

**OPERATING INSTRUCTIONS**  
**Power Pack**  
**P-350**



**OPERATING INSTRUCTIONS P-350**



office (936)494-4200  
1-800-409-0018  
fax (936)494-4517  
[www.Pileco.com](http://www.Pileco.com)

491 Conroe Park W. Dr. • Conroe, TX 77303

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# OPERATING INSTRUCTIONS P-350

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# OPERATING INSTRUCTIONS P-350

## PREFACE

This owner's manual has been written for the users of Pileco Inc. Power Pack The owner's manual explains how to use, service and inspect the power pack, with the intention to use the power pack safe and efficiently.

One copy of the present manual should at any time be at the location where the unit is in operation.

When the instructions of this owner's manual are not strictly followed, accidents may happen.

Therefore, make sure you understand all the instructions in this manual before you start using the power pack.

For ordering of parts we refer to the parts manual of the relating power pack.

For the operation of the machine which is attached to the power pack, we refer to the owner's manual of the relating manufacturer.

If operational or maintenance problems arise which are beyond the scope of this manual, please contact Pileco Inc. at the telephone number on this page.

We are prepared to assist you in order to make the best use of your equipment.

If you call, please have the following at hand:

Model number:

Equipment serial number:

## Safety Indicators Explained:

The following symbols are used throughout the manual.

**Caution** indicates a potentially hazardous situation which, if not avoided may result in minor or moderate injury. For example, protect eyes!

**CAUTION**

**Warning** indicates a potentially hazardous situation which, if not avoided could result in death or serious injury

**! WARNING !**

**Danger** indicates an imminently hazardous situation, which if not avoided will result in death or serious injury

**! DANGER !**

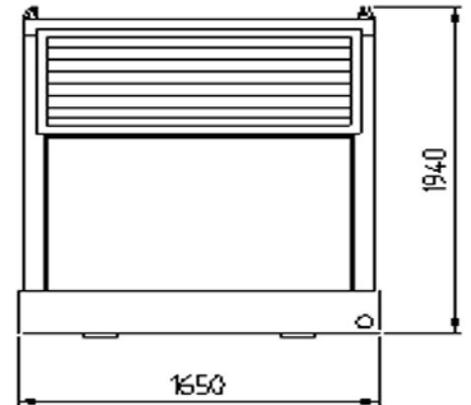
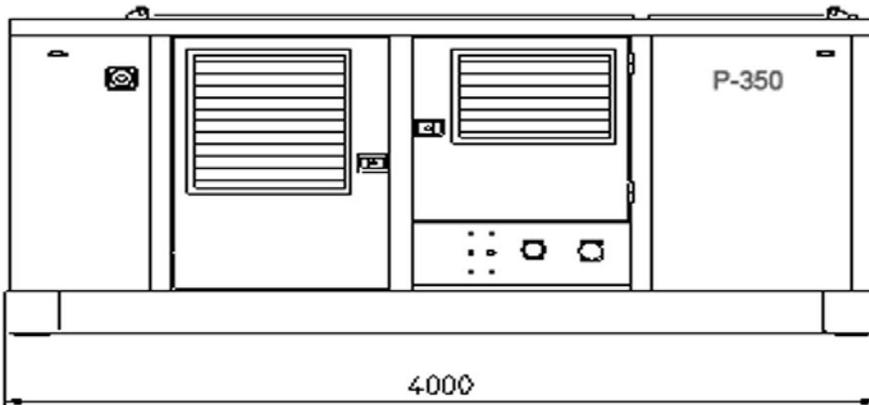
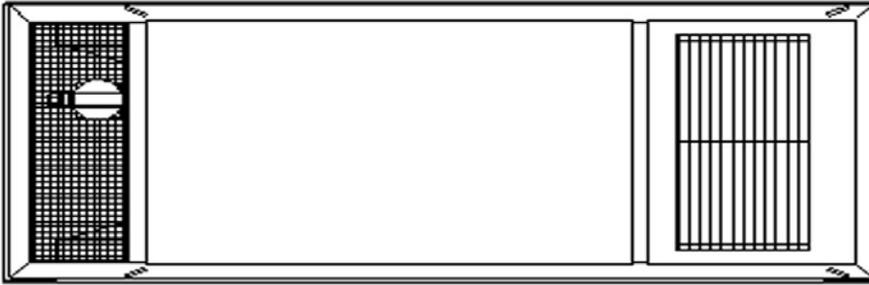
# OPERATING INSTRUCTIONS P-350

## 1. INTRODUCTION

The power pack can be used for the following purposes:

1. To drive an Pileco vibratory hammer
2. To drive an auger, impact hammer, cutter, winch or shear
3. To drive a sand pump

### 1.1 Dimensions



### 1.2 Specifications

<b>Diesel Engine:</b>	Caterpillar C9 ACERT	
<b>Max. theoretical power:</b>	250 kW	335 HP (DIN)
<b>Max. Frequency:</b>	2100 rpm	2100 VPM
<b>Max. Working pressure:</b>	350 bar	5076 psi
<b>Hydraulic pump:</b>	Rexroth A11VLO260/60	
<b>Max. oil flow:</b>	410 L/min	108 gal/min
<b>Diesel oil:</b>	620 L	172 gal
<b>Hydraulic oil:</b>	1200 L	317 gal
<b>Weight:</b>	5600 kg	12,346 lb.

Dimensions:		
<b>A</b>	<b>158 "</b>	<b>4000 mm</b>
<b>B</b>	<b>76.5 "</b>	<b>1940 mm</b>
<b>C</b>	<b>65 "</b>	<b>1650 mm</b>

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## **2. DESCRIPTION AND OPERATION**

### **2.1 General**

The P-350 power pack is powered by a CATERPILLAR C9 ACERT engine. The engine develops 335 horsepower (250 kW) and is mounted on a tubular sub-base which serves as a fuel tank.

The power unit and the driven machine are operated from the control panel or remote control pendant. The standard remote control pendant is connected by cable. Pileco Inc. can provide a wireless pendant as an option.

Hydraulic oil is stored in the reservoir. Oil cooling is accomplished by two air-to-oil exchangers.

