Swing clamp with fail-safe function

Top flange type, with optional switch rod for position monitoring, without overload protection device, double acting

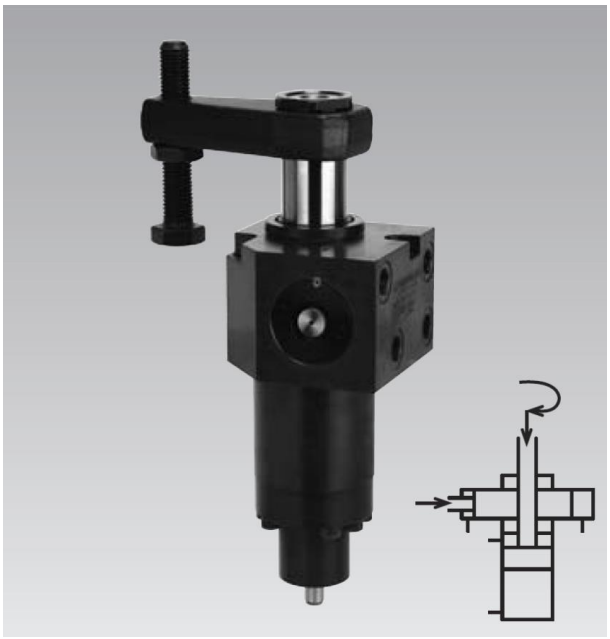


Table of contents

1 Description of the product

Function

The hydraulic swing clamp is a pull-type cylinder where a part of the total stroke is used to swing the piston.
The piston rod locking is made by a separately-controlled double-acting wedge-shaped piston.
Clamping:

1. Swinging and clamping
2. Locking

Unclamping:

1. Release locking
2. Unclamping and swinging back

Self-locking

The wedge-shaped piston is designed as a self-locking piston so that the swing clamp can be depressurised after clamping. The previously generated clamping force will be maintained.
Conditions: Before depressurising, the locking pressure must be available at least for 3 seconds.

Special features

- The patented piston rod locking is made by friction locking by a separately-controllable double-acting wedge-shaped piston with self-locking. In the case of a pressure drop or complete pressure reduction, the clamping force will be maintained.
- Omission of the overload protection device
  In the case of a slight collision with the clamping arm during loading and unloading of the fixture, the angular position of the clamping arm will be maintained. Less critical are the weight of the clamping arm or an increased swing speed.
- FKM wiper
  This wiper has a high chemical resistance when using aggressive cutting fluids.
- Reinforced swing mechanism
  The reinforced swing mechanism endures a collision of the clamping arm with the workpiece during clamping up to a pressure of 100 bar.

2 Validity of the documentation

This document applies to the following products:

Swing clamps with reinforced swing mechanism of data sheet B 1.8805. The following types or part numbers are concerned:

- 1895 304 KXX35, 1895 324 KXX35, 1895 334 KXX35
- 1895 404 KXX35, 1895 424 KXX35, 1895 434 KXX35
- 1895 444 KXX35
- 1896 304 KXX36, 1896 324 KXX36, 1896 334 KXX36
- 1896 404 KXX36, 1896 424 KXX36, 1896 434 KXX36
- 1896 444 KXX36

and their versions XX:

- DH = without metallic wiper without switch rod
- DM = with metallic wiper without switch rod

- MH = without metallic wiper with switch rod
- MM = with metallic wiper with switch rod

3 Target group of this document

- 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.

4 Symbols and signal words

⚠ 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.

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 for information and avoidance of dangers when installing the products into the machine as well as information and references for transport, storage 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 products can be guaranteed.
Furthermore, the consideration of the operating instructions will:

- avoid injuries
- reduce down times and repair costs,
- increase the service life of the products.

5.2 Safety instructions

The product was manufactured in accordance with the generally accepted rules of the technology.
Observe the safety instructions and the operating instructions given in this manual, in order to avoid personal damage or material damage.

- Read these operating instructions thoroughly and completely, before you work with the product.
- Keep these operating instructions so that they are accessible to all users at any time.
- Pay attention to the current safety regulations, regulations for accident prevention and environmental protection of the country in which the product will be used.
- Use the ROEMHELD product only in perfect technical condition.
- Observe all notes on the product.
- Use only accessories and spare parts approved by the manufacturer in order to exclude danger to persons because of not suited spare parts.
- Respect the intended use.
- You only may start up the product, when it has been found that the incomplete machine or machine, in which the product shall be mounted, corresponds to the country-specific provisions, safety regulations and standards.
- Perform a risk analysis for the incomplete machine, or the machine.
  Due to the interactions between the product and the machine/fixture or the environment, risks may arise that only can be determined and minimized by the user, e.g. :
  - generated forces,
  - generated movements,
  - Influence of hydraulic and electrical control,
  - etc.

6 Application

6.1 Intended use

The products are used in industrial / commercial applications to transform hydraulic pressure into movement and /or force. They must only be operated with hydraulic oil.
Furthermore the following belongs to possible uses:

- Use within the capacity indicated in the technical characteristics.
- 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!

Modifications can lead to weakening of the components, reduction in strength or malfunctions.

- Do not modify the product!

The use of the products is not authorised:

- For domestic use.
- For use at fairgrounds and amusement parks.
- In food processing or in areas with special hygiene regulations.
- In mines.

- In ATEX areas (in explosive and aggressive environments, e.g. explosive gases and dusts).
- If physical effects (welding currents, vibrations or others) or chemically acting media damage the seals (resistance of the seal material) or components and this can lead to functional failure or premature failure.

Special solutions are available on request!

7 Installation

⚠ 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.

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.

Injury by dropping parts!

Some products have a heavy weight and can cause injury when dropping.

- Transport products professionally.
- Wear personal protection equipment!

Weight specifications see chapter "Technical characteristics".

Poisoning due to contact with hydraulic oil.

Wear, damage of the seals, aging 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.

7.1 Design

This hydraulic clamping element is a pull-type cylinder where a part of the total stroke is used to swing the piston.

Thereby the clamping points are free for loading and unloading the fixture.

The patented piston rod locking is made by friction locking by a separately controllable double-acting wedge-shaped piston with fail-safe function.

In the case of a pressure drop or complete pressure reduction, the clamping force is maintained.

