Operating Instructions
Hydro-Pneumatic Pump Unit

Target group of this document
Experts for installation and maintenance of hydraulic systems. All electrical works must only be realized by electricians.

Provided use
Generation of hydraulic pressure especially for small and mid-sized clamping and assembly fixtures with single-acting cylinders, which are working intermittently (build up and maintain pressure). As the power supplied is compressed air, it can be used without restriction in hazardous surroundings. Other applications are possible after agreement.

Safety

Material damage
With hydraulic pressure very high forces are generated. All lines and connections have to be designed according to the operating pressure.

Instructions for safe operation
• Swarf or contamination in the hydraulic oil lead to increased wear or damage at the valves and the pump, respectively.
• Emerging hydraulic oil has to be absorbed by oil fixing agent and disposed environmentally.
• Use only with indicated hydraulic oil as per DIN 51524 (ISO viscosity classification as per DIN 51519):

<table>
<thead>
<tr>
<th>Type</th>
<th>Hydraulic oil</th>
<th>Viscosity</th>
</tr>
</thead>
<tbody>
<tr>
<td>86xx</td>
<td>HLP 22</td>
<td>ISO VG 22</td>
</tr>
<tr>
<td>68xx</td>
<td>as per delivered hydraulic circuit diagram</td>
<td></td>
</tr>
</tbody>
</table>

Function
The hydro-pneumatic pump unit generates an pulsating hydraulic flow rate of up to 500 bar from a pneumatic pressure of up to 4.8 bar. Pressure adjustment is made at the pneumatic side.

The pump works with an automatic stroke reversing control by a pilot-operated 4/2 directional control valve. Stroke frequency and thereby the flow rate, depend on air pressure and hydraulic counter pressure.

The hydro-pneumatic pump unit can be operated intermittently.

Material damage
The pump or other components can be damaged by overheated oil.

• Check the oil temperature at regular time intervals (max. 70 °C), install electrical oil level and oil temperature control, if necessary.
• The hydro-pneumatic pump unit is equipped with an oscillating pump unit. Therefore safe fixing is required.
**Installation**

The hydro-pneumatic pump unit has to be mounted in upright position, if possible above the installation or fixture. If the hydro-pneumatic pump unit will be installed below the fixture, an air bleeding possibility has to be provided at the highest point of the installation.

**Troubles of functioning**

Protect the device against penetration of swarf as well as cutting lubricants and coolants!

- Install the pump unit vertically at an appropriate place so that vibrations cannot be transmitted to other components.
- Fix the pump unit with 3 screws M8 at the bottom of the reservoir.

**Pneumatic connection**

- Screw in air supply tube (tube Ø8 mm) in the screw-in thread (1b) or fix with screw-in hose nipple and hose clamp.

**Air pressure**

<table>
<thead>
<tr>
<th>min.</th>
<th>1.0 bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>max.</td>
<td>16.0 bar Compressed air of more than 4.8 bar will be blown off at the safety valve (not dangerous).</td>
</tr>
</tbody>
</table>

**Hydraulic connection**

- Design hydraulic lines as per operating pressure! See also Roemheld data sheets F 9.300 (tubes) and F 9.360 (hoses).
- Connect hydraulic lines to qualifying standards, pay attention to scrupulous cleanliness!
- Do not use sealing tape, copper rings or coned fittings.
- Clean tubes and hoses, e.g. with cleaning agents.
- Check sealing of the lines!

<table>
<thead>
<tr>
<th>Port</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Clamping line</td>
</tr>
<tr>
<td>T</td>
<td>Return line</td>
</tr>
</tbody>
</table>

**Charging with hydraulic oil**

Hydro-pneumatic pump units are delivered without oil charge. Oil will be filled in through the oil filler neck (1g).

**Troubles of functioning**

- Use only the indicated hydraulic oil!
- Pay attention to scrupulous cleanliness when filling the oil!

**Emerging hydraulic oil**

Refill oil only when cylinders are in retracted position, otherwise the maximum oil volume of the reservoir can be exceeded!

- Make sure that all cylinders are in retracted position!
- Remove oil filler neck (1g) (remove cover, if required).
- Insert clean funnel with filter (mesh aperture max. 0.4 mm) in oil filler neck (1g).
- Fill with oil.
- Check oil level at the upper oil level gauge (1f).
- Screw on oil filler neck.
- Operate the cylinders or fixture several times. For this purpose compressed air has to be connected.
- Check oil level and refill, if necessary.

All figures are schematic figures.
Bleeding

Bleed the hydraulic lines during start-up of the system, otherwise clamping times can be considerably prolonged and function problems as well as increased wear can be caused.

For bleeding the operating pressure has to be reduced to a very low value!

- Reduce the air pressure at the pressure reducing valve (1a) to 0.5 bar.
- Pressurise clamping line.
- Loosen carefully a bleeding screw or a fitting at the highest or remotest point of the fixture.
- Open for a short time 3/2 directional control valve (1h) and pump until bubble free oil comes out.
- Tighten air-bleed screws or fitting nuts.
- Refill lost oil (see section "Charging with hydraulic oil", page 2).

Adjust operating pressure

Adjust the operating pressure to the clamping element or cylinder with the lowest admissible operating pressure.

- Adjust the air pressure at the pressure reducing valve (1a) to the desired value as per the diagram (2).
- Check the hydraulic pressure at the pressure gauge (1i).

Control variants

- Operate the cylinders or fixture several times and check the tightness of the fittings, and retighten, if necessary.
- If the pressure drops in the hydraulic line, the pump unit re-delivers automatically until the equilibrium of adjusted pneumatic pressure and hydraulic operating pressure will be obtained.
- In case of a failure of the air pressure the hydraulic pressure will not drop immediately.

