



SCANDINAVIAN PILE DRIVING AB

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Original instructions

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1. Preface

1.1. Message of rights and liability

The intention of this manual is to familiarize the user of the machine and its associated equipment with the intended area of use. Following the instructions provided in this manual enables correct use of the machine and result in a safer operation. Potential repair expenses which is a result of wear or incorrect usage can be reduced if the instructions for maintenance are followed according to the information provided in this manual.

The content of the manual must be read and exercised by all people who work with or on the machine and its associated equipment. Precautions related to safety are especially emphasized and practical training with the machine should be exercised according to the safety precautions that are established in this manual. Serious accidents may occur if the instructions and information stated in this manual are not followed. Out of safety reasons, the manual should be stored easily accessible and in close proximity to the machine and its associated equipment.

As a result of a continuous development, the content of the manual may vary over time depending on the current design of the delivered product. The manufacturer reserves the right to perform technical modifications. Hence, the graphical and written information in the manual may differ from corresponding part of a previously delivered product. The change and implementation of instructions as a result of technical modifications may be introduced without prior notice.

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1.2.General terminology

1.2.1.Symbols

The following symbols are used in the manual to indicate particularly important information:

Warning

Disregarding or inaccurate compliance with the instructions could result in death or injury or damage to the equipment and the environment.



Notice

Technical instructions which the user must particularly observe.



1.2.2. Definition of terms

The following terms are continuously used in the manual, see Table 1.

Table 1. Definition of terms

Term	Definition
Machine	The complete machine, which is the final product that results from
	the assembly of a carrier with various equipment and any tools. A complete machine consisting of carrier and mast can also be called rig or complete rig.
Carrier	The unit that powers the equipment.
	For example, excavator, truck, etc.
Equipment	For example, mast, spinner, front loader, etc.
Tool	For example, rotation, hammer, etc.

2. General information

2.1.Declaration of Conformity

Declaration of Conformity can be found as an annex to the instructions of use.

2.2. Data plate

Data plate for identification is fixed on the product. The data plate also provides certain technical information, see Figure 1.

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Designation Type Serial number Year of construction Operating weight Operating pressure		kg		
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Figure 1. Data plate

3. Safety information

3.1.Intended use

3.1.1.Area of use

The front loader is designed to be used as an aid for earth-moving machinery and is mounted in the bolt pattern on the carrier's steering axle.



Different carriers may have different limitations in capacity when it comes to the steering axle where the front loader should be mounted. Check with the manufacturer of the carrier to ensure that the front loader can be mounted safely.

The front loader is powered by hydraulic oil from the carrier via two-way hydraulic outlet and is remote controlled wirelessly via a handheld device.

Intended areas of use for the front loader are, for example, lifting material, mounting a support beam with a BM-attachment, levelling ground with a levelling bucket, etc.

Only the machine movements described by the manufacturer are permitted. It is prohibited to use the machine for work for which it is not intended, for example work operations that require higher capacity than the product is designed to handle, or work operations where external systems, accessories and tools are added that have not been approved by the manufacturer. Only those systems, accessories and tools that the manufacturer deem as suitable may be used, the selection is made considering the type of work to be performed and adapted to the environment in which the work is to be carried out.

3.1.2. Authorized personnel

The machine may only be manoeuvred by authorized personnel that have been trained in safe operation. Make sure that no unauthorized people are in the work area when the machine is in operation.

3.1.3. Personal protective equipment

All users of the machine must always wear appropriate personal protective equipment for the work that is to be performed.

Appropriate personal protective equipment means, for example, hearing protection, safety helmet, non-slip protective shoes, safety glasses, protective gloves, protective overalls, high visibility clothing, face mask, etc.



For safety reasons, users of the machine must not wear loose clothing with loose parts or accessories, such as chains or jewellery. There is a risk of loose clothing or accessories getting caught in the moving parts of the machine, which could cause personal injury.



Long hair must be tied up and properly pulled back.



Radio headphones must not be used because it can lead to accidents due to the person wearing the radio headphones not hearing warning calls or other sounds or signals that are intended to warn of danger.

3.1.4. Temperature range

Never use the machine outside of the recommended temperature range -20° C to $+40^{\circ}$ C.



The life span of the machine's components risks being significantly shortened if the temperature recommendations are not respected.



Use outside of the temperature range may have a negative impact on the hydraulic system.



Cold temperature has a negative impact on the steel and welds that make up the machine.

