



## Swing clamp without swing stroke

top flange type, with optional switch rod for position monitoring, with reinforced swing mechanism, double acting, max. operating pressure 350 bar



### 1 Description of the product

Double-acting swing clamp with reinforced swing mechanism with and without switch rod for position monitoring.

This line is a further development of the proved ROEMHELD swing clamps with the aim to improve process safety in linked clamping systems. The most important characteristics are as follows:

- **Swinging without axial stroke**  
This version can clamp workpieces in recesses that are only insignificantly higher than the clamping arm.
- **Reinforced swing mechanism**  
The reinforced swing mechanism without overload protection device endures a collision of the clamping arm with the workpiece during clamping up to a pressure of 100 bar.
- **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.

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### 2 Validity of the documentation

This document applies to the following products:

Swing clamps with swing stroke of data sheet B 1.8806. The following types or part numbers are concerned:

- Clockwise rotation 90°:  
1893-N90R-12XX, 1895-N90R-16XX, 1896-N90R-20XX,
- Counterclockwise rotation 90°:  
1893-N90L-12XX, 1895-N90L-16XX, 1896-N90L-20XX,

#### XX: Version:

**DH** = without switch rod, without metallic wiper

**DM** = without switch rod, with metallic wiper

**MH** = with switch rod, without metallic wiper

**MM** = with switch rod, with metallic wiper

Special swing angles between 20° and 70° are available on request.

Electrical position monitoring:

- 0353-897, 0353-893, 0353-902,
- 0353-909, 0353-908, 0353-907.

Pneumatic position monitoring

- 0353-896, -892, -903

### 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 designed exclusively for clamping of workpieces or as a swivelling stop in industrial applications. They must only be operated with hydraulic oil.

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.
- Only HLP hydraulic oils may be used.
- Solely clamping arms may be moved.

## 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.
  - Higher flow rates than indicated on the data sheet or installation drawing.

**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 dismantling 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 falling parts!**

- Keep hands and other parts of the body out of the working area.
- Wear personal protection equipment!

#### **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.

### **CAUTION**

#### **Great weight may fall**

Some product types have a considerable weight. These have to be secured against working free during transport.

Weight specifications see chapter "Technical characteristics".

### 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.

The swing stroke is not visible.

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

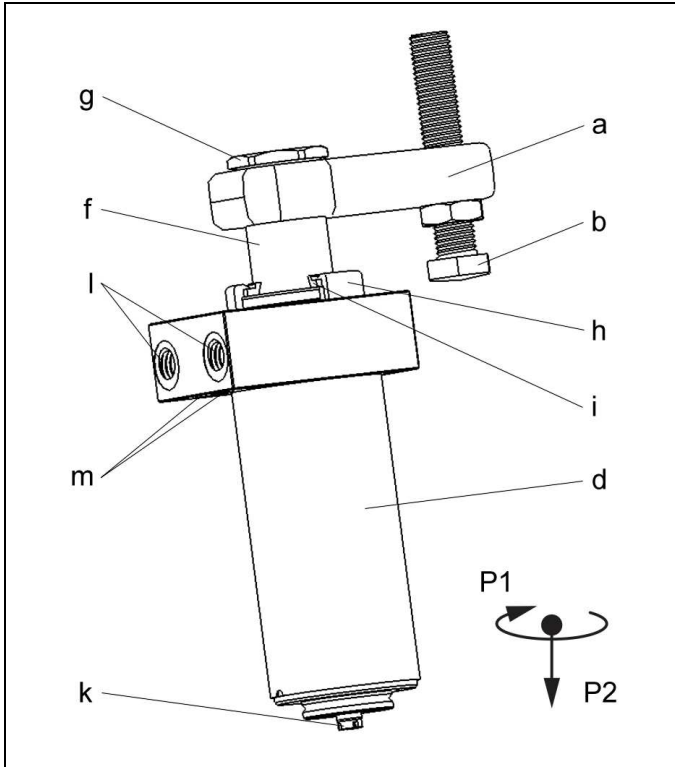


Figure 1.: Components

a Clamping arm (accessory)	k Switch rod
b Contact bolt (accessory)	l Hydraulic ports A and B
f Piston	m Hydraulic ports, manifold-mounting version A and B
g Fixing nut (included in the delivery)	P1 Swing direction
h Metallic wiper, retaining ring for DM or MM version	P2 Clamping stroke
i Metallic wiper, wiper ring for DM or MM version	