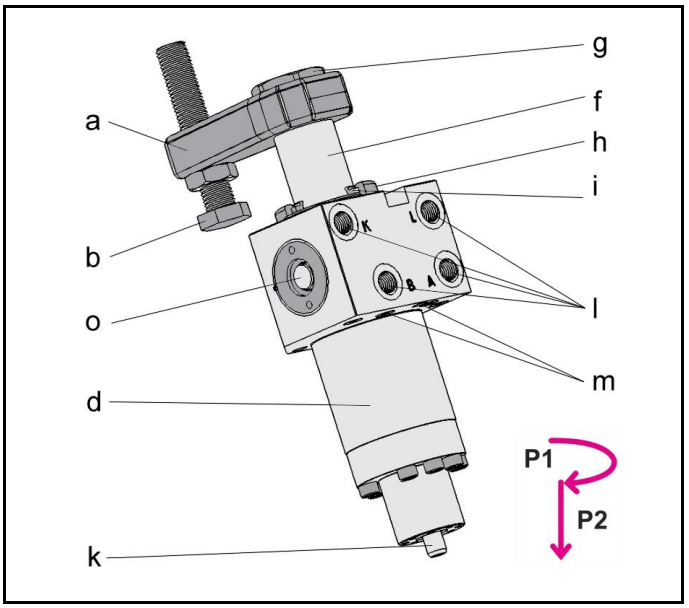


Fig. 1: Components

a	Clamping arm (accessory)	k	Switch rod
b	Contact bolt (accessory)	l	Hydraulic ports: A = Clamping B = Unclamping K = Locking L = Unlocking
f	Piston with integrated piston rod		
g	Fixing nut (included in delivery)	m	Hydraulic ports, manifold-mounting version A, B, K and L
h	Metallic wiper, retaining ring for MH or MM version or accessories	o	Locking rod
		P1	Swing stroke
i	Metallic wiper, wiper ring for DM or MM version or accessories	P2	Clamping stroke

In version 189X XX4 K**M**X3X the piston rod **(k)** protrudes through the bottom and allows a pneumatic or electrical control of the piston position outside the clamping area.

Due to the design, the locking rod **(o)** protrudes at the side. This results in a stroke movement of approx. 3 mm.

7.2 Swing angle and direction

The swing clamps are available with swing angles of 0 ° up to 90 °. "Swing direction cw" means clockwise rotation, looking from above onto the piston - from the unclamped to the clamped position.

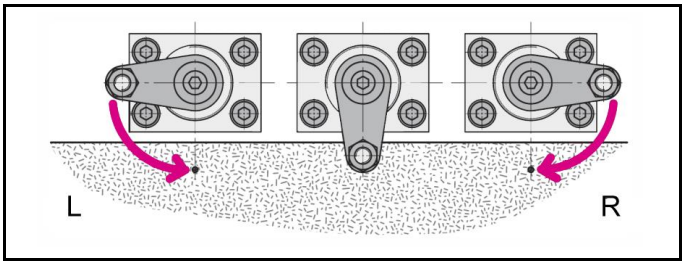


Figure 2: Swing direction
(L = counterclockwise "ccw", R = clockwise "cw")

7.3 Assembly of the position monitoring (accessory)

1. Screw on position monitoring at the flange and at the piston rod.

Note

See operating instructions of the position monitoring.

7.4 Mounting types

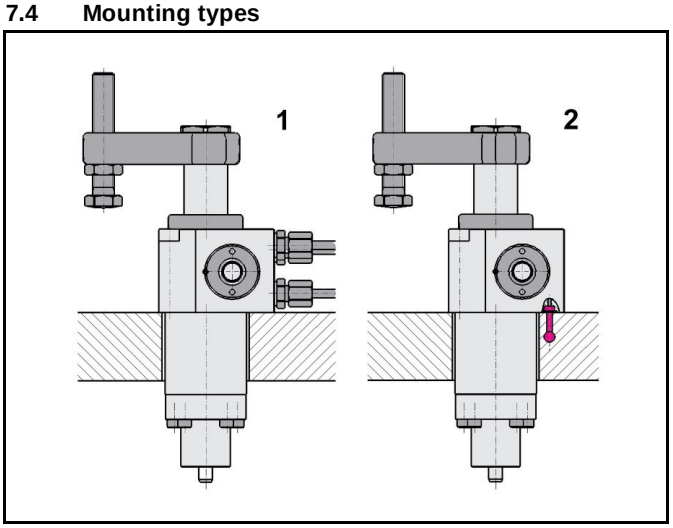


Figure 3: Mounting types

1	Flange type, hydraulic connection by pipes.	2	Manifold-mounting type, hydraulic connection without pipes.

7.5 Admissible oil flow rate

⚠ WARNING

Injury due to overload of the element

High-pressure injection (squirting out of hydraulic oil under high pressure) or flying components!

- Due to throttling or closing of ports a pressure intensification can occur.
- Connect the ports professionally!

⚠ CAUTION

Malfunction or early failure

Exceeding the max. flow rate can lead to overload and premature failure of the product..

- The maximum flow rate must not be exceeded!

7.5.1 Calculation of the admissible flow rate

Admissible flow rate

The admissible flow rate or the admissible stroke speed is valid for vertical mounting positions in combination with standard add-on parts as clamping arms or contact bolts, etc.

In case of other mounting positions and/or add-on parts the flow rate has to be reduced.

If the pump flow rate divided by the number of elements is larger than the admissible flow rate of one element, the flow rate has to be throttled.

This prevents an overload and therewith an early failure.

The flow rate can be checked as follows:

$$Q_P \leq 0{,}06 \cdot \dot{V}_Z \cdot n \quad \text{and/or} \quad Q_P \leq 6 \cdot v_Z \cdot A_K \cdot n$$

for clamping elements and work supports (indicated on the data sheets)

Maximum piston speed

At specified pump flow rate Q_P and with the effective piston area A_K the piston speed can be calculated as follows:

$$v_m < \frac{Q_P}{6 \cdot A_K \cdot n}$$

Legend

$\dot{V}_Z$ = Admissible flow rate of the element in [cm³/s]

Q_P = Flow rate of the pump in [l/min]

A_K = Piston area in [cm²]

n = Number of elements, same dimensions

$v_Z = v_m$ = Admissible/maximum stroke speed in [m/s]

NOTE

Flow rate

- The maximum oil volume and/or the maximum stroke speed depend on the corresponding product.
  - For clamping cylinders see data sheet A 0.100.
  - For clamping elements, work supports, hydraulic valves, power units and other hydraulic elements indicated on the corresponding data sheets.

Further "things worth knowing about hydraulic cylinders, basics, detailed knowledge and calculations on hydraulic cylinders" see Technical information on the internet!

7.5.2 Throttling of the flow rate

The throttling always has to be effected in the supply line to the element. Only thus pressure intensification and thereby pressures exceeding the operating pressure are avoided. The

hydraulic circuit diagram shows flow control valves which allow oil return from the element without any impediments.