3.1.5. Machine movements, stability and positioning



All machine movements that are not described by the manufacturer should be considered dangerous and are not allowed.

Always position the machine in a safe and well-balanced position for its intended use. All necessary stabilizing measures required for the work must be taken. Avoid unnecessary inclinations, long overhangs or positions that may increase the risk of tipping.

The ground on which the machine stands in the work area must be strong at all times to ensure the stability of the machine. If necessary, stabilize the ground using, for example, mud mats to prevent the machine from tipping over due to vibrations during operation.

When moving machinery within the work area, the equipment must always be in a position as close to the carrier as possible to avoid losing stability. Weight distribution should be kept as low as possible.



3.1.5.1. Inclination angles

Figure 2. Inclination angles



Figure 3. Inclination angles

3.2. Reasonably foreseeable misuse

No other areas of use may be applied to the machine other than those specified by the manufacturer as intended use. Nor may other objects be handled by the machine than those approved by the manufacturer.

The manufacturer of the machine cannot ensure that the machine can safely apply to other areas of use or handle other objects than what the product was originally designed for.

Despite clear instructions, certain misuse is foreseeable and must be explicitly avoided. Listed below are some prohibited procedures that, despite warnings, can be predicted to occur in conjunction with use of the machine.



The machine shall not be used to lift or move people.



The machine shall not be used to lift objects whose weight exceeds the maximum permissible load weight.



It is not permitted to use the machine with other systems and/or tools than those approved by the manufacturer.

3.3. Residual risks

Even when the machine is used correctly and all safety procedures are followed, certain risks may remain that cannot be fully eliminated. Be aware of the risks listed below.

3.3.1. Noise and vibrations



If appropriate personal protective equipment is not used correctly and on a regular basis, there is a residual risk that noise and vibrations could cause long-term health issues.

3.3.2. Broken hose/pipe containing pressurized hydraulic fluid



There is always a residual risk that pressurized hydraulic hoses and/or pipes may burst. Always use personal protective equipment and keep a safe distance to pressurized hoses or pipes.

3.3.3. Risk of crushing by moving machine parts



There is always a residual risk of crushing when working near moving parts on the machine. Always exercise the utmost attention and caution when working near moving machine parts. Do not insert any body parts in moving machine parts. Press the emergency button immediately as soon as dangerous situations arise involving people near moving machine parts.

3.4. Safety instructions



All users of the machine need to observe the following safety instructions:

- Make sure that all users of the machine have understood the contents of the manual, as well as how to use the complete machine and the meaning of all warning symbols on the machine.
- Never remove or destroy protective devices, safety components, signs or stickers applied to the machine by the manufacturer.
- Protective devices or safety components must never be removed or opened while the machine is in operation. Only when the machine is switched off or at a standstill may protective devices or safety components be temporarily removed or opened for repair, service or maintenance work.
- Ensure that protective devices and safety components are operating properly before start of each work shift. Test drive all functions while in idle mode to simulate working with the machine.
- Components of the complete machine must not be assembled or disassembled by anyone other than authorized personnel.
- Foreign components must not be installed on the machine.
- Do not start the machine by tampering with switches, pedals, buttons or protective devices.
- Protect all cables and hydraulic lines and water lines lying on the ground around the machine.
- Never leave the machine unattended with electricity or hydraulics connected.
- It is forbidden to sit or stand on the machine while it is in operation.
- Never push or break with any equipment that is part of the assembled machine, this could result in major damage to the machine.
- Never walk under a hanging load, as this could result in death or serious personal injury in the event of an accident.
- The operator must always be extra careful when turning as the risk of crushing increases during such work operations.
- The operator must ensure that lighting in the work area is sufficient to perform work with or on the machine in a safe way. Use additional lighting where daylight and machine lights are not sufficient to provide proper working light.
- Check that there are no underground or above ground lines within the work area.

4. Technical information

4.1. Overview/dimensions



Figure 4. Overview BM1416

4.2. Technical specification

Table 2. Technical specification BM1416

Weight	Approximately 550 kg	
Maximum permissible load weight	2000 kg	
Hydraulic pressure	200 bar	
Hydraulic oil flow	50 l/min	
Electricity	12-24 VDC	
Remote control	Wireless control via handheld device	
Recommended carrier	Approximately 14–16 ton	

4.3. Remote control

For information about the remote control, refer to the remote control manual. For layout of the remote control, refer to chapter *Operation* in this manual.

