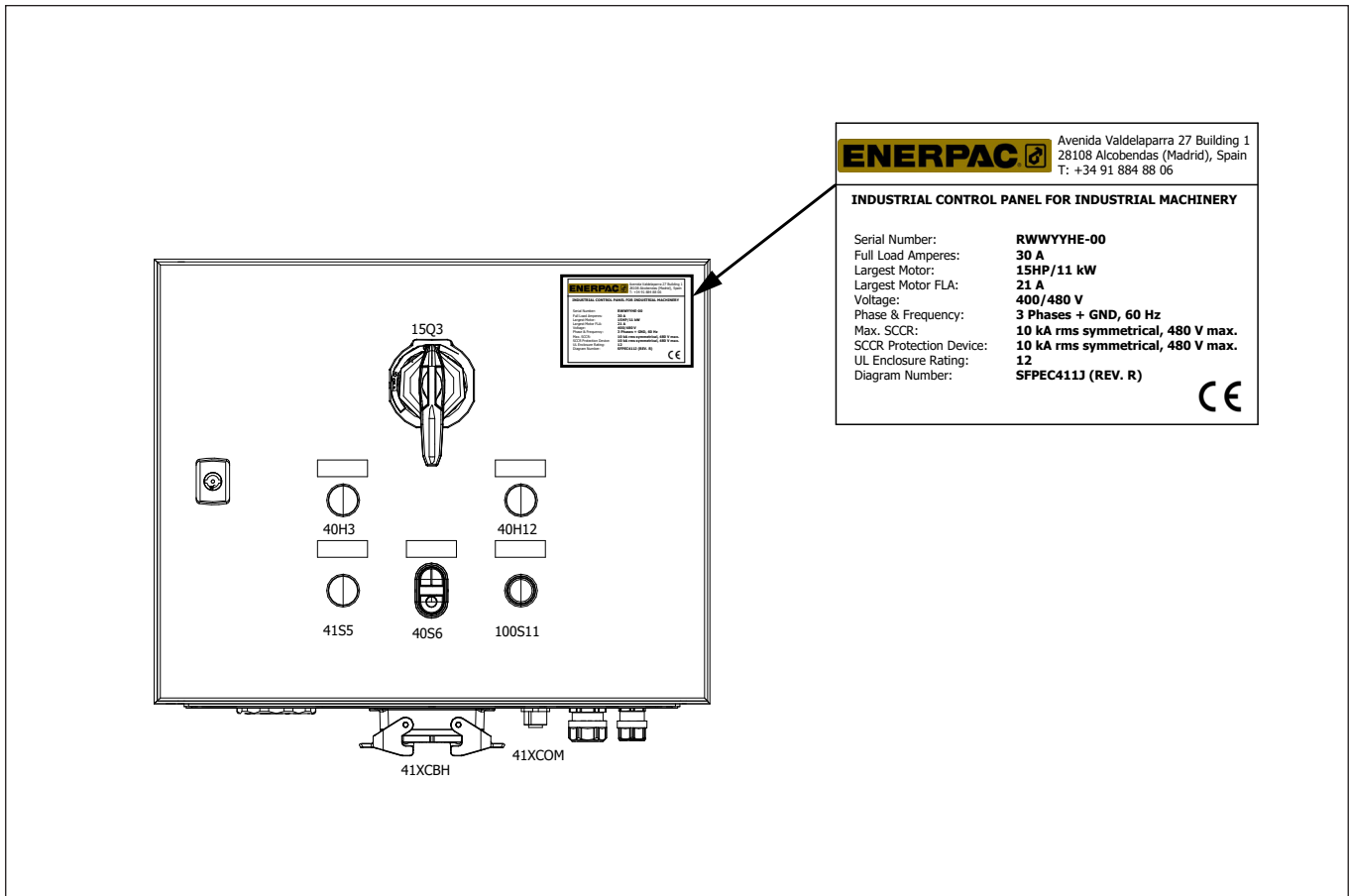


Figure 25: UL Decal

