Congratulations!

You have just purchased DYNASET hydraulic equipment!

The equipment allows you to maximize the productivity and efficiency of your mobile machine. Read this User Manual before using your new equipment. It contains important information that will help you to take the full advance of the technical features available in your equipment.

Please contact us for any feedback you might have on our products. Your feedback is important to us for improving our products and customer service.

We are constantly developing and releasing new innovations. Please visit on our website and social media channels for the latest news and updates.

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HIGH PRESSURE WATER PUMPS

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1. **GENERAL**

This manual contains general information about assembly, installation, operation and maintenance of DYNASET HPW high pressure water pumps.

!!! ATTENTION!

Read this user manual before installation, use or maintenance of the HPW pump to ensure proper handling, operation and maintenance right from the beginning. Pay attention to warnings and safety instructions. READ CHAPTER “2. SAFETY” for more information.

1.1. **PRODUCT INFORMATION**

DYNASET HPW pump converts the hydraulic oil flow of a base machine into high pressure water. HPW pumps are used for pumping water and other fluids depending on a model. The power of the pump is defined by flow rate and pressure. Actuating power is supplied from the hydraulic system of the base machine or other hydraulic installation. Pumping fluid can be taken from reservoir or pressurized supply network. Water can also be taken from natural source such as lake or river.

The relation ship between hydraulic oil flow and pressure to pumping fluid flow and pressure is linear. HPW pumps can be safely operated in power range of 0-100%.

Most of HPW pumps are self-priming. READ CHAPTER “10. TECHNICAL SPECIFICATIONS” for specific characteristics of any pump.

!!! NOTE!

The design of HPW pump is protected with an international patent.
1.2. PRODUCT IDENTIFICATION KEY

**HPW 200 / 30 - 45 - ST - VR**

<table>
<thead>
<tr>
<th>PRODUCT GROUP</th>
<th>MAXIMUM WATER PRESSURE, BAR</th>
<th>MAXIMUM WATER FLOW, L/MIN</th>
<th>MAXIMUM HYDRAULIC FLOW, L/MIN</th>
<th>OPTIONS</th>
</tr>
</thead>
</table>

**Picture 1: Identification key for HPW pumps**

**MAXIMUM WATER PRESSURE**
Maximum water pressure that HPW pump can produce (40-1600 bar).

**MAXIMUM WATER FLOW**
Maximum amount of water or other pumping fluid that moves through HPW pump (15-300 l/min).

**MAXIMUM HYDRAULIC FLOW**
Maximum amount of hydraulic oil from the hydraulic system of base machine that HPW pump is designed to run (8-350 l/min).

**OPTIONS**

**Water unloader valve (ST/PA)**
The unloader valve directs water flow into bypass when the high pressure water output is closed or not needed. In HPW200 pumps water unloader valve is ST-model, other HPW pumps has PA-model.

**Flow limiter (VR)**
Limits the oil flow from the base machine. This function allowes to use the HPW pump with partial load instead of maximum flow.

**Pressure reducing valve (PA)**
Reduces the oil pressure from the base machine. This function gives possibilities to drive HPW pump with partial load instead of maximum pressure.
Load Sensing (LS)
Load Sensing on PT-flange. Senses and provides only the pressure and flow required by the HPW pump. This function saves significantly energy and customer’s expenses preventing excessive part wear in long term.

Marine (M)
For marine use. Pipes of unloader valve and all bolts are made of stainless steel.

Center body and water heads stainless steel (AIS)
The center body and the water heads of the pump are made of stainless steel.

Center body and water heads aluminium bronze (AB)
The center body and the water heads of the pump are made of aluminium bronze.

Center body aluminium bronze + water heads aluminium (AB-AL)
The center body is made of aluminium bronze and the water heads of are made of aluminium.

Under water use (SUB)
For under water use. The center body and the water heads are made of stainless steel or aluminium. Plugs are made of stainless steel, bolts are made of stainless steel or with special coating.

Seals for hot fluids and specific chemicals (HOT)
Seals are made to tolerate hot fluids and some specific chemicals.

Load Sensing Control (LSC)
Automatic Load Sensing Control on PT-flange. It is useful when hydraulic flow and pressure is occasionally needed. Off-state drives main hydraulic pump via LS-line to 0° angle and on-state drives hydraulic pump to full angle, producing maximum oil flow to the HPW pump. This function saves significantly energy and customer’s expenses preventing excessive part wear in long term.
1.3. TYPE PLATE

The products type plate shows the following information.

1. Product identification key
2. Product code
3. Serial number
4. Maximum hydraulic flow
5. Maximum hydraulic pressure
6. Production month / year
7. Output water flow rate and pressure.
8. Manufacturer’s contact information
1.4. HPW PUMP LINE-UP

Picture 3: HPW pump line-up

1. HPW 200
2. HPW 420
3. HPW 220
4. HPW 520
5. HPW 90
6. HPW 180
7. HPW 460
8. HPW 130
9. HPW 800
10. HPW 1000
11. HPW 1200
12. HPW 1600
13. HPW 300
1.5. MAIN COMPONENTS OF HPW PUMP

1. Body
2. Head right
3. Head left
4. PT-flange
5. Suction manifold
6. Discharge manifold
7. Hydraulic pressure line (P)
8. Hydraulic tank line (T)
9. Pumping fluid intake (S)
10. Pumping fluid outlet (WP)
11. Pressure gauge
12. Water unloader valve

Picture 4: Main components of HPW pump
2. SAFETY

2.1. SAFETY PRECAUTIONS

ATTENTION!
Operators and maintenance personnel must always comply with local safety regulations and precautions in order to close out the possibility of damages and accidents.

The pressure in both hydraulic oil and water circuits of HPW pump is considerably high. Keep the condition of your equipment and hydraulic system under constant observation.

