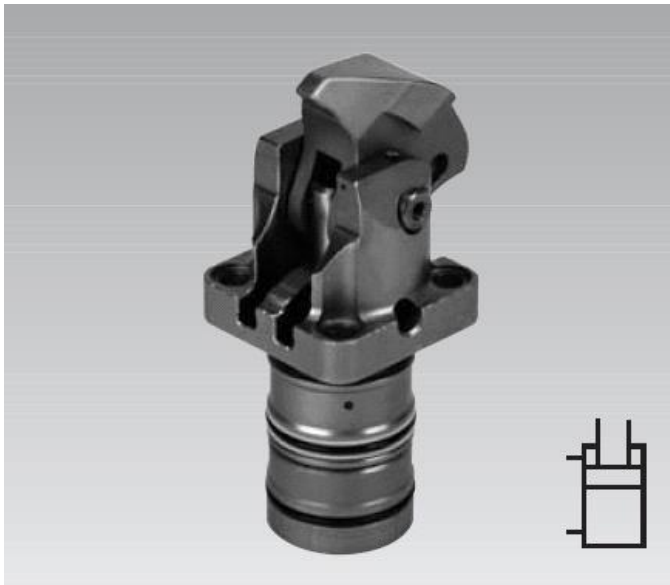




Compact Clamps

cartridge type, pneumatic position monitoring optional, double acting



1 Description of the product

The hydraulic compact clamp is a double-acting pull-type cylinder where a part of the linear stroke is used to swing the clamping lever onto the workpiece.

In unclamping position the clamping lever is swung up so that the workpiece can be unloaded without problems.

In the clamping area, the clamping lever slides downwards at two hardened surfaces of the body. In one of these surfaces there is a small bore hole for the standard pneumatic clamping monitoring. In the clamping area, this bore hole is closed by the clamping lever as soon as the lever gets in contact with the workpiece and the clamping force exceeds a minimum value. The version with cover is inserted in open bore holes and enables the smallest possible building height.

The version without cover requires a closed pocket hole.

Beside the short clamping lever, also a long clamping lever is available, that is provided for reworking to the desired length and contour.

2 Validity of the documentation

This document applies to the following products:

Compact clamp of data sheet B1.827. The following types or part numbers are concerned:

- 1801 110, 111, 120, 121
- 1802 110, 111, 120, 121
- 1803 110, 111, 120, 121
- 1804 110, 111, 120, 121

180X XXX	with clamping monitoring
180X XXXA	monitoring of unclamping position
180X XXXB	without position monitoring

3 Target group of this document

- Specialists, fitters and set-up men of machines and installations with hydraulic 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 (electric, hydraulic, pneumatic knowledge, etc.) of function and design of the corresponding components.

An **expert** 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.

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4 Symbols and signal words

WARNING

Person damage

Stands for a possibly dangerous situation.
 If it is not avoided, death or very severe injuries will result.

CAUTION

Easy injuries / property damage

Stands for a possibly dangerous situation.
 If it is not avoided, minor injuries or material damages will result.



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 instructions serve 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 these operating instructions, 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 damage or material damage.

- Read these operating instructions thoroughly and completely, before you work with the product.
- Keep these operating instructions so that they are 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.

Due to the interactions between the product and the machine/fixture or the environment, risks may arise that only can be determined and minimized by the user, e.g. :

- generated forces,
- generated movements,
- Influence of hydraulic and electrical control,
- etc.

6 Application

6.1 Intended use

The products are used in industrial / commercial applications to transform hydraulic pressure into movement and /or force. They must only be operated with hydraulic oil.

Furthermore the following belongs to possible uses:

- Use within the capacity indicated in the technical characteristics.
- Use as per operating instructions.
- Compliance with service intervals.
- Qualified and trained personnel for the corresponding activities.
- Mounting of spare parts only with the same specifications as the original part.

6.2 Misapplication

WARNING

Injuries, material damages or malfunctions!

Modifications can lead to weakening of the components, reduction in strength 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.
- 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.
 - In mines.
 - In explosive and aggressive environments (e.g. ATEX).
- For other operating and environmental conditions.

e.g.:

- Higher operating pressures or flow rates than indicated on the data sheet or installation drawing.
- With hydraulic fluids that do not correspond to the specifications.

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!

Some products have a heavy weight and can cause injury when dropping.

- Transport products professionally.
- Wear personal protection equipment!

Weight specifications see chapter "Technical characteristics".

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.

