Hydro-pneumatic pump unit
for single and double acting cylinders, max. operating pressure 500 bar

Table of contents

1 Validity of the documentation

Hydro-pneumatic pump units of data sheet D 8.602.
The following types or part numbers are concerned:

- 8601 211 - For single-acting cylinders
- 8601 221 - For double-acting cylinders

2 Target group of this document

2.1 Operator

Tasks:

Operation in setting or automatic mode.

Qualification

No special requests, introduction on the basis of the operating instructions, danger instruction, minimum age 18 years.

2.2 Qualified personnel

Tasks:

Transport, installation, start up, setting mode, trouble shooting, putting out of service, checks, maintenance works.

- Specialists, fitters and set-up men of machines and installations with hydraulic expert knowledge.

Qualification of the personnel

Expert knowledge means that the personnel must

- be in the position to read and completely understand technical specifications such as circuit diagrams and product-specific drawing documents,
- have expert knowledge (electric, hydraulic, pneumatic knowledge, etc.) of function and design of the corresponding components.

An **expert** is somebody who has due to its professional education and experiences sufficient knowledge and is familiar with the relevant regulations so that he

- can judge the entrusted works,
- can recognize the possible dangers,
- can take the required measures to eliminate dangers,
- knows the acknowledged standards, rules and guidelines of the technology.
- has the required knowledge for repair and mounting.

3 Symbols and signal words

⚠ DANGER

Danger of life / heavy health damages

Stands for an imminent danger.

If it is not avoided, death or very severe injuries will result.

⚠ WARNING

Person damage

Stands for a possibly dangerous situation.

If it is not avoided, death or very severe injuries will result.

⚠ CAUTION

Easy injuries / property damage

Stands for a possibly dangerous situation.

If it is not avoided, minor injuries or material damages will result.

Hazardous to the environment

The symbol stands for important information for the proper handling with materials that are hazardous to the environment.
Ignoring these notes can lead to heavy damages to the environment.

Mandatory sign!

The symbol stands for important information, necessary protection equipment, etc.

▶ **Note**

This symbol stands for tips for users or especially useful information. This is no signal word for a dangerous or harmful situation.

4 Safety instructions

4.1 Basic information

The operating instructions serve to information and avoidance of dangers for transport, operation and maintenance.

Only in strict compliance with these operating instructions, accidents and property damages can be avoided as well as trouble-free operation of the product can be guaranteed.

Furthermore, the consideration of the operating instructions will result in:

- reduced down times and repair costs,
- increased service life of the products.

4.2 General safety tips

⚠ WARNUNG

Injuries caused by missing safety devices!

To avoid injuries appropriate safety devices must be provided by the customer.

⚠ WARNING

Injuries due to non-compliance of the operating instructions!

The product may only be operated, if the operating instructions - especially the chapter "Safety instructions" have been read and understood.

⚠ WARNING

Injuries due to misuse, incorrect operation or abuse!

Injuries can occur if the product is not used within the intended use and the technical performance data.

Before start up, read the operating instructions!

⚠ WARNING

Injury due to overturning product!

Overturning product due to inappropriate means of transportation.

Do not stand below the load during lifting and lowering, stay outside the danger zone.

Use suitable means of transportation.

Pay attention to the weight of the equipment.

Pay attention that the product is safely located (centre of gravity see instruction sign).

⚠ WARNING

Poisoning due to contact with hydraulic oil!

For handling with hydraulic oil consider the material safety data sheet.

Wear protection equipment.

⚠ WARNING

Injury by high-pressure injection (squirting out of hydraulic oil under high pressure)!

Improper connection can lead to escapes of oil under high pressure at the connections.

Mounting or dismounting of the element must only be made in depressurised mode of the hydraulic system.

Connection of the hydraulic line as per DIN 3852/ISO 1179.

Unused connections have to be locked professionally.

Use all mounting holes.

⚠ WARNING

Burning due to hot oil!

In operating conditions oil temperatures up to 70 °C can appear due to environment influences.

All works must only be made in cool mode!

⚠ WARNING

Burning due to hot surface!

In operating conditions, surface temperatures of more than 70 °C can appear at the product.

All maintenance and repair works must only be effected in cooled mode or with safety gloves.

⚠ WARNING

Injury / burning due to contact with energized parts!

Before working on electric equipment, the energized parts must be de-energized and secured.

Do not open protection covers at electric parts.

All electrical works must only be realised by electricians.

⚠ CAUTION

Damage of components!

Works only to be effected by authorised personnel.

⚠ CAUTION

Damage of components!

The admissible performance data of the product, see chapter "Technical characteristics", may not be exceeded.

⚠ CAUTION

Hydraulic power unit can be damaged!

Stick absolutely to the indicated direction of the rotary field.

⚠ CAUTION

Damage of components!

The product must not be cleaned with:

- Corrosive or corroding components or
- Organic solvents as halogen or aromatic hydrocarbons and ketones (cellulose thinner, acetone, etc.),

because this can destroy the seals.

▶ **Note - qualification of the user**

All works may only be effected by qualified personnel familiar with the handling of hydraulic components.

4.3 Personal protective equipment

For works at and with the product, wear safety goggles!

For works at and with the product, wear protective gloves!

For works at and with the product, wear safety shoes!

For all works at the product, the operator has to make sure that the necessary protection equipment will be worn.

5 Description

Single-acting version

The hydro-pneumatic pump unit is manually operated. Only by operating the pedal the fixture will be clamped or unclamped. The pump delivers oil as long as the desired operating pressure is obtained. Air pressure is adjusted by a pneumatic service unit.

Oil pressure is maintained by an integrated check valve. The pump does not automatically supply oil in case of leaks!

Double-acting version

By pushing the pedal, the connected double-acting hydraulic cylinders are extended or retracted according to the position of the 4/3 directional manual control valve. The pedal has to be pushed as long as the cylinders are in its final position and the desired oil pressure is obtained. After release of the pedal, the pump does not re-deliver in case of pressure drop on the oil side! The pedal can be locked by the laterally-arranged pin with the description “PUSH INTO LOCK”, thereby the pump is continuously supplied with air. In this case the cylinders are exclusively activated by the 4/3 directional manual control valve.

