Swing Clamps with Sturdy Swing Mechanism
Bottom flange type, with optional position monitoring, double acting, max. operating pressure 350 bar

Application
Hydraulic swing clamps are used for clamping of workpieces, when it is essential to keep the clamping area free of straps and clamping components for unrestricted workpiece loading and unloading.

Due to the sturdy swing mechanism and the manifold possibilities of position monitoring these swing clamps are particularly suited for

• Automatic manufacturing systems
• Clamping fixtures with workpiece loading via handling systems
• Transfer lines
• Test systems for motors, gears and axes
• Assembly lines
• Special machine tools

Description
The hydraulic swing clamp is a pull-type cylinder where a part of the total stroke is used to swing the piston.

The favourable area ratio (piston/piston rod) allows high clamping forces already at relatively low oil pressures.

Due to the sturdy swing mechanism the angle position of the clamping arm remains the same after a slight collision with the workpiece during loading or unloading. Also a collision during the clamping process is not critical.

When using high flow rates the swing speed is limited by installed throttle points.

The FKM wiper at the piston rod can be protected against coarse and hot swarf by an optionally available metallic wiper (see page 6).

The different possibilities of the position monitoring are presented at the side.

Important notes see page 6.

Advantages
● 4 sizes available
● Compact design partially recessible
● High clamping force at low pressures
● Sturdy swing mechanism
● Insensitive against high flow rates
● Indexing of the clamping arm in a specified position is possible
● Special swing angle easily realizable
● Standard FKM wiper
● Metallic wiper optional
● Screw counterbores coverable
● Position monitoring available in six variants
● Hydraulic and pneumatic ports integrated in the flange
● Mounting position: any

Installation and connecting possibilities

Pipe thread

Drilled channels

Pneumatic position monitoring
Monitoring of the clamping arm in clamping position (adjustable)

Both controls combined

Position monitoring as accessories
Switch rod for external sensors

Monitoring of the piston in unclamping position

Pneumatic position monitoring in clamping and unclamping position

Electrical position monitoring in clamping and unclamping position

Subject to modifications
Actual issue see www.roemheld-group.com
**Swing angle**

1. **Swing angle 90° (standard)**
   
<table>
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<tr>
<th>Part no.</th>
<th>184XX090RXX</th>
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<td>184XX090LXX</td>
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2. **Swing angle \( \alpha < 90° \)**

   By insertion of a distance plate the return stroke of the piston is reduced and thus the swing angle is reduced. Clamping stroke and clamping position remain the same. The swing stroke and the dimensions \( h, h_1, \) and \( m \) are reduced by \( y \):

   \[
y = (90° - \alpha) \times k \quad (k \text{ see chart page } 3)
   \]

   Dimensions 3 ±0.5 and \( o \) of the switch rod are lengthened by the value \( y \).

   **Example:**

   Swing clamp 1845L090L30
   Desired swing angle 45° ccw
   **Part no.** 1845L045L30

   Shortening:
   \[
y = (90° - 45°) \times 0.12 \text{ mm/°} = 5.4 \text{ mm}
   \]

3. **Swing angle > 90°**

   Available on request!

---

**Attention danger of collision!**

The contact bolt for the actuation of the pneumatic valve must be completely screwed into the angle bracket for start up (see page 4 dimension 3.5 mm). The adjustment is made with clamped workpiece to approx. 5 mm valve stroke.

**Important note!**

The lower part of the swing clamp must be protected against swarf and dirt for trouble-free functioning of the orifice plate.

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**Pneumatic position monitoring for versions L and N with accessory locking flange**

- **Unclamped**
- **Clamped**

**View X**

- Nut included in the delivery.
- Spare nut see page 4.

