



Workholding Systems Vario-Line

Jaw widths 100 mm, 125 mm, 160 mm, mechanical – hydraulic



1 Product description

Description

The products are designed for universal workpiece clamping on machine tools. They are equipped with mechanical-hydraulic clamping slides with hydraulic power amplifiers. The internal design is the same for all variants.

When building up the clamping force, the primary piston is pressed into the oil chamber by means of the inner pressure spindle. A high hydraulic pressure and consequently a high clamping force is built up.

When the socket pin has been pulled out, the clamping slide can be moved into another clamping range or it can be fully removed (see page 4).

Application

The products are used for machining dimensionally stable workpieces in single or multiple clamping systems.

The products are suitable both for series production and individual production on 3-axis equipment.

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2 Validity of documentation

This documentation is valid for the following products:

Products of catalogue sheet WS 2.3170.

The following types or part numbers are concerned:

- 3170

3 Target group

Specialists, fitters and set-up men of machines and installations with hydro-mechanical expert knowledge.

Qualification of the personnel

Expert knowledge means that the personnel must

- be in the position to read and completely understand technical specifications such as circuit diagrams and product-specific drawing documents,
- have expert knowledge of function and design of the corresponding components.

A **specialist** is somebody who has due to its professional education and experiences sufficient knowledge and is familiar with the relevant regulations so that he

- can judge the entrusted works,
- can recognize the possible dangers,
- can take the required measures to eliminate dangers,
- knows the acknowledged standards, rules and guidelines of the technology.
- has the required knowledge for repair and mounting.

4 Symbols and signal words

WARNING

Personal damage

Stands for a possibly dangerous situation.

If it is not avoided, death or very severe injuries can be the consequences.

CAUTION

Light injuries / property damage

Stands for a possibly dangerous situation.

If it is not avoided, minor injuries or property damages can be the consequences.

Hazardous to the environment



The symbol stands for important information for the proper handling with materials that are hazardous to the environment.

Ignoring these notes can lead to heavy damages to the environment.



Mandatory sign!

The symbol stands for important information, necessary protection equipment, etc.

NOTE

- This symbol stands for tips for users or especially useful information. This is no signal word for a dangerous or harmful situation.

5 For your safety

5.1 Basic information

The operating manual serves for information and avoidance of dangers when installing the products into the machine as well as information and references for transport, storage and maintenance.

Only in strict compliance with this operating manual, accidents and property damages can be avoided as well as trouble-free operation of the products can be guaranteed.

Furthermore, the consideration of the operating instructions will:

- avoid injuries
- reduce down times and repair costs,
- increase the service life of the products.

5.2 Safety instructions

The product was manufactured in accordance with the generally accepted rules of the technology.

Observe the safety instructions and the operating instructions given in this manual, in order to avoid personal or material damage.

- Read this operating manual thoroughly and completely, before you work with the product.
- Keep this operating manual so that it is accessible to all users at any time.
- Pay attention to the current safety regulations, regulations for accident prevention and environmental protection of the country in which the product will be used.
- Use the ROEMHELD product only in perfect technical condition.
- Observe all notes on the product.

- Use only accessories and spare parts approved by the manufacturer in order to exclude danger to persons because of not suited spare parts.
- Respect the intended use.
- You only may start up the product, when it has been found that the incomplete machine or machine, in which the product shall be mounted, corresponds to the country-specific provisions, safety regulations and standards.
- Perform a risk analysis for the incomplete machine, or the machine.
Interactions between the product and the machine/fixture or its environment may result in risks, which may only be identified and minimized by the user, e.g. :
 - forces generated,
 - movements initiated,
 - Influence of hydraulic and electrical control,
 - etc.
- Use of personal protective equipment is to be considered for all work steps.

6 Use

6.1 Intended use

The products are exclusively designed for clamping workpieces in industrial applications. They must only be operated with hydraulic oil.

In addition, use in compliance with the intended purpose includes:

- Use within the capacity limits specified in the technical data (see data sheet).
- Use as described in this operating manual.
- Compliance with maintenance intervals.
- Qualified and trained personnel for the corresponding activities.
- Mounting of spare parts only with the same specifications as the original part.
- Only HLP hydraulic oils may be used.
- Only clamping jaws may be moved.

6.2 Inappropriate use

WARNING

Injuries, material damages or malfunctions!

- Do not modify the product!

The use of these products is not admitted:

- For domestic use.
- On pallets or machine tool tables in primary shaping and metal forming machine tools.
- If due to physical/chemical effects (vibrations, welding currents or others), damages of the products or seals can be caused.
- In machines, on pallets or machine tool tables that are used to change the characteristics of the material (magnetise, radiation, photochemical procedures, etc.).
- In areas for which special guidelines apply, especially installations and machines:
 - For the use on fun fairs and in amusement parks.
 - In food processing or in areas with special hygiene regulations.
 - For military purposes.
 - In mines.
 - In explosive and aggressive environments (e.g. ATEX).
 - In medical engineering.
 - In the aerospace industry.

- For passenger transport.
- For other operating and environmental conditions e.g.:
 - Higher operating pressures than indicated on the data sheet or installation drawing.
 - With hydraulic fluids that do not correspond to the specifications.
 - Higher flow rates than indicated on the data sheet or installation drawing.

Special solutions are available on request!

7 Installation

⚠ WARNING

Injury by high-pressure injection (squirting out of hydraulic oil under high pressure)!

- Improper connection can lead to escapes of oil under high pressure at the connections.
- Mounting or dismounting of the element must only be made in depressurised mode of the hydraulic system.
- Connection of the hydraulic line as per DIN 3852/ISO 1179.
- Unused connections have to be locked professionally.
- Use all mounting holes.

Injury by high-pressure injection (squirting out of hydraulic oil under high pressure)!

Wear, damage of the seals, ageing and incorrect mounting of the seal kit by the operator can lead to escapes of oil under high pressure.

- Before using them, make a visual control.

Injury by dropping parts!

- Keep hands and other parts of the body out of the working area!
- Wear personal protection equipment!

Poisoning due to contact with hydraulic oil.

Wear, damage of the seals, aging and incorrect mounting of the seal kit by the operator can lead to escapes of oil.

Incorrect connection can lead to escapes of oil at the ports.

- For handling with hydraulic oil consider the material safety data sheet.
- Wear protection equipment.

⚠ CAUTION

Heavy weight may drop

- Some product types have a considerable weight. These have to be secured against dropping during transport.
- Weight specifications see chapter "Technical data".

i NOTE

Aggressive media

If there is a possibility that aggressive cutting and cooling liquids including swarf may ingress the inside of the clamping slide, the clamping slide inside must be cleaned by the customer.

Ease of movement

Please make sure that the product moves easily upon installation!

7.1 Design

The hydraulic force of an internal piston will be transmitted by the slide onto the clamping jaw.

Series VL

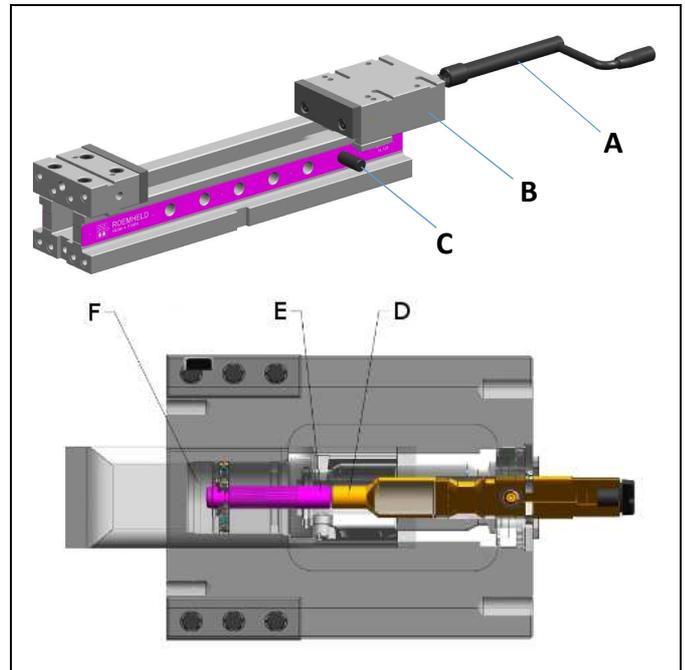


Figure 1: Components for series VL

A Crank handle	D Pressure spindle
B Clamping slide	E Primary piston
C Socket pin	F Oil chamber

7.2 Mounting types

WARNING

Risk of injuries due to improper product fixing!

If the product is fixed improperly, it may loosen from the machine table or be damaged during clamping or machining.

- Install the product as instructed in the present operating manual.
- Ensure that the installation surface of the product base and the machine table are clean before installation.
- The installation surface of the product base must be even and have a minimum overlap of 75 % on the machine table.
- Install the product in accordance with the torque specified in the operating manual.
- Fix the product so that it may not be displaced by the machining forces.

Bruises, burns and bone fractures caused by dropping workpieces!

Workpieces may cause injuries when dropping.

- Wear safety shoes with safety level 1 (S1) as a minimum requirement.

Risk of injuries by improperly mounted crank handle and/or torque wrench!

An improperly mounted crank handle or torque wrench may slip off during operation and cause injuries to the operator.

- Check crank handle and/or torque wrench for proper seat.

Risk of injuries due to limited range of motion of the crank handle and/or the torque wrench!

When using the crank handle or the torque wrench, extremities may be squeezed between the crank handle and/or the torque wrench and objects in the range of motion.

- The range of the crank handle's and/or torque wrench's motion must be freely accessible.

