



## Pneumatic swing clamps

top flange type, for adjustable magnetic sensors, double acting, max. operating pressure 7 bar



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### 1 Description of the product

#### Application

Pneumatic swing clamps are used for applications which require only low clamping forces.

The installed magnetic piston allows monitoring of clamping and unclamping position.

#### Description

When pressurising the element, the clamping arm swings and lowers by 90° to the clamping position and then lowers to the clamping point. The position monitoring gives the required information regarding the position of the piston, but not regarding the position of the clamping arm.

Monitoring is made by electronic sensors (see accessory) which detect the magnetic field of the magnetic piston. The switching points can be continuously adjusted by displacement of the magnetic sensors.

### 2 Validity of the documentation

This document applies to the following products:

Pneumatic swing clamps of data sheet J 7.203. The following types or part numbers are concerned:

#### Clockwise rotation:

- 1873 103, 1874 103, 1875 103, 1876 103, 1877 103

#### Counterclockwise rotation:

- 1873 203, 1874 203, 1875 203, 1876 203, 1877 203

### 3 Target group of this document

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

#### 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 Safety instructions

### **DANGER**

#### **Danger of life / heavy health damages**

Stands for an imminent danger.  
If it is not avoided, death or very severe injuries will result.

### **WARNING**

#### **Person damage**

Stands for a possibly dangerous situation.  
If it is not avoided, death or very severe injuries will result.

### **CAUTION**

#### **Easy injuries / property damage**

Stands for a possibly dangerous situation.  
If it is not avoided, minor injuries or material damages will result.

#### **Hazardous to the environment**



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



#### **Mandatory sign!**

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

### **NOTE**

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

## 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

#### **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**

##### **Operating pressure of 7 bar not exceed**

The maximum operating pressure of 7 bar must not be exceeded.

##### **High forces by pneumatic pressure**

With pneumatic pressure very high forces are generated.  
The fixture or machine must be in the position to compensate these forces.

### **NOTE**

#### **Qualification of personnel, pneumatic**

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

## 6 Application

### 6.1 Intended use

The products are designed exclusively for clamping of workpieces or as a swivelling stop in industrial applications, where low clamping forces are sufficient. They must only be operated with compressed air.

The installed magnetic piston allows monitoring of clamping and unclamping position.

Furthermore the following are 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.
- 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 falling parts!

- Keep hands and other parts of the body out of the working area.
- Wear personal 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 pneumatic 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 of the fixture.

