
# Essential Maintenance Guidance
# Pop-Up Scissor Lifts

# 1 Essential Maintenance Guidance

**This Guidance** relates to all **Pop-Up** Push Around Scissor Lifts.

As part of our continual process of development and learning we want to highlight the importance of maintenance and pre-use checks as well as the functionality of key components and systems.

Close attention to this guidance will help ensure your proper and safe use of **Pop-Up** Push Around Scissor Lifts.

The guidance includes a simple table detailing the frequency of machine checks, inspections and maintenance that are required to be undertaken. This information is in addition to previous information contained within the **Pop-Up** Push Around Scissor Lift User Guides.

We are also including important information on motor contactors, the hydraulic system and machine storage all of which are key in the safe operation of our scissor lifts.

## Usage and Operation

Motor Contactors are a type of heavy duty electrical relay, capable of switching relatively high current power circuits, on and off. This type of contactor is used to supply power to the hydraulic pump motor by using the 'Elevate' push buttons on the control panel to energise the solenoid within the motor contactor and bridge the high current contacts.

The type used on **Pop-Up** machines consist of an electromagnetic plunger and contacts on both the supply side and the load side of the high current circuit. The plunger is used to bridge the supply side and load side contacts with a bus bar attached to the end of the plunger. A large solenoid, energised by a relatively low current circuit moves the plunger to bridge the contacts. The plunger is also spring loaded and when the solenoid is not energised the plunger is pushed back into its 'fail-safe' position, creating an open circuit between the contactors.

Motor contactors are specified according to the frequency of use and current load to be applied through the contacts over a specified period of time. This ensures the reliability and suitability of the motor contactor to the task of switching the circuit in and out over many thousands of operations. However all contactor tips are susceptible to arcing, when the gap between the contacts on the plunger and the supply side and load side contact tips becomes small enough for a spark to 'jump' across very much like a spark plug used in an internal combustion engine. Over a period of time arcing can cause pits on one side and build-up of contact material on the other of the contact tips. This in turn reduces the surface area of the contact tips, increasing electrical resistance, which can in some cases lead to the welding of the contactor tips. The risk of welding increases if the battery is constantly kept in a poor state of charge as this can lead to 'contact chattering' once the battery voltage drops below the operational voltage envelope of the motor contactor. It is important to keep the battery in a decent state of charge, not only to increase the life of the battery but also the motor contactor.

It is recommended that testing and inspection of contactors should be carried out after every other LOLER inspection or every 12 months, whichever comes first.

If for any reason the condition or correct operation of the contactor cannot be verified, replacement is recommended. Only manufacturer's original parts should be fitted and these will be supplied with a date label which can be attached to the new contactor once fitted.

A machine which is found to have, or a history of a malfunctioning contactor should immediately be removed from service until the motor contactor has been replaced.

**NEVER PUT A MACHINE WITH A MALFUNCTIONING MOTOR CONTACTOR BACK INTO SERVICE UNTIL THE MOTOR CONTACTOR HAS BEEN REPLACED**

### Fused Contactor Tips

If the motor contactor develops permanently fused contactor tips, the pump motor will run continuously, however the contactor tips can also free themselves due to the pressure of the return spring attached to the plunger within the solenoid body effectively disguising the problem. This intermittent fusing must be dealt with immediately as it will most likely develop into full fusing of the contactor tips. **The machine should be removed from service and the motor contactor replaced.**

The motor contactor has a direct feed from the battery. If the contactor tips do fuse together, disconnect the Negative cable from the battery terminal post. This disconnects the high current circuit from the motor.

### Solenoid Coil - Open Circuit

A burnt out solenoid coil on the motor contactor will prevent the high current circuit from connecting to the motor and will in turn prevent the machine from elevating. It can be detected by checking for a 12v supply at the motor contactor coil terminals.

Examples of contactor tips that have momentarily fused together

**NEVER PUT A MACHINE WITH A MALFUNCTIONING MOTOR CONTACTOR BACK INTO SERVICE UNTIL THE MOTOR CONTACTOR HAS BEEN REPLACED**

## Power Pack

**Pop-Up** machines use an electro hydraulic power pack to elevate the platform. The unit consists of a motor, tank, pump, manifold, hydraulic fluid and various solenoid valves.
All of these components need to be inspected, serviced or tested on a regular basis to ensure the smooth running and longevity of the power pack.

## Hydraulic Oil Viscosity

The hydraulic oil used in **Pop-Up** machines should be suited to the climate the machine is being used in and also the work rate of the machine. The table below shows the various oils available and the oil generally used in **Pop-Up** machines has been highlighted.