Series VL

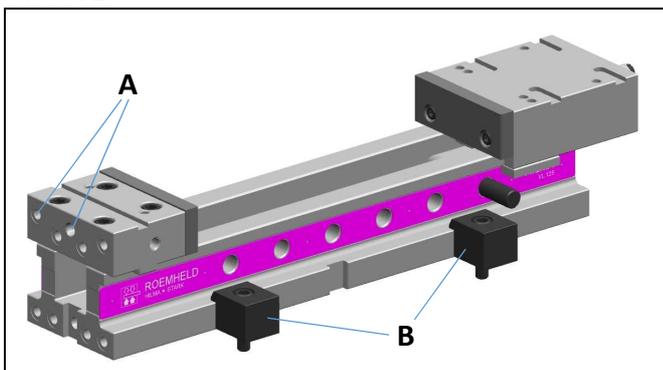


Figure 2: Mounting types for series VL

A Mounting and positioning holes for vertical mounting	B Clamping claws
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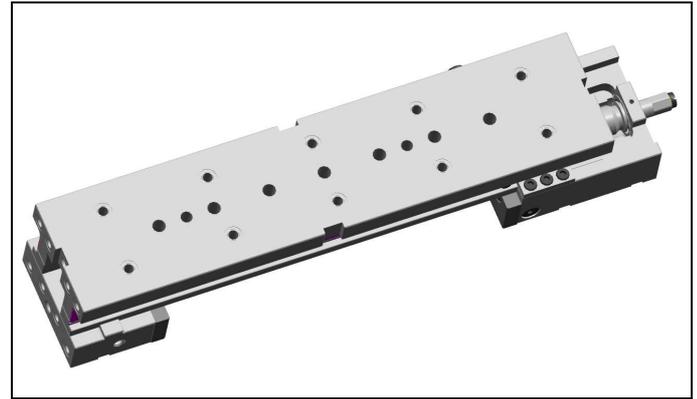


Figure 3: View from below with mounting and positioning holes

Fixing on the machine table:

1. Unevenness and swarf between the contact surface and the base surface shall be removed.
2. Alignment
 - with a load cell,
 - with keyblocks,
 - positioning pins.
3. Fixing
 - with screws,
 - with clamping claws.

Special fixing kits may be ordered for each series.

8 Start-up

WARNING

Poisoning due to contact with hydraulic oil.

Wear, damage of the seals, aging and incorrect mounting of the seal kit by the operator can lead to escapes of oil.

Incorrect connection can lead to escapes of oil at the ports.

- For handling with hydraulic oil consider the material safety data sheet.
- Wear protection equipment.

Danger of injury due to high-pressure injection in case of improper handling!

In case of improper handling of the hydraulic system, fluids can splash out under high pressure and injure people.

- Work on hydraulic equipment should only be carried out by qualified personnel with the relevant knowledge in this area.

NOTE

Lubrication before start-up

The elements are delivered with minimal lubrication.

The sliding surfaces have to be lubricated lightly with slide way oil, ISO VG 220, before start-up!

- Check tight seat (check tightening torque of the fixing screws).

NOTE

Product operation on grinding machines

When the product is used on grinding machines, the product will be more heavily contaminated.

- Clean product from contamination regularly.

Observe clamping force and temperature difference

The product is to be used in such a way that the temperatures occurring as intended do not lead to inadmissible clamping forces. In particular, the following points must be observed:

- Durability of seals
- Expansion of media.
- Admissible temperature difference of the product in clamped condition is max. +/- 10 °C.

WARNING

Risk of injuries or damage to property by collision with system components!

In the range of motion of the system components, persons may be injured by collision with system components, or damage to property may be caused by collision with other system components.

- Check the range of motion of the system components before start-up.

9 Operation

WARNING

Vibration will loosen the product fixture!

Vibration affects the workpiece fixture and results in an improperly fixed workpiece. An improperly fixed workpiece may be catapulted off the product during machining and result in personal injuries or damage to property.

- Exclude vibration on the product if possible.

Risks of burns caused by hot workpieces!

Hot workpieces may cause burns on parts of the body.

- Wear heat-resistant protective clothing.

Risk of injuries during workpiece clamping!

The workpiece properties may induce personal injuries during clamping if the workpiece is not clamped properly.

- Remove contamination on the clamping surfaces before clamping.
- Observe material properties of the workpiece during clamping.
- Observe workpiece shape during clamping.
- Observe workpiece clamping surface during clamping.
- Observe workpiece inertia during clamping.

Risk of injury due to improperly secured socket pins!

If the socket pin is not properly secured, the socket pin may slip out of the securing. The clamping slide can slip from the base and cause injuries due to a socket pin not secured in the product.

- Check that the socket pin is properly secured before clamping.

CAUTION

Risk of injuries by crushing of extremities during clamping

The product is to be used in a manner so that the operator's own or other persons' extremities may not be squeezed during clamping.

- Keep your own or other persons' extremities off the clamping area during clamping.

Risk of injuries due to exertion during clamping and unclamping of the product

When unclamping the product, high forces have to be overcome initially. Persons may slip off the product during unclamping and be injured.

- Be careful and proceed slowly when unclamping the product.

NOTE

Machining with mounted crank handle and/or torque wrench is not permitted

Machining with mounted crank handle and/or torque wrench on the product is not permitted.

- Remove the crank handle and/or torque wrench from the product before machining a workpiece.

9.1 Setting the clamping range

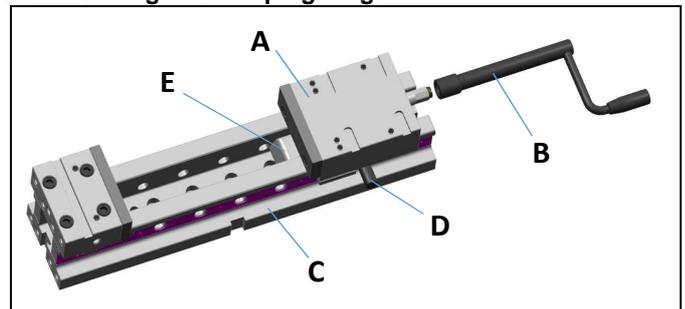


Figure 4: Setting the clamping range

A Clamping slide	D Socket pin
B Crank handle	E Angle nut
C Base	

- Pull the socket pin and move the clamping slide until the workpiece can be inserted.
- Push the clamping slide against the workpiece.
- Turn the crank handle until the angle nut in the base adjusts so that the socket pin can be inserted through the base and angle nut up to the stop.
- Insert the socket pin.
- Check clamping range overlap (min. 2 mm).

9.2 Clamping and unclamping

WARNING

Risk of injuries due to flexible or insufficiently clamped workpieces!

Flexible or insufficiently clamped workpieces may be catapulted off the machine or drop and cause personal injuries during machining.

- Only use the product for clamping rigid workpieces.
- Sufficiently clamp the workpiece before machining.

Risk of injuries due to insufficient clamping force or insufficient workpiece clamping!

Insufficient clamping force or insufficiently clamped workpieces may be catapulted off the machine or drop and cause personal injuries during machining.

- Have the product checked for its operational reliability by a qualified expert after extended downtimes, repair work, and at regular intervals.
- Have the product checked for its defined clamping force by a qualified expert.
- Have the product checked for visual damage or wear by a qualified expert.
- Check whether the product is fixed properly before product start-up.
- Check whether the workpiece is clamped properly before product start-up.

- By turning the crank handle clockwise, the clamping slide is moved to the workpiece until a noticeable resistance is created. By means of the catch, the changeover to the mechanical-hydraulic power transmission takes place with increased force on the crank handle. When the inner pressure spindle is turned further, the clamping force is built up continuously up to the stop.
- The clamping force adjustment to sensitive workpieces is continuously adjustable by reducing the crank rotation (see technical data). A clamping force preselection is available as an accessory.
- The clamping force is continuously reduced by turning the crank handle counterclockwise until the catch engages noticeably. The vice is opened when the crank handle is turned further.
- The catch must engage, otherwise only a reduced clamping force will be achieved when reclamping.

9.3 Clamping and unclamping with gripper

To compensate for the plastic deformation of the workpiece when clamping with the gripper, two clamping operations are required, as described in chapter Clamping and unclamping.

NOTE

Loss of clamping force in the gripper area

The first time the workpiece is clamped with the gripper, deformation occurs in the area of the gripper. Due to the deformation, the workpiece is no longer sufficiently clamped and must be reclamped in a second clamping operation.

- After the first clamping, do not move the workpiece and clamp it a second time.

9.3.1 Brake for clamping slide

CAUTION

Danger of crushing due to dropping clamping slide without brake (BB 100 + 125)

When the product is used vertically with the socket pin pulled, the clamping slide is not held in position without the brake fitted. Without the brake fitted, the slide drops down along the base and can crush limbs.

- Install the brake before using the product vertically.

Danger of crushing due to dropping clamping slide without gas pressure spring (BB 160)

When the product is used vertically with the socket pin pulled, the clamping slide is not held in position without the gas pressure spring fitted. Without the gas pressure spring fitted, the slide drops down along the base and can crush limbs.

- Install the gas pressure spring before using the product vertically.

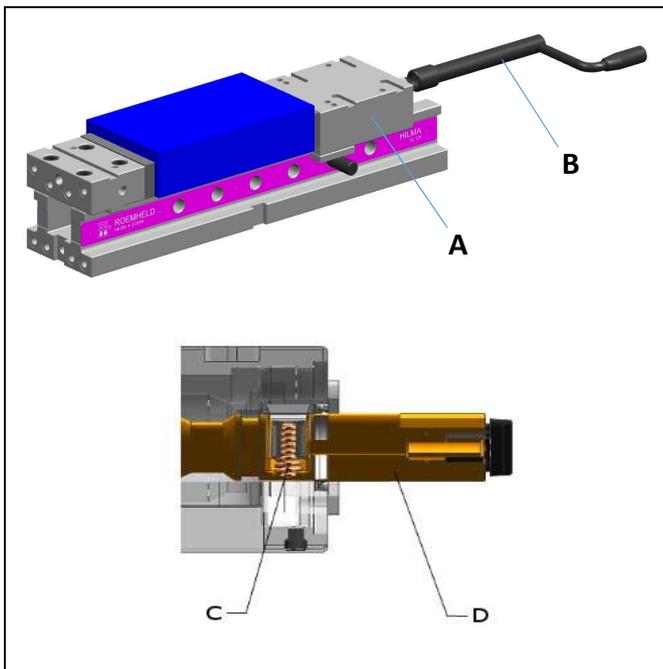


Figure 5: Clamping and unclamping

A Clamping slide	C Catch
B Crank handle	D Pressure spindle

⚠ WARNING

Risk of injury due to damage to the gas pressure spring!