All of the above components are contained in a sheet metal enclosure with lockable doors.

### **2.2 Hydraulic system (for the circuitry, refer to the parts manual)**

The hydraulic circuitry of the Pileco Inc. power pack is a so-called open-loop system. This means that the oil is taken from a reservoir. The pressure in the return line is very low.

Each power pack is equipped with several pumps. The main pump drives the vibratory hammer. The secondary pump can be used to open/close a clamp and to adjust the centrifugal force of a RF vibratory hammer.

#### **The Main Pump**

When the diesel engine is running and the forward/start button is activated, hydraulic fluid is taken from the reservoir by the drive pump and is pumped to the drive manifold.

The oil is directed through the hoses to the driven machine (vibratory hammer). It flows back to the power pack through the return line.

The circuit is protected by means of a pressure relief valve and is provided with a return line filter.

The hydraulic hoses can be quickly disconnected at the power pack directly behind the manifold.

#### **The Secondary Pump**

When the diesel engine is running, and the clamp or RF actuator buttons are activated, hydraulic fluid is taken from the reservoir by the secondary pump and pumped directly to the mentioned hydraulic parts. It flows back to the power pack through the return line.

### **2.3 Electrical system (for the circuitry, refer to the parts manual)**

The power pack contains a 24V DC electrical installation.

All main hammer functions are electrically controlled either from the remote control or from the main control panel.

#### **The power pack is equipped with a control module, which will warn the operator in the following cases:**

- Hydraulic oil temperature too high.
- Hydraulic oil level too low.
- Engine coolant temperature too high.
- Engine coolant level too low.
- Engine Over speed.
- Engine lubrication oil pressure too low.

If necessary, the Power Pack will stop the main oil flow automatically.

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## **The power pack is also equipped with the following safety measures:**

- Emergency stop. (Skid, radio remote, cable remote)
- Safety switch on the butterfly valve. If the oil supply to the main oil pump has been shut off by means of the butterfly valve, the engine can not be started.

## **Optional Warning**

- Warm up active.

## **3. SAFETY INSTRUCTIONS**

### **3.1 General**

Power packs contain components which are under high pressure during operation. Some components get very hot, other components have rotating parts which can cause serious injuries.

Therefore pay special attention to this chapter and the operation and maintenance section in this manual.

Regular maintenance and skilful operation will not only lengthen the mechanical life, but is essential for the safety of the user and possible bystanders.

Pileco Inc. accepts no liability for any damage or physical injury caused by non-compliance with the safety instructions in this manual or by carelessness during the installation, use, adjustment or maintenance of the equipment.

### **3.2 Safety precautions / Instructions**

It is the responsibility of the user or operator to ensure that the local health and safety regulations are observed before and during the use of the equipment.

#### **Operators**

- Only trained employees should be permitted to operate the machine.
- Temporary employees and trainees should only be permitted to work with the equipment under the supervision and instruction of trained personnel.

#### **Owner's Manual**

- Everyone who works at or with the equipment should be familiar with the contents of this manual and the manuals of the machines which are driven by the power pack and should follow the instructions accurately.
- One copy of the present manual should at any time be at the location where the unit is in operation.
- The management is under obligation to inform the personnel of the contents of this manual and is obliged to observe all of the regulations and directions.
- Additional manuals are available on request.

#### **Clothing and Footwear**

- When working with the equipment, DO NOT wear watches, jewellery or any loose clothing which could be caught in moving or rotating parts.
- Always wear protective goggles, a safety helmet, protective footwear and hearing protection specially suited for

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the work.

- Keep hands away from moving or rotating parts. Wear working gloves.
- Take appropriate measures for the protection of hearing if the sound level of 85 dB(A) is exceeded; always use ear protection when working close to a machine in operation.

## Water and Moisture

- Make sure all protective devices of the electric installation have been installed to guarantee adequate protection from moisture and water. Failure to do so can result in malfunction of safety circuits and cause harm to personnel and equipment components.
- NEVER direct a jet of water at electrical parts.

## Fire or Explosion Prevention

- Hydraulic oil and diesel fuel are flammable. Therefore:
- Do not weld or flame-cut on pipes or tubes that contain flammable fluids. Clean them thoroughly with non-flammable solvent before welding or flame cutting on them.
- Clean and tighten all electrical connections. Check regularly for loose or frayed electrical wires. Wiring must be kept in good condition, properly routed and firmly attached. Routinely inspect wiring for wear or deterioration. Loose, unattached, or unnecessary wiring must be eliminated.

**Never smoke when filling the fuel tank or use flames in the vicinity.  
Never store flammable liquids near the engine.**

**! W A R N I N G !**

## Work Area

- Place the power pack in a safe and “watch-friendly” place.
- Keep the work area clean. Keep the equipment accessible and make sure that the area surrounding of the equipment is kept clean.

## Always

- lead exhaust fumes outside when operating in a closed area. Continued breathing-in of exhaust fumes may be fatal.
- Pay attention to irregular or unusual noises and analyse where they come from.
- Remove all tools and electrical cords before starting the power pack.
- Notify proper personnel when power unit is not functioning properly.

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## **NEVER**

- make adjustments or repairs while the engine is working.
- continue operation when service inspection is due, or when a repair is necessary.
- continue operation when it is known that one of the safety provisions is out of order or not working properly.
- leave the remote control pendant unattended.
- attempt to connect the quick-disconnect couplers when the engine is running.

## **Tools**

- Never use defective (maintenance) tools.
- Only use a tool for the purpose it was designed for.

## **Technical Specifications**

- The permissible tolerances as mentioned in the present manual should NOT be exceeded.

## **Safeguards**

- All safeguards must be correctly installed and may only be removed for maintenance and service purposes by qualified PILECO service personnel.
- The equipment should never be switched ON when the protective covering is incomplete or when the safeguards have been rendered inoperative.
- All safeguards must be checked at regular intervals and repaired immediately in case of malfunction.

## **Safety Directions and Warnings**

- Any safety direction, warning or instruction fitted on the equipment should NOT be removed, rendered illegible or covered. They should be present and legible throughout the entire operating life of the equipment.
- Illegible, damaged or covered safety directions, warnings or instructions should immediately be replaced or repaired.