Small leaks are compensated by the pump and the oil pressure is maintained constantly.

6 Application

6.1 Intended use

Application

The hydro-pneumatic pump unit is particularly suitable for smaller hydraulic clamping and assembly fixtures with single or double-acting hydraulic elements.

Single-acting version

The hydro-pneumatic pump unit is manually operated. Only by operating the pedal the fixture will be clamped or unclamped. The pump delivers oil as long as the desired operating pressure is obtained. Air pressure is adjusted by a pneumatic service unit.

Oil pressure is maintained by an integrated check valve. The pump does not automatically supply oil in case of leaks!

Double-acting version

By pushing the pedal, the connected double-acting hydraulic cylinders are extended or retracted according to the position of the 4/3 directional manual control valve. The pedal has to be pushed as long as the cylinders are in its final position and the desired oil pressure is obtained. After release of the pedal, the pump does not re-deliver in case of pressure drop on the oil side! The pedal can be locked by the laterally-arranged pin with the description “PUSH INTO LOCK”, thereby the pump is continuously supplied with air. In this case the cylinders are exclusively activated by the 4/3 directional manual control valve.

Small leaks are compensated by the pump and the oil pressure is maintained constantly.

The products are used to generate hydraulic pressure in industrial applications for bending or clamping of workpieces and / or to operate fixtures alternatively hydraulic actuators within closed, low in dust rooms.

Furthermore the following belongs to possible uses:

- Use within the capacity indicated in the technical characteristics (see data sheet).
- Use as per operating instructions.
- Compliance with service intervals.
- Qualified and trained personnel for the corresponding activities.
- Mounting of spare parts only with the same specifications as the original part.

6.2 Misapplication

⚠ WARNING

Injuries, material damages or malfunctions!

Do not modify the product!

The use of these products is not admitted:

- For domestic use.
- On pallets or machine tool tables in primary shaping and metal forming machine tools.
- If due to vibrations or other physical / chemical effects damages of the products or seals can be caused.
- In machines, on pallets or machine tool tables that are used to change the characteristics of the material (magnetise, radiation, photochemical procedures, etc.).
- In areas for which special guidelines apply, especially installations and machines:
  - For the use on fun fairs and in leisure parks.
  - In food processing or in areas with special hygiene regulations.
  - For military purposes.
  - In mines.
  - In explosive and aggressive environments (e.g. ATEX).
  - In medical engineering.
  - In the aerospace industry.
  - For passenger transport.
- For other operating and environmental conditions e.g.:
  - Higher operating pressures than indicated on the data sheet or installation drawing.
  - With hydraulic fluids that do not correspond to the specifications.

7 Transport

⚠ WARNING

Injury due to overturning product!

Overturning product due to inappropriate means of transportation.

Do not stand below the load during lifting and lowering, stay outside the danger zone.

Use suitable means of transportation.

Pay attention to the weight of the equipment.

Pay attention that the product is safely located (centre of gravity see instruction sign).

For works at and with the product, wear suitable protection equipment!

The product is delivered in a solid carton box.

To avoid damages to the product, maximally four individual carton boxes may be put on top of each other.

Note

It is recommended to take the product out of the carton box just before mounting.

7.1 Unpacking

When unpacking check the hydro-pneumatic pump unit for possible damage.

Dents and fissures, etc. at the product may lead to oil leakages.

In this case do not install the pump!

The empty packaging must be disposed in accordance with the statuary regulations in the given country (see chapter disposal).

8 Storage

⚠ CAUTION

Damage of components!

The product may not be exposed to direct solar radiation, because the UV light can destroy the seals.

A storage differing from the storage conditions is inadmissible.

In case of improper storage, the seals can embrittle and resinification of the anti-corrosive oil or corrosion at the element can occur.

The product is delivered in a solid carton box.

To avoid damages to the product, maximally four individual carton boxes may be put on top of each other.

ROEMHELD products are tested with mineral oil by default. The exterior of the products is protected against corrosion.

The residual oil film after the test procedure provides for a six-month interior protection against corrosion when stored in dry and tempered rooms.

For longer storage times the product must be filled with a non-resinifying corrosion protection agent and the external steel surfaces must be treated.

The following storage conditions must be kept:

- Storage in original packing to keep away direct radiation or harmful UV light
- Temperature between 10° and 50°C
- Relative humidity < 70 %,

9 Installation

9.1 Overview of components

9.1.1 Overview 8602 211

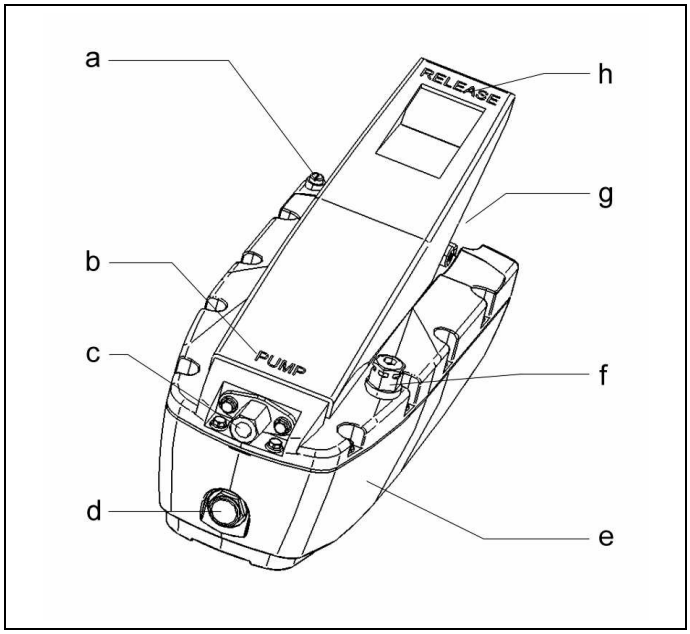

Figure 1: Schematic figure, components according to design

a	Bleeding screw	f	Filler and bleeding cap.
b	Pump pump pedal "PUMP"	g	Hydraulic port, back G1/4
c	Pneumatic port G1/4, with air filter	h	Release pressure release pedal “RELEASE”
d	Oil level gauge		
e	Reservoir		

