WARNING HYDRAULIC POWER PACK
Any piece of equipment can be dangerous if not operated properly. YOU are responsible for the safe operation of this equipment. The operator must carefully read and follow any warnings, safety signs and instructions provided with or located on the equipment. Do not remove, defeat, deface or render inoperable any of the safety devices or warnings on this equipment. IF any safety devices or warnings have been removed, defeated, defaced or rendered inoperable, DO NOT USE THIS EQUIPMENT!!!

IMPORTANT SAFETY RULES TO FOLLOW.
Post this Safety and operating instruction at work locations, provide copies to employees, and make sure that everyone reads the Safety and operating instruction before operating or servicing the machine. In addition, the operator or the operator's employer must assess the specific risks that may be present as a result of each use of the machine. Safety signal words: The safety signal words Danger, Warning and Caution have the following meanings:

DANGER: Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
WARNING: Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
CAUTION: Personal precautions and qualifications only qualified and trained persons may operate or maintain the machine. They must be physically able to handle the bulk, weight, and power of the tool. Always use your common sense and good judgment.

PERSONAL PROTECTIVE EQUIPMENT
Always use approved protective equipment. Operators and all other persons in the working area must wear protective equipment, including at a minimum: Protective helmet. Hearing protection. Impact resistant eye protection with side protection. Respiratory protection when appropriate. Protective gloves. Proper protective boots. Appropriate work overall or similar clothing (not loose-fitting) that covers your arms and legs.

WARNING: Drugs, alcohol or medication Drugs, alcohol or medication may impair your judgment and powers of concentration. Poor reactions and incorrect assessments can lead to severe accidents or death.
► Never use the machine when you are tired or under the influence of drugs, alcohol or medication.
► No person who is under the influence of drugs, alcohol or medication may operate the machine.

WARNING: Hydraulic oil at high pressure Thin jets of hydraulic oil under high pressure can penetrate the skin and cause permanent injury. Immediately consult a doctor if hydraulic oil has penetrated the skin. Never use your fingers to check for hydraulic fluid leaks. Keep your face away from any possible leaks.

WARNING: Hydraulic oil Spilled hydraulic oil can cause burns, accidents due to slippery conditions and will also harm the environment. Take care of all spilled oil and handle it according to your safety and environmental regulations. Never dismount the hydraulic machine when the hydraulic oil is hot.

CAUTION: Skin eczema. Hydraulic oil can cause eczema if it comes in contact with the skin. Avoid getting hydraulic oil on your hands. Always use protective gloves when working with hydraulic oil. Wash hands after contact with hydraulic oil.

CAUTION: Moving parts Risk for crushed hands and fingers. Never check bores or passages with hands or fingers. Never operate the machine when adjusting the choke control or fuel valve.

WARNING: Whipping hydraulic hose. Hydraulic hoses under pressure can whip uncontrollably if screws loosen or are loosened. A whipping hydraulic hose can cause severe injuries. Depressurize the hydraulic system before loosening the connection of a hydraulic hose. Tighten the nuts on the connections of the hydraulic hoses to the required torque. Check that the hydraulic hose and the connections are not damaged.

Personal precautions
Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

Operation, precautions
DANGER: Explosion hazard
When working on certain materials and when using certain materials in machine parts, sparks and ignition can occur. Explosions will lead to severe injuries or death.
► Never use the machine in any explosive environment.
► Never use the machine near flammable materials, fumes or dust.
► Make sure that there are no undetected sources of gas or explosives.

DANGER: Fuel hazard
The fuel (petrol and oil) is extremely flammable and petrol fumes can explode when ignited, causing serious injury or death.
► Protect your skin from contact with the fuel. If fuel has penetrated the skin, consult a qualified health professional.
► Never remove the filler cap, and never fill the fuel tank when the machine is hot.
► Release the filler cap slowly to let pressure escape.
► Never overfill the fuel tank.
► Make sure the filler cap is screwed on when the machine is used.
► Avoid spilling fuel on the machine, wipe off any spilled fuel.
► Check regularly for fuel leaks. Never use the machine if it is leaking fuel.
► Never use the machine in the proximity of material that can generate sparks. Remove all hot or spark-generating devices before starting the machine.
► Never smoke when filling the fuel tank or when working with the machine or servicing it.
► Only store fuel in a container that is specially constructed and approved for the purpose.
► Consumed petrol and oil containers must be taken care of and returned to the retailer.
► Never use your fingers to check for fluid leaks.