## **Service and Maintenance**

- The service and maintenance activities should only be carried out by qualified PILECO personnel or one of PILECO's appointed and certified dealers or its endorsees in full compliance with all safety measures and service intervals.
- Use PILECO Parts and recommended fluids.

## **Electrical System**

- Work on the electrical system or equipment may only be carried out by skilled electricians or by specially instructed personnel under the supervision of such electricians and in accordance with the applicable electrical engineering rules.

## **Hydraulic System**

- Work on the hydraulic equipment may only be carried out by persons having special knowledge and experience in hydraulic systems.

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- When bleeding hoses or looking for leaks, take protective measures. Escaping oil under pressure, even a pin-hole size leak, can penetrate body tissue, **causing serious injury or possible death.**

## Use according to purpose

- In order to guarantee correct operation, the equipment should only be used in accordance with the purpose as described in this owner's manual.

## **3.3 Incorporated safety precautions**

In case a vibratory hammer is used in combination with the power pack, a number of safety provisions are built-in. These safety provisions ensure that the risk for failures, human injuries and environmental pollution is reduced to a minimum:

- Dual operating functions, either by hand-held pendant or on the control box in the power pack
- Return line, although virtually not under pressure, is in pressure mode, preventing hose bursts when the quick disconnect coupling is not tightened properly or out of order.
- Emergency stop on hand-held pendant.
- Emergency stop on radio remote control .(with a 5 second delay)
- Emergency stop on outer side of the power pack.

**Never change the electrical wiring or hydraulic safety setting, which changes the above safety provisions.**

**In most countries the hammer and power pack are not allowed to operate in explosion-risk areas without modifications. Always contact PILECO when special requirements are compulsory.**

**! W A R N I N G !**

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## 3.4 Safety signs on the power pack

	HAZARD DESCRIPTION	HOW TO PREVENT
	THE SURFACE CAN BE HOT	DO NOT TOUCH. ALLOW THE SURFACE TO COOL DOWN
	EXPLOSION RISK	KEEP AWAY FROM FIRE
	COMPONENT IS PRESSURIZED	DEPRESSURIZE BEFORE MAINTENANCE
	RISK FOR IMBALANCE SLIPPERY SURFACE	USE ADEQUATE CLIMBING DEVICE
	RISK FOR SHORT CIRCUIT	DISCONNECT POWER SOURCE BEFORE OPENING DASHBOARD
	HIGH NOISE LEVEL	USE EAR PROTECTION
	RISK OF BURNS TO FINGERS OR HANDS RESULTING FROM DANGEROUS LIQUIDS OR CHEMICALS	WEAR PROTECTIVE GLOVES
	FIRE RISK	KEEP MACHINE CLEAR OF OIL RESTS BE CAREFUL WHEN HANDLING FUEL AND HYDRAULIC OIL

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## 4. ASSEMBLY AND INSTALLATION

### 4.1 Delivery of equipment

Make a thorough inspection of the unit immediately after delivery.

In case of any damage or shortage notify the transit agent at once and have the delivery carrier make a remark on the freight bill.

**Always lift the power pack by its own lifting lugs. Use certified slings and place the power pack on a horizontal and stable ground (surface).**

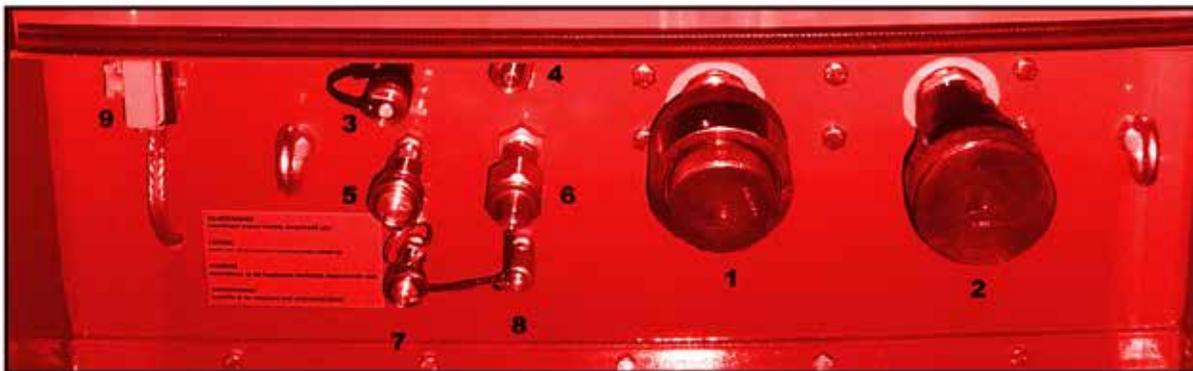
**! WARNING !**

### 4.2 Connecting the hydraulic hoses

**Never connect or disconnect the hoses while the engine is still running.**

**CAUTION**

- Make sure the connectors are not under pressure.
- Clean the couplers with a lint-free cloth.
- Check the couplers and hoses for any damage.
- Connect the hoses with the help of quick-disconnect couplers. Avoid kinking and chafing. The couplers are sized to ensure correct connection.
- Make sure the couplers are FULLY tightened. The drive pressure coupler (1) and drive return coupler (2) can be tightened with a chain-wrench, the others should be tightened by hand.



- |                        |                     |                                     |
|------------------------|---------------------|-------------------------------------|
| 1. Drive pressure hose | 5. Drain hose       | 9. Pendant remote control connector |
| 2. Drive return hose   | 6. Drain hose       |                                     |
| 3. Clamp hose (close)  | 7. Eccentric mom. + |                                     |
| 4. Clamp hose (open)   | 8. Eccentric mom. - |                                     |

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## 4.3 Connecting the remote control

Connect the cable plug to the control panel of the power pack (see illustration, item A).



### When the pendant control cable is:

**Connected :** The hammer can only be activated by means of the pendant control.

**Disconnected :** The hammer can only be activated by means of the control module at the control panel, or radio remote control.

### REMARK

The **EMERGENCY STOP** on the power pack housing is always operational.

The **EMERGENCY STOP** on the pendant remote control and radio remote control are operational only when they are connected.

