



Operation and Maintenance Manual

Enerpac SFP409SB

Battery-Powered Split-Flow Hydraulic Pump

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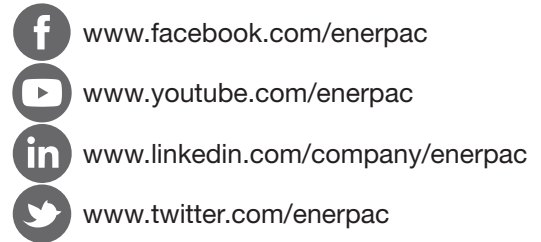
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To reduce the risk of injury, user must read and understand this document before use.

ABOUT US

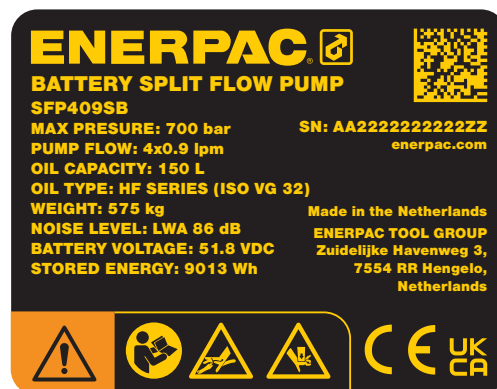
Enerpac is a global market leader in high pressure hydraulic tools, controlled force products, portable machining, on-site services and solutions for precise positioning of heavy loads. As a leading innovator with a 110-year legacy, Enerpac has helped move and maintain some of the largest structures 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

L5033 is available in the following languages, visit www.enerpac.com for a copy.

- Další jazyky lze nalézt na www.enerpac.com.
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- Ga voor de overige talen naar www.enerpac.com.
- For alle andre språk henviser vi til www.enerpac.com.
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- För andra språk, besök 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 (10150 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.
- If the charging cable will not fit in the electrical outlet, and adapted cable will be provided in its stead.

- 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 back-up pressure. Sharp bends and kinks will internally damage the hose leading to premature hose failure.
- Do not drop heavy objects on hose. A sharp impact may cause internal damage to hose wire strands. Applying pressure to a damaged hose may cause it to rupture.
- Do not lift hydraulic equipment by the 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.

1.2 Lithium-Ion Battery Safety Precautions

⚠ WARNING

Read this user manual carefully before installing or using the battery. Failure to follow any of the instructions or warnings in this document could result in electrical shock, serious injury or death. In addition the battery could become damaged, potentially rendering it inoperable.

1.2.1 To avoid serious injury, risk of fire, explosion and danger of electric shock or electrocution:

- Risk of electric shock; do not probe the battery. Its terminals could contain high voltage and high current that could result in electric shock and/or injury.
- If the battery housing cracks or breaks open, with or without leaks, do not recharge or use the battery. Dispose of it properly and replace with a new battery. Do not attempt to repair a damaged or leaking battery.
- Do not allow water or other liquids on or inside the battery. Do not expose the battery to rain, water or moisture. The battery is dust resistant but not waterproof.
- Do not try to use the battery for any other purpose than what is presented in this manual and in the operation manuals for the cordless tools using this battery.
- Do not try to short circuit any terminals of the battery.

- Do not connect the positive terminal and the negative terminal of the battery to each other with any metal objects.
- Be aware of risks involving battery related fires, explosions, and burns. Do not incinerate the battery. Do not overheat the battery. Refer to the supplier's documentation. Do not crush the battery.
- Do not disassemble the battery or attempt to loosen or remove its tamper resistant fasteners. Battery contains no user serviceable or replaceable parts.
- Do not wear any metallic items such as watches, bracelets, etc. while handling the battery or when installing or removing it from the cordless tool or charger.
- In case of fire, utilize suitable extinguishing media including but not limited to; water spray, carbon dioxide, dry chemical powder or appropriate foam. Use agent appropriate for surrounding materials.

Additional safety instructions and precautions:

- Do not allow the battery to overheat. If it becomes unusually hot, discontinue use of the SFP and allow time for battery to cool down.
- Do not charge the battery in rain or in wet conditions. Do not immerse the battery, charger or cordless tool in water or other liquid.
- Keep battery and charger away from unauthorized users.

NOTICE

Refer to the separate supplier manual provided with the battery for additional safety precautions and instructions.

- Do not allow small metal items or material such as steel wool, aluminium foil, or other foreign particles into the battery cavity.
- Do not place or store the battery in direct sunlight.
- Do not place or store the battery in high-temperature locations, such as near a fire, heater, etc.
- Do not knock, strike or step on the battery.
- Do not solder directly onto the battery or pierce the battery with nails or other sharp objects.
- Under extreme usage or temperature conditions, battery cell leakage may occur. Avoid contact with battery liquid. If a leak develops, the released electrolytes are corrosive and toxic. Do not get the solution in the eyes or on skin, and do not swallow it.
- Immediately discontinue use of the battery if it emits an unusual smell, feels excessively hot, changes color, changes shape, or appears abnormal in any other way.
- Do not attempt to modify or repair the battery. If battery is damaged or has reached the end of its useful life, it must be replaced.
- Dispose of a used battery properly. Do not disassemble the battery and do not dispose of it in fire.

1.2.2 First Aid Instructions:



Failure to follow first aid instructions may result in death or serious personal injury

- If battery liquid comes in contact with skin, wash immediately with soap and water, then neutralize with lemon juice or vinegar.
- If battery liquid gets in your eyes, flush with clean water for a minimum of 10 minutes, then seek immediate medical attention.
- If battery liquid is swallowed, seek immediate medical attention.

2. Compliance Statement

2.1 EU Declaration of Conformity



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



Enerpac declares that all electrical components used on Enerpac SFP409SB carry the UL508A Industrial Control Panels.

3. Introduction

3.1 Overview

The Battery-Powered Split-Flow Hydraulic Pump (SFP-B Series) is a self-contained hydraulic power solution designed for split-flow lifting and skidding applications where access to external electrical power is limited, unreliable or impractical.

The SFP-B Series incorporates electrically operated solenoid valves controlled through a pendant, enabling precise control of cylinder movement during lifting and lowering operations. The pump can be used with either single-acting or double-acting hydraulic cylinders and provides simultaneous pressure and return flow to support split-flow applications.

Depending on the application requirements, the connected cylinders can be operated individually or simultaneously to achieve controlled load positioning and movement.

3.2 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.