**Connecting scheme**

- Use screws 12.9
- Required for versions M and N
- Required for pneumatic position monitoring "Clamped" Version M with accessory page 5
- Required for pneumatic position monitoring "Unclamped" Version M with accessory page 5 or version N

**Connecting holes:**

- 2 x hydraulics (A, B) max. Ø 5
- Spare O-ring 8x1.5 Part no. 3000343
- 2 x pneumatics (E, S) max. Ø 2.5 (only as required)
- Spare O-ring 3.68x1.78 Part no. 3000334

---

**Example for swing angle < 90°**

- **Off-position ±3°**
- **Indexing mark represented in clamping position max. 5°**

**Example:**

Swing clamp 1845 L090 L30
Desired swing angle 45° ccw
**Part no.** 1845 L045 L30

Shortening:

\[
y = (90° - 45°) \times 0.12 \text{ mm/°} = 5.4 \text{ mm}
\]

3. **Swing angle > 90°**

   Available on request!
## Technical data

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<th>Max. pulling force (350 bar) [kN]</th>
<th>Effective clamping force [kN]</th>
<th>Clamping stroke (mm)</th>
<th>Swing stroke (mm)</th>
<th>Total stroke ±0.2 (mm)</th>
<th>Min. operating pressure (bar)</th>
<th>Max. flow rate Clamping (cm³/s)</th>
<th>Effective clamping force with accessory clamping arm as a function of the oil pressure</th>
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### Effective clamping force with accessory clamping arm as a function of the oil pressure

#### Operating pressure [bar]

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#### Additional notes:
- **h = upper edge piston, h max. = upper edge nut**
- *** = lower edge clamping arm**
- **M = Option metallic wiper (see also page 6)**
- **Part no.**
  - **Clockwise rotation 90°**
    | 1843 | 1844 | 1845 | 1846 |
    | X090 | X090 | X090 | X090 |
    | R23M | R24M | R30M | R36M |
  - **Swing direction 90° ccw**
    | 1843 | 1844 | 1845 | 1846 |
    | X090 | X090 | X090 | X090 |
    | L23M | L24M | L30M | L36M |
  - **0 degree**
    | 1843 | 1844 | 1845 | 1846 |
    | X000 | X000 | X000 | X000 |
    | 023M | 024M | 030M | 036M |

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*Clamping force for other lengths see page 4.*
### 2. Admissible flow rate Q*

In the chart on page 3, the admissible flow rates for clamping and unclamping with the clamping arms (accessories) are specified. Longer special clamping arms have a higher torque of inertia. To avoid an overload of the swing mechanism, the flow rate has to be reduced:

#### 2.1 Moments of inertia are known

\[
Q_e = \frac{Q}{L} \cdot \sqrt{\frac{Q}{c}} \text{ cm}^3/\text{s}
\]

\[Q_e = \text{Flow rate with special clamping arm}\]

\[Q = \text{Flow rate as per chart (page 3)}\]

\[J_e = \text{Moment of inertia of the clamping arm (accessory) with contact bolt (chart)}\]

\[J_L = \text{Moment of inertia special clamping arm}\]

* Only for vertical mounting position!

#### 2.2 Moments of inertia not known

This simplified calculation is only applicable for clamping arms of the above shape.

**Example:** Swing clamps 1843

\[L = 70 \text{ mm}\]

\[e = 35 \text{ mm as per above chart}\]

\[Q_e = 10 \text{ cm}^3/\text{s} \text{ (as per chart page 3)}\]

1. **Extension factor**

   \[x = \frac{L - e}{35 \text{ mm}} = 2\]

2. **Flow rate factor**

   \[y = 0.35\]

3. **Max. flow rate**

   \[Q_L = y \cdot Q_e = 0.35 \cdot 10 \text{ cm}^3/\text{s} = 3.5 \text{ cm}^3/\text{s}\]

4. **Min. clamping time**

   \[\text{approx. 1.4 s}\]

**Calculation of the flow rate**

\[\text{Length factor} \times \text{Flow rate factor} \times \text{Extension factor} = 1.4 \times 0.35 \times 2 = 0.98\]

**Calculation of the clamping force**

\[F_{\text{adm}} = \frac{D}{L} + E \leq 350 \text{ [bar]}\]

Example:

**Swing clamps 1843**

\[L = 70 \text{ mm}\]

1. **Admissible clamping force**

   \[F_{\text{adm}} = \frac{D}{L} + E = \frac{210}{70} = 3 \text{ kN}\]

2. **Admissible operating pressure**

   \[P_{\text{adm}} = \frac{D}{L} + E \leq 350 \text{ [bar]}\]
Accessory for 184XM0XX • Pneumatic position monitoring (not adjustable)

Locking flange (adjustable)

Application
A prerequisite for automated processes of workpiece clamping are hydraulic clamping elements whose position can be monitored at any time.