## 5. OPERATIONS

**Make sure you are familiar with the SAFETY INSTRUCTIONS as described in Chapter 3 before you operate the power pack. Make sure the operator has a clear view on the working area and the machine which is driven by the power pack. Make sure that communication with other involved persons (crane driver) is always possible.**

**! WARNING !**

### 5.1 Emergency stop

Check if the emergency stop buttons on the remote control pendant / radio remote control and the outside of the power pack are released. If not, turn the button clockwise.

### IMPORTANT!

Always reset the emergency stop button immediately after the hammer and power pack have been shut down completely.

### 5.2 Filling the pressure and return hose

When the driven machine is shipped with all hoses attached, the hoses are usually full of oil and may be used immediately. However, if any of the hoses are connected at the jobsite or if air is present in hoses, they must be bled prior to operation.

- Start and warm up the engine (read chapter "Starting the engine" on page 18.).

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- Keep the engine running at 1500 rpm.
- Press the forward button for appr. 2 seconds and than stop, to build up some pressure without running the machine(vibratory hammer). Do this 2 or 3 times and the hoses are filled.
- Check the oil level in the hydraulic oil tank. Refill if necessary.

## **5.3 Bleeding/filling the clamp hoses**

When the vibrator and hydraulic clamp are shipped with all hoses attached, the hoses are usually full of oil and may be used immediately. However, if the clamp hoses are connected at the jobsite or if air is present in hoses, they must be bled prior to operation.

- Start and warm up the engine (read chapter “Starting the engine” on page 18.).
- Turn the clamp switch (OPEN/CLOSE) on the remote control to the position OPEN. The pressure in the clamp hoses will go down to almost zero.
- Shut down the engine (read chapter “Stopping the engine” on page 20.).

**When bleeding hoses or looking for leaks, take protective measures. Escaping oil under pressure, even a pin-hole size leak, can penetrate body tissue, causing serious injury or possible death.**

**CAUTION**

- Loosen the clamp-close-connector a little bit at the clamp (with a tray under the connector).
- Start and warm up the engine (read chapter “Starting the engine” on page 18.).
- Turn the clamp switch (OPEN/CLOSE) on the remote control to the position CLOSE.
- Wait until fluid flows without any traces of air, then tighten the connector.
- Repeat the above instruction for the clamp-open-connector.
- Turn the clamp switch to CLOSE and OPEN several times to ensure the clamp cylinder is working properly.

## **5.4 Control panel**

The control panel contains a control module from which the operator can control the vibratory hammer, the clamp and the power pack.

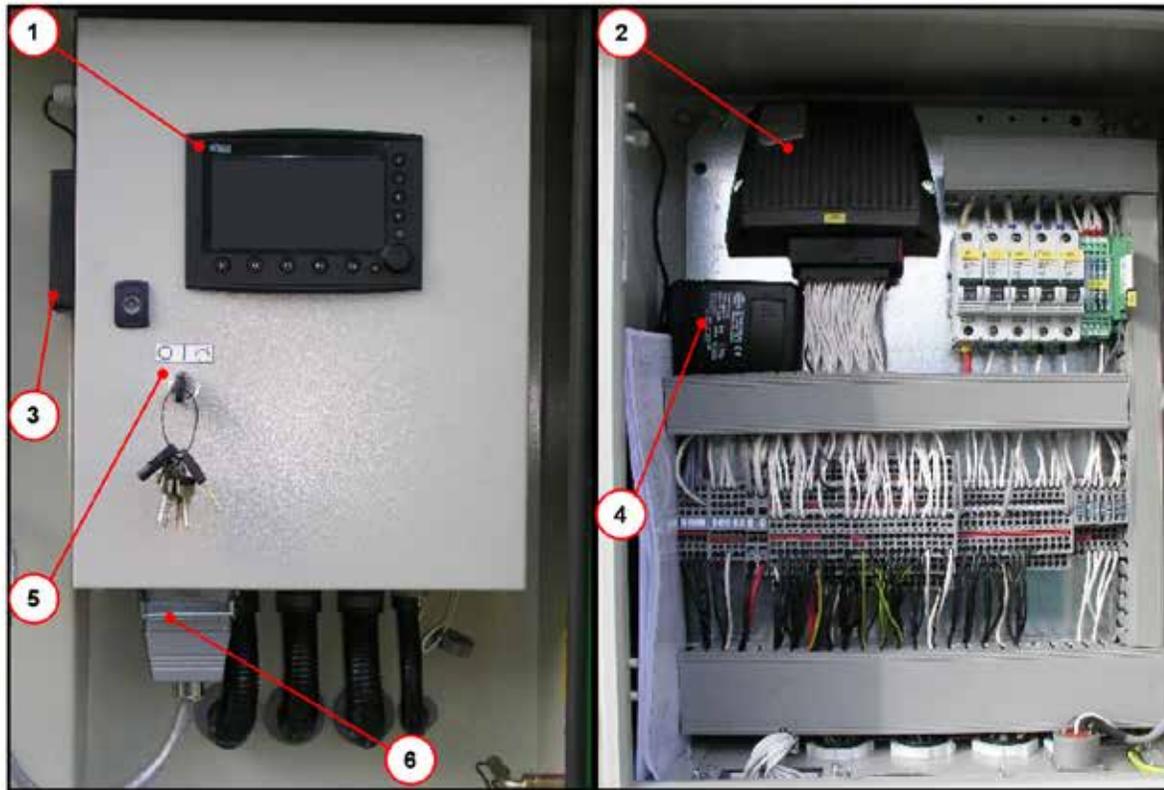
**Make sure the operator has a clear view on the connected machine(s) and the working area.**

**CAUTION**

### **IMPORTANT:**

The operation / maintenance / safety instructions on the inside of the control panel door merely serve as reminders. They are not complete and therefore not intended as a substitute for a thorough understanding of the present manual.

