

# Snow Plow Hydraulic Power Unit

## MANUAL



**ATTENTION!** Before operating the **Snow Plow** hydraulic power unit, it is essential to familiarize yourself with all the recommendations provided in this manual. The manufacturer assumes no responsibility for damages resulting from improper use of the **Snow Plow** hydraulic power unit or unauthorized modifications to its construction.

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### A2 OVERVIEW

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This operations manual is designed for users of hydraulic snowplow power units. It provides essential information for the assembly, initial startup, operation, maintenance, and safe use of the hydraulic power unit.

The manual has been prepared based on the expertise and experience of the manufacturing company and its specialists. Particular emphasis is placed on adhering to the safety precautions outlined in the relevant section of this manual.

Tasks involving the disassembly or assembly of the power unit and electrical components must be performed exclusively by qualified and authorized personnel. Repairs or adjustments not specified in this manual should not be attempted.

### A3 PRODUCT CLAIMS

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In the event of a technical issue, please contact the Magister Hydraulics technical department at **info@magisterhyd.com**. You can reach us by email or phone regarding your claim. To assist you more effectively, please provide the following information:

- Power unit code (found on the label located on the oil tank)
- Operating voltage and frequency
- Operating pressure
- Pump displacement
- Production date
- Detailed description of the issue
- Operating hours of the power unit

## A4 LABELING

Technical information about the power unit (including motor power, pump displacement, oil tank capacity, and similar specifications) is provided on the label. The label is affixed to the oil tank.

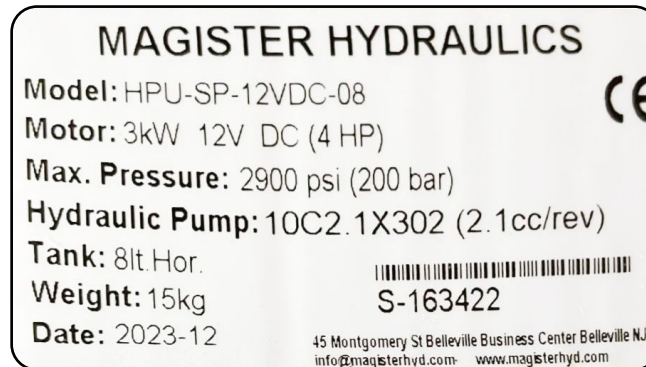


Photo 1. Power Unit Label

## A5 APPLICATIONS

The hydraulic power unit is designed for integration with snowplows equipped with double-acting cylinders for blade up/down motion and blade rotation. It features a compact design and includes NG6 solenoid-operated directional control valves.

### Key features include:

- A solenoid valve for the blade's up/down movement, offering a floating position when required via a 2/2 BLPV block.
- A solenoid valve for the blade's left/right movement.
- A double overcenter valve to protect the system in case the blade encounters an obstacle.



## A6 PRODUCTION CONDITIONS AND REQUIREMENTS

The hydraulic power unit is designed for use both indoors and outdoors, within an ambient temperature range of -77°F to +122°F. It operates effectively in air humidity levels of up to 80%.

## A7 TECHNICAL SPECIFICATION

The power units are designed to deliver flow rates ranging from 0.2 GPM to 7.1 GPM, depending on the chosen electric motor (ranging from 0.37 kW to 4 kW) and hydraulic pump (from 0.30 ci/rev to 0.55 ci/rev). The working pressure varies from 580 to 3191 psi, depending on the size of the selected components.



### A8 NOISE SPECIFICATIONS

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The hydraulic power unit generates noise levels not exceeding 85 dB, in compliance with EN 60034-9.

### A9 OPERATING FLUID

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The oil tank should be filled with new, filtered mineral-based ISO 6743/4 fluid. Use hydraulic oils with a mineral or synthetic base and a viscosity range of 15 to 68 cST at 104°F. The hydraulic fluid may need to be adjusted based on the working environment. Do not use motor oil, diesel oil, or water as fluid in the system. Filtration class should be -9 according to NAS 1638.

