



# Power Unit

max. operating pressure 200 bar



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## 1 Validity of the documentation

Power units of the data sheet D 8.010.

The following types or part numbers are concerned:

### Basic equipment

- 8403 242, 244, 288, 283, 284

### Basic equipment

- 8403 342, 344

### Power units with accessories

#### CEE connecting line "A"

- 8403-28XA

#### Handle "B"

- 8403-28XB

#### Discharge valve "K"

- 8403-2XXK

- 8403-3XXK

#### Oil level and temperature control "T"

- 8403-2XXT

- 8403-3XXT

#### Different combinations

- 8403-2XXABKT

- 8403-3XXKT

## 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.

- 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.

### 2.3 Expert / qualified person

#### Tasks:

Maintenance and test of safety equipments.

#### Qualification

The specifications in the operating safety regulations (BetrSichV) 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.

## 3 Safety instructions

### **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 For your safety

### 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 Safety instructions

#### **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.

### 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 of the product

### ⚠ 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!

These power units are especially suitable for the operation of small and simple hydraulic clamping fixtures. One clamping circuit for single and double-acting cylinders is available. The low weight also allows mobile use.

Using this power unit, extension and retraction of the cylinders is effected by the change of the sense of rotation of the electric motor. The radial piston pump alternatively supplies to port A or port B. The other port is discharged by opening a pilot-controlled check valve.

## 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 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

### 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 Installation

### **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!**

### 8.1 Overview of components

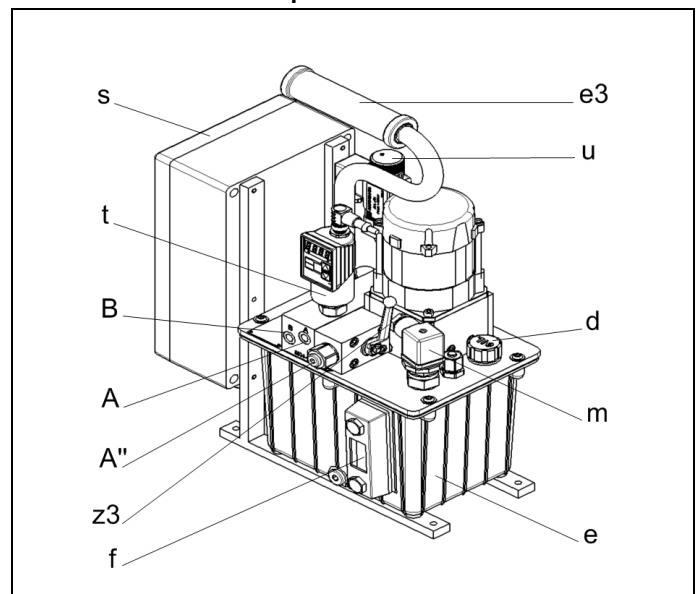


Figure 1: Schematic figure, components according to design

d Air filter and oil filler plug	t Electronic pressure switch with digital display
e Oil reservoir	s Electric control
e3 Handle (accessory "B")	u Mechanical pressure switch
f Oil level gauge	z3 Discharge valve (accessory "K")
m Oil level and temperature control (accessory "T")	

Connection	Function
A	Clamping line 30....200 bar
B	Unclamping line approx. 60 bar
A''	Clamping line 30 ... 200 bar, as well as larger distance to port B

## 8.2 Installation

### 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).

## 8.3 Connection of the hydraulic equipment

1. Connect hydraulic lines to qualifying standards and pay attention to scrupulous cleanness (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.

### Note

#### Connection of the hydraulic

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

## 8.4 Electric connection

### 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

#### Work by qualified personnel

- Works only to be effected by authorised personnel.

### 8.4.1 Control box

#### NOTE

Pay attention to the enclosed electric circuit diagram and electrical characteristics!

1. Check if the electric connection is in accordance with the operating voltage of the motor (see name plate).
2. In case of power units with electric control put the main switch to "0".
3. Open the cover of the terminal box / electric control.
4. For power units with electric control:  
Insert the mains connecting line into the provided fitting and connect it to the terminals L1, L2, L3 and PE. It is absolutely necessary to connect in phase with the clockwise field of rotation.
5. Close the cover of the electronic control.