9.1.2 Overview 8602 221

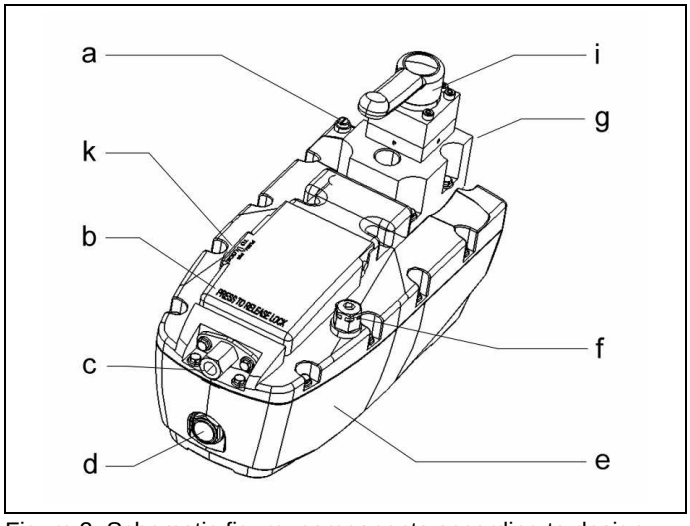

Figure 2: Schematic figure, components according to design

a	Bleeding screw	F	Filler and bleeding cap
b	Pump pedal - Pump and unlocking (k) of the locking button	g	2 x hydraulic port, back G1/4
c	Pneumatic port G1/4, with air filter	i	4/3 directional control valve, manually operated
d	Oil level gauge	k	Locking button of the pump pedal
e	Reservoir		

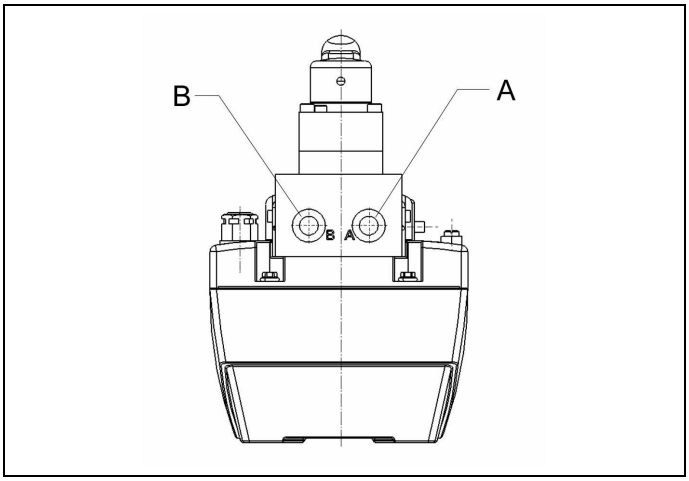

Figure 3: Hydraulic connections

A Hydraulic port	B Hydraulic port

9.2 Mounting types

9.3 Mounting position

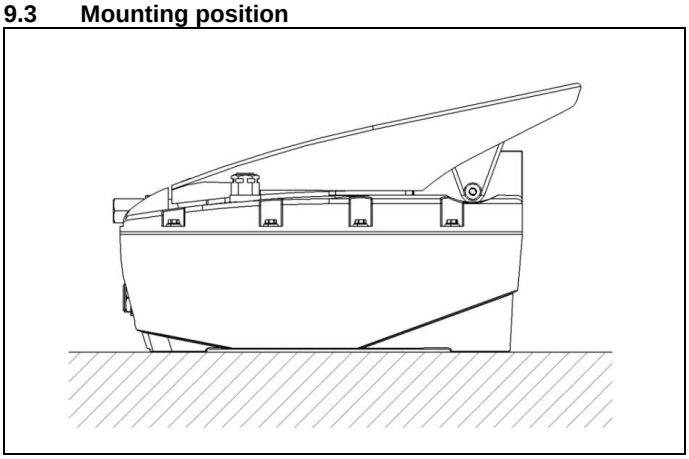

Figure 4: Mounting position - horizontal

For perfect functioning and resucking of the hydraulic oil, the hydro-pneumatic pump unit has to be installed horizontally.

9.4 Installation

⚠ WARNING

Injuries, material damages or malfunctions!

The product must never be opened. At the product no changes must be made, except the ones expressly mentioned in the operating instructions!

⚠ CAUTION

Damage of components due to incorrect connection!

Incorrect connection can lead to faulty controls and switchings and thus to damages.

Works only to be effected by qualified personnel.

⚠ CAUTION

Damage of the reservoir!

Oil can emerge.

The depth of the fixing holes of 20 mm/s must not be exceeded.

The hydro-pneumatic pump unit can can be mounted in horizontal or vertical position.

The figure shows the distances and dimensions to the customer's fixing.

For fixing self-tapping screws for thermoplastics shoud be used (example: Ø 5 - UNI 9707).

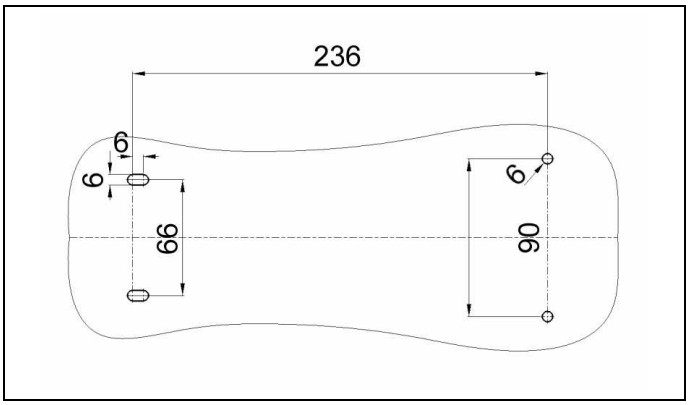

Figure 5: Dimensions for fixing

9.5 Connection of the hydraulic equipment

1. Connect hydraulic lines to qualifying standards and pay attention to scrupulous cleanness (A = Extend, B = Retract)!

Note

See ROEMHELD data sheets A 0.100, F 9.300, F 9.310 and F 9.360.