4.4. Carrier

For information about the carrier, refer to the carrier's manual.

4.5. Hydraulic and electricity

The machine is powered by electricity and hydraulics. The equipment has no power source of its own but is powered by the carrier's supply of electricity and hydraulics. Electric diagram and hydraulic diagram are enclosed as separate appendices to this manual.



Treat electrical equipment as live and hydraulic hoses as pressurized. The hydraulic oil may be hot and poses a risk of personal injury if touched.



The hydraulic pressure from the carrier must not exceed the pressure specified in the technical specification. Damage to the hydraulic system may occur if the pressure is set above what is specified.

4.5.1. Hydraulic oil



The following information about hydraulic oil is very important for the machine functionality and must be observed by all users of the machine:

- It is prohibited to mix different types or brands of hydraulic oils.
- Mixing hydraulic oils can have a negative impact on machine performance, cause corrosion on component surfaces and lead to increased mechanical wear.
- When changing the type or brand of hydraulic oil, all the original oil can never be completely drained from the hydraulic system, and thus there will be some mixing of the original oil and the new oil.
- The manufacturer does not provide any form of warranty for damage to the product caused by oil mixing, regardless of whether it was accidental or not.
- Always consult the manufacturer if there are uncertainties about which type or brand of hydraulic oil to use for the product.
- As far as possible, it is always best to avoid mixing different hydraulic oils. A miscibility test needs to be performed to ensure whether two different hydraulic oils are miscible.
- Mixing oils with different additive packages is never recommended as it can compromise the additive performance of both components.
- Routine analysis of oil samples from the hydraulic system is recommended.
- Lubricants may sometimes be used in hydraulic systems. Avoid mixing different types of lubricants. Even mixing the same type of lubricant should be avoided if these lubricants have different viscosities.

4.5.2. Oil leakage, oil change and residual products

If a hose ruptures or a hydraulic hose is damaged, it must be replaced immediately. The new hose must be dimensioned according to the hydraulic diagram.

Turn off the carrier and close any taps in the event of an oil leak to prevent oil spillage. Repair the oil leak and check the oil level in the carrier. Open any taps that were previously closed, before restarting the carrier. Collect any oil spillage with absorbent material. Oil changes should be carried out in a workshop by authorized personnel.



There are hose rupture valves on the lift and tilt to minimize the risks of hose rupture.

4.6. Emergency stop

4.6.1. Emergency stop button

The machine is equipped with an emergency stop button. In case of a remote controlled machine, the emergency stop button is located on the remote control, so that it can be activated immediately from the operator's position.

5. Transport

Transport on road must be carried out with a transport vehicle that is suitable for the machine or equipment that is to be transported, and that has a load capacity exceeding the total weight, width and length of the machine or equipment. It is important that the driver of the transport vehicle is observant of the total height of the loaded vehicle.

5.1.Loading and unloading via ramp

Loading or unloading machinery or equipment via a ramp is a dangerous operation and should only be carried out by authorized personnel with responsibility for, and experience in, handling such work and who are familiar with the transport vehicle. It is recommended that an additional operator supervises the loading/unloading from the other side of the ramp.



When loading and unloading via ramp, the following must be considered:

- Make sure that the transport vehicle is in a position that allows easy loading and that the ground is stable.
- Make sure that the transport vehicle has the handbrake engaged.
- Lower the loading ramps and ensure that all stabilization measures have been taken.
- Make sure that the angle of the ramp does not exceed 10° (see Figure 5).
- Check that there is no person or object in the immediate vicinity of the machine or equipment that could be damaged during loading/unloading.
- If possible, warning signs should be placed around the loading zone.
- To make loading and unloading as safe as possible, it is recommended that rubber mats are placed on the ramps to prevent the machine from sliding off the ramp.
- The machine or equipment must be placed in line with the trailer, in a straight position on the trailer.
- Secure the support leg as soon as the machine or equipment has been loaded.

If the transport vehicle does not have a ramp or if it is impossible to position the transport vehicle in such a way that loading via the ramp can be achieved, then it may be necessary to lift the machine or equipment when loading and unloading.



Figure 5. Loading/unloading via ramp

5.2. Securing and lashing

Drivers of transport vehicles should be informed about how machine or equipment must be secured and lashed before transport, with chains and fasteners at designated securing points (for example, see Figure 6–7).