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1. IQAN PLC control
2. IQAN PLC module
3. Remote control battery charger (option)
4. Remote control battery charging adapter (option)
5. Start switch
6. Remote control connector

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## 5.5 Pendant remote control, cable

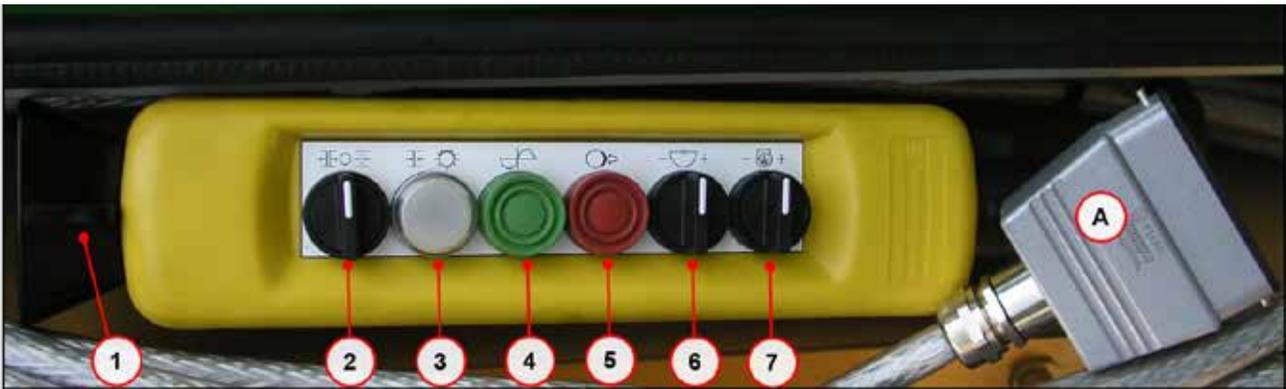
Connect the cable plug (A) to the control panel of the power pack.  
Release the emergency stop.

### When the pendant control cable is:

**Connected :** The hammer can only be activated by means of the pendant control.

**Disconnected :** The hammer can only be activated by means of the switches/buttons at the control panel, or the radio remote control.

### The remote control pendant contains the following functions:



1. Emergency stop
2. Clamp open / close
3. Warning lamp: clamp closed
4. Start operation
5. Stop operation
6. Eccentric moment switch
7. RPM switch

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## 5.6 Radio remote control (option)

Connect the cable plug (A) of the receiver (B) to the control panel of the power pack

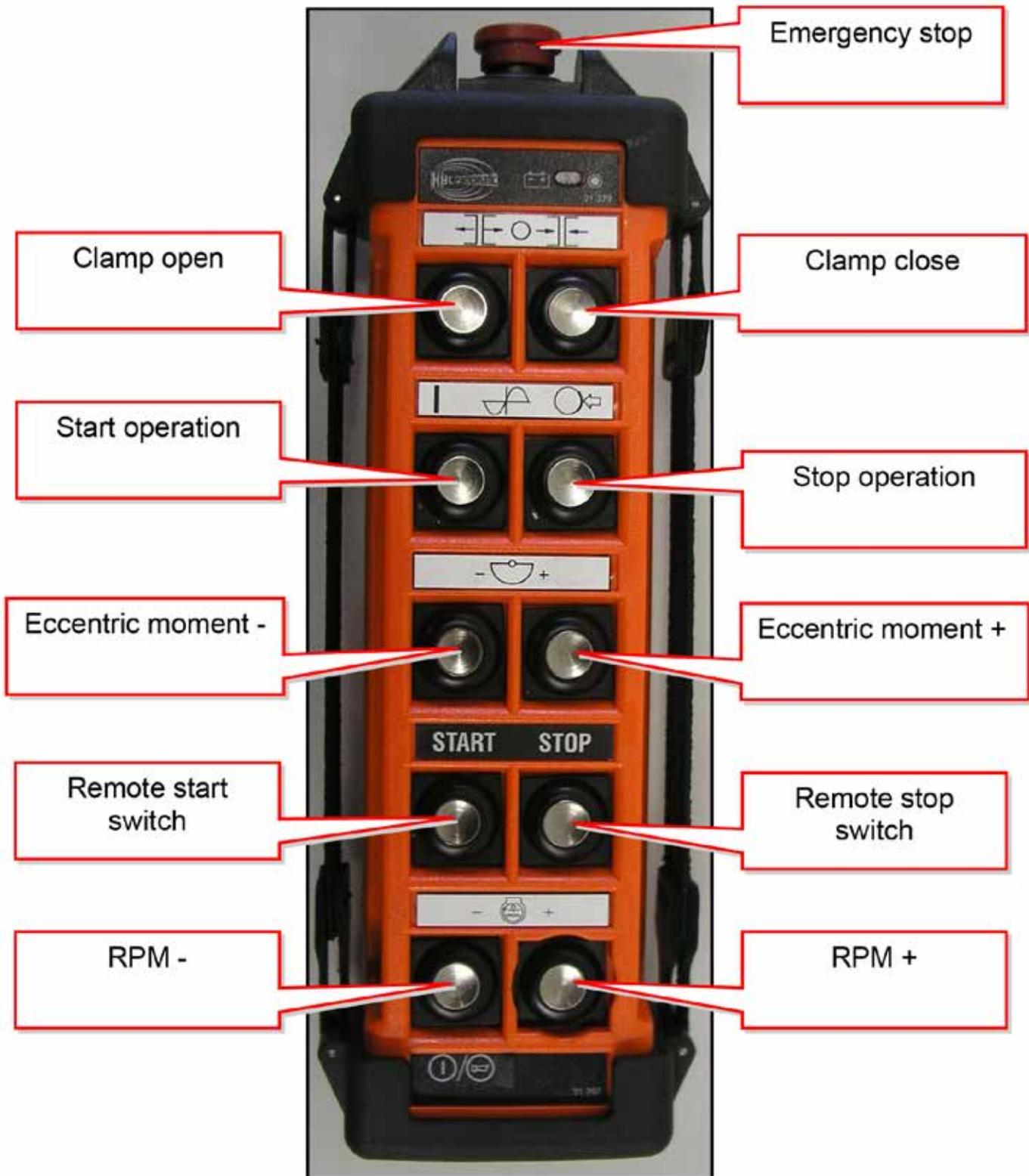
To turn on the radio remote control:



- **Step 1.** Press the no. **1** button. Red led starts flickering
- **Step 2.** Press the no. **2** button. Green led up once.
- **Step 3.** Press the no. **3** button. Green led starts flickering. Remote control is ready for use.

