



Hydro-pneumatic pump

max. operating pressure 500 bar



1 Description of the product

The tandem plunger pump is built into the oil reservoir in a space-saving manner. It operates with oscillating movements and automatic stroke reversing control by a pilot-operated 4/2 directional control valve. The stroke frequency and thereby the flow rate depend on air pressure and hydraulic counter pressure.

Control variants

- **Manually-operated 3/2 directional control valve**
This valve is equipped with a turning handle for direct operation at the power unit.
- **Pneumatically-operated 3/2 directional control valve**
This valve is mounted on the power unit allowing for pneumatic remote control, which, however, requires an additional hand lever valve (accessory). According to the length of the pneumatic piping between both valves, there is a longer or shorter time delay for the clamping and unclamping operation.
- **Without valve (external valve control)**
This type is designed for external valve control connected with a pressure and return line each. The clamping pump keeps the set pressure constant. A valve must never be used for depressurized circulation as the pump only serves for intermittent operation.

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2 Validity of the documentation

Hydro-pneumatic pumps of data sheet D8600. The following types or part numbers are concerned:

- Hydro-pneumatic pump with manual valve **8600 110**
- Hydro-pneumatic pump with pneumatic valve **8600 111**
- Hydro-pneumatic pump without valves **8600 112**

3 Target group of this document

3.1 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.

3.2 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.
- Specialists, fitters and set-up men of machines and installations with expert knowledge in electrical engineering.

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.

3.3 Expert / qualified person

Tasks:

Maintenance and test of safety equipments.

Qualification

The specifications in the operating safety regulations (Be-trSichV) after professional training and prompt professional activity are as follows:

- Technical professional training, e. g. as skilled worker,
- At least two years work experience,
- After classification of the dangerousness corresponding tests passed,
- Regular further training,
- Knowledge of relevant rules and standards (regulations, standards),
- Involvement in the handling of the corresponding products and regular test activities.

An expert / qualified person is a person who has sufficient knowledge in design, control and applications due to their professional education and experience:

- Safety devices as:
 - Two-hand control,
 - Safety light curtains and light grids
 - Separating safety devices,
 - etc.
- Hydraulic components as:
 - Safety-related parts of controls,
 - Hydraulic hoses,
 - Accumulators,
 - etc.
- Electric components as:
 - Safety-related parts of controls,
 - etc.
- Technical professional training, e. g. as skilled worker,
- etc.

and is familiar with the respective national work safety regulations, accident prevention directions, guidelines and generally accepted technical rules and regulations (e. g. DIN standards, VDE regulations, technical rules of other EC member states) so that he is in the position to judge the working safety and to carry out the delegated tasks.

4 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.

5 For your safety

5.1 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:

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

5.2 Safety instructions

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!

Injury due to movement of the connected drives!

- The pump motor starts running again after the clamping process and a pressure drop of 10% to maintain the clamping pressure!
- Connected drives can carry out a movement!
- Secure the working area of the drives!

⚠ WARNING

Injuries caused by missing safety devices!

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

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.

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!

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).

Poisoning due to contact with hydraulic oil!

- For handling with hydraulic oil consider the material safety data sheet.
- Wear protection equipment.

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.

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!

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.

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

Work by qualified personnel

- Works only to be effected by authorised personnel.

Performance of the product!

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

Hydraulic power unit can be damaged!

- Stick absolutely to the indicated direction of the rotary field.

Aggressive cleaning agents

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.

ℹ NOTE

Qualification of personnel

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

5.3 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.

6 Application

6.1 Intended use

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 physical / chemical effects (vibrations, welding currents or others) 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.
- With other specifications of the hydraulic fluids than the ones approved below technical specifications.

7 Transport

Hazardous to the environment

During improper transit, escaping oil residuals can lead to environmental pollutions.

Transport the product only in an upright position! Pay attention to the sign on the packaging: "Top, do not overturn".



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 (on a throw-away pallet) and may only be transported to the installation site by means of a corresponding conveyor (pay attention to the min. lifting force).