The pneumatic position monitorings signal the following conditions by closing two bore holes:
1. Piston extended, clamping arm in off-position.
2. Piston in clamping area, clamping arm in clamping position.

By the pressure increase in the pneumatic line an electro-pneumatic pressure switch or a differential pressure switch can be actuated. The electrical switching devices are integrated in the electric control so that on the clamping fixture no electricity is required.

Description
The pneumatic position monitoring consists of the stainless control housing with fit signal sleeve, to be connected to the switch rod of the swing clamp by means of the delivered screw. Four fixing screws are included in our delivery.

Pneumatic port
Drilled channels
The swing clamp with the mounted position monitoring is inserted into the location hole and is immediately ready for use with the mounted O-rings.

Hose connection
Remove the plugs M5 and screw-in connecting nipple M5 (accessory) Sealing to the flange area is made by the two O-rings.

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

Technical data
Connection O-ring or thread M5
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
5 bar system pressure [bar] min. 3.5
Air flow rate **) [l/min] 10,...20

*) Required pressure drop if one or several position monitorings are not operated.

**) For measuring of the flow rate appropriate devices are available. Please contact us.

Function chart
Part no.
Swing clamps 1843M0XX 1844M0XX 1845M0XX 1846M0XX
L [mm] 52 52 75 75
L1 [mm] 50 50 73 73
Swing angle (see page 2)
0 or 90° 0353913 0353913 0353914 0353916
15 to 75° = XX 03539130XX 03539130XX 03539140XX 03539160XX

Swing clamps 1843 1844 1845 1846
a [mm] 68 76 85.5 100
b [mm] 50 58 66 82
c [mm] 25 29 33 41
Ød [mm] 43 50 58 74
e [mm] 32 36 41.5 48
f [mm] 12 16 18 22
g [mm] 12 14 16 18
h [mm] 43 47 52.5 89
Switching area 2 ÷ 9 mm
Part no. complete 0353320 0353321 0353322 0353323
Pneumatic valve 0353933 0353933 0353933 0353933
Switching area 2 ÷ 10 mm
Part no. complete 0353420 0353421 0353422 0353423
Pneumatic valve 0353934 0353934 0353934 0353934

Locking flange with pneumatic valve
With the integrated pneumatic valve the clamping position can be monitored directly at the clamping arm.

The fixing at the swing is made by tightening both locking screws.

The precise adjustment is made in clamping position with clamped workpiece. The valve tappet has to be pushed by approx. 5 mm (function chart see page 2).

Part no. complete 0353320 0353321 0353322 0353323
Pneumatic valve 0353933 0353933 0353933 0353933
Switching area 2 ÷ 9 mm
Part no. complete 0353420 0353421 0353422 0353423
Pneumatic valve 0353934 0353934 0353934 0353934

*) Installation dimensions for pneumatic valve see B 1.853 page 5

Subject to modifications B 1.854 / 6 - 20 E
Accessory for 184XM0XX • Electrical position monitoring (adjustable)
Important notes • Wiper system • Throttling of flow rate

Application

Electrical position monitorings signal the following conditions due to damping of two inductive proximity switches:
1. Piston extended, clamping arm in off-position.
2. Piston in clamping area, clamping arm in clamping position.
3. Piston in final position, no workpiece inserted. *)

*) If this function is not desired, e.g. in setting mode, the proximity switch can be adjusted so that the switch is still damped at the stroke end (see function chart).

Description

The electrical position monitoring consists of the housing with two adjustable inductive proximity switches and one switching cam fixed at the switch rod of the swing clamp. The fixing screws are included in our delivery. The housing can also be mounted turned by 180°. The radial distance of the proximity switches to the switching cam should be 0.5 mm. It is secured by means of a set screw M4. After untightening of the locking screw M4 the proximity switches can be axially displaced.

