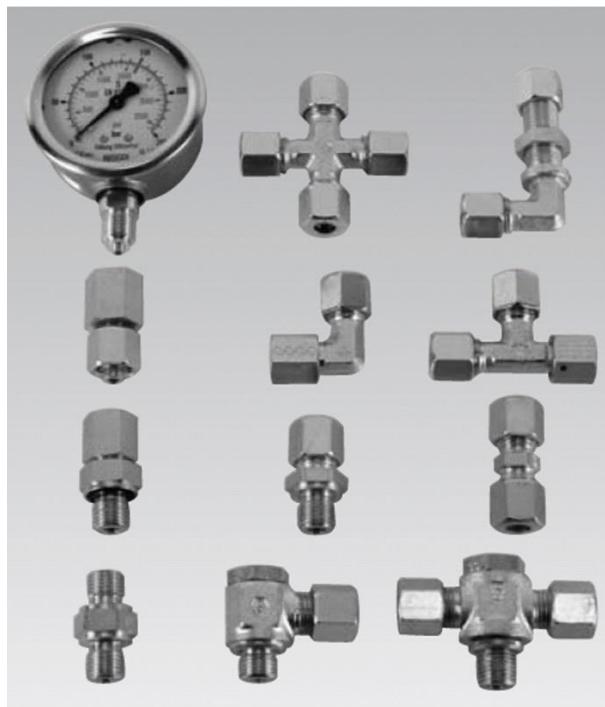




# Fittings with 24° cone as per DIN EN ISO 8434-1

Fitting accessories, plug-type connectors, hydraulic pipes, pipe clamps, pressure gauges



## 1 Description of the product

### Description - Fittings, cutting ring unions

Fittings of different versions are used in pipe systems as connecting and display elements between modern installations. They are used at pressure generators up to the hydraulic actuator.

Fittings are available up to a max. operating pressure of 500 bar.

### Description - Pressure gauge for pipe mounting

The pressure gauges filled with liquids are used for the simple visual control of the system pressure. They convert the hydraulic pressure into a mechanical movement of the indicator needle. The liquid filling acts as damping in case of dynamic pressures and vibrations.

## 2 Validity of the documentation

This document applies to the following products:

Elements of data sheet F 9.300. The following types or part numbers are concerned:

Tube male stud coupling	
Type B with sealing edge	Type E with elastic seal
9206-003	9206-028
9208-034	9208-075
9208-003	9208-131
9210-004	9210-028
9215-003	9215-033
9208-116	9208-164
9208-102	9208-132
9210-104	9210-029
9216-004	9216-021

Stand pipe union with sealing cone	
Type E with elastic seal	
9208-017	
9210-109	
9208-018	
9210-136	

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<b>Swivel banjo coupling</b>	
Type B with sealing edge	Type E with elastic seal
9206-004	9206-044
9208-004	9208-080
9210-015	9210-038
9215-004	9215-048
9210-105	9208-177
9216-005	9210-149
	9216-033

<b>KDS sealing ring for swivel banjo couplings</b>	
Type B with sealing edge	Type E with elastic seal
3002-260	3001-766
3002-261	3001-765
3002-262	3001-323
3002-263	3001-324

<b>T-swivel coupling</b>	
Type B with sealing edge	Type E with elastic seal
9206-019	9206-048
9208-120	9208-169
9210-006	9210-154
9215-030	9215-050
9210-107	9208-178
9216-007	9210-153
	9216-035

<b>Straight coupling</b>	<b>90° elbow coupling</b>
9206-007	9206-008
9208-007	9208-008
9210-007	9210-008
9215-007	9215-008
9208-106	9208-107
9210-108	9210-112
9216-008	9216-009

<b>Plug</b>	
Type B with sealing edge	Type E with elastic seal
3610-047	3610-158
3300-821	3610-191
3610-045	3610-099
	3610-098
	3610-263
	3610-264
	3610-265
	3610-325

<b>T-coupling</b>	<b>Cross-type coupling</b>
9206-009	9206-011
9208-009	9208-010
9210-009	9210-010
9215-009	9215-010
9208-108	9208-109
9210-113	9210-114
9216-010	9216-011

<b>Thread reducing adaptor</b>	
Type B with sealing edge	Type E with elastic seal
3613-016	3613-073
3613-015	3613-055
3613-018	3613-074

