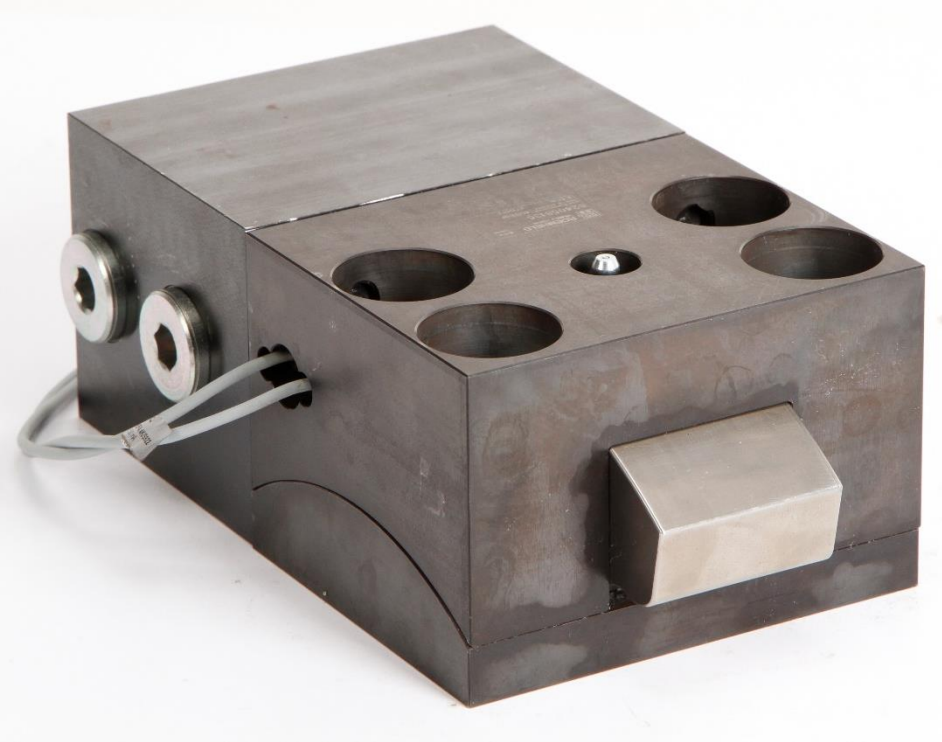
Operating Manual

incl . Declaration of Incorporation and Installation Instructions
for incomplete machines as per Machinery Directives 2006/42/EC

Arch clamps

Types: 2503-xxxx
2504-xxxx
2505-xxxx
2506-xxxx
2507-xxxx
2508-xxxx
2509-xxxx



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11/2021 Printed in Germany. Subject to modifications

Contents

For safe and functional operation, it is imperative to read the operating manual before installation and start-up!

1. Safety instructions

1.1 General data

Hilma-Römheld arch clamps are safety-tested and intended for use within the scope of technical data.
In case of non-compliance, danger to the operator or malfunctions of the machine cannot be excluded.
Unauthorized modifications or changes of the Hilma-Römheld arch clamps are prohibited for safety reasons and void the warranty.

1.2 Field of application

Hilma-Römheld arch clamps clamp by an arch-shaped movement especially dies in die-casting machines or other presses.

1.3 Operating data

Hilma-Römheld arch clamps may only be loaded with the specified values (see catalog product group 2).

Attention: Overloading the arch clamps can lead to failure or destruction of the elements.

1.4 Temperatures

The maximum operating temperature of the standard version is 100 °C. For higher temperatures, special versions must be used. (Special versions up to a temperature of 250 °C)

Note: At temperatures above 100 °C, the use of inductive sensors for position monitoring of the clamping element is no longer possible.

1.5 Hazard warnings

- In case of incorrect operation, the clamping bolt is completely retracted into the housing and the die on the ram can fall out of the machine.
- When using the clamps on the press ram, a multi-circuit hydraulic supply for the clamping elements and pilot-operated check valves must be used directly on the clamps to secure the hydraulic clamping.
- For safety reasons and in accordance with the Machinery Directive 2006/42/EC, the hydraulic pressure must be maintained.
- The element has a mechanical interlock, which prevents the clamping bolt from retracting completely in the depressurized state. It is essential to ensure that the distance between the front edge of the clamping element and the die is not greater than the dimension specified in the catalog.
- If the safety measures above-mentioned cannot be implemented when using top dies or for vertical installation, **mechanical protection is required.**
- Installation and repair works must only be carried out in depressurized mode (press in position UT).
- Do not exceed specified operating pressures and temperatures.

The operator must be instructed before the start-up of the elements.
Young people under the age of 16 are not allowed to operate the elements.
Young people over the age of 16 as part of their training, but only under supervision.
The operating manual must be accessible to the operator.
The operator must inform third parties of any hazards in the working area.

