



Bore Clamps, Eccentric

Pneumatic seat check and clamping monitoring, double acting



1 Description of the product

The double-acting hydraulic cylinder operates a tie bolt that is eccentrically arranged at the edge of the housing in which the clamping bolt is safely engaged.

This conical clamping bolt expands the hardened clamping bushing so that its points penetrate the bore surface in the workpiece with a positive fit.

Clamping bolt and clamping bushing can be exchanged very quickly after loosening the workpiece support. The bore clamp can remain on the fixture and no hydraulic oil escapes.

All functions can be monitored pneumatically.

The use of the connection for positive air pressure protection prevents liquids and swarf from entering the clamping bushing.

2 Validity of the documentation

This document applies to the following products:

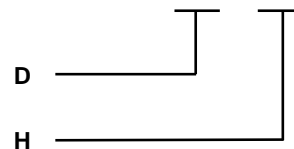
Bore clamps as per data sheet B 1.486. The following types or part numbers are concerned:

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2.1 Code for part numbers

ID. BCE 1 **XXX** H **XXX** S Z



D = **Bore diameter**

080 = 8.0 mm

090 = 9.0 mm

100 = 10.0 mm

110 = 11.0 mm

120 = 12.0 mm

H = **Height**

085 = 85 mm

095 = 95 mm

105 = 105 mm

115 = 115 mm

125 = 125 mm

135 = 135 mm

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

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 permitted:

- For domestic use.
- For the use on fun fairs and in 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 chemically acting media damage the seals (seal material durability) or components and thereby functional failure or premature failure could occur.

For deviating 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.

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 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".

⚠ CAUTION

Malfunction or early failure

Side loads and forced conditions acting on the piston lead to increased wear.

- Provide external guides.
- Avoid forced conditions (overdetermination) of the piston.

7.1 Design

NOTE

The bore clamp has no centring function

To insert and position the workpiece, suitable guides and centring bolts must be provided.

The centring bolts also have to absorb the occurring side loads during machining.

For further information see ROEMHELD data sheet.

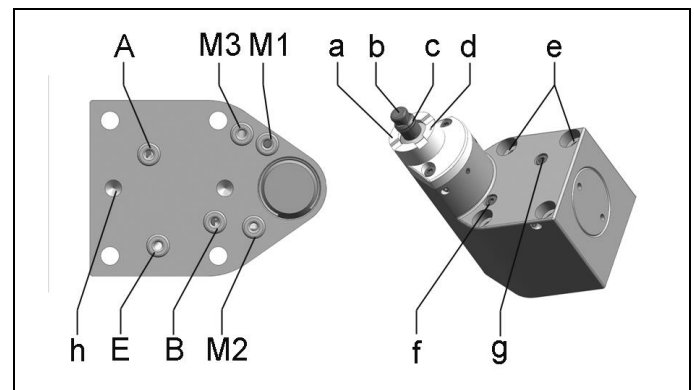


Figure 1: Components

A Port - clamping	a Support surface
B Port - unclamping	b Clamping bolt
M1 Port - seat check	c Clamping bushing
M2 Port - unclamping monitoring	d Seat check
M3 Port - clamping monitoring	e Mounting holes for screws M5 x 50 DIN 912 8.8 (4x)
E Port - positive air pressure connection	f Bleeding screw - unclamping
h Centring bore Ø 5M6 (2x)	g Bleeding screw - clamping

NOTE

Exact positioning - bore clamp

The two centring holes (h) for dowel pins 5m6 can be used for exact positioning of the bore clamp.

7.2 Throttling of the flow rate

A flow rate throttling has to be effected in the supply line to the element. This avoids pressure intensification and thereby pressures exceeding the max. operating pressure. The hydraulic circuit diagram shows flow control valves which allow oil return from the element without any impediments.

