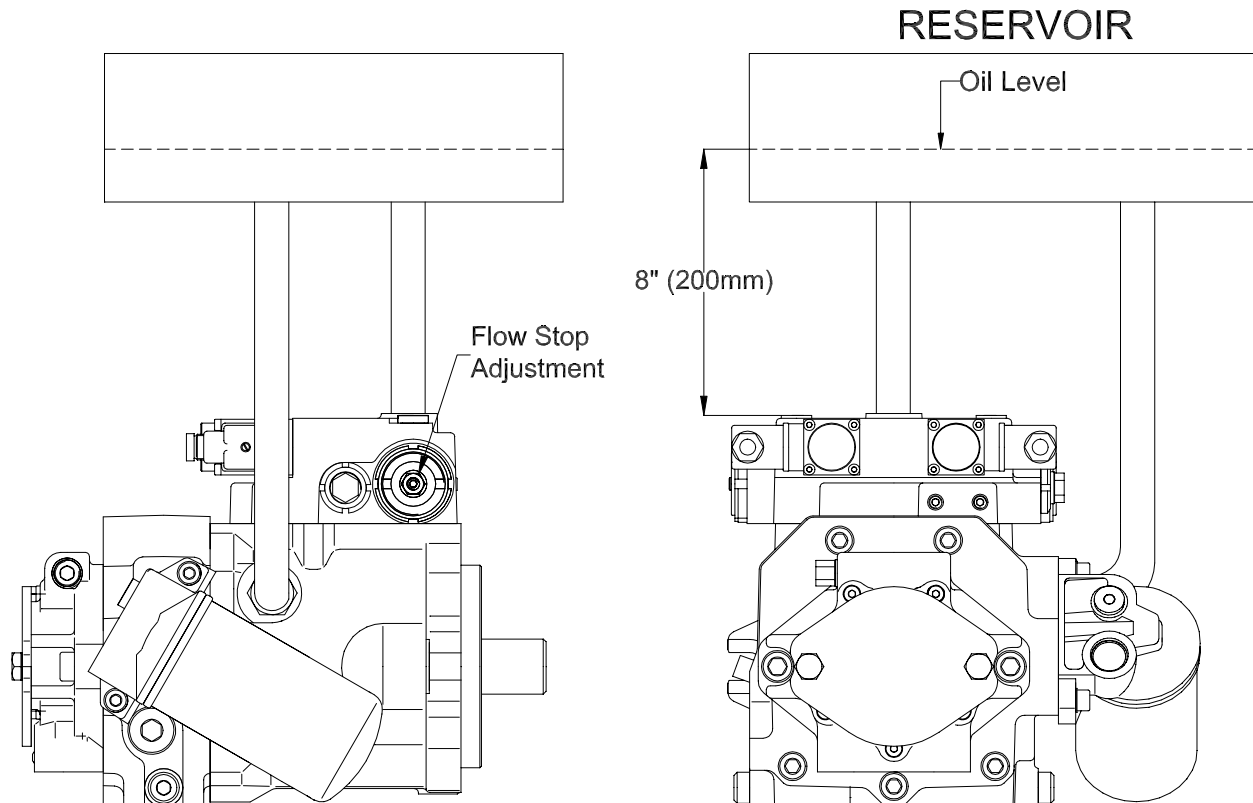


Note: The oil level in the reservoir should always be at least 8 inches (~200mm) above the highest point of the pump as illustrated below:



**Installation:**

- Always cover or cap all HPV-02 case drain, control, and high pressure hydraulic lines during the installation of a new or replacement HPV-02 pump.
- Always ensure all connections to the HPV-02 replacement pump are capped or covered during initial installation.
- Connect and tighten each hydraulic line one at a time removing caps or covers just before each connection is made.
- Installation must be carried out in accordance with the circuit or piping diagram.
- It is recommended that the HPV-02 pumps be mounted with the pump control facing upward (as illustrated above).

- The pump can optionally be mounted with the pump control facing to either side. During start-up, additional care must be taken to vent entrapped air from the pump control via the highest flow stop adjustment (see the sketch above).
- Avoid mounting the pump with the pump control facing down. Entrapped air is difficult to remove and any contaminants in the hydraulic oil will eventually settle into the control.

### **Venting:**

- Positive venting is vital for the proper operation of the hydraulic system.
- The highest case drain port on the pump housing must be connected to the reservoir. If the pump control is mounted on top (as illustrated above), then the vent port in the pump control should be connected to the reservoir as well.
- All vent lines must be mounted continuously rising toward the reservoir. This allows any entrapped air to escape freely from the pump case.