WARNING

HIGH PRESSURE WATER AND OIL!
Can cause severe injuries.
Always wear appropriate clothing and safety equipment.

Couplings, valves and hoses need to be kept tight and clean to avoid possible leakages. Leaks in the hydraulic system must be repaired immediately to avoid injuries caused by high pressure blowouts.

In order to avoid accidents, it is not allowed to clean or inspect HPW unit when hydraulic fluid circuit is pressurized. Prior to any cleaning, inspection and service, hydraulic system of your base machine must be stopped and all hydraulic fluid circuits must be depressurized.

Prevent nozzles, water circuit and pipeline from freezing. Draining and air flushing of the water circuit have to performed before ambient temperature reaches 0°C or lower.

2.2. SAFETY EQUIPMENT

Always wear appropriate clothing and safety equipment such as safety goggles, safety shoes and ear protection when operating the HPW pump.
2.3. OPERATING SAFETY

When operating the HPW pump, beware of the unit parts warmed by hot hydraulic oil.

⚠️ WARNING

RISK OF BURNS!

The unit parts and hydraulic oil can be hotter than 80 °C!

Wear personal safety equipment!

Never aim high pressure water at a person.

⚠️ WARNING

HIGH PRESSURE WATER!

Never aim high pressure water at a person. This can cause severe injuries.

⚠️ ATTENTION!

Do not exceed the maximum pressure, temperature or load.
2.4. MAINTENANCE SAFETY

**ATTENTION**
Installation and service of hydraulic equipment must be performed by qualified and experienced personnel only.

**NOTE!**
When carrying out any maintenance to HPW pump keep the components of the system clean. This is to ensure safe, reliable and longlife operation of your equipment.

Hydraulic system of the base machine should be maintained according to the service program.

2.5. WARNING LABELS

Product recipient is obligated to place warning labels on the DYNASET product. Attach labels to visible and appropriate place onto or close to DYNASET product where it’s easily seen. Clean surface with solvent detergent before attaching labels.
3. OPERATING PRINCIPLES

3.1. OPERATING DESCRIPTION

The patented HPW-pump utilizes the reciprocal motion of the hydraulic piston.

HPW-pump is driven by hydraulic flow through the hydraulic ports (P) and (T). Hydraulic flow moves the piston assembly (1) into its extreme position. After extreme position reached, reversal valve (2) inside the piston assembly changes the direction of hydraulic flow and the piston assembly starts to move into the opposite direction.
High Pressure Water Pumps

Operating Principles

Picture 6: Operating description of HPW pump 2

Move of the piston assembly creates pressure and suction. Pump self-primes from water supply line (S) and generates pressure into pressure line (WP). When piston assembly moves away from head it creates underpressure (3) and water (or other pumping fluid) is sucked through intake valve (4) into head.

When water piston moves towards the head, it creates pressure (5) and water is pushed through pressure valve (6) into pumping fluid outlet (WP).

⚠️ NOTE!

Most of HPW-pumps are self-priming. Specific characteristics of any pump can be verified according to parameters, READ CHAPTER “10. TECHNICAL SPECIFICATIONS”.
The relationship between hydraulic oil flow and pressure to pumping fluid flow and pressure is linear.

![Diagram of hydraulic fluid flow and pumping fluid pressure](image)

**Picture 7:** Relation of pumping fluid’s flow rate and pressure.

HPW pumps can be safely operated in power range of 0-100%.

### 3.2. HYDRAULIC CONNECTION IN PARALLEL AND SERIES

Hydraulic lines of multiple HPW pumps can be connected in parallel to get maximum output pressure and double the output flow. Use flow controller valves when high pressure water pumps are connected in parallel.

![Diagram of hydraulic line connection in parallel](image)

**Picture 8:** HPW hydraulic line connection in parallel
Hydraulic lines of multiple HPW pumps can be connected in series to get higher output flow in small hydraulic flow. Maximum output pressure is divided by the count of the pumps in series connection.

![HPW hydraulic line connection in series](image)

**Picture 9: HPW hydraulic line connection in series**

### 3.3. PUMPING FLUID CONNECTION IN PARALLEL AND SERIES

Pumping fluid lines of multiple HPW pumps can also be connected in parallel or in series.

⚠️ **NOTE!**

If pumps with different pressure level is used, the pump which has lower nominal pressure, must be protected with for example check valve.
4. INSTALLATION

4.1. BEFORE INSTALLATION

ATTENTION!
Read the instructions before installing the DYNASET product!

4.1.1. HYDRAULIC SYSTEM OF A BASE MACHINE

Base machines have different type of hydraulic systems. Most common hydraulic systems in mobile machinery are:

- Open centre hydraulic system with Load Sensing variable displacement pump
- Closed centre hydraulic system with Load Sensing variable displacement pump
- Hydraulic system with fixed displacement pump
- Hydraulic system with fixed displacement pump at fixed rotation speed

Before installing the DYNASET product, find out the type of the hydraulic system of your machine.

If you are unsure of the hydraulic system, please contact the base machine manufacturer.

Next four paragraphs describe the hydraulic systems in more detail.
OPEN CENTRE HYDRAULIC SYSTEM WITH LOAD SENSING VARIABLE DISPLACEMENT PUMP

In open centre hydraulic system the flow is returned to tank through the control valves open centre; that is, when the control valve is centered. It provides an open return path to tank and the fluid is not pumped into a high pressure. In Load Sensing variable-displacement pump, the flow rate and output pressure adjusts automatically based on the load of the hydraulic system.
Papercut: Connection figure for open centre hydraulic system with Load Sensing variable displacement pump

1. DYNASET hydraulic equipment
2. DYNASET Priority valve PV-SAE
   2.1. DYNASET PC-SAE pressure compensator
   2.2. DYNASET LSV Load sensing valve
3. Base machines variable displacement pump
4. Open centre directional control valves
5. Oil cooler
6. Oil filter
7. Oil tank
CLOSED CENTRE HYDRAULIC SYSTEM WITH LOAD SENSING VARIABLE DISPLACEMENT PUMP