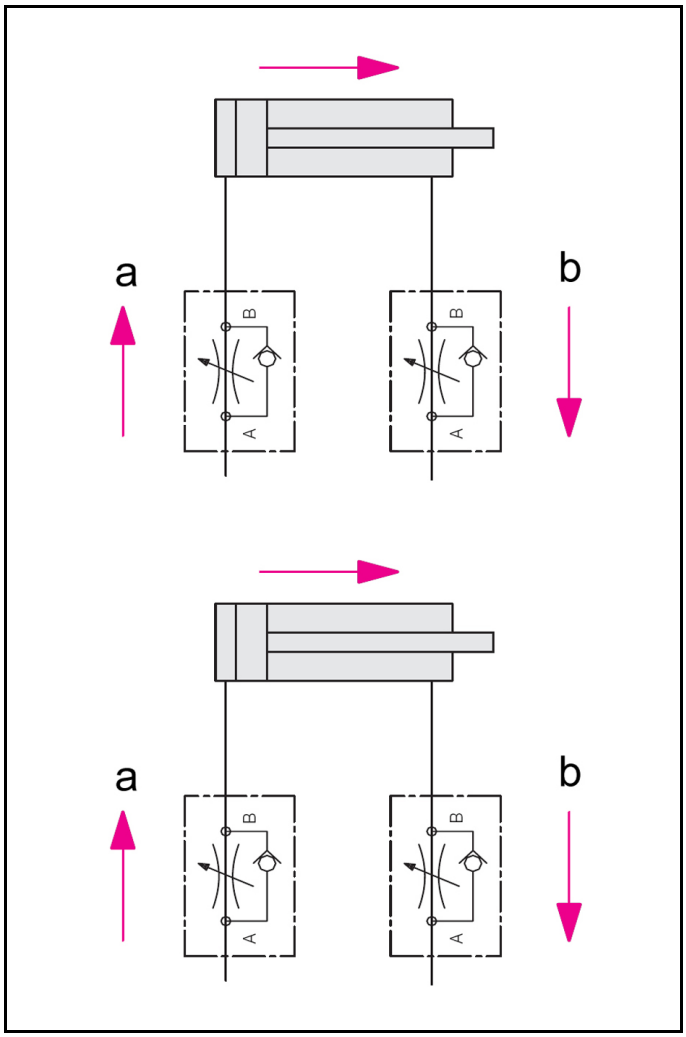


Figure 4: Hydraulic circuit diagram without flow control valves

a Throttling direction	b Free flow

If a return-flow throttling is required due to a negative load, it must be guaranteed that the max. operating pressure (see technical characteristics) will not be exceeded.

7.6 Installation of pipe-mounted types

1. Clean the support surfaces.
2. Fix the element at the support surface (see figure "Mounting types).

⚠ WARNING

Product can fall down

Injury by falling products!

- Safety shoes have to be worn to avoid injuries due to falling objects.

⚠ CAUTION

Product not properly tightened

Product can loosen during operation.

- Fix and/or secure with sufficient tightening torque.

NOTE

Determination of the tightening torque

To determine the tightening torque of the fixing screws a screw calculation as per VDI 2230 page 1 has to be effected. The screw material is indicated in the chapter "Technical characteristics".

Proposals and approximate values for the tightening torques see chapter "Technical characteristics".

7.7 Installation of manifold-mounted types

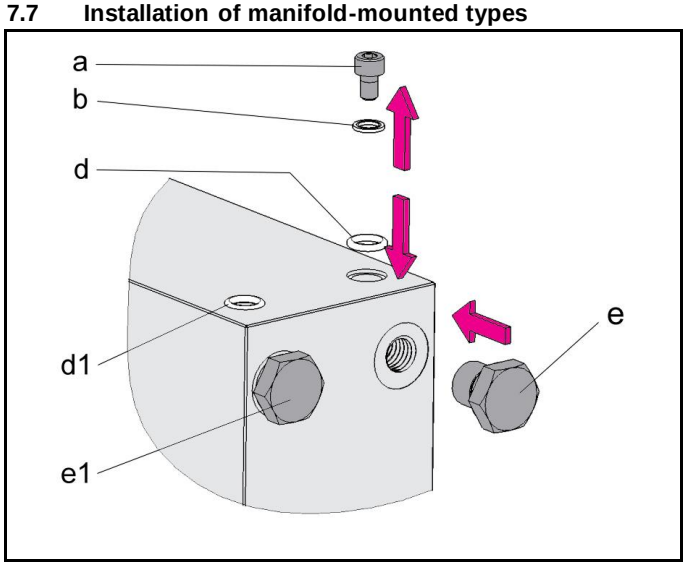


Figure 5: Example of the preparation for hydraulic ports without pipes

NOTE

Arrangement of the ports

- The figure shown is a schematic sketch. The arrangement of the ports depends on the respective product (see chapter Design).

a	Socket head cap screw	d1	Mounted O-ring
b	Sealing ring	e	Screw plug (accessory)
d	O-ring (accessory, according to the version)	e1	Mounted screw plug

1. Drill the holes for hydraulic oil supply and return in the fixture (see also data sheet or installation drawing).
2. Grind or finish mill flange surface (Ra ≤ 0.8 and a flatness of 0.04 mm to 100 x 100 mm. Marks, scratches, shrink holes are not admissible on the surface.)

For some versions:

3a. Remove socket head cap screws and sealing rings. Insert O-rings (accessory, if required).

3b. Seal pipe ports with screw plug (accessory, if required)

4. Clean the support surfaces.
5. Position and fix on the fixture.
6. Install bleeding screws at the upper ends of the piping.

⚠ CAUTION

Product not properly tightened

Product can loosen during operation.

- Fix and/or secure with sufficient tightening torque.

NOTE

Tightening torques

- The tightening torques for the fixing screws have to be designed with reference to the application (e. g. as per VDI 2230).

Proposals and approximate values for the tightening torques see chapter "Technical characteristics".

7.8 Connection of the hydraulic equipment

⚠ CAUTION

Damage due to extending or retracting in locked condition

Extending or retracting in locked condition leads to defects of components. Leakage and failure will result.

- Connect hydraulic lines in a professional way.
- Avoid confusion when connecting ports.
- It is imperative to adhere to the switching sequence.

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.

7.9 Assembly and disassembly of the clamping arm

⚠ WARNING

Injury by crushing!

Components of the product make a movement while they are in operation, this can cause injuries.

- Keep parts of the body and items out of the working area!

⚠ CAUTION

Damage or functional failure

Internal components can be damaged when tightening and loosening the fixing nut.

- It is imperative to back up the piston.
- No torques must be introduced into the piston.
- The conical surfaces of the piston and the clamping arm must be clean and grease free!

Note

When tightening and untightening the fixing nut, the clamping arm or the hexagon socket in the piston have to be backed up. It is recommended to effect tightening and untightening in the swing range.

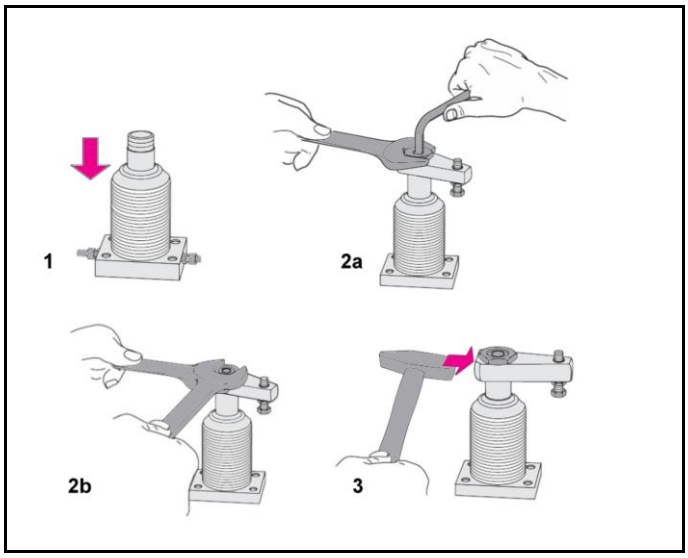


Figure 6: Assembly / disassembly (example)

7.9.1 Assembly of the clamping arm - with pressure

1. Retract piston and pressurise clamping line (port A) (Fig. Assembly, **Pos. 1**).
2. Put the clamping arm in the intended clamping position.
3. Fasten fixing nut and hold clamping arm with an Allen key (Tightening torque of the fixing nut for the clamping arm see technical characteristics. Fig. Assembly, **Pos. 2**).
4. Clamp several times.
5. Check if the clamping point is within the clamping stroke (Fig. Adjustment of the clamping arm, **Pos. 2**).