The versions MH and MM are equipped with a piston rod that protrudes through the bottom and allows a pneumatic or electrical control of the piston position outside the swarf area.

### 7.2 Swing angle and direction

The swing clamps are available with standard swing angle of 90°. Special swing angles between 20° and 70° are available on request.

"Swing direction cw" means clockwise rotation, looking from above onto the piston (from unclamped position to clamped position).

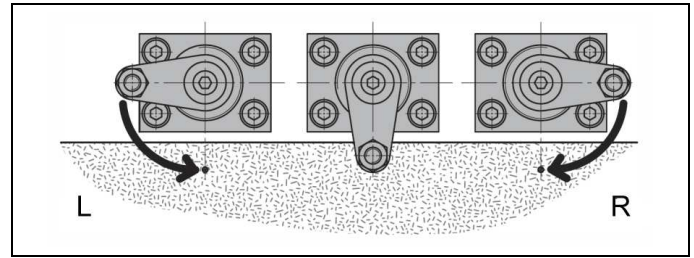


Figure 2.: Swing direction (L =counterclockwise "ccw", R = clockwise "cw")

### 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

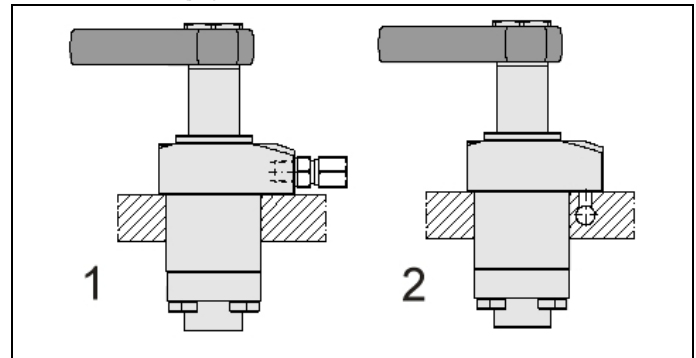


Figure 3.: Mounting types

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

**Maximum flow rates do not exceed**

The maximum flow rate must not be exceeded.

### 7.5.1 Calculation of the admissible flow rate

#### Admissible oil 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:

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

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

### Maximum piston speed

At specified pump flow rate **Q** and with the effective piston area **A** 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 [cm<sup>3</sup>/s]

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

$A_K$  = Piston area in [cm<sup>2</sup>]

$n$  = Number of elements, same dimensions

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

### NOTE

#### Oil volume

- The maximum oil volume and/or the maximum stroke speed depend on the corresponding product.
  - For clamping cylinders see data sheet A 0.100.
  - or 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 in the [Technical library](#) on the internet!

or download



### 7.5.2 Throttling of the flow rate

The throttling always has to be effected in the supply line to the swing clamp. 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.

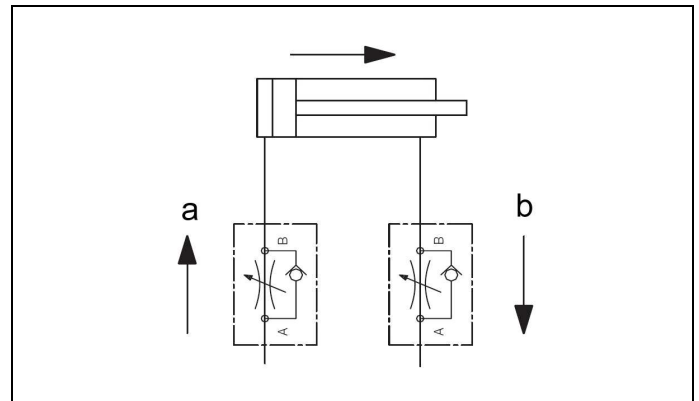


Figure 4.: Hydraulic circuit diagram without flow control valves

a Throttling direction	b Free flow
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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

- Clean the support surfaces.
- Fasten the element support at the flange surface (see figure "Mounting types").