In a closed centre hydraulic system the oil flow is stopped from the pump when control valve is centered. The pump can rest when the oil is not required to operate a function. In Load Sensing variable-displacement pump, the flow rate and output pressure adjusts automatically based on the load of the hydraulic system.
Picture 13: Connection figure for closed centre hydraulic system with Load Sensing variable displacement pump

1. DYNASET hydraulic equipment
2. DYNASET LSV Load Sensing valve
3. DYNASET Shuttle valve
4. Base machines variable displacement pump
5. Closed centre directional control valves
6. Oil cooler
7. Oil filter
8. Oil tank
HYDRAULIC SYSTEM WITH FIXED DISPLACEMENT PUMP

In hydraulic system which has the fixed displacement pump, the oil flow from the pump is fixed. Every stroke of the hydraulic motor moves the same amount of oil. The output flow is function of the motor’s rpm and pump’s displacement.
Picture 15: Connection figure for hydraulic system with fixed displacement pump

1. DYNASET hydraulic equipment
2. DYNASET Priority valve PV-SAE
   2.1. DYNASET PC-SAE pressure compensator
   2.2. DYNASET LSV Load sensing valve
3. Base machines fixed displacement pump
4. Open centre directional control valves
5. Oil cooler
6. Oil filter
7. Oil tank
HYDRAULIC SYSTEM WITH FIXED DISPLACEMENT PUMP AT FIXED ROTATION SPEED

Picture 16: Open centre hydraulic system with fixed displacement pump

In a hydraulic system which has the fixed displacement pump, the oil flow from the pump is fixed. Every stroke of the hydraulic motor moves the same amount of oil. The engine of the base machine is set to run at fixed rpm when pump is used.
Picture 17: Connection figure for hydraulic system with fixed displacement pump at fixed rotation speed

1. DYNASET hydraulic equipment
2. DYNASET VKV free flow valve
3. Base machines fixed displacement pump
4. Oil cooler
5. Oil filter
6. Oil tank
4.1.2. DYNASET VALVES

DYNASET valves are designed to enable easy installation of your DYNASET hydraulic product.

**DYNASET LOAD SENSING VALVE**

![Load sensing valve LSV](Picture 18: Load sensing valve LSV)

DYNASET LSV load sensing valves are made for installations in a closed centre hydraulic systems.

**DYNASET PRIORITY VALVE**

![Priority valve PV-SAE](Picture 19: Priority valve PV-SAE)

DYNASET PV-SAE priority valve enables the installations of the DYNASET products into any hydraulic system.
4.2. INSTALLING DYNASET HYDRAULIC PRODUCT

4.2.1. PLACING DYNASET HYDRAULIC PRODUCT

Place DYNASET hydraulic product where there is an easy access to the unit. Ensure proper ventilation.

NOTE!
When positioning the HPW pump note the maximum inclinations and ensure that required oil cooling capacity of hydraulic system is sufficient. READ CHAPTER “10. TECHNICAL SPECIFICATIONS” for specific cooling capacities.
4.2.2. INSTALLING DYNASET VALVES

Installation instructions can be found in DYNASET LSV, DYNASET PV SAE or DYNASET VKV instructions manual.

4.2.3. CONNECTING HYDRAULIC HOSES

Connect pressure- (P) and return (T) lines of a hydraulic system to the corresponding hydraulic ports of the DYNASET unit.

NOTE!
Location of P- and T-ports variates between different DYNASET hydraulic equipment.

In case of hydraulic flow being too high. The flow must be reduced either by dropping down the rotation speed of base machine’s hydraulic pump or using flow limiter valve. DYNASET PV-SAE priority valve is recommended.
Generally DYNASET products T-line is to be connected directly to the return line of a hydraulic system.

If oil cooler is used between HPW pump and oil tank the return hydraulic pressure should be under 5 bar.

![Return line connection](picture)

**ATTENTION!**
Ensure that the filtering degree and cooling capacity of the hydraulic system are sufficient. READ CHAPTER “10. TECHNICAL SPECIFICATIONS” for more information.

### 4.2.4. HYDRAULIC FLUIDS

To use proper hydraulic fluid READ CHAPTER “6.2. Hydraulic fluids” for more information.
4.3. INSTALLING HPW-PUMP

4.3.1. MAXIMUM INCLINATIONS

Pump should be mounted on sufficiently horizontal surface to enable proper working of leakage detecting holes, which are found either on bottom surface or side faces of pump housing (depends on model).

Picture 25: Leakage detecting holes

4.3.2. CONNECTION TO THE PUMPING FLUID INTAKE

Connect water supply line pipe to the intake port (S).

Picture 26: Connection to the pumping fluid intake
When installing HPW pump into pumping fluid line note following things:

1. Intake filter for pumping fluid.
2. Air separator for pumping fluid.
3. Pumping fluid intake line hose diameter.
4. Pumping fluid intake line can be pressurised, maximum feed pressure can be typically 16 bar.
5. Pumping fluid temperature, typically between 5 to 70 °C
6. Most HPW pumps can be used as self-priming and the head of a pumping fluid intake line is typically 3 m as maximum.

**NOTE!**
READ CHAPTER “10. TECHNICAL SPECIFICATIONS” for specific characteristics of your HPW pump.
4.3.3. CONNECTION TO THE PUMPING FLUID OUTPUT

Connect the water or other pumping fluid output line to the water pressure port (WP).

Picture 28: Connection to the pumping fluid output
5. **OPERATION**

5.1. **STARTING THE HPW PUMP**

⚠️ **ATTENTION!**
Check all hoses and couplings in hydraulic and pumping fluid circuits before use to ensure there are no leaks or damages.

Ensure that there is water or other pumping fluid available in intake line.