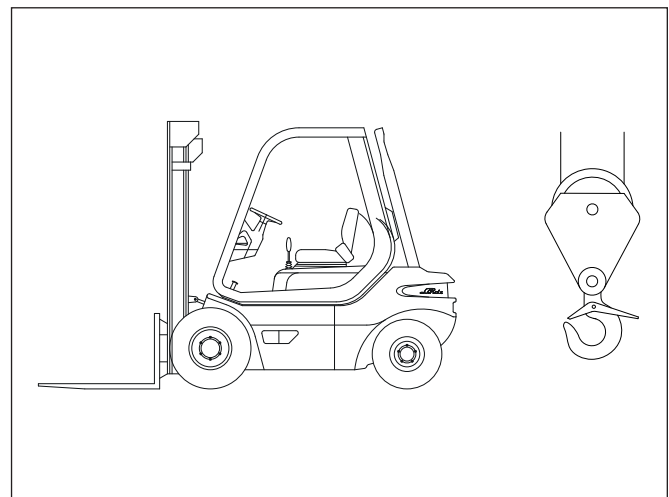


Figure 1: Transport Frame

5. Features & Components

5.1 Hydraulic Power Unit

- | | | |
|---------------------|----------------------|--|
| 1. Electric cabinet | 6. Pump set | 10. Clogging filter indicator, return filter element and return filter housing |
| 2. Frame | 7. Breather filter | 11. 48 V Batteries |
| 3. Reservoir | 8. Motor gasket | |
| 4. Sight glass | 9. Assembly manifold | |
| 5. Motor | | |

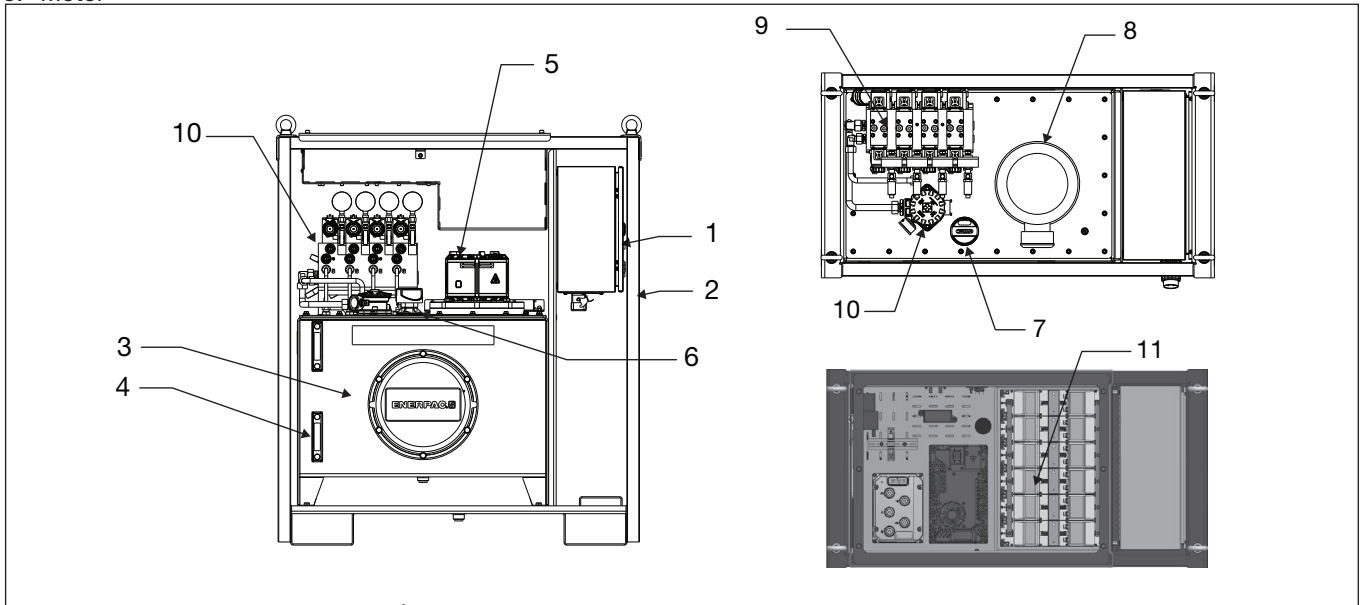


Figure 2: Major Features and Components of Split Flow Pump

5.2 Hydraulic Manifold

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

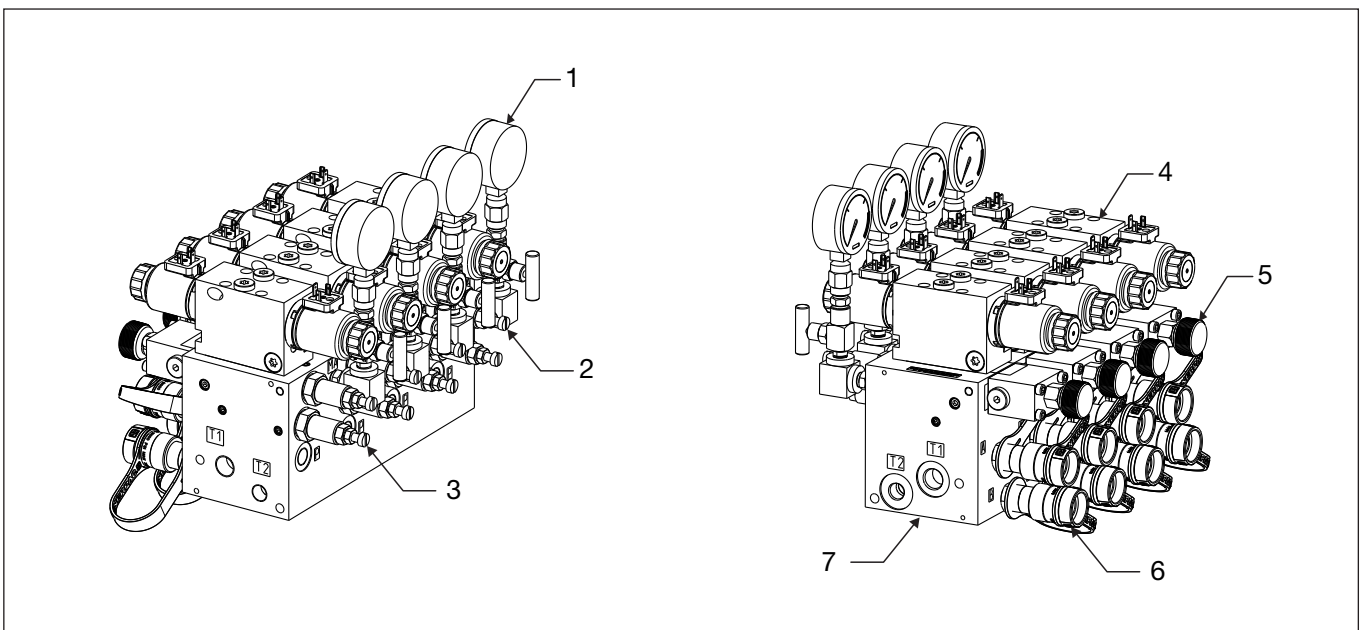


Figure 3: Hydraulic Manifold.