Note

Use only fittings "screwed plug B and E" as per DIN 3852 (ISO 1179).

Note

Do not use sealing tape, copper rings or coned fittings.

Note

Use hydraulic oil as per ROEMHELD data sheet A 0.100.

9.6 Connection of pneumatic equipment

⚠ DANGER

Unexpected start of the connected cylinders when switching on the power units!

When switching on, the operating pressure will be generated and in the process the cylinders can move!

Secure the working area adequately!

⚠ WARNING

Unexpected start-up of the pump!

With locked pump pedal, unexpected start-up of the pump may occur.

Install hand-operated valve in the pneumatic line for quick switching off.

Important note

When connecting the product to the pneumatic supply line, the hydro-pneumatic pump unit starts to deliver.

Important note

We recommend to install a hand-operated shut-off valve just in front of the hydro-pneumatic pump unit. By this valve the hydro-pneumatic pump unit can be quickly switched off in case of emergency or for maintenance works.

1. Connect pneumatic lines to qualifying standards and pay attention to scrupulous cleanness!
   Accessories see also data sheet J 7.400.

10 Start up

10.1 Charging with hydraulic oil

⚠ WARNING

Poisoning due to contact with hydraulic oil!

For handling with hydraulic oil consider the material safety data sheet.

Wear protection equipment.

For works with operating fluids, pay attention to the safety data sheets!

For works at and with the product, wear suitable protection equipment!

Important!

The pressure generator is delivered without oil filling.

Filling must only be made when the connected hydraulic drives and accumulators are in off-position.

Accumulated oil volume in drives or accumulators can lead to overflowing of the oil reservoir!

Note

Operation of the products with hydraulic fluids that do not correspond to the specifications is inadmissible. See technical characteristics:

Note

Use hydraulic oil as per ROEMHELD data sheet A 0.100.

Note!

No impurities must enter into the oil reservoir.
Use clean filter cloth!

Follow the signs

(For power units with piston pumps or double pumps with gear and piston pump combinations)

Attention!

Before filling the oil unscrew bleeding screw M6. Screw in again after filling.

Note

Fill with oil here.

HLP 22

For piston pumps

Use hydraulic oil as per DIN 51524-2 HLP 22.

In the chapter "Technical characteristics" the oil volumes and the effectively usable oil volume are indicated, that can be filled in and used depending on the mounting position.

Procedure:

- Pull out the filler cap by means of a flat screw driver and remove the cap.
- For oil filling use funnel with filter cloth (see purity class)!
  Pay attention to the indicated oil volume (see technical characteristics).
- Clean filler opening and cap.
- Insert and push in the cap.

10.1.1 Preparation of mounting

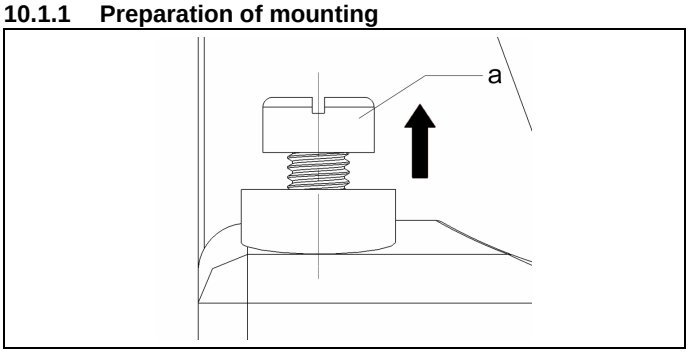

Figure 6: Unscrewed bleeding screw

Unscrew the bleeding screw (a) by three to four revolutions.

10.1.2 Connection of the tank pipe (in double-acting applications)

Procedure:

- Put the hydro-pneumatic pump unit onto a plane and horizontal base. If necessary, this can be made at the installation point.
- If the bleeding cap was pulled out, completely push in the cap.
- Unscrew the locking pin of the cap and screw in a NPTF fitting (3/8 NPTF).

10.2 Connection of compressed-air pipe

Procedure:

- Screw in fitting at compressed air connection.
- Connect to the compressed-air system.

Important note

We recommend to install a hand-operated shut-off valve just in front of the hydro-pneumatic pump unit. By this valve the hydro-pneumatic pump unit can be quickly switched off in case of emergency or for maintenance works.

10.3 Bleeding of the hydraulic system

Hazardous to the environment

In case of improper use leaking oil can lead to environmental pollution

Pay attention to the notes for appropriate handling.

⚠ WARNING

Poisoning due to contact with hydraulic oil!

Wear, damage of the seals, ageing and incorrect mounting of the seal kit by the operator can lead to escapes of oil.

Incorrect connection can lead to escapes of oil at the ports.

For handling with hydraulic oil consider the material safety data sheet.

Wear protection equipment.

After filling the hydraulic oil there is still residual air in the internal and external pipes and the hydraulic drives (hydraulic cylinders, etc).

Air in hydraulic systems has among other things the following undesirable effects:

- longer extending and retracting times e.g. of the hydrocylinder.
- short cycling
- Accelerated ageing of the oil.
- Increased wear at seals and pump.

To avoid these undesirable effects the whole hydraulic system (power unit, valves, drives and piping) have to be bled by repeated operation of the hydraulic drive!

Procedure:

1. For bleeding the oil pressure has to be reduced to a very low value!
2. Adjust pressure relief valve to the lowest possible value by screwing counterclockwise (see section "Adjust operating pressure" in the chapter "Operation").
3. Pressurise clamping line.
4. Loosen carefully a bleeding screw or a fitting at the highest or remotest point of the fixture.
5. Pump until bubble free oil comes out.
6. Close bleeding point.
7. If double-acting elements are used, bleeding has to be effected also for the unclamping line.
8. Refill lost oil.

Note

Carry out function test.

The operating direction of the control units must be obvious to the direction of motion of the plant.