When the engine of base machine is running and hydraulic flow is available, the HPW pump can be started by opening the hydraulic control valve.

![Picture 29: Starting the HPW pump](image)

⚠️ **ATTENTION!**
Never put your hand, fingers or body directly in front of the spray nozzle!

The spray nozzle attached to a pressure tool determines the flow rate and the pressure when operating parameters of hydraulic circuit meet the HPW pump’s requirements.

Correct size of the spray nozzle of pressure tool is a very important step for ensuring the optimal water jet or hydro-demolition power in each application.
5.2. ADJUSTING FLOW RATE AND PRESSURE OF PUMPING FLUID

5.2.1. ADJUSTING FLOW RATE AND PRESSURE WITH WATER UNLOADER VALVE

Picture 30: HPW pump with water pressure unloader valve

1. The water unloader valve is used to adjust the desired maximum output pressure limit. The adjusting knob is tightened to increase pressure and loosened to decrease pressure.

2. Whereupon the adjusted maximum pressure limit is being reached, water unloader valve circulates the water within the pump and prevents the output pressure to rise over the limit.

5.2.2. ADJUSTING FLOW RATE AND PRESSURE WITHOUT WATER UNLOADER VALVE

Picture 31: HPW pump without water pressure unloader valve

1. The water pressure and flow are adjusted by adjusting corresponding parameters in the hydraulic circuit.

2. In circuits based on fixed displacement pump closing the water pressure line opens the pressure relief valve in hydraulic system.
NOTE!
Hydraulic fluid circulation through pressure relief valve causes heating of oil and hydraulic system!

3. In circuits based on variable displacement hydraulic pump closing the water pressure line adjusts hydraulic pump’s swashplate at 0° angle. Hydraulic pump produces flow only for self-lubrication and self-flushing.

5.3. PUMPING FLUIDS

Most liquids, which can be transferred by pumping, can be pumped also with HPW pump.

Water based fluids and seawater can be pumped without any special arrangements, however the pump must be flushed and cleaned thoroughly after a working shift with clean fresh water. Same rule applies when pumping gelatinous fluids, flush HPW pump with clean fresh water or suitable solvent. Solvents, fuels and oils can be pumped without any special arrangements.

Fluids with abrasives or high content of solids can be pumped as well, but should be kept in mind, that HPW pump’s service lifetime is considerably shortened.

Note that DYNASET HDF-pump series is especially designed for pumping abrasive fluids. If pumping solution is aggressive to NBR-rubber, special seals must be used.

When HPW pump is going to be used as a self-priming unit with a special or high viscosity liquid, the flow and self-priming conditions should be valued. If the self-priming property can not be reached, pumping liquid is to be fed with certain pressure, or the pump should be used at lower hydraulic flow. READ CHAPTER “10. TECHNICAL SPECIFICATIONS” for specific values of your HPW pump.

HPW-models made of special materials are available by request.

NOTE!
HPW pump can be run dry unlimited time without any harm, because self-lubricating sealing and circulating hydraulic oil prevent the pump from overheating.
5.4. **WORKING IN COLD TEMPERATURES**

To prevent pipes and HPW pump from freezing in cold season, pump and pumping fluid output line should be dewatered after a working shift. Detach the intake hose from HPW pump and run it dry for a while until all water is removed from water circuit.

5.5. **STOPPING THE HPW PUMP**

HPW pump is stopped by shutting off the hydraulic flow.

![Stopping the HPW pump](image1)

*Picture 32: Stopping the HPW pump*

High pressure can remain in closed pressure circuit. Release water pressure to avoid unexpected water discharges and injuries. If spray gun or similar tool has been used, pull the trigger for some time after the pump has stopped.

![Stopping procedure of the HPW pump](image2)

*Picture 33: Stopping procedure of the HPW pump*

1. Shut off hydraulic flow.
2. Pull the trigger of spray gun to let the pressure out the system.
3. Ensure that there is no pressure left in the system from the pressure gauge.

**NOTE!**

Clean the pump completely after work, if special pumping fluid is used! READ CHAPTER “5.3. Pumping fluids“ or contact your supplier for use of special pumping fluids.
6. MAINTENANCE

DYNASET HPW pumps are low-maintenance pumps. In normal operating conditions HPW pump does not require any other service, except replacement of sealings or occasionally replacement of water valves. It depends on content of abrasives in pumping fluid, as well as on cleanliness of hydraulic oil.

⚠️ ATTENTION!

Before beginning any maintenance or repair, ensure that the system is stopped and completely depressurized. Make sure that the system can not start accidentally.

6.1. MAINTENANCE INTERVAL

All maintenance must be complied with as they are scheduled in this manual. The following table provides maintenance schedule for DYNASET HPW pumps.

<table>
<thead>
<tr>
<th>CHECK POINTS</th>
<th>Daily</th>
<th>After daily use</th>
<th>Every 3 months</th>
<th>Every 1500 hours or if necessary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observe leakage detactors</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clean HPW pump</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change water intake filter</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change sealings</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>

Check constantly whether the fluid dropping from pump’s leakage detectors is growing. Replace sealing in proper time to exclude intermixing of hydraulic oil and pumping fluid.

MAX
10 drops / min

1 min
6.2. HYDRAULIC FLUIDS

Wide range of standard hydraulic fluids can be used with DYNASET hydraulic equipment. Depending on the operating temperature, following mineral hydraulic oils are recommended:

<table>
<thead>
<tr>
<th>Mineral hydraulic oil</th>
<th>Operation temperature up to</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO VG 32S</td>
<td>60 °C</td>
</tr>
<tr>
<td>ISO VG 46S</td>
<td>70 °C</td>
</tr>
<tr>
<td>ISO VG 68S</td>
<td>80 °C</td>
</tr>
</tbody>
</table>

Synthetic and bio-oils can also be used if their viscosity characteristics and lubricating efficiency are similar to the mineral oils.