1.6 Declaration

Hilma-Römheld arch clamps have been developed, designed and manufactured in accordance with the Machinery directive 2006/42/EC.

2. Design and function

2.1 Design

Depending on the type, the arch clamps consist of different subassemblies:

1. Block cylinder double acting
2. Housing with clamping bolt / locking
3. Position monitoring

2.2 Functional description

2.2.1 Standard element

The pressure is applied to port A of the arch clamp, the clamping bolt moves to the clamping position, the pressure increases, and the pressure switch responds. For the version with position monitoring, an additional signal “clamping position reached” is given by inductive proximity switches.

Element in clamping/end position

The pressure is applied to port B, the elements return to their initial position.
For the version with position monitoring, an additional signal “parking position reached” is given by inductive proximity switches.

3 Technical data, main dimensions

Arch clamp

Clamping force	depending on the type 25 - 450 kN (exact information in the catalog sheet)
Operating pressure	200 bar
Clamping stroke	depending on clamping edge design

Hydraulic interface

Port A	Movement to clamping position - Clamping
Port B	Unclamping - movement to starting position
Max. temperature (standard)	100°C
Max. temperature (special)	250°C

4 Mounting instructions, installation and start-up

When mounting the incomplete machine arch clamp, the following conditions must be fulfilled so that it can be assembled correctly and without impairing persons' safety and health with other parts to form a complete machine.

4.1 Mounting

- From size 2506 onwards, there are threads onto the element for proper transport by a lifting device.
- Only carry out mounting work when the press is in depressurized mode.
- Make the drilling pattern as per drawing or catalog sheet.

Attention: When clamping with arch clamps, side loads are generated, which must be absorbed by drill bushes. Therefore the installation of drill bushes is mandatory.
Non-installation will result in malfunctions and the manufacturer's warranty will become void!

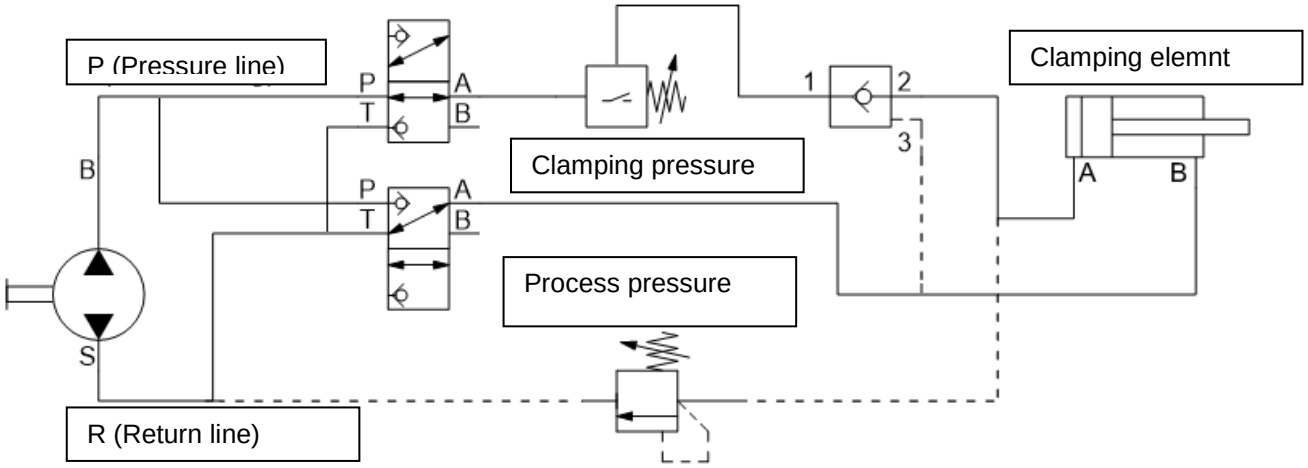
- **First**, press the drill bushes into the arch clamp.
- Place the arch clamp and tighten the screws with tightening torque according to the catalog sheet.
- For the orderly the line connections of the hydraulicassemblies that are used to transport the element, must be dismantled and marked.

4.2 Hydraulic installation

The hydraulic lines on the machine side must be adequately dimensioned (8x1.5 DIN 2391-St35 NBK or larger) and installed / documented according to the regulations (DIN EN ISO 4413:2010) or state of the art in high-pressure hydraulics. Keep pipelines short. Preferably use pipelines. When using hose lines, keep attation to the bending radius and reduce twisting to a minimum. Inccorect connections can lead to hazards. Mark pipes and hoses accordingly.

External supply lineas msut be sufficiently dimensioned and laid in such a way that they can be used during the tool change and cannot be damaged.