DANGER: Exhaust gas hazard
The exhaust gas from the machine’s combustion engine contains carbon monoxide which is poisonous, and chemicals known to the State of California and other authorities to cause cancer, birth defects, or other reproductive harm. Inhalation of exhaust fumes can cause serious injury, illness, or death.
► Never inhale exhaust fumes.
► Never operate the machine indoors or in a poorly ventilated area.
► Never stand in a deep hole, ditch, or similar surrounding during operating.

WARNING: Dust and fume hazard
Dusts and/or fumes generated or dispersed when using the machine may cause serious and permanent respiratory disease, illness, or other bodily injury (for example, silicosis or other irreversible lung disease that can be fatal, cancer, birth defects, and/or skin inflammation). Some dusts and fumes created by drilling, breaking, hammering, sawing, grinding and other construction activities contain substances known to the State of California and other authorities to cause respiratory disease, cancer, birth defects, or other reproductive harm. Some examples of such substances are: > Crystalline silica, cement, and other masonry products. > Arsenic and chromium from chemically-treated rubber. > Lead from lead-based paints. Dust and fumes in the air can be invisible to the naked eye, so do not rely on eye sight to determine if there is dust or fumes in the air. To reduce the risk of exposure to dust and fumes, do all of the following:
► Perform site-specific risk assessment. The risk assessment should include dust and fumes created by the use of the machine and the potential for disturbing existing dust.
Use proper engineering controls to minimize the amount of dust and fumes in the air and to minimize build-up on equipment, surfaces, clothing, and body parts. Examples of controls include: exhaust ventilation and dust collection systems, water sprays, and wet drilling. Control dusts and fumes at the source where possible. Make sure that controls are properly installed, maintained and correctly used.

Wear, maintain and correctly use respiratory protection as instructed by your employer and as required by occupational health and safety regulations. The respiratory protection must be effective for the type of substance at issue (and if applicable, approved by relevant governmental authority).

Work in a well ventilated area.

If the machine has an exhaust, direct the exhaust so as to reduce disturbance of dust in a dust filled environment.

Operate and maintain the machine as recommended in the operating and safety instructions.

Select, maintain and replace consumables/inserted tools/other accessory as recommended in the operating and safety instructions. Incorrect selection or lack of maintenance of consumables/inserted tools/other accessories may cause an unnecessary increase in dust or fumes.

Wear washable or disposable protective clothes at the worksite, and shower and change into clean clothes before leaving the worksite to reduce exposure of dust and fumes to yourself, other persons, cars, homes, and other areas.

Avoid eating, drinking, and using tobacco products in areas where there is dust or fumes.

Wash your hands and face thoroughly as soon as possible upon leaving the exposure area, and always before eating, drinking, using tobacco products, or making contact with other persons.

Comply with all applicable laws and regulations, including occupational health and safety regulations.

Participate in air monitoring, medical examination programs, and health and safety training programs provided by your employer or trade organizations and in accordance with occupational health and safety regulations and recommendations. Consult with physicians experienced with relevant occupational medicine.

Work with your employer and trade organization to reduce dust and fume exposure at the worksite and to reduce the risks. Effective health and safety programs, policies and procedures for protecting workers and others against harmful exposure to dust and fumes should be established and implemented based on advice from health and safety experts. Consult with experts.

Residues of hazardous substances on the machine can be a risk. Before undertaking any maintenance on the machine clean it thoroughly.

**WARNING Overheated power pack**
The power pack can become overheated and cause burns.

Never close the cooler in order to warm up the power pack quicker.

Never run the power pack without a fan.

**WARNING Slipping, tripping and falling hazards**
There is a risk of slipping or tripping or falling, for example tripping on the hoses or on other objects. Slipping or tripping or falling can cause injury. To reduce this risk:

- Always make sure that no hose or other object is in your way or in any other person's way.
- Always make sure you are in a stable position with your feet as far apart as your shoulders width and keeping a balanced body weight.

**DANGER Electrical hazard**
The machine is not electrically insulated. If the machine comes into contact with electricity, serious injuries or death may result.

- Never operate the machine near any electric wire or other source of electricity.
- Make sure that there are no concealed wires or other sources of electricity in the working area.