7.1 Design

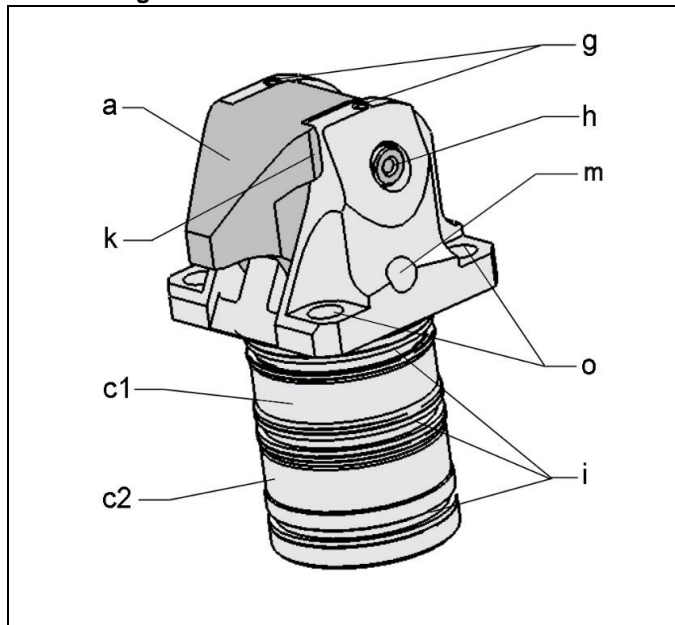


Figure1: Components

a Clamping lever	g Set screw (secured)
c1 Hydraulic port A clamp- ing	h Guide bolts
c2 Hydraulic port B un- clamping	o Bore hole for fixing
k Bore hole for pneumatic clamping monitoring	i Sealing rings
	m Screw plug

7.2 Version with universal clamping lever

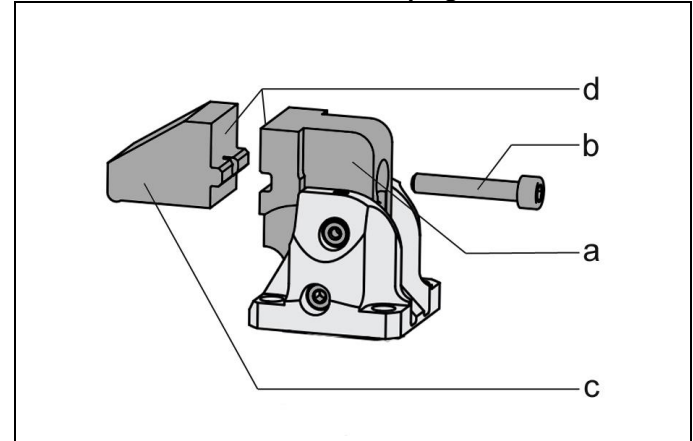


Figure 2: Components

a Universal clamping lever	c Customised clamping lever
b Fixing screws 12.9	d Joining surfaces

NOTE

Joining surfaces

The joining surfaces must be free of dirt.

Product	Tightening torques (MA)
	[Nm]
	12.9
1801 XXX	10
1802 XXX	10
1803 XXX	42
1804 XXX	42

7.3 Admissible oil flow rate

⚠ WARNING

Injury due to overload of the element

High-pressure injection (squirting out of hydraulic oil under high pressure) or flying components!

- Due to throttling or closing of ports a pressure intensification can occur.
- Connect the ports professionally!

⚠ CAUTION

Malfunction or early failure

Exceeding the max. flow rate can lead to overload and premature failure of the product..

- The maximum flow rate must not be exceeded!

7.3.1 Calculation of the admissible flow rate

Admissible flow rate

The admissible flow rate or the admissible stroke speed is valid for vertical mounting positions in combination with standard add-on parts as clamping arms or contact bolts, etc.

In case of other mounting positions and/or add-on parts the flow rate has to be reduced.

If the pump flow rate divided by the number of elements is larger than the admissible flow rate of one element, the flow rate has to be throttled.

This prevents an overload and therewith an early failure.

The flow rate can be checked as follows:

$$Q_P \leq 0,06 \cdot \dot{V}_Z \cdot n \quad \text{and/or} \quad Q_P \leq 6 \cdot v_Z \cdot A_K \cdot n$$

for clamping elements and work supports (indicated on the data sheets)

Maximum piston speed

At specified pump flow rate Q_P and with the effective piston area A_K the piston speed can be calculated as follows:

$$v_m < \frac{Q_P}{6 \cdot A_K \cdot n}$$

Legend

- \dot{V}_Z = Admissible flow rate of the element in [cm³/s]
- Q_P = Flow rate of the pump in [l/min]
- A_K = Piston area in [cm²]
- n = Number of elements, same dimensions
- $v_Z = v_m$ = Admissible/maximum stroke speed in [m/s]

NOTE

Flow rate

- The maximum oil volume and/or the maximum stroke speed depend on the corresponding product.
 - For clamping cylinders see data sheet A 0.100.
 - For clamping elements, work supports, hydraulic valves, power units and other hydraulic elements indicated on the corresponding data sheets.