## 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 tank to avoid!

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

**Follow the signs**

**Note**



**Note**  
Fill with oil here.



**For piston pumps**  
Use hydraulic oil as per DIN 51524-2 HLP 22.

For oil filling proceed as follows:

1. Make sure that all hydraulic drives (hydro-cylinders, etc.) are retracted in off-position!
2. Switch off main switch at the electric control, switching position "0", or disconnect from the mains.
3. Depressurise the system by operating the discharge valve.
4. Insert clean funnel with filter or filter cloth (see purity class) in oil filler neck.
5. Filling of hydraulic oil until hydraulic oil can be seen between the two markings at the oil level gauge.
6. Screw in cover.
7. Operate the fixture several times.  
(For the first start up pay attention to "Bleeding of the hydraulic system".)
8. Check oil level and refill hydraulic oil, if necessary.

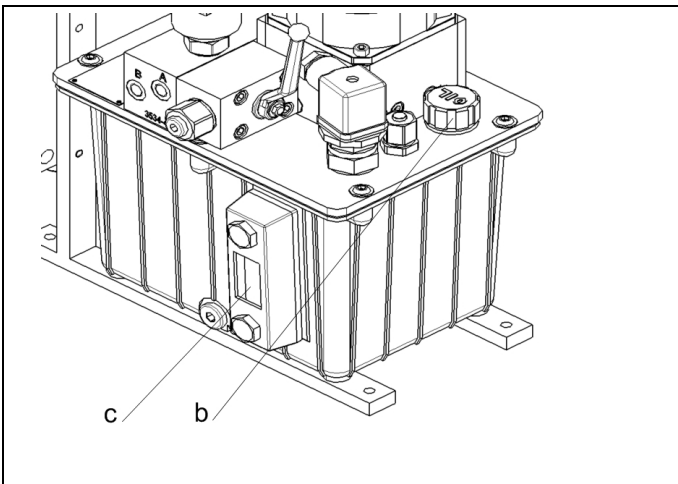


Figure 2: Air filter and oil filler neck and bleeding

b Air filter and oil filler neck with instruction signs	c Oil level gauge
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**10 Bleeding of the hydraulic system**

**For all pumps**

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 hydro-cylinder.
- 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 "Start up").
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 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.

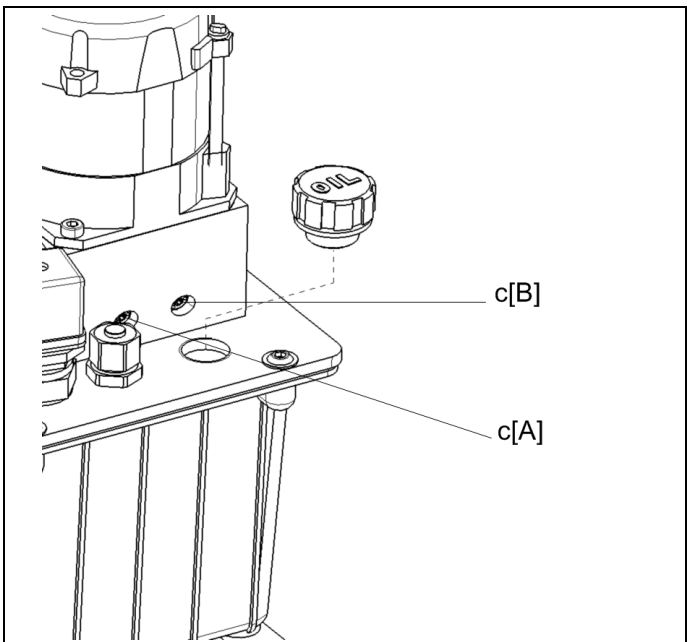


Figure 3: Components at the pressure relief valve, depending on the type

c[A] Adjusting screw of the pressure relief valve in line "A"	c[B] Adjusting screw of the pressure relief valve in line "B"
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Further notes to the pressure switch in the corresponding operating instructions.

### 11.1 Adjust the operating pressure and machine release with electronic Teach-In pressure switch in line "A".



Figure 4: Design of the pressure switch with Teach-In function in line "A".