Hydraulic fluid should be replaced every 6 months or 1 year, depending on usage. (After the initial 100 operating hours, it is recommended to change the fluid every 3,000 hours.) The suction filter should also be cleaned regularly. If the fluid level drops, additional oil should be added.



### B1 SAFETY GUIDELINES

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To operate the hydraulic power unit, only personnel familiar with the safety protocols for electrical equipment and systems operating under pressure should be allowed.

For the safe operation of the hydraulic power unit, the following guidelines must be observed:

- The power unit must not be operated if the terminal box cap on the motor is missing or replaced, or if connectors on the solenoid valve coils are not of the same type as those originally installed with the power unit.
- The connection must be performed by a qualified electrician. During installation, ensure the correct direction of rotation for the electric motor. When viewed from the shaft end, the motor must rotate counterclockwise.
- Hydraulic connections should be made with care. The manifold has two outlet ports that need to be connected to the system actuator.
- The selection of pipes must be based on the system's pressure and flow requirements.
- Tube connectors must be securely tightened, and fluid leakage on the external surfaces must be avoided. Proper sealing elements should be used to ensure no leakage.
- Replacing the air breather with a plug is strictly prohibited.
- Pressure relief valve readjustment to a higher pressure is not permitted.
- The power unit must be securely mounted to a foundation or stable frame.
- The power unit is not allowed for use in explosive, hazardous, or combustible environments.
- Lack of oil may cause damage to the hydraulic pump.
- Insulated cables must be used for connections.
- The power unit assembly should not be performed in a wet environment.
- The positive (+) and negative (-) terminals of the DC motor must not come into contact with each other.
- The ends of the DC motor cables must be insulated.
- The DC motor should not operate without the starter installed.
- The oil tanks are equipped with breathers marked with a red color. Blind plugs should not be installed on these breathers.
- Hose diameters should not be undersized.

## C1 MAIN PARTS

The power unit consists of the following main components:

- Electric motor
- Central manifold
- Hydraulic gear pump
- Oil tank
- Suction filter
- Solenoid valve group