### **Piping:**

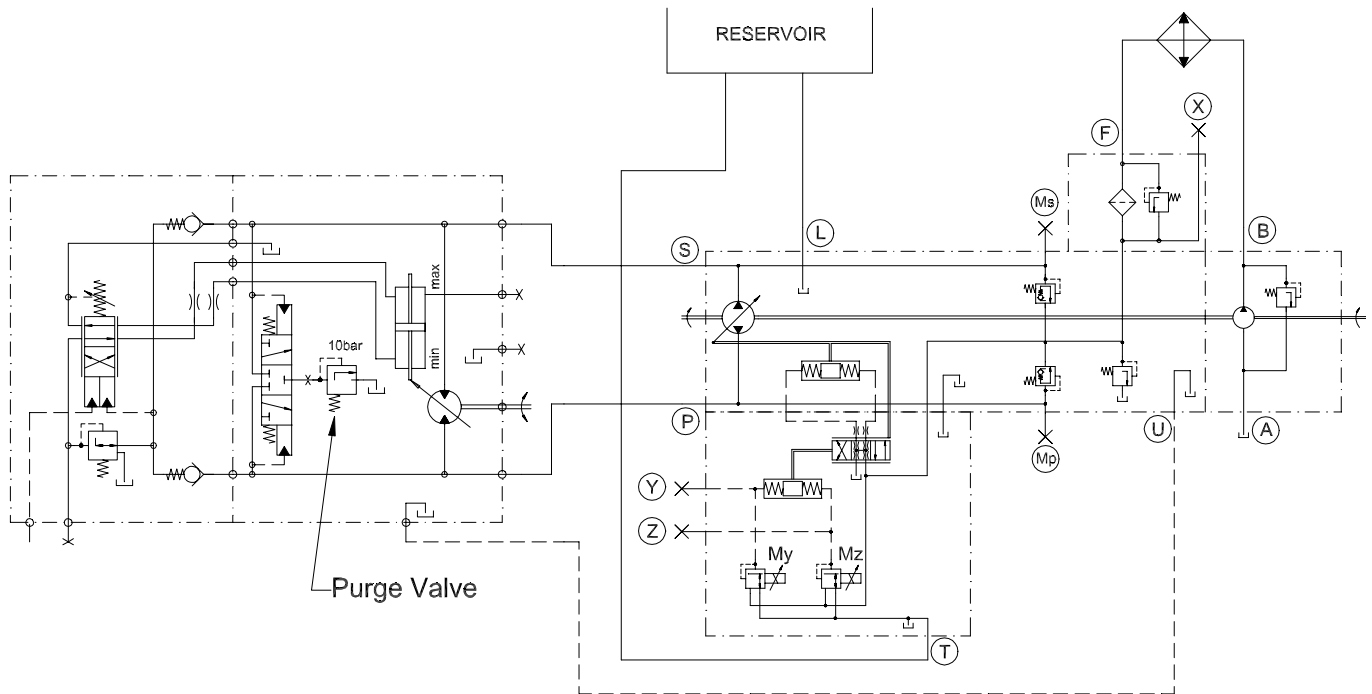
- Pipe work should be seamless drawn precision steel tube or hoses of suitable pressure rating.
- During installation, attention should be paid to cleanliness. The pipes must be deburred, washed and blown through.
- Scaled or rusted pipes must be scoured and then neutralized - Hoses must be brushed and flushed through when contaminated.

**IMPORTANT:** The cleanliness of the circuit **before** commissioning has a crucial influence on the operation and life expectancy of the hydraulic components.

### **Filling the Hydrostatic Transmission:**

- The initial filling of the system must be carried out in such a way that all of the air can escape from the high pressure circuit and from the pump/motor cases before the hydraulic units are operated.

- The integral purge valve, which may be fitted as an option on the Linde hydraulic motors, assists in the venting of air from the high pressure circuit. This optional purge valve is illustrated in the schematic below.
  - With a pressure differential of about 350 psi (25 bar) across the hydraulic motor, the purge valve discharges a controlled amount of oil flow out of the high pressure circuit into the motor case. Therefore, any entrained air may escape freely to the reservoir. Again, refer to the schematic below.

