



Threaded-Body Work Support

3 types of function, with venting of the spring area, single acting



1 Description of the product

Hydraulic work supports are used to provide a self-adjusting rest for the workpiece during the machining operations. They compensate the workpiece surface irregularities, also deflection and vibration under machining loads.

The threaded-body design of the elements allows direct installation in clamping fixtures, in horizontal or vertical mounting position, and thereby a space-saving arrangement in critical installation conditions. Hydraulic oil is fed through drilled channels in the fixture body. Hydraulic locking is made together with hydraulic clamping of the workpiece, or independently.

There are three variations of plunger actuation:

1. Spring advanced; plunger extended in off-position.
2. Air pressure advanced; plunger retracted in off-position.
The pneumatically-actuated plunger allows precise setting of the plunger contact force by means of a pressure reducing valve.
3. Hydraulic pressure and spring advanced; the plunger is retracted in off-position. It moves forward with a light spring force against the workpiece, when hydraulic pressure is applied.

The elements are protected against penetration of swarf by a metallic wiper edge and sealed against liquids. The venting port allows also the connection of air sealing.

A mounting body for pipe threads or drilled channels is available as accessory.

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2 Validity of the documentation

This document applies to the following products:

Threaded-body work supports of data sheet B 1.943. The following types or part numbers are concerned:

- 1940 300; 400; 501; 601
- 1941 300; 400; 501; 601
- 1942 300; 400; 501; 601

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.

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

Work supports are used for industrial/commercial applications in order to protect workpieces against vibration and deflection. They must only be operated with hydraulic oil.

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

- Use within the capacity indicated in the technical data sheets.
- 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.

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!

CAUTION

Transverse forces

The products are not suitable to compensate side loads.

The use of the products is not authorised:

- For domestic use.
- For use at fairgrounds and amusement parks.
- In food processing or in areas with special hygiene regulations.
- In mines.
- In ATEX areas (in explosive and aggressive environments, e.g. explosive gases and dusts).
- If physical effects (welding currents, vibrations or others) or chemically acting media damage the seals (resistance of the seal material) or components and this can lead to functional failure or premature failure.

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.

⚠ CAUTION

Transverse forces and forced states to bolt

Side loads and forced conditions on the plunger lead to premature failure.

- Provide external guides.
- Avoid forced conditions (overdetermination) of the plunger. Do not introduce any torques.

i NOTE

Vent connection

- If there is a possibility that aggressive cutting lubricants and coolants penetrate through the sintered metal air filter into the interior of single-acting products, a vent hose has to be connected and be placed in a protected position.
- It is absolutely necessary to follow the instructions for venting of the spring area see data sheet G0.110.

7.1 Design

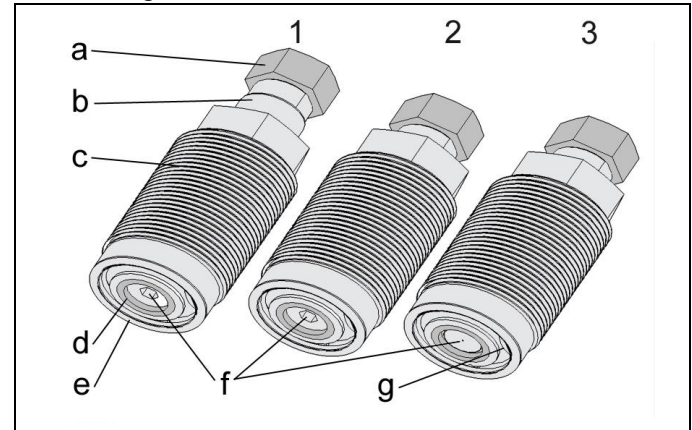


Figure 1: Components

1 Spring advanced; plunger extended in off-position.	a Contact bolt
2 Air-pressure advanced; plunger retracted in off-position	b Plunger
3 Hydraulic pressure and spring advanced; the plunger is retracted in off-position	c Housing
	d Kantseal
	e O-ring
	f Connection hydraulics
	g Connection pneumatics / positive air pressure connection

Contact of the plunger by spring force (1)

The plunger is extended in off-position.

Contact of the plunger by pneumatic pressure (2)

The plunger is retracted in off-position. The pneumatically-actuated plunger allows precise setting of the plunger contact force by means of a pressure reducing valve.

Contact of the plunger by hydraulic pressure (3)

The plunger is retracted in off-position. It moves forward with a light spring force against the workpiece, when hydraulic pressure is applied. With increasing oil pressure, the support plunger locks hydraulically.

7.2 Instructions for safe operation

⚠ CAUTION

Transverse forces

The products are not suitable to compensate side loads.