Please note:

Careful design is required. According to the corresponding application conditions, safety measures have to be planned and checked later on.

Inductive position monitorings are not suitable for the use in coolant and swarf areas.

Technical data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating voltage</td>
<td>10...30 V DC</td>
</tr>
<tr>
<td>Max. residual ripple</td>
<td>15 %</td>
</tr>
<tr>
<td>Max. constant current</td>
<td>200 mA</td>
</tr>
<tr>
<td>Switching function</td>
<td>interlock</td>
</tr>
<tr>
<td>Output</td>
<td>PNP</td>
</tr>
<tr>
<td>Body material</td>
<td>stainless steel</td>
</tr>
<tr>
<td>Thread</td>
<td>M 8 x 1</td>
</tr>
<tr>
<td>Code class</td>
<td>IP 67</td>
</tr>
<tr>
<td>Environmental temperature</td>
<td>-25...+70 °C</td>
</tr>
<tr>
<td>LED Function display</td>
<td>yes</td>
</tr>
<tr>
<td>Protected against short circuits</td>
<td>yes</td>
</tr>
<tr>
<td>Connection type</td>
<td>Right angle plug</td>
</tr>
<tr>
<td>Length of cable</td>
<td>5 m</td>
</tr>
</tbody>
</table>

Part no.

<table>
<thead>
<tr>
<th>Swing clamps</th>
<th>1842M0XX</th>
<th>1844M0XX</th>
<th>1845M0XX</th>
<th>1846M0XX</th>
</tr>
</thead>
<tbody>
<tr>
<td>L [mm]</td>
<td>76</td>
<td>76</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>L1 [mm]</td>
<td>52</td>
<td>52</td>
<td>73</td>
<td>73</td>
</tr>
<tr>
<td>With switch and plug</td>
<td>0353905</td>
<td>0353905</td>
<td>0353915</td>
<td>0353915</td>
</tr>
<tr>
<td>Without switch and plug</td>
<td>0353906</td>
<td>0353906</td>
<td>0353917</td>
<td>0353917</td>
</tr>
</tbody>
</table>

Function chart

- Unclamped
- Clamped
- Adjustable
- Swing angle
- Clamping stroke
- 90°
- 0°
- 50°
- 1 mm
- 1 mm
- 10°
- 1 mm
- LED: Clamped
- LED: Unclamped
- Approx. 71
- Hole diameter
- Direction of flow control
- Free flow
- With right angle plug
- Only for pipe thread!

Wiper system

The standard FKM wiper has a high chemical resistance against most cooling and cutting fluids.

The optional metallic wiper protects the FKM wiper against mechanical damage due to big or hot swarf.

It consists of a radially floating wiping disk and a retaining disk.

The metallic wiper can be delivered already mounted ("M") or as an accessory for retrofitting (see page 4).

Attention!

The metallic wiper is not suitable for dry machining or minimum quantity lubrication. Also in applications with very little grinding swarf, the standard FKM wiper has a better protection effect.

If there is any danger that small particles stick to the piston rod, the metallic wiper disk can also be replaced by a hard plastic disk.

Throttling of the flow rate

A flow rate throttling always has to be effected in the supply line to the swing clamp. This avoids a pressure intensification and thereby pressures exceeding 350 bar.

Important notes

Swing clamps must only be used for clamping of workpieces in industrial applications and may only be operated with hydraulic oil. They can generate very high forces. The workpiece, the fixture or the machine must be in the position to compensate these forces.

In the effective area of piston rod and clamping arm there is the danger of crushing. The manufacturer of the fixture or the machine is obliged to provide effective protection devices.

The swing clamp has no overload protection device. When mounting the clamping arm, the clamping arm or the hexagon socket in the piston have to be backed up for tightening and untightening the fixing nut. During loading and unloading of the fixture and during clamping a collision with the clamping arm has to be avoided. Remedy: Mount position adaptor.

Operating conditions, tolerances and other data see data sheet A 0.100.

Subject to modifications

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Actual issue see www.roemheld-group.com

Röhmled GmbH