7.9.2 Assembly of the clamping arm - without pressure

1. Put the clamping arm onto the piston.
2. Move the piston manually to the clamping position.
3. Align clamping arm.
4. Fasten fixing nut with an Allen key and hold the clamping arm with an open-ended wrench (Tightening torque of the fixing nut for the clamping arm see technical characteristics. Fig. Assembly, **Pos. 2**).
5. Clamp several times.
6. Check if the clamping point is within the clamping stroke (Fig. Adjustment of the clamping arm, **Pos. 2**).

NOTE

Tightening torque of the fastening nut

- Tightening torque of the fixing nut for the clamping arm see technical characteristics.

7.9.3 Disassembly of the clamping arm - without pressure

⚠ CAUTION

Damage or functional failure of the piston rod guide

Hard blows may impair the function of the product or lead to failure.

- No direct or indirect blows may be used to loosen the clamping arm.

1. Loosen the fixing nut one revolution. Hold the clamping arm with an Allen key (**Pos. 2b**).
2. Hammer **slightly** onto the front face to loosen the clamping arm (**Pos. 3**).

7.10 Adjustment of contact bolt

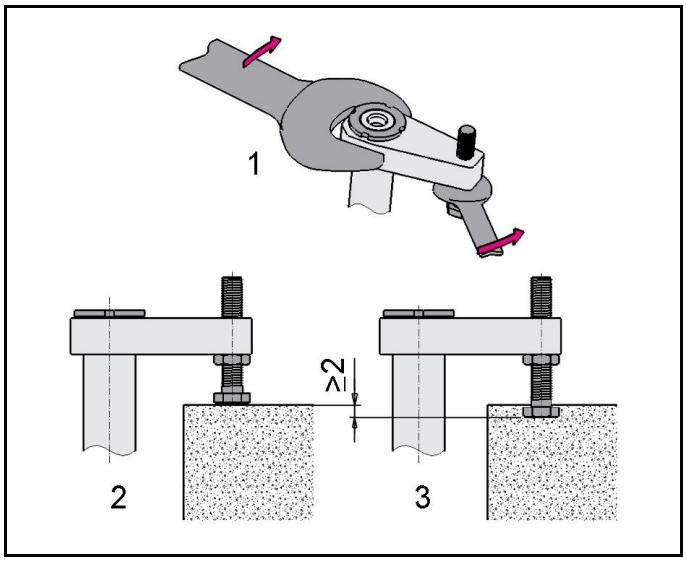


Figure 7: Adjustment of the clamping arm (example)

1. Loosen the lock nut at the contact bolt and completely turn back the contact bolt. (Fig. Adjustment of the clamping arm, **Pos. 1**).
2. Move the clamping arm to the clamping position above the workpiece. (Pay attention to the tolerance of the swing angle)
3. Screw out the contact bolt until it contacts the workpiece. (Fig. Adjustment of the clamping arm, **Pos. 2**).
4. Move the clamping arm back to the unclamping position.
5. Unscrew the contact bolt again by the half of the clamping stroke.
6. Tighten the lock nut at the contact bolt. Hold the clamping arm with an open-ended wrench. (Fig. Adjustment of the clamping arm, **Pos. 1**).

7.10.1 Check adjustment of the contact bolt

1. Move the clamping arm, with throttled flow rate and low pressure to the clamping position onto the workpiece. Pay attention that the contact bolt touches the workpiece only after completion of the swing stroke.
2. Measure and note the distance between clamping arm and upper edge of the workpiece in clamped condition (**Pos. 2**).
3. Unclamp swing clamp again.
4. Unload workpiece out of the fixture.
5. Clamp swing clamp again.
6. Measure the distance as described below item 2. The distance measured now should be at least 2 mm smaller .

7.11 Assembly of the metallic wiper

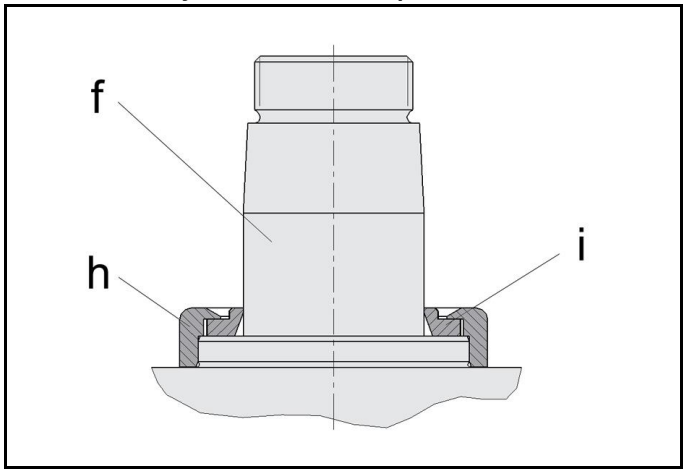


Figure 8: Metallic wiper

f	Piston with integrated swing mechanism	i	Metallic wiper, wiper ring (accessory)
h	Metallic wiper, retaining ring (accessory)		

The swing clamp is optionally supplied with mounted metallic wiper.
The metallic wiper can also be mounted later as an accessory:

1. Put the wiper ring onto the piston rod until the ring touches the body, pay attention to smooth running.
2. If the wiper ring is too stiff, the hard sealing edge must be ground with emery since otherwise the piston rod will be damaged in the long run.
3. Uniformly press the retaining ring without jamming, onto the collar of the body.

8 Start up

⚠ WARNING

Poisoning due to contact with hydraulic oil.

Wear, damage of the seals, aging 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.

⚠ CAUTION

Injury due to bursting or malfunction

Exceeding the max. operating pressure (see technical data) can cause the product to burst or malfunction.

- The maximum operating pressure must not be exceeded.
- If necessary, avoid overpressure by using suitable valves.

8.1 Hydraulic control

NOTE

The clamping force diagrams are only valid, if "clamping" and "locking" are controlled separately (see catalogue).
If the connection "locking" is controlled by a sequence valve, the clamping force is approx. 10 - 20% lower.
Reason: To guarantee a safe switching sequence, the opening pressure of the sequence valve has to be adjusted to approx. 90% of the desired clamping pressure. Thus the clamping piston will already be locked at approx. 90% of the clamping pressure and the clamping force cannot further increase to 100%.