5.3 Electric Panel & Batteries Power Supply

- | | | |
|---|---------------------------------|--|
| 1. Main switch | 4. Power On indicator | 7. Power Supply for Batteries Assembly |
| 2. System alarm light
(fault detected) | 5. Depressurize push-button | 8. Batteries Assembly On/Off Switch |
| 3. System Display & Control screen | 6. Start/Stop motor push-button | |

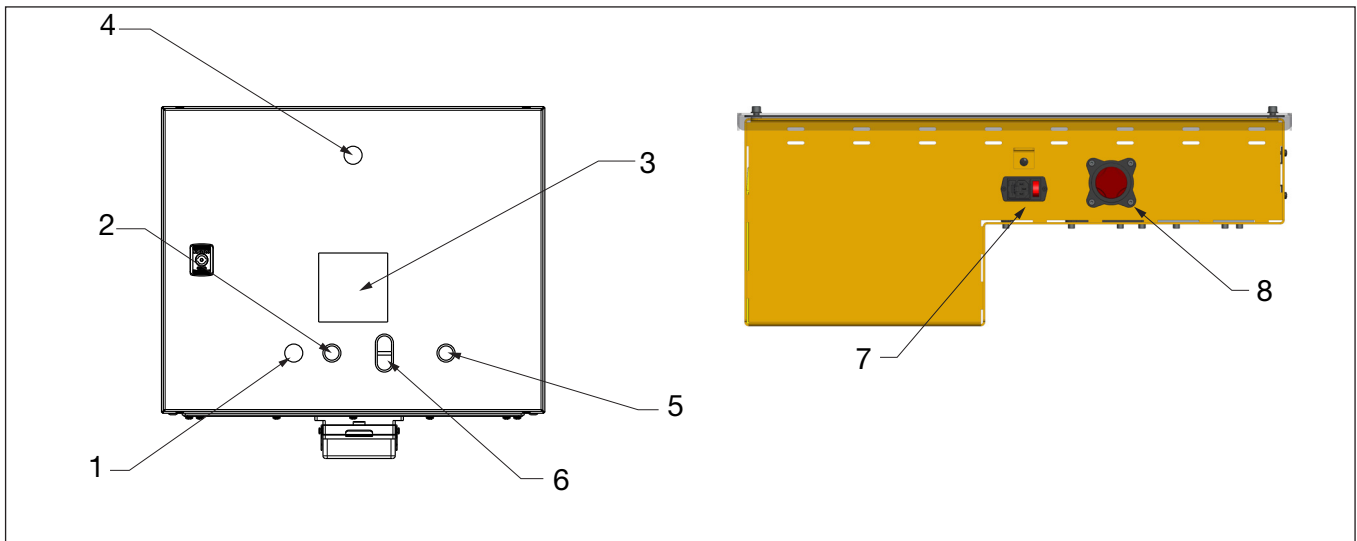


Figure 4: Electric Panel & Batteries Power Supply

5.4 Pendant Control

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

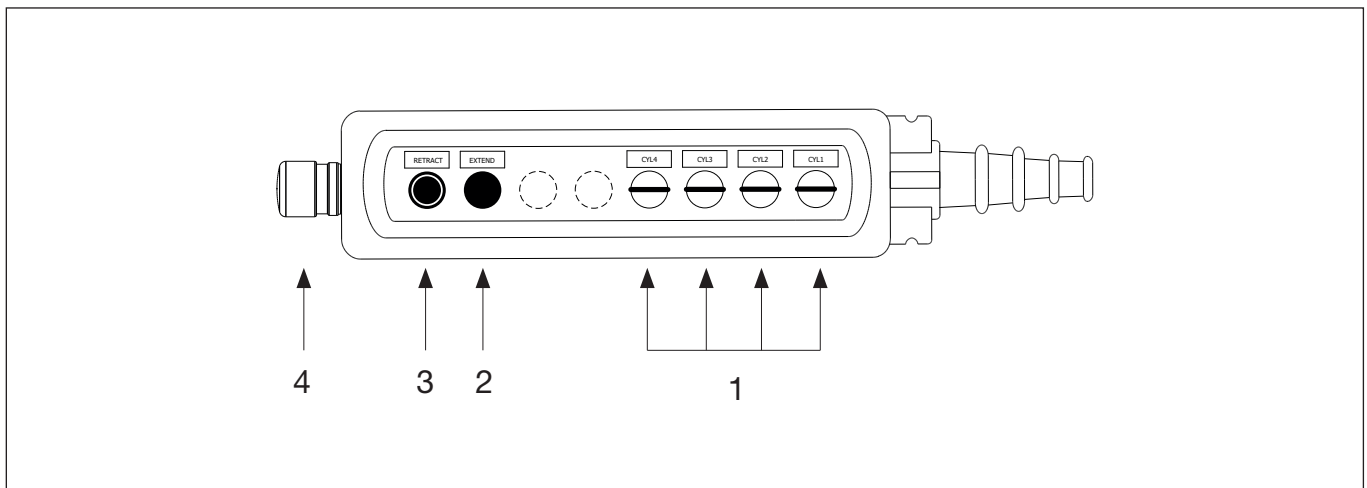


Figure 5: Pendant Control

5.5 Hydraulic Scheme

- | | | |
|--------------------------|---|---------------------------------------|
| 1. Electric Motor | 9. Pressure Gauge (Clogging Filter Indicator) | valve 4/3 |
| 2. Housing | 10. Manifold Assembly (4 outputs). | 10.14. Compensated flow control valve |
| 3. Coupling | 10.10. Manifold | 10.15. Needle valve |
| 4. Pump | 10.11.1-4 P line relief Valve | 10.16. Pressure gauge |
| 5. Visual Level | 10.11.5-8 B line relief valve | 10.17.1-4 Plug |
| 6. Breather filter | 10.12. Hydraulic coupler | 11. 11. Hydraulic oil |
| 7. Return Filter housing | 10.13. Manual/solenoid distribution | |
| 8. Filter element | | |