The product must only be lifted down from the transport pallet by means of a conveyor, the product must centrally rest on the two fork rakes e.g. of the fork-lift truck.

8 Assembly

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

Injuries caused by missing safety devices!

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

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.

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.



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

NOTE

Pneumatic supply

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

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.

8.1 Overview of components

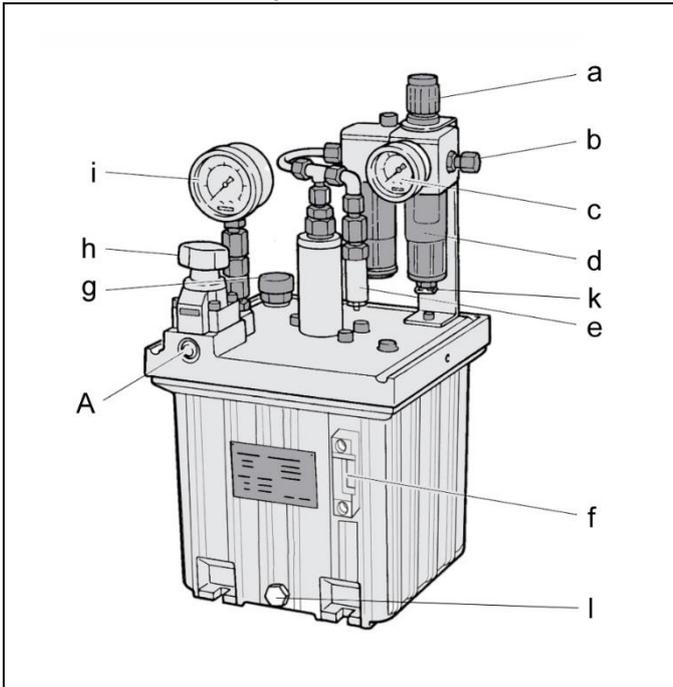


Figure 1: Schematic figure, components according to design

a Pressure relief valve	g Filler screw with air filter
b Pneumatic port (screw-in thread)	h 3/2 directional control valve (here a manual valve)
c Air-pressure pressure gauge	c Pressure gauge for display of the operating pressure
d Service unit	k Water trap
e Safety valve	l Oil drain plug
f Oil level and oil temperature control	

Connection	Function
A	Clamping line (single acting)

CAUTION

Malfunctions!

Chips, coolants and cutting fluids can cause malfunctions.

- Protect the power units against penetration of chips, coolants and cutting fluids!

NOTE

Dirt from entering the system

- With increasing dirt penetration into the hydraulic system, additional high-pressure filters have to be provided in front of the connections.

The power unit has to be mounted in upright position, if possible above the installation or fixture.

If the power unit will be installed below the fixture, an air bleeding possibility has to be provided at the highest point of the installation.

- Install the power unit at an appropriate place.
- If required mount at the provided holes / plates at the bottom of the reservoir (see chapter Overview of components).

8.2 Connection of the hydraulic equipment

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

NOTE

More details

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

Screwed Plug

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

hydraulic connection

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

Pressure fluids

- Use hydraulic oil as per ROEMHELD data sheet A 0.100.

Connection of the hydraulic

Further connection data, plans or similar (e. g. hydraulic, electric circuit diagrams or electrical parameters) see enclosures!

8.3 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.

NOTE

Pneumatic supply

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

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.

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

9 Start up

9.1 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!

NOTE

The pressure generator is delivered without oil filling.

- Filling must only be made when the connected hydraulic actuators and accumulators are in off-position.
- Accumulated oil volume in actuators or accumulators can lead to overflowing of the oil reservoir!

Hydraulic fluids

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

Pressure fluids

- Use hydraulic oil as per ROEMHELD data sheet A 0.100.

Impurities in the oil reservoir to avoid!

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

Filtration and cleanliness level of the hydraulic fluid

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

For oil filling proceed as follows:

- Separate hydro-pneumatic pump from pneumatic supply.
- Make sure that all hydraulic drives (hydro-cylinders, etc.) are retracted in off-position!
- Depressurise the system e.g. by pressing the emergency stop at the valves (depending on the type).