The gas pressure spring is under high pressure. When attempting to open or overheat the gas pressure spring, the pressure escapes from the gas pressure spring and may injure persons.

- Do not open gas pressure spring.
- Do not heat the gas pressure spring above 80 °C.
- After prolonged storage, check gas pressure spring for proper function.

Danger of crushing due to automatic pushing back of the clamping slide!

When the product is used horizontally and with the socket pin pulled, the gas pressure spring pushes the clamping slide to the rear and can crush limbs in the process.

- Keep the movement area of the clamping slide free of body parts and objects before pulling the socket pin.

i NOTE

Vertical mounting with brake

The products are suitable for vertical mounting. However, the brake must be mounted or activated.

9.3.2 Brake for clamping slide BB 100 + 125

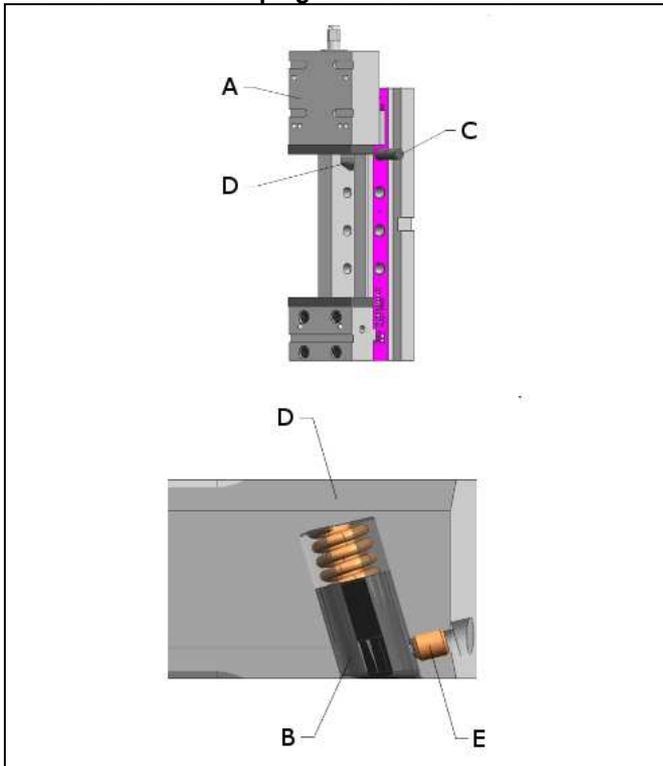


Figure 6: Brake for clamping slide BB 100 + 125

A Clamping slide	D Angle nut
B Brake	E Locking screw
C Socket pin	

The brake is not mounted or activated when delivered. This enables easy adjustment of the clamping range in horizontal operation.

Mount the brake

- Pull the socket pin.
- Pull the clamping slide back to the end of the guide.
- Install contact piece, pressure spring and locking screw into the angle nut.

Release the brake

- Press the brake into the angle nut.
- Tighten locking screw.

9.4 Angle drive

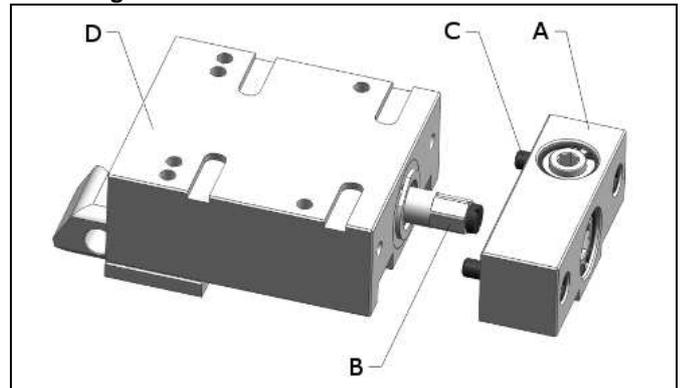


Figure 7: Angle drive

A Angle drive	C Screws
B Pressure spindle	D Slide surface

Mount the angle drive

- Push the angle drive onto the pressure spindle.
- Tighten the screws slightly.
- Align the angle drive parallel to the slide surface.
- Tighten the screws.
- Check smooth running.

Dismount the angle drive

- Loosen the screws.
- Remove the angle drive from the pressure spindle.

10 Maintenance

⚠ WARNING

Burning due to hot surface!

- In operation, surface temperatures of over 70°C may develop on the product.
- Maintenance and repair work should only be performed in a cooled down condition and/or with protective gloves.

Risk of injuries by breaking product parts!

Due to overload or faulty operation during operation, product parts may break, and this may cause personal injuries.

- Observe maintenance intervals for all parts pursuant to this Operating Manual.

Danger of injury due to high-pressure injection in case of improper handling!

In case of improper handling of the hydraulic system, fluids can splash out under high pressure and injure people.

- Work on hydraulic equipment should only be carried out by qualified personnel with the relevant knowledge in this area.

10.1 Maintenance plan

Maintenance works	Interval	Realisation
Cleaning	As required	Operator
Regular checks	daily	Operator
Regular lubrication	At the latest after 500 clamping cycles!	⚠ Caution! If this lubrication will not be made, this can lead to a failure of the fixture clamp!
Repair		Qualified personnel

10.2 Cleaning

⚠ CAUTION

Damage to moving components!

Avoid damage to moving components (rods, plungers, bolts, etc.) as well as wipers and seals.

Aggressive cleaning agents

The product must not be cleaned with:

- corrosive or caustic substances or
- organic solvents as halogenated or aromatic hydrocarbons and ketones (cellulose thinner, acetone, etc.), since this can damage the seals.

The element must be cleaned at regular intervals. Especially the clamping slide and the housing have to be cleaned of swarf and other liquids.

In the case of heavy contamination, cleaning must be made at shorter intervals.

10.3 Regular checks

1. Check tightness of hydraulic connections (visual control).
2. Leakage control at the housing and the clamping slide.
3. Clamping force control by pressure control.
4. Check the observance of the maintenance intervals.

10.4 Exchange seal kit

The exchange of the seal kit has to be made in case of external leakages. For high availability we recommend to change the seals at the latest after 1,000,000 cycles or 2 years.

The seal kit is available as spare part.

NOTE

Seal kits

- Do not install seal kits which were exposed to light for a longer time.
- Observe storage conditions (see chapter "Technical data").
- Only use original seals.

10.5 Maintenance and care

Dismount the clamping slide

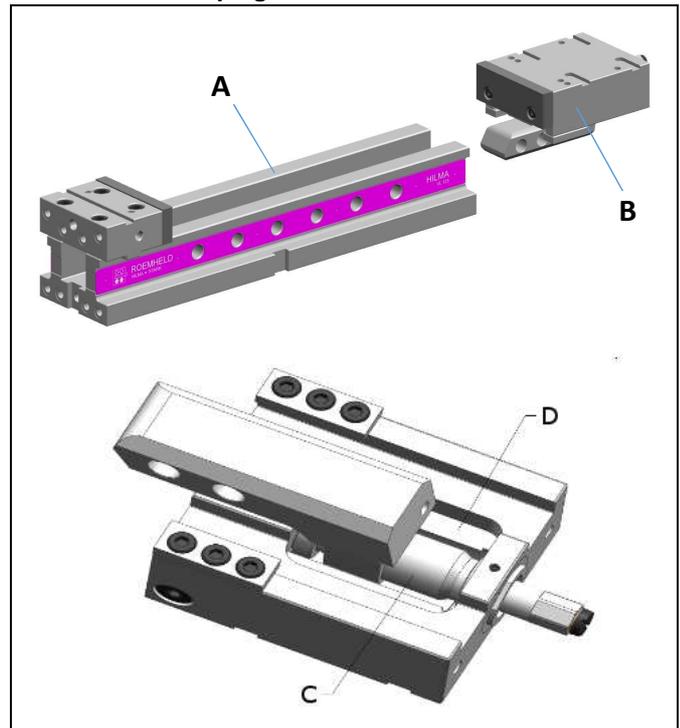


Figure 8: Dismount the clamping slide

A Base	C Spindle thread
B Clamping slide	D Spindle area

The following maintenance and care work is to be performed as required, however once a month, each:

1. Remove the clamping slide from the base, clean and, if necessary, remove the sliding surfaces and oil them with slide way oil.
2. Lubricate spindle thread with slide way oil.
3. Lubricate spindle area with slide way oil.

On this occasion, check the oil reserve at distance "F" between secondary piston and slide body.

"F" = approx. 1 mm.