### WARNING

#### Injury by falling products!

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

### NOTE

#### Tightening

- 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".

### 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".

### 7.7 Installation of manifold-mounted types

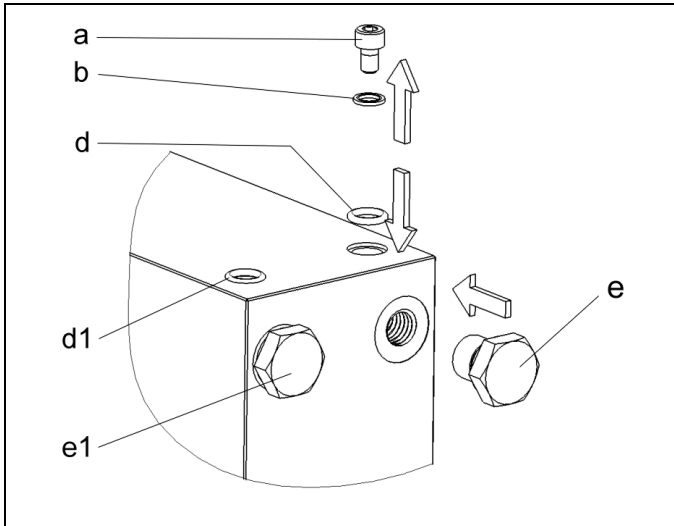


Figure 5.: Example, preparation for hydraulic ports without pipes

#### **NOTE**

##### The arrangement of the ports

- The shown figure is a schematic diagram. 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, depending on the version)	e1 Mounted screw plug

- Drill the holes for hydraulic oil supply and return in the fixture (see also data sheet).
- Grind or finish mill the manifold-mounting surface ( $R_a \geq 0.8$  and a flatness of 0.04 mm to 100 x 100 mm, marks, scratches, shrink holes, concentric machining marks are inadmissible).

For some versions:

- Remove socket head cap screws and sealing rings, insert o-rings (accessories, if required).
  - Tighten pipe ports with screw plugs (accessories, if required)
- Clean the support surfaces.
  - Position and fasten on the fixture.
  - Install bleeding screws at the upper ends of the piping.

#### **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

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

#### **NOTE**

##### More details

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

##### Screwed Plug

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

##### hydraulic connection

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

##### Pressure fluids

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

### 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**

##### When tightening and untightening the fixing nut, the piston has to be backed up

- 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.

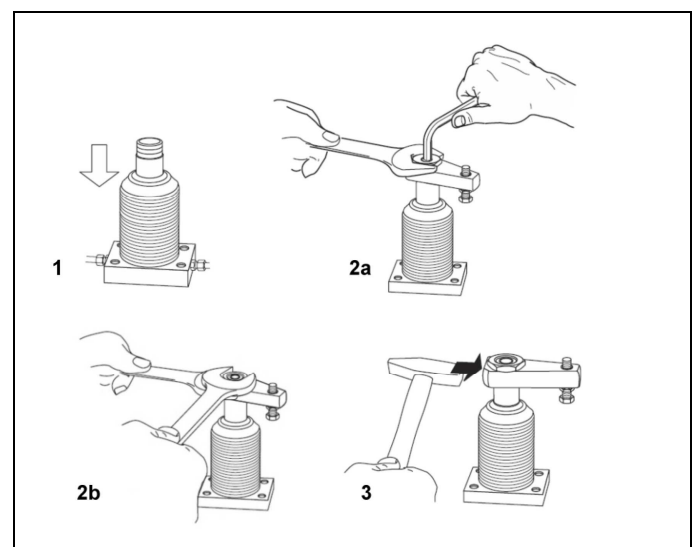


Figure 6.: Assembly / disassembly (example)

### 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**

##### Piston rod guide

Heavy hammering can destroy the piston rod guide!