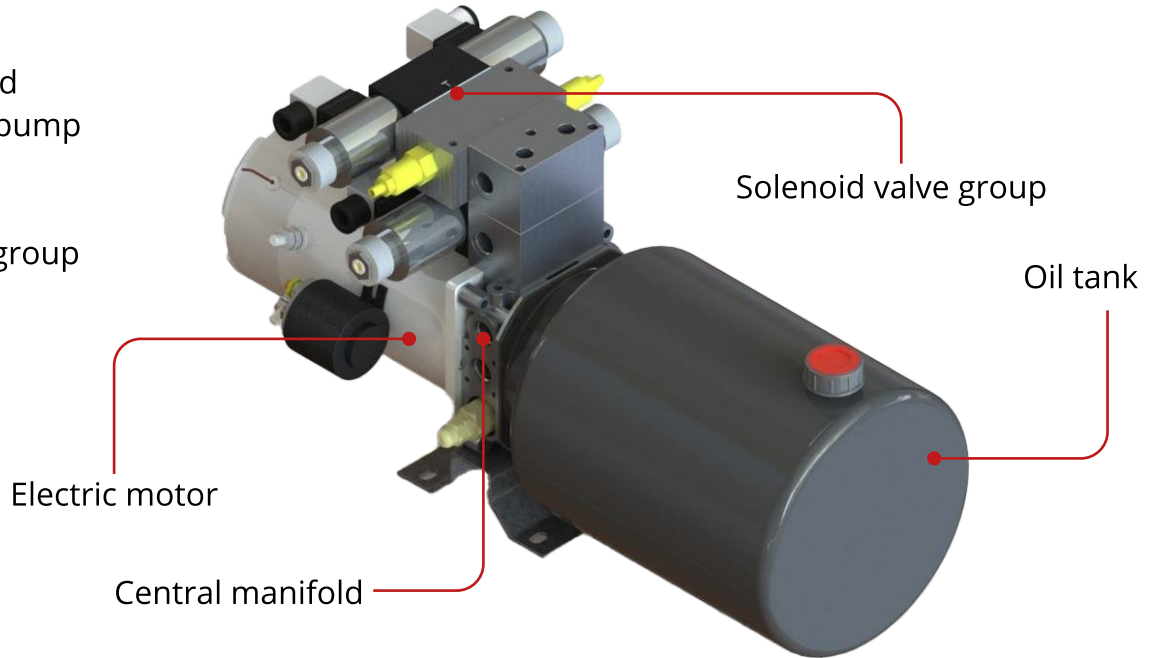


Photo 2. Main Components of Snow Plow Power Unit

When the electric motor is powered on, it drives the gear pump. The pump draws hydraulic fluid from the tank and directs it to the central manifold, which then distributes it to the system's actuators. The A and B ports of the subplates beneath the solenoid valves must be connected to the double-acting cylinders of the snow plow.

## C2 ELECTRICAL PARTS

The hydraulic power unit is equipped with:

- Electric motor
- NG6 4/3 solenoid valves with ABT floating spool (In the neutral position, P is blocked, and A, B, and T are connected.)
- BLPV block with a 2/2 double-lock solenoid-operated cartridge valve to provide a floating position when required.

The electric motor is available in the following configurations: 1.6 kW at 12 V, 2 kW at 12 V, 3 kW at 12 V, 2.2 kW at 24 V, and 3 kW at 24 V.

Solenoid-operated valve coils can function at voltages of 12 V, 24 V, or 220 V. The connectors are designed according to DIN 43650 standards.

The operation of the snow plow hydraulic power unit is determined by the machine to which it is integrated. During operation, the power unit must not have any leakage of hydraulic fluid on its external surfaces. The power unit is activated when the motor receives the required voltage. Control is achieved through the proper combination of motor activation and solenoid valve switching.

## SECTION E: ASSEMBLY OF THE POWER UNIT

### E1 WORK AREA REQUIREMENTS

The power unit must be mounted using M10 bolts with a mounting bracket beneath the central manifold. The area around the power unit must remain clear to allow access to the oil filler, valves, and unloading throttle. The power unit should not be placed in enclosed spaces that could hinder its cooling. Additionally, the power unit should not come into contact with any parts that may cause vibration or transmit noise.

### E2 TRANSPORTING OF THE HYDRAULIC POWER UNIT

The hydraulic power unit can be transported using any type of covered transport. When transporting, be sure to follow the recommendations indicated on the packaging. If there is oil inside the tank during transportation, the air breather must be replaced with a blind plug, or the oil should be drained prior to transport.

### E3 POWER UNIT PROTECTION

The hydraulic power unit is removed from the carton. The polyethylene packaging is taken off. The safety plugs are removed from the supply ports.

### E4 CONNECTION PORTS

The NG6 solenoid valves and double overcenter valves are modularly mounted to subplates on the central manifold. The A and B ports of the subplates are connected to the double-acting cylinders of the snowplow. The port threads are BSPP 3/8" (for the SAE version, they are 3/4-16 UNF). The maximum tightening torque for the fittings is 65 Nm.



Photo 3. Connection Ports on Subplates

E5 HYDRAULIC SYSTEM CONNECTION

The pipelines from the power unit are connected to the actuators within the system. Hydraulic circuit details and technical information are provided on the technical drawing. Once the power unit is fully installed, fill the tank with clean working fluid to the specified level. Be sure to clean all hydraulic components before assembly. After initial operation, verify the oil level in the tank.

E6 HYDRAULIC SYSTEM CONNECTION

The connection of the power unit to the electrical system should be performed by a licensed electrician to ensure compliance with safety regulations for working with electrical equipment. Please refer to the manufacturer for the electrical schematic.