Figure 6. Lashing



Figure 7. Symbol for securing point

It is important that the machine or equipment is well supported and that the load is well distributed and lashed in the best possible way. Great care must be taken at these steps as hydraulic hoses, valve packages, electronic units or other vital components are at risk of being damaged during lifting or lashing. The machine or equipment's components and hoses must be well protected so that they do not get pinched. When transporting on a hook truck, it is important that the so-called crane hooks on the truck's hook platform are properly connected.

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When carriers with mounted front loader are to be transported using transport vehicles, the complete machine must not be secured in the front loader. Securing/lashing may only be done via the carrier's securing points, see the carrier's manual. If the front loader is to be transported without being mounted on the carrier, securing must be done in such a way that vital components are not at risk of being damaged.

5.3. Lifting

Lifting machinery or equipment is a dangerous operation that should only be carried out by authorized personnel with responsibility for, and experience in, handling heavy lifting and who knows how to use lifting aids.

Before lifting, it must be ensured that the machine or equipment to be lifted is positioned within the reach of the lifting equipment and the transport vehicle, and that the ground in the lifting zone is stable. Permitted lifting equipment includes cranes, forklifts and loaders. It is also important to ensure that all hoses on the machine or equipment are well protected from being pinched before the lifting begins

Attach the lifting device to the lifting points on the machine or equipment. Lifting of the machine or equipment should be done in a controlled, slow and careful manner to avoid impacts that could cause damage. Make sure that no unauthorized people are in the lifting zone.

Lifting aids and tools, such as chains, ropes and lashing straps, must be long enough to reach around the machine or equipment and when tense the chains must always be at an angle of more than 60° to each other. Any aids used must be in good condition and adapted to the weight that is to be lifted. Different working methods require different lifting tools, make sure to only use tools that are approved for the work. See Figure 8 for an example of correct and incorrect lifting of drill rods.



Figure 8. Correct/incorrect method for lifting drill rods

6. Installation

During installation of the equipment towards the carrier, the operator must consider the following.

- Prepare hoses and cables for hydraulic and electricity.
- Provide the receiver with 12-24 VDC.
- Use the included electrical and hydraulic diagram for correct connection.

After installation the operator must consider the following.

- Check that the hydraulic pressure complies with the technical specification.
- Test all functions.

7. Operation

7.1. Preparations before operation



Before the machine is put into operation, the operator must consider the following:

- Read through all the manuals
- Read through and apply the rules and safety regulations that apply in the workplace.
- Check the surroundings of the work area. Check that there are no lines in or on the ground (for example sewer, gas, water, electricity, etc.) where drills or piles are to be driven down. Check that there are no lines in the air (for example telephone line, power line, etc.) where the machine will be operated.
- Check that no unauthorized people are within the work area.
- Make sure that there are no people either near the machine or any people that are performing any maintenance work on the machine.
- Check that the machine is properly stabilized.
- Check that all protective devices are intact and correctly positioned.
- Check the function of the emergency stop.
- Check that all levers are in neutral mode.
- Check that all controls are in neutral mode
- Activate the control button for remote control/valve package.
- Check that all hydraulic quick couplings on hoses are properly connected, the hoses must not be twisted or obstruct intended machine movements.
- Activate the hydraulics of the equipment.
- Check that the oil pump valves are open.
- Check the oil.
- Check that the pressure line, tank line and drain line are connected to the equipment. The drain line from the equipment must be connected separately to the carrier's hydraulic tank. It must not be connected to other return lines.
- Ensure that any shut off valves connected to the equipment's hydraulic lines are open before starting the machine.



Note that the tank connection on the valve package must never be pressurized or exposed to back pressure (max 40 bar dynamic pressure). Pressurization or back pressure at the tank connection can cause damage to the valve package.

7.2. Start the machine

The carrier is operated from the cab or by remote control. The equipment is operated by remote control. Make sure that all preparations are completed before starting the machine.

Press the START-button on/in the carrier (for instructions on starting the engine, refer to the carrier manual).

Press the START-button on the remote control (for instructions, refer to the remote control manual).

7.3. Manoeuvring

The front loader is operated from the operator's cabin via the dozer blade lever and by wireless control via a handheld remote control.



Deviations regarding manoeuvring may occur if the manufacturer has not performed the installation of the front loader.



All controls and buttons for the front loader must only be operated by hand, they must not be activated by any kind of aiding tool.



If an emergency stop is needed, use the remote control stop button or the carrier stop button.