**Table 3.** ISO viscosity grades

| Viscosity grade | Average kinematic viscosity mm²/s @ 40°C | Kinematic-viscosity limits mm²/s @ 40°C | |
|---|---|---|---|
| | | min. | max. |
| ISO VG 10 | 10 | 9.00 | 11.0 |
| ISO VG 15 | 15 | 13.5 | 16.5 |
| ISO VG 22 | 22 | 19.8 | 24.2 |
| ISO VG 32 | 32 | 28.8 | 35.2 |
| ISO VG 46 | 46 | 41.4 | 50.6 |
| ISO VG 68 | 68 | 61.2 | 74.8 |
| ISO VG 100 | 100 | 90.0 | 110 |

= Oil used in **Pop-Up** machines

## Contamination

Oil contamination is the main cause of faults and malfunction in hydraulic systems.
Abrasive particles in the fluid can erode or block moving parts, leading to system malfunction.
It is recommended that hydraulic oil should be replaced after every 2,000 working hours or at least once every year.

## Solenoid Valves

Solenoid valves are actuated by an electromagnetic coil that is energised when a control button has been pressed. Although rare, the mechanical section of the valve can become trapped due to oil contamination or wear. It is essential that a strict regime of replacing hydraulic oil according to the manufacturer's instructions is observed to prevent this possibility. The coil of the solenoid valve can also become faulty and go 'open circuit'. Use the troubleshooter overleaf to diagnose these possible faults.

fig.1 - Typical Hydraulic Power Pack

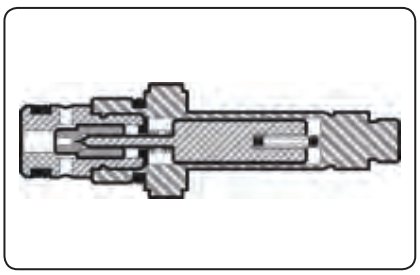


fig.2 - Typical Solenoid Valve

## PUSH Pro 6, 8 & 10

### No lifting - pump operating normally

Pump solenoid coil burnt out
Pump solenoid connector plug loose or disconnected
No power supply to pump solenoid
Pump solenoid valve could be stuck in the open position* (see note below)
'O' rings on pump leaking (oil foaming in hydraulic oil tank) relief valve out of adjustment

### No lifting - pump will not operate

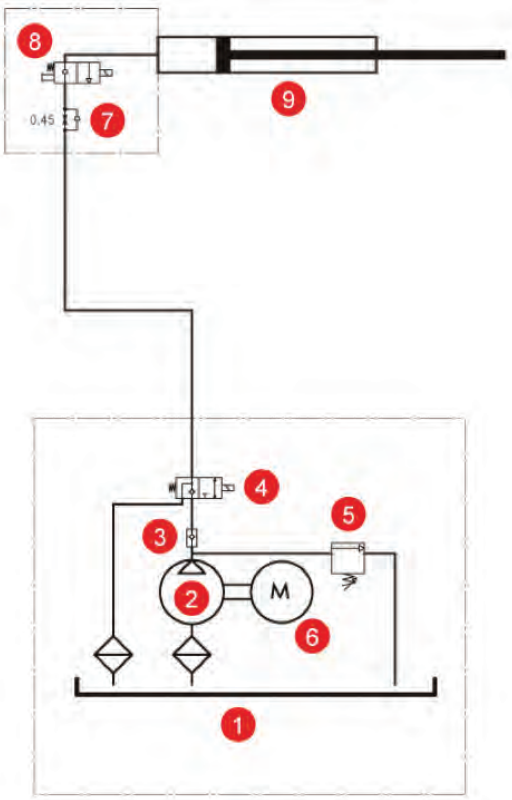
Motor contactor solenoid burnt out
No power supply to motor contactor
High current power supply problem (loose connection, blown fuse)

### Normal lifting but no lowering

Pump solenoid valve stuck in the closed position* (see note below) lift cylinder solenoid valve stuck in the closed position
Lift cylinder solenoid valve coil burnt out
Lift cylinder solenoid valve coil connector plug loose or disconnected
No power supply to main cylinder solenoid
Pump solenoid power supply relay fused