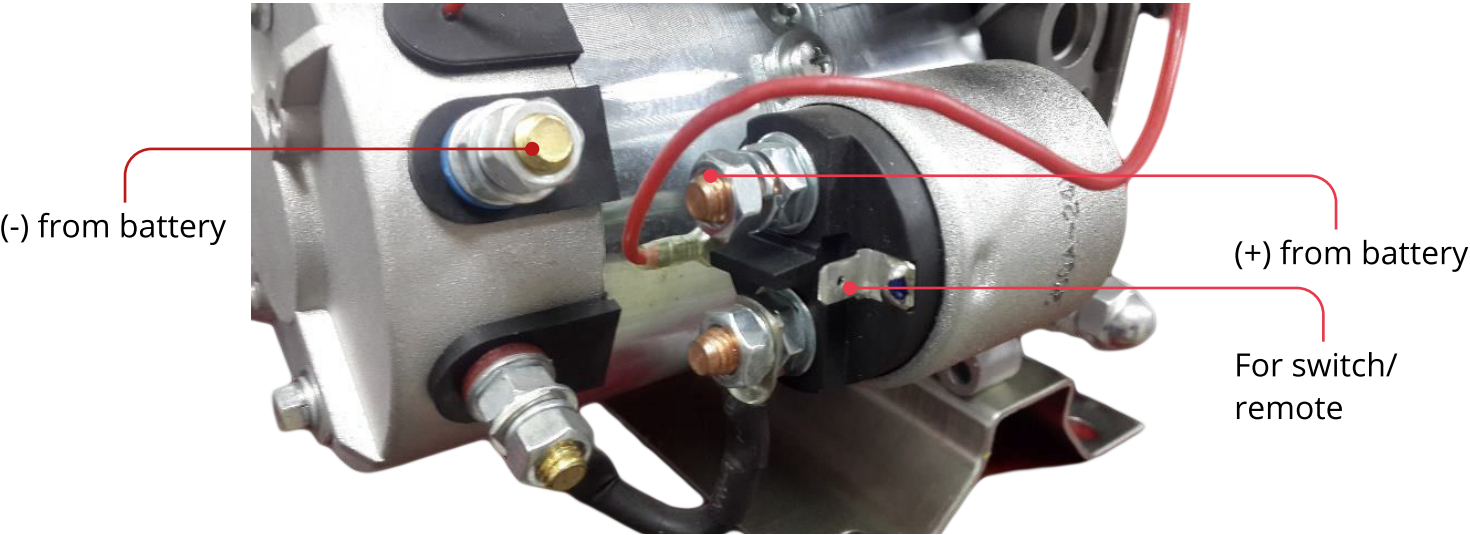
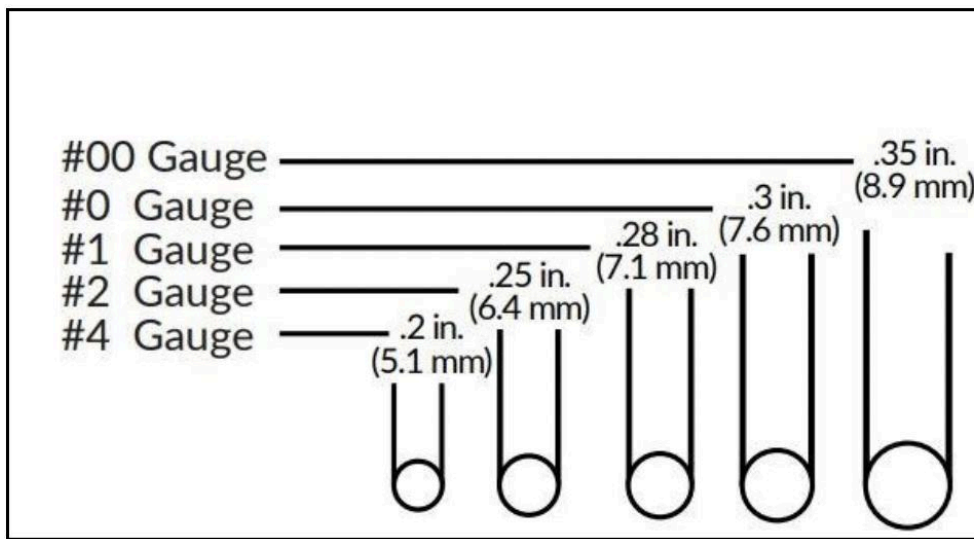