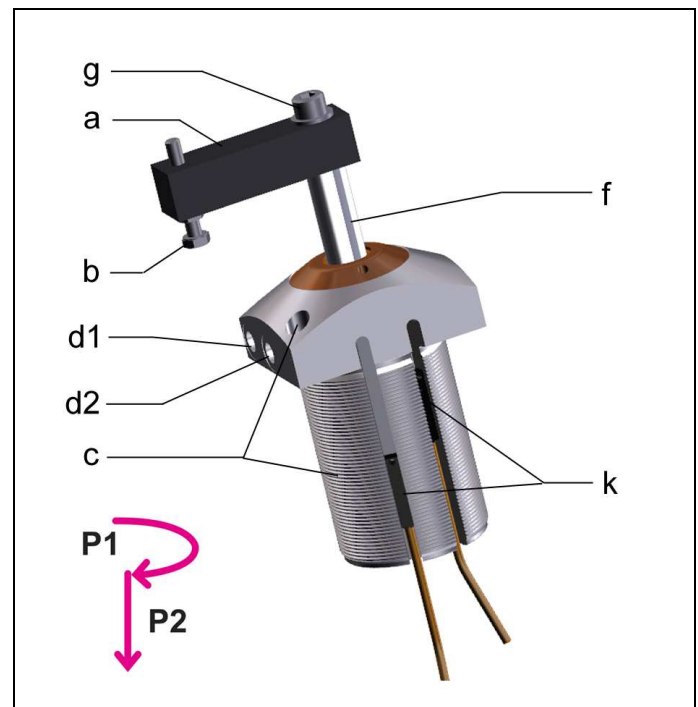


Figure 1: Components

a	Clamping arm (accessory)	g	Fixing screw (included in the delivery)
b	Contact bolt (accessory)	k	Magnetic sensor (accessory)
d1	Pneumatic port (clamping - retract)	c	Fixing possibility
d2	Pneumatic port (unclamping - extend)	P1	Swing stroke
f	Piston with integrated swing mechanism and solenoid	P2	Clamping stroke

### 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.

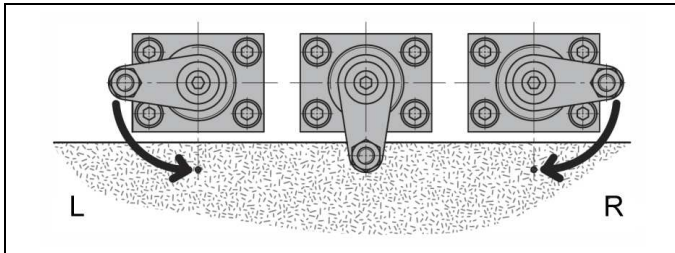


Figure 2: Swing direction  
(L = counterclockwise "ccw", R = clockwise "cw")

### 7.3 Connection of pneumatic equipment

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

#### Application example

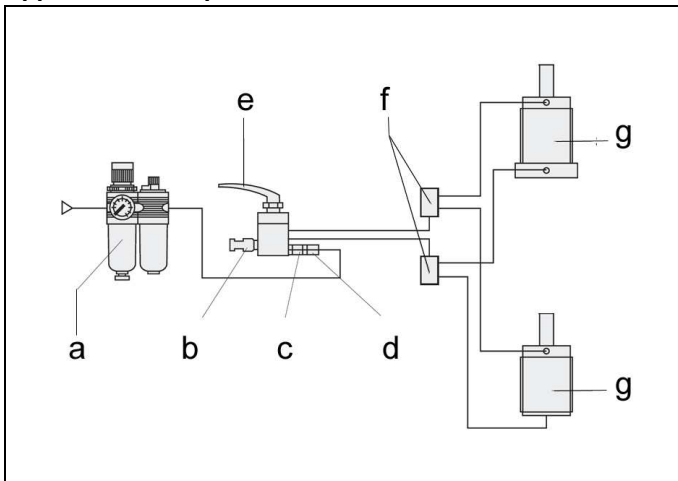


Figure 3: Application example

a Service unit	e Manual valve
b Silencer	f Connecting block
c Check valve	g Pneumatic element
d Socket end	

#### **i** NOTE

##### More details

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

### 7.4 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

##### Assembly and disassembly of the clamping arm

- When tightening and untightening the fixing screw, the clamping arm 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!

#### **i** NOTE

When tightening and untightening the fixing screw, the clamping arm has to be backed up. It is recommended to effect tightening and untightening in the swing range.