Automatic transmission fluids and even engine oils can be used, provided that they are allowed to be used in hydraulic system of your base machine.

For the hydraulic fluid change interval follow the base machine’s maintenance instructions.

To use special hydraulic fluids with DYNASET equipment, please contact the nearest DYNASET representative for more information.

6.3. CLEANING THE HPW PUMP

**ATTENTION!**

Keep the HPW pump clean to enable its safe and longlife operation. Check and clean your HPW pump after every work shift.

6.4. REPLACING WATER VALVES

1. Remove screws from the head.
2. Pull out the head.

3. Remove water valves and O-rings.

⚠️ ATTENTION!
The pressure valve’s spring has less turns than the suction valve’s spring. Do not mix up the valves when re-assembling the pump!

1. Suction valve
2. Pressure valve
4. Install new suction (1) and pressure (2) valves.

5. Install the head.

6. Repeat the operation to the other head.

6.5. REPLACING PUMP SEALS

1. Remove screws from the head.
2. Pull out the head and remove water valves.

3. Remove the other head and water valves.

4. Turn the pump frame into a vertical position.
5. Use rubber hammer and special tool to remove piston assembly with cylinder and sealing flanges from the pump.

6. Remove the sealing flanges from the piston assembly.

7. Remove seals and o-rings from the sealing flanges.
8. Remove the piston assembly from the cylinder.

9. Remove seal from the piston assembly and o-ring from the cylinder.

10. Install new o-ring to the cylinder, new o-ring and seal to the piston assembly.
11. Install the piston assembly to the cylinder. Use vaseline or mineral oil on the seal and mating surfaces to make installation easy.

12. Install new o-rings and seals to the sealing flanges. First install o-rings and then the seals. Compress the seal into a kidney shape, place it into groove and push it back to normal shape. Avoid making sharp bends on the seal.

⚠️ ATTENTION!
Seals of the sealing flange differs from each other, make sure that correct seal is installed into correct place.
13. Install sealing flanges into the piston assembly. Use lubricant to make the installation easy.

14. Lubricate mating surfaces of the piston assembly and insert it to the body. Place the special tool in the top of the piston assembly.

**NOTE!**
Make sure that the piston assembly is installed correctly.
15. Use rubber hammer to install piston assembly into the body.

16. Remove seals from the heads.

17. Install new seals into the heads.

18. Install water valves. SEE CHAPTER “6.4. Replacing water valves”.
NOTE!
DYNASET recommends replacing the water valves at the same time as the pump seals.

19. Install both heads into the body.

20. Test run the pump and make sure that there are no leakages.

6.6. TROUBLESHOOTING

Performing the maintenance tasks requires a qualified hydraulic mechanic. Please, contact DYNASET authorized workshop or dealer for more maintenance information.

<table>
<thead>
<tr>
<th>FAILURE</th>
<th>REASON</th>
<th>CORRECTIVE ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPW pump does not work.</td>
<td>Hydraulic flow not sufficient or no hydraulic flow at all.</td>
<td>Enable or adjust the hydraulic flow.</td>
</tr>
<tr>
<td></td>
<td>Hydraulic pressure too low.</td>
<td>Adjust the hydraulic pressure.</td>
</tr>
<tr>
<td></td>
<td>Hydraulic flow reversed.</td>
<td>Check and reconnect hydraulic hoses. Pressure hose should be connected to P-port and return hose to T-port.</td>
</tr>
<tr>
<td></td>
<td>Hydraulic piston damaged mechanically.</td>
<td>Replace damaged part.</td>
</tr>
</tbody>
</table>
## HIGH PRESSURE WATER PUMPS

### MAINTENANCE

<table>
<thead>
<tr>
<th>FAILURE</th>
<th>REASON</th>
<th>CORRECTIVE ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPW pump works, but does not deliver water flow.</td>
<td>Water intake and pressure valves are open (jammed with debris) or damaged.</td>
<td>Check water valves and clean them thoroughly or replace when damaged.</td>
</tr>
<tr>
<td></td>
<td>Regulator’s unloader valve opens from intake to pressure (models with water pressure unloader valve).</td>
<td>Check the valve and repair failure.</td>
</tr>
<tr>
<td>HPW pump does not receive pumping fluid</td>
<td>Intake hose detached or hose breathes.</td>
<td>Check and fix the hose and connectors.</td>
</tr>
<tr>
<td></td>
<td>Water supply line clogged.</td>
<td>Check strainer or water filter and clean thoroughly.</td>
</tr>
<tr>
<td></td>
<td>Suction head to high.</td>
<td>Check the performance with pressurized water supply when possible.</td>
</tr>
<tr>
<td>Water pressure line blocked.</td>
<td>Nozzle clogged.</td>
<td>Check the nozzle and clean thoroughly.</td>
</tr>
<tr>
<td></td>
<td>Regulator’s check valve damaged, pressure line blocked (models with water pressure unloader valve).</td>
<td>Check the valve and repair failure.</td>
</tr>
<tr>
<td>Water flow rate too small</td>
<td>Insufficient hydraulic flow or pressure.</td>
<td>Adjust the hydraulic flow to the demanded level at required pressure.</td>
</tr>
<tr>
<td></td>
<td>Nozzle of your pressure tool undersized.</td>
<td>Verify the nozzle sizing and replace with proper one.</td>
</tr>
<tr>
<td></td>
<td>Pressure loss in delivery hose.</td>
<td>Verify the hose sizing and replace with proper one.</td>
</tr>
</tbody>
</table>
# HIGH PRESSURE WATER PUMPS MAINTENANCE