11 Operation

⚠ WARNING

Injury by high-pressure injection (squirting out of hydraulic oil under high pressure)!

Improper connection and use can lead to escapes of oil under high pressure at the seals.

Mounting or dismounting of the element must only be made in depressurised mode.

Fixing has to be made in an appropriate way.

⚠ WARNING

Injury by high-pressure injection (squirting out of hydraulic oil under high pressure)!

Wear, damage of the seals, ageing and incorrect mounting of the seal kit by the operator can lead to escapes of oil under high pressure.

Before using them make a visual control.

⚠ CAUTION

Damage of components or malfunction due to pressure on oil reservoir!

Oil reservoir can be damaged!

Open oil filler / bleeding screw one revolution, so that a pressure compensation takes place.

11.1 Single-acting version

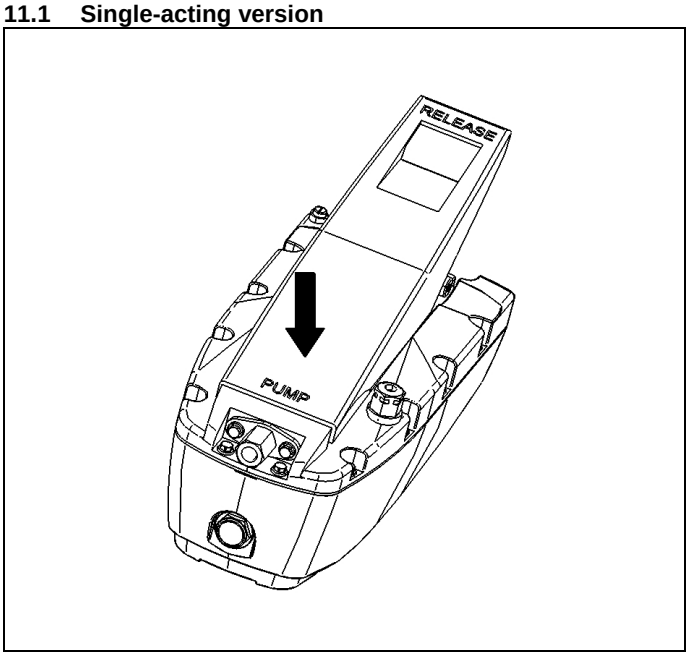

Figure 7: Operation of the single-acting version

Procedure:

- Press the marked point with the inscription “PUMP” with the foot.
- When releasing the pedal no further pressure will be built up. The obtained pressure is maintained.
- To reduce the pressure the pedal is operated at the marked point with the inscription “RELEASE”.

11.2 Double-acting version

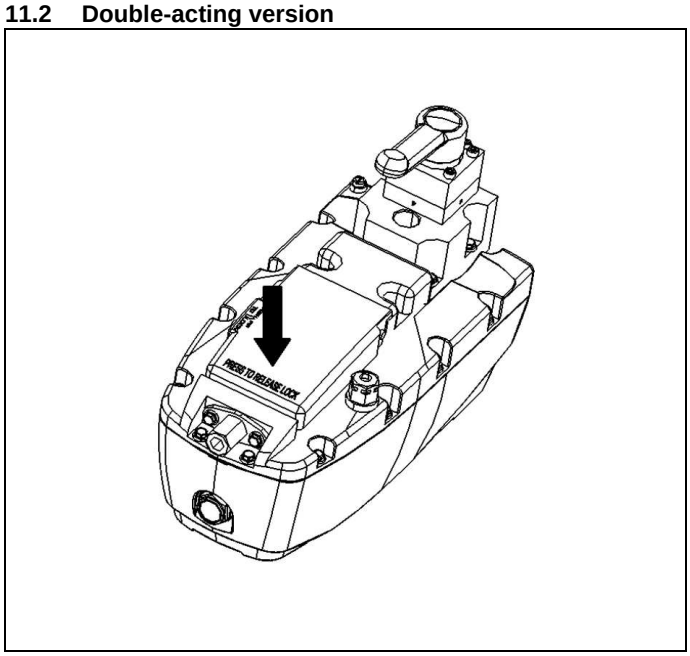

Figure 8: Operation of the double-acting version

Procedure:

The double-acting hydro-pneumatic pump unit can be used with intermittent or continuous operation.

Intermittent operation:

- Press the marked point with the inscription “PRESS TO RELEASE LOCK” with the foot.
- When releasing the pedal no further pressure will be built up. The obtained pressure is maintained.

11.2.1 Switch on continuous operation:

- Press the marked point with the inscription “PRESS TO RELEASE LOCK” with the foot.

  Press the locking pin "PUSH PIN TO LOCK", to maintain the pedal in the pump position.
- Now the connected consumer element can be operated with the 4/3 directional control valve.

11.2.2 Switch off continuous operation:

- Press the marked point with the inscription “PRESS TO RELEASE LOCK” with the foot.

  Thereby locking is released, the locking pin releases the pedal.

11.2.3 Operation with 4/3 directional manual control valve:

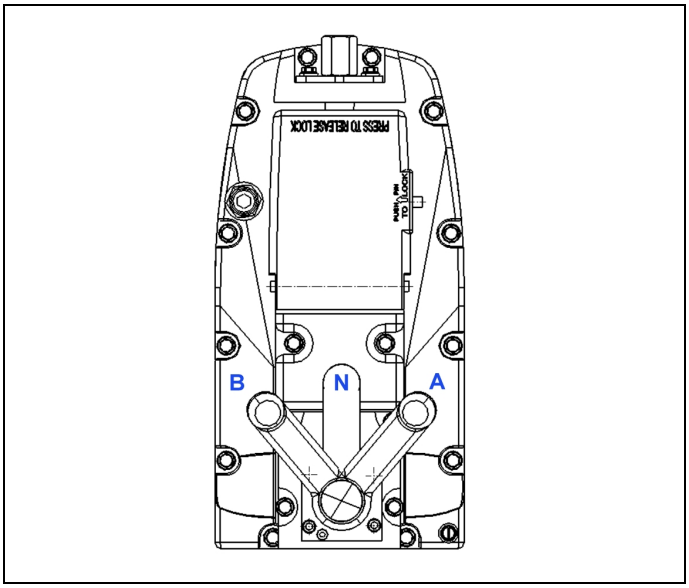

Figure 9: Valve positions of the double-acting version

The hydro-pneumatic pump unit is equipped with one 4/3 directional manual control valve. This enables the operation of double-acting consumer elements.

