Hinge Clamps 70 bar with throttle valve, metallic wiper edge and optional position monitoring double acting, max. operating pressure 70 bar

**Application**

Hydraulic hinge 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.

A clamping recess in the workpiece a little bit wider than the clamping lever is sufficient as clamping surface.

The special kinematics allow clamping without side loads of workpieces which are very sensitive against deformation.

This series with an operating pressure of 70 bar is designed for the direct connection to the low-pressure hydraulics of machine tools.

In combination with the optional pneumatic or electrical position monitorings hinge clamps are particularly suitable for:

- Automatic manufacturing systems with very short cycle times
- Clamping fixtures with workpiece loading by handling systems
- Transfer lines
- Test systems for motors, gears and axes
- Assembly lines
- Special machine tools

**Description**

The hinge clamp is a double acting hydraulic cylinder with integrated clamping lever. When pressurising the element, the piston moves upwards and swivels the clamping lever over the hinges forwards and at the same time downwards onto the workpiece. The piston force is deviated by 180° and, depending on the lever length, the force is available as clamping force (see page 4).

The kinematics are so designed that no side loads enter into the workpiece, if the clamping surface is at the same height as the centre of rotation of the clamping lever (see comparison "Forces at the clamping point"). The 3 available clamping directions (L, G, R) make it easier to adapt to the workpiece shape or the hydraulic connectivity.

All sizes are optionally available with switch rod for external position monitoring. Electrical and pneumatic position monitorings for the clamping and unclamping position are available as accessories.

**Important notes** see page 6.

**Advantages**

- High clamping force in the low-pressure range
- Very short clamping time (min. 0.5 s)
- Throttle valve as standard, easily adjustable from the top
- Compact design partially recessible
- Lever bolt plain bearing
- 3 clamping directions selectable
- Clamping possible without side loads
- Clamping lever can be swivelled into small recesses
- Long clamping lever adaptable to the workpiece contour
- FKM wiper protected by metallic wiper edge
- Position monitoring available as accessory
- Mounting position: any

**Forces at the clamping point**

Conventional lever mechanism of other manufacturers

Lever mechanism without side loads

ROEMHELD system

**Installation and connecting possibilities**

Pipe thread

Drilled channels

**Versions**

Without switch rod

(Option Long clamping lever)

With switch rod

**Clamping direction**

Code letters

L  G  R

**Accessories**

pneumatic  electrical
**Versions: without / with switch rod**

**Dimensions • Accessories**

**Without switch rod**

**1826G7X31**
Clamping lever with contact bolt

**With switch rod**

**1826G7X40**
Without clamping lever

**Connecting dimensions for self-manufactured clamping levers**

**With switch rod**

**1826G7X41**
Clamping lever with contact bolt

**Inductive position monitoring** (page 6)

**With switch rod**

**1826G7X42**
Clamping lever, long

**Accessories**

**Pneumatic position monitoring** (page 5)

Cartridge type

**Pipe thread connection**

**Inductive position monitoring** (page 6)

**Connecting scheme**

**Use fixing thread screw material 10.9**

**Clamping direction**

R  
G  
L  

X = code letter for part no.
### Technical data

<table>
<thead>
<tr>
<th>Size</th>
<th>1</th>
<th>2</th>
<th>3</th>
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<table>
<thead>
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<table>
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<th>26</th>
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<td>16</td>
<td>25</td>
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<td>with switch rod ([cm^3])</td>
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<td>5.5</td>
<td>7</td>
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<table>
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<th>Max. flow rate ([cm^3/s])</th>
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<td>6.28</td>
<td>8.83</td>
<td>14</td>
<td>23.4</td>
</tr>
<tr>
<td>with switch rod ([cm^2])</td>
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<table>
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<tbody>
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<td>1826X7230</td>
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<td>Clamping lever with contact bolt ([kg])</td>
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<td>1826X7231</td>
<td>1826X7331</td>
<td>1826X7431</td>
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<td>Clamping lever, long ([kg])</td>
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<td>1826X7232</td>
<td>1826X7332</td>
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<table>
<thead>
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<td>Clamping lever ([kg])</td>
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<td>1826X7240</td>
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<td>1826X7440</td>
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<tr>
<td>Clamping lever with contact bolt ([kg])</td>
<td>1826X7141</td>
<td>1826X7241</td>
<td>1826X7341</td>
<td>1826X7441</td>
<td>1826X7541</td>
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<td>Clamping lever, long ([kg])</td>
<td>1826X7142</td>
<td>1826X7242</td>
<td>1826X7342</td>
<td>1826X7442</td>
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<table>
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<td>X Spare O-ring ([mm])</td>
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<td>7 x 1.5</td>
<td>7 x 1.5</td>
<td>9 x 1.5</td>
<td>9 x 1.5</td>
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</tbody>
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**Römheld GmbH**

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Subject to modifications

B 1.8268 / 11 - 15 E
### Calculation of the clamping force

1. Length L of clamping lever is known
   1.1 Admissible operating pressure
   \[ p = \frac{B}{(C/L) + 1} \leq 70 \text{ [bar]} \]

1.2 Effective clamping force
   \[ p_{adm} > 70 \text{ bar} \rightarrow F_{Sp} = A \frac{L}{p} \leq 70 \text{ [kN]} \]

2. Min. length of clamping lever
   \[ L_{min} = \frac{C}{(B/p) - 1} \text{ [mm]} \]

   - \( L, L_{min} = \) length of clamping lever [mm]
   - \( p, p_{adm} = \) operating pressure [bar]
   - \( A, B, C, = \) constants as per chart
   - \( A^*, B^* = \) for version with switch rod

### Eccentric lever

The diagrams show the admissible operating pressure for any combination of length L of clamping lever and the eccentricity Le.