When driving with a load on the front loader, the operator must assess whether there is a risk of tipping. The operator must lash the load correctly and ensure that the load is properly lifted.

7.3.1. Lifting

When lifting with the front loader, a selector button is used that allows the choice between using the dozer blade or the front loader.

7.3.2. Hydraulic attachment locking

When hydraulically locking the bucket, the bucket lock button must be held, and the dozer blade lever must be moved forward or backward when opening/locking.

7.3.3. Inclination

When tilting, the inclination button must be held, and the dozer blade lever must be moved forward or backward when tilting up/down.

7.3.4. Load dampening and float mode

For load dampening and float mode, the dozer blade lever does not need to be activated. Activation of these modes is instead done solely by pressing a button on the remote control.



The float mode has a delay of 2 seconds to prevent accidental button pressing.



Be careful when activating the float mode, the front loader is at risk of falling freely if it is not positioned against the ground at the time of activation.

7.3.5. Remote control layout

т	able	3	Remote	control	lavout
	able	э.	Remote	control	layout

Button	Function
1	Lifting (momentary)
2	Inclination (momentary)
3	Locking cylinder (momentary)
4	Load dampening (latched)
5	Float mode (latched, 2s delay)
6	Option
7	Start
8	Stop



The diodes show with flashing light which function is active. Load dampening is indicated by yellow light. Float mode is indicated by red light. See Figure 9.



Figure 9. Remote control layout

7.4. Machine stop

Before turning off the machine, make sure that the levers and buttons with nonautomatic returns are in zero position (neutral position) and that the machine is in a stable position.



If a situation occurs where there is a risk of personal injury, the emergency stop button must be pressed immediately to stop the machine!

7.5. Storage

In conjunction with the machine being taken out of service for a period to be put in storage, the following needs to be considered to ensure that the machine remains in good condition.

- 1. Clean the machine thoroughly.
- 2. Lubricate the machine according to the lubrication schedule.
- 3. Make sure the machine is positioned protected and on solid ground.
- 4. Cover the machine to protect it from dirt and dust.
- Before the machine is put back into use after storage, thorough service maintenance should be carried out where all mechanical, electrical and hydraulic parts are checked.

8. Maintenance and service

8.1. General information about maintenance

The machine, equipment, tools and accessories need maintenance and service to avoid unnecessary repairs. Continuous maintenance is important to ensure that work with the machine can continue under safe conditions.



It is the operator's responsibility to ensure that service, maintenance and repair measures are carried out continuously and at the recommended intervals.



The operator must wear appropriate personal protective equipment and ensure that the lighting is sufficient to safely perform maintenance work and/or repairs on or inside the machine.



Any faults and defects that may affect safety must be repaired immediately by authorized personnel (using original spare parts) before the machine can be put back into operation. Major repairs must be carried out in a workshop by authorized personnel, simpler repairs can be carried out on site by the machine operator.



After every repair, service or maintenance work, the protective devices and safety component's functionality must be tested before the machine is put back into operation.



The work area around the machine must be kept free from objects that could cause accidents or hinder work when the machine is in operation. After every repair, service or maintenance work, tools and replaced parts must be removed from the work area before the machine is put back into operation.



The machine's engine and main power switch must be turned off before service, maintenance or reparation of the machine starts.



During service, maintenance and reparation, the electricity must be disconnected and the hydraulics turned off.



The start key should be placed in connection with the closed hydraulic valve to prevent unintentional starting with the suction line closed. This way, damage to the hydraulic system can be avoided.



Work on the machine should only be carried out after the parts exposed to high temperatures have had time to cool down. All service work performed on the hydraulic system requires that the pressure in the entire hydraulic system is released before service work begins.

8.1.1. Maintenance of electrics

The electrical components of the machine are sensitive. To ensure their life length, the electrical components must be kept clean and protected from dirt and moisture. Check regularly that there are no breaks or damage to cables, fuses or connectors. Also check that there are no loose components or loose connections. Never spray water directly on electrical components.

8.1.2. Maintenance of the hydraulic system

8.1.2.1. Replacing the hydraulic hose

Damaged hoses must be replaced with hoses of the same dimensions and characteristics as the original part. Use a hose with the correct measurements to avoid overloading the hose. Adjust the length of the hose so that it is not too tight or too long.

Make sure that the hoses are positioned properly so that they are not stretched too much when bundled together. Ensure that the hoses are not twirled or twisted during assembly. Tighten the couplings to the correct torque, do not tighten the couplings so hard that the coupling breaks.