- Position A: Pressure on port "A", return of the hydraulic oil via port "B" to the reservoir.
- Position B: Pressure on port "B", return of the hydraulic oil via port "B" to the reservoir.
- Position N: In the centre position the ports are locked, the pump stops.

This function can be controlled in continuous or intermittent operation.

Note

If the double-acting hydro-pneumatic pump unit is used to operate a single-acting consumer element, the unused port has to be locked by a screw plug.

12 Maintenance

⚠ CAUTION

Unexpected start or movement!

In case of unexpected start or stored energy injuries can occur.

Prior to the maintenance works, the product is to be separated from the energy supply and the pressure lines have to be depressurised.

For works at and with the product, wear suitable protection equipment!

Note

Further operating instructions for individual components are available in the internet (www.ROEMHELD.com) or on request!

12.1 Plan for maintenance

Maintenance works	Interval	Realisation
Cleaning	As required	Operator
Check	daily	Operator
Checking of hydraulic system and components	yearly	Qualified personnel
Exchange of the hydraulic fluid after start up	after 250 operating hours or 3 months	Qualified personnel
Check the hydraulic fluid	after 1250 operating hours or 6 months	Qualified personnel
Exchange of hydraulic fluids	in case of damages	Qualified personnel
Repair		ROEMHELD service staff

12.2 Regular checks

Checks by the operator have to be effected as follows:

12.3 Daily checks

- Check all fixing screws, retighten if required.
- Check all cable fixings and fittings, retighten if required.
- Check hydraulic components for external leakage - retighten fittings, if required.
- Hydraulic hoses must not get in contact with substances which can cause a damage (acids, lys, solvents, ...).
- Check the oil level of the hydraulic power unit (see chapter Charging of the hydraulic power unit with oil) - if required refill oil (specifications see chapter Technical characteristics).
- Check safety devices as per chapter Safety devices.

12.4 Yearly checks

Hydraulic system, hydraulic hoses

An expert has to check all hydraulic components at least once a year if they are still work-proof. Assessed damages have to be repaired immediately.

The following checks and works have to be effected:

- An expert has to check all hydraulic hoses at least once a year if they are still work-proof. Assessed damages have to be repaired immediately.
- The hydraulic hoses of the device have to be exchanged as per BGR 237 at least after 6 years by new ones.

12.5 Cleaning

⚠ WARNING

Injury by flying out components or oil!

For cleaning works always wear safety goggles, protective shoes and safety gloves.

⚠ CAUTION

Damage of components!

The product must not be cleaned with:

- Corrosive or corroding components or
- Organic solvents as halogen or aromatic hydrocarbons and ketones (cellulose thinner, acetone, etc.),

because this can destroy the seals.

The following cleaning works have to be effected daily at the hydro-pneumatic pump unit:

- Clean the product only with cleaning clothes.
- Afterwards lubricate slightly movable components (pedal, locking pin, etc.) and not coated steel components.

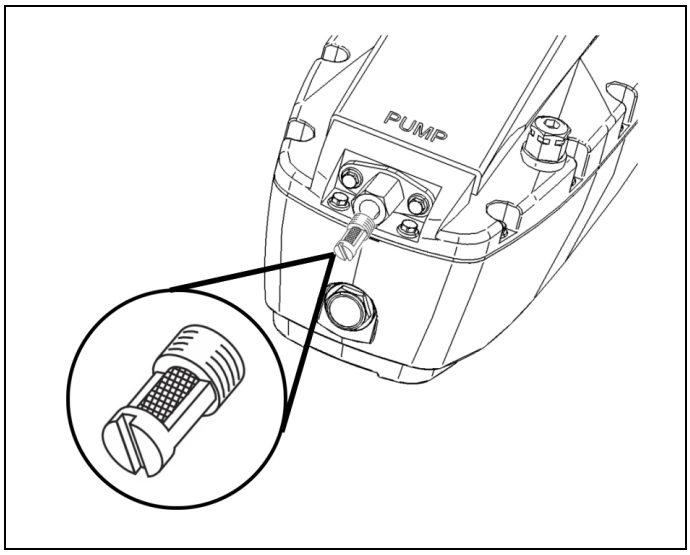

Figure 10: Air filter

- In the interior of the pneumatic port there is an air filter.
  - Unscrew the filter in the compressed-air connection by means of a screwdriver.
  - Clean the filter with compressed air (from the inside outwards).
  - Insert and fasten the filter.
    Attention: Don't screw too tight to avoid damage of the thread.
  - Screw in compressed air connection.

Note

If the filter is excessively polluted or damaged, the filter must be exchanged. A new filter can be ordered from the manufacturer.

12.6 Maintenance and check of the hydraulic fluid

Important factors that influence the degree of contamination of the hydraulics fluid are:

- Contamination of the surroundings
- Size of the hydraulic system
- Design of the hydraulic system as specified
- Number of consumer elements,
- Cycle time,
- Number of fluid circulations through the filter per time unit,
- Implementation of the maintenance schedules,
- Training of the maintenance personnel.

They change the operating characteristics of hydraulic fluids and lead to their ageing.

The monitoring of the condition and a filtration adapted to the requirements of the application (if necessary, draining and degasification) are indispensable for the maintenance of the operating characteristics and guarantee of a long service life of hydraulic fluids and components.

The hydraulic fluid must be regularly exchanged or examined by the lubricant manufacturer and/or qualified staff.

A reference investigation according to the maintenance schedule with analysis as per ISO 4406 or mass of impurities with analysis as per E 12662 is recommended

Note

For guarantee, liability and warranty claims, maintenance proofs and/or the results of analysis of the hydraulic fluids have to be submitted to us.