#### Formula
\[ p_{adm} = \frac{X \cdot L}{(Y \cdot Le) + L + Z} \text{ [bar]} \]

- \( L = \) length of clamping lever
- \( Le = \) eccentricity
- \( X, Y, Z = \) constant as per chart
- \( X^* = \) for version with switch rod

#### Table

<table>
<thead>
<tr>
<th>1826</th>
<th>71</th>
<th>72</th>
<th>73</th>
<th>74</th>
<th>75</th>
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<tr>
<td>( A )</td>
<td>0.73</td>
<td>1.18</td>
<td>1.82</td>
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<td>( A^* )</td>
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<td>1.67</td>
<td>3.11</td>
<td>6.45</td>
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<tr>
<td>( B )</td>
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<td>115.62</td>
<td>118.23</td>
<td>119.27</td>
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<tr>
<td>( B^* )</td>
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<td>125.9</td>
<td>127.73</td>
<td>125.7</td>
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<td>( C )</td>
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<td>16.65</td>
<td>18.9</td>
<td>22.05</td>
<td>27.45</td>
</tr>
</tbody>
</table>

#### Example 1:
Hinge clamp 1826G7432
- Special clamping lever \( L = 32 \text{ mm} \)
- Effective clamping force
  \[ F_{Sp} = A \frac{L}{p} \cdot p = 3.35 \cdot 70 = 233 \text{ kN} \]
- Admissible operating pressure
  \[ p_{adm} = \frac{B}{(C/L) + 1} = \frac{119.26}{27.45/20} + 1 = 50.2 \text{ bar} \]

#### Example 2:
Hinge clamp 1826G7432
- \( p = 50 \text{ bar} \)
- Min. length of clamping lever
  \[ L_{min} = \frac{C}{(B/p) - 1} = \frac{22.05}{27.45/78} + 1 = 16 \text{ mm} \]
- Effective clamping force
  \[ F_{Sp} = A \frac{L}{p} \cdot p = 3.35 \cdot 50 = 165 \text{ kN} \]

#### Example 3:
Hinge clamp 1826G7532
- Special clamping lever \( L = 20 \text{ mm} \)
- Admissible operating pressure
  \[ p_{adm} = \frac{B}{(C/L) + 1} = \frac{119.26}{27.45/20} + 1 = 88.2 \text{ bar} \]
- Effective clamping force
  \[ F_{Sp} = A \frac{L}{p} \cdot p = 6.76 \cdot 50 = 165 \text{ kN} \]

#### Example 4:
Hinge clamp 1826G7532
- Special clamping lever \( L = 78 \text{ mm} \)
- Admissible operating pressure
  \[ p_{adm} = \frac{B}{(C/L) + 1} = \frac{119.26}{27.45/78} + 1 = 88.2 \text{ bar} \]
- Effective clamping force
  \[ F_{Sp} = A \frac{L}{p} \cdot p = 6.76 \cdot 78 = 165 \text{ kN} \]

### Admissible operating pressure \( p_{adm} \), at eccentric location of the clamping point

#### Table

<table>
<thead>
<tr>
<th>1826 X</th>
<th>71</th>
<th>72</th>
<th>73</th>
<th>74</th>
<th>75</th>
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<tbody>
<tr>
<td>( X )</td>
<td>127.77</td>
<td>125.12</td>
<td>120.69</td>
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<td>124.75</td>
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<td>( X^* )</td>
<td>142.24</td>
<td>140.76</td>
<td>131.43</td>
<td>133.49</td>
<td>130.74</td>
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<tr>
<td>( Y )</td>
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<td>3.7</td>
<td>3.5</td>
<td>3.379</td>
<td>3.588</td>
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<tr>
<td>( Z )</td>
<td>16.5</td>
<td>18.5</td>
<td>21</td>
<td>24.5</td>
<td>30.5</td>
</tr>
</tbody>
</table>

### Important note

Depending on the eccentric load, there will be a one-sided wear of the bolts and an increasing torsion of the clamping lever around the longitudinal axis.

Recommendation: Regular visual inspection
Accessories

Pneumatic position monitoring (not adjustable)

Application
The pneumatic position monitoring signals the following conditions by closing two bore holes:
1. Piston retracted and clamping lever in off-position
2. Piston in clamping area and clamping lever in clamping position.
For each control function, a pneumatic line has to be provided at the clamping fixture.