8.2 Function sequence

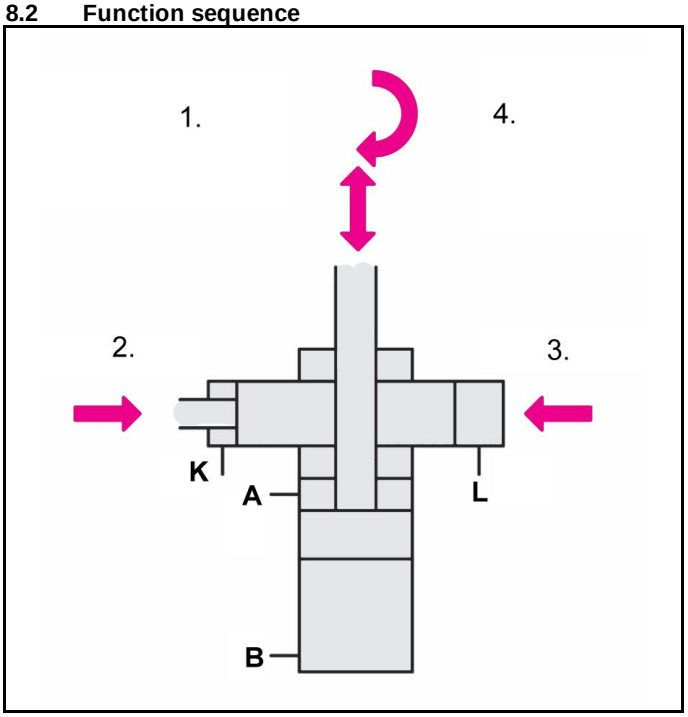


Figure 9: Function sequence

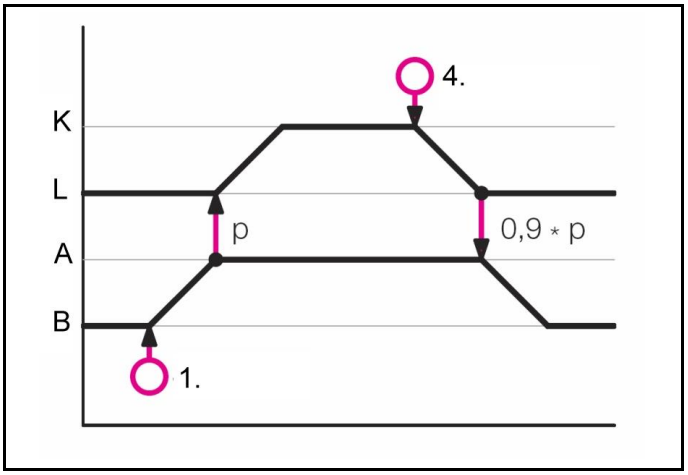


Figure 10: Function chart

1.	Swinging in and clamping	A	Clamping,
2.	Locking	B	Unclamping,
3.	Unlocking	K	Locking,
4.	Unclamping and swinging out	L	Unlocking,

8.3 Hydraulic control

The control is effected either with one switching circuit and 2 sequence valves or by two separate double-acting switching circuits.

8.3.1 Sequence control by sequence valves

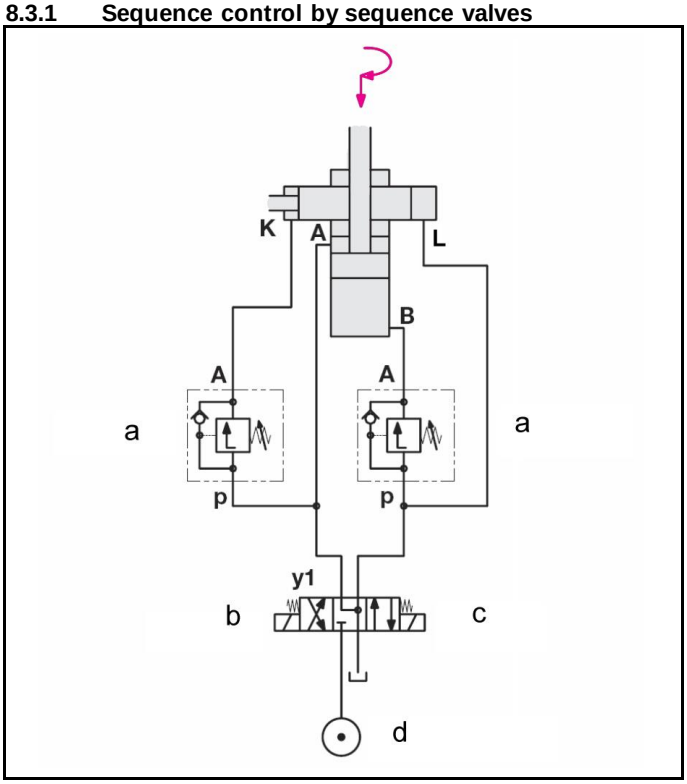


Figure 11: Hydraulic circuit diagram, control by sequence valves

a	Adjustment of the sequence valves, 0.9 x p max.	c	Valve position - clamping
b	Valve position - unclamping	d	Supply port p max. 250 bar
		y1	Valve 1

Switching sequence

1. Starting position
   y1 de-energised or y1 "Unclamping“
2. Clamping
   ► y1 "Clamping"
3. Depressurise (if required).Before depressurising, the locking pressure must be available at least for 3 seconds.
   ► y1 de-energised
4. Unclamping
   ► y1 "Unclamping“

Advantages

- Only 1 clamping circuit required
- Can be integrated in every double-acting clamping system

Disadvantages:

- Loss of clamping force of 10 – 20 % according to the adjusting precision of the sequence valve
- Switching sequence not precisely controllable

8.3.2 Sequence control by pressure switches

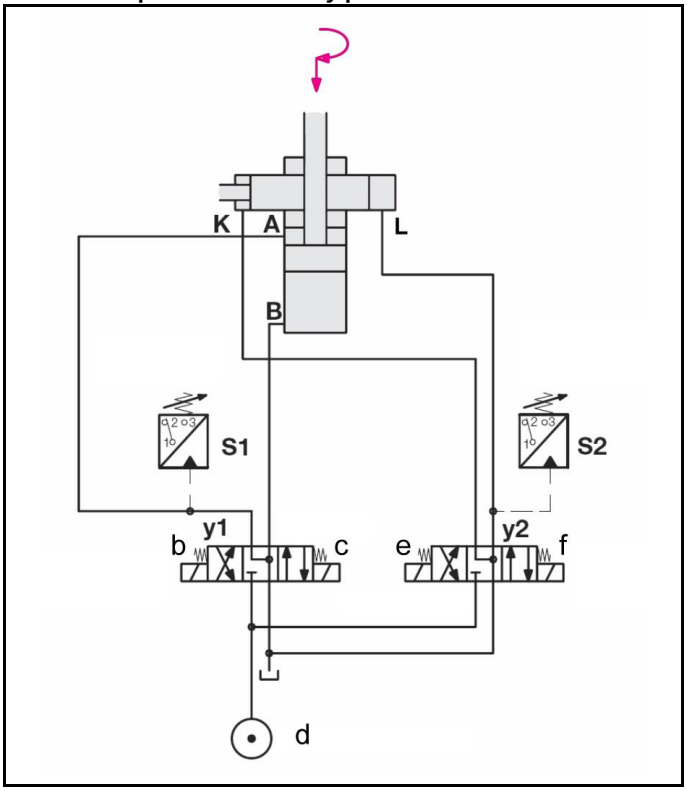


Figure 12: Hydraulic circuit diagram, control by pressure switch

S1	Adjustment of the pressure switch,clamped p max.	d	Supply port p max. 250 bar
Ss	Adjustment of the pressure switch,unlamped 0.9 x p max.	e	Valve position - unlocking
b	Valve position - unclamping	f	Valve position locking
c	Valve position - clamping	y1	Valve 1
		y2	Valve 2