**WARNING Involuntary start**
Involuntary start of the machine may cause injury.

- Keep your hands away from the start and stop device until you are ready to start the machine.
- Learn how the machine is switched off in the event of an emergency.
- Stop the machine immediately in all cases of power supply interruption.

**WARNING Noise hazard**
High noise levels can cause permanent and disabling hearing loss and other problems such as tinnitus (ringing, buzzing, whistling, or humming in the ears). To reduce risks and prevent an unnecessary increase in noise levels:

- Risk assessment of these hazards and implementation of appropriate controls is essential.
- Operate and maintain the machine as recommended in these instructions.
- Select, maintain and replace the insertion tool as recommended in these instructions.
- If the machine has a silencer, check that it is in place and in good working condition.
- Always use hearing protection.
- Use damping material to prevent work pieces from 'ringing'.

**WARNING Nominal pressure**
If the maximum nominal pressure for the hydraulic machine is exceeded, it can result in material damage and personal injury.

- Always run the hydraulic machine with a tool that does not require a continuously higher pressure than the stated nominal pressure. See section "Technical data".

**Maintenance, precautions**

**WARNING Machine modification**
Any machine modification may result in bodily injuries to yourself or others.

- Never modify the machine. Modified machines are not covered by warranty or product liability.
- Always use original parts, insertion tools, and accessories.
- Change damaged parts immediately.
- Replace worn components in good time.

**WARNING Hot components**
Under normal working conditions the engine components, particularly the exhaust system, will get hot. The hydraulic oil, pump, valve, and tank can also reach high temperatures that can cause burns.

- Never touch a hot exhaust system, hydraulic oil, pump, valve or tank.

**WARNING Accessory hazards**
Accidental engagement of accessories during maintenance or installation can cause serious injuries, when the power source is connected.

- Never inspect, clean, install, or remove accessories while the power source is connected.

**Storage, precautions**
- Keep the machine and tools in a safe place, out of the reach of children and locked up.
Overview
To reduce the risk of serious injury or death to yourself or others, read the Safety Instructions section based on the previous pages of this manual before operating the machine.

Design and function
PAC P13 is a hydraulic power pack designed for operating hydraulic breakers and other hydraulic machines. For other parts, please refer to the PAC P13 manual with an 1H-HP series or a cooled pump engine with a hydraulic fluid (oil) system (pump on demand).
The oil flow is 20.0 l (1.2 gpm continuous; 5.8 US gallons).

Main parts

A. Filter condition gauge
B. Oil supply
C. Engine oil, coolant
D. O-ring valve
E. Filter cap, hydraulic oil
F. Filter cap, fuel
G. Ignition switch, OFF and ON
H. Hand brake
I. Air filter
J. Check control
K. Fuel tap
L. Sight glass, hydraulic oil level
M. Pressure relief valve

Hydraulic oil

In order to protect the environment, use of biodegradable hydraulic oil is recommended. No other fluids may be used.

- Viscosity grade EP23-46 (ISO 80W-90)
- Viscosity grade 15-100 ISO
- Viscosity index minimum 100.

Standard mineral or synthetic oil can be used. Make sure only to use clean oil and filling equipment. When the machine is used continuously, the oil temperature will reach a level which is called the working temperature. The working temperature is the highest temperature the oil can reach. It can be maintained within the temperature range. This machine must not be used if the oil cannot be maintained within the temperature range. If the working temperature of the oil decreases below 20% (30°C) and 70% (130°C), this is a sign that the oil needs to be replaced.

Note: The setting of the pressure relief valve on the machine can be up to the maximum permissible setting according to the EN series, or different to the EN series. This is because the EN series contains information on the technical specifications of the machine. The pressure relief valve setting on the machine can be adjusted to suit the needs of the application. The pressure relief valve setting is set to a lower pressure than the minimum setting of the machine.

Hydraulic control and connectors

Checking the hydraulic system

To set the pressure relief valve, start the engine.
1. Stop the engine.
2. Connect the hydraulic system to the hydraulic pack. Make sure the hydraulic system is not open (A) and (B).
3. Make sure that the hydraulic system is not open (A) and (B).
4. Start the engine.
5. Move the bypass valve on the power pack to the open position.
6. Turn the hydraulic valve, and the power pack flows approximately 70 l/min (1.8 gpm).
7. Check the pressure in the hydraulic lines.
8. Slowly adjust the hydraulic control, and the pressure should decrease to approximately 100 bar (1450 psi).
9. Check the pressure in the hydraulic lines. If it is not in accordance with the technical specifications for the power pack, unplug the hydraulic pack and contact the manufacturer for troubleshooting.