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**The remote control pendant contains the following functions:**



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## 5.7 Starting / stopping



- A** Earth switch      **C** IQAN PLC control  
**B** Start switch      **D** Remote control

1. Turn earth switch ( **A** ) to "ON" position.(clockwise)
2. Turn on remote control

Make sure the emergency stop is not switched on.

The following steps must be taken in a few seconds.

- **Step 1.** Press the no. **1** button.  
Red led starts flickering
- **Step 2.** Press the no. **2** button.  
Green led up once.
- **Step 3.** Press the no. **3** button.  
Green led starts flickering.  
Remote control is ready for use.



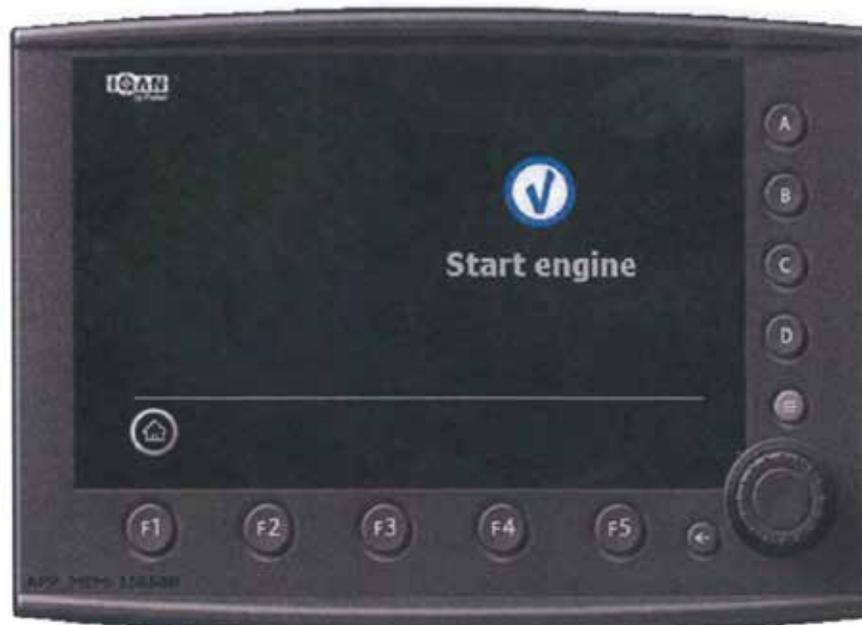
# OPERATING INSTRUCTIONS P-350

Continued.....

3. Turn start switch ( **B** ) to "I "position.  
The "WAIT" screen will popup.



4. After a few seconds the "START ENGINE " sign will popup.



5. Turn start switch ( **B** ) to "START "position.

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## Stopping

- Stop operation.
- Allow the engine to run at idle speed for at least 5 min.
- Turn start switch ( ) to “O” (OFF).
- Turn earth switch (1) to “OFF”.
- Turn off the radio remote control (stop button).

**Vibrator may fall off pile. If the diesel engine is shut down while the vibrator is clamped to a pile, the clamp check valve will keep the vibrator clamped to the pile. However, system leakage could result in a loss of clamp pressure over time. Therefore, it is not recommended to leave the vibrator clamped to a pile when the diesel engine is not running.**

**CAUTION**

## 5.8 IQAN PLC System

This power pack is provided with an IQAN PLC system.

All controls, settings, parameters, etc. are set and can be read out of the display.

The advantage with respect to the EMS system, it requires much less electronics, no more pressure gauges, hydraulic settings can be changed easily, it's all in one.

### **Standard Screen After Engine Start**



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## 5.8.1 Button descriptions



Press **A** for PILECO info.

Press **B** for engine parameters.

Press **C** for hydraulic parameters.

Press **D** for internal light.

Press **≡** for main menu.

Press **X** to enter.

Turn **X** to scroll.

Press **←** for previous screen.

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## 5.8.2 Main Menu

Press  to enter the main menu.



Press  for adjust menu.

Press  for measure.

Press  to adjust preferences.

Press  for machine information.

Press  to enter.

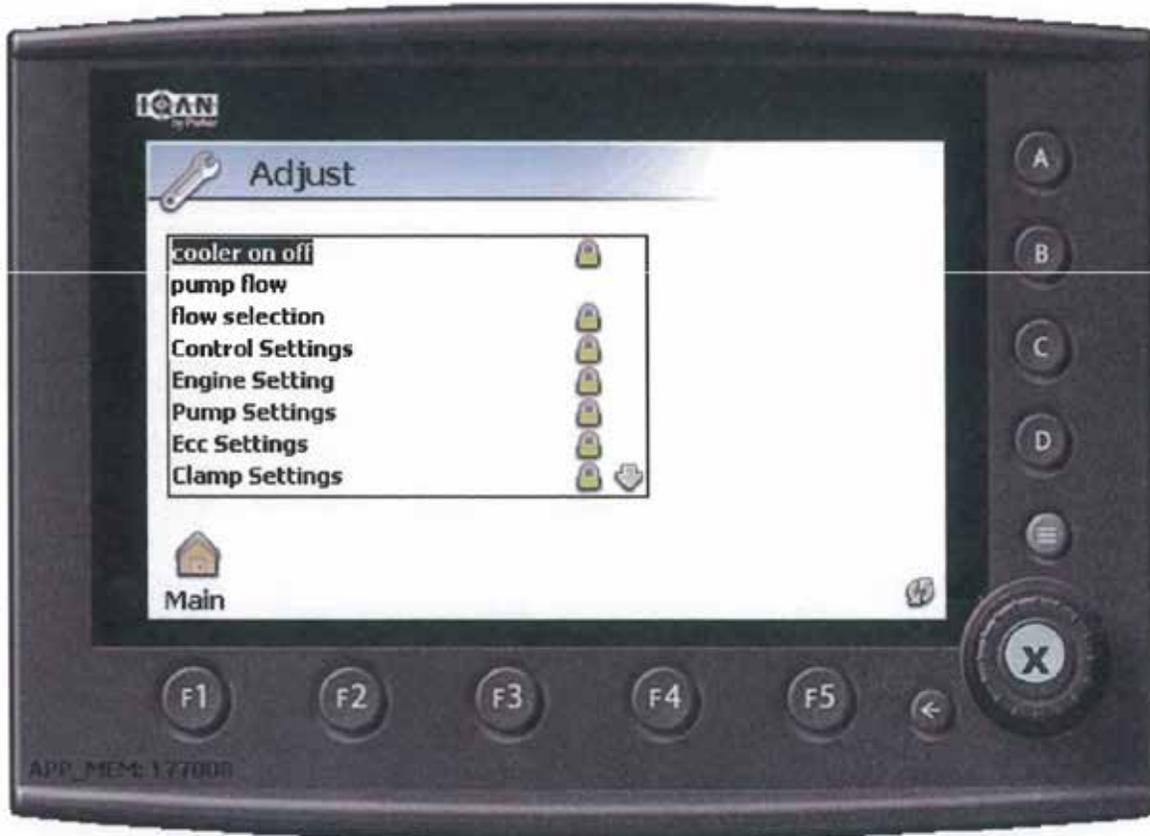
Turn  to scroll.