Refilling of hydraulic oil

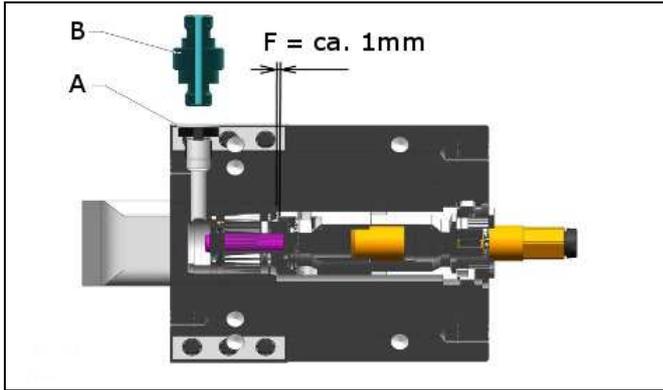


Figure 9: Refilling of hydraulic oil

A Screw plug	B Filling nipple
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4. Turn the pressure spindle back until the indexing bolt engages.
5. Remove the clamping slide from the base, clean and, if necessary, remove the sliding surfaces and oil them with slide way oil.
6. Unscrew the screw plug.
7. Move primary piston to off-position.
8. Use a filling nipple and an oil gun or pressurise the oil chamber with compressed air.
9. Fill hydraulic oil to the brim without bubbles.
10. Screw in and tighten bleeding screw plug
11. Lubricate spindle thread with slide way oil.
12. Lubricate spindle area with slide way oil.

On this occasion, check the oil reserve at distance "F" between secondary piston and slide body.

"F" = approx. 1 mm.

Lubrication of the catch

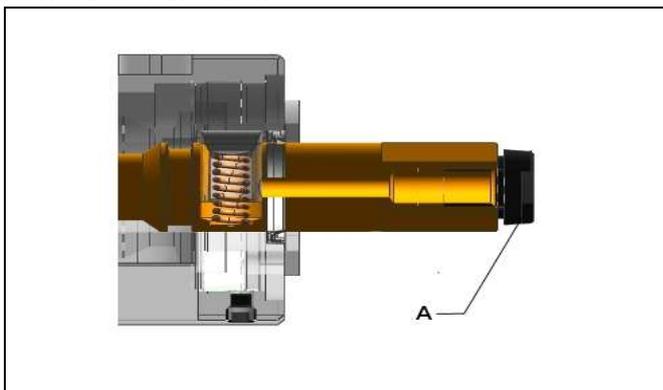


Figure 10: Lubrication of the catch

A Screw plug	
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13. Loosen the screw plug.
14. Add approx 0.5 ccm of Vactra 2 hydraulic oil.
15. Screw in the screw plug.
16. Relubrication as required, but at least once a month.

10.6 Service / maintenance service

1. In Germany
Maintenance by manufacturer
Please return the machine vice carriage paid.

Maintenance at customer workshop:
Please call maintenance service - information 12.3011.
Service phone: 02733 – 281 150

2. Internationally
Please contact the HILMA-RÖMHELD general importer or your local dealer.

11 Trouble shooting

Fault	Cause	Remedy
Clamping slide has too much play	Guide worn out	Exchange vice, exchange component, if required.
Clamping pressure reduces due to leakages at the vice	Wear at the seals	Exchange seals
No clamping pressure build-up	Pressure spindle not in off-position.	Turn pressure spindle back, until the indexing bolt engages (see chapter "Clamping and unclamping").
	Clamping range set incorrectly.	See chapter "Setting the clamping range".
	Premature change over to hydraulic power transmission due to blocked slide guide.	After pulling the socket pin, remove the clamping slide from the base, clean and oil all sliding surfaces.
	High pressure path consumed by protruding burr or yielding workpiece.	Clamp only burr-free workpieces. Support yielding workpieces or clamp with formed jaws.
	Oil reserve exhausted.	Refill oil (see chapter "Refilling of hydraulic oil").
Socket pin sluggish	Dirt between base and angle nut	Remove the clamping slide and clean the guide.
Sluggish clamping range adjustment	Brake effective.	See chapter "Brake for clamping slide BB100 and BB 125".

12 Technical data

Characteristics

Type 3170			
Jaw width [mm]	100	125	160
Max. clamping force [kN]	25	40	50
Effort on the crank [N]	50	75	95
Crank radius [mm]	80	100	125

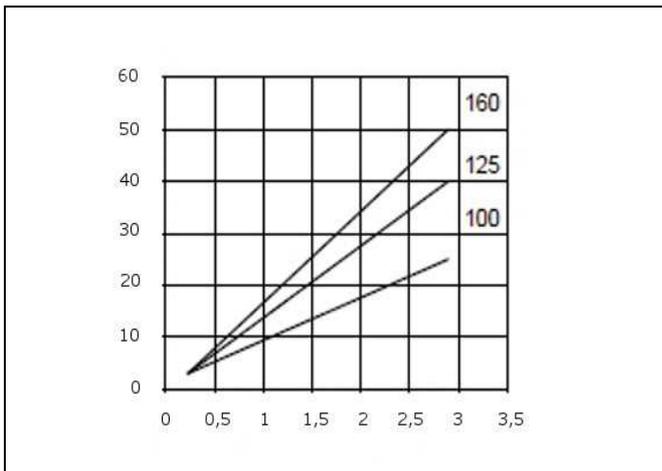


Figure 11: Relation of clamping forces

X – axis: Crank turns	Y - axis: Clamping force [kN]
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NOTE

Further details

- For further technical data see ROEMHELD data sheet.

Proposal, tightening torques for screws of tensile strength 8.8, 10.9, 12.9

NOTE

- The indicated values are approximate values and have to be interpreted according to the user's application!
See note!

Thread	Tightening torque (MA) [Nm]		
	8.8	10.9	12.9
M6	10	15	18
M8	25	36	45
M10	49	72	84
M12	85	125	145
M14	135	200	235
M16	210	310	365
M20	425	610	710

Note: Applicable to workpieces and set screws made of steel with metric thread and connecting surface dimensions as per DIN 912, 931, 933, 934 / ISO 4762, 4014, 4017, 4032

The tightening torque (MA) values in the table take account of: Steel/steel design, friction value $\mu_{ges} = 0.14$ - not lubricated, utilisation of minimum yield point = 90%.

12.1 Storage

CAUTION

Storage of components!

- The product must not be exposed to direct sunlight, since UV light may cause serious damage to the seals.
- Storage not in compliance with the storage conditions is inadmissible.
- In case of improper storage, the seals can embrittle and resinification of the anti-corrosive oil or corrosion at the element can occur.

ROEMHELD products are tested with mineral oil by default. The exterior of the products is protected against corrosion. The residual oil film after the test procedure provides for a six-month interior protection against corrosion when stored in dry and tempered rooms. For longer storage times the product must be filled with a non-resinifying corrosion protection agent and the external surfaces must be treated.

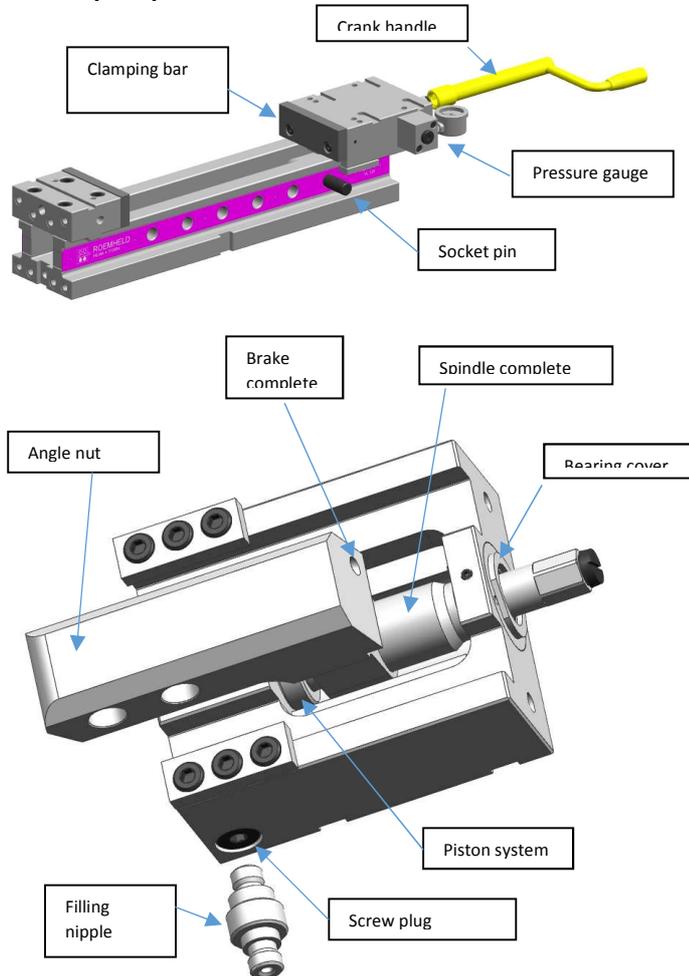
12.2 Accessories

NOTE

Accessories

- see data sheet

12.3 Spare parts

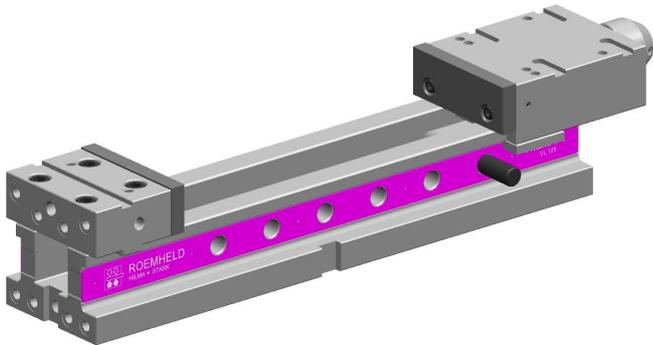


Description	Pc (s)	Spare part no.		
		BB 100	BB 125	BB 160
Socket pin	1	7.3072.0006	7.3073.0006	7.3074.0006
Crank handle	1	4.2056.0020	4.2056.0019	4.2056.0021
Locking screw	1	1.0908.1009	1.0908.1009	1.0908.1010
Filling nipple	1	5.3090.0006	5.3090.0006	5.3090.0007
Angle nut	1	5.2053.0075	5.2053.0073	5.2053.0074
Spindle complete	1	9.3072.0523	9.3073.0523	9.3074.0523
Bearing cover	1	5.2031.0038	5.2031.0039	5.2031.0040
Clamping bar	2	9.3022.0512	9.3023.0512	9.3024.0512
Piston system	1	9.3072.0522	9.3073.0522	9.3074.0522
Pressure gauge left-hand	1	9.3122.0552	9.3122.0552	9.3122.0552
Pressure gauge right-hand	1	9.3122.0554	9.3122.0554	9.3122.0554
Brake complete (accessory)	1	9.3122.0551 in angle nut	9.3123.0551 in angle nut	9.3769.0401 Gas spring

Subject to modifications

Workholding Systems Vario-Line

Jaw widths 100 mm, 125 mm, 160 mm, hydraulic



1 Product description

Description

The products are designed for universal workpiece clamping on machine tools. They are equipped with hydraulic clamping slides.