12.7 Oil change

Hazardous to the environment

Due to possible environmental pollution, the individual components should be disposed only by an authorised expert company.

⚠ WARNING

Burning due to hot oil!

In operating conditions oil temperatures up to 70 °C can appear due to environment influences.

All works must only be made in cool mode!

⚠ WARNING

Burning due to hot surface!

In operating conditions, surface temperatures of more than 70 °C can appear at the product.

All maintenance and repair works must only be effected in cooled mode or with safety gloves.

⚠ WARNING

Poisoning due to contact with hydraulic oil!

For handling with hydraulic oil consider the material safety data sheet.

Wear protection equipment.

⚠ CAUTION

Short circuit of internal components!

In case of high water entry (condensation, coolants, etc.) into the oil reservoir, a short circuit can result.

It is imperative to stick to the interval for the oil change!

For works with operating fluids, pay attention to the safety data sheets!

For works at and with the product, wear suitable protection equipment!

▶ **Note**

Oil changes must only be made in depressurised mode.

▶ **Note**

Use hydraulic oil as per sign at the oil filler neck (see also technical characteristics).

▶ **Note**

Pay attention to the indication for filtration and purity class of the hydraulic fluid (see technical characteristics).

▶ **Note**

Operation of the products with hydraulic fluids that do not correspond to the specifications is inadmissible. See technical characteristics:

▶ **Note**

Use hydraulic oil as per ROEMHELD data sheet A 0.100.

▶ **Note!**

No impurities must enter into the oil reservoir.
Use clean filter cloth!

Follow the signs

Note

Fill with oil here.

For piston pumps

Use hydraulic oil as per DIN 51524-2 HLP 22.

In the chapter "Technical characteristics" the oil volumes and the effectively usable oil volume are indicated, that can be filled in and used depending on the mounting position.

Procedure:

- Pull out the filler cap by means of a flat screw driver and remove the cap.
- For oil filling use funnel with filter cloth (see purity class)!
  Pay attention to the indicated oil volume (see technical characteristics).
- Clean filler opening and cap.
- Insert and push in the cap.

13 Trouble shooting

In the following section, some anomalies are listed, that can occur during the operation, beside it some remedies are described.

If the problems cannot be solved with the described procedure, please contact the manufacturer.

Trouble	Cause	Remedy
Pump does not start	The supply line of the compressed air is closed or is clogged.	Make sure that the compressed air is supplied to the pump.
The pump stops under load	Air pressure is too low	Make sure that the pneumatic pressure of the pump is between 2.8 and 10 bar.
	Air filter is contaminated or clogged.	Clean or replace air filter.
The pump runs, but no pressure is built up.	Leakage at consumer elements	Check whether there is a leakage and repair, if necessary.
	Leakage in the pump	⚠ **Caution !** Works only by ROEMHELD experts
	Oil level is too low	Check oil level and refill, if necessary.
The pump does not obtain the adjusted operating pressure.	Air pressure is too low	Make sure that the pneumatic pressure of the pump is between 2.8 and 10 bar.
	Interior safety valve misaligned.	Switch off the pump, inform manufacturer. ⚠ **Caution !** Work only by ROEMHELD experts
	Leakage at consumer elements	Check whether there is a leakage and repair, if necessary.
The pump generates pressure, but the connected consumer elements do not move.	Overload	Check performance data of the consumer element and the pump.
	The oil does not circulate correctly.	Control whether the lines are kinked and/or squeezed, whether there are jam points or whether the cylinder is defect.
Consumer element retracts, despite the fact that release is not pressed.	Leakage at consumer elements	Check whether there is a leakage and repair, if necessary.
	Defect in the pump	Switch off the pump, inform manufacturer. ⚠ **Caution !** Works only by ROEMHELD experts
Single-acting consumer element does not retract to off-position	Hydraulic line squeezed	Check hydraulic line
	For consumer elements without spring return: not sufficient retracting weight.	Check and remedy.
Double-acting consumer element does not move.	Hydraulic line squeezed	Check hydraulic line
	Manual valve in incorrect position.	Check and remedy.
Insufficient pump performance.	Air pressure is too low	Make sure that the pneumatic pressure of the pump is between 2.8 and 10 bar.
	Air filter is contaminated or clogged.	Clean or replace air filter.
	Reservoir was not bled	Check and remedy.

14 Technical characteristics

Hydraulic fluids

Details of the hydraulic fluids to be used are attached to the oil filler neck.

HLP 22

For piston pumps

Use hydraulic oil as per DIN 51524-2 HLP 22.

Purity of the hydraulic fluids

The admissible contamination (unsolved impurities in the hydraulic fluid) depends on the component of the hydraulic system that is most sensitive to dirt. The indicated purity class is the maximally admissible value that should not be exceeded, with regard to the operating safety (clogging of gaps, orifices as well as the locking of the control piston) and the service life (wear reduction).

Application	**Minimum purity as per NAS 1638**	**Minimum purity as per ISO 4406**	**attainable with filter fineness ***
Radial piston and gear pumps, valves and cylinders	8 (recommended: 5 up to 7)	20 / 17 / 13	≤ 20 µm
Proportional pressure and flow control valves	7 (recommended: 5 up to 6)	18 / 16 / 13	≤ 10 µm

***** Important influential factors see chapter: "Maintenance and check of the hydraulic fluid"

In particular with proportional valves, the repetitive accuracy depends especially on the purity degree of the hydraulic fluid.

Note

Please note that a new hydraulic fluid "on tap" does not necessarily meet the highest requirements of cleanness.

Note

Mixing of different types of hydraulic fluid can lead to unintended chemical reactions with mud formation resinification or similar.
Therefore, the respective manufacturers should be consulted for a change between different hydraulic fluids.
In any case, the entire hydraulic system is to be rinsed thoroughly.

Note - Damage of components!

If a lot of dirt can get into the hydraulic lines, an upstream high-pressure filter must be provided. The filter must be installed in front of the connections of the power unit.