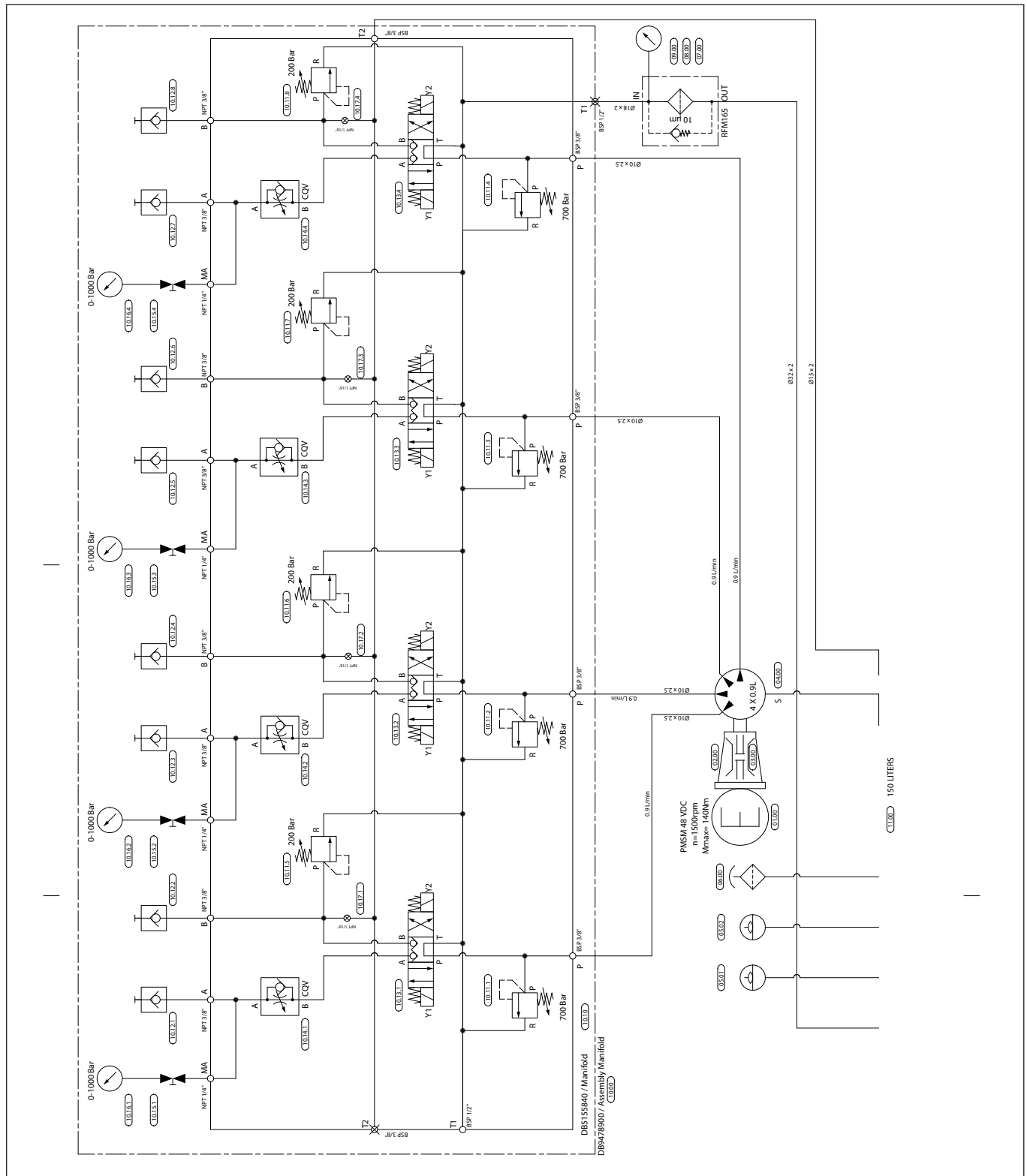


Figure 6: Hydraulic Scheme

6. Technical Product Data

6.1 Dimensional Diagram

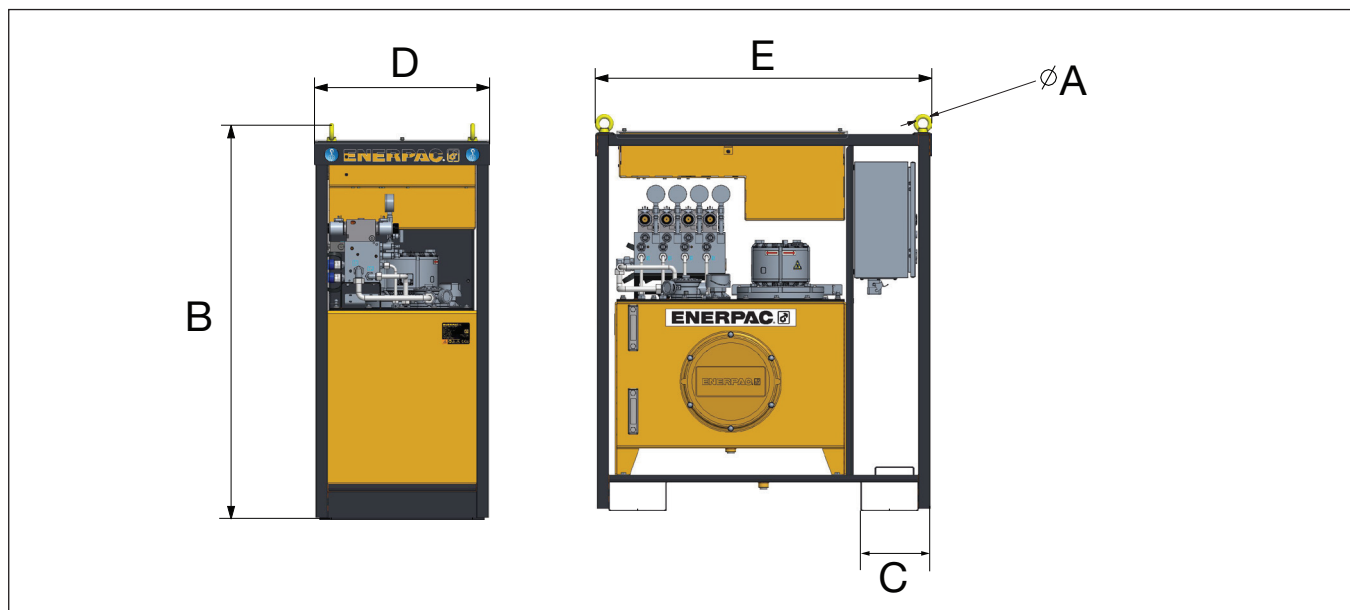


Figure 7: Split Flow Pump Dimensions

6.2 Dimensional Table

Model	Dimension	mm	in
SFP409SB	A	30	1.18
	B	1361	53.58
	C	192	7.56
	D	605	23.82
	E	1163	45.79

6.3 SFP Capabilities

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

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

PUMP MODEL	SFP409SB
Reservoir size gal / l	40 / 150 (Usable oil capacity is 45 gal / 135 l.)
Split flow outlets	4
Flow per outlet in ³ /min (10,150 psi) l/min (700 bar)	65 / 0,9
Weight lbs / kg	1268 / 575

7. Initial Setup

7.1 Installation

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.

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 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.

7.2 Battery

SFP409SB is powered through a battery assembly consisting of six 48 V Varta Easy Blade lithium-ion batteries.

These batteries are charged through their corresponding chargers, which are powered through the line plug, and have a life cycle of an approximate 10 hours when working on low pressure, 2-3 hours when working to a medium pressure (300 bar) and around 1.5 hours when working at maximum capacity (700 bar).

They also come with an integrated BMS system that will notify the user when battery charge is running low.

NOTICE

These batteries can also work while the system is plugged and charging. Keep in mind, however, that this will slow down the charging cycle, so it is recommended to charge the SFP after every use.

CAUTION

In case the energy demand is higher than the energy input provided by the charger, the procedure will only postpone the discharge of the batteries. This practice is not recommended, as it may compromise the batteries' durability, reducing their lifespan.

Refer to the supplier's documentation for further information and technical specifications of the batteries.

If the Battery Saving mode is activated, the motor will turn off automatically in case the motor is on and running without any valve being activated.

7.3 Electric Panel

The electric panel includes the controls to switch on the machine (see Figure 4).