The hydraulic power stroke is generated by an external pressure transducer. The return spring ensures fast opening of the clamping slide. When the socket pin has been pulled out, the clamping slide can be moved into another clamping range or it can be fully removed.

The precise adjustment of the clamping range is made with the crank handle.

Application

The products are used for machining dimensionally stable workpieces in single or multiple clamping systems.

The products are suitable both for series production and individual production on 3-axis equipment.

2 Validity of documentation

This documentation is valid for the following products:

Products of catalogue sheet WS 2.3170.

The following types or part numbers are concerned:

- 3170

3 Target group

Specialists, fitters and set-up men of machines and installations with hydro-mechanical expert knowledge.

Qualification of the personnel

Expert knowledge means that the personnel must

- be in the position to read and completely understand technical specifications such as circuit diagrams and product-specific drawing documents,
- have expert knowledge of function and design of the corresponding components.

A **specialist** is somebody who has due to its professional education and experiences sufficient knowledge and is familiar with the relevant regulations so that he

- can judge the entrusted works,
- can recognize the possible dangers,
- can take the required measures to eliminate dangers,
- knows the acknowledged standards, rules and guidelines of the technology.
- has the required knowledge for repair and mounting.

Table of contents Part 2

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8	Start-up	15
9	Operation	16+17+18
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4 Symbols and signal words

WARNING

Personal damage

Stands for a possibly dangerous situation.

If it is not avoided, death or very severe injuries can be the consequences.

CAUTION

Light injuries / property damage

Stands for a possibly dangerous situation.

If it is not avoided, minor injuries or property damages can be the consequences.

Hazardous to the environment



The symbol stands for important information for the proper handling with materials that are hazardous to the environment.

Ignoring these notes can lead to heavy damages to the environment.



Mandatory sign!

The symbol stands for important information, necessary protection equipment, etc.

NOTE

- This symbol stands for tips for users or especially useful information. This is no signal word for a dangerous or harmful situation.

5 For your safety

5.1 Basic information

The operating manual serves for information and avoidance of dangers when installing the products into the machine as well as information and references for transport, storage and maintenance.

Only in strict compliance with this operating manual, accidents and property damages can be avoided as well as trouble-free operation of the products can be guaranteed.

Furthermore, the consideration of the operating instructions will:

- avoid injuries
- reduce down times and repair costs,
- increase the service life of the products.

5.2 Safety instructions

The product was manufactured in accordance with the generally accepted rules of the technology.

Observe the safety instructions and the operating instructions given in this manual, in order to avoid personal or material damage.

- Read this operating manual thoroughly and completely, before you work with the product.
- Keep this operating manual so that it is accessible to all users at any time.
- Pay attention to the current safety regulations, regulations for accident prevention and environmental protection of the country in which the product will be used.
- Use the ROEMHELD product only in perfect technical condition.

- Observe all notes on the product.
- Use only accessories and spare parts approved by the manufacturer in order to exclude danger to persons because of not suited spare parts.
- Respect the intended use.
- You only may start up the product, when it has been found that the incomplete machine or machine, in which the product shall be mounted, corresponds to the country-specific provisions, safety regulations and standards.
- Perform a risk analysis for the incomplete machine, or the machine.

Interactions between the product and the machine/fixture or its environment may result in risks, which may only be identified and minimized by the user, e.g. :

- forces generated,
- movements initiated,
- influence of hydraulic and electrical control,
- etc.
- Use of personal protective equipment is to be considered for all work steps.

6 Use

6.1 Intended use

The products are exclusively designed for clamping workpieces in industrial applications. They must only be operated with hydraulic oil.

In addition, use in compliance with the intended purpose includes:

- Use within the capacity limits specified in the technical data (see data sheet).
- Use as described in this operating manual.
- Compliance with maintenance intervals.
- Qualified and trained personnel for the corresponding activities.
- Mounting of spare parts only with the same specifications as the original part.
- Only HLP hydraulic oils may be used.
- Only clamping jaws may be moved.

6.2 Inappropriate use

WARNING

Injuries, material damages or malfunctions!

- Do not modify the product!

The use of these products is not admitted:

- For domestic use.
- On pallets or machine tool tables in primary shaping and metal forming machine tools.
- If due to physical/chemical effects (vibrations, welding currents or others), damages of the products or seals can be caused.
- In machines, on pallets or machine tool tables that are used to change the characteristics of the material (magnetise, radiation, photochemical procedures, etc.).
- In areas for which special guidelines apply, especially installations and machines:
 - For the use on fun fairs and in amusement parks.
 - In food processing or in areas with special hygiene regulations.
 - For military purposes.
 - In mines.
 - In explosive and aggressive environments (e.g. ATEX).
 - In medical engineering.
 - In the aerospace industry.

- For passenger transport.
- For other operating and environmental conditions e.g.:
 - Higher operating pressures than indicated on the data sheet or installation drawing.
 - With hydraulic fluids that do not correspond to the specifications.
 - Higher flow rates than indicated on the data sheet or installation drawing.

Special solutions are available on request!

7 Installation

⚠ WARNING

Injury by high-pressure injection (squirting out of hydraulic oil under high pressure)!

- Improper connection can lead to escapes of oil under high pressure at the connections.
- Mounting or dismounting of the element must only be made in depressurised mode of the hydraulic system.
- Connection of the hydraulic line as per DIN 3852/ISO 1179.
- Unused connections have to be locked professionally.
- Use all mounting holes.

Injury by high-pressure injection (squirting out of hydraulic oil under high pressure)!

Wear, damage of the seals, ageing and incorrect mounting of the seal kit by the operator can lead to escapes of oil under high pressure.

- Before using them, make a visual control.

Injury by dropping parts!

- Keep hands and other parts of the body out of the working area!
- Wear personal protection equipment!

Poisoning due to contact with hydraulic oil.

Wear, damage of the seals, aging and incorrect mounting of the seal kit by the operator can lead to escapes of oil.

Incorrect connection can lead to escapes of oil at the ports.

- For handling with hydraulic oil consider the material safety data sheet.
- Wear protection equipment.

⚠ CAUTION

Heavy weight may drop

- Some product types have a considerable weight. These have to be secured against dropping during transport.
- Weight specifications see chapter "Technical data".

i NOTE

Aggressive media

If there is a possibility that aggressive cutting and cooling liquids including swarf may ingress the inside of the clamping slide, the clamping slide inside must be cleaned by the customer.

Ease of movement

Please make sure that the product moves easily upon installation!

7.1 Design

The hydraulic power stroke is generated by an external pressure transducer. The return spring ensures fast opening of the

clamping slide. When the socket pin has been pulled out, the clamping slide can be moved into another clamping range or it can be fully removed. The precise adjustment of the clamping range is made with the crank handle.

Series VL

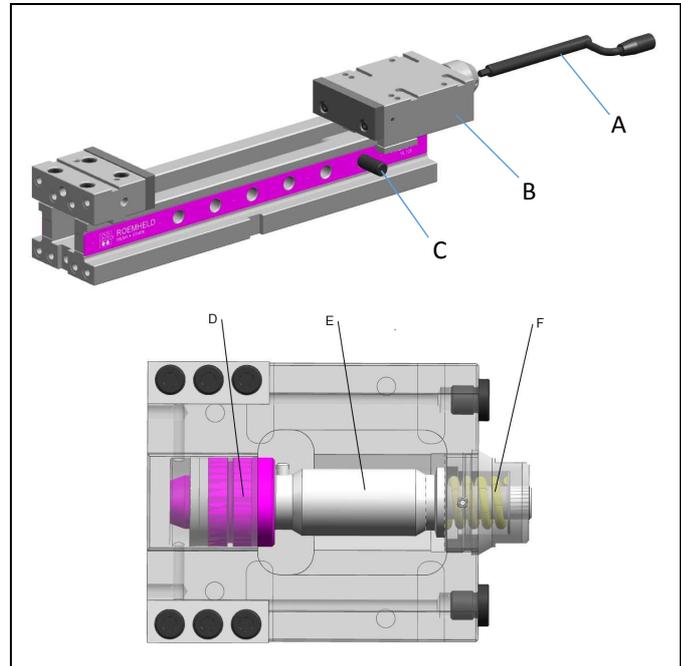


Figure 1: Components for series VL

A Crank handle	D Piston
B Clamping slide	E Spindle
C Socket pin	F Return spring

7.2 Mounting types

⚠ WARNING

Risk of injuries due to improper product fixing!

If the product is fixed improperly, it may loosen from the machine table or be damaged during clamping or machining.

- Install the product as instructed in the present operating manual.
- Ensure that the installation surface of the product base and the machine table are clean before installation.
- The installation surface of the product base must be even and have a minimum overlap of 75 % on the machine table.
- Install the product in accordance with the torque specified in the operating manual.
- Fix the product so that it may not be displaced by the machining forces.

Bruises, burns and bone fractures caused by dropping workpieces!

Workpieces may cause injuries when dropping.

- Wear safety shoes with safety level 1 (S1) as a minimum requirement.