Photo 4. Connection on DC motor

For detailed information, please refer to the document “DD.043 R(0) Remote Control Connection on Power Units.”  
Selecting the correct cable size when connecting the battery to the hydraulic power unit is crucial. An improper selection can lead to issues in the electrical circuit. The table below can assist in choosing the appropriate cable size.

|             |           |             |             |             |             |
|-------------|-----------|-------------|-------------|-------------|-------------|
| 18-21 meter | #1        | #00         |             |             |             |
| 15-18 meter | #2        | #0          | #0          |             |             |
| 12-15 meter | #2        | #1          | #0          | #00         |             |
| 9-12 meter  | #4        | #1          | #0          | #00         | #00         |
| 6-9 meter   | #4        | #2          | #1          | #0          | #00         |
| 3-6 meter   | #4        | #2          | #1          | #0          | #00         |
| 0-3 meter   | #4        | #2          | #1          | #0          | #00         |
|             | 0-100 amp | 100-150 amp | 150-200 amp | 200-250 amp | 250-300 amp |





**Insulation not included.**

## SECTION F: MAINTENANCE OF THE HYDRAULIC POWER UNIT

### F1 POWER UNIT CLEANING

The power unit is cleaned using a textile cloth without the use of any cleaning agents or solvents. The cloth should not leave any fibers on the treated surfaces. Once a year, it is necessary to change the oil and flush the tank. The oil change procedure is as follows:

- Release the pressure from the system.
- Disconnect the power unit from the electrical supply.
- Disassemble the pipelines. Unscrew the bolts securing the power unit to the base.
- Place the power unit vertically on the tank and unscrew the securing bolts.
- Remove the electric motor, central manifold, and pump from the unit. Drain the old oil and clean the internal surfaces of the tank. Clean the suction filter as well.

After cleaning, reinstall the electric motor and central manifold onto the tank. Secure them with the fixing bolts and bracket. Reinstall the power unit in its operational position. Fill the system with working fluid up to the indicated level. Ensure the air breather is securely closed. Reassemble the pipelines and reconnect the power unit to the electrical system according to the application.

**Contaminated oil significantly reduces the lifespan of the power unit.**

## F2 PRESSURE ADJUSTMENT

The pressure adjustment in the hydraulic power unit is performed using the pressure relief valve, which is integrated into the main manifold. The pressure is adjusted as follows:

1. A pressure gauge is installed at port "P."
2. The nut on the adjusting screw is loosened.
3. The adjusting screw is turned counterclockwise until it reaches its limit.

Next, the hydraulic power is activated, and the adjusting screw is turned (clockwise to increase pressure, counterclockwise to decrease pressure) until the desired pressure is reached. Finally, the nut is tightened to lock the setting.