Switching sequence

1. Starting position
   y1 and y2 de-energised or
   y1 "Unclamping“; y2 "Unlocking“
2. Clamping
   ► 1. y1 "Clamping“; y2 de-energised
   ► 2. S1 = p max ► y2 "Locking“
3. Depressurise (if required). Before depressurising, the locking pressure must be available at least for 3 seconds.
   ► y1 and y2 de-energised
4. Unclamping
   ► 1. y1 "Unlocking"
   ► 2. S2 = 0.9 p max
   ► y1 "Unclamping“

Advantages

- Precise switching sequence
- Clamping force exactly adjustable and reproducible

Disadvantages:

- 4 supply lines are required
- Higher expenses for control (hydraulic and electrical)

8.4 Connection of the hydraulic equipment

- Check tight seating (check tightening torque of the fixing screws, see chapter "Technical characteristics").
- Check tight seating of hydraulic connections (check tightening torque of the hydraulic connections, see chapter "Technical characteristics").
- Bleed the hydraulic system.

NOTE

Clamping time

- Without bleeding the clamping time will be considerably prolonged and function problems may occur.

- Start up of position monitoring.

Note

See operating instructions of the position monitoring.

8.5 Bleeding of pipe-mounted types

1. Loosen carefully at low pressure union nut of the pipe at the hydraulic ports.
2. Pump until bubble free oil comes out.
3. Fasten union nuts of the pipe.
4. Check tightness.

8.6 Bleeding of manifold-mounted types

1. Loosen carefully the bleeding screws of the fixture at low pressure.
2. Pump until bubble free oil comes out.
3. Fasten the bleeding screws.
4. Check correct function.
5. Check sealing of the hydraulic connections!

8.7 Admissible operating pressure

NOTE

Various Clamps

- The swing clamps are designed for a maximum pressure (see chapter Technical characteristics).
- According to the version of the used clamping arm, the operating pressure must be reduced considerably.
- Please pay attention to the clamping force diagrams on the data sheet.

9 Maintenance

⚠ WARNING

Burning due to hot surface!

During operation, surface temperatures on the product can exceed 70°C.

- Maintenance and repair work should only be performed in a cooled down condition and/or with protective gloves.

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!

⚠ CAUTION

Maintenance and repair work

All maintenance and repair works only to be effected by ROEMHELD service staff.

9.1 Cleaning

⚠ CAUTION

Material damage, damage to moving components

Damage to piston rods, plungers, bolts, etc., as well as wipers and seals can lead to leakage or premature failure!

- Do not use cleaning agents (steel wool or similar) that cause scratches, marks or the like.

Material damage, damage or functional failure

Aggressive cleaning agents can cause damage, especially to seals.

The product must not be cleaned with:

- corrosive or caustic substances or
- organic, solvents such as halogenated or aromatic hydrocarbons and ketones (cellulose thinner, acetone, etc.).

The product must be cleaned at regular intervals, especially the area of the piston or the plunger housing has to be cleaned from swarf and other liquids.

In the case of heavy contamination, cleaning must be made at shorter intervals.

Note

Special care must be taken with:

- dry machining
- minimum quantity lubrication and
- small grinding swarf

Small swarf and dust can stick to the rod / plunger of the element and be pulled into the sealing gap of the metallic wiper edge.

Thus, a sticky / pasty mass of swarf / dust can arise that hardens during standstill.

Result: Malfunction due to deadlock / bonding and increased wear.

Remedy: Regular cleaning of the piston rod/support plunger in the effective area of the wiper.

9.2 Regular checks

1. Check tightness of hydraulic connections (visual control).
2. Check running surfaces (of the piston rod or bolt) if there are marks and scratches. Traces of marks can be an indication for a contaminated hydraulic system or an inadmissible side load of the block cylinder.
3. Leakage check at the housing - piston rod, bolt or flange.
4. Clamping force control by pressure control.
5. Check if the maintenance intervals are kept.

9.3 Exchange seal kit

The exchange of the seal kit is made in case of external leakages. For high availability, the seals have to be changed at the latest after 500,000 cycles or 2 years.

The seal kit is available as spare part. An instruction for the exchange of the seal kit is available on request.

NOTE

Seal Kits

- Do not install seal kits which were exposed to light for a longer time.
- Pay attention to the storage conditions (see chapter "Technical characteristics").
- Only use original seals.

10 Trouble shooting

Trouble	Cause	Remedy
Piston rod with clamping arm does not retract	Clamping pressure is not available or too low	Check at the pressure generator, if pressure is available and high enough (minimum pressure: 30 bar)
Swing angle is not completely effected or exceeded (tolerance of end position ± 2°):	Too much clearance in the swing mechanism	⚠ **Caution !** Repair required by ROEMHELD
	Operating pressure too low	Adjust operating pressure in accordance with the technical characteristics.
Piston rod has too much play:	Guide or piston rod are worn out	Exchange piston rod, exchange component, if required
Clamping pressure reduces due to leakages at the swing clamp:	Wear at the seals	Exchange seals

Trouble	Cause	Remedy
Element does not lock	Error in hydraulic control	Check hydraulic control
Element cannot be unlocked	Error in hydraulic control	Check hydraulic control
	Pressure for unclamping too low	Check pressure
Piston rod with clamping arm does not retract/extend	Switching sequence consequence was not kept	Check switching sequence
	Error in hydraulic control	Check hydraulic control
	Locking defect	⚠ **Caution ! Works only to be effected by ROEMHELD service personnel.**

11 Accessory

11.1 Selection of the clamping arm

⚠ CAUTION

Material damage or functional failure

Use of an incorrectly dimensioned clamp can lead to damage on the product.

- When dimensioning, consider length, mass and the resulting radial torque and mass moment of inertia (see data sheet or installation drawing).

When selecting the clamping arm, the corresponding operating pressures as shown in the clamping force diagram (see ROEMHELD data sheet) must not be exceeded. If longer clamping arms will be used, not only the operating pressure but also the flow rate has to be reduced.

11.2 Position monitoring

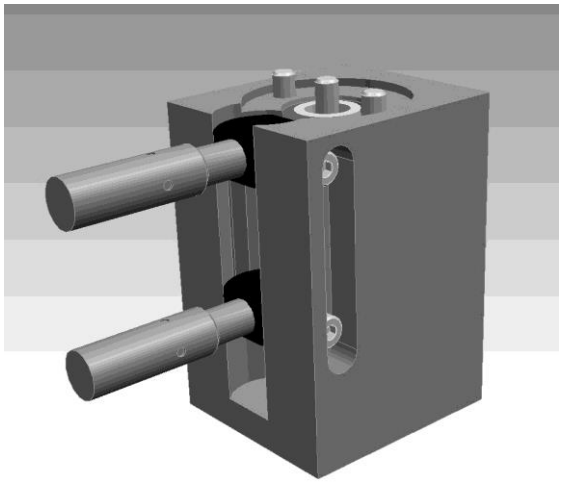
NOTE

- Position monitoring

NOTE

- See ROEMHELD data sheet.