#### Pressure increase

- Main switch ON (connect operating voltage). The device is automatically in RUN mode. The current pressure is displayed.
- Simultaneously actuate the push-buttons at the pressure switch ▲ and ▼ (Reset/Esc) for at least 3 seconds (see operating instructions of the Teach-In pressure switch).
- Thus the TEACH mode is activated. The digital display extinguishes cyclically in TEACH mode and the pump runs in continuous operation against pressure.
- Adjust at the pressure relief valve "c[A]" the desired higher pressure by clockwise turning of the socket head cap screw. Control by digital display.
- Actuate push-button Enter/Set. The digital display now shows permanently the current system pressure.

The pump switches off.

After a pressure drop of 10% (return switching point pressure switch) the pump supplies again.

\* The switching point for the machine release (MB) is set automatically.

#### **NOTE**

A pressure reduction is not possible in this cycle. See next section.

#### Pressure reduction

- Simultaneously actuate the push-buttons at the pressure switch ▲ and ▼ (Reset/Esc) for at least 3 seconds (see operating instructions of the Teach-In pressure switch).
- Turn out the socket head cap screw at the pressure relief valve "c[A]" by some counterclockwise turns
- Operate for a short time the electrical switch of the cylinder control for the pressure relief of the system.
- The current pressure is displayed.
- Adjust at the pressure relief valve the desired higher pressure by clockwise turning of the socket head cap screw. Control by digital display.

- Actuate push-button Enter/Set. The digital display now shows permanently the current system pressure.

#### **NOTE**

Check and readjust, if required, the adjustment in warm operating mode.

### 11.2 Adjust machine release with electrical Teach-In pressure switch

The switching output S2 is automatically set to approx. 80% of the operating pressure and electrically interlinked with the control of the machine tool.

So the machine tool can only start if the fixture is clamped. On the other hand the machine tool is immediately switched off, if the pressure in the system drops by more than 20%.

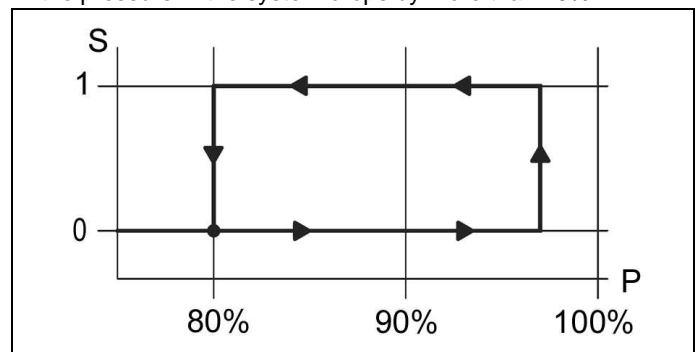


Figure 5: Switching points for machine tool interlock

S	Switching output	P	Operating pressure
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### 11.3 Pressure switch

#### 11.4 Brief instruction for the Teach-In function

1. Connect operating voltage. The device is now automatically in RUN mode

2.

Press the key Reset / Esc for at least 3 s.  
→ Activation of the TEACH mode  
(Press arrow key up and arrow key down at the same time.)

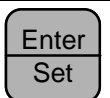


The device is now in TEACH mode (display extinguishes cyclically).

3. Now the pressure can be adjusted at the pressure generator and can be checked at the display of the pressure switch.

4.

Shortly press Enter/Set key.



The device is now again automatically in RUN mode, the switching points were newly calculated and saved.

**Note**

**System pressure**

If the system pressure is reduced, a pressure relief must be planned at the side of the consumer elements!  
This is required to relieve the integrated check valve, otherwise the function is impaired.

**NOTE**

The pressure gauge or the digital display shows the corresponding current pressure.

**11.4.1 Adjust the operating pressure with the mechanical pressure switch in line "B"**



Figure 6: Version of the mechanical pressure switch

**Pressure increase**

- Connect operating voltage and switch to unlock.
- Adjust the pressure switch by several clockwise turns. The pump must now supply in continuous operation against pressure.
- Adjust the socket head cap screw at the pressure relief valve "c[B]" (Attention: covered by air filter and oil filler plug) clockwise until the desired pressure is obtained.
- Tighten the dowel pin.
- Adjust the pressure switch counterclockwise until the motor switches off.  
Then turn a further quarter of a turn counterclockwise (internal switching tolerance) to maintain a secure switching point.  
Check the pressure again.

The pump switches off.

After a pressure drop of 10% (return switching point pressure switch) the pump supplies again.

**NOTE**

A pressure reduction is not possible in this cycle. See next section.