8.1.3. Welding

If welding is required, contact the manufacturer for assistance or instructions. Improper welding may result in breakage.



When welding on or with the machine, all cables to the remote control receiver box must be disconnected. Ignoring this warning poses a risk of damaging the electrical system. No electronics or computers may be connected to the machine during welding.

If welding must be performed, follow the instructions below to minimize the risk of irreversible damage to the machine.

- 1. The engine/diesel engine must be switched off.
- 2. Disconnect the batteries from the main power switch on the machine.
- 3. Disconnect all computers with quick coupling connections.
- 4. Connect the welder's ground cable as close to the welding area as possible (maximum 50 cm from the welding area).
- 5. Attach the welding ground clamp as close to the welding area as possible.
- 6. Check that the current flowing from the electrical current from the ground cable to the welding area does not pass through any layers.
- 7. Do not use electrical and electronic components as a welding ground point.
- 8. Do not weld on the diesel engine and/or components installed on the diesel engine.
- 9. Protect cables and electronic components that are sensitive to splashing and residual products from welding.
- 10. Use approved welding procedures for different materials.

8.1.4. Cleaning and sanitation

Regular cleaning is part of preventative maintenance. The machine operator must keep the machine free from debris, dirt, mud, grease, oil, cement, salt water, or other foreign materials. Cleaning the machine should be performed at the end of the work shift, with the engine turned off and the machine in a stable position.

After cleaning the machine, the operator must ensure that there are no damaged, worn or loose parts. Regularly check the condition of labels, stickers and warning signs on the machine and replace them if damaged.



When cleaning the machine, the operator must consider the following:

- Only wash the machine in a place designated for that type of cleaning, such as a washing facility with a treatment plant.
- Avoid spraying water directly on electrical components, connectors or cables.
- Do not clean electrical components, connectors or cables with a pressure washer.
- Do not clean sensitive hydraulic components with a pressure washer.
- Sensitive parts (electronics, hydraulic components, PLC, etc.) should be cleaned with low pressure air.
- Appropriate personal protective equipment must be worn when cleaning machines by using pressurized water or pressurized air. It is mandatory to wear fully covering protective overalls, non-slip protective shoes, safety glasses, face mask and protective gloves when cleaning.
- Ensure that only people wearing appropriate personal protective equipment are in the work area during cleaning
- Only use detergents recommended by the manufacturer. Using other detergents may affect the operation of the machine and repeal the warranty.
- Do not use flammable or combustible liquids, toxic chemicals or acids to clean the machine.
- Do not store oily rags next to the machine, place them in a suitable container.



When working in environments where the machine is exposed to salt water, special cleaning needs to be carried out daily at the end of the work shift. First rinse the machine with clean water and then lubricate the rinsed surfaces with high performance lubricant. It is important that salt water is removed from the machine to avoid damaging corrosion.

8.1.4.1. Pressure washer



When using a pressure washer, all users need to observe the following safety instructions:

- The high-pressure jet can be very dangerous. Never direct the jet at people or animals as this poses a risk of injection injuries.
- The user of the pressure washer needs to be aware of their surroundings. Never use the pressure washer when tired.
- The user of the pressure washer needs to use appropriate personal protective equipment.
- To achieve safety, the user of the pressure washer needs to stand well balanced, on firm ground and in a stable position. Avoid reaching movements to access or reach a certain part of the machine with the pressure washer, instead change to a new position.
- The pressure washer produces a type of recoil, hold the pressure washer firmly with both hands.
- Never use a pressure washer on flammable liquids as this poses a risk of explosion.
- Do not clean electronic components or sensitive hydraulic components with a pressure washer.
- Pressure washers should never be used in cabins or around controls. Cleaning of the cabin interior should be done by vacuuming and wiping by hand.

8.1.4.2. **Rinsing and application of detergent**

Rinsing with water alone is often not enough to loosen grease and dirt. In this case, detergents, such as degreasing solutions and washing detergents, need to be used.

Rinse the machine with fresh water and then apply washing detergent to the surface. For best results, clean one side of the machine at a time and always apply washing detergent from bottom to top, do not let the washing detergent dry on the surface. Brush if necessary to remove stubborn dirt. Rinse the machine from top to bottom with high pressure in a sweeping motion and hold the spray nozzle approximately 150-200 mm from the cleaning surface, a greater distance is required when rinsing sensitive surfaces. For best results, finally wipe the surface with a chamois leather or a soft cloth that is dry and clean. Also, clean and polish glass surfaces.