Further "things worth knowing about hydraulic cylinders, basics, detailed knowledge and calculations on hydraulic cylinders" see Technical information on the internet!

7.3.2 Throttling of the flow rate

The throttling always has to be effected in the supply line to the element. Only thus pressure intensification and thereby pressures exceeding the operating pressure are avoided. The hydraulic circuit diagram shows flow control valves which allow oil return from the element without any impediments.

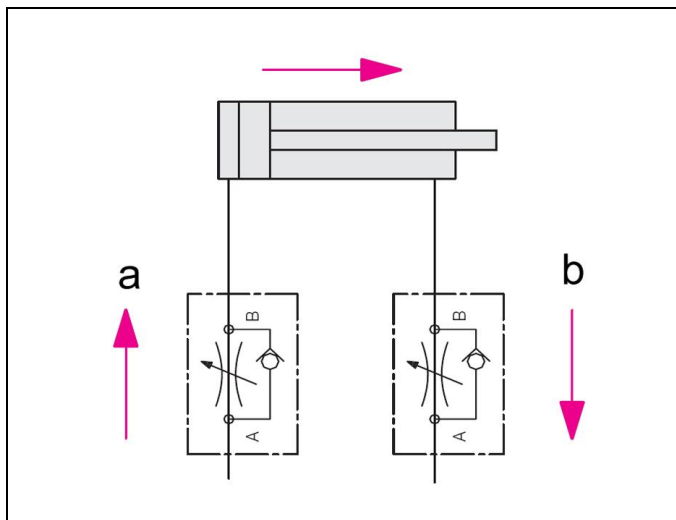


Figure 3: Hydraulic circuit diagram without flow control valves

a Throttling direction	b Free flow
------------------------	-------------

If a return-flow throttling is required due to a negative load, it must be guaranteed that the max. operating pressure (see technical characteristics) will not be exceeded.

7.4 Installation of products with external sealing

7.4.1 Design

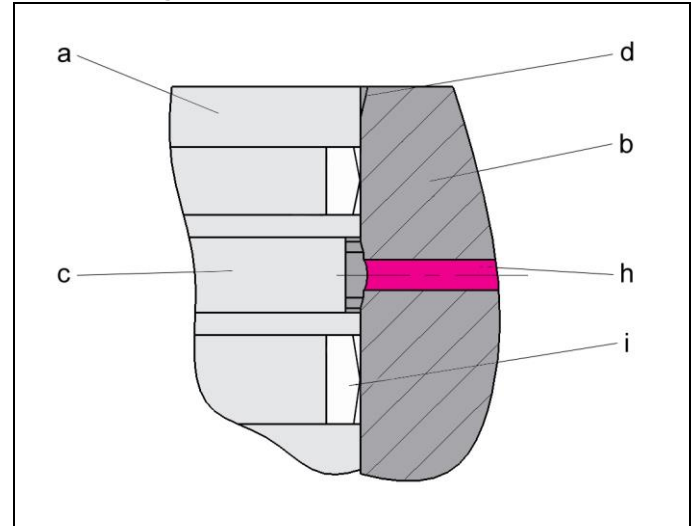


Figure 4: Components

a Housing of the element	h Supply hole in the fixture body
b Fixture body	i Combination with applied pressure from both sides
c Slot for transmission of the pressure medium	
d Insertion chamfer	

7.4.2 Installation

WARNING

Injury by crushing!

Due to protruding components there can be pinch points during installation.

- Keep hands and fingers away from pinch points!

Before mounting the following points are to be checked:

- Is the location hole prepared according to the specifications on the data sheet?
 - Are the tolerances and surfaces met?
 - Is the wall thickness of the fixture sufficient?
- Are the insertion chamfers in the fixtures realised according to the drawing?
- Are the bore holes in the installation geometry deburred and chamfered?
- Are machining residues such as swarf, dirt and foreign particles removed?
- Are the threaded tips covered?
- Are the seals and components greased or oiled prior to assembly?
 - Pay attention to media compatibility of the sealings!
 - ROEMHELD recommends to use the sealing medium for lubrication.
- Do not use grease with additions of solids as molybdenum sulphate or zinc sulphide.
- Do not use sharp objects for mounting!
- Pay attention to protruding back-up rings. Use special tools for correct positioning.
- Wherever possible use assembly aids.

Procedure for mounting

1. Insert in bore hole
2. Pay attention that the seals will not be damaged.
3. Uniformly tighten the fixing screws with the corresponding tightening torque.
See chapter Technical characteristics.