<table>
<thead>
<tr>
<th>FAILURE</th>
<th>REASON</th>
<th>CORRECTIVE ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water pressure too low</td>
<td>Insufficient hydraulic flow or pressure.</td>
<td>Adjust the hydraulic pressure to the demanded level at required hydraulic oil flow. Pressure loss should be minimized. Do not use hoses of too small diameter or/and of an excessive length.</td>
</tr>
<tr>
<td></td>
<td>Nozzle of pressure tool oversized.</td>
<td>Verify the nozzle sizing and replace with proper one.</td>
</tr>
<tr>
<td></td>
<td>Wear-out of nozzle.</td>
<td>Replace the nozzle.</td>
</tr>
<tr>
<td></td>
<td>Insufficient water supply.</td>
<td>Check and fix the problem. Use pressurised water supply if available.</td>
</tr>
<tr>
<td></td>
<td>Water pressure unloader valve set too low (models with water pressure unloader valve).</td>
<td>Check and re-adjust to specification.</td>
</tr>
<tr>
<td>Intence pulsating of water pressure.</td>
<td>Some of water intake and pressure valves are open or damaged.</td>
<td>Check water valves, clean thoroughly or repair.</td>
</tr>
<tr>
<td></td>
<td>Water intake line breathes causing pump cavitation.</td>
<td>Check water intake line and fix the problem.</td>
</tr>
<tr>
<td></td>
<td>Water intake line's diameter to small, resulting in pump cavitation.</td>
<td>Verify the hose sizing and replace with proper one.</td>
</tr>
<tr>
<td></td>
<td>Excessive hydraulic flow, when HPW-pump runs too fast.</td>
<td>Adjust the hydraulic flow to the demanded level.</td>
</tr>
<tr>
<td></td>
<td>Filter clogged or too small.</td>
<td>Clean filter or replace filter of correct size.</td>
</tr>
<tr>
<td>FAILURE</td>
<td>REASON</td>
<td>CORRECTIVE ACTION</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Closing the water pressure line does not drop pressure to free circulation mode.</td>
<td>Insufficient hydraulic pressure in relation to pumping fluid pressure, adjusted with water pressure unloader valve.</td>
<td>Adjust the hydraulic pressure up as much as necessary to enable proper operation of water pressure unloader valve. Note that the maximum hydraulic pressure should not be overrun! If boosting the hydraulic pressure is not possible, the water unloader pressure setting should be dropped.</td>
</tr>
<tr>
<td>Hydraulic system starts to run through the pressure relief valve, emitting excessive heat.</td>
<td>Defective water pressure unloader valve (models with water pressure unloader valve).</td>
<td>Repair or replace water pressure unloader valve.</td>
</tr>
<tr>
<td>Sealings and water pistons wear off repeatedly.</td>
<td>Broken filter.</td>
<td>Check and replace filter.</td>
</tr>
<tr>
<td></td>
<td>Filter missing totally.</td>
<td>Install filter. Always must use filter, even with clear tap water.</td>
</tr>
<tr>
<td>Leakages.</td>
<td>Hydraulic oil leakages.</td>
<td>Check the tightness of component mating, tighten screws. Replace sealings of pumps mated surfaces if necessary.</td>
</tr>
<tr>
<td></td>
<td>Pumping fluid leakages.</td>
<td>Check the tightness of component mating, tighten screws. Replace sealings of pumps mated surfaces if necessary.</td>
</tr>
<tr>
<td></td>
<td>Hydraulic oil-pumping fluid leakage.</td>
<td>If the draining from leakage detectors exceeds rate of 10 drops per minute, pump’s sealings should be replaced. The rule applies to dropping of hydraulic fluid, pumping fluid and their commixture.</td>
</tr>
</tbody>
</table>
7. MANUFACTURER'S LIMITED WARRANTY

1. Warranty coverage
All hydraulic accessories manufactured by DYNASET OY are subject to the terms and conditions of this limited warranty. Products are warranted to the original purchaser to be free from defects in materials or workmanship. Exclusions from warranty are explained in item Exclusions from warranty.

2. Beginning of warranty period
Warranty period begins from the delivery date of the product. Delivery is considered to be done on the date when installation has been accomplished or purchaser has taken the product in use. Product is considered as taken in use at the date when DYNASET OY has delivered the product to purchaser, unless separately agreed otherwise by written agreement.

3. Warranty period
Warranty period is twenty four (24) months based on maximum of 2000 hours usage during this time period. In cases where the system is provided complete with certain special components (e.g. drive unit), those components are considered as a subject to their manufacturer’s warranty.

4. Warranty procedures
Immediately upon identifying a problem which purchaser believes to be a failure subject to the product's limited warranty, purchaser must contact primary to the seller of the product. Contact must be made as soon as possible, latest thirty (30) days after the problem was identified. Seller and/or manufacturer technical staff determines the nature of the problem primarily by phone or e-mail. Purchaser commits to give necessary information and to perform routine diagnostic procedures in order to determine the nature of the problem and necessary procedures.

5. Warranty repairs
If the product is found to be defective during the warranty period, DYNASET OY will, at its option, either repair the product, authorize it to be repaired at its authorized workshop or exchange the defective product. If the product must be repaired elsewhere than premises of DYNASET OY or authorized workshop, all costs excluded from this warranty (traveling and waiting hours, daily allowance, traveling expenses and uninstallation/reinstallation costs) will be charged from the purchaser. If the problem is not covered by this limited warranty, DYNASET OY has the right to charge purchaser of troubleshooting and repairing.

6. Delivery terms of warranty repair
If the product is found possible to be defective under this limited warranty and it needs to be repaired, DYNASET OY gives Warranty Return Number (WRN). Items being returned must be shipped, at the purchaser’s cost, adequately packed for shipment, to the DYNASET OY or to other location authored by DYNASET OY. Shipment documents must contain:

- Purchaser’s name and contact information
- Receipt of original purchase
- WRN code
- Problem description
7. Warranty of repaired product
Warranty period of the product repaired under this limited warranty continues to the end of original warranty period.