**Pressure reduction**

- Adjust the pressure switch by several clockwise turns. The pump must now supply in continuous operation against pressure.
- Turn out the socket head cap screw at the pressure relief valve "c[B]" by some clockwise turns
- Operate for a short time the electrical switch of the cylinder control for the pressure relief of the system.
- Adjust the socket head cap screw at the pressure relief valve clockwise until the desired pressure is obtained.
- Tighten the dowel pin
- Adjust the pressure switch counterclockwise until the motor switches off.  
Then turn a further quarter of a turn counterclockwise. Check the pressure again.

**NOTE**

Check the adjustments and readjust, if required, in warm operating mode.

**12 Operation**

**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.

**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!**

**NOTE**

**Operating pressure**

Adjust the operating pressure to the clamping element or cylinder with the lowest admissible clamping pressure (see section "Adjust operating pressure").

**Switch**

The power units are operated by a push-button or foot-actuated switch:

1. Operation: Clamping
2. Operation: Unclamping

The pilot light is lit, as soon as the clamping pressure is obtained.

- Relative duty cycle 10%

**Calculate duty cycle**

This power unit can only be used intermittently similar to section S3 of VDE 0530. The electric motor will be cut off by the mounted pressure switch as soon as the preset operating pressure is reached.

The relative duty cycle (%ED) can be calculated as follows:



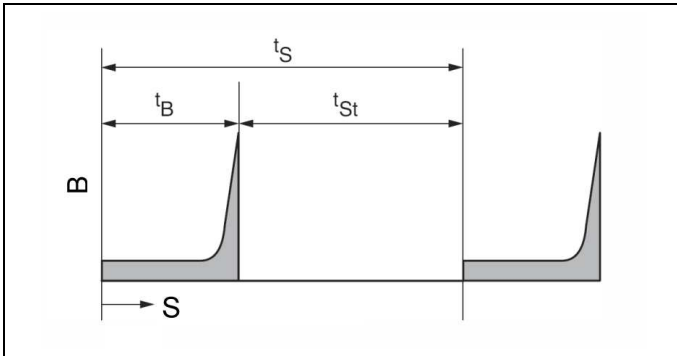


Figure 7: Diagram relative duty cycle

B Load (pressure)	tS Cycle time
S Start	tSt Load-unload time
tB Time elapsed from motor start to motor cut off (running time)	

$$\% ED = \frac{t_B}{t_B + t_{St}} \cdot 100 = \frac{t_B}{t_S} \cdot 100$$

Different motor running and idle times are simply added.

**Example:**

Clamping fixture with double-acting cylinders

Clamping time	tB1 = 5 s
Machining time	tSt1 = 60 s
Unclamping time	tB2 = 3 s
Load-unload time	tSt2 = 12 s
Cycle time	tS = 80 s

$$\%ED = \frac{t_{B1} + t_{B2}}{t_S} \times 100 = \frac{5s + 3s}{80s} \times 100$$

$$\%ED = 10 \%$$

The max. relative duty cycle is a function of the motor load. Motor winding temperature of the motor is dependent among others on oil temperature and oil level.

### 13 Maintenance

#### **⚠ 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.



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

#### **i Note**

**Operating instructions**

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

### 13.1 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

### 13.2 Regular checks

Checks by the operator have to be effected as follows:

### 13.3 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.

### 13.4 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.

### 13.5 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 mechanical components:

- Clean the product only with cleaning clothes.
- Afterwards lubricate slightly movable components (piston rods, guides etc.) and not coated steel components.

## 14 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.

### 14.1 Oil change



#### Hazardous to the environment

Due to possible environmental pollution, the individual components must 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!

##### 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**

##### 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!**

**Note**

- Oil changes must only be made in depressurised mode.

**Hydraulic oil use according sign**

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

**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).

To change the oil proceed as follows:

1. Make sure that all hydraulic drives (hydro-cylinders, etc.) are retracted in off-position!
2. Switch off main switch at the electric control, switching position "0", or disconnect from the mains.
3. Depressurise the system by operating the discharge valve.
  - Unscrew oil drain plug.
  - Drain oil completely
  - Apply oil drain plug - if required screw in new screw (see spare parts list).
4. Unscrew the cover for oil filling at the return filter or the fill-in and venting filter.
5. Insert clean funnel with filter or filter cloth (see purity class) in oil filler neck.
6. Filling of hydraulic oil until hydraulic oil can be seen between the two markings at the oil level gauge.
7. Screw in cover.
8. Operate the fixture several times.  
(For the first start up pay attention to "Bleeding of the hydraulic system".)
9. Check oil level and refill hydraulic oil, if necessary.