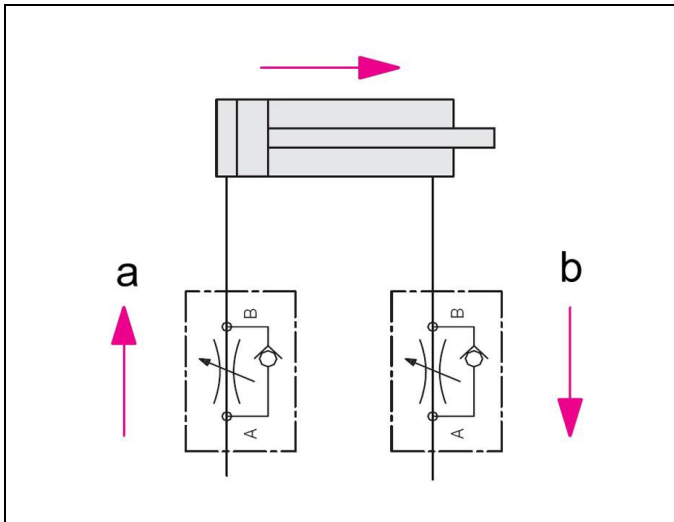


Figure 2: Hydraulic circuit diagram with flow control valves

a Throttle direction	b free flow
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7.3 Installation of manifold-mounted types

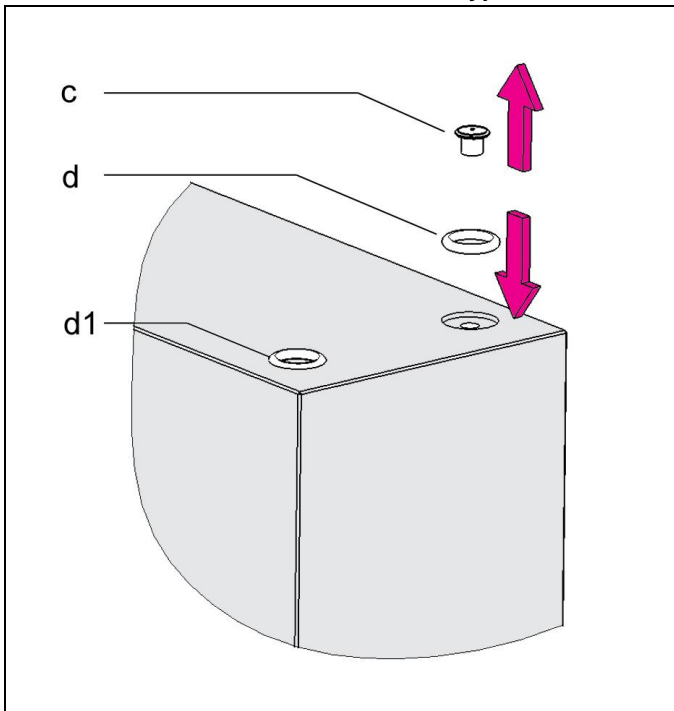


Figure 3: Example of the preparation for hydraulic ports without pipes

NOTE

Schematic sketch

- The figure shown is a schematic sketch. The arrangement of the ports depends on the respective product (see chapter Design).

c Countersunk plug against dirt for transport	d1 Mounted O-ring
d O-ring (accessory, according to the version)	

- Drill the holes for hydraulic oil supply and return in the fixture (see also data sheet).

- Grind or finish mill flange surface (Rz max.4 and a flatness of 0.04 mm to $\square 100$ mm. Marks, scratches, shrink holes are not admissible on the surface.)
- Remove countersunk plug. Insert O-rings (accessory, if required).
- Clean the support surfaces.
- Position and fix on the fixture.

NOTE

Tightening torque

Tighten the fixing screws M5x50 DIN 912-8.8 with a tightening torque of 6 Nm.

7.4 Connection of hydraulic and pneumatic equipments

- Connect hydraulic and pneumatic lines professionally and pay attention to cleanliness (A = clamping, B = unclamping, M1= seat check, M2= unclamping monitoring, M3= clamping monitoring, E = positive air pressure connection)!

NOTE

More details

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

Pressure fluids

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

7.5 Leakage due to the system

The piston rod is set in motion by the hydraulic oil to perform the clamping task.

The hydraulic oil must be sealed at the piston rod to the atmosphere. During extension of the piston rod, the hydraulic oil must remain in the cylinder.

For ROEMHELD products, sealing systems are used for the piston rod, generally consisting of several sealing elements. Those sealing systems enable the sealing points to be absolutely leak-proof in the total specified pressure area, when the system is not in operation. Neither does oil escape at the piston rod, nor is oil transferred from the piston side and piston rod side.