Risk of injuries by improperly mounted crank handle and/or torque wrench!

An improperly mounted crank handle or torque wrench may slip off during operation and cause injuries to the operator.

- Check crank handle and/or torque wrench for proper seat.

Risk of injuries due to limited range of motion of the crank handle and/or the torque wrench!

When using the crank handle or the torque wrench, extremities may be squeezed between the crank handle and/or the torque wrench and objects in the range of motion.

- The range of the crank handle's and/or torque wrench's motion must be freely accessible.

Series VL

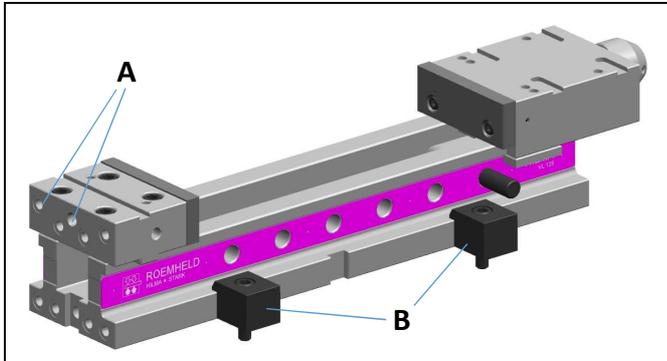


Figure 2: Mounting types for series VL

A Mounting and positioning holes for vertical mounting	B Clamping claws
--	------------------

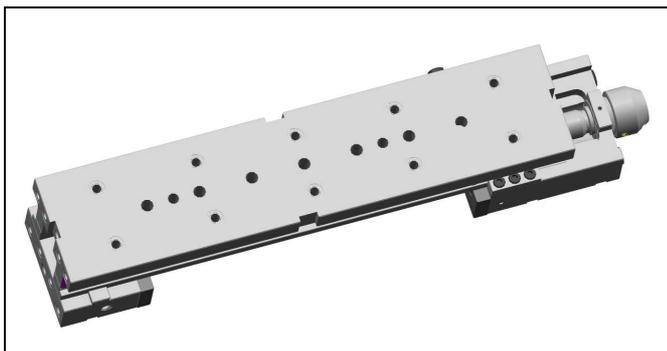


Figure 3: View from below with mounting and positioning holes

Fixing on the machine table:

1. Unevenness and swarf between the contact surface and the base surface shall be removed.
2. Alignment
 - with a load cell,
 - with keyblocks,
 - with positioning pins
3. Fixing
 - with screws,
 - with clamping claws.

Special fixing kits may be ordered for each series.

8 Start-up:

⚠ WARNING

Poisoning due to contact with hydraulic oil.

Wear, damage of the seals, aging and incorrect mounting of the seal kit by the operator can lead to escapes of oil.

Incorrect connection can lead to escapes of oil at the ports.

- For handling with hydraulic oil consider the material safety data sheet.
- Wear protection equipment.

Danger of injury due to high-pressure injection in case of improper handling!

In case of improper handling of the hydraulic system, fluids can splash out under high pressure and injure people.

- Work on hydraulic equipment should only be carried out by qualified personnel with the relevant knowledge in this area.

i NOTE

Lubrication before start-up

The elements are delivered with minimal lubrication.

The sliding surfaces have to be lubricated lightly with slide way oil, ISO VG 220, before start-up!

- Check tight seat (check tightening torque of the fixing screws).

i NOTE

Product operation on grinding machines

When the product is used on grinding machines, the product will be more heavily contaminated.

- Clean product from contamination regularly.

Observe clamping force and temperature difference

The product is to be used in such a way that the temperatures occurring as intended do not lead to inadmissible clamping forces. In particular, the following points must be observed:

- Durability of seals
- Expansion of media.
- Admissible temperature difference of the product in clamped condition is max. +/- 10 °C.

⚠ WARNING

Risk of injuries or damage to property by collision with system components!

In the range of motion of the system components, persons may be injured by collision with system components, or damage to property may be caused by collision with other system components.

- Check the range of motion of the system components before start-up.

9 Operation

⚠ WARNING

Vibration will loosen the product fixture!

Vibration affects the workpiece fixture and results in an improperly fixed workpiece. An improperly fixed workpiece may be catapulted off the product during machining and result in personal injuries or damage to property.

- Exclude vibration on the product if possible.

Risks of burns caused by hot workpieces!

Hot workpieces may cause burns on parts of the body.

- Wear heat-resistant protective clothing.

Risk of injuries during workpiece clamping!

The workpiece properties may induce personal injuries during clamping if the workpiece is not clamped properly.

- Remove contamination on the clamping surfaces before clamping.
- Observe material properties of the workpiece during clamping.
- Observe workpiece shape during clamping.
- Observe workpiece clamping surface during clamping.
- Observe workpiece inertia during clamping.

Risk of injury due to improperly secured socket pins!

If the socket pin is not properly secured, the socket pin may slip out of the securing. The clamping slide can slip from the base and cause injuries due to a socket pin not secured in the product.

- Check that the socket pin is properly secured before clamping.

⚠ CAUTION

Risk of injuries by crushing of extremities during clamping

The product is to be used in a manner so that the operator's own or other persons' extremities may not be squeezed during clamping.

- Keep your own or other persons' extremities off the clamping area during clamping.

NOTE

Machining with mounted crank handle and/or torque wrench is not permitted

Machining with mounted crank handle and/or torque wrench on the product is not permitted.

- Remove the crank handle and/or torque wrench from the product before machining a workpiece.

9.1 Setting the clamping range

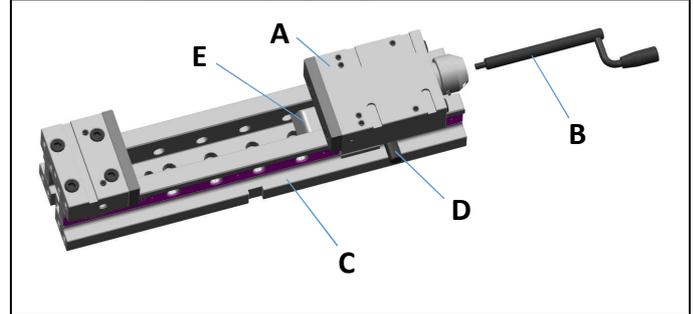


Figure 4: Setting the clamping range

A Clamping slide	D Socket pin
B Crank handle	E Angle nut
C Base	F Anti-torsion device

- Pull the socket pin and move the clamping slide until the workpiece can be inserted.
- Push the clamping slide against the workpiece.
- Turn the crank handle until the angle nut in the base adjusts so that the socket pin can be inserted through the base and angle nut up to the stop.
- Insert the socket pin.
- Adjust the insertion clearance for the workpiece by turning the crank handle. BB100 = 3mm, BB125 = 3mm, BB160 = 5mm
- Remove the crank handle and push the anti-torsion device onto the bearing cover of the clamping slide.

Do not use the entire power stroke as insertion clearance, otherwise the clamping slides will move during clamping against the internal stop and as a result the workpiece will not be clamped. In the case of yielding parts, the clamping slide may have to be closed with the crank handle before clamping.

9.2 Oil port

At one of the two oil ports G1/4, the clamping slide is connected to the hydraulic unit via a high-pressure hose. The system is bled free from bubbles via the second port with low pressure adjustment of the power unit.

Oil recommendation: HLP32 or HLP46 as per DIN 51524

The pressure transducer should work in intermittent operation and be equipped with pressure monitoring and machine safety system. The pressure monitoring switches on the pump after a pressure drop of 10%. In the case of a pressure drop of 15%, the machine is stopped by the machine safety system.

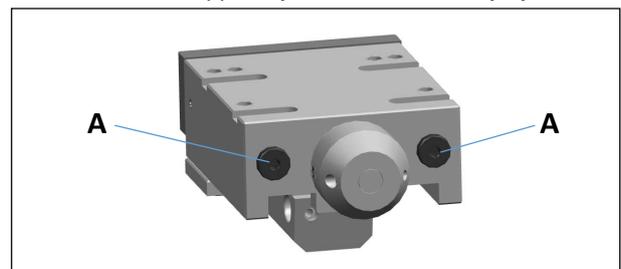


Figure 5: Oil port

A Oil port G1/4

9.3 Clamping and unclamping

WARNING

Risk of injuries due to flexible or insufficiently clamped workpieces!

Flexible or insufficiently clamped workpieces may be catapulted off the machine or drop and cause personal injuries during machining.

- Only use the product for clamping rigid workpieces.
- Sufficiently clamp the workpiece before machining.

Risk of injuries due to insufficient clamping force or insufficient workpiece clamping!

Insufficient clamping force or insufficiently clamped workpieces may be catapulted off the machine or drop and cause personal injuries during machining.

- Have the product checked for its operational reliability by a qualified expert after extended downtimes, repair work, and at regular intervals.
- Have the product checked for its defined clamping force by a qualified expert.
- Have the product checked for visual damage or wear by a qualified expert.
- Check whether the product is fixed properly before product start-up.
- Check whether the workpiece is clamped properly before product start-up.

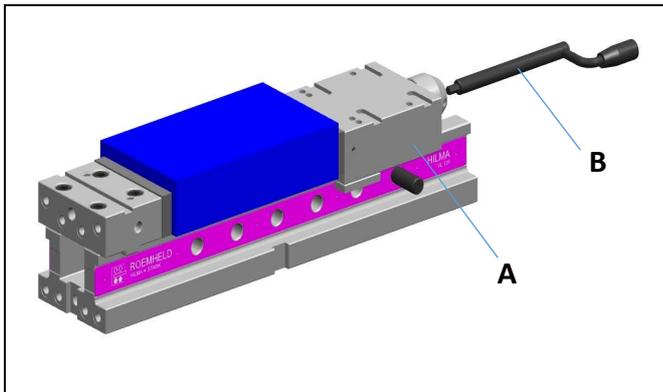


Figure 6: Clamping and unclamping

A	Clamping slide
B	Crank handle

When the hydraulic power unit is switched on, the workpiece is clamped proportionally to the set pressure, see technical data 12. To unclamp, a directional control valve is actuated so that the integrated spring returns the clamping slide to its off-position.