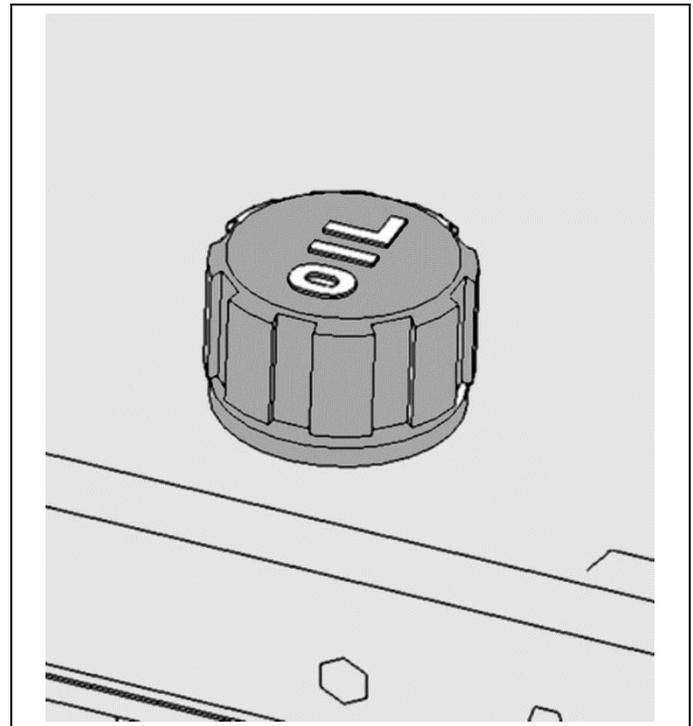


Figure 2: Filler screw with air filter

- Unscrew the cover of the air filter and the oil filler neck (**OIL**).

9.2 Bleeding of the hydraulic system

After filling the hydraulic oil there is still 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:

- prolongation of the extending and retracting times of consumer elements
- 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 suitable measures!

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.
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.

9.3 Adjust operating pressure

WARNING

Injury due to movement of the connected drives!

- Connected drives can carry out a movement.
- Secure the working area of the drives.

If a separate pressure switch is available for machine tool interlock (see hydraulic circuit diagram) the following procedure is required:

- first adjust machine tool interlock (see section "Adjust machine tool interlock (optional)",
- then adjust the operating pressure.

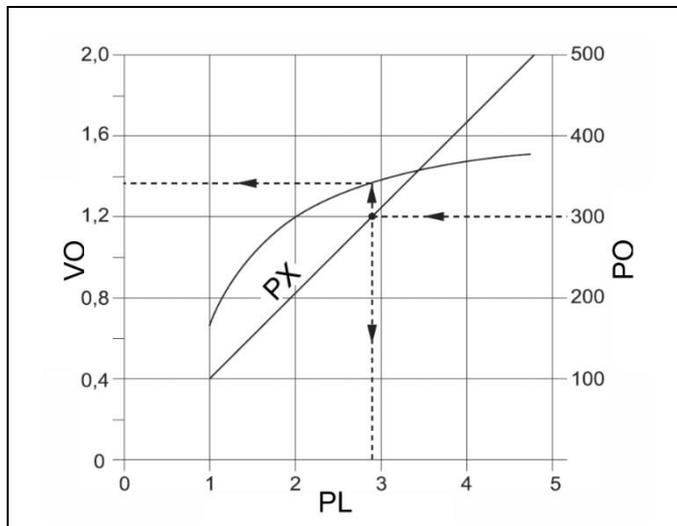


Figure 3: Flow rate without counter pressure (idle running)

PO Operating pressure [bar]	VO Flow rate Qoil [l / min]
PL Required air pressure [bar]	Px 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 to the desired value as per diagram .
- Check the hydraulic pressure at the pressure gauge.
- 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.

10 Operation

WARNING

Injury by crushing!