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**).

### 7.9.4 Adjustment of contact bolt

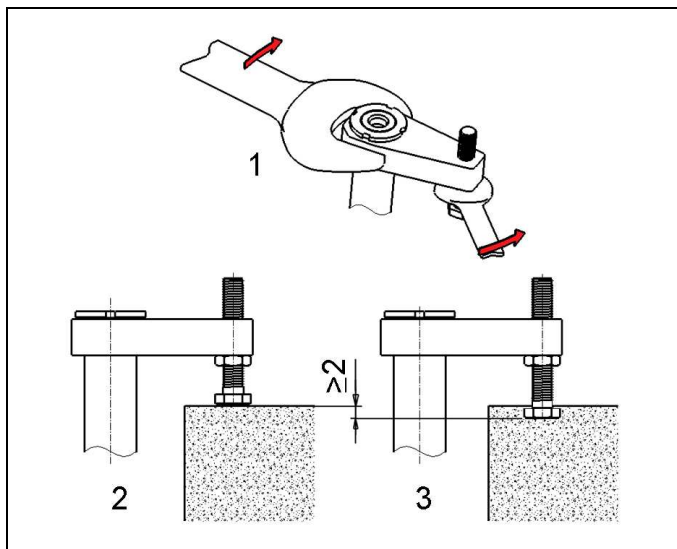


Figure 7.: Adjustment of the clamping arm (example)

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**).

### 7.9.5 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 .

### 7.9.6 Assembly of the metallic wiper

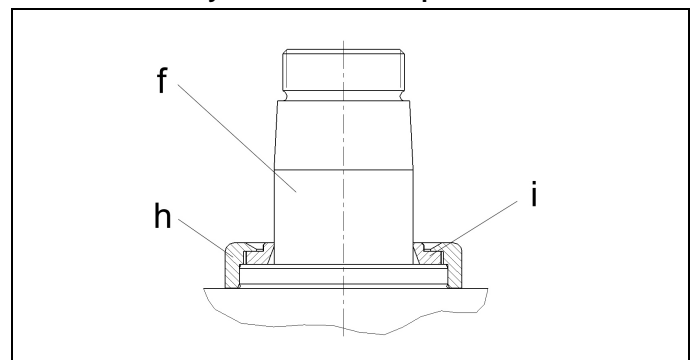


Figure 8.: Metallic wiper

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, 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.

### ⚠ CAUTION

#### Operating pressure of 350 bar does not exceed

The maximum operating pressure of 350 bar must not be exceeded.

- 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.

### i NOTE

#### Clamping time

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

- Start up of position monitoring.

### i Note

See operating instructions of the position monitoring.

#### 8.1 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.

#### 8.2 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!

#### 8.3 Admissible operating pressure

### i 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!

- 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.

### 9.1 Cleaning

### ⚠ CAUTION

#### Avoid damages of the moved components

Avoid damages of the moved components (rods, plungers, bolts, etc.) as well as of wiper and seal.

#### 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 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.

### i 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.

## CAUTION

### Maintenance and repair work

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

The exchange of the seal kit has to be made in case of external leakages. For high availability we recommend to change the seals at the latest after 1,000,000 cycles or 2 years.

Due to the complex design a seal exchange must only be effected by ROEMHELD service personnel.