For single-acting elements with spring return max. length 5 m, four double-acting elements longer lengths are possible. Make sure that pipes are installed with a large bending radius. Maximum cleanliness during installation is a prerequisite for a trouble-free operation of the system. Pipe ends must be deburred, pipelines, high-pressure hoses and fittings cleaned and blown out. Remove the sealing plugs of the element only immediately before making the connection.



For correct operation of the element, the connections are as shown in the hydraulic circuit diagram to execute. A pressure control valve is to be used in the clamping line, which must be set on the specified clamping pressure. Behind this valve should be a hydraulically unlockable Check valve can be provided. In addition, a pressure relief valve must be provided, which must be adjusted to the process pressure, and the excess pressure in the return line drains. Process in chamber A, in which the clamping pressure is applied, a additional and permissible one Process hydraulic pressure arises (see specific technical information).
If this is reached, becomes Protection of the element the pressure is regulated by the pressure relief valve. The mechanical lock still works!
To enable the element to be retracted, the non-return valve to chamber A must be connected to the Hydraulic Connection to chamber B are connected so that this is unlocked by the release pressure.

The Maxmimum operating pressure must not be exceed.

4.3 Start-up

Before start-up, read the operating instructions!

The incomplete machine may only be put into operation if, if necessary it has been determined that the machine will be built into the partly completed machine should, complies with the provisions of the Machinery Directive.

- Equip the pressure generator with a pressure relief valve adapted to the operating pressure.
- Note the hydraulic diagram at chapter 4.2
- Secure the working area.
- Only use fresh and clean oil.
- Bleed the complete system by operating the pump at low pressure (<=20 bar) until the oil, which emerges at the highest point is free from bubbles (rinsing).
- Apply pressure to the element several times and move it. Carry out a visual inspection.
- Check hydraulic installation for leaks - Visual inspection of the pressurized piping, hoses, fittings and clamping elements.

ATTENTION: When moving the clamping elements, do not bring your hands into the moving area.
DANGER OF INJURY

Control:
For *all elements*, a sufficiently large time span t > 3s must be provided in the control sequence to ensure the functional sequence.

Depending on the hydraulic system's design (pipe cross-sections, hose lengths, position and flow rate of the power unit, etc.) on the machine, the required time periods can vary. If necessary, the specified values must be corrected upward or downwards according to the system parameters.

5 Troubleshooting

The arch clamps have left our house in perfect condition.
All functions have been checked and necessary adjustments have been made.
If, after observing all the instructions in chapter 4.0 (Mounting instructions, installation and start-up), malfunctions still occur, please use the following table to check the possible causes:

Trouble	Possible causes	Countermeasures
Clamping element does not clamp or unclamp	- Hydraulic supply interrupted/incorrect. - Hydraulic system not bled. - Correct operating pressure not set. - Power unit does not work or is not in operation. - Check valve in Clamping line not unlocked - work area is blocked	- Check hydraulic lines and hose connections up to the power unit. - Check correct connection (clamping/unclamping). Bleed the hydraulic system. Correct operating pressure. Check /correct the setting of the valves in chapter 4.2 - remove the blockade in the work area

6 Maintenance and repair

The arch clamps are usually not subject to any special maintenance. Visual control and checking of the arch clamps have to be effected once a week.
The lubrication intervals must be adapted to the operating conditions.
Lubrication with high-temperature grease must be carried out in the starting position using the lubricating nipple located on the arch clamp so that complete filling of the housing with grease is prevented (element can no longer move to the starting position.

Operating temperature	Lubrication interval	Lubricant
20 - 50° C	**2 months or 750 cycles**	**Lithium saponified mineral oil based greases**
50 - 180° C	**4 weeks or 500 cycles**	**High-temperature grease on synt. basis e.g. Arcanol L79V FAG company**
> 180° C	**2 weeks or 250 cycles**	**High-temperature lubricating paste e.g. Wolfracote CP from Klüber or equivalent copper paste**

The lubrication intervals must be shortened for high clamping cycle frequencies and heavy dirt accumulation in conjunction with high temperatures.
In these cases and with poor accessibility, it is recommended to connect to an automatic lubrication system.
Hydraulic valves are very sensitive to dirt. Make sure that no impurities get into the hydraulic fluid.
A change of oil should be carried out once a year. For regular maintenance work on the press:
- Visual inspection of electrical connections (plugs, cable) for damage.
- Check the hydraulic system for leaks.

Note: Design of the hydraulic system, according to **DIN EN ISO 4413:2010,** safety requirements for fluid power systems and their components.

For spare parts lists and mounting sketches, see chapter 7.0 (Technical appendix).