11.3 Electrical position monitoring to be mounted at products with switch rod



11.3.1 Description of the product

The position monitoring will be screwed on at the cylinder bottom and can also be mounted in a position rotated by 180°. Different versions are available according to the application conditions. A control cam is provided at the extended piston rod causing the activation of the proximity switches. Adjustment of the switching position is effected by displacement of the proximity switches in the lateral groove. The proximity switches are switched on in a stroke range of approx. 6 mm by means of the control cam.

11.3.2 Validity of the documentation

These operating instructions apply to the electrical position monitoring with the following part numbers:

- without switch 0353 813, 815,
- with standard switch 0353 814, 811,

11.3.3 For your safety

Qualification of the user

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

11.3.4 Application

11.3.4.1 Intended use

Position monitorings are used for industrial/commercial applications to obtain electrical feedback from both end positions or intermediate positions of a product.
They are exclusively designed to be mounted at ROEMHELD products and for their control.
In addition, applies the intended use of the products for which they have been designed.

11.3.4.2 Misapplication

Position monitoring systems are not suitable for applications where coolants are used, since swarf can influence the function of the magnetic sensors.

11.3.5 Installation

1. Screw on position monitoring at the flange and at the piston rod.
2. Connect both proximity switches S1 and S2 as per electrical circuit diagram.

NOTE

Application of Position Control

- Position monitoring is not suitable for applications where coolants and lubricants are used.
- Install protection covers against possible swarf.

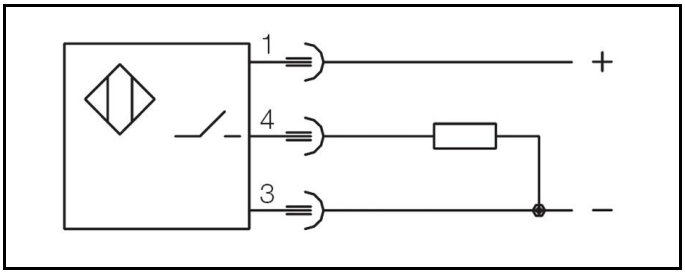


Fig. 13: Circuit diagram for pnp (+) sensor(s)

1	brown +
3	blue -
4	black (signal pnp)

11.3.6 Start up

11.3.6.1 Electrical position monitoring

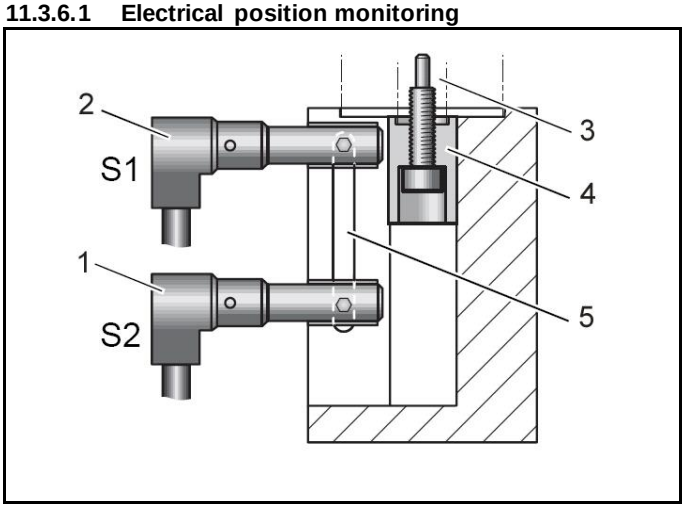


Figure 14: Design of the electrical position monitoring

1	Proximity switch S2 (clamped)	4	Signal sleeve
2	Proximity switch S1 (unclamped)	5	Slot for displacement of the proximity switches
3	Switch rod of the swing clamp		

Adjustment of proximity switches

1. Unclamp piston.
2. Screw in proximity switch S1 up to the stop on the signal sleeve and turn back 1/2 rotation.
3. Fix S1 with a headless screw. The distance to the signal sleeve must be 0.5 mm.
4. Displace S1 to the upper stop in the slot. Fix S1 with the socket head cap screw.
5. Clamp piston.
6. Displace S2 in the slot so that a signal course as per figures (Fig. signal course) will be achieved. Fix S2 with the socket head cap screw.

Figure 15: Signal course - clamping

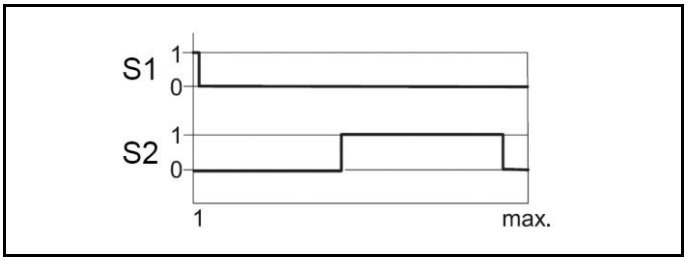


Figure 16: Signal course - unclamping

1	Signal ON	0	Signal OFF

The two figures show the signal course at both proximity switches during a clamping and unclamping process (max. = total stroke).

11.3.7 Maintenance

⚠ WARNING

Burning due to hot surface!

During operation, surface temperatures on the product can exceed 70°C.

- Maintenance and repair work should only be performed in a cooled down condition and/or with protective gloves.

11.3.7.1 Cleaning

The position monitoring must be cleaned at regular intervals.

11.3.7.2 Regular checks

- Check position monitoring if there are damages.
- Check tight seating of the position monitoring.
- The position monitoring itself is maintenance free.

11.3.8 Trouble shooting

Trouble	Cause	Remedy
No signal when extending or retracting the piston:	No supply voltage	Check supply voltage and switch on again, if necessary
Incorrect signals:	Proximity switch or position monitoring has become loose	Adjust and fix again proximity switch or position monitoring
No signal:		

11.3.9 Accessory

- Plug with cable
- Spare proximity switch

Note

See ROEMHELD data sheet

11.3.10 Technical characteristics

Operating voltage UB:	10 ... 30 V DC
Residual ripple:	max. 15%
Switching function:	Interlock
Output:	PNP
Cylinder body material:	Steel, corrosion resistant
Protection as per DIN 40050	IP 67

Note

Further technical data with reference to the position monitoring are included in the ROEMHELD data sheet.