8. Exclusions from warranty
This warranty shall not apply to:

- Failures due to normal wear and tear, improper installation, misuse, abuse, negligence, purchaser selection of improper product to intended use, accident, improper filtration of hydraulic oil or intake water or lack of maintenance.

- Cost of maintenance, adjustments, installation or startup.

- Coating, hydraulic oil, quick couplings and interconnection hoses (internal or external to system assemblies).

- Products altered or modified in a manner not authorized by DYNASET OY in writing.

- Products which have been repaired during warranty period by others than DYNASET OY or its authorized workshop.

- Costs of any other damage or loss, whether direct, indirect, incidental, special or consequential, arising out of the use of, or the inability to use, the product.

- Telephone or other communications expense.

- Product that is used in exceptional conditions, considered to cause excessive wear and tear.

- Faults caused by nature phenomenon’s like flood, thunder, etc.

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8. PRODUCT DISPOSAL

Dispose and recycle all DYNASET products and their packaging environmentally responsible way.

Do not dispose used oils, electrical components, batteries or any other hazardous waste with normal waste. They are harmful for the environment and can be recycled for re-use.

Contact your local waste recycling facility for more information about recycling hazardous waste.

⚠️ NOTE!
Always act according to the waste legislation, regulations and recommendations in waste disposal and waste recycling issued by your local authorities.
9. DECLARATION OF CONFORMITY

We hereby declare that the design and manufacture of the product stated below are in conformity with the provisions of the European Parliament and Councils on the harmonization of the laws of Member States on the safety of machines.

Machine directive 2006/42/EC
LVD directive 2006/95/EC
EMC directive 2004/108/EC

Applied conformity standards:


EN60204-1 Safety of machinery – Electrical equipment of machines.

Manufacturer: DYNASET Oy
Menotie 3, FI-33470 Ylöjärvi, Finland

Product group: HIGH PRESSURE WATER PUMPS
Product: HPW High pressure water pumps

If the device has been modified by someone other than the manufacturer or without the manufacturer’s permission, this declaration is not valid.

Timo Nieminen
R&D Manager
Ylöjärvi, Finland 01.12.2015
### 10. TECHNICAL SPECIFICATIONS

#### DISCHARGE CHARACTERISTICS

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>flow max.</td>
<td>l/min (gpm)</td>
<td>30 (7.92)</td>
<td>20 (5.28)</td>
<td>50 (13.21)</td>
<td>150 (39.62)</td>
<td>30 (7.92)</td>
<td>90 (23.78)</td>
<td>50 (13.21)</td>
</tr>
<tr>
<td>Pressure max.</td>
<td>bar (psi)</td>
<td>200 (2901)</td>
<td>420 (6092)</td>
<td>220 (3191)</td>
<td>90 (1305)</td>
<td>520 (7542)</td>
<td>180 (2611)</td>
<td>460 (6672)</td>
</tr>
<tr>
<td>Power</td>
<td>kW</td>
<td>10</td>
<td>14</td>
<td>18.5</td>
<td>22.5</td>
<td>26</td>
<td>27</td>
<td>38</td>
</tr>
</tbody>
</table>

#### HYDRAULIC CONNECTIONS

<table>
<thead>
<tr>
<th>Pressure line</th>
<th>Return line</th>
<th>Service line</th>
<th>Outlet line</th>
<th>Intake line</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>BSP 1/2&quot;</td>
<td>BSP 1/2&quot;</td>
<td>BSP 3/8&quot;</td>
<td>BSP 3/4&quot;</td>
</tr>
<tr>
<td>T</td>
<td>BSP 1/2&quot;</td>
<td>BSP 1/2&quot;</td>
<td>BSP 3/8&quot;</td>
<td>BSP 3/4&quot;</td>
</tr>
<tr>
<td>WP</td>
<td>BSP 3/4&quot;</td>
<td>BSP 3/4&quot;</td>
<td>BSP 1/2&quot;</td>
<td>BSP 1/2&quot;</td>
</tr>
<tr>
<td>S</td>
<td>BSP 1/8&quot;</td>
<td>BSP 1/8&quot;</td>
<td>BSP 1/8&quot;</td>
<td>BSP 1/8&quot;</td>
</tr>
</tbody>
</table>

#### HYDRAULIC POWER REQUIREMENTS

| Oil flow max. | l/min (gpm) | 45 (11.89) | 50 (13.21) | 70 (18.49) | 85 (22.4) | 85 (22.45) | 115 (30.37) | 115 (30.37) | 140 (37.98) |
| Operating pressure | ∆p. bar (psi) | 185 (2683) | 190 (2756) | 180 (2611) | 190 (2756) | 190 (2756) | 190 (2756) | 240 (3481) | 240 (3481) |
| Pressure max. | bar (psi) | 200 (2901) | 220 (3191) | 210 (3046) | 210 (3046) | 250 (3626) | 210 (3046) | 250 (3626) | 250 (3626) |

#### HYDRAULIC FLUID REQUIREMENTS

| Viscosity | cSt | 10-200 / optimum 25-35 |
| Temperature * | ° C (* F) | max. 70 (158) |
| Filter ratio, recommendation | μm | min. 25 |
| Cooling capacity requirement | kW | 2 2 3 4 4 6 5 6 |

#### PUMPING FLUID INTAKE REQUIREMENTS

| Suction head max | m (ft) | 3 (9.8) |
| Feed pressure | bar (psi) | -0.3...16 (-43.5...232) |
| Water filter | mesh | min. 80 |