1. Main switch: turn it to the right to turn on the equipment. Then, switch to the left to the original position to turn off the system.
2. System alarm light: This light is on when an alarm is active in the system.
3. System Display & Control screen: This screen shows battery charge and motor information, along with access to the active alarms screen.
4. Power on Indicator: This light is on when the system is connected to power.
5. Depressurize push-button: Push this button to depressurize the system.
6. Start/Stop motor push-button: Pushing these buttons, the motor of the SFP will be switched on/off.
7. Power supply: the plug that allows the batteries to recharge.
8. Batteries Assembly On/Off Switch: connects the batteries to the system circuit, allowing them to provide power to the Pump.

7.4 System Display & Control Screen

SFP409SB has a display screen on its Electric Panel, which provides the operator with information about the battery status, motor information and active alarms.

7.4.1 Main Screen

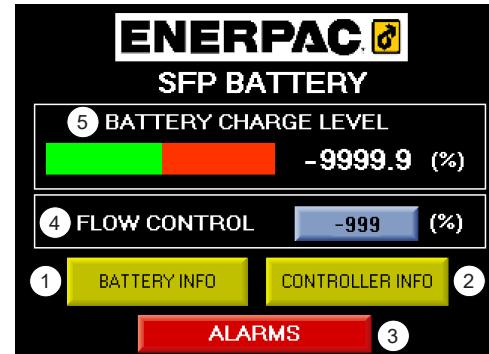


Figure 8: Main Screen

Inside the Main Screen, the following features can be seen:

1. **Battery Info:** by pressing this button, the system will display all relevant battery information (see figure 10).
2. **Controller Info:** displays all the information recorded by the Controller (see Figure 9).
3. **Alarms:** pressing this button allows the user to access all the active alarms log on the system.
4. **Flow Control:** measured in percentage, pressing the number displayed allows the user to modify the speed of the motor (between 30% and 100%).

Flow control adjusts the pump flow rate linearly. 100% corresponds to a flow rate of 0.9 lpm, while 30% corresponds to a flow rate of 0.27 lpm.

The following table provides a summary:

Flow Control %	Nominal Flow rate (lpm)
100%	0.9 lpm
80%	0.72 lpm
50%	0.45 lpm
30%	0.27 lpm

5. **Battery Charge Level:** shows the charge level of the batteries.

NOTICE

All screens displayed on the SFP are designed to provide basic information about the system status. No operation can be performed through any of these screens, and no part of the system can be controlled through them.

7.4.2 Controller Information Screen

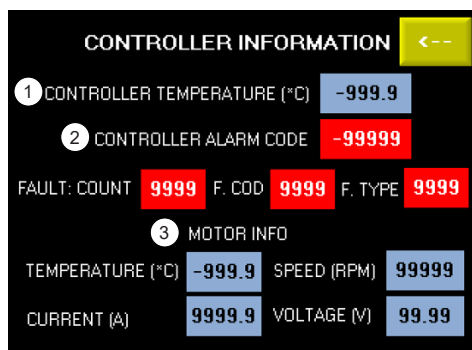


Figure 9: Controller Information Screen.

This screen displays all the information recorded by the Controller:

1. **Controller Temperature (°C).**
2. **Controller Alarm Code:** reports any error on the Controller. Refer to the instructions on the Curtis AC&-FA controller or contact Enerpac for further detail.
3. **Motor Info:**
 - a. Motor Temperature (°C).
 - b. Motor Speed (RPM).
 - c. Current (A).
 - d. Voltage (V).

NOTICE

None of the data or information in display can be edited through this screen.

7.4.3 Battery Information Screen

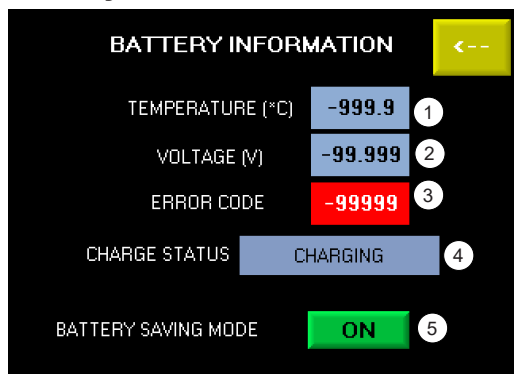


Figure 10: Battery Information Screen

1. **Temperature (°C)**
2. **Voltage (V)**
3. **Battery Error Code:** shows the associated code of any battery-related error. Refer to the manufacturer's documentation for further detail.
4. **Battery Charge Status:** gives live information on whether the battery is currently charging, idle or discharging.
5. **Battery Saving Mode:** when ON, it prevents the system from wasting battery energy by turning it off after 5 minutes when the motor has been running with no valves activated.

7.5 Hydraulic Connections

SFP409SB 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. If there are leaks, qualified personnel must repair it.

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. 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 output A to the cylinder's advance coupler.
5. Connect output B to the cylinder's return coupler (only for double acting cylinders).
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 the system. If there are leaks, qualified personnel must repair it.
8. Keep cylinders connected to a hydraulic system with a minimum cleanliness level of NAS 1638 Class 6.

7.6 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

Follow the next steps to switch on the system:

1. Turn ON the Batteries Switch (Figure 4, item 8).
2. Turn ON the Main Switch on the cabinet (Figure 4, item 1).
3. Check that the Power On Indicator is lit (Figure 4, Item 4).
4. Press the start motor push-button (Figure 4, item 6).
5. When the electric motor is on, use the pendant control to move the cylinders. Refer to section 8.2.

8.2 Pendant Control

Through this pendant, the operator can operate all cylinders connected to the SFP409SB.

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: push to extend the plunger. Release the button to hold the load.
3. Retract push-button: push to retract the plunger. Release the button to hold the load.
4. Safety push-button: When this button is pushed the pump will stop.

8.3 Pressure Relief Valves Setting

Relief valves are factory set at 700 bar (10150 psi). Their maximum work pressure is between 10 and 700 bar (145 psi and 10150 psi).

SFP409SB 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.

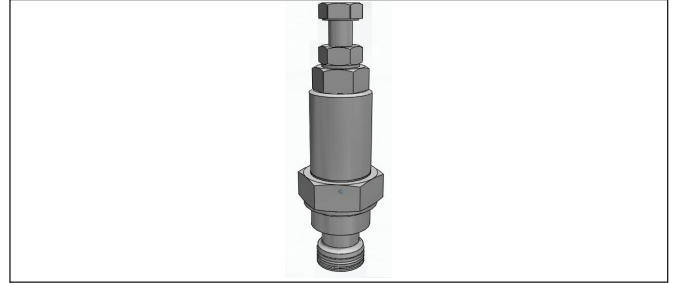


Figure 11: Relief Valve

8.4 Relieving Hydraulic Pressure

With the motor switched off:

1. Use the pendant control to select the cylinders to be Depressurized (Figure 4, No 1).
2. Push Depressurize 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.