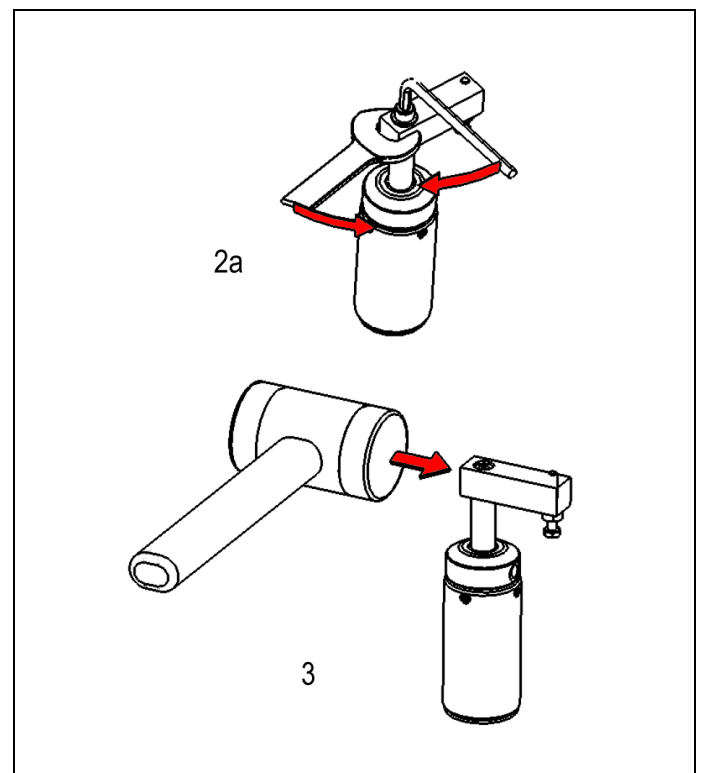


Figure 4: Assembly /disassembly (example)

#### 7.4.1 Assembly of the clamping arm - with pressure

1. Retract piston and pressurise clamping line (port A).
2. Put the clamping arm in the intended clamping position.
3. Fasten fixing screw and hold clamping arm with an Allen key (Fig. Assembly, Pos. 2a).
4. Clamp several times.
5. Check if the clamping point is within the clamping stroke.

#### 7.4.2 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 screw and hold clamping arm with an Allen key (Fig. Assembly, **Pos. 2a**).
5. Clamp several times.
6. Check if the clamping point is within the clamping stroke.

#### **NOTE**

##### Tightening torque

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

#### 7.4.3 Disassembly of the clamping arm - without pressure

#### **CAUTION**

##### Piston rod guide

Heavy hammering can destroy the piston rod guide!

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

#### 7.5 Adjustment of contact bolt

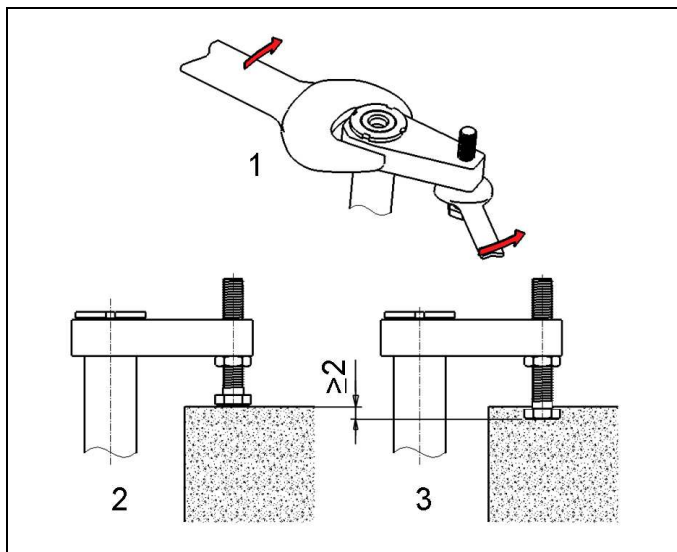


Figure 5: Adjustment of the clamping arm (example)

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**).

#### 7.5.1 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 .

## 8 Start up

### **CAUTION**

#### Operating pressure of 7 bar not exceed

The maximum operating pressure of 7 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").
- Start up of position monitoring.

#### **NOTE**

See operating instructions of the position monitoring.