**15 Trouble shooting**

Trouble	Cause	Remedy
Power unit does not start:	Safety fuse defect	Check and exchange, if required
	Pressure switch misaligned	Adjustment (see "Adjust operating pressure")
	Electric control is not o.k., e.g. over-current, parting of cable, rotary field, motor temperature	<b>⚠ Caution !</b> Works only to be effected by authorised personnel. Reset protection switch
	Oil level too low or oil temperature too high, the light in the door of the control box or at the main switch is lit	Refill oil or let cool oil
Motor does not switch off after reaching operating pressure	Pressure switch misaligned	Adjustment (see "Adjust operating pressure")
	Pressure switch defect	Exchange pressure switch
	Rotary field	Change phases

Trouble	Cause	Remedy
Operating pressure will not be obtained	Pressure relief valve adjusted too low	Adjustment (see section "Adjust operating pressure")
	External leakage	Eliminate leak, e.g. by tightening fittings or replacing pipes or hoses.
	Pump defect	Exchange pump or return power unit for repair
	Leakage of a hydraulic drive	Check which drive is leaky.
	Pressure switch misaligned	Adjustment (see section "Adjust operating pressure")

Trouble	Cause	Remedy
Pump motor will be switched on and off in short intervals in position "Clamping" and "Unclamping":	Check valve in the pump unit is leaky.	Exchange pump unit.
	Leakage at the cylinder (clamping element/ cylinder or similar)	Squeeze pressure line to locate the leakage, exchange seal or element.
	Fittings are leaky	Retighten fittings
Pump does not deliver:	Oil level is too low	Refill oil
	Pump not bled	Drain off completely the oil and refill (see section "Oil filling")
	Wrong sense of rotation	Check electrical connection, see sense of rotation

**NOTE**

After the exchange or the repair of hydraulic components, their function must be tested.

