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. The version with pendulum eye or fork head allows simultaneous clamping of two workpieces with half clamping force.

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

Direction of rotation
The swing clamps are available with clockwise or counterclockwise swing motion. Off-position is the extended piston position.

Process safety
To improve the process safety when using heavy double clamping arms the swing mechanism has been reinforced and an overload protection device has not been realised. During clamping the reinforced swing mechanism endures a collision of the clamping arm with the workpiece up to a pressure of 100 bar. All versions are also available with a switch rod at the cylinder bottom. The control cams are mounted at this rod to control the clamping and unclamping position with limit switches or pneumatically.
Adaptable position monitorings for inductive or pneumatic control are available as accessory (page 4).

Description
The piston end of this swing clamp is designed as pendulum eye or fork head. By means of a double clamping arm 2 workpieces can be clamped at the same time. For both versions a springy element is required in order to maintain the double clamping arm in the unclamped position in horizontal position.

Pendulum eye
The sturdy pendulum eye can transmit high clamping forces up to a max. operating pressure of 500 bar. The double clamping arm has to be dimensioned according to the load.

Fork head
The fork head allows a max. operating pressure of 160 bar. Advantageous is the fact that relatively simple clamping arms can be manufactured from flat materials.

Important notes
Danger of injury
Hydraulic clamping elements generate high clamping forces. Considerable injuries can be caused to fingers in the effective area of the double clamping arm.
Remedy: mount protection devices.
Operating conditions, tolerances and other data see data sheet A 0.100.

Clamping arm
Due to the missing overload protection device a collision with the clamping arm during loading and unloading of the fixture must be avoided. Remedy: mount position adaptor.
The double clamping arm in clamping position should preferably be at right angles to the piston axis to avoid overload of the spring element. Both contact bolts must only contact the workpiece after completion of the swing stroke. Please consider: For a newly designed double clamping arm, the moment of inertia must be determined to calculate the admissible flow rate using the formula on page 3.

Advantages
- Introduction of clamping force without side loads
- Compact design
- Double clamping arm facilitates multiple clamping of similar workpieces
- Pendulum eye for high clamping forces
- Fork head for simple clamping arms
- Alternatively pipe thread or drilled channels
- Reinforced swing mechanism
- FKM wiper standard
- Available with position monitoring

Connecting possibilities
- Pipe thread
- Drilled channels

Swing clamp with optional position monitoring (accessory)
Dimensions
Part no.

Pendulum eye 189X137X (500 bar)
without switch rod

Fork head 189X157X (160 bar)

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With switch rod 189X1X6X

Accessory: position monitoring see page 4.

Part no.

1893 1370 000M

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Off-position
(unclamped extended position)
The fixing of the clamping arm with pendulum eye or fork head does not allow an adjustment of the off-position as possible in case of cone fixation. Therefore the desired off-position has to be indicated when placing the order. The angle \( \alpha \) can be selected in steps of 5°.

1. Example of ordering
Piston rod diameter = 20 mm, pendulum eye, without switch rod, swing angle 90° clockwise, off-position 0°, metallic wiper mounted
Part no.: 18931370000M

2. Example of ordering
Piston rod diameter = 32 mm, fork head, with switch rod, swing angle 60° counterclockwise, off-position –30°, metallic wiper mounted
Part no.: 18951565M30M

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M = Metallic wiper, mounted

\( P \) (Plus) = +\( \alpha \)

\( M \) (Minus) = –\( \alpha \)

0° = \( \alpha = 0° \)

Swing angle \( \pm 1° \)

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Subject to modifications
Technical data

Clamping stroke [mm] 25 22
Swing stroke [mm] 9 13
Total stroke [mm] 34 35
Operating pressure, min. [bar] 30 30
Adm. flow rate [cm³/s] 8 20
for moment of inertia [kgm²] 0.00032 0.002295
Effective piston area
Clamping [cm²] 1.76 4.52
Unclamping [cm²] 4.9 12.56
Oil volume/stroke [cm³] 6 15.8
Oil to return [cm³] 16.7 44
a1 [mm] 10 29.5
a3 [mm] - 19.5
Ø b1 - 0.1 [mm] - 36
Ø b2 f7 [mm] 10 10
Ø d [mm] 20 32
e + 0.1 [mm] 8 12
f [mm] 20 32
f1 [mm] 26 37
g f7 [mm] 12 20
h [mm] 188.5 196.5
k [mm] 45 63
l [mm] 90 85
Ø m H7 [mm] 10 16
Ø m1 H7 [mm] 6 10
Ø p [mm] 6.5 9
r [mm] M45x1.5 M60x1.5
s [mm] 50 65
t [mm] 9 15
t1 [mm] 21 33
t2 [mm] 10 15
t3 [mm] 29 40
x [mm] 115.5 109.5
x1 [mm] 120.5 114.5
y [mm] 20.5 28

Accessories
Metallic wiper, complete (customer assembly) 0341 107 0341 100
O-Ring 8 x 1.5 3000 343 3000 343
Screw plug G 1/4 3610 264 3610 264

Admissible flow rate
The admissible flow rate indicated in the chart applies to the use of double clamping arms whose moment of inertia does not exceed the chart value. The clamping time is thus approx. 0.8 seconds and the unclamping time approx. 2 seconds.

For new clamping arms with a different moment of inertia, the admissible flow rate can be calculated using the following formula:

\[ Q_2 = Q_1 \times \sqrt{\frac{J_1}{J_2}} \text{ [cm}^3\text{/s]} \]

Where:
- \( Q_1 \) = Adm. flow rate (chart value)
- \( Q_2 \) = Adm. flow rate with the moment of inertia of the new clamping arm \( J_2 \)
- \( J_1 \) = Moment of inertia (chart value)
- \( J_2 \) = Moment of inertia of the new clamping arm
Delivery

The position monitorings are not delivered mounted at the swing clamp. Fixing screws and signal sleeve are included in the delivery. Electrical position monitorings are delivered with 2 inductive proximity switches and 2 right angle plugs. The housings can be mounted rotated by 2x180° (1893) or 8x45°.

Pneumatic position monitoring

Electrical position monitoring

Technical data for proximity switches

- **Voltage**: 10...30 V DC
- **Residual ripple max.**: 15 %
- **Constant current max.**: 200 mA
- **Switching function**: interlock
- **Output**: PNP
- **Body material**: stainless steel
- **Code class**: IP 67
- **Environmental temperature**: –25...+70°C
- **Connection**: Plug
- **Length of cable**: 5 m
- **LED function display**: Yes
- **Protected against short circuits**: Yes