#### 8.1 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.

### 8.2 Start up of the position monitoring

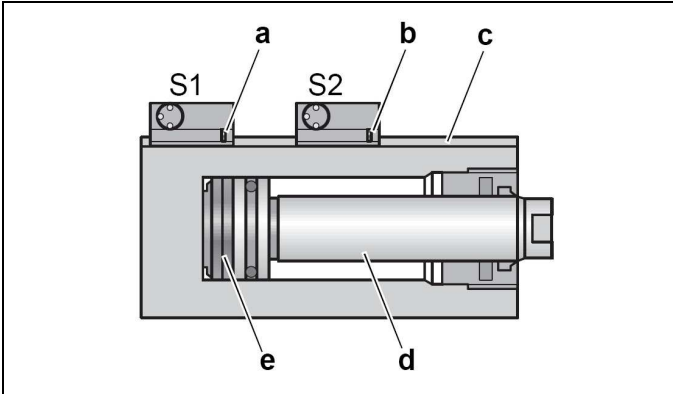


Figure 6: Design

a Magnetic sensor S1 (retracted)	d Piston rod
b Magnetic sensor S2 (extended)	e Magnetic disks
c Slot for displacement of the magnetic sensors	

Condition for start up is that the magnetic sensors S1 and S2 are electrically wired as per circuit diagram and a correct supply voltage is available.

The magnetic sensors can be mounted in the same slot or in different slots of the block cylinder. In the case of arrangement in one slot the minimum distance between the switching points is 6 mm, in two slots 3 mm.

The red point on the magnetic sensor indicates the position of the sensor element.

- Retract piston.
- Displace magnetic sensor S1 in the slot until the yellow LED at the right angle plug is lit. Mark the position of the red point at the slot.
- Continue displacing S1 until the yellow LED is no longer illuminated. Mark the position of the red point at the slot.
- Fasten S1 in the centre of both markings.
- Extend piston.
- Proceed in the same way with S2, so that a signal course as per figure 8 will be obtained.

The following figure shows the principal signal course during extending and retracting the piston (max. = total stroke).

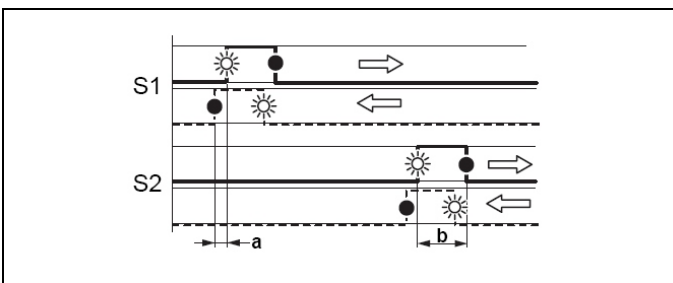


Fig. 7: fundamental signal course

☀ Signal on	a Hysteresis
● Signal off	b Overrunning distance

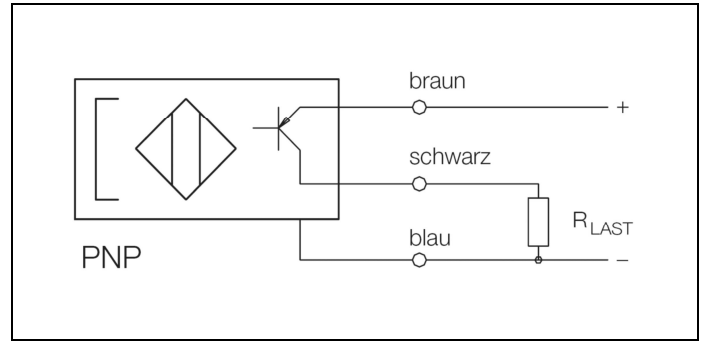


Figure 8: Circuit diagram for PNP (+) magnetic sensor

brown +
blue -
black

### 8.3 Operation

- Steel parts (e.g. swarf) in the environment of the cylinder can influence the magnetic field and therefore the switching points.
- Install a protection cover at least 30 mm above the magnetic sensors.