#### OVERALL DIMENSIONS

| Length | mm (in) | 160 (6.3) | 160 (6.3) | 170 (6.7) | 175 (6.9) | 140 (5.5) | 240 (9.4) | 195 (7.7) | 175 (6.9) |
| Width | mm (in) | 245 (9.6) | 245 (9.6) | 280 (11.0) | 345 (13.6) | 290 (11.4) | 330 (13.0) | 314 (12.2) | 400 (15.7) |
| Height | mm (in) | 165 (6.5) | 155 (6.1) | 185 (7.2) | 250 (9.8) | 175 (6.9) | 175 (6.9) | 197 (7.8) | 270 (10.6) |
| Weight | kg (lbs) | 8 (17.6) | 16 (35.2) | 18 (39.6) | 31 (68.3) | 22 (48.5) | 28 (61.7) | 26 (57.3) | 35 (77.2) |

* SEE CHAPTER “6.2. Hydraulic fluids”
# HIGH PRESSURE WATER PUMPS

## TECHNICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>HPW 300 /300-350</th>
<th>HPW 800 /300-140</th>
<th>HPW 1000 /300-140</th>
<th>HPW 1200 /100-440</th>
<th>HPW 1600 /15-140</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DISCHARGE CHARACTERISTICS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pumping fluid flow max. l/min (gpm)</td>
<td>300 (79.25)</td>
<td>30 (7.92)</td>
<td>30 (7.92)</td>
<td>100 (26.41)</td>
</tr>
<tr>
<td>Pressure max. bar (psi)</td>
<td>300 (4351)</td>
<td>800 (11603)</td>
<td>1000 (14504)</td>
<td>1200 (17405)</td>
</tr>
<tr>
<td>Power kW</td>
<td>150</td>
<td>40</td>
<td>50</td>
<td>200</td>
</tr>
</tbody>
</table>

## HYDRAULIC CONNECTIONS

| Pressure line | P | SAE 6000 1 1/4" | BSP 3/4" | SAE 6000 1 1/4" | BSP 3/4" | SAE 6000 1 1/4" | BSP 3/4" | BSP 3/4" |
| Return line | T | SAE 6000 1 1/4" | BSP 3/4" | SAE 6000 1 1/4" | BSP 3/4" | SAE 6000 1 1/4" | BSP 3/4" | BSP 3/4" |
| Service line | | BSP 1/8" | BSP 1/8" | BSP 1/8" | BSP 1/8" | BSP 1/8" | BSP 1/8" | |
| Outlet line | WP | SAE 6000 1" (BSP 3/4") | BSP 3/4" | MP 9/16" | MP 3/4" | HP 1/4" | | |
| Intake line | S | SAE 3000 2" | BSP 3/4" | BSP 3/4" | SAE 3000 2" | BSP 3/4" | BSP 3/4" | |

## HYDRAULIC POWER REQUIREMENTS

| Oil flow max. l/min (gpm) | 350 (92.46) | 140 (39.96) | 140 (39.96) | 440 (116.16) | 140 (39.96) |
| Operating pressure Δp. bar (psi) | 350 (5076) | 210 (3046) | 260 (3771) | 300 (4351) | 230 (3336) |
| Pressure max. bar (psi) | 350 (5076) | 210 (3046) | 260 (3771) | 300 (4351) | 230 (3336) |

## PUMPING FLUID REQUIREMENTS

| Suction head max m (ft) | 3 (9.8) | 2 (6.5) | | | |
| Feed pressure bar (psi) | -0.3...16 (-43.5...232) | -0.2...16 (-29...232) | 5...20 (72.5...290) | 1...16 (14.5...232) | 1...16 (14.5...232) |
| Water filter mesh | min. 80 | min. 80 | min. 625 | min. 625 | min. 625 |

## HYDRAULIC FLUID REQUIREMENTS

| Viscosity cSt | 10-200 / optimum 25-35 |
| Temperature °C (° F) | max. 70 (158) |
| Filter ratio, recommendation μm | min. 25 |
| Cooling capacity requirement kW | 30 | 6 | 8 | 35 | 6 |

## OVERALL DIMENSIONS

| Length mm (in) | 270 (10.6) | 195 (7.6) | 168 (6.6) | 265 (10.4) | 195 (7.6) |
| Width mm (in) | 745 (29.3) | 340 (13.3) | 379 (15.6) | 915 (36) | 405 (15.9) |
| Height mm (in) | 360 (14.2) | 195 (7.6) | 194 (7.6) | 350 (13.8) | 160 (6.3) |
| Weight kg (lbs) | 170 (374.7) | 39 (85.9) | 39 (85.9) | 177 (390.2) | 36 (79.3) |

* SEE CHAPTER “6.2. Hydraulic fluids”
ELECTRICITY
HG Hydraulic Generator
HGV POWER BOX Variable Hydraulic Generator System
HGV Variable Hydraulic Generator System
HWG Hydraulic Welding Generator
HGG Hydraulic Ground Power Generator

HIGH PRESSURE WATER
HPW Hydraulic High Pressure Water Pump
HPW Hydraulic Power Washer
KPL High Pressure Street Washing Unit
HPW-DUST High Pressure Dust Suppression System
PPL High Pressure Pipe Cleaning Unit
HPW-FIRE High Pressure Firefighting System
FP Fire Fighting Piercing Kit
HDF Hydraulic Drilling Fluid Pump
JPL High Pressure Bin Washing System
HSP Hydraulic Submersible Pump

COMPRESSED AIR
HK Hydraulic Piston Compressor
HKL Hydraulic Rotary Vane Compressor
HKR Hydraulic Screw Compressor

MAGNET POWER
HMG PRO Hydraulic Magnet Generator
MAG Lift Magnet
HMAG PRO Hydraulic Magnet

VIBRATION
HVB Hydraulic Vibra
HVD Hydraulic Directional Vibra
HRC Hydraulic Reversal Cylinder

POWER BOOSTING
HPI Hydraulic Pressure Intensifier
HPI-C Hydraulic Pressure Intensifier for Cylinder

KNOW-HOW
Hydraulic Power Take-off (PTO)
Hydraulic Power Unit Technology
De-Icing Technology
Installation Valves
HHK Hydraulic Grinder
HV/HVY Hydraulic Winch / Winch Unit