## 16 Technical characteristics

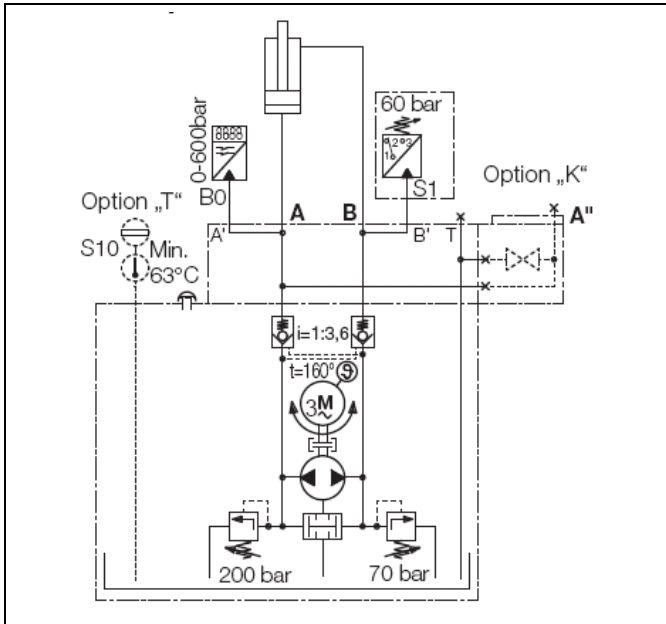


Figure 8: Hydraulic circuit diagram for supply voltage 400 V Y 50 Hz

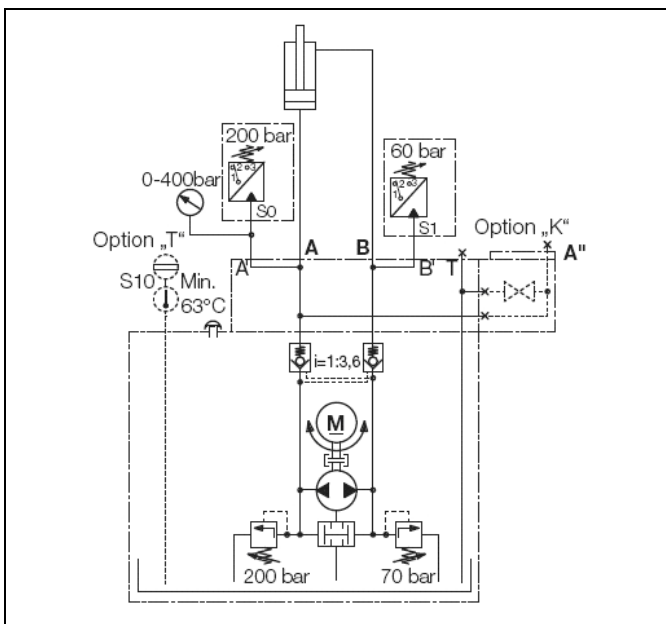


Figure 9: Hydraulic circuit diagram for supply voltage 24 V DC

### Hydraulics

Max. operating pressure	200 bar	
Operating pressure	30... 200 bar	
Filling quantity	3.5 l usable 1.5 l	
Max. oil temperature	60 °C	
Max. flow rate	840328X	840334X
[l/min]	0.52	0.8

### Electric motor 8403 24X

Nominal voltage	380÷420 V Y 50 Hz	
Type	Three-phase motor, 2-pole	
Code class	IP 54	
Relative duty cycle (ED) see name plate	See section "Operation"	

### Electric control (if available)

Control voltage for the valves	24 V DC
Fuse external	required 3 x 6 A slow
Connection	Cable 4 x 1 mm <sup>2</sup>

### Electric motor 8403 34X

Nominal voltage	24 V DC
Type	Direct current brush motor
Code class	IP 40
Relative duty cycle (ED) see name plate	See section "Operation"

### Environment

Environmental temperature	0 °C to + 35 °C
Humidity	< 80 %, not condensing

### NOTE

Further characteristics see name plate of the power unit or hydraulic and electric circuit diagram.

### Note

#### Valve control

Proposals for valve control see ROEMHELD data sheet.

## 17 Disposal

### ⚠ DANGER



#### 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.

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.



## 18 EC-Declaration of conformity

### 18.1 Manufacturer

#### Manufacturer

Römheld GmbH Friedrichshütte  
Römheldstraße 1-5  
35321 Laubach, Germany  
Tel.: +49 (0) 64 05 / 89-0  
Fax: +49 (0) 64 05 / 89-211  
E-mail: info@roemheld.de  
www.roemheld.com

### 18.2 Validity of the documentation

Power units of the data sheet D 8.010.  
ing types or part numbers are concerned:

#### Basic equipment

- 8403 242, 244, 288, 283, 284

#### Basic equipment

- 8403 342, 344

#### Power units with accessories

##### CEE connecting line "A"

- 8403-28XA

##### Handle "B"

- 8403-28XB

##### Discharge valve "K"

- 8403-2XXK
- 8403-3XXK

##### Oil level and temperature control "T"

- 8403-2XXT
- 8403-3XXT

##### Different combinations

- 8403-2XXABKT
- 8403-3XXKT

The follow-

### 18.3 EC-Declaration of conformity

The listed products are designed and manufactured in line with the relevant versions of the EC directives **2006/95/EC - Low voltage directive** and in compliance with the valid technical rules and standards.

In accordance with **2006/42/EC** (EC MSRL) and E 982 these products are components that are not ready for use and are exclusively designed for the installation into an incomplete machine / machine.

The products may only be put into operation after it was assessed that the incomplete machine / 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 IV was prepared for the products.

### 18.4 List of the applied standards

**2006/42/EC** Machinery Directive

**2001/95/EC**, General product safety

**2004/108/EC** EMC - Electromagnetic compatibility

**2006/95/EC**, Low voltage directive

**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

**2002/95/EC**, Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)

**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. (German implementation of the Work Equipment Directive 89/655/EEC)

**Product Safety Act - PSG**; November 2011

#### EMC law (Germany)

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

**DIN EN ISO 12100-2**, 2004-04, 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 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**; 2006-03, Electromagnetic compatibility (EMC) - Generic standards - Immunity for industrial environment

**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

Responsible person for the documentation:  
Dipl.-Ing. (FH) Jürgen Niesner, Tel.: +49(0)6405 89-0.

**Römheld GmbH**  
**Friedrichshütte**  
Laubach, 12.08.2013

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