

# Bi-Directional Power Unit

## MANUAL



**ATTENTION!** Before operating the hydraulic power unit, be sure to review all the recommendations in this manual. The manufacturer is not responsible for any damage resulting from improper use of the hydraulic power unit or unauthorized modifications.

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## A1 MANUFACTURER

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## A2 INTRODUCTION

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This operations manual is intended for users of hydraulic bi-directional (reversible) power units. It provides essential information on assembly, initial startup, maintenance, and the safe and proper operation of the hydraulic power units.

When compiling this manual, the experience of the manufacturing company and its specialists was taken into account. We strongly recommend following the safety precautions outlined in this manual when operating the machine.

Only qualified and authorized specialists should perform tasks that require disassembly and reassembly of the power unit or its electrical components. Repairs and adjustments not covered 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.

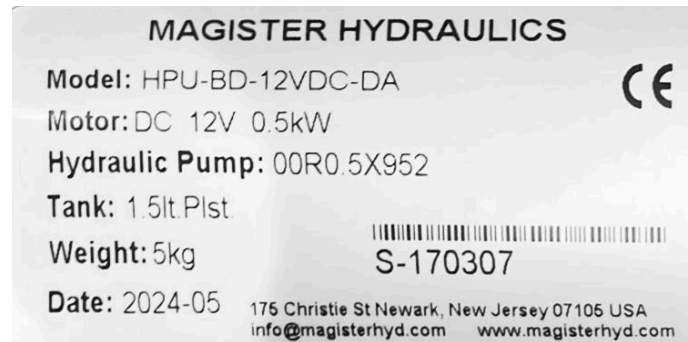


Photo 1. Power Unit Label

## A5 APPLICATIONS

The hydraulic power unit is designed for integration into railway maintenance vehicles and door mechanisms.

### Key features include:

- A double-acting cylinder or hydraulic motor that operates without the need for a directional control valve
- A compact design
- A reversible DC motor and gear pump



## 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 and built to provide flow from 0.2 to 1.8 GPM, depending on the selected hydraulic pump (0.01 ci/rev to 0.1 ci/rev). The working pressure ranges from 580 to 3,190 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 must 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 a temperature of 104°F. The hydraulic fluid may vary depending on the working environment.

Do not use motor oil, diesel oil, or water as fluid in the system. The required filtration class is NAS 1638 - 9.

Hydraulic fluid should be changed every 6 months to 1 year, depending on application 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. If the fluid level decreases, 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