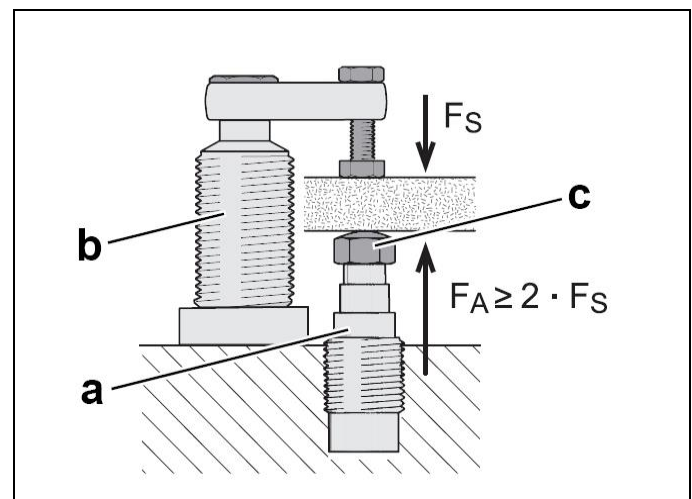


Figure 2: Principle, force flow during support

a Work support	c Contact bolt
b Swing clamp	

- Design the operating pressure so that support force F_A is more than twice the clamping force F_s . This reserve allows the compensation of machining forces.
- The recommended operating pressure is at least 100 bar.
- Operate the work supports only with mounted contact bolt to avoid damage of the plunger and penetration of liquids.
- Contact bolts and extensions with large weight can influence the functions of the work support.

NOTE

Receiving bore

- When using the versions with contact by air pressure and elements with vent port, pay attention that the location hole is not filled with oil.
- Otherwise oil can enter into the element and lead to malfunctions.

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.

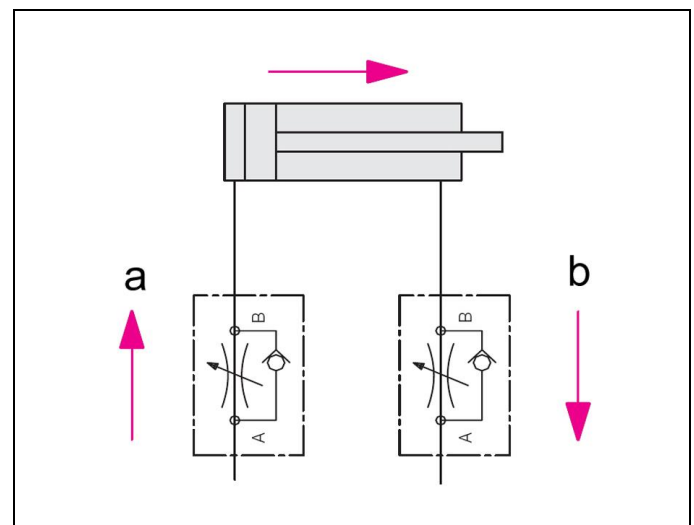


Figure 3: Hydraulic circuit diagram without flow control valves

a Throttling direction	b Free flow
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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

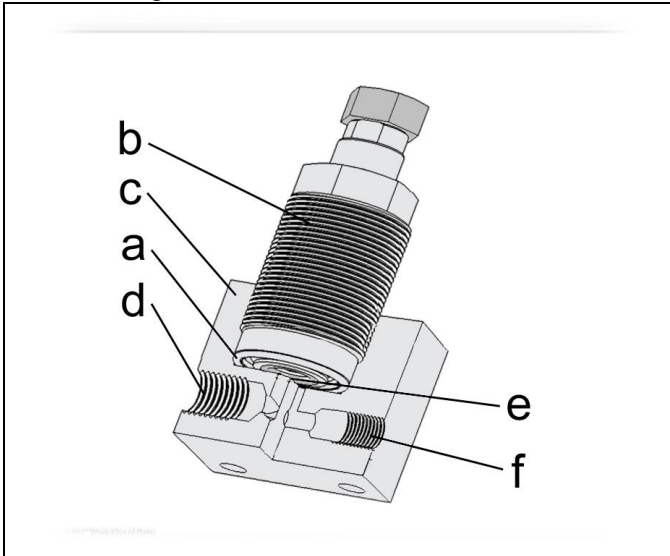


Figure 4: Mounting of the axial seal at the plane surface

a Axial seal	e Plane surface and installation dimensions as per indications on the data sheet
b Body	
c Fixture body	
d Hydraulic connection	f Venting / positive air pressure connection

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!

Injury by cutting!