11.3.11 Technical characteristics for proximity switches

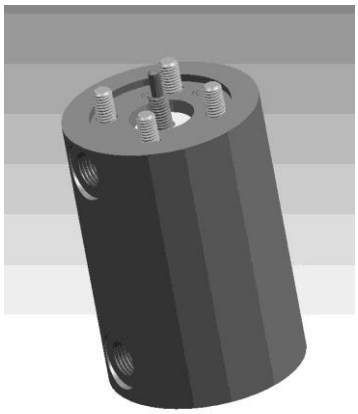
Ambient temperature:	-25 °C to +70 °C
Rated operating distance Sn	0.8 mm
Secured operating distance:	0 … 0.65 mm
Hysteresis:	max. 15 %
Repeatability:	max. 5%
Material of housing:	stainless steel
Code class:	IP 67
Type of connection:	Plug S49
Voltage:	DC

Switching function:	Interlock
Switching output:	**PNP**
Operating voltage UB:	10. 30 V
Rated operating voltage:	24 V
Rated current:	100 mA
Residual ripple:	max. 10%
Switching frequency:	3 kHz
Protection against reverse battery:	yes
Protected against short circuits:	yes
Tightening torque:	1 Nm

NOTE

Further technical data with reference to the position monitoring are included in the data sheet.

11.4 Pneumatic position monitoring to be mounted at products with extended piston rod



11.4.1 Description of the product

The position monitoring is screwed on the cylinder bottom. A control cam is provided at the extended piston rod causing the activation of the pneumatic jets.

11.4.2 Validity of the documentation

These operating instructions apply to the pneumatic position monitoring with the following part numbers:

- 0353 808, 809

11.4.3 For your safety

Qualification of the user

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

11.4.4 Application

11.4.4.1 Intended use

Pneumatic position monitorings are used for industrial applications in order to get a feedback from both end positions of the stroke range of a product.
They are exclusively designed to be mounted at ROEMHELD products and for their control.
In addition, applies the intended use of the products for which they have been designed.

11.4.5 Installation

1. Screw on position monitoring at the flange and at the piston rod.
2. Connect both pneumatic ports **(p1 = unclamped** and **p2 = clamping range)** .

Note

For interpretation of the pneumatic pressure we recommend to use a differential pressure switch.
Parallel connection for up to 8 swing clamps is possible. For a greater number there are special solutions. Please contact us.

11.4.6 Start up

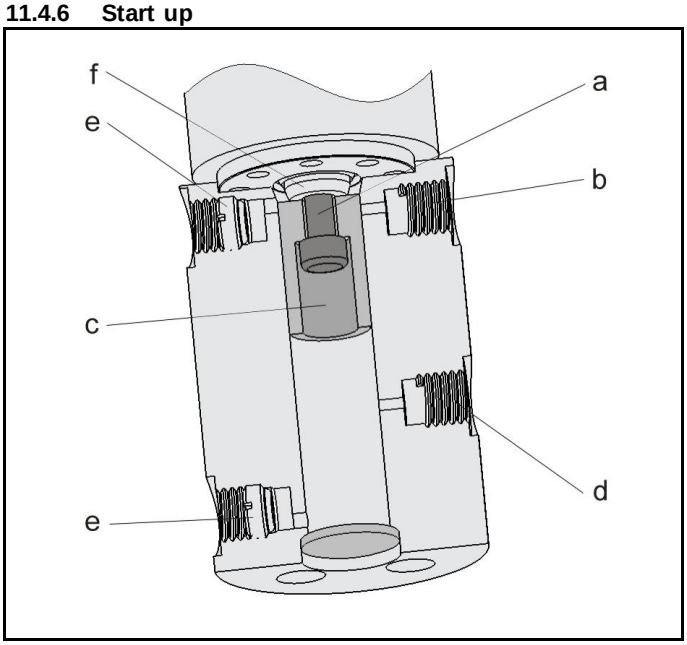


Figure 17: Design

a	Fixation of the signal sleeve	d	Lower pneumatic port, clamping range
b	Upper pneumatic port, unclamped	e	Venting by means of the filter element
c	Signal sleeve with switching cams	f	Switch rod of the swing clamp

1. Connect the pneumatic ports of the differential pressure switch to the position monitoring.
2. The piston position will be signalled by the pressure build up at the upper or lower pneumatic port:

Pressure built-up and/or signal sleeve is	Piston is
at the top (Fig. Design)	extended
at the bottom	retracted

NOTE

For interpretation of the pneumatic pressure we recommend to use the differential pressure switches type PEL.
Series connection for up to 4 swing clamps is possible.

NOTE

Evaluation of the pneumatic pressure

- For interpretation of the pneumatic pressure we recommend to use a differential pressure switch.
- Parallel connection for up to 8 elements is possible. For a greater number there are special solutions. Please contact us.

Evaluation of the pneumatic pressure

- The dependence between pipe length, jet diameter, leakage, pressure and flow rate determines the measurable pressure differential. In case of a too high flow rate the pressure differential is too low.
- For the interpretation of the pneumatic pressure we recommend to use a differential pressure switch. Parallel connection of up to four elements is possible.

Impurities in the compressed air

- The pollution of the compressed air can lead to interferences in the measurement .

11.4.7 Maintenance

⚠ WARNING

Burning due to hot surface!

During operation, surface temperatures on the product can exceed 70°C.

- Maintenance and repair work should only be performed in a cooled down condition and/or with protective gloves.

11.4.7.1 Cleaning

The position monitoring must be cleaned at regular intervals.

11.4.7.2 Regular checks

- Check position monitoring if there are damages.
- Check tight seating of the position monitoring.
- The position monitoring itself is maintenance free.

11.4.8 Trouble shooting

Trouble	Cause	Remedy
No signal	Insufficient pressure differential	Throttle flow rate, reduce pressure
	Position monitoring has become loose	Fix again position monitoring
	Leakage in the system	Check supply lines
Incorrect signals:	Position monitoring has become loose	Fix again position monitoring

11.4.9 Technical characteristics

Cylinder body material:	Steel, corrosion resistant

Note

Further technical data with reference to the position monitoring are included in the data sheet.

12 Technical characteristics

General characteristics

Types	Maximum operating pressure [bar]	max. effective clamping force*) [kN]
1895 XXX KXX 35	250	**11.3**
1896 XXX KXX 36		**17.6**

*) Values dependent on the used clamping arm, see clamping force diagram in the catalogue.

Part-no.	1895 XXX KXX35	1896 XXX KXX36
Swing stroke, P1 (mm)	13	16
Clamping stroke, P2 (mm)	22	20
Min. operating pressure [bar]	30	
Admissible flow rate [cm^3/s]	20	36
Tolerance of swing angle (degree)	± 1	
Use screw material	12.9	

Types	Tightening torque of the fixing nut of the clamping arm [Nm]
1895 XXX KXX 35	**90**
1896 XXX KXX 36	**160**

NOTE

Further information

- For further technical data see ROEMHELD data sheet.

13 Storage

⚠ CAUTION

Damage due to incorrect storage of components

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

- Storage in the packaging and moderate environmental conditions.
- The product must not be exposed to direct sunlight, since UV light may cause serious damage to the seals.

The elements are tested by default with mineral oil. The exterior of the elements is treated with a corrosion inhibitor.
The oil film remaining after the test provides for a six-month interior corrosion protection, if stored in dry and uniformly tempered rooms.
For longer storage times, the element has to be filled with a non-resinifying corrosion inhibitor and the outside surfaces must be treated.

14 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.

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.

15 Declaration of manufacture

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

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

Declaration of manufacture of the products

They 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 components, that 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 / 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.

Laubach, 10.03.25