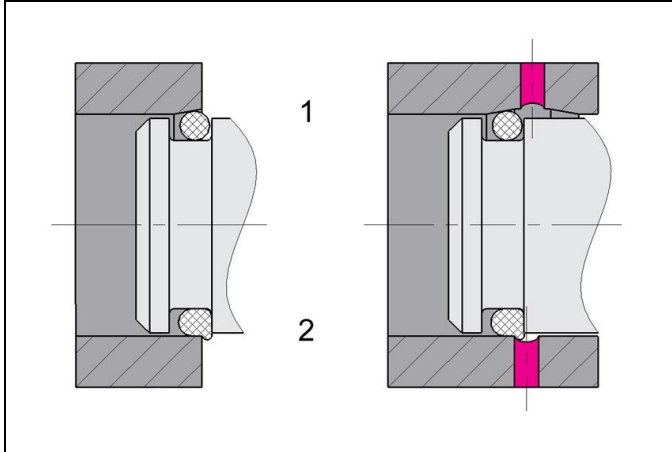


Figure 5: Installation with insertion chamfer and cross hole

1 Correct with chamfer	2 Incorrect without chamfer
------------------------	-----------------------------

7.5 Connection of the hydraulic equipment

1. Connect hydraulic lines to qualifying standards and pay attention to scrupulous cleanness (A = Clamp, B = Unwind)!

NOTE

More details

- See ROEMHELD data sheets A 0.100, F 9.300, F 9.310 and F 9.360.

Screwed Plug

- Use only fittings "screwed plug B and E" as per DIN 3852 (ISO 1179).

Hydraulic connection

- Do not use sealing tape, copper rings or coned fittings.

Pressure fluids

- Use hydraulic oil as per ROEMHELD data sheet A 0.100.

7.6 Assembly / Disassembly of the clamping lever

Disassembly of the clamping lever

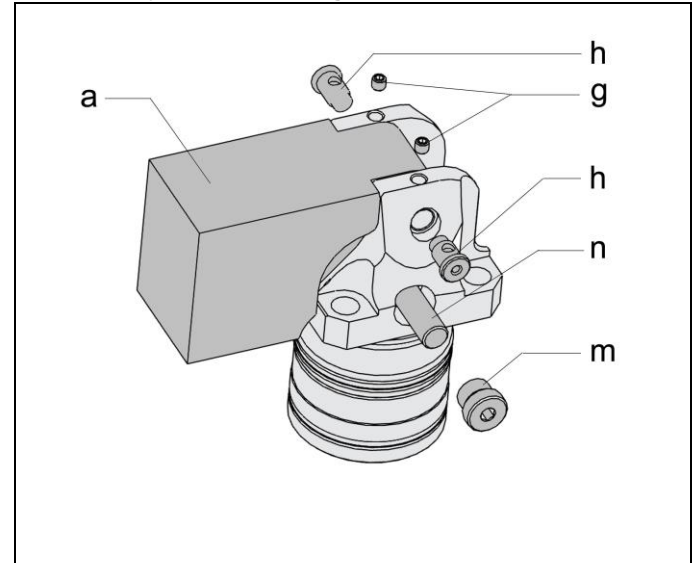


Figure 6: Assembly/Disassembly of the clamping lever

a Clamping lever (blank)	m Screw plug
g Set screw (secured)	M4 -> 3 Nm
h Guide bolts	M5 -> 5.9 Nm
n Bolt	

1. First remove the set screw (**g**)
2. Pull out guide bolt (**h**) by means of a thread bolt.
3. Remove screw plugs (**m**).
4. Push bolt (**n**) out of the bore hole.
5. Remove clamping lever (**a**).
6. Assemble the clamping lever in reverse order.
7. Secure (glue) set screw (**g**)

NOTE

Set screws Pos. g have to be secured with glue.
Proposal: DELO-ML 5249, medium strength.

Disassembly of the clamping arm with unclamping monitoring

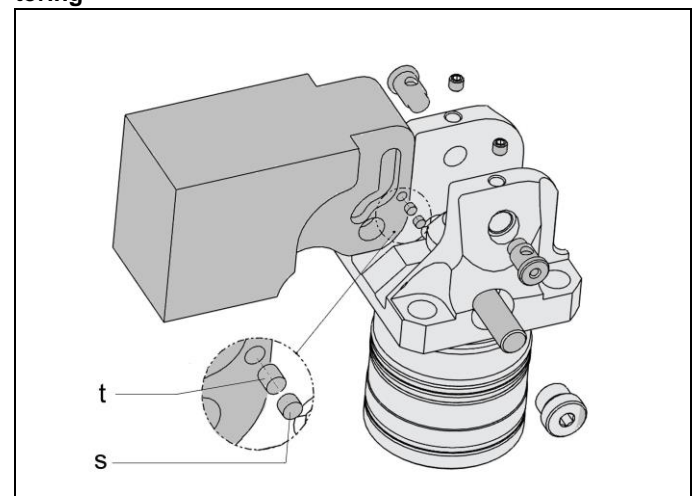


Figure 7: Assembly/Disassembly of the clamping lever

Alternative

t elastic cylinder element	s Disk (counterbore direction of the cylinder element!)
----------------------------	---

1. First remove the set screw (g)
2. Pull out guide bolt (h) by means of a thread bolt.
3. Remove screw plugs (m).
4. Push bolt (n) out of the bore hole.
5. Remove clamping lever (a).
6. Assemble the clamping lever in reverse order.
7. Insert cylinder element (t) and disk (s) into the bore hole – counterbore in the disk in the direction of the elastic cylinder element.
8. Secure (glue) set screw (g)

NOTE

Set screws Pos. g have to be secured with glue.
Proposal: DELO-ML 5249, medium strength.