Important: ROEMHELD products do not leak oil when static.

To ensure an adequate working life, the sealing systems must be lubricated by the hydraulic fluid while in motion, in dynamic operation. Since the hydraulic fluid must reach the sealing lip, a certain amount of oil is lost from leakage, in the process.

According to the used sealing and the corresponding application conditions the amount can be very different depending on the product group. However the leakage should be very little (see A 0.100 General characteristics of hydraulic equipment).

Leakage-free cylinders (leakage re-circulation or special sealing) are available on request.

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!

Danger of crushing due to segment clamping bushing!

The gap in the segment clamping bushing decreases in unclamped mode. This may result in crushing.

Work on this element must only be carried out in unclamped position and by qualified personnel.

⚠ 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.

i NOTE

Clamping time

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

Distortion-free workpiece clamping

A distortion-free workpiece clamping is only guaranteed if the workpiece rests backlash-free on all bore clamps.

Achieve clamping forces

The specified clamping forces are only achieved if the points of the clamping bushing penetrate into the bore wall.

Positive air pressure protection

If swarf and liquids penetrate into an open clamping bore, positive air pressure must be continuously switched on.

Function control

You will find a detailed description on the data sheet.

8.1 Bleeding of manifold-mounted types

1. At an oil pressure of 20 bar, carefully loosen the bleeding screws by approx. 1½ turns when unclamping and clamping the bore clamp.
2. Pump until bubble free oil comes out.
3. Tighten bleeding screw M3 with a tightening torque of 1.5 Nm.
4. Check correct function.
5. Check sealing of the hydraulic connections!

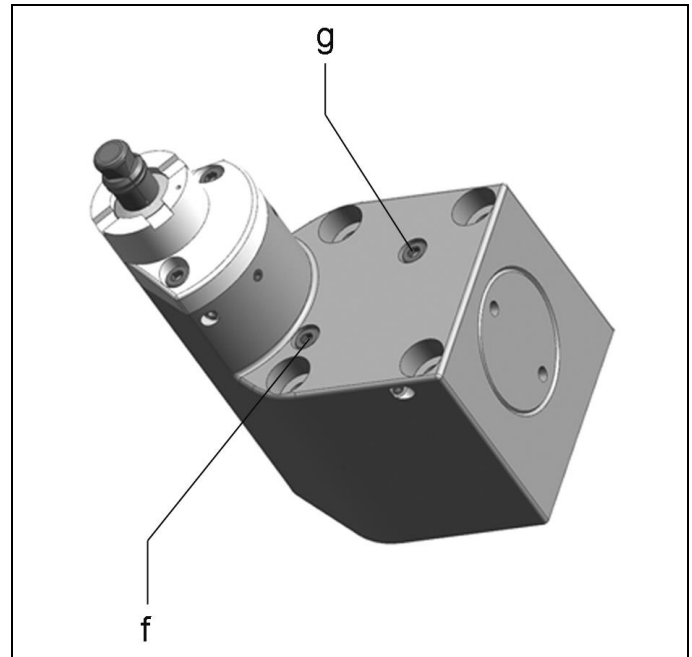


Figure 4: Bleeding screws

f	Bleeding screw - unclamping	g	Bleeding screw - clamping
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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.

The element must be cleaned at regular intervals.

i NOTE

Clean the support surface and blast clean the clamping bushing before every clamping cycle.

If swarf fall into an open clamping bore, blast air must be continuously switched on.

9.2 Regular checks

1. Check tightness of hydraulic connections (visual control).
2. Check clamping bushing if there are damages.
3. Check for possible leakage on the housing - piston rod, bolts or flange.
4. Clamping force control by pressure control.
5. Check the observance of the maintenance intervals.