9.4 Clamping and unclamping with gripper

To compensate for the plastic deformation of the workpiece when clamping with the gripper, two clamping operations are required, as described in chapter 9.3 Clamping and unclamping.

NOTE

Loss of clamping force in the gripper area

The first time the workpiece is clamped with the gripper, deformation occurs in the area of the gripper. Due to the deformation, the workpiece is no longer sufficiently clamped and must be reclamped in a second clamping operation.

- After the first clamping, do not move the workpiece and clamp it a second time.

9.4.1 Brake for clamping slide

CAUTION

Danger of crushing due to dropping clamping slide without brake (BB 100 + 125)

When the product is used vertically with the socket pin pulled, the clamping slide is not held in position without the brake fitted. Without the brake fitted, the slide drops down along the base and can crush limbs.

- Install the brake before using the product vertically.

Danger of crushing due to dropping clamping slide without gas pressure spring (BB 160)

When the product is used vertically with the socket pin pulled, the clamping slide is not held in position without the gas pressure spring fitted. Without the gas pressure spring fitted, the slide drops down along the base and can crush limbs.

- Install the gas pressure spring before using the product vertically.

Risk of injury due to damage to the gas pressure spring!

The gas pressure spring is under high pressure. When attempting to open or overheat the gas pressure spring, the pressure escapes from the gas pressure spring and may injure persons.

- Do not open gas pressure spring.
- Do not heat the gas pressure spring above 80 °C.
- After prolonged storage, check gas pressure spring for proper function.

Danger of crushing due to automatic pushing back of the clamping slide!

When the product is used horizontally and with the socket pin pulled, the gas pressure spring pushes the clamping slide to the rear and can crush limbs in the process.

- Keep the movement area of the clamping slide free of body parts and objects before pulling the socket pin.

NOTE

Vertical mounting with brake

The products are suitable for vertical mounting. However, the brake must be mounted or activated.

9.4.2 Brake for clamping slide BB 100 + 125

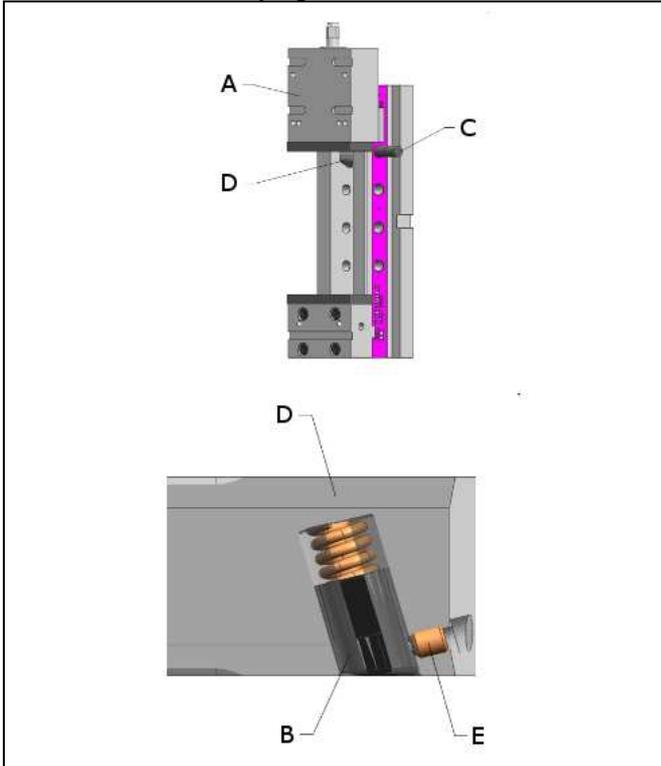


Figure 7: Brake for clamping slide BB 100 + 125

A Clamping slide	D Angle nut
B Brake	E Locking screw
C Socket pin	

The brake is not mounted or activated when delivered. This enables easy adjustment of the clamping range in horizontal operation.

Mount the brake

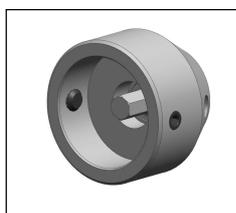
- Pull the socket pin.
- Pull the clamping slide back to the end of the guide.
- Install contact piece, pressure spring and locking screw into the angle nut.

Release the brake

- Press the brake into the angle nut.
- Tighten locking screw.

9.4.3 Anti-torsion device for clamping slide

After adjusting the clamping range, the anti-torsion device is pushed onto the bearing cover of the clamping slide. Align the hexagon socket of the spindle and the hexagon head of the anti-torsion device (observe the insertion clearance). Then secure with the set screws. This secures the spindle against torsion when the clamping force is applied.



10 Maintenance

⚠ WARNING

Burning due to hot surface!

- In operation, surface temperatures of over 70°C may develop on the product.
- Maintenance and repair work should only be performed in a cooled down condition and/or with protective gloves.

Risk of injuries by breaking product parts!

Due to overload or faulty operation during operation, product parts may break, and this may cause personal injuries.

- Observe maintenance intervals for all parts pursuant to this Operating Manual.

Danger of injury due to high-pressure injection in case of improper handling!

In case of improper handling of the hydraulic system, fluids can splash out under high pressure and injure people.

- Work on hydraulic equipment should only be carried out by qualified personnel with the relevant knowledge in this area.

10.1 Maintenance plan

Maintenance works	Interval	Realisation
Cleaning	As required	Operator
Regular checks	daily	Operator
Regular lubrication	At the latest after 500 clamping cycles!	⚠ Caution! If this lubrication will not be made, this can lead to a failure of the fixture clamp!
Repair		Qualified personnel

10.2 Cleaning

⚠ CAUTION

Damage to moving components!

Avoid damage to moving components (rods, plungers, bolts, etc.) as well as wipers and seals.

Aggressive cleaning agents

The product must not be cleaned with:

- corrosive or caustic substances or
- organic solvents as halogenated or aromatic hydrocarbons and ketones (cellulose thinner, acetone, etc.), since this can damage the seals.

The element must be cleaned at regular intervals. Especially the clamping slide and the housing have to be cleaned of swarf and other liquids.

In the case of heavy contamination, cleaning must be made at shorter intervals.

10.3 Regular checks

1. Check tightness of hydraulic connections (visual control).
2. Leakage control at the housing and the clamping slide.
3. Clamping force control by pressure control.
4. Check the observance of the maintenance intervals.

10.4 Exchange seal kit

The exchange of the seal kit has to be made in case of external leakages. For high availability we recommend to change the seals at the latest after 1,000,000 cycles or 2 years. The seal kit is available as spare part.

NOTE

Seal kits

- Do not install seal kits which were exposed to light for a longer time.
- Observe storage conditions (see chapter "Technical data").
- Only use original seals.

10.5 Maintenance and care

Dismount the clamping slide

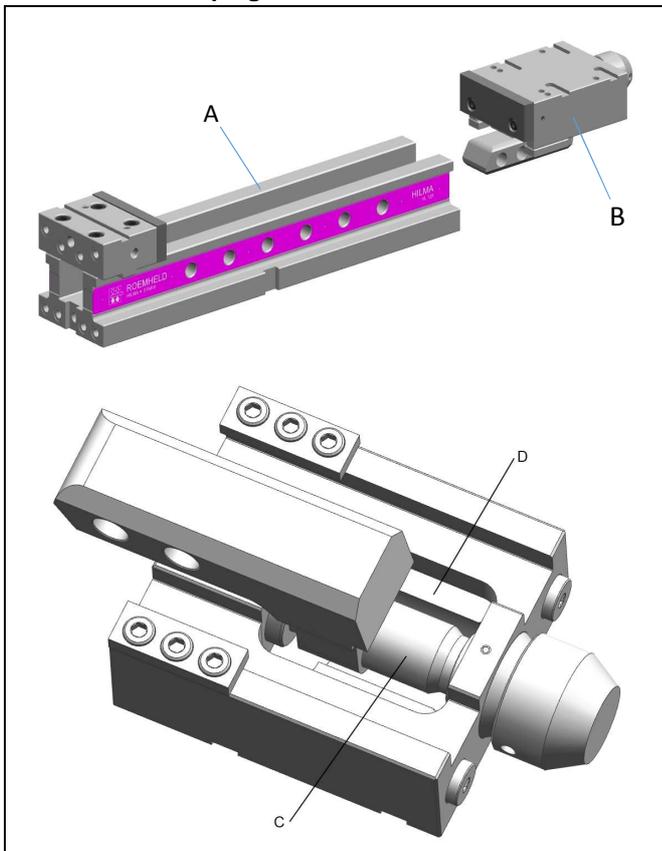


Figure 8: Dismount the clamping slide

A Base	C Spindle thread
B Clamping slide	D Spindle area

The following maintenance and care work is to be performed as required, however once a month, each:

1. Remove the clamping slide from the base, clean and, if necessary, remove the sliding surfaces and oil them with slide way oil.
2. Lubricate spindle thread with slide way oil.
3. Lubricate spindle area with slide way oil.