***NEVER PUT A MACHINE WITH A MALFUNCTIONING HYDRAULIC SYSTEM BACK INTO SERVICE UNTIL THE FAULT HAS BEEN RECTIFIED**

### Pop-Up Pro 6, 8 & 10 Hydraulic Schematic Diagram




| Component Identifier | |
|---|---|
| 1 | Hydraulic oil tank |
| 2 | Hydraulic pump |
| 3 | Check valve |
| 4 | Pump solenoid valve |
| 5 | Relief valve |
| 6 | Motor |
| 7 | Flow restrictor / check valve |
| 8 | Lift cylinder solenoid valve (manual override) |
| 9 | Lift cylinder |

## PUSH Eco 6 & 8

### No lifting - pump operating normally

'O' rings on pump leaking (oil foaming in hydraulic oil tank)
Relief valve out of adjustment
HBK solenoid valve defective
No power supply to HBK solenoid valve coil
HBK 30A relay defective
No power supply to HBK 30A relay

### No lifting - pump will not operate

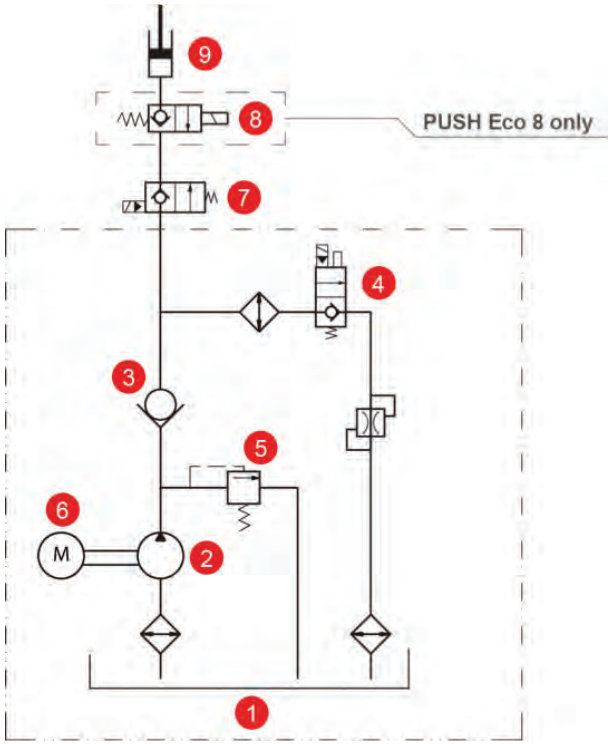
Motor contactor solenoid burnt out
No power supply to motor contactor
High current power supply problem (loose connection, blown fuse)

### Normal lifting but no lowering

Pump solenoid valve stuck in the closed position* (see note below)
Lift cylinder solenoid valve stuck in the closed position (Eco 8 only)
Lift cylinder solenoid valve coil burnt out (Eco 8 only)
Lift cylinder solenoid valve coil connector plug loose or disconnected (Eco 8 only)
Intermittent or no power supply to main cylinder solenoid (Eco 8 only)

***NEVER PUT A MACHINE WITH A MALFUNCTIONING HYDRAULIC SYSTEM BACK INTO SERVICE UNTIL THE FAULT HAS BEEN RECTIFIED**

### Pop-Up Pro 6, 8 & 10 Hydraulic Schematic Diagram




| Component Identifier | |
|---|---|
| 1 | Hydraulic oil tank |
| 2 | Hydraulic pump |
| 3 | Check valve |
| 4 | Pump solenoid valve (manual override) |
| 5 | Relief valve |
| 6 | Motor |
| 7 | HBK solenoid valve |
| 8 | Lift cylinder solenoid valve (manual override) |
| 9 | Lift cylinder |

**Maintenance Plan**

It is essential that the **Pop-Up** machines are regularly maintained to ensure the safety of the users. The users are also duty bound to inspect the machine prior to use with visual and operational checks as listed in the table overleaf. This table also outlines the schedule of maintenance required at set intervals and should be used as a guide for service engineers to follow.

If the machine has been in storage for a long period of time, it may be necessary to undertake all the checks as per the table above. The Lifting Operations and Lifting Regulations 1998 (**LOLER**) require that lifting equipment for lifting persons must be **THOROUGHLY EXAMINED** every six months. Following any maintenance on the machines, a full function test should be undertaken to ensure correct operation of the machine. It is essential that only manufacturer's approved replacement parts are used when maintaining and servicing the **Pop-Up** machines. Failure to do so may result in an unsafe or unstable machine.

If any defects are identified, these should be reported to the relevant supervisor. Defects should only be rectified by those competent to do so. The machine should not be put back into service unless each of the listed items is checked and ascertained to be 'OK'.