8.5 A Line Flow Control

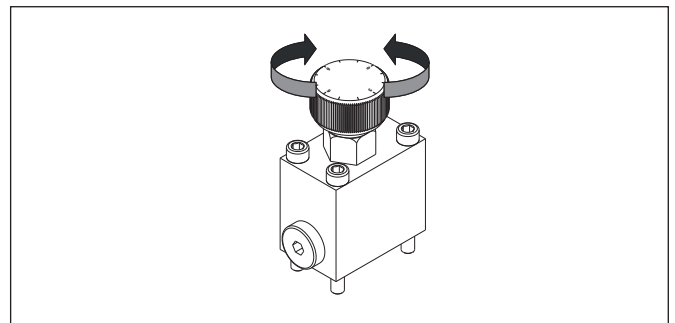


Figure 12: Flow Control Valve

SFPs have flow control valves installed on top of line A 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 colour. 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.

For 10 and 40 litres 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 litres models, unscrew the front lid to access inside of the reservoir.

1. Pour all oil out of the reservoir.
2. Thoroughly clean the reservoir and reservoir magnet with a suitable cleaning agent.
3. 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.
4. Remove the bleeder screw. Refer to paragraph 9.3 for further information.
5. Fill the reservoir with clean Enerpac hydraulic oil. The reservoir is full when oil level is on top of the sight gauge, but letting some visible part without oil.
6. Leave the pump two hours quiet to purge the air.
7. 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.

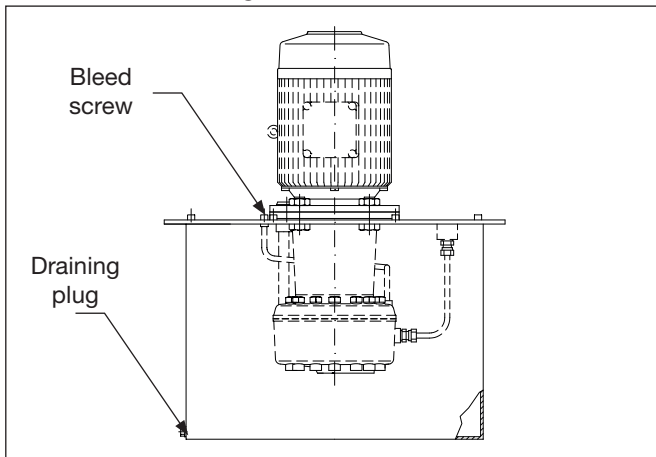


Figure 13: Motor and pump detail

9.4 Filter Cartridge Replacement

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

In 150I 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 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.

9.5 Using Single Acting Cylinders

SFP-B 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 8.3. 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 5.5.

10. Troubleshooting

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.

ALARMS CHART			
CODE	ALARM	POSSIBLE CAUSE	SOLUTION
000	24 DC Protection Failure	The indicated (#) DC protection has been tripped, due to an excessive consumption, overheating, short circuit.	- Open the electrical cabinet and reactivate the DC protection. - Reset alarm.
001	Emergency Stop	Safety Stop is activated.	- Deactivate Safety Stop button. - Reset alarm.
003	Controller Alarm. Check Alarm Code	There is an alarm in the motor controller or motor inverter.	- Check the alarm code in the controller information screen (See Section 7.4.2). - Contact Enerpac for further details. - Reset alarm.
004	Low Battery	- The battery charge level is below 15%. - Warning alarm. The system can still work.	- Charge the batteries. - Reset alarm.
005	Charge Battery	- The battery charge level is below 5%. - Stop alarm. The system cannot work.	- Charge the batteries. - Reset alarm.

11. Parts List

Product Date Code Beginning With: A

11.1 SFP409SB

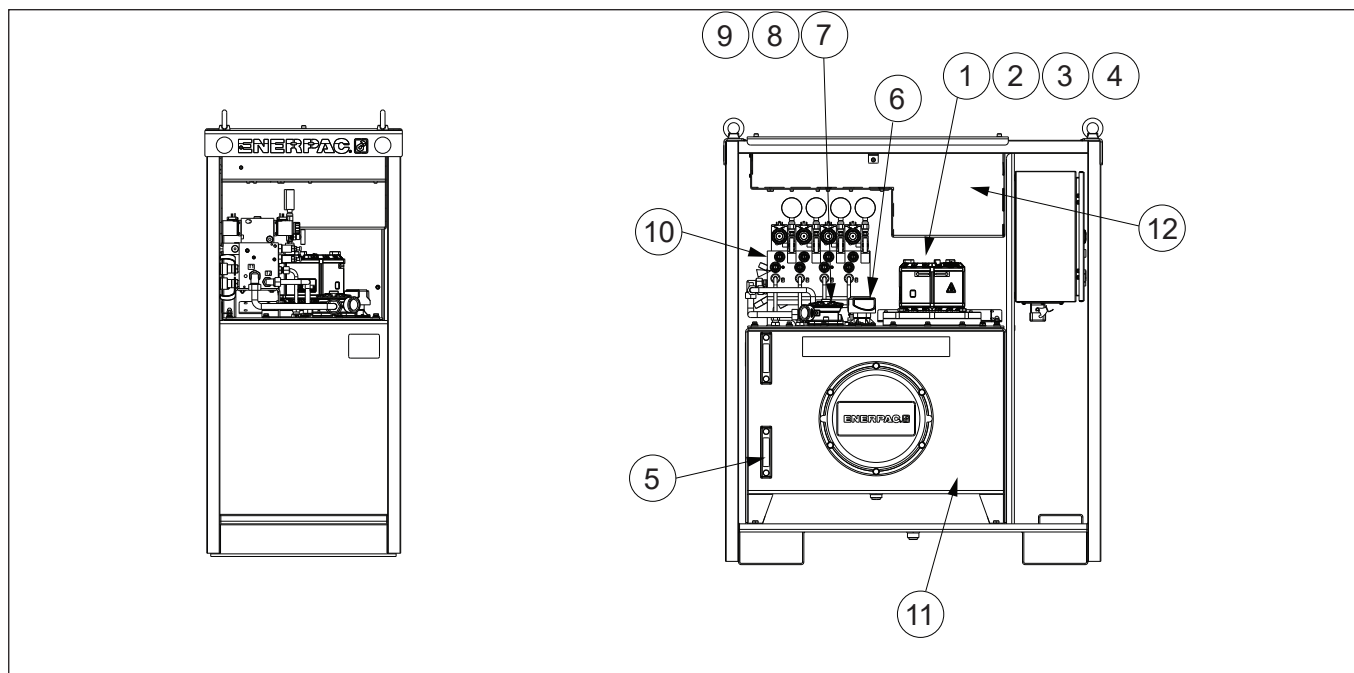


Figure 14: SFP409SB Components

11.1.1 SFP409SB - Table of Parts

Item	Description	Qty.	Part number
1	Electric Motor 9 kW	1	■
2	Bellhousing	1	■
3	Elastic Coupling	1	■
4	Radial piston pump	1	■
5	Level Gauge	2	▲
6	Breather Filter	1	□
7	Return filter housing	1	DB4678118
8	Filter element	1	□
9	Pressure Gauge	1	DB4605118
10	Hydraulic Manifold	1	Refer to Section 11.2
11	Hydraulic Oil	150 l	□ (Only 20L)
12	Battery Box	1	Refer to Section 11.3

NOTE:

- Item included in and available only as part of Repair Kit 03834410100.
- ▲ Item included in and available only as part of Repair Kit 03834420500.
- Item included in and available only as part of Repair Kit 03834430300.
- ◆ Item included in and available only as part of Repair Kit 03834440100.