## 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: 50 bar)
Swing angle is not completely effected or exceeded (tolerance of end position $\pm 2^\circ$ ):	Too much clearance in the swing mechanism	Repair required by ROEMHELD
Piston rod has too much play:	Guide or piston rod are worn out	Exchange swing clamp, if necessary to be checked by ROEMHELD service personnel.
Clamping pressure reduces due to leakages at the swing clamp:	Wear at the seals	Exchange swing clamp, if necessary to be checked by ROEMHELD service personnel.

## 11 Technical characteristics

### General characteristics

Part-no.	Max. operating pressure [bar]	Max. effective clamping force*)
		[kN]
1893 N90X 12XX	350	6.1
1895 N90X 12XX		15.8
1896 N90X 12XX		24.7

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

Part-no.	1893 N90X 12XX	1895 N90X 12XX	1896 N90X 12XX
Clamping stroke, P2 [mm]	12	16	20
Min. operating pressure [bar]	50		
Max. operating pressure [bar]	350		
Admissible flow rate [cm <sup>3</sup> /s]	5	17	36
Tolerance of the swing angle (degree)	$\pm 2^\circ$		
Screw material	12.9		

## NOTE

### Further information

- For further technical data see ROEMHELD data sheet.

## 12 Storage

### ⚠ CAUTION

#### Storage of components!

- The product may not be exposed to direct solar radiation, because the UV light can destroy the seals.
- A storage differing from the storage conditions is inadmissible.
- In case of improper storage, the seals can embrittle and resinification of the anti-corrosive oil or corrosion at the element can occur.

The 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.

## 13 Accessory

### 13.1 Selection of the clamping arm

#### ⚠ CAUTION

##### Using an incorrect clamping arm

When using incorrect clamping arms, damages can occur.

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.

### 13.2 Position monitoring

- Position monitoring

#### ℹ NOTE

- See ROEMHELD data sheet.

### 13.3 Electrical position monitoring

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



#### 13.3.1 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 4 x 90°. The signal sleeve with switching cam is fixed at the extended piston rod causing the signalling for the inductive proximity switches.

The minimum distance to the positions to be monitored depends on the switch type and is indicated in the chart.

Different versions are available according to the application conditions.

The position monitoring can alternatively be supplied with or without proximity sensors.

#### 13.3.2 Validity of the documentation

Electrical position monitoring:

- 0353-897, 0353-893, 0353-902,
- 0353-909, 0353-908, 0353-907.

### 13.3.3 Target group of this document

- 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.

### 13.3.4 For your safety

#### Qualification of the user

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

### 13.3.5 Application

#### 13.3.5.1 Intended use

Position monitorings are used for industrial applications in order to get an 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.

#### 13.3.5.2 Misapplication

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

### 13.3.6 Installation

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

## **i** NOTE

#### Application of Position Control

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

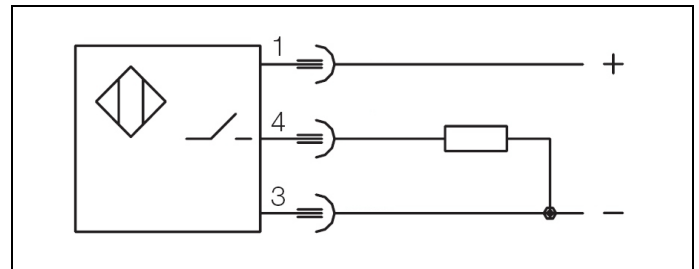


Fig. 9.: circuit diagram for pnp (+) magnetic sensor

- |   |         |
|---|---------|
| 1 | brown + |
| 3 | blue -  |
| 4 | black   |