10.6 Service / maintenance service

1. In Germany
Maintenance by manufacturer
Please return the machine vice carriage paid.

Maintenance at customer workshop:

Please call maintenance service - information 12.3011.
Service phone: 02733 – 281 150

2. Internationally
Please contact the HILMA-RÖMHELD general importer or your local dealer.

11 Trouble shooting

Fault	Cause	Remedy
Workpiece is not clamped or not clamped sufficiently	Slide moves against internal stop	Reduce insertion clearance, see 9.1
	Yielding work-piece	Support the workpiece or close the slide manually before clamping
	Operating pressure too low	Set higher pressure at pressure transducer
	Spindle has loosened	Push the anti-torsion device onto the bearing cover of the clamping slide, see 9.3.3
Clamping slide does not return to off-position or returns to off-position only slowly when pressure is relieved	Too high resistance in the return line	Increase cable cross-section or reduce cable length
	Directional control valve dirty or defective	Clean the directional control valve and exchange if necessary
	Hydraulic oil too thick	Use hydraulic oil HLP 32 or HLP 46 as per DIN 51524
	Return spring defective	Exchange return spring
	The clamping slide jams due to heavy contamination.	Pull the socket pin and remove the clamping slide from the base. Clean the guideway, remove if necessary, and lubricate.
Socket pin sluggish	Dirt between base and angle nut	Remove the clamping slide and clean the guide.
Sluggish clamping range adjustment	Brake effective.	See chapter "Brake for clamping slide BB100 and BB 125".

12 Technical data

Characteristics

Type 3170			
Jaw width [mm]	100	125	160
Max. clamping force [kN]	25	40	63
Operating pressure [bar]	350	350	350
Hydraulic power stroke [mm]	5	5	7
Oil volume per power stroke [cm ³]	5	7	14

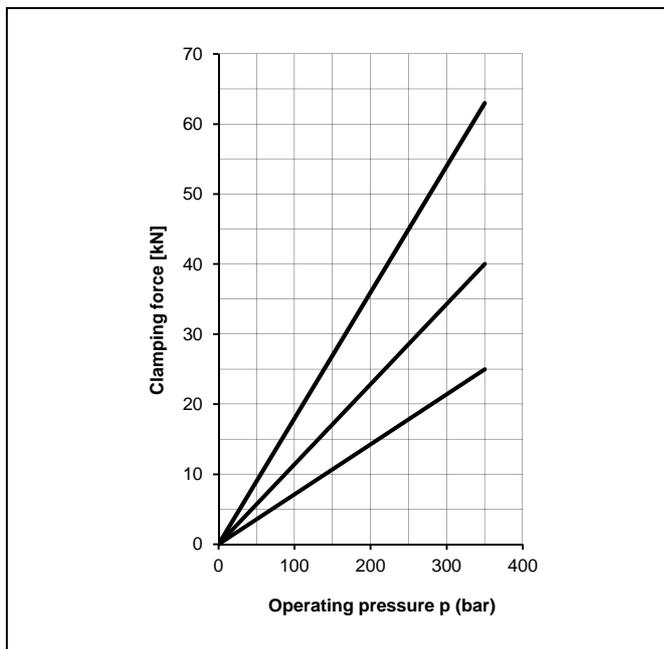


Figure 9: Relation of clamping forces

NOTE

Further details

- For further technical data see ROEMHELD data sheet.

Proposal, tightening torques for screws of tensile strength 8.8, 10.9, 12.9

NOTE

- The indicated values are approximate values and have to be interpreted according to the user's application!
See note!

Thread	Tightening torque (MA) [Nm]		
	8.8	10.9	12.9
M6	10	15	18
M8	25	36	45
M10	49	72	84
M12	85	125	145
M14	135	200	235
M16	210	310	365
M20	425	610	710

Note: Applicable to workpieces and set screws made of steel with metric thread and connecting surface dimensions as per DIN 912, 931, 933, 934 / ISO 4762, 4014, 4017, 4032

The tightening torque (MA) values in the table take account of: Steel/steel design, friction value $\mu_{ges} = 0.14$ - not lubricated, utilisation of minimum yield point = 90%.

12.1 Storage

CAUTION

Storage of components!

- The product must not be exposed to direct sunlight, since UV light may cause serious damage to the seals.
- Storage not in compliance with the storage conditions is inadmissible.
- In case of improper storage, the seals can embrittle and resinification of the anti-corrosive oil or corrosion at the element can occur.

ROEMHELD products are tested with mineral oil by default. The exterior of the products is protected against corrosion.

The residual oil film after the test procedure provides for a six-month interior protection against corrosion when stored in dry and tempered rooms.

For longer storage times the product must be filled with a non-resinifying corrosion protection agent and the external surfaces must be treated.

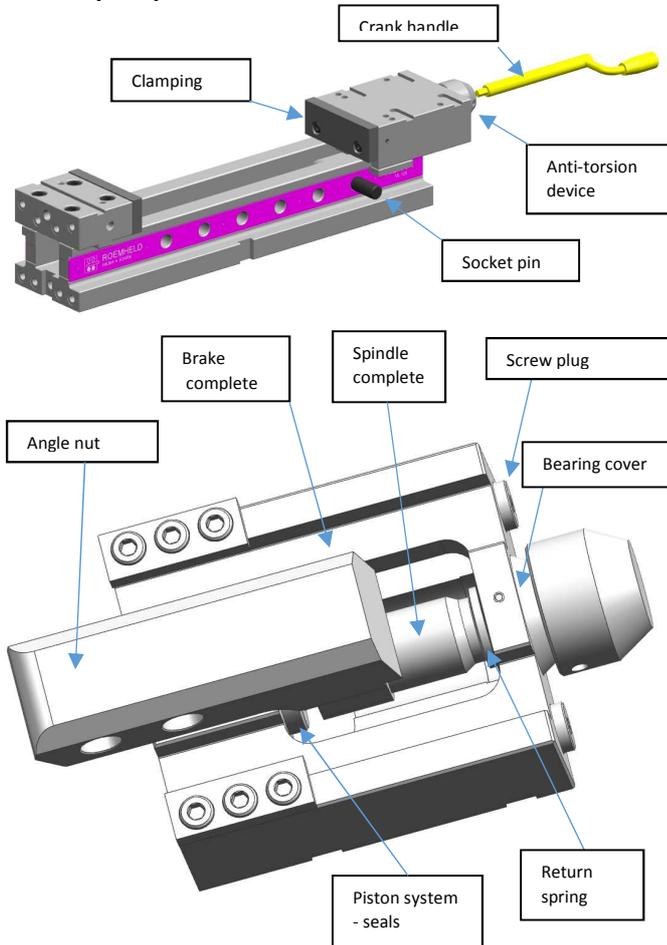
12.2 Accessories

NOTE

Accessories

- see data sheet

12.3 Spare parts



Description	Pc (s)	Spare part no.		
		BB 100	BB 125	BB 160
Socket pin	1	7.3072.0006	7.3073.0006	7.3074.0006
Crank handle	1	4.2056.0022	4.2056.0022	4.2056.0023
Locking screw	1	1.0908.1009	1.0908.1009	1.0908.1009
Return spring	1	1.2098.0364	1.2098.0366	1.2098.0365
Angle nut	1	5.2053.0075	5.2053.0073	5.2053.0074
Spindle complete	1	9.3082.0513	9.3083.0513	9.3084.0513
Bearing cover	1	9.3082.0521	9.3083.0521	9.3084.0521
Clamping bar	2	9.3022.0512	9.3023.0512	9.3024.0512
Piston	1	5.1010.1064	5.1010.1049	5.1010.1065
Seals	1	9.3082.0520	9.3083.0520	9.3084.0520
Anti-torsion device	1	9.3765.1204	9.3765.1304	9.3765.1404
Brake complete (accessory)	1	9.3122.0551 in angle nut	9.3123.0551 in angle nut	9.3769.0401 Gas spring

Subject to modifications

13 Disposal



Hazardous to the environment

In order to avoid potential environmental damage, the individual components have to be disposed of by approved expert companies.

All materials have to be disposed of in compliance with the applicable codes and regulations as well as environment protection regulations.

Particular importance is to be attached to the disposal of components containing residues of pressure liquids. The notes regarding disposal in the safety data sheet have to be observed. As regards the disposal of electrical and electronic components (e.g. stroke measuring systems, proximity switches, etc.) the country-specific statutory requirements and regulations have to be complied with.

14 Declaration of incorporation

Manufacturer

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Products of catalogue sheet WS 2.3170.

The following types or part numbers are concerned:

- 3170

They are designed and manufactured in line with the relevant versions of the directives **2006/42/EC** (EC MSRL) and in compliance with the valid technical rules and standards.

In accordance with EC-MSRL, these products are components that are not yet ready for use and are exclusively designed for the installation in a machine, a fixture or a plant.

According to the pressure equipment directives the products are not to be classified as pressure reservoirs but as hydraulic placing devices, since pressure is not the essential factor for the design, but the strength, the inherent stability and solidity with regard to static or dynamic operating stress.

The products may only be put into operation after it was assessed that the incomplete machine / machine, in which the product shall be installed, corresponds to the machinery directives (2006/42/EC).

The manufacturer commits to transmit the special documents of the products to state authorities on request.

The technical documentation as per appendix VII part B was prepared for the products.

15 List of the used standards

Product Safety Act - ProdSG; November 2011

DIN EN ISO 12100, 2011-03, Safety of machinery; Basic concepts, General principles for design (replacement for part 1 and 2)

DIN EN ISO 13857; 2008-06, Safety of machinery - Safety distances to prevent hazard zones being reached by upper and lower limbs. (replaces: DIN EN 294)

DIN EN 349, 2008-09, Safety of machinery - Minimum gaps to avoid crushing of parts of the human body

DIN EN 81714-2, 2007-08, Design of graphical symbols for use in the technical documentation of products

DIN EN ISO 4413, 2011-04, Fluid technology - General rules and safety requirements for hydraulic systems and their components

DIN EN 82079; 2010-10, Preparation of instructions, structuring, content and presentation - Part 1

Hilma-Römheld GmbH
H. - J. Molka
Managing director



Hilma-Römheld GmbH
Hilchenbach

Hilchenbach, 04.05. 2020