- Due to the stored energy, an unexpected start of the product can occur.
- Maintenance works at the product must only be made in depressurised mode!
- Keep hands and other parts of the body out of the working area!

Injuries due to unexpected / unintended start!

- Make sure that only the operator can change the switching position.

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.

CAUTION

Avoid overheating of the system

In order to avoid overheating of the system the maximum running time (relative duty cycle) must not be exceeded.



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

Clamping

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

Unclamping

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

Pneumatic pilot-operated valves

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

11 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

Operating instructions

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

11.1 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 fluids, if required, exchange the hydraulic fluid and the filter	after 1250 operating hours or 6 months	Qualified personnel
Change the hydraulic fluid and the filter	After 2500 operating hours, at the latest after 24 months, or in case of damage	Qualified personnel
Repair		ROEMHELD service personnel

NOTE

Rest period

- Observe the rest period of at least 1 hour after changing the hydraulic fluid!

11.2 Regular checks

Checks by the operator have to be effected as follows:

11.2.1 Daily checks

- Check all fixing screws, retighten if required.
- Check all cable fixings and fittings, retighten if required.
- Check if hydraulic hoses, pipes and cables are damaged, or have chafe marks, etc.).
- 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 re-fill oil (specifications see chapter Technical characteristics).
- Check safety devices as per chapter Safety devices.

11.2.2 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.

11.3 Cleaning

WARNING

Injury by flying out components or oil!

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

CAUTION

Aggressive cleaning agents

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 and not coated steel components.

11.4 Clean oil screens (if available)

Note

The screen disks are in the hydraulic ports.

In case of strong contamination, the screen disks must be cleaned.

- Remove fittings at the hydraulic ports.
- Unscrew the screen disk with a pointed tool (scriber).
- Clean the disk and refit.
- Screw in fitting.

Spare part

Spare part	Order-No.
Screen disk G1/4	3887 009 (0,63mm)
Screen disk G3/8	3300 097 (0,63mm)
Screen disk G1/2	3887 120 (0,63mm)

11.5 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.

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"

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

Note

New hydraulic fluid

- Please note that a new hydraulic fluid "on tap" does not meet the requirements of cleanness. If necessary, use cleaned oil.

Mixing of different types of hydraulic fluid

- 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.

11.6 Oil change

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!

NOTE

The pressure generator is delivered without oil filling.

- Filling must only be made when the connected hydraulic actuators and accumulators are in off-position.
- Accumulated oil volume in actuators or accumulators can lead to overflowing of the oil reservoir!

Hydraulic fluids

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

Pressure fluids

- Use hydraulic oil as per ROEMHELD data sheet A 0.100.

Impurities in the oil reservoir to avoid!

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

Filtration and cleanliness level of the hydraulic fluid

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

For oil filling proceed as follows:

- Separate hydro-pneumatic pump from pneumatic supply.
- Make sure that all hydraulic drives (hydro-cylinders, etc.) are retracted in off-position!
- Depressurise the system e.g. by pressing the emergency stop at the valves (depending on the type).