### 13.3.7 Start up

#### 13.3.7.1 Design

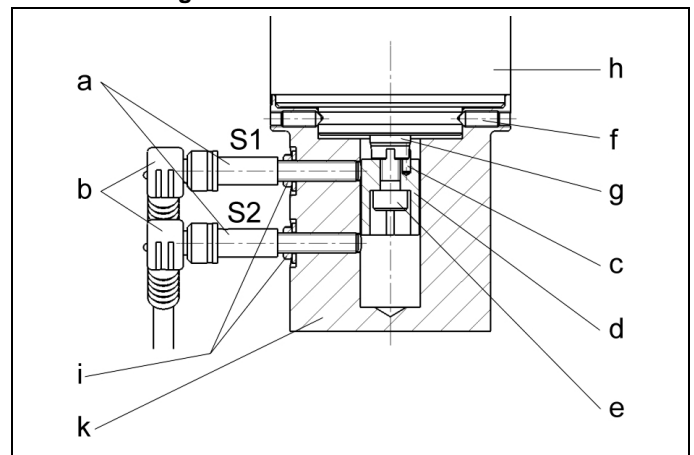


Figure 10.: Design of the electrical position monitoring

a	Proximity switch S1 (unclamped) Proximity switch S2 (clamped)	f	Set screw, fixing of the position monitoring at the body (h)
b	Right angle plug	g	Switch rod
c	Dowel pin, anti-torsion device, signal sleeve (d) and switch rod (g)	h	Body of the swing clamp
d	Signal sleeve	i	Lock nut
e	Socket head cap screw, fixation of the signal sleeve (d)	k	Housing of position monitoring

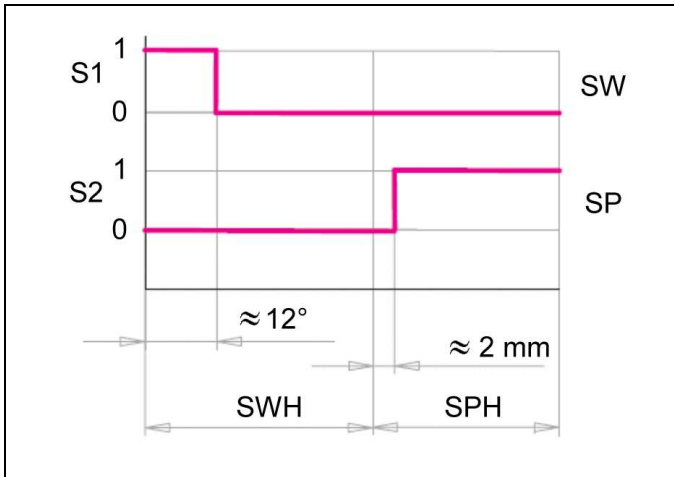


Figure 11.: Signal course clamping and unclamping process

1	Signal ON	SP	Clamping
0	Signal OFF	SPH	Clamping stroke
S1	Proximity switch 1, unclamped	SW	Swinging
S2	Proximity switch 2, clamped	SWH	Swing stroke

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

### **⚠ 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 of components due to incorrect adjustment!**

If the proximity switch was too deeply screwed in, it can be squeezed during operation. Check the position of the proximity switch by manual adjustment of the signal sleeve.

1. Manually unclamp the piston - extend.
2. Insert dowel pin (c) in signal sleeve (d) and the slot of the switch rod.  
The position of the dowel pin with signal sleeve is 180° compared with the proximity switches (a)
3. Secure signal sleeve with socket head cap screw (e).  
For this purpose the element can be clamped.
4. Carefully screw in proximity switch S1 to the stop of the signal sleeve and turn back by one rotation.
5. Fix proximity switch S1 with the lock nut (i).
6. Manually clamp the piston - retract
7. Carefully screw in proximity switch S2 to the stop of the signal sleeve and turn back by one rotation.
8. Fix proximity switch S2 with the lock nut (i).
9. Check adjustment of the proximity switches and signal.

### 13.3.8 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.

#### 13.3.8.1 Cleaning

The position monitoring must be cleaned at regular intervals.

#### 13.3.8.2 Regular checks

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

#### 13.3.8.3 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:		

### 13.3.9 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

#### **i Note**

Further technical data with reference to the position monitoring are included in the ROEMHELD data sheet B 1.552.