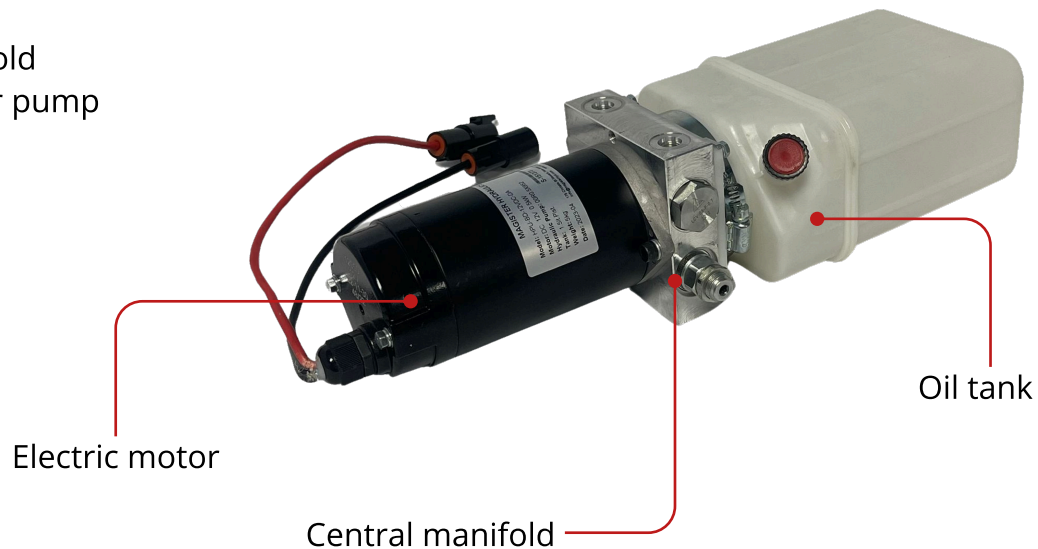


Photo 2. Main components of the bi-directional power unit

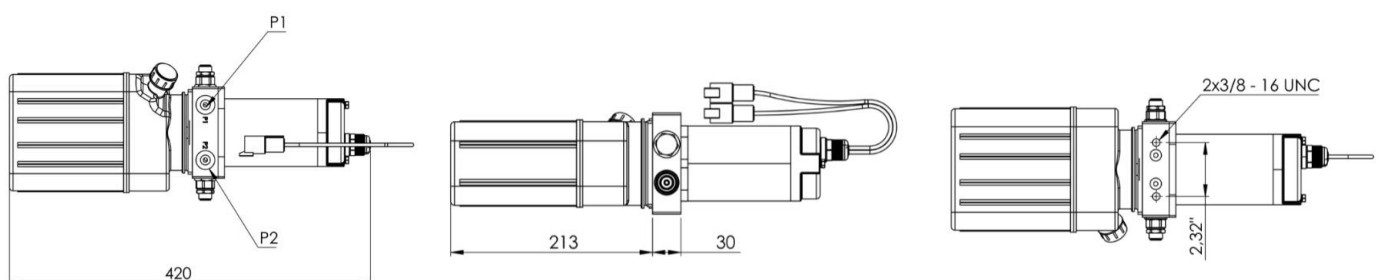
When the electric motor is powered on, it drives the gear pump. The pump draws the working fluid from the tank and directs it to the central manifold, which then sends it to the system's actuators. Two outlet ports are connected to the hydraulic actuator ports.

## C2 ELECTRICAL PARTS

The hydraulic power unit is equipped with:

- Electric motor
- 10 AWG cables with DTHD04-1-8P connectors

The electric motor can be selected as either 500 W or 800 W – 12 / 24 V DC.



The operation of the power unit is determined by the machine it is integrated into. During the power unit's operation, leakage of working fluid on the external surfaces is not allowed.

The power unit is activated when the motor is supplied with the necessary 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 two 3/8-16 UNC holes beneath the central manifold. The area around the power unit must remain clear, and access to the oil filler, valves, and unloading throttle must be maintained. The power units should not be placed in enclosed spaces that could hinder cooling. The power unit should not come into contact with any parts that may vibrate and 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 central manifold has two outlet ports on top. The port threads are 7/16-20 UNF.