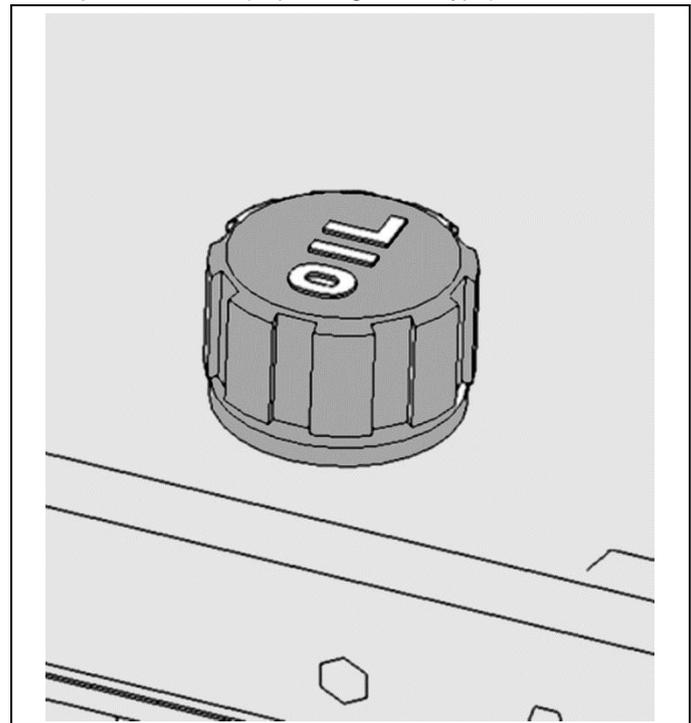


Figure 4: Filler screw with air filter

- Unscrew the cover of the air filter and the oil filler neck (OIL).

11.7 Bleeding of the hydraulic system

After filling the hydraulic oil there is still 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:

- prolongation of the extending and retracting times of consumer elements
- 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 suitable measures!

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.
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.

12 Trouble shooting

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.
	No sufficient air pressure adjusted at the service unit Directional control valve is leaky	Required air pressure see chapter: "Technical characteristics"
The pump runs, but no pressure is built up.	Leakage at consumer elements	⚠ Caution ! Check, if there is a leakage point.
	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	Required air pressure see chapter: "Technical characteristics"
	Leakage at consumer elements	Check whether there is a leakage and repair, if necessary.

13 Accessory

	Part-no.
Handle	0353 217
Cover	0353 714

Accessories for remote control of 8600 111

	Part-no.
Hand lever valve with catch	3812 005
Sound absorber for hand lever valve	3887 015
Foot valve with catch including cover	0381 206
Air hose ND 6	3890 059
Screwed socket G1/4	3890 071
Tube clamp	3890 076

Further accessories see data sheets F9XXX ff. and J7400.

14 Technical characteristics
Hydraulic fluids

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

 **NOTE**

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"

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

Note
New hydraulic fluid

- Please note that a new hydraulic fluid "on tap" does not meet the requirements of cleanness. If necessary, use cleaned oil.

Mixing of different types of hydraulic fluid

- 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.

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.

NOTE
Dirt from entering the system

- With increasing dirt penetration into the hydraulic system, additional high-pressure filters have to be provided in front of the connections.

Hydraulic

Max. operating pressure	500 bar
Operating pressure	Continuously adjustable from 100 up to 500 bar
Max. oil charge	4 l (up to upper marking)
Max. oil temperature	70 °C
Max. flow rate	25 cm ³ /s or 1.5 l/min

Pneumatic characteristics

Air pressure	1.0 to 4.7 bar
Max. air consumption	1,200 l/min

Environment

Environmental temperature	+5 °C to +40 °C
Noise level	max. 78 dB (A) (in 1 m distance and height above the floor)
Weight [kg]	20

Note

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

15 Disposal

Hazardous to the environment

Due to possible environmental pollution, the individual components must 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.

16 Declaration of incorporation

Manufacturer

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Declaration of incorporation

The mentioned products 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.

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.

If the product is modified and not approved by us, this declaration will become invalid.

List of the applied standards

2006/42/EC, Machinery directive [www.eur-lex.europa.eu]

2014/30/EU EMC - Electromagnetic compatibility [www.eur-lex.europa.eu]

2014/35/EC, Low voltage directive [www.eur-lex.europa.eu]

DIN EN ISO 12100, 2011-03, Safety of machinery; Basic concepts, General principles for design (replacement for part 1 and 2)

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 ISO 14123-1, Safety of machinery - Reduction of risks to health resulting 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 ISO 4413, 2011-04, Hydraulic fluid power - General rules and safety requirements for systems and their components

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 60204-1; 2007-06, Safety of machinery - Electrical equipment of machines, Part 1: General requirements

DIN EN 60529; 2000-09, Degrees of protection provided by enclosures (IP- Codes)

DIN EN 61000-6-2; 2005, Electromagnetic compatibility, immunity for industrial environments

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, 14.05.2019

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