ROEMHELD
HILMA ▪ STARK

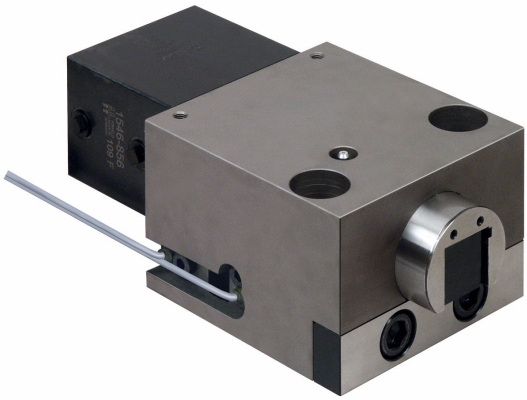
Operating Instructions

including installation and assembly instructions

for incomplete machines as per Machinery Directive 2006/42/EC

Wedge clamps

Types: 4604-xxx
2403-xxxx
2404-xxxx
2405-xxxx
2406-xxxx
2407-xxxx
2408-xxxx
2409-xxxx
2410-xxxx
2411-xxxx
2423-xxxx



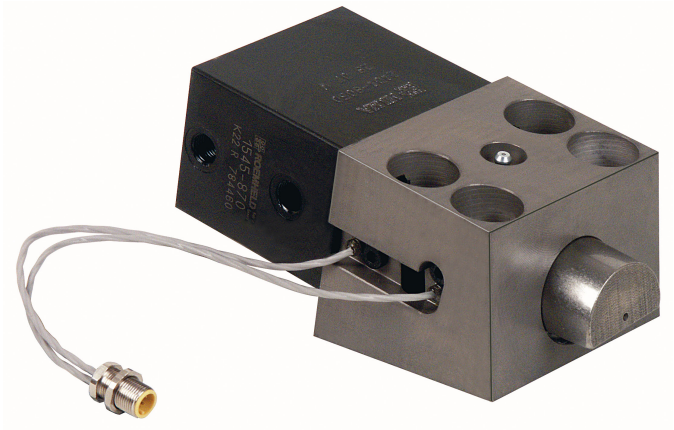


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Table of contents

In order to ensure safe operation according to the intended purpose, please read the operating manual before installation and before putting the clamp into operation!

1 Safety information

1.1 General

The safety of Hilma-Römheld wedge clamps has been thoroughly checked. They are designed for use as specified in the technical data. If the technical data is not observed, the health of the operator and the proper functioning of the machine may be put at risk. Unauthorised modification or alteration of Hilma-Römheld wedge clamps is prohibited for reasons of safety. If this instruction is not observed, our guarantee will be invalid.

1.2 Field of application

Hilma-Römheld wedge clamps are intended to clamp tools at an angle of 20°. They are especially designed for clamping dies in die casting machines or other types of presses. In the case of designs with sequential valve control, the elements of one clamping circuit move to the clamping position one after the other. Hilma-Römheld wedge clamps are intended to clamp tools at an angle of 0°. They are especially designed for clamping dies in die injection molding machines or other types of presses

1.3 Operating characteristics

Hilma-Römheld wedge clamps may not be subject to loads beyond the specified values (see catalogue, product group 2).

Attention: Any overload of the wedge clamps may lead to failure or demolition of the clamps.

1.4 Temperatures

The maximum operating temperature for standard-type wedge clamps is 100 °C. For higher temperatures, special designs should be used. (Special designs are available for temperatures of up to 250 °C)
Note: Temperatures beyond 100 °C do not allow for the use of inductive sensors for position control of the clamp (optional 120°C).

1.5 Important information on danger

- In case of incorrect operation of the wedge clamping element, the clamping bolt may fully retract into the guide housing and thus cause the upper die falling off the slide.
- When using the elements on the press slide, a multi-circuit hydraulic supply for the clamping elements and pilot-controlled check valves must be applied directly to the clamping element in order to secure hydraulic clamping.
- For reasons of safety and pursuant to machine directive 2006/42/CE, hydraulic pressure must be maintained. In the event of loss of pressure, the upper die can push the wedge bolt back into the housing.
- If the above safety measures cannot be implemented when using the elements on the press slide or in the case of vertical installation, **a mechanical safety device is required**.
- Installation and repair works may only be carried out when the system is out of operation and without pressure.
  (Press in lower dead centre position.)
- Do not exceed the specified temperatures and pressures.

Attention: In the case of designs with control valves flanged to the rear side, do not apply pressure to port R – risk of destruction of valves.

Before putting the clamps into operation, the operator must be fully trained.
Young people less than 16 years old are not allowed to operate the clamps. Staff aged over 16 years are allowed to operate the clamps under supervision as part of their apprenticeship. The operating instructions must be accessible to the operator. The operator must advise any other personnel of possible risks in the operating area.

2 Design and function

2.1 Design

Depending on the design, the wedge clamps are composed of various subassemblies:

1. Double-acting block cylinder, with sequential valve control (depending on design)
2. Housing with clamping bolt
3. Position monitoring
4. Flange plate with control valves
5. Locking element

2.2 Functional description

2.2.1 Standard element

Pressure is applied to port A of the wedge clamp. The clamping bolt moves to the clamping position, the pressure increases, and the pressure switch reacts. For designs with position monitoring using inductive proximity switches, a "clamping position reached" signal is given.