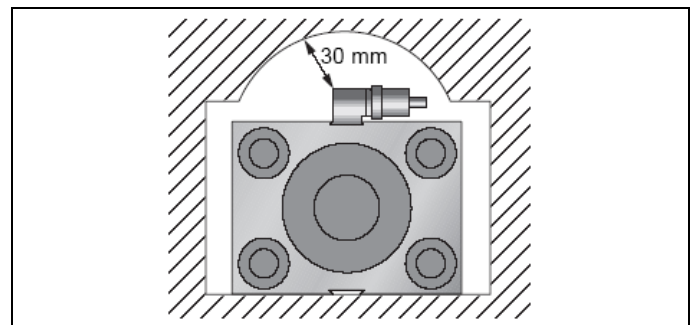


Figure 9: Minimum distance between sensors and covers etc.

### 8.4 Technical characteristics

#### 8.4.1 Technical data, magnetic sensor

Housing material	PA 6
Operating voltage UB:	10 - 30 V DC
Residual ripple:	max. 10%
Current load I LOAD	200 mA
Current consumption	≤ 25 mA
Protected against short circuits	yes
Protection against reverse battery	installed
Switching hysteresis	typ. 1.5 mm
Protection as per IEC 529	IP 65
Environmental temperature	-25°C to +70°C
Plug connection	M8 - Plug
Function display	LED (yellow)
Operating voltage	No
Cable, length of cable	0.26 m
Switching output	pnp

#### Note

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

## NOTE

### Further information

- For further technical data see ROEMHELD 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, the cleaning has to be made in shorter intervals.

### 9.2 Regular checks

- Check tightness of hydraulic connections.
- Check running surfaces of the piston rod if there are marks and scratches. Marks can be an indication for an inadmissible side load of the product.
- Clamping force control by pressure control.
- Check the observance of the maintenance intervals.

### 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 1,000,000 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: 3 bar)
Swing angle is not completely effected or exceeded (tolerance of end position $\pm 2^\circ$ ):	Too much clearance in the swing mechanism	<b>Caution !</b> 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 helix rod are worn out	Exchange swing clamp, exchange component, if required.
Clamping pressure reduces due to leakages at the swing clamp:	Wear at the seals	Exchange seals

## 11 Technical characteristics

### General characteristics

Types	Maximum operating pressure [bar]	Effective clamping force Pulling force at ... [N]		
		4 bar	5 bar	6 bar
1873 103 1873 203	7  (as a function of the clamping arm length)	<b>105.5</b>	<b>131.9</b>	<b>158.3</b>
1874 103 1874 203		<b>276.4</b>	<b>345.5</b>	<b>414.6</b>
1875 103 1875 203		<b>422.2</b>	<b>527.7</b>	<b>633.3</b>
1876 103 1876 203		<b>659.7</b>	<b>824.6</b>	<b>989.6</b>
1877 103 1877 203		<b>1050.5</b>	<b>1313.1</b>	<b>1575.8</b>

Types	Tightening torque fixing screw of the clamping arm
187X X03	<b>6 Nm</b>

### Weights

Types	Total stroke [mm]	Weight [kg]
1873 103 1873 203	14.5	0.3
1874 103 1874 203	18.5	0.6
1875 103 1875 203	32.0	1.0
1876 103 1876 203	33.0	1.5
1877 103 1877 203	41.0	2.6

## 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.

ROEMHELD products are treated as standard with a corrosion prevention agent.

This ensures that the products are protected internally for six months from corrosion, when they are stored in dry rooms with a stable temperature.

Extended storage times require treatment with a non-resinifying corrosion prevention agent, and the external surfaces will also require treatment.

## 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

#### NOTE

- See ROEMHELD data sheet.

## 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  
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Fax: +49 (0) 64 05 / 89-211  
E-mail: info@roemheld.de  
www.roemheld.com

### Declaration of manufacture of the products

Pneumatic swing clamps of data sheet J 7.203. The following types or part numbers are concerned:

#### Clockwise rotation:

- 1873 103, 1874 103, 1875 103, 1876 103, 1877 103

#### Counterclockwise rotation:

- 1873 203, 1874 203, 1875 203, 1876 203, 1877 203

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, 04.02.2014