8.1.4.3. Cleaning of the undercarriage

The undercarriage of the carrier consists of many moving components that must be maintained to ensure proper function. At the end of each workday, the operator should routinely clean the undercarriage. It is suitable to use a shovel to manually loosen larger pieces of material stuck to the undercarriage, then proceed to pressure washing.

If the undercarriage is not routinely inspected and maintained, the life length of the machine could be significantly reduced due to wear and tear. When operating in colder climates, the risk of wear is greater since mud, dirt and other debris will freeze and begin to rub against the bolts, loosen the steering and seize the rollers. In addition, mud, dirt and other debris stuck to the undercarriage can add weight to the machine, which in turn has a negative impact on fuel economy.

8.2. Lubrication schedule

The machine/equipment must be maintained by being lubricated with grease, suitable is universal grease.

Suitable lubrication interval is daily during work shift, 10 hour interval, or more frequently if necessary. All lubrication points (Figure 10) should be lubricated on both sides of the equipment.

For lubrication of carrier, tools or other components, reference is made to the respective manufacturer's manual.



Lubrication may only be carried out when the machine is stationary and switched off.



Figure 10. Lubrication points BM1416

8.3. Preventive maintenance



Repeat the maintenance schedule according to the specified interval.



Maintenance should be carried out at least once per work shift.



The connection between the carrier and the front loader should be checked continuously during the work.



Repaint and touch up the paint if necessary.

Work area	Description of work		
General	Check that no cracks have appeared anywhere		
General	Check for any cracks in welded joints		
General	Check bolted connections, loose screws, bolts, etc		
	All bolted connections must be locked with either lock nuts, lock thread, Loctite 638 or Nord-Lock washers.		
General	Check that there are no gaps, check cylinder		
	mountings, replace bushings if necessary		
General	Make sure the sliding surfaces and slide rails are		
	clean from dirt		
General	Lubricate all lubrication points		
General	General cleaning		
Hydraulic system	Check that there are no leaks, examine the condition		
	of the hoses		
Emergency stop	Check the emergency stop function, check that the		
	machine stops when the emergency stop is pressed		

8.3.1. Daily maintenance (10 hours)

8.3.2. Weekly maintenance (50 hours)

Work area	Description of work
Daily maintenance	Repeat daily maintenance
Electricity	Check cables and connectors, they must not be
	damaged or come into contact with sharp edges

8.4. Troubleshooting

The troubleshooting chapter presents some of the likely causes of problems that may occur with the machine. If problems occur where cause cannot be traced by the operator, or if the fault persists after troubleshooting, the manufacturer's after-sales department needs to be contacted.

8.4.1. After-sales support

Contact the manufacturer's after-sales department via one of the following contact methods.

Telephone: +46 224 138 10

Email: service@spdab.com

Email: info@spd.se

8.4.2. General troubleshooting

Cause	Action
Powerless hydraulics	Check hydraulic pressure
No movement when function is activated	Check electrical cables/hydraulic hoses
Slow function movement	Check oil flow

9. Disabling and scrapping

The machine has a life expectancy of 10 000 hours or 10 years, after which it should be scrapped or undergo overhaul and refurbishment.

9.1. Disposal

To dispose of the machine and permanently take it out of service, follow the specified procedure.

- Disconnect the machine from the power supply, electrics, hydraulics and air supply. Ensure that all external supplies have been disconnected and that the hydraulic circuit is not pressurized.
- 2. Follow the instructions regarding deregistration and dismantling in accordance with the relevant legislation in the country where the machine is put into service.
- 3. Sort the materials released during dismantling of the machine, in a customary manner in connection with scrapping, to ensure that each type of material is destroyed properly.

9.2. Waste recycling

Special attention must be paid to toxic and hazardous waste. This type of waste must be recycled in accordance with the relevant legislation in the country where the machine is put into service. Recycling of toxic and hazardous waste shall only be carried out by operators who are authorised to handle such recycling.



It is absolutely forbidden to throw waste (paint, oils, various hazardous residues, etc.) from the machine into nature.



If recycling is not carried out at the same time as dismantling but is done afterwards, the machine and its parts must be stored under protection to prevent substances such as lubricants and paint from being washed off by the rain and flowing down into the ground.



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