Instructions for operation

Clamping
- Turn manual valve by 90° to clamping position (1h).
- The pump delivers as long as the clamping pressure is obtained and re-delivers automatically in case of pressure loss.

Unclamping
- Turn manual valve by 90° to unclamping position (1h).

Pneumatic pilot-operated valves

Danger of injury
Make sure that only the operator can change the switching position.

Danger of injury
In case of failure of the control pressure, the cylinders can extend or retract.
Protect the working area by corresponding safety precautions.

In case of remote-controlled pump units it is recommended to use key switches and pressure switches for machine tool interlock.

Under no circumstances a valve for unpressurised cycles must be used, since the pump is only suited for intermittent cycles.
**Inspection**

Check every day:
- Check for external leakage, retighten fittings, if necessary (max. seating torque 60 Nm for G¼).
- Check oil level and refill, if necessary (see section "Charging with hydraulic oil", page 2).
- Check oil temperature during functioning (max. 70 °C).
- Check perfect functioning of the intermittent cycling.
- Remove water level in water separator (3a) of the service unit by opening the drain plug.

**Maintenance**

⚠️ **Emerging hydraulic oil**

Maintenance works must only be made in depressurised mode!

**Maintenance intervals**
- First oil change after 250 operating hours or 3 months.
- Further oil changes after 2,500 operating hours or once a year.

**Effect oil change**

Oil change should be made always at system operational temperature.
- Disconnect air supply.
- Remove oil filler neck (3c).
- Remove oil drain plug (3b).
- Drain and dispose oil.
- Apply oil drain plug, if required, exchange copper sealing washer.
- Charge with hydraulic oil (see section "Charging with hydraulic oil", page 2).

**Clean oil screens (if available)**

Screen disks are in the hydraulic ports. They are to be cleaned when contaminated.
- Remove fittings at the hydraulic ports.
- Unscrew the screen disk with a pointed tool (scriber).
- Clean the disk and refit.
- Screw in fitting.

**General characteristics**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Hydro-pneumatic pump unit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hydraulic characteristics</strong></td>
<td></td>
</tr>
<tr>
<td>Max. oil charge</td>
<td>4.0 l (upper marking)</td>
</tr>
<tr>
<td>Max. oil temperature</td>
<td>70 °C</td>
</tr>
<tr>
<td>Operating pressure</td>
<td>adjustable, 100 – 500 bar (see diagram)</td>
</tr>
<tr>
<td>Max. flow rate</td>
<td>25 cm³/s or 1.5 l/min</td>
</tr>
<tr>
<td>Transmission ratio</td>
<td>1:108</td>
</tr>
<tr>
<td><strong>Pneumatic characteristics</strong></td>
<td></td>
</tr>
<tr>
<td>Air pressure</td>
<td>1.0 – 4.7 bar</td>
</tr>
<tr>
<td>Max. air consumption</td>
<td>1,200 l/min</td>
</tr>
<tr>
<td>Min. control pressure for pneumatic valve</td>
<td>3 bar</td>
</tr>
<tr>
<td><strong>Environment</strong></td>
<td></td>
</tr>
<tr>
<td>Environmental temperature</td>
<td>+5 °C up to +40 °C</td>
</tr>
<tr>
<td>Noise level</td>
<td>max. 78 dB (A) (in 1 m distance and height above the floor)</td>
</tr>
</tbody>
</table>

*Further characteristics see name plate at the hydro-pneumatic pump unit.*
## Trouble shooting

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause / Remedy</th>
</tr>
</thead>
</table>
| Pump unit does not start | No sufficient air pressure adjusted at the service unit  
- Adjust air pressure between 1.0 and 4.8 bar (see diagram 2) |
| Operating pressure will not be obtained | External leakage  
- Eliminate leak, e.g., by tightening fittings or replacing tubes or hoses  
- Directional control valve is leaky  
- Replace directional control valve  
- Pump defect  
- Exchange pump or return pump unit for repair  
- Leakage of a clamping element  
- Check which clamping element is leaky. For this purpose disconnect all clamping elements from the power unit and connect them again individually. |
| Pump motor will be switched on and off in short intervals in position “Clamping” and “Unclamping” | External leakage  
- Eliminate leak, e.g., by tightening fittings or replacing tubes or hoses  
- Fittings are leaky  
- Retighten fittings  
- Directional control valve is leaky  
- Replace directional control valve  
- Pump defect  
- Exchange pump or return pump unit for repair  
- Connected clamping elements are leaky  
- For testing purposes disconnect the clamping fixture from the pump unit.  
- If the pump unit works now properly, leakage is due to the clamping device.  
- Squeeze systematically the clamping elements to locate the leakage.  
- Check valve in mounting plate is leaky  
- Remove directional control valve, then remove and replace check valve  
- Leakage at the lip seal or Glydring of a clamping element  
- Squeeze pressure line to locate the leakage. Replace sealing or element, respectively  
- Pump not bleedled  
- Drain off completely the oil and refill (see section “Charging with hydraulic oil”, page 2) |
| Pump does not deliver | Oil level is too low  
- refill oil  
- Reverse valve is defect  
- Return for repair  
- Sound absorber contaminated  
- Clean sound absorber, and replace, if required |

## Data sheets

<table>
<thead>
<tr>
<th>Types</th>
<th>Corresponding data sheets</th>
</tr>
</thead>
<tbody>
<tr>
<td>86xx</td>
<td>D8.600</td>
</tr>
<tr>
<td>68xx</td>
<td>Special types</td>
</tr>
</tbody>
</table>

Subject to changes without notice.