Press  for previous screen.

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## 5.8.3 Adjustments/Settings

Go to main menu  and select adjust .



The following settings are adjustable:

Pump flow	Accessible.
Control setting	* qualified personnel only.
Pump setting	* qualified personnel only.
Sensor setting	* qualified personnel only.
Engine setting	* qualified personnel only.
Maintenance reset	* qualified personnel only.
Lube oil cooler	Option.
Warm - up system	Option.
Flow selection (key switch)	Option.

Pump flow is accessible, for the rest of the settings you need to contact Pileco, or your nearest Pileco dealer.

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## 5.8.4 Adjust Pump Flow

With this setting you can choose to drive your machine at normal operation or full power operation.

### For Example:

36RFts at normal operation : 2000 rpm

36RFts at full power operation : 2300 rpm

Other speed settings are possible on request.

Go to main menu  and select adjust .

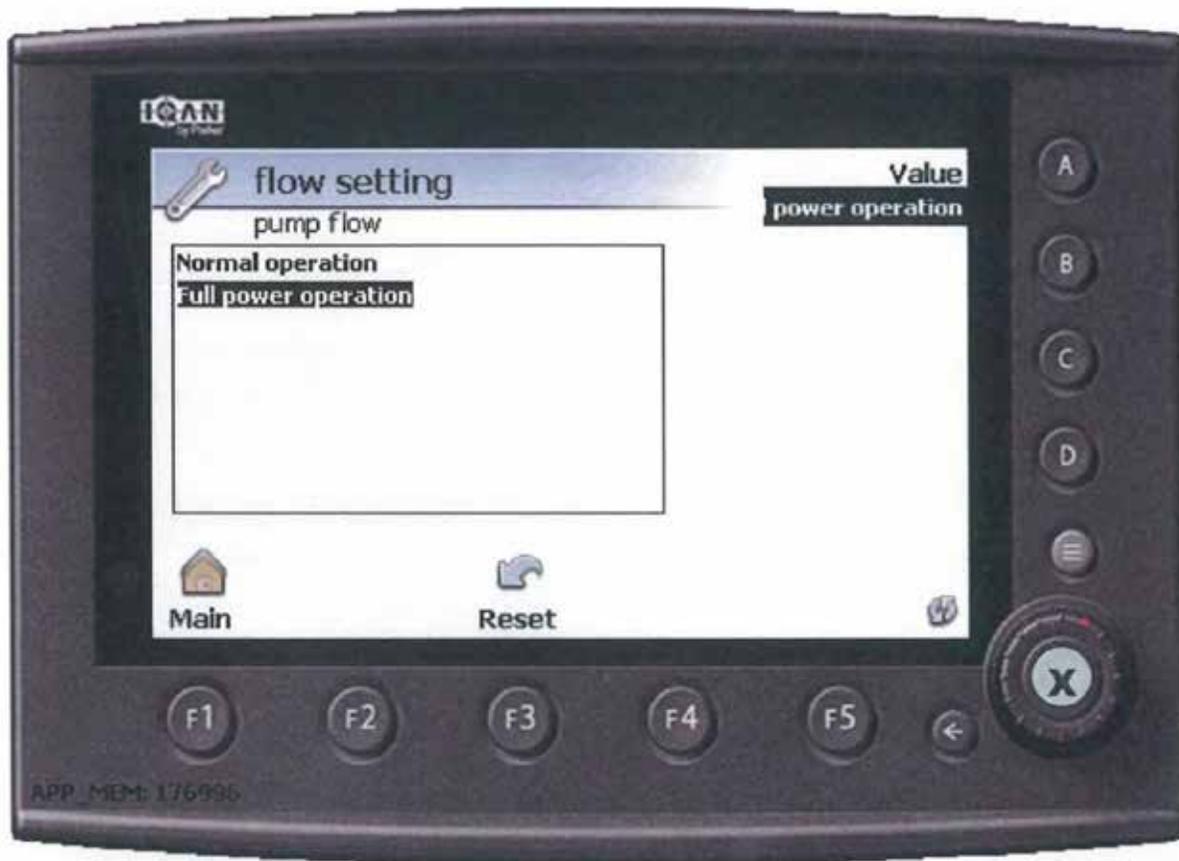
Scroll through the menu by turning the  button. Enter pump flow by pressing .



# OPERATING INSTRUCTIONS P-350

Continued.....

Enter flow setting by pressing the **X** button.



Choose NORMAL OPERATION or FULL POWER OPERATION by turning the **X** button.

Enter the setting by pressing the **X** button.

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## 5.9 Troubleshooting

**It can not be emphasized enough that most difficulties can be prevented by good periodic inspection, lubrication and maintenance. The time and energy consumed in proper care is only a fraction of that incurred when trouble stops operation.**

If the difficulty cannot be corrected, contact your local Pileco Inc. service location.

For difficulties which involve the hammer or the clamp, we refer to the relating owner's manuals.