**Date:** .....
**Owner:** .....

**Model No:** .....
**Serial No:** .....
**Serviced By:** .....

| | | **Type of Inspection** (tick applicable) | | | | | |
|---|---|---|---|---|---|---|---|
| | | **Operator** | **Service Engineer** | | | | |
| **Item** | **Inspect for** | **Pre-use** | **6 Monthly** | **12 Monthly** | **Y** | **N** | **R** |
| **Operator's Manual** | In manual holder, all pages readable and intact | • | • | • | | | |
| **Electrical System** | | | | | | | |
| Battery terminals | Clean, connectors tight | • | • | • | | | |
| Battery charge indicator | Proper operation | • | • | • | | | |
| Battery charger | Proper operation | • | • | • | | | |
| Cables and wiring harness | No wear or physical damage | • | • | • | | | |
| **Hydraulic System** | | | | | | | |
| Battery terminals | Between full and add marks with platform stowed | • | • | | | | |
| Battery charge indicator | Complete fluid change every other LOLER examination | | | • | | | |
| Battery charger | Test and inspect every other LOLER examination | | | • | | | |
| Cables and wiring harness | No leaks, all fittings tight | • | • | • | | | |
| **Castors** | Good condition, no damage / smooth movement | | | | | | |
| **Manual Brakes** | Proper operation, no damage or deformation | • | • | • | | | |
| **Auto Brakes** | Proper operation, no damage or deformation | • | • | • | | | |
| **Lower Control Station** | | | | | | | |
| Operating controls | Proper operation | • | • | • | | | |
| Emergency stop | Shuts off lower controls / proper operation | • | • | • | | | |
| Lowering alarm and interrupt | Sounds when platform lowers / proper operation | • | • | • | | | |
| **Emergency Lowering** | Proper operation | • | • | • | | | |
| **Safety Prop** | No damage or deformation | | | | | | |
| **Structures** | | | | | | | |
| Weldments - scissors, chassis, steps and platform etc. | Welds intact, no damage or deformation | • | • | • | | | |
| Platform side slide blocks / rollers | In place, no damage or deformation | • | • | • | | | |
| Fasteners | In place, tight and no damage | • | • | • | | | |
| Scissor and cylinder pins | Securely in place, no damage or corrosion | • | • | • | | | |
| **Upper Control Station** | | | | | | | |
| Guardrail system | Welds intact, no damage or deformation | • | • | • | | | |
| | All fasteners in place, no loose or missing parts | • | • | • | | | |
| Platform floor | No damage or deformation | • | • | • | | | |
| | Clean to prevent slip and fall hazards | • | • | • | | | |
| Entry gate | Proper operation, no damage or deformation | • | • | • | | | |
| Operating controls | Proper operation / raise, lower and enable | • | • | • | | | |
| Lowering delay | Proper operation, limit switch delays lowering | • | • | • | | | |
| Emergency stop | Shuts off upper controls / proper operation | • | • | • | | | |
| **Operation And Safety Decals** | In place and legible | • | • | • | | | |
| **Lubrication** | | | | | | | |
| Slider blocks / roller guides | Free of damage, and debris, lubricate with teflon spray | | • | • | | | |
| Pivot pins | Ensure sufficient lubrication is present, add if required | | • | • | | | |
| Castor swivel mounts | Ensure sufficient lubrication is present, add if required | | • | • | | | |

*Maintenance Table Key: Y = Yes / Acceptable, N = No / Not Acceptable, R = Repaired / Acceptable*

# 9 Storage

## Short-Term Storage

Machines should be stored in a clean, dry indoor environment. They should not be stored outside without a cover, since the electrical components are not protected from external weather conditions.

When the machine is stored, both manual rear brakes should be applied, and the Emergency Stop button should be depressed to allow for removal of the key to prevent unauthorised use. Frequent checks on the condition of the machine should be made to ensure that no excessive deterioration occurs due to the environment in which the machine is housed.

## Long-Term Storage

If the machine is to be taken out of operation for a period longer than one month, the following precautions should be taken.

Ideally, the battery charger should be switched on. The charger has an in-built maintenance mode, and will maintain the battery in good condition indefinitely, although obviously the electrolyte level must still be checked periodically. If this is not practical, then the charger should be switched on once a week for half an hour. This is especially important in cold conditions.

The hydraulic oil must be replaced (recommended after 3 months of non-use)

If the storage period is for an undetermined period, it is advisable that the battery be removed and stored in a secure battery storage container. It is also recommended that all external electrical and hydraulic connections be wax coated to prevent corrosion.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