### 13.3.10 Technical data / proximity sensor

Environmental temperature:	<b>-25 °C to +80 °C</b>	<b>-25 °C to +120 °C</b>
Rated operating distance Sn:	1.5 mm	1.5 mm
Secured operating distance:	0 ... 1.2 mm	0 ... 2.0 mm
Hysteresis:	max. 15 %	max. 15 %
Repetitive accuracy:	max. 5%	max. 5%
Body material:	1.4104 steel, corrosion resistant	
Code class:	IP 68	IP 68
Connection type:	plug S4	plug S4
Voltage:	DC	DC
Switching function:	interlock	interlock
Output:	<b>pnp</b>	<b>pnp</b>
Operating voltage UB:	10 ... 30 V	10 ... 30 V
Design voltage:	24 V	24 V
Design current:	200 mA	200 mA
Residual ripple:	max. 15%	max. 15%
Switching frequency	1 kHz	2 kHz
Protection against reverse battery:	installed	installed
Protected against short circuits	yes	yes

### 13.3.11 Accessory

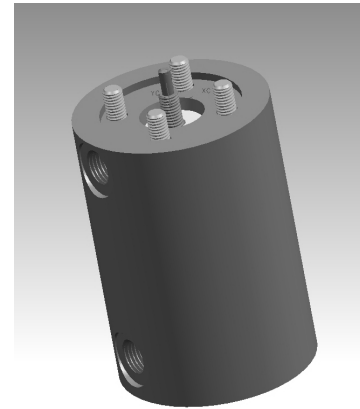
- Plug with cable
- Spare proximity switch

### **Note**

See ROEMHELD data sheet B 1.552.

### 13.4 Pneumatic position monitoring

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



#### 13.4.1 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 4 x 90°. Different versions are available according to the application conditions. A switching cam is provided at the extended piston rod causing the signalling of the jets.

#### 13.4.2 Validity of the documentation

Pneumatic position monitoring

- 0353-896, -892, -903

#### 13.4.3 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.

#### 13.4.4 For your safety

##### Qualification of the user

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

### 13.4.5 Application

#### 13.4.5.1 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.

#### 13.4.5.2 Misapplication

Position monitoring systems are not suitable for applications where coolants are used.

### 13.4.6 Installation

1. Screw on position monitoring at the flange and at the piston rod.
2. Connect both pneumatic ports (**b = unclamped** and **d = 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.

### 13.4.7 Start up

### 13.4.8 Design

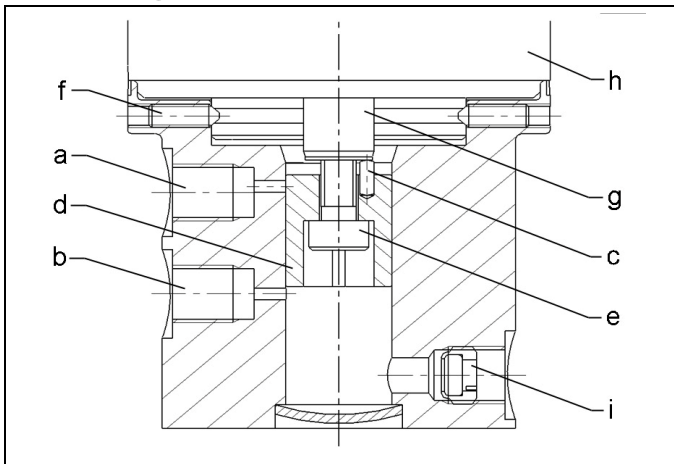


Figure 12.: Design

a Pneumatic port E1 (at the top), monitoring unclamped	f Set screw, fixing of the position monitoring at the body (h)
b Pneumatic port E2 (at the bottom), monitoring clamping range	g Switch rod
c Dowel pin, anti-torsion device, signal sleeve (d) and switch rod (g)	h Body of the swing clamp
d Signal sleeve	i Venting by means of the filter element
e Socket head cap screw, fixation of the signal sleeve (d)	k Housing of position monitoring