11.2 Hydraulic Manifold Solenoid Valves (DB9487900)

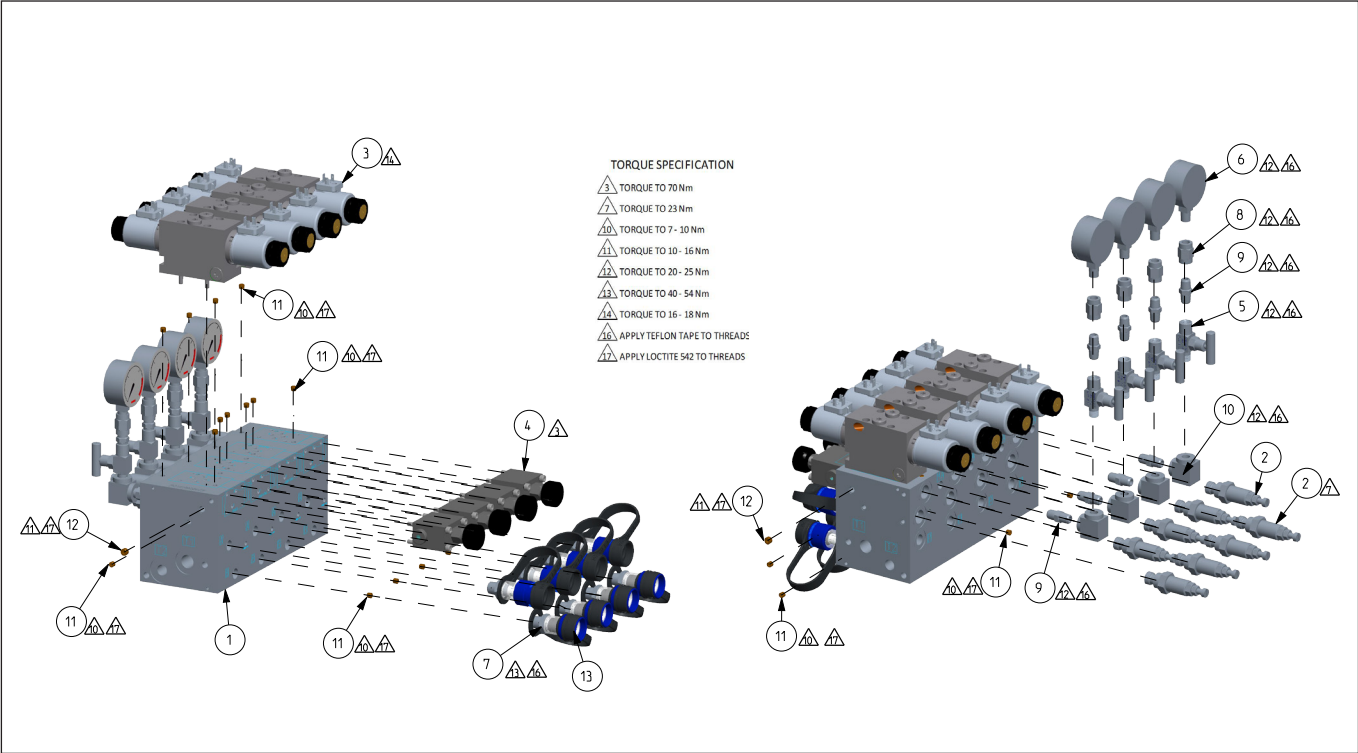


Figure 15: Manifold Exploded View

11.2.1 DB9487900 - Table of Parts

Item	Description	Qty.	Part Number
1	Manifold SFP 2P relief in B	1	DB5155840
2	Safety valve MVE4A	8	DB1062663
3	Solenoid distribution valve 4/3	4	▲
4	Compensated flow control	4	▲
5	1/4" NPT M/F needle valve	4	▲
6	Gauge	4	▲
7	Female coupler	8	▲
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	▲

NOTE:

- Item included in and available only as part of Repair Kit 03834410100.
- ▲ Item included in and available only as part of Repair Kit 03834420500.
- Item included in and available only as part of Repair Kit 03834430300.
- ◆ Item included in and available only as part of Repair Kit 03834440100.