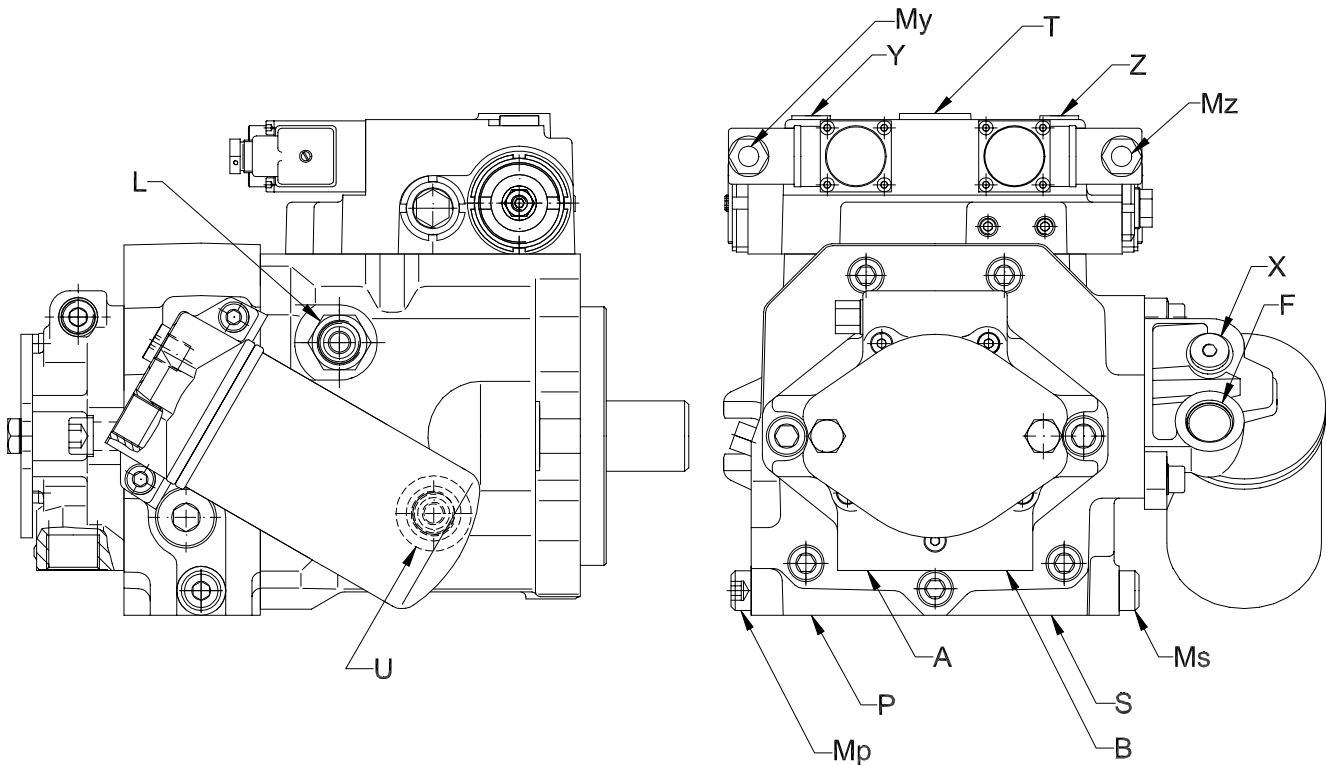


- The hydraulic motor(s) must be free to rotate under no load. For example, when a vehicle is chocked up with the wheels/tracks clear of the ground and free to rotate.
- If already fitted, loosen the vent plugs on the cooler.
- Manually fill the HPV-02 pump case at the most accessible case drain port with filtered oil. Manually fill the high-pressure (closed loop) lines with filtered oil if the lines are extremely long. Fill the oil reservoir to the maximum level with filtered oil, and fill the motor case(s) to the maximum level via the most accessible case drain port with filtered oil.
- Connect bleed lines or hoses to high pressure gauge ports "Mp" and "Ms". Connect a 1000 psi (70 bar) pressure gauge or transducer to gauge port "X".