After replacement, the element must be moved a few times for bleeding via the power unit (this also applies if hydraulic connections have been loosened).
For the start-up, observe chapter 4.0 (Mounting instructions, installation and start-up).

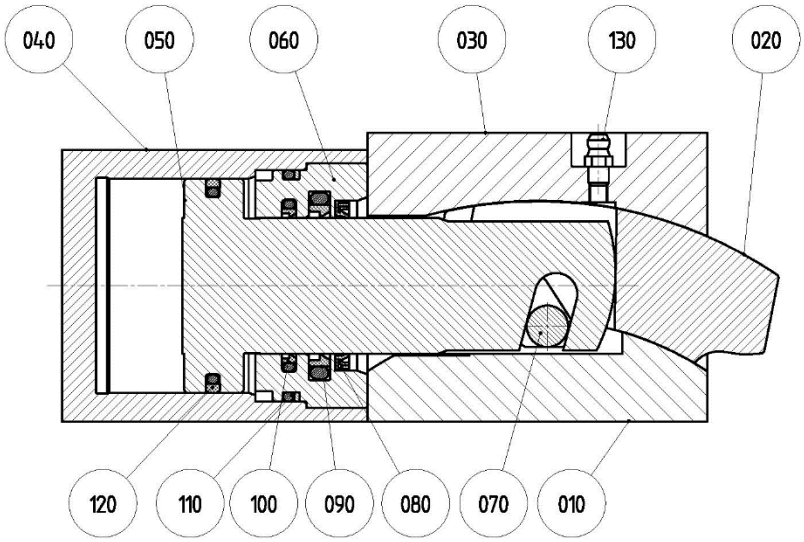
6.1 Shutdown

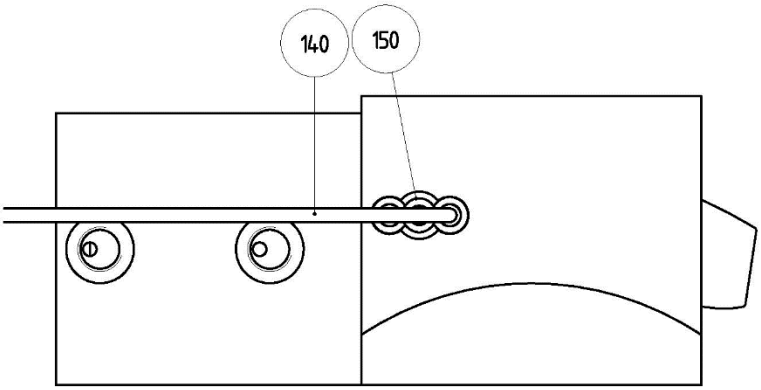
- Arch tensioning elements signal that the wear limit has been reached through significant leaks on the Element, as well as wear of the clamping bolt
- Replace arch tensioning elements before the element fails due to wear.
- When the product reaches the end of its life, you can send the element back to the manufacturer for overhaul.

In the event of permanent shutdown, the respective local guidelines for recycling or Dispose of to follow.

7 Technical appendix, spare parts

Spare parts list arch clamp	
Pos.	**Designation**
010	Base
020	Clamping bolt
030	Upper part
040	Block cylinder housing
050	Piston
060	Cover
070	Locking bolt
080	Wiper
090	Stepseal sealing
100	Stepseal sealing
110	O-ring + back-up ring
120	Glydring sealing
130	Lubricating nipple
140	Proximity switches
150	Fastening screw





Declaration of Incorporation for Incomplete Machines

according to

Machinery Directive EC-RL 2006/42/EC of June 9, 2006

We, **Hilma- Römheld GmbH**
Auf der Landeskrone 2
57239 Wilnsdorf-Wilden

hereby declare that the incomplete machine and its variants:

Arch clamp
Type
8.2503
8.2504
8.2505
8.2506
8.2507
8.2508
8.2509

meet the following essential requirements of Annex I: 1.1.2,1.1.3,1.1.5,1.1.6,1.2.3, 1.2.4, 1.2.6, 1.3.2, 1.3.4, 1.3.7, 1.3.8,1.5.3,1.5.9,1.7.1,1.7.3,1.7.4.1,1.7.4.2,1.7.4.3, of the above mentioned directive.

We hereby declare that the above mentioned incomplete machine within the meaning of Article 2g is intended exclusively for incorporation into or assembly with another machine or equipment.

The documentation has been prepared in accordance with Annex VII B. Start-up is prohibited until it has been determined that the machine in which the incomplete machine is to be installed complies with the above-mentioned directives' provisions.

With this declaration of incorporation, we undertake, upon justified request, to transmit the incomplete machine's special technical documents in paper or electronic form to the competent national authorities.

Person responsible for the document:
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Wilnsdorf-Wilden, November 11, 2021
Nico Hanke
Managing director