Description
When moving to a switching position, the air pressure in the supply line increases and operates a differential pressure switch or an electro-pneumatic pressure switch.

Pneumatic port
Cartridge type
The hinge clamp with the mounted position monitoring and inserted O-rings is put into the location hole and immediately ready for use.

Mounting body
The mounting body is put onto the cartridge-type version and held by the supplied safety ring. The pneumatic ports M5 can be rotated by 360°.

Monitoring by pneumatic pressure switch
For the evaluation of the pneumatic pressure increase, standard pneumatic pressure switches can be used. With one pressure switch up to 8 position monitorings can be controlled (see circuit diagram).
It has to be considered that process-safe functioning of pneumatic controls is only guaranteed with throttled air pressure and air flow rate.

Technical data
Connection Drilled channels or threads M5
Nominal diameter 2 mm
Max. air pressure 10 bar
Range of operating pressure 3...5 bar
Differential pressure*) at 3 bar system pressure min. 1.5 bar
5 bar system pressure min. 3.5 bar
Air volume **) 10...20 l/min

*) Minimum pressure difference, if one or several position monitorings are not operated.
**) For measuring of the flow rate appropriate devices are available.

Function chart

<table>
<thead>
<tr>
<th>Size</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<tr>
<td>Ø A ±0.1 [mm]</td>
<td>39</td>
<td>47</td>
<td>53</td>
<td>63</td>
<td>78</td>
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<tr>
<td>Ø C f7 [mm]</td>
<td>38</td>
<td>42</td>
<td>42</td>
<td>45</td>
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<tr>
<td>Ø D H7 [mm]</td>
<td>38</td>
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<td>42</td>
<td>45</td>
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<tr>
<td>Ø E [mm]</td>
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<td>F [mm]</td>
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<td>J min. [mm]</td>
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<td>K min. [mm]</td>
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<td>Ø S max. [mm]</td>
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<td>54</td>
<td>64</td>
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Part no.
Cartridge type 0353341 0353342 0353343 0353344 0353345
with 4 screws 0353341A 0353342A 0353343A 0353344A 0353345A
Mounting body for retrofitting of the cartridge type

* Dimensions see page 2 and 3

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Römhled GmbH

Subject to modifications

B 1.8268 / 11-15 E
Application
The electrical position monitoring signals the following conditions due to damping of two inductive proximity switches:
1. Piston retracted and clamping lever in off-position
2. Piston extended and clamping lever in off-position.
For each control function, an electrical line has to be provided at the clamping fixture.

Description
The electrical position monitoring can be easily retrofitted at all hinge clamps with switch rod (1926X7X4X).
Included in our delivery are:
1. Signal sleeve with screw
2. Adapter with 4 countersunk screws
3. Control housing with 3 set screws
4. Inductive proximity switches with right angle plug (if ordered)
The signal sleeve is screwed onto the switch rod. The adapter is mounted with 4 countersunk screws at the bottom cover.
The control housing can be put onto the adapter in any angular position and locked with 3 set screws.
For information on adjustment of proximity switches, see operating manual.

Important notes
Inductive position monitorings are not suitable for the use in coolant and swarf areas. According to the corresponding application conditions, safety measures have to be planned and checked later on.

Technical data
- Operating voltage: 10...30 V DC
- Max. residual ripple: 10%
- Max. constant current: 100 mA
- Switching function: interlock
- Output: PNP
- Housing material: stainless steel
- Thread: M 5 x 0.5
- Code class: IP 67
- Ambient temperature: -25...+70 °C
- LED Function display: yes
- Protected against short circuits: yes
- Connection type: Plug
- Length of cable: 5 m

Function chart

<table>
<thead>
<tr>
<th>Size</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<td>10.5</td>
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<td>12</td>
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<td>B [mm]</td>
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<td>Ø D [mm]</td>
<td>33</td>
<td>42</td>
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<td>45</td>
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<tr>
<td>L [mm]</td>
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<td>103.5</td>
<td>117</td>
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<tr>
<td>L1 [mm]</td>
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<td>45</td>
<td>49</td>
<td>56.5</td>
<td>62</td>
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Part no.
- without switch: 0353351 0353352 0353353 0353354 0353355
- with switch and plug: 0353351S 0353352S 0353353S 0353354S 0353355S

Spare parts
- Inductive proximity switch: 3829198 3829198 3829198 3829198 3829198
- Right angle plug: 3829099 3829099 3829099 3829099 3829099

Important notes!
Hinge clamps must only be used for clamping of workpieces in industrial applications and may only be operated with hydraulic oil. Hinge clamps can generate very high forces. The workpiece, the fixture or the machine must be in the position to compensate these forces. Considerable injuries can be caused to fingers during clamping and unclamping in the effective area of the clamping lever. The manufacturer of the fixture or the machine is obliged to provide effective protection devices. Hinge clamps have to be checked regularly on contamination by swarf and have to be cleaned. Operating conditions, tolerances and other data see data sheet A 0.100.