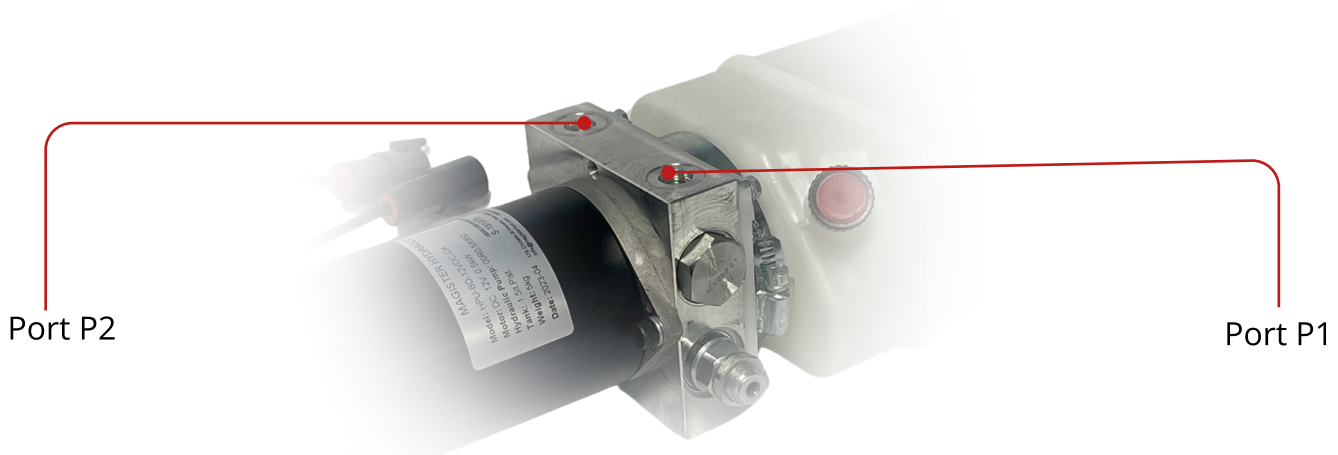


Photo 3. Connection ports P1 & P2



E5 HYDRAULIC SYSTEM CONNECTION

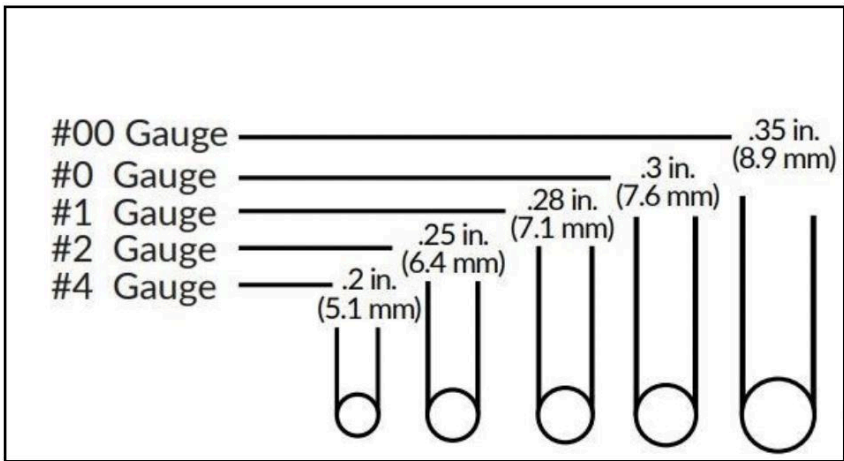
The pipelines from the power unit are connected to actuators in the system. Hydraulic circuit and technical information can be found in the technical drawing. After the power unit is fully installed, pour clean working fluid into the tank to the specified level. Be sure to clean all hydraulic components before installation. After initial operation, check the oil level in the tank.

E6 HYDRAULIC SYSTEM CONNECTION

The power unit should be connected to the electrical system by a certified electrician to ensure that safety protocols for working with electrical equipment are followed. Please consult the manufacturer for the electrical diagram.

It is important to select the correct cable size when connecting the battery to the hydraulic power unit. An incorrect selection may lead to issues in the electrical circuits. The table below can be used to choose the appropriate cable.

#1	#00			
#2	#0	#0		
#2	#1	#0	#00	
#4	#1	#0	#00	#00
#4	#2	#1	#0	#00
#4	#2	#1	#0	#00
#4	#2	#1	#0	#00
0-100 amp	100-150 amp	150-200 amp	200-250 amp	250-300 amp



Insulation not included.

## F1 POWER UNIT CLEANING

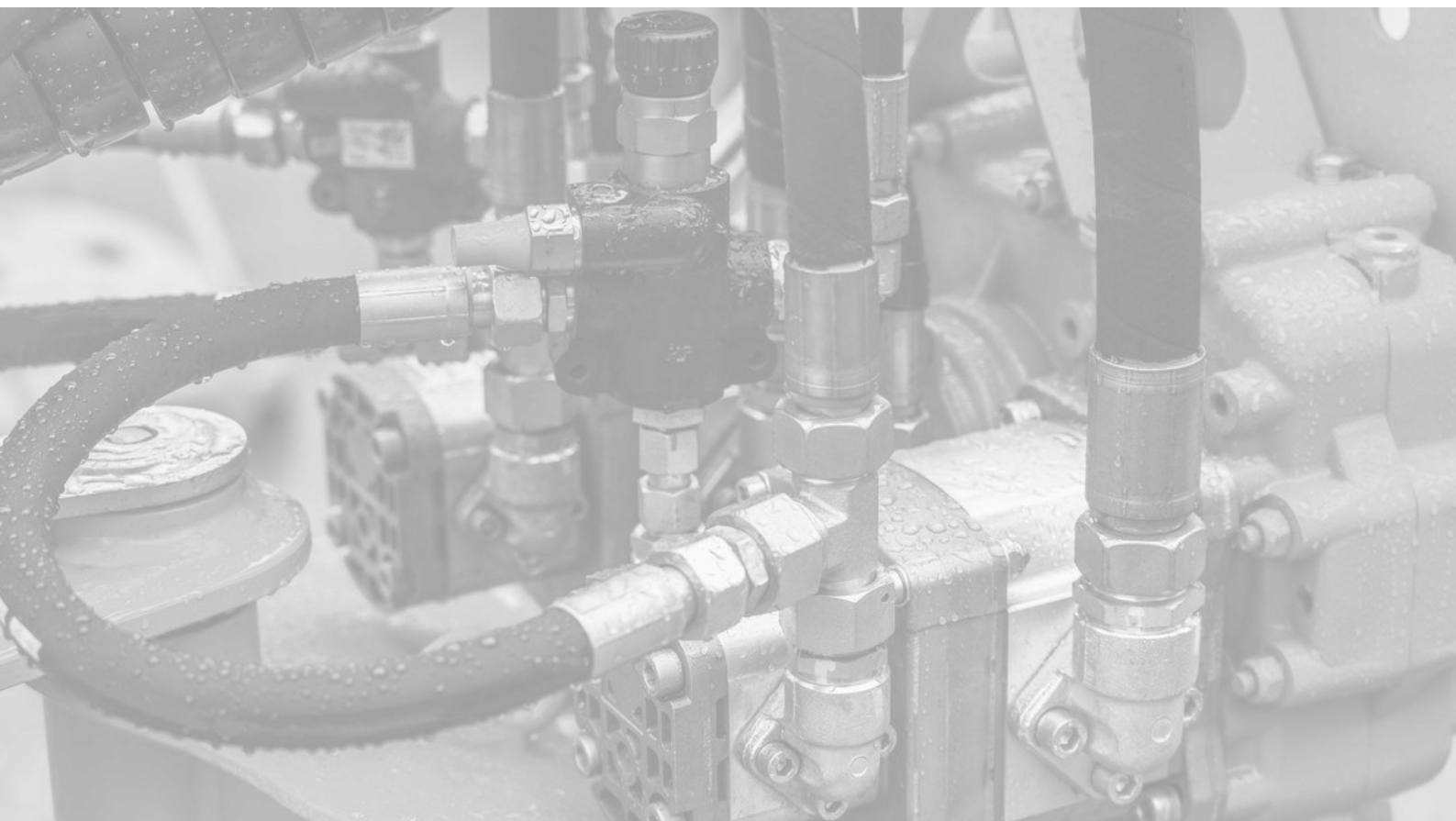
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The power unit is cleaned using a textile cloth without the use of any cleaning agents or solvents. The cloth should not leave any fibers on the treated surfaces. Once a year, it is necessary to change the oil and flush the tank. The oil change procedure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