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.

Injury by crushing!

Components of the product make a movement while they are in operation.

- This can cause injuries.
- Keep parts of the body and items out of the working area!

CAUTION

Injury due to bursting or malfunction

Exceeding the max. operating pressure (see technical data) can cause the product to burst or malfunction.

- The maximum operating pressure must not be exceeded.
- If necessary, avoid overpressure by using suitable valves.

1. Check tight seat.
2. Check tight seat of the hydraulic ports (check tightening torque of the hydraulic ports).
3. Bleed the hydraulic system.

NOTE

Clamping time

- Without bleeding the clamping time will be considerably prolonged and function problems may occur.

8.1 Bleeding of manifold-mounted types

1. Loosen carefully the bleeding screws of the fixture at low pressure.
2. Pump until bubble free oil comes out.
3. Fasten the bleeding screws.
4. Check correct function.
5. Check sealing of the hydraulic connections!

8.2 Pneumatic position monitoring

NOTE

The compact clamp is available with "clamping monitoring" or "unclamping monitoring".

The control of both positions is not possible since the minimum dimensions of the housing allow only one pneumatic connection.

8.3 Pneumatic clamping monitoring (180X XXX)

In the clamping area, the clamping lever slides downwards at two hardened surfaces of the body. In one of the surfaces there is the bore hole for the pneumatic clamping monitoring. The clamping lever overruns the bore hole, but does not completely close it. Only when the workpiece is really clamped, the clamping lever supports itself on the sliding surface and the bore hole will be firmly closed.

The clamping monitoring signals.

- The clamping lever is in the usable clamping range and
- a workpiece is clamped.

NOTE

Required minimum pressures

Required minimum pressures for clamping monitoring:

Hydraulics	70 bar
Pneumatics	3 bar

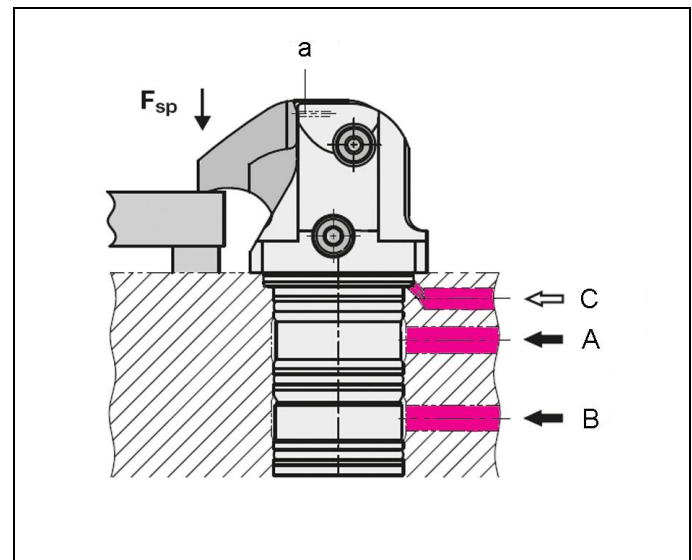


Figure 8: Clamping monitoring

a	Pneumatic bore hole	A	> 70 bar Clamping
C	Pneumatics 3 – 6 bar	B	> 20 bar Unclamping

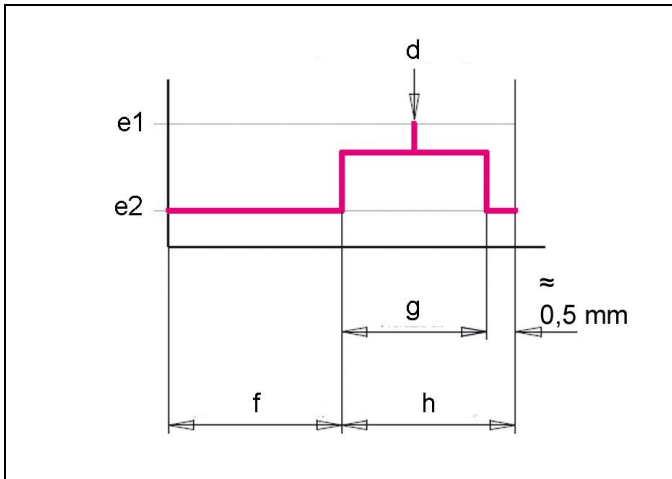


Figure 9: Function chart

e1 Bore hole closed	f Swing angle
e2 Bore hole open	g usable
d Clamping force build-up	h Clamping stroke