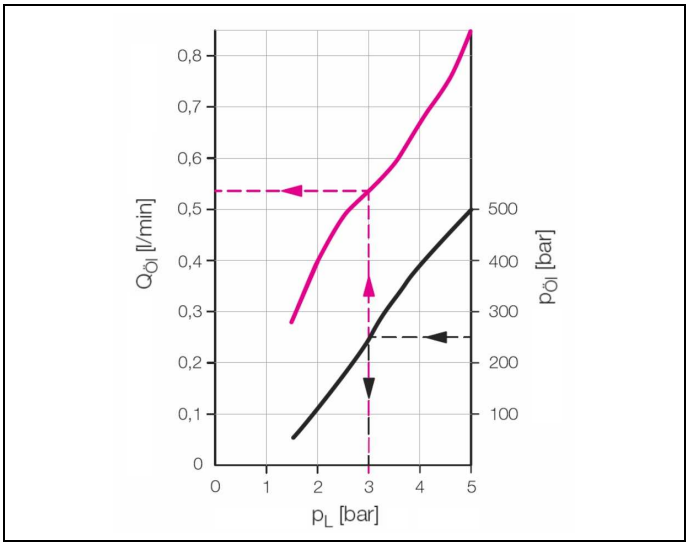

Figure 11: Example for an operating pressure at the preceding service unit

pÖl	Operating pressure [bar]	QÖl	Flow rate without counter pressure (idle running) [l/min]
pL	Required air pressure [bar		

General characteristics

Max. flow rate [cm3/s] [l/min]	14.16 0.85
Max. operating pressure [bar] *)	500
Min. operating pressure [bar]	50
Max. air pressure [bar]	5
Min. starting pressure [bar]	1.5
Max. air consumption [Nl/min]	400
Transmission ratio	1:100
Max. oil volume [l]	2.5
Usable oil volume [l]	2.1
Connecting thread (oil + air)	G 1/4
Viscosity range [10 – 6 m2/s]	10 - 500
Noise level	75 db (A) / 1m

*) On request, the max. operating pressure can be limited.

Note

Further characteristics see name plate of the pump unit or electric control.

15 Disposal

Hazardous to the environment

Due to possible environmental pollution, the individual components should be disposed only by an authorised expert company.

The individual materials have to be disposed as per the existing regulations and directives as well as the environmental conditions.

Special attention has to be drawn to the disposal of components with residual portions of hydraulic fluids. The instructions for the disposal at the material safety data sheet have to be considered.

For the disposal of electrical and electronic components (e.g. stroke measuring systems, proximity switches, etc.) country-specific legal regulations and specifications have to be kept.

16 Declaration of manufacture

16.1 Manufacturer

Manufacturer

Römheld GmbH Friedrichshütte
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35321 Laubach, Germany
Tel.: +49 (0) 64 05 / 89-0
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16.2 Validity of the documentation

Hydro-pneumatic pump units of data sheet D 8.602.
The following types or part numbers are concerned:

- 8601 211 - For single-acting cylinders
- 8601 221 - For double-acting cylinders

16.3 Declaration of manufacture

are designed and manufactured in line with the relevant versions of the directives **2006/42**/EC (EC MSRL) and in compliance with the valid technical rules and standards.
In accordance with EC-MSRL, these products are not yet ready for use and are exclusively designed for the installation in a machine, a fixture or a plant.
According to the pressure equipment directives the products are not to be classified as pressure reservoirs but as hydraulic placing devices, since pressure is not the essential factor for the design, but the strength, the inherent stability and solidity with regard to static or dynamic operating stress.

The products may only be put into operation after it was assessed that the incomplete machine, in which the product shall be installed, corresponds to the machinery directives (2006/42/EC).

The manufacturer commits to transmit the special documents of the products to state authorities on request.
The technical documentation as per appendix VII part B was prepared for the products.

16.4 List of the applied standards

2006/42/EC Machinery Directive

2001/95/EC, General product safety

92/58/EEC, Minimum requirements for the provision of safety and/or health signs at work

89/391/EEC, Introduction of measures to encourage improvements in the safety and health of workers at work

89/655/EEC, Minimum safety and health requirements for the use by workers of personal protective equipment at the workplace

Operating safety regulations (BetrSichV) for the transposal of the directive on the introduction of measures to encourage improvements in the safety and health of workers at work. 89/655/EEC

GPSG law for safety of equipment and products,

§ 2 Definition of terms e.g.: What is technical equipment

§ 4 Placing on the market/marking and exhibiting

Terms and definitions:

- "Foreseeable misuse
- Principle of presumption for engineer standards
- Compliance with standards
- §5 Special obligations for consumer products

DIN EN ISO 12100-1, 2009-11, Safety of machinery; Basic concepts, general principals for design

DIN EN ISO 12100-2, 2009-11, Safety of machinery – Basic concepts; general principles for design, part 2: Technical principles

DIN EN ISO 14121-1, 2007-12, Safety of machinery- Risk assessment- Part 1: Principles

DIN EN ISO 13732-1, 2008-12, Ergonomics of the thermal environment - Methods for the assessment of human responses to contact with surfaces - Part 1: Hot surfaces

DIN EN 614-1 a. 2, 2009-06, Safety of machinery - Ergonomic design principles

DIN EN 626-1, 2008-09, Safety of machinery - Reduction of risks to health from hazardous substances emitted by machinery

DIN EN ISO 13849-1, 2008-12, Safety of machinery - Safety-related parts of control systems - General principles for design

DIN EN ISO 13849-2, 2008-09, Safety of machinery - Safety-related parts of control systems - Validation

DIN EN 982, 2009-06, Safety of machinery - Safety requirements for fluid power systems and their components - Hydraulics

DIN EN ISO 11201, 2009-11, Acoustics - Noise emitted by machinery and equipment - Measurement of emission sound pressure levels at a work station

DIN EN 60073; 2003-05, Basic and safety principles for man-machine interface

DIN EN 61310-1; 2008-09, Safety of machinery - Indication, marking and actuation. Requirements on signals

DIN EN 81714-2, 2007-08, Design of graphical symbols for use in the technical documentation of products

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Römheld GmbH
Friedrichshütte

Laubach, 12.08.2011

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