Transport

Transporting the power pack is required. Ensure the power pack is held in place during transportation and maintenance.

Operation

To start the power pack:
1. Ensure the engine is on the power pack.
2. Start the engine.
3. Move the bypass valve on the power pack to the open position.
4. Slowly adjust the hydraulic control, and the pressure should decrease to approximately 100 bar (1450 psi).
5. Check the pressure in the hydraulic lines. If it is not in accordance with the technical specifications for the power pack, unplug the hydraulic pack and contact the manufacturer for troubleshooting.

Quick release couplings

The quick release couplings are designed to be easily connected and disconnected. Ensure that the couplings are not damaged and correctly engaged before operation. Failure to do so may result in damage to the quick coupling and inadequate pressure for the system.

Installation

WARNING: The hydraulic system must be installed according to the manufacturer's instructions. This includes the use of the correct hydraulic oil and the use of the correct filter and pressure relief valve settings. Ensure that the couplings are not damaged and correctly engaged before operation. Failure to do so may result in damage to the quick coupling and inadequate pressure for the system.

NORE: Disconnect the hydraulic lines before starting the engine. Ensure that the hydraulic system is not open (A) and (B).

EHTMA

The EHTMA (European Hydraulic Tool Manufacturers Association) has collaborated with hydraulic manufacturers to produce a range of power packs and components in terms of flow rate and working pressure.

To ensure the safe and efficient operation of the machine, it is important to follow the manufacturer's instructions. This includes the use of the correct hydraulic oil and the use of the correct filter and pressure relief valve settings. Ensure that the couplings are not damaged and correctly engaged before operation. Failure to do so may result in damage to the quick coupling and inadequate pressure for the system.
Starting the engine
1. Turn the engine switch (A) to position ON.

2. Turn on the fuel by setting the fuel control (B) to the ON position.

3. Move the chokes control (C) to the CLOSE position. If the engine is warm, or the air temperature is high, move the choke control to the OPEN position.

Change flow rate
The flow rate can be changed from 201. p.m. (5 US gpm) to 101. p.m. (2 US gpm).
1. Loosen the screw (A).

2. Move the PCD cylinder to the alternative mark.

3. Tighten the screw (A).

4. Set the hydraulic by-pass valve (D) to the OFF position.

5. Pull out the starter cord (E) until it meets. Release the handle on the starter cord goes back again, and then push the starter cord until the engine starts.

6. As the engine warms up, gradually move the choke control (C) to the OPEN position.

Before usage, the power pack must be allowed to warm up to its working temperature for several minutes.

Stopping the engine
1. Turn the engine switch (A) to position OFF.

2. Turn off the fuel by setting the fuel control (B) to the OFF position.

When taking a break
- During all breaks you must place the machine in such a way that it is not likely to be inadvertently started. Make sure to place the machine on the ground, so that it can not fall.

- In the event of a longer break or when leaving the workplace, switch off the power supply and then bleed the machine by activating the start and stop button.

Maintenance
Regular maintenance is a basic requirement for the continued safety and efficient use of the machine. Follow the maintenance instructions carefully.

- Before starting maintenance on the machine, disconnect it in order to avoid exposure to hazardous substances. See "Cleaning and HOUSEKEEPING".

- Use only authorised parts, any damage or malfunction caused by the use of unauthorised parts is not covered by warranty or product liability.

- When disassembling components with solvent, comply with appropriate health and safety regulations and ensure there is satisfactory ventilation.

- For major service of the machine, contact your nearest authorized workshop.

- After each service, check the machine's vibration levels. If not, contact your nearest authorized workshop.

Every day
Never perform maintenance when the power pack is running.

- Clean and inspect the machine and its functions each day before starting work.

- Conduct a general inspection for leaks and damage and wear.

- Change damaged parts immediately.

- Replace worn components as good time.

- Never use the equipment if you suspect that it is damaged.

- Never skid or abuse the equipment.

- Make sure that all the attached and related equipment, such as hoses and PCD (power on demand) are in good condition.