<b>Straight bulk head fitting</b>	<b>Angular bulk head fitting</b>
9206-026	9206-014
9208-023	9208-029
9210-117	9210-110
9215-022	9215-018
9208-117	9208-118
9210-119	9210-027
9216-017	9216-020

<b>Double connector</b>	
Type B with sealing edge	Type E with elastic seal
3610-037	3610-261
3610-062	3610-262

<b>Standpipe elbow with sealing cone</b>	<b>Check valve, poppet type</b>
9208-038	9206-012
9208-036	9208-012
	9210-012
	9215-011
	9208-111
	9210-116
	9216-012

<b>Elastic sealing for screwed plug type E</b>	
NBR	FKM
3002-253	3002-254
3002-142	3002-255
3002-256	3002-257
3002-258	3002-259

Union nut	Cutting ring
9206-001	9206-002
9208-001	9208-101
9210-002	9210-103
9215-001	9215-002
9208-100	9208-101
9210-102	9210-103
9216-002	9216-003

Blanking plug	Hydraulic pipe galvanized
9206-023	3128-112
9208-039	3128-113
9210-024	3128-212
9215-031	3128-114
9216-016	3128-119

Hydraulic oil as per DIN 51524-2 in the reservoir (max. 120°C)					
HLP 22		HLP 32		HLP 46	
1 L	9892-001	1 L	9895-001	1 L	9896-001
5 L	9893-001	5 L	9891-001	5 L	9897-001
20 L	9894-001	20 L	9899-001	20 L	9898-001

Fire-resistant hydraulic fluid HF-DU (max. 200°C)					
1 L	9892-001				
5 L	9893-001				
20 L	9894-001				

Single pipe clamps										
Clamp size I	Clamp size II									
3300-892	3300-897									
3300-893	3300890									
3300-895										
Twin clamps										
3300-891										
3300-449										

Pressure gauge with glycerine filling and screw plug					
Measuring range					
0 - 40 bar	9820-000				
0-100 bar	9821-000				
0-250 bar without glycerine filling	9810-000				
0-250 bar	9822-000				
0-400 bar	9823-000				

Pressure gauge with glycerine filling and screw plug, wrench size SW 9 or closed housing	
Measuring range	
0-250 bar	9822-005
0-400 bar	9823-005
0-600 bar	9846-000

Pressure gauge union with edge sealing ring		
Type	Measuring range	
A	0-250 bar	9208-011
B	0-250 bar	9208-042
A	0-500 bar	9208-040
B	0-500 bar	9208-041
A	0-500 bar	9208-110

90°-elbow		
0-250 bar	9811-011	
0-500 bar	9811-012	

### 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.

**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

**Fittings, cutting ring unions, connecting inserts and precision tubes**

are used in industrial applications:

- to connect hoses and pipes, for flange-mounting at reservoir covers and end users.

### Pressure gauges for pipe mounting

are used in industrial applications:

- With increased safety requirements for personal protection
- With liquid filling of housings that are exposed to high dynamic loads and vibrations
- For gaseous and liquid, aggressive, non-high-viscous and non-crystallizing measuring fluids, also in aggressive environment.

For the process industry in: Chemistry, petrochemistry, power plants, mining, on/offshore, environment sector, machine construction and general plant construction

Furthermore the following are possible uses:

- Use within the capacity indicated in the technical characteristics (see data sheet).
- The operation with the permitted hydraulic oils (see data sheet A 0.100).
- 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!

- 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 leisure 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.

**Special solutions are available on request!**

## 7 Assembly

### ⚠️ 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 dismantling 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, ageing 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