Element in clamping / final position
Pressure is applied to port B. The elements move back to their initial positions. For designs with position monitoring using inductive proximity switches, a "parking position reached" signal is given.

2.2.2 Element with sequential valve control

Element in initial position
Pressure is applied to port A of the wedge clamp. The clamping bolt moves to the clamping position. For designs with sequential valve control, port C of the block cylinder is now released, and pressure is applied to the next element. Port C of the last element may be connected to a pressure switch which gives a "clamping position reached" signal to the press controls.
Element in clamping / end position
Pressure is applied to port B. The elements move back to their initial positions.

Version with a double sequence

The element is provided with the two additional ports D1 and D2 for checking the home position.

If the element is in the home position, the path between D1 and D2 is open. If all clamping elements are in their home position, the pressure at the end of the line will be at a maximum, which may be checked by means of a pressure switch.

The signal that the home position has been reached will be transmitted to the press controls.

2.2.3 Element with control valves

Function as in the case of the standard clamp, but with pressure and return lines.
When the clamp moves to the clamping or parking position, pressure is applied only to line P, whereas line R serves as return line. No pressure must be applied to the return line, otherwise the control valves will be destroyed.

Pressure is applied to line P. The element moves to the clamping position. The installed check valve ensures that the pressure is "locked in". The pressure switch and the additional proximity switch (if applicable, depending on the design) give a "clamping position reached" signal. A voltage of 24VDC must be applied to both control valves, and pressure must be applied to line P in order to move the clamp to the parking position. The pressure switch and the additional proximity switch (if applicable, depending on the design) give a "parking position reached" signal.

2.2.4 Element with locking element

Function as in the case of the standard clamp. Before moving the clamping element, however, pressure must be applied to the locking element.

Attention: When the key bolt is returned to the home position, the wedge-type clamping element must be unlocked, otherwise the locking system may be damaged.

2.2.5 Element with form-fit safety step

Same function as standard element, however the die must have the counter contour of the clamping bolt when clamping onto the 20° bevel so that a form fit is achieved in the case of a pressure drop. The dimensions can be found in the data sheet WZ 2.2404 for the various wedge clamp sizes. Alternatively, the dies can be retrofitted with adapter plates, which are offered as accessories.

2.2.6 Optional function port B

For elements that are equipped with connection B on both sides, this can be used to cool the elements in the clamped state. This requires an additional function on the unit, the flow must be depressurized so as not to reduce the clamping pressure. The cooling effect depends on the operating parameters of the unit.

Attention: When using adapter plates, the guide housing of the wedge clamping element must be increased by the same amount with intermediate plates as the adapter plate on the tool.

3 Technical data, main dimensions

Wedge clamp 20°

Clamping force	25- 1250 kN, depending on design
Total stroke	20-100 mm, depending on design
Working pressure	350 bars (type 50 kN 275 bars)
Clamping stroke	Depending on clamping edge

Hydraulic interface

Port A	Move to clamping position - clamp
Port B	Unclamp, move to initial position
Port C	Connection with subsequent element
Port P	Pressure line to move to clamping or unclamping position
Port R	Return line

Wedge clamp 0°

Clamping force	25- 200 kN, depending on design
Total stroke	2 mm, depending on design
Working pressure	250 bars
Clamping stroke	Depending on clamping edge

Wedge clamp 0° (10° inclination)

Clamping force	25- 100 kN, depending on design
Total stroke	depending on design
Clamping pressure	200 bars
Dismantling pressure	350 bars
Clamping stroke	Depending on clamping edge

Wedge clamp 0° (5 inclination)

Clamping force	16- 60 kN depending on design
Total stroke	depending on design
Clamping pressure	50 bars
Dismantling pressure	200 bars
Clamping stroke	Depending on clamping edge

Max. temperature (standard design)	100°C
Max. temperature (special design)	250°C

4 Installation instructions, connection and putting into operation

If the incomplete machine 'Wedge clamp' is installed, the following minimum conditions must be complied with, in order to ensure correct assembly with other components to form a complete machine without endangering personal health and safety.

4.1 Installation

- Installation work must only be carried out when the system is out of operation and without pressure
- Prepare drill pattern according to the drawing or the catalogue sheet
- **First,** press drill bushes into the wedge clamp

Attention: **When clamping using wedge clamps, transverse loads are produced which have to be accepted by the bushes. Therefore, mounting of the bushes is mandatory. If the bushes were not mounted, malfunction might occur, and our guarantee would be invalid.**

- Position the wedge clamp and tighten the screws applying the torque specified on the applicable catalogue sheet.