Example for clamping position

Required switching pressure 4.5 bar

Pressure drop is approx 2 bar, if 1 compact clamp is not clamped

As per diagram:

Required flow rate approx. 10-13 l/min

(depending on the number of connected compact clamps)

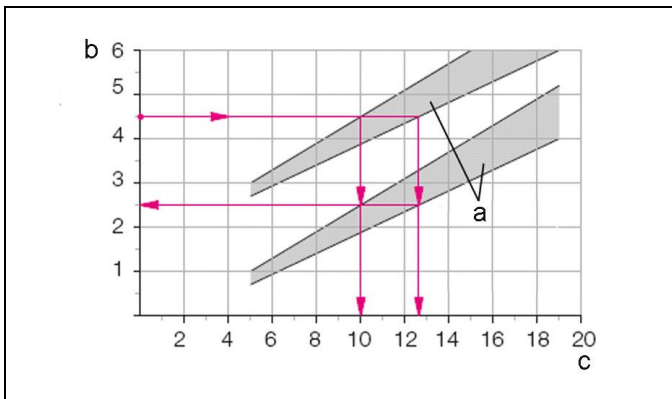


Figure 10: Clamping position

a Tolerance range for 1-8 compact clamps	c Required flow rate [l/min]
b Pressure switch Switching pressure [bar]	

Required flow rate depending on the switching pressure of the pneumatic pressure switch for a pressure drop Δp 2 bar.

8.4 Pneumatic unclamping monitoring (180X XXXA)

In the unclamping position the clamping lever closes a pneumatic bore hole.

NOTE

Required minimum pressures

Required minimum pressures for unclamping monitoring:

Hydraulics	20 bar
Pneumatics	3 bar

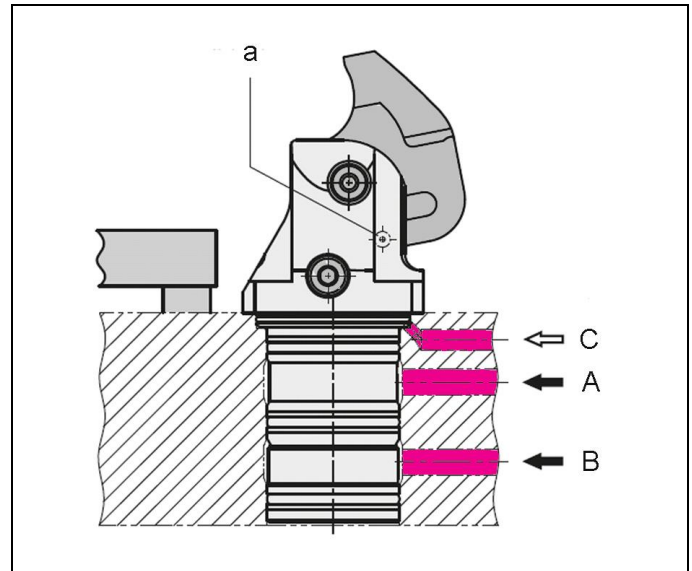


Figure 11: Clamping monitoring

a Pneumatic bore hole	A > 20 bar Clamping
C Pneumatics 3 – 6 bar	B > 20 bar Unclamping

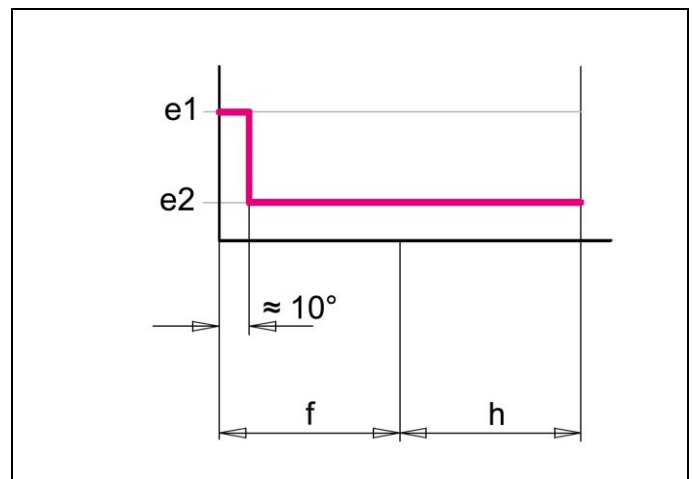


Figure 12: Function chart

e1 Bore hole closed	f Swing angle
e2 Bore hole open	h Clamping stroke

Example for unclamping position

Required switching pressure 4.5 bar

Pressure drop is approx 2 bar, if 1 compact clamp is not clamped

As per diagram:

Required flow rate approx. 8.5-10 l/min

(depending on the number of connected compact clamps)

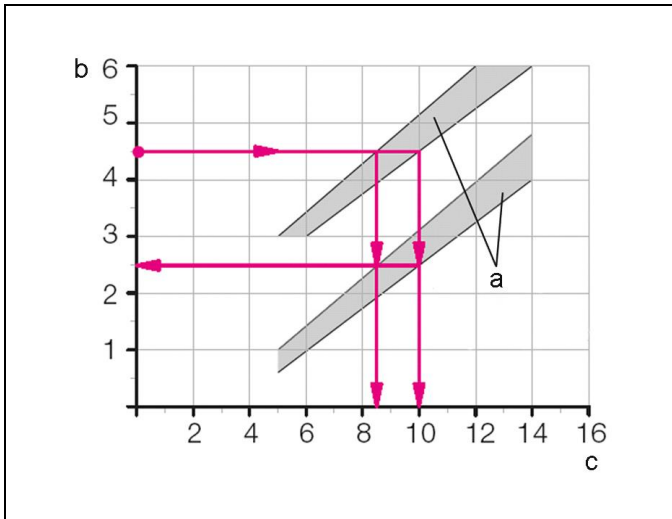


Figure 13: Unclamping position

a Tolerance range for 1-8 compact clamps	c Required flow rate [l/min]
b Pressure switch Switching pressure [bar]	

Required flow rate depending on the switching pressure of the pneumatic pressure switch for a pressure drop Δp 2 bar.

8.5 Monitoring by pneumatic pressure switch

For the evaluation of the pneumatic pressure increase standard pneumatic pressure switches can be used. With one pressure switch up to 8 compact clamps can be controlled.

NOTE

Air pressure and air volume

Pneumatic position monitorings are only process-safe, when air pressure and air volume are precisely adjusted.

For measuring of the air volume appropriate devices are available. Please contact us.

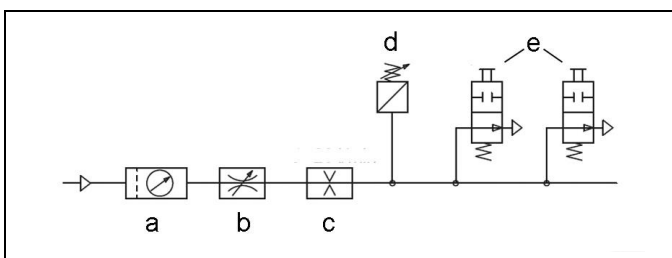


Figure 14: Circuit diagram

a Service unit 3-6 bar	d Pressure switch 3-6 bar
b Flow control valve	e Position monitorings max. 8 pieces
c Flow sensor 5-20 l/min	

9 Maintenance

WARNING

Burning due to hot surface!

During operation, surface temperatures on the product can exceed 70°C.

- Maintenance and repair work should only be performed in a cooled down condition and/or with protective gloves.

Injury by crushing!

Due to the stored energy, an unexpected start of the product can occur.

- Maintenance works at the product must only be made in de-pressurised mode!
- Keep hands and other parts of the body out of the working area!

9.1 Cleaning

CAUTION

Material damage, damage to moving components

Damage to piston rods, plungers, bolts, etc., as well as wipers and seals can lead to leakage or premature failure!

- Do not use cleaning agents (steel wool or similar) that cause scratches, marks or the like.

Material damage, damage or functional failure

Aggressive cleaning agents can cause damage, especially to seals.

The product must not be cleaned with:

- corrosive or caustic substances or
- organic, solvents such as halogenated or aromatic hydrocarbons and ketones (cellulose thinner, acetone, etc.).

The element must be cleaned at regular intervals. Especially the piston area or the clamping lever has to be cleaned of swarf and other liquids.

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

NOTE

Pay special attention in the case of

- dry machining
- minimum quantity lubrication and
- small grinding swarf

Small swarf and dust can stick to the rod / bolt / clamping lever and be pulled into the sealing gap of the metallic wiper or the clamping lever can get jammed.

Thus a sticky / pasty mass of swarf / dust can arise, that hardens during standstill.

Result: Malfunction due to deadlock / bonding and increased wear.

Remedy: Regular disassembly, cleaning and lubrication of the lever mechanism.

9.2 Regular checks

1. Check tightness of hydraulic connections (visual control).
2. Check running surface (piston rod, bolts) if there are marks and damages. Run marks can be an indication for a contaminated hydraulic system or an inadmissible side load of the product.
3. Leakage check at the housing - piston rod, bolts or flange.
4. Clamping force control by pressure control.
5. Check the observance of the maintenance intervals.