9.3 Replace clamping bushing and clamping bolt

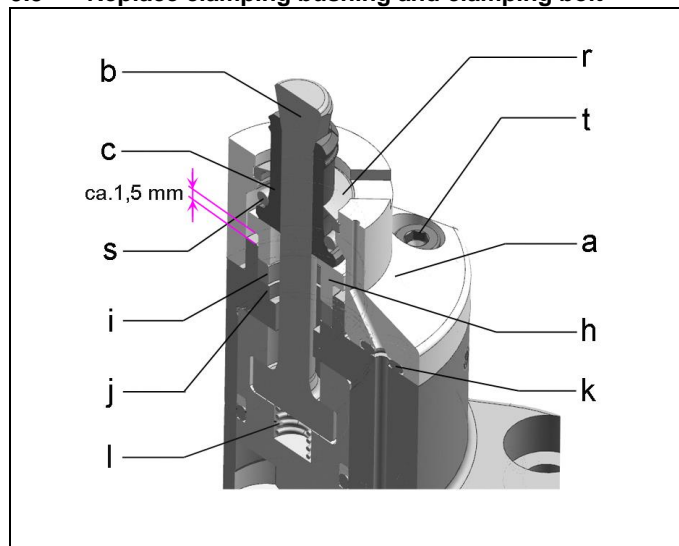


Figure 5: Change clamping bushing and clamping bolt

a Workpiece support	s O-ring
b Clamping bolt	h Pull-down disk
c Clamping bushing	i Thrust collar
t Screw M3	j Anti-rotation device
r Sealing ring	l Spring
	k O-ring

1. To exchange the clamping bolt, pressure must be applied to port **B**.
2. Unscrew workpiece support (**a**) with two screws M3 (**t**). Remove workpiece support (**a**).
3. Remove used clamping bushing (**c**).
4. Remove the pull-down disk (**h**) and thrust collar (**i**).
5. Remove anti-rotation device (**j**).
6. Press down used clamping bolt (**b**), turn by 90° and remove.
7. Remove spring (**l**) (ATTENTION spring is preloaded!).

NOTE

Make sure that the parts that are not worn out are installed clean.

7. Insert spring (**l**).
8. Insert new clamping bolt (**b**), press down and turn by 90°.
9. Insert anti-rotation device
10. Insert thrust collar (**i**) and pull-down disk (**h**). (Check the distance of approx. 1.5 mm)
11. Push the new clamping bushing (**c**) complete with O-ring (**s**) onto the clamping bolt (**b**) and put it onto the pull-down disk (**h**).
12. Carefully put the workpiece support (**a**) onto the clamping bushing and fix it with two screws M3 (tightening torque 1.5 Nm).

9.4 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

Fault	Cause	Remedy
Bore clamp no longer clamps	Clamping bolt torn	Change clamping bolt
	Clamping bushing torn	Change clamping bushing
	Teeth on clamping bushing worn or broken	
Clamping bolt does not move downwards	Clamping bolt torn	Change clamping bolt
	Clamping bolt not engaged in the bayonet	Clamping bolt engaged in the bayonet
Clamping bushing does not go to the unclamping position	Swarf are located between the clamping bolt and the clamping bushing	Remove swarf Connect positive air pressure connection
	O-ring or sealing ring torn or no more preload	Replace seals
	Anti-rotation device (bayonet) of the clamping bolt not installed correctly	Install the clamping bolt correctly (Check the distance of approx. 1.5 mm)
Air blows off at flange surface	Screws not tightened	Tighten screws to the specified torque
	O-ring forgotten	Insert O-ring
	O-ring defective	Replace O-ring
Clamping bolt extends jerkily:	Air in the hydraulic system	Hydraulic bleeding
System pressure drops:	O-rings defective	Replace O-rings
	Wear of the seals	Replace sealing rings.

11 Technical characteristics

Characteristics

Types	Maximum operating pressure [bar]	Maximum clamping force [kN]
BCE1080HXXXSZ	80	3.3
BCE1090HXXXSZ	80	3.3
BCE1100HXXXSZ	120	5.0
BCE1110HXXXSZ	120	5.0
BCE1120HXXXSZ	120	5.0

Weights

Types	Weight [kg]
BCE1XX0H085SZ	1.20
BCE1XX0H095SZ	1.22
BCE1XX0H105SZ	1.24
BCE1XX0H115SZ	1.26
BCE1XX0H125SZ	1.28
BCE1XX0H135SZ	1.30

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

Further information

- For further technical data see ROEMHELD data sheet.

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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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, 02.01.2024