- Sharp-edged threads can cause cut injuries.
- Wear personal protection equipment!

CAUTION

Product not properly tightened

Product can loosen during operation.

- Fix and/or secure with sufficient tightening torque.



For works at and with the product, wear protective gloves!

NOTE

Location hole

The location hole must be oil free and dry.

When installing and especially when exchanging the work support pay attention to a dry location hole, otherwise remaining oil will be pressed into the internal mechanics.

This can lead to malfunctions or failure of the work support.

Machining with coolants and cutting lubricants

When machining with coolants and cutting lubricants, the connection bore for venting of the spring area is to be displaced so that no fluid can penetrate (see data sheet G 0.110).

Also for dry machining the vent port must not be closed.

This can lead to malfunctions or failure.

Positive air pressure

During set-up, the positive air pressure may equal max. 0.2 bar.

After clamping the support plunger, the positive air pressure

can be increased to max. 4 bar. Deactivate the positive air pressure before releasing the pressure.

Vibrations

Due to vibrations during machining of the workpiece additional forces can occur that exceed the additional load force of the element. This can cause yielding of the support plunger.

Remedy: Use a larger work support or increase the number of work supports.

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 bore holes in the installation geometry deburred and chamfered?
- Are machining residues such as swarf, dirt and foreign particles removed and bore holes free of oil?
- Do not use sharp objects for mounting!
- Wherever possible use assembly aids.

Procedure for mounting

4. Insert or screw in into bore hole
5. Screw in and pay attention to smooth running.
Pay attention that the seals will not be damaged.
6. Fix with corresponding tightening torque (see general characteristics).
See chapter Technical characteristics.

7.5 Connection of the hydraulic equipment

CAUTION

Work by qualified personnel

- Works only to be effected by authorised personnel.

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

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.

Connection of the hydraulic

Further connection data, plans or similar (e. g. hydraulic, electric circuit diagrams or electrical parameters) see enclosures!

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

CAUTION

Damage of components!

When bleeding the fixture by means of the product, penetrating oil will lead to function failure.

Bleeding of the fixture has to be carried out by the customer's bleeding screw.

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!

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!

CAUTION

Maintenance and repair work

All maintenance and repair works only to be effected by ROEMHELD service staff.

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 product must be cleaned at regular intervals, especially the area of the piston or the plunger housing has to be cleaned from swarf and other liquids.

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

Note

Special care must be taken with:

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

Small swarf and dust can stick to the rod / plunger of the element and be pulled into the sealing gap of the metallic wiper edge.

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 cleaning of the piston rod/support plunger in the effective area of the wiper.

9.2 Regular checks

1. Check tightness of hydraulic connections (visual control).
2. Check running surfaces (of the piston rod or bolt) if there are marks and scratches. Traces of marks can be an indication for a contaminated hydraulic system or an inadmissible side load of the block cylinder.
3. Leakage check at the housing - piston rod, bolt or flange.
4. Clamping force control by pressure control.
5. Check if the maintenance intervals are kept.

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
Plunger does not extend	Oil flow rate too high	Reduce oil flow rate
	Inner parts corroded	Repair required by ROEMHELD
	Penetration of cooling liquids	Repair required by ROEMHELD
	Broken spring	Repair required by ROEMHELD
Plunger does not retract	Inner parts corroded	Repair required by ROEMHELD
	Penetration of cooling liquids	Repair required by ROEMHELD
	Broken return spring	Repair required by ROEMHELD
Plunger moves back	Operating pressure not sufficient	Check the dimensioning of the operating pressure as per catalogue
		Adjust the operating pressure correspondingly
	Load (clamping and machining force) too high	Check dimensioning of the load
		Adjust the operating pressure correspondingly
		Use other elements (work support/swing clamp)

11 Technical characteristics

General characteristics

Types	Maximum operating pressure	Adm. load force
	[bar]	[kN]
194X-300	500	6.5
194X-400	500	15.0
194X-501	500	23.5
194X-601	500	42.0

Types	Tightening torques
	[Nm]
194X-300	60
194X-400	100
194X-501	200
194X-601	400

Weights

Types	Stroke [mm]	Weight [kg]
194X-300	8	0.3
194X-400	10	0.5
194X-501	10	0.9
194X-601	16	1.9

NOTE

Further information

- For further technical data see ROEMHELD data sheet. B1943

12 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.

13 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.

14 Declaration of manufacture

Manufacturer

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35321 Laubach, Germany
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www.roemheld.com

Responsible person for the documentation:

Dipl.-Ing. (FH) Jürgen Niesner, Tel.: +49(0)6405 89-0.

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, 17.06.2024