11.3 Battery Box

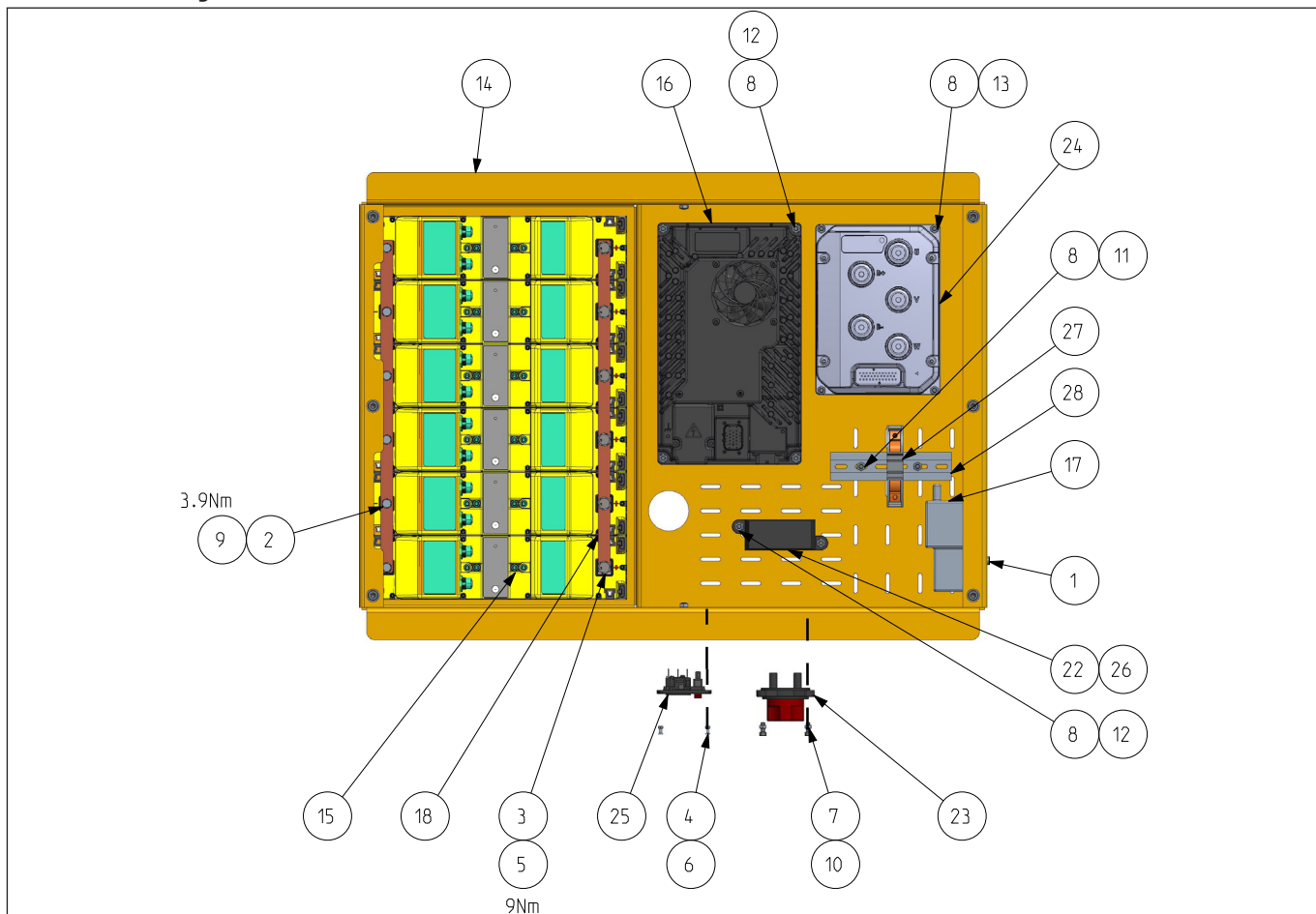


Figure 16: Battery Box details.

11.3.1 Battery Box Parts List

Parts List - Figure 16			
Item	Description	Qty.	Part number
1	Screw, raised cheesehead M5x.8 X 12	2	CAACH507028-3A
2	Washer	6	CAE1060108-1A
3	Washer	6	CAE1080108-1A
4	Screw-fhs, hex, M3X0.5 X 10, 10.9	2	CBA315028-1B
5	Screw-hex, hhcs, M8X16.00	6	CBB0819046-1B
6	Nut-hex, M3, 2.40, 5.50	2	CBB1030120-1D
7	Nut-hex, M4, 3.20, 7.00	4	CBB1040120-1D
8	Nut-hex, M5, 4.00, 8.00	12	CBB1050120-1D
9	Screw-hex, hhcs, M6X16	6	CBB619046-1B
10	Screw-shcs, hex, M5X12.00	4	CBE517028-1A
11	Screw-shcs, hex, M6X10.00	2	CBE615028-1A
12	Screw-shcs, hex, M6X16.00	6	CBE619028-1A
13	Screw-shcs, hex, M6X20.00	4	CBE621028-1A
14	Assembly battery box SFP409SB	1	DB0162201-99
15	Varta easy blade 48V battery	6	◆
16	Varta easy charger 48V	1	DB4816380
17	Line contactor	1	DB4818380
18	Copper busbar 15x4mm, for battery connection	2	DB4821380
19	Varta battery communication cable	5	DB4822380
20	Varta battery charger communication cable	1	DB4823380

Parts List - Figure 16			
Item	Description	Qty.	Part number
21	Power cord europe 1.8M	1	DB4824380
22	Fuse holder	1	DB4825380
23	Battery switch	1	DB4828380
24	Motor controller ACF6-A	1	DB4829380
25	Power entry connector	1	DB4838380
26	Fuse 125A	1	DB4844380
27	Pt power 50 terminal	1	DB4845380
28	Perforated din rail STL 150 x 35 x 7.5	1	DB4847380
29	Terminator resistor CAN - M12	1	DB4849380
30	POWER CORD 1.8M. C13 - USA	1	DB4850380
31	POWER CORD 1.8M. C13 - UK	1	DB4851380
32	POWER CORD 1.8M. C13 - AUS	1	DB4852380
33	POWER CORD 1.8M. C13 - EUROPE	1	DB4853380
NOTE: □ Item included in and available only as part of Repair Kit 03834410100. ▲ Item included in and available only as part of Repair Kit 03834420500. ■ Item included in and available only as part of Repair Kit 03834430300. ◆ Item included in and available only as part of Repair Kit 03834440100.			

10.1 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.

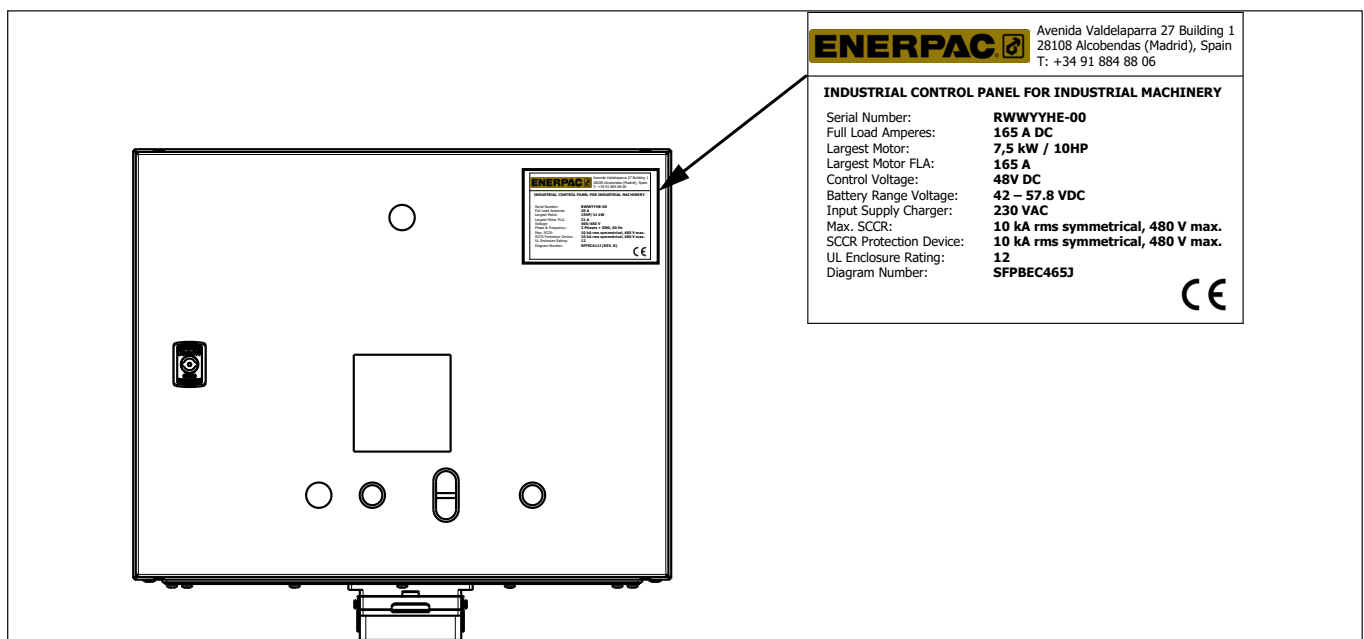


Figure 17: UL Decal

NOTES

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