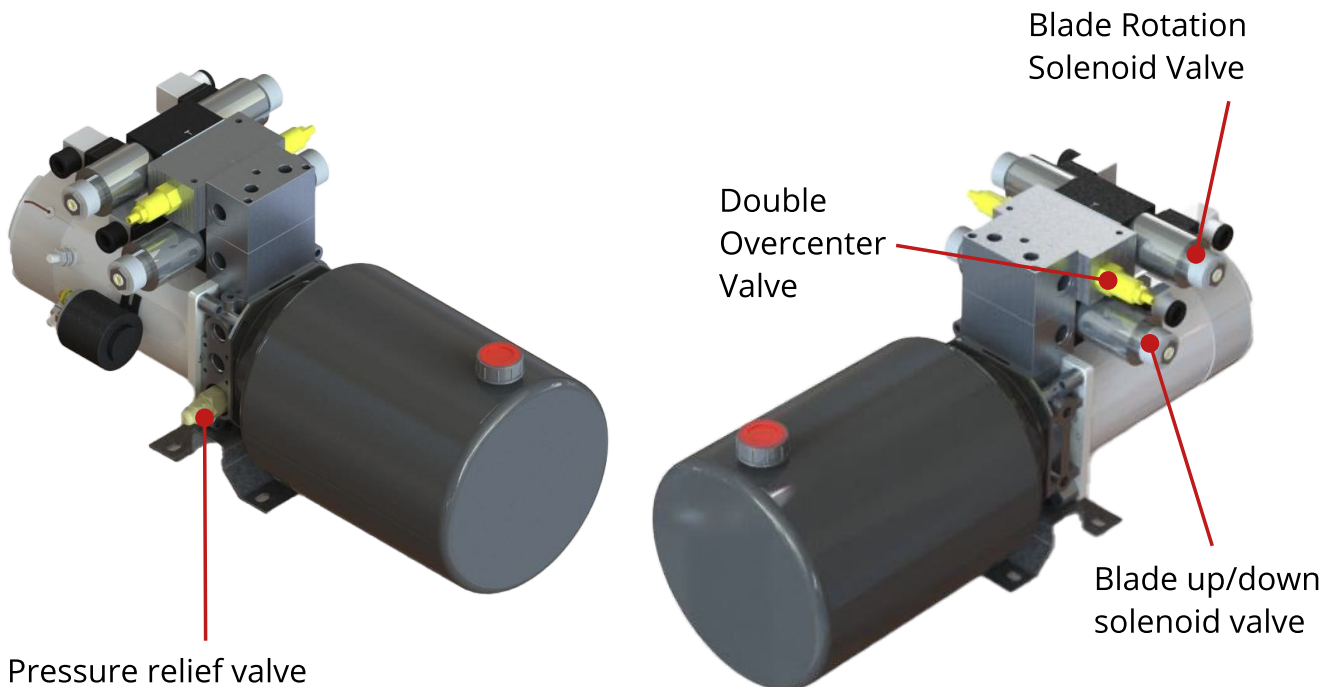
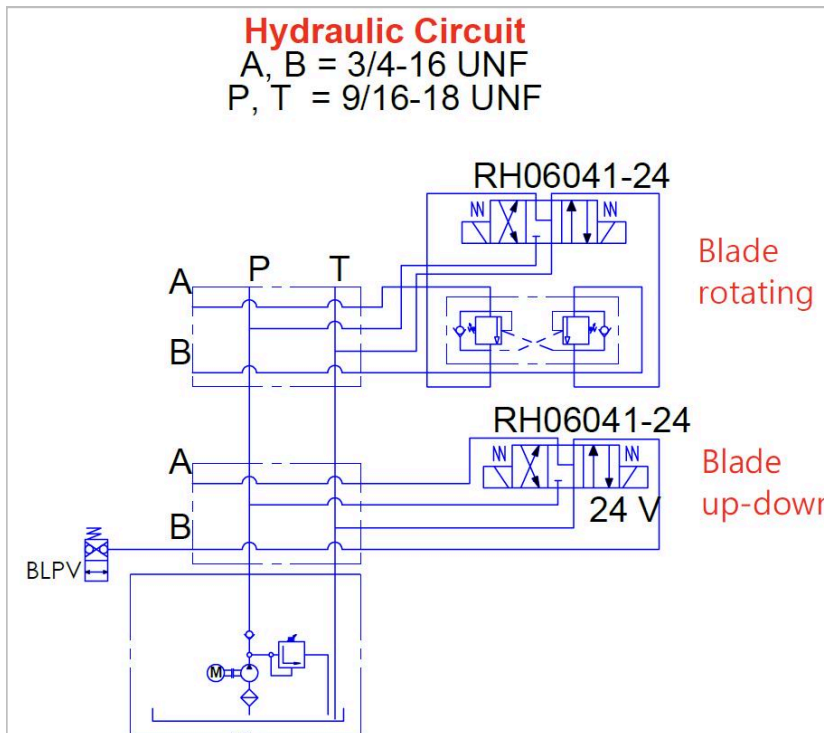