- Disconnect the prime mover's starting mechanism to insure that the prime mover will NOT start.
- "Crank" the prime mover for at least ten seconds and stop while simultaneously monitoring the charge pressure at port "X". Continue this procedure at least 5 times or until the charge pressure at port "X" increases to the integrated boost relief valve setting in the pump (Consult Linde if unsure what boost relief valve setting is in the pump - The pump serial number is mandatory for this request). During this step, air in the closed loop should be discharged from the bleed lines. All air must be removed from the closed loop lines.
- Check the hydraulic oil level in the reservoir and HPV-02 case. Add filtered oil to each as required.
- Reconnect the prime mover's starting mechanism.
- Start the prime mover and leave at low idle. Operate the prime mover at low idle for about 10 minutes while monitoring the charge pressure at port "X". The charge pressure at port "X" should remain at the boost relief valve setting.
- Turn the prime mover OFF. Disconnect the bleed lines from gauge ports "Mp" and "Ms" and securely recap the ports.

**WARNING: The wheels/tracks will turn during this next step.**

- Start the prime mover and set it at low idle, slowly stroke the pump 3 times to maximum displacement in both directions for about 30 seconds each time.
- Warm the hydraulic oil by steadily increasing the prime mover speed and by increasing the load to the hydraulic motor(s). This will allow any air in the fluid to be released more easily.
- Check the HPV-02 hydraulic neutral setting, regulation begin setting, and the maximum flow setting when the hydraulic oil reaches its normal operating temperature.
- Check the oil level in the reservoir and fill with filtered oil if necessary before delivery of the machine.



**Routine Maintenance:**

- Maintenance of the hydraulic system is limited to changing the filter element of the HPV-02 pump and changing the hydraulic fluid.
- In order to guarantee proper functions and efficiency of the hydraulic pumps, the purity of the hydraulic oil over the entire operating period must comply to at least class 18/13 according to ISO 4406.
- With modern filtration technology, however, much better values can be achieved which contributes significantly to extending the life and durability of the hydraulic pumps and complete system.

**Changing the Filter:**

- The filter cartridge fitted to the HPV-02 pump must be replaced for the first time after the initial start-up, but at least after 100 hours of operation.
- Further filter changes should be made after every 500 hours of operation. If possible, these changes should be arranged to coincide with other routine maintenance work on the equipment, e.g., those on the prime mover.

### Changing the Hydraulic Fluid:

- Oil changes are carried out by first draining the tank, cooler, pump, and motor housings. The high-pressure fluid must be changed after 1000-2000 hours of operation, according to the application.
- High working temperatures and frequent cooling-down phases with low temperatures condense water and will shorten the life of the hydraulic fluid.
- The oil remaining in the high-pressure circuit itself need not be changed. **Do not open up the high pressure lines if possible.** The instructions regarding initial filling must also be adhered to when changing the hydraulic fluid. In some applications, a complete oil change may not be necessary. The oil lost during each filter change must be replaced by fresh filtered oil.

### Cleaning:

- Cleaning of the hydraulic system when changing oil is normally not necessary. If the system becomes contaminated due to unusual circumstances (defect, etc.), then it must be thoroughly cleaned before recommissioning. Housings and pipelines must be flushed. If necessary, the pipelines and hydraulic units must be disassembled.

### Service:

- Maintenance and repairs should be undertaken only by skilled personnel who are familiar and trained with the equipment. Linde offers an excellent after-sales service capable of carrying out the work of repair and overhaul if required.
- Only spare parts specified in the Linde spare parts catalogs should be used. The serial number stamped on the unit name tag is relevant to the configuration of the unit. Therefore, the serial number should be quoted when ordering spare parts.

### Oil Selection and Viscosity Recommendations:

Suitable hydraulic oils are:

- Mineral oil HLP to DIN 51524
- Biodegradable fluids upon request
- Other pressure fluids upon request

Linde recommends only using hydraulic oils which are confirmed by the producer as suitable for use in high pressure hydraulic installations. For the correct choice of suitable hydraulic oils, it is necessary to know the working temperature in the hydraulic circuit (closed loop). The hydraulic oil chosen must allow the working viscosity to be within the optimum viscosity range (as shown below).

Attention: Due to pressure and speed influences, the temperature of the leakage fluid is always higher than the circuit temperature. The temperature must not exceed 194°F (90°C) in any part of the system. Under special circumstances, if the stated conditions cannot be observed then please consult Linde.

- Recommended viscosity range for optimum performance: 15 cSt to 30 cSt
- Maximum allowable working viscosity range: 10 cSt to 80 cSt
- Viscosity limitations: 6 cSt minimum viscosity  
1000 cSt maximum viscosity (**Intermittent** for cold starts)
- Oil temperature limitations: (-68)°F to 194°F  
(-20) °C to 90°C