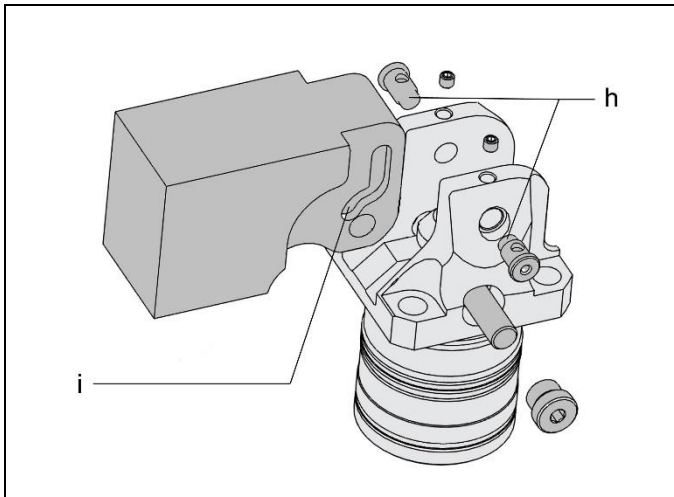


Figure 15: Compact Clamps

6. Grease swing curve (i) half-yearly with RENOLIT HLT 2.
7. Check guide bolts (h) yearly, in the case of visible wear the guide bolts have to be exchanged.

NOTE

See chapter Disassembly/assembly of the clamping lever.

9.3 Exchange seal kit

The exchange of the seal kit is made in case of external leakages. For high availability, the seals have to be changed at the latest after 500,000 cycles or 2 years.

The seal kit is available as spare part. An instruction for the exchange of the seal kit is available on request.

NOTE

Seal Kits

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

10 Trouble shooting

Trouble	Cause	Remedy
Piston does not extend:	hydraulic oil supply or return is impeded	check and blow through tubes or channels
Piston extends jerkily:	air in the hydraulic system	hydraulic bleeding
System pressure reduces:	hydraulic port leaky	seal
	wear of seals	replace seals

11 Accessory

NOTE

Accessories

- See data sheet.

12 Technical characteristics

General characteristics

Type	Maximum operating pressure [bar]	Maximum clamping force [kN]
1801 1XX	250	3.2
1802 1XX	250	4.5
1803 XX1	200	7.5
1803 XX0	250	7.5
1804 1XX	250	11.5

Weight, versions with cover

Type	Clamping lever, short [kg]	Clamping lever, long [kg]
1801 1XX	0.30	0.57
1802 1XX	0.53	0.88
1803 1XX	0.92	1.40
1804 1XX	1.17	1.70

Weight, versions without cover

Type	Clamping lever, short [kg]	Clamping lever, long [kg]
1801 1XX	0.27	0.54
1802 1XX	0.46	0.82
1803 1XX	0.82	1.30
1804 1XX	1.03	1.56

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 [Nm]		
	8.8	10.9	12.9
M3	1,3	1,8	2,1
M4	2,9	4,1	4,9
M5	6,0	8,5	10
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
M24	730	1050	1220
M30	1,450	2100	2450

Note: Valid for 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

In the table values for tightening torques the following is considered:

Design steel/steel, friction value $\mu_{ges} = 0.14$ - not oiled, utilisation of the minimum yield point = 90%.

NOTE

Use screw material 12.9 for the **version without cover**.

NOTE

Further information

- For further technical data see ROEMHELD data sheet.

13 Storage

CAUTION

Damage due to incorrect storage of components

In case of improper storage, the seals can embrittle and resinification of the anti-corrosive oil or corrosion on/in the element can occur.

- Storage in the packaging and moderate environmental conditions.
- The product must not be exposed to direct sunlight, since UV light may cause serious damage to the seals.

The elements are tested by default with mineral oil. The exterior of the elements is treated with a corrosion inhibitor.

The oil film remaining after the test provides for a six-month interior corrosion protection, if stored in dry and uniformly tempered rooms.

For longer storage times, the element has to be filled with a non-resinifying corrosion inhibitor and the outside surfaces must be treated.

14 Disposal



Hazardous to the environment

Due to possible environmental pollution, the individual components must be disposed only by an authorised expert company.

The individual materials have to be disposed as per the existing regulations and directives as well as the environmental conditions.

Special attention has to be drawn to the disposal of components with residual portions of hydraulic fluids. The instructions for the disposal at the material safety data sheet have to be considered.

For the disposal of electrical and electronic components (e.g. stroke measuring systems, proximity switches, etc.) country-specific legal regulations and specifications have to be kept.

15 Declaration of manufacture

Manufacturer

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35321 Laubach, Germany
Tel.: +49 (0) 64 05 / 89-0
Fax: +49 (0) 64 05 / 89-211
E-mail: info@roemheld.de
www.roemheld.com

Responsible person for the documentation:

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Declaration of manufacture of the products

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.

Laubach, 16.12.2022