### **Engine does not start**

- Check if the IQAN PLC display shows a message. Remedy the cause if necessary.
- If the engine does not turn over, check the battery and check if the connectors of the battery are fully tightened.
- If the engine turns over, check the fuel supply and the fuel filter.
- Consult the Caterpillar Operation & Maintenance Manual.
- Call your local Caterpillar dealer.

### **Engine does not stop**

If there is an emergency, push the emergency stop button.

Check the electrical components and connections.

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## **6. CLEANING & MAINTENANCE**

### **6.1 General**

Preventive maintenance includes normal servicing that will keep the power pack in good operating condition and will prevent unnecessary trouble.

Lubrication is an essential part of the protective maintenance, therefore it is important to follow-up the instructions carefully.

**Regularly maintenance will not only increase the life span and the output of the power pack, but is essential for the safety of the user and possible bystanders. Before starting the maintenance, make sure the machine has cooled down and the working area is safe and clean. Install a DO NOT OPERATE or similar warning label to the ignition switch. Turn off the mass switch prior to maintenance work on the electrical system.**

**CAUTION**

### **IMPORTANT!**

- Thoroughly clean all fittings, caps, filler plugs and level plugs and their surrounding surfaces before servicing.
- Prevent dirt from entering lubricants and coolants.
- Except for the visual inspections, all maintenance work shall be carried out with the diesel engine stopped. Take care that the earth switch is in the “OFF” position.

### **6.2 New or Stored Power Packs**

For new or stored power packs, refer to the diesel engine Operation’s Manual (section “Preparation for Starting Engine, First Time”).

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## **6.3 Service intervals**

Every 250 Service hours, the MAINTENANCE WARNING SIGN will appear on the display.

Contact PILECO or your nearest PILECO dealer for a service appointment or more information.

For more detailed information regarding the engine, refer to the “Operation and maintenance manual” of the Caterpillar C9 engine.

## **Daily Maintenance**

### **Before start up:**

#### **Engine:**

- Check the coolant level in the radiator (engine should be cooled down).
- Check the air filter service indicator.
- Check the engine oil level.
- Inspect the water separator of the Fuel filter. Drain if necessary.
- Check for leaks and loose connections.
- Check the fuel level.

#### **Other Components:**

- Clean the bottom plate of the power pack
- Inspect hydraulic system for leaks.
- Visually check all couplers and hoses for signs of damage or cuts.
- Make sure all connections are tightened fully, especially the quick-disconnect couplers.
- Check the oil level of the hydraulic tank on the level gauge. (should be in between min. and max. indication).

### **After start up:**

- Check hoses for leaks. Make sure they hang freely with no kinks.
- Check the pump, hydraulic manifolds and fittings for leaks.
- Check the return filter service indicator.

## **Every 250 Service hours / 6 months**

#### **Engine:**

- Check on the hour counter (IQAN) if the engine is due for a service interval (besides the 250 hours service interval).
- For detailed information about inspection and maintenance, refer to the diesel engine “Operation & maintenance manual”.

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## Other Components:

- Visually check the condition (dirt) of the oil cooler and the radiator. Clean when necessary.
- Grease the door hinges

## Remaining Service Intervals

### Engine:

- Refer to the diesel engine “Operation & maintenance manual”.

### Other Components:

- Have the hydraulic fluid analysed by a local hydraulic service centre. Replace fluid if required.
- Have the hydraulic system inspected by PILECO (authorized) service personnel.

The intervals are based on normal operation. Perform these services more often as needed for operation under abnormal or severe circumstances.

### Severe Conditions

The intervals specified are based on normal operating conditions. Operating under severe or unusual conditions will require some adjustments in service intervals.

In the following circumstances, the service time intervals should be reduced by one-half of those specified.

- when the average temperature is above 35 °C (80 °F) or below -23 °C (-10 °F)
- when operating in the presence of dust or sand
- when operating in excess of twelve hours per day

When operating in air with high salt or moisture, the service intervals do not need to be changed. However, the unit should be inspected weekly to determine if additional servicing is required. Also, have the hydraulic oil tested quarterly.

For extended inactive periods, the engine should be started at least once a week and run until thoroughly warm. Service intervals may be extended from those specified. For stored power packs, refer to the diesel engine Operation’s Manual (section “Preparation for Starting Engine, First Time”).

### 6.4 Draining and filling the hydraulic oil reservoir

The Hydraulic reservoir is drained by removing a plug on the bottom of the of the reservoir.

The hydraulic reservoir is filled by the manual pump mounted on the back (engine side) of the reservoir. All oil is pumped to the reservoir through the return filter to insure no dirt enters the hydraulic system.

### 6.5 Capacities

Refill Capacity engine oil	± 31 L
Capacity hydraulic oil tank	1050 L

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## 6.6 Liquids

### NORMAL CIRCUMSTANCES (-23° C to 35° C) (-10° F to 80° F):

Diesel engine oil	Mobil Delvac MX 15W-40
Hydraulic fluid	Mobil DTE15M
Coolant	Mono Ethylene Glycol (1:1 mixture with water) Cat inhibitor 3%

### SEVERE CIRCUMSTANCES:

- Engine: refer to the “Operation and maintenance manual” of the Caterpillar C9 engine.
- Hydraulic system: contact your local specialist

## 6.7 Welding

Do not weld or flame-cut on pipes or tubes that contain flammable fluids. Clean them thoroughly with non-flammable solvent before welding or flame cutting on them.

Proper welding procedures are necessary in order to avoid damage to the engine’s computer, sensors and associated components. When possible, remove the component from the unit and then weld the component. If this is not possible, follow the instructions below:

- Stop the engine. Turn the ignition switch to the “OFF” position.
- Disconnect the negative battery cable from the battery.
- **Disconnect the connectors from the Engine Control Module. Move the harness to a position that will not allow the harness to accidentally move back and make contact with any of the ECM pins.**
- **Disconnect the connectors from the IQAN PLC in the control panel.**
- Connect the welding ground cable directly to the part that will be welded. Place the ground cable as close as possible to the weld.
- Protect the wiring harness from welding debris and spatter.
- Use standard welding practices to weld the materials.

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