Photo 5-6. Pressure relief valve and double lock, normally closed cartridge valves

The factory settings of the power units typically meet the requirements for most field applications. However, users should exercise caution when adjusting the settings on the manifold. Ensure the lock nut of the pressure relief valve is properly tightened. Turning the adjustment screw clockwise will increase the pressure setting, while turning it counterclockwise will decrease the pressure setting.

**Caution! Do not exceed the maximum working pressure indicated on the technical drawing.**



The BLPV block with a 2/2 double-lock cartridge valve is optional and provides a floating function for the blade up/down cylinder by continuously energizing the valve coil.

## Features:

- Compact design
- One solenoid valve controls the up/down movement of the blade and provides a floating position using the 2/2 BLPV block when required
- One solenoid valve controls the left/right movement of the blade
- A double overcenter valve is included to protect the system in case the blade encounters an obstacle

## F3 TROUBLESHOOTING

| PROBLEM                                    | REASONS   | METHOD OF ELIMINATION  |
|--|---|--|
| <b>Not sufficient pressure</b>             | <ul style="list-style-type: none"> <li>• Lack of oil inside the tank</li> <li>• Damaged pressure relief valve</li> <li>• Damaged solenoid operated valve</li> <li>• Damaged Hydraulic pump</li> <li>• Filter pipe type is incorrect</li> <li>• Filter is blocked</li> <li>• Air on suction line</li> <li>• Contamination</li> </ul> | <ul style="list-style-type: none"> <li>• The oil is filled up</li> <li>• Readjustment of the relief valve</li> <li>• Replacement</li> <li>• Replacement</li> <li>• Replacement</li> <li>• Replacement</li> <li>• Elimination of the air</li> </ul> |
| <b>No pressure</b>                         | <ul style="list-style-type: none"> <li>• Gear pump doesn't operate properly</li> <li>• Electric wiring is wrong</li> </ul>  | <ul style="list-style-type: none"> <li>• Repair or replacement</li> <li>• Make sure correct rotation</li> <li>• Check wiring</li> </ul>  |
| <b>Electric motor runs but no pressure</b> | <ul style="list-style-type: none"> <li>• Gear pump doesn't prime</li> </ul>   | <ul style="list-style-type: none"> <li>• Disassemble pressure relief valve, run the unit for a few seconds until oil comes from the port, re-assemble the pressure relief valve</li> </ul>   |
| <b>Non-performance of the function</b>     | <ul style="list-style-type: none"> <li>• Damaged solenoid valve</li> <li>• Damaged check valve</li> <li>• Damaged pressure relief valve</li> <li>• Damaged hydraulic pump</li> </ul>  | <ul style="list-style-type: none"> <li>• Replacement</li> </ul>  |
| <b>Load doesn't stay in place</b>          | <ul style="list-style-type: none"> <li>• Check valve problem</li> <li>• Cylinder internal leak</li> </ul>   | <ul style="list-style-type: none"> <li>• Disassemble check valve clean the cavity with brake cleaner and use air pressure to remove contaminants/debris and replace check valve</li> <li>• Repair/inspect the cylinder/seals</li> </ul>            |

The manufacturer guarantees that the product complies with the applicable standards and technical documentation, and that its functionality during operation is in accordance with the current manual.

Please don't remove the product label from the oil tank while the warranty is valid. The warranty lasts for 12 months from the Order date.

The manufacturer will be responsible for addressing any defects caused by its fault. The warranty will be void if the user performs unauthorized repairs or fails to follow the instructions outlined in this manual.

Warranty services will be provided at the manufacturer's facility or through an authorized service provider.



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