### Control by pneumatic pressure switch

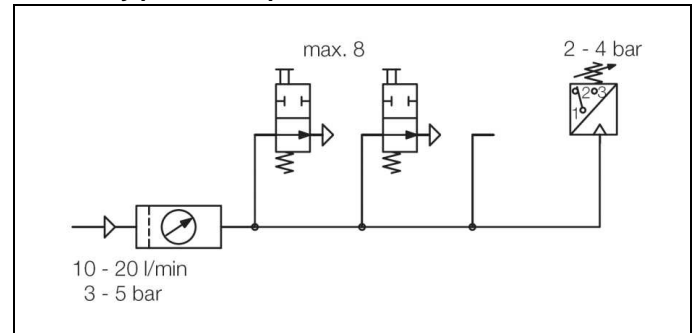


Figure 13.: Circuit diagram max. position monitorings

#### **Note**

For the evaluation of the pneumatic pressure built-up standard pneumatic pressure switches can be used. It is possible to control with one pressure switch up to 8 position monitorings connected in series (see circuit diagram).

#### **Note**

It has to be considered that process-safe functioning of pneumatic position monitorings is only guaranteed with throttled air and system pressure. The nominal values are indicated below technical characteristics.

### Procedure

1. Manually unclamp the piston - extend.
2. Insert dowel pin (c) in signal sleeve (d) and the slot of the switch rod.  
The position of the dowel pin with signal sleeve is 180° compared with the terminals (a)
3. Secure signal sleeve with socket head cap screw (e).  
For this purpose the element can be clamped.
4. Connect pressure switch / differential pressure switch.
5. The piston position will be signalled by the pressure build up at the upper or lower monitoring.

Pressure build-up	Piston position
Monitoring E1 (at the top)	extended / retracted
Monitoring E2 (at the bottom)	Clamping range

6. Test the function of the monitoring.

#### **NOTE**

#### 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.

### 13.4.9 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.

#### 13.4.9.1 Cleaning

The position monitoring must be cleaned at regular intervals.

#### 13.4.9.2 Regular checks

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

#### 13.4.9.3 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

### 13.4.10 Technical characteristics

#### Technical characteristics

Port	G 1/8
Nominal diameter [mm]	2
Max. air pressure [bar]	10
Range of operating pressure [bar]	3...5
Differential pressure* at 3 bar system pressure [bar]	min. 1.5
Differential pressure* at 5 bar system pressure [bar]	min. 3.5
Air flow rate** [l/min]	10...20

\* Pressure drop when controlling the function "Clamped", if one or several position monitorings are not operated.

\*\* For measuring the air flow rate appropriate devices are available. Please contact us.

## 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](mailto:info@roemheld.de)  
[www.roemheld.com](http://www.roemheld.com)

### Declaration of manufacture of the products

Swing clamps with swing stroke of data sheet B 1.8806. The following types or part numbers are concerned:

- Clockwise rotation 90°:  
1893-N90R-12XX, 1895-N90R-16XX, 1896-N90R-20XX,
- Counterclockwise rotation 90°:  
1893-N90L-12XX, 1895-N90L-16XX, 1896-N90L-20XX,

### XX: Version:

**DH** = without switch rod, without metallic wiper

**DM** = without switch rod, with metallic wiper

**MH** = with switch rod, without metallic wiper

**MM** = with switch rod, with metallic wiper

Special swing angles between 20° and 70° are available on request.

Electrical position monitoring:

- 0353-897, 0353-893, 0353-902,
- 0353-909, 0353-908, 0353-907.

Pneumatic position monitoring

- 0353-896, -892, -903

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 and EN 982, 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.

Responsible person for the documentation:

Dipl.-Ing. (FH) Jürgen Niesner, Tel.: +49(0)6405 89-0.

**Römheld GmbH**

**Friedrichshütte**

Laubach, 11.12.2013