There are two relief valves on the P1 and P2 lines.

The settings for these relief valves are related to the work performed during the cylinder extension and retraction movements.

Pressure adjustment in the hydraulic power unit is made using a pressure relief valve built into the main manifold. The pressure adjustment is carried out in the following sequence: First, the nut on the adjusting screw is loosened. The adjusting screw is then unscrewed until it reaches its limit.

The hydraulic power is turned on, and the adjusting screw is adjusted (clockwise to increase, counterclockwise to decrease) until the desired pressure is reached. Finally, the nut is tightened.

Pilot operated check valve for locking

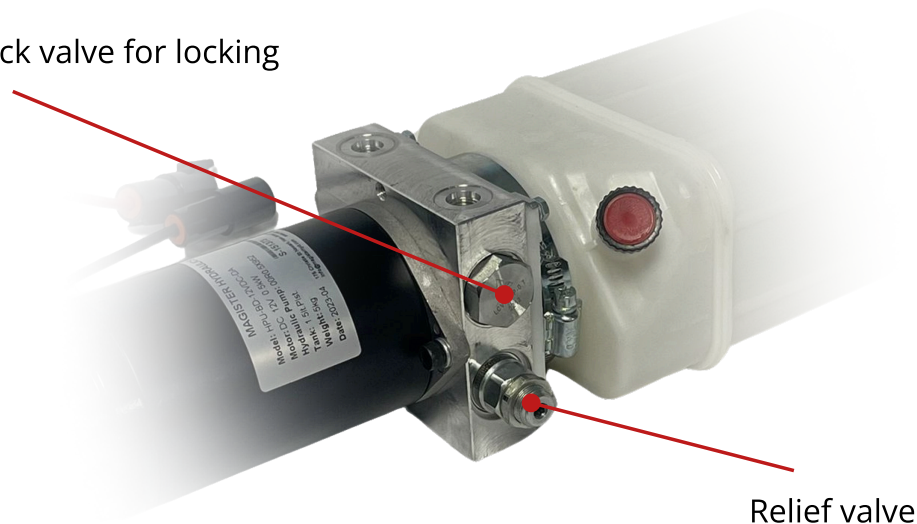
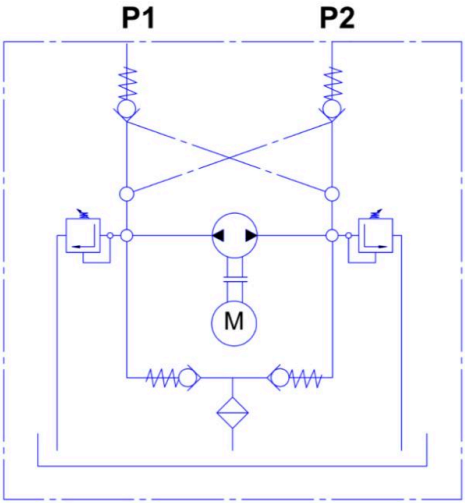


Photo 5. Pressure relief and pilot-operated check valve

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.**

**Hydraulic Circuit**  
**P1 , P2 = 7/16" - 20 UNF**



- Features:**
- Double-acting cylinder or hydraulic motor can operate without the need for a directional control valve
  - Compact design
  - Reversible DC motor and gear pump
  - Locking with pilot-operated check valves

**F3 TROUBLESHOOTING**

PROBLEM	REASONS	METHOD OF ELIMINATION
Not sufficient pressure	<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>
No pressure	<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>
Electric motor runs but no pressure	<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>
Non-performance of the function	<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>
Load doesn't stay in place	<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>

All power units are 100% tested before being delivered to the customer. Please, feel free to contact us with any questions.

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.

### Magister Hydraulics

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