4.2 Hydraulic installation

The hydraulic lines on the machine side must be of sufficient size (8x1.5 DIN 2391-St35 NBK or larger), must be installed in accordance with the specifications (DIN EN ISO 4413) and must conform with up-to-date practice in high-pressure hydraulics. Pipes should be as short as possible, i.e., max. length of 5 m for

single-acting elements with spring return or longer for double-acting elements. Pipe bends should have a large radius. A neat installation is essential for trouble-free operation of the system. Make sure that the

pipe ends are free from burrs and that pipes, high-pressure hoses and screw fittings are cleaned and blown through. Protective plugs should only be removed immediately before connecting the hydraulic system.

Subsequent valve control: Connect the pressure line to port A of the first element in the clamping circuit, connect port C to port A of the next element. Connect port C of the last clamp to the return line. Connect the pressure line to port B of the first element, connect each of the following elements to port B of the previous element using pipes.

Version with a double sequence: The pressure line is connected to port D1 of the first element, from output D2 to port D1 of the subsequent element and from output D2 of the last element to the return line.

Design with control valves: **Port P as supply connection, port R without pressure, return to the power unit.**

4.3 Putting into operation

Read the manual before putting the system into operation!

- Provide the pressure generator with a pressure relief valve to suit the working pressure
- Secure the working range
- Only use clean, fresh oil
- Bleed the complete system at the highest point at low pressure (20bar), in order to eliminate any bubbles
- Apply pressure to all elements and move them several times. Carry out visual check
- Check the hydraulic system for tightness. Visually check the pipes, hoses, screw connections and clamps when under pressure.

ATTENTION: During clamping and unclamping, keep your hands or tools away from the clamping area. **Danger of injury!**

Controls:
When adjusting the controls, set a sufficient period of time, i.e., t > 3s, for *all elements* in order to ensure proper operation.

Depending on the design of the hydraulic system (pipe cross-sections, hose lengths, position and output of the pump unit, etc.), the required times may vary. The quoted values should be corrected (increased or reduced) to suit the machine parameters.

5 Trouble shooting

The wedge clamps have left our premises in a perfect condition. All functions have been tested, and necessary adjustments have been made.

If any malfunction should occur even though the information contained in chapter 4.0 (Installation, connection and putting into operation) has been duly observed, please try to discover the cause using the table below:

Failure	Possible cause	Remedial action
Clamp does not clamp or unclamp	-Hydraulic supply interrupted / incorrect. -Hydraulic system not bled. -Working pressure incorrect. -Pump unit does not work or is not in operation.	Check hydraulic pipes and hose connections up to the pump unit. Check for correct connection (clamping/unclamping). Bleed hydraulic system. Correct working pressure.
Subsequent element does not move to the clamping position	-Incorrect installation of hydraulic system.	Check whether port C of the previous element is connected to port A of the subsequent element.
Subsequent element does not move to the initial position	-Incorrect installation of hydraulic system.	Check whether ports B of the elements are connected with each other.
Clamp with control valves does not move to the parking position	- Control valves do not switch.	Check electric installation, replace valves, if necessary.

6 Maintenance and repair

Under normal conditions, wedge clamps do not need special maintenance. However, a visual check should be carried out once a week. The system should be lubricated when in the initial position using grease for high-temperature bearings. In order to prevent complete filling of the housing with grease, the grease should be applied through the lubricating nipples on the wedge clamp (otherwise the element cannot move back to the initial position).

Service temperature	Lubricating interval	Lubricant
20 - 50° C	3 months	Lithium-based greases on the basis of mineral oil
50 - 180° C	4 weeks	Synth. grease for high-temperature bearings, e.g. Arcanol L79V by Messrs. FAG
> 180° C	4 weeks	High temperature lubricating paste, e.g. Wolfracote CP by Messrs. Klüber or equivalent copper paste

In the case of frequent clamping cycles or in a dirty environment t along with high temperatures, the lubricating intervals should be reduced.
In such cases, or if the system is hardly accessible, we recommend to use an automatic lubricator.
Hydraulic valves are very sensitive to dirt. Make sure that no impurities get into the hydraulic fluid. We recommend that the oil is changed once a year.
When carrying out routine maintenance work on the press:
- inspect the electrical connections (plugs, cables) for damage
- check the hydraulic system for tightness.

Note: The hydraulic system is designed to **DIN EN ISO 4413** "Safety-related requirements on hydraulic systems and their components.

For the list of spare parts and installation drawings, please refer to chapter 7 (Technical appendix).

After having replaced a wedge clamp, move the new clamp several times in order to bleed the system through the pump unit (the same applies if hydraulic connections have been disconnected).

For putting the system into operation, see chapter 4.0 (Installation, connection and putting into operation)

7 Technical appendix, list of spare parts

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:

Wedge clamps
Part no. 4604-xxx
8.2403.xxxx
8.2404.xxxx
8.2405.xxxx
8.2406.xxxx
8.2407.xxxx
8.2408.xxxx
8.2409.xxxx
8.2410.xxxx
8.2411.xxxx
8.2423.xxxx

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. The design of our components corresponds to the standards DIN EN ISO 4413 and EN 60204-1.

Person responsible for the document:
Thomas Willingshofer
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57234 Wilnsdorf-Wilden

Wilnsdorf-Wilden, June 13, 2022
Nico Hanke
Managing director