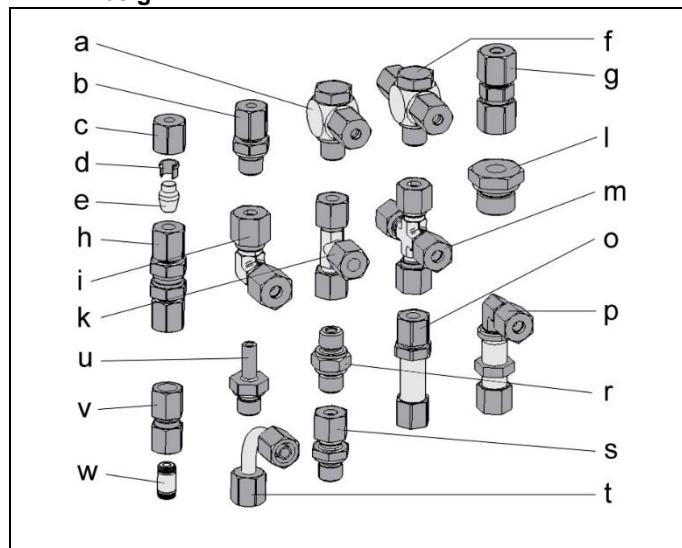


Figure 1: Components

a	Swivel banjo coupling	m	Cross-type coupling
b	Tube male stud coupling	o	Straight bulk head fitting
c	Nut	p	Angular bulk head fitting
d	Cutting ring	r	Double connector
e	Blanking plugs for cutting ring unions	s	Straight coupling with elastic seal
f	T-swivel coupling without throttling	t	90°-elbow
g	Straight coupling	u	Stand pipe union
h	Check valve, poppet type	v	Pressure gauge union
i	Elbow coupling	w	Plug connection short or long
k	T-coupling		
l	Thread reducing adaptor		

### Function

The cutting ring union is a form fit and force fit high-pressure connection. When tightening the nut, the hardened cutting ring slides along the cone of the fitting, tapers and cuts in the pipe. In front of the cutting edge, material bulging is clearly visible. Pre-condition for this function is the fit of the rectangularly cut pipe at the cone. The angle of the cutting edge is selected so that in the last phase of the cut-in process a strain hardening of the cut-in point is caused. The cutting depth is limited by a second edge in the interior of the ring - the stop edge. Thus it is not possible that pipes with minor wall thickness will be cut through. The cutting ring with high surface hardness and increased toughness in the core is now elastically deformed in their central part. The cutting ring acts as a spring, that compensates the pressure shocks, the temperature loads and vibrations and avoids automatic loosening of the fitting. Due to this effect the fitting can be disconnected and connected again as often as required.

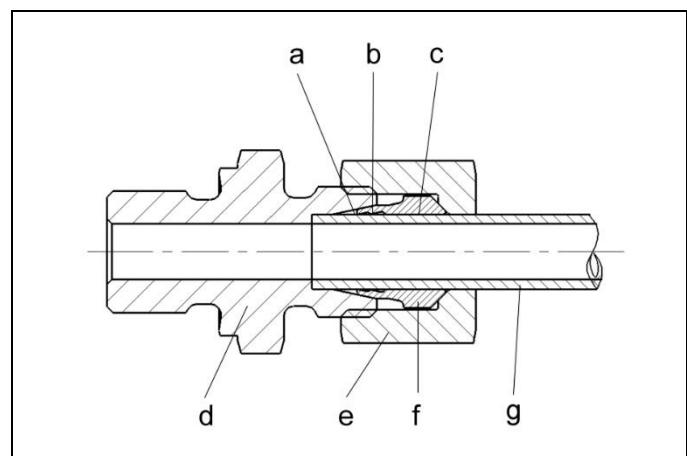


Figure 2: Design of a cutting ring union

a	Stable and visible knife edge, safe cutting control by clearly visible material bulging	d	Fitting
b	Limitation of cutting depth by stop edge	e	Nut
c	High fatigue strength due to springy preload	f	Cutting ring
		g	Precision steel tube

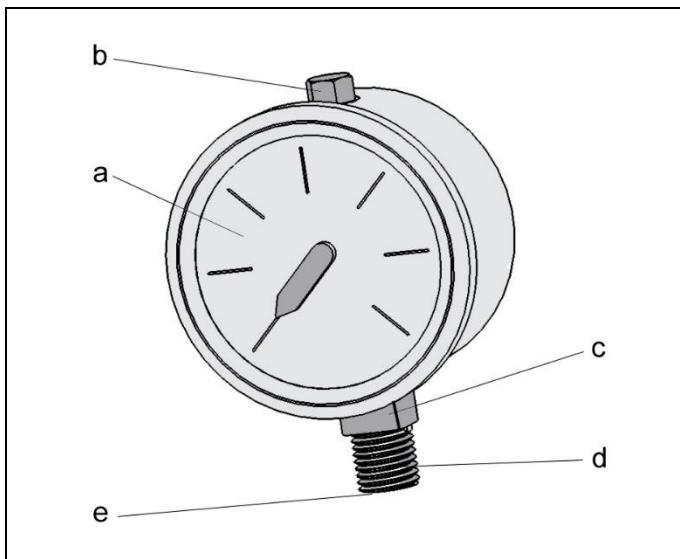


Figure 3: Components

a Motion work and instrument dial	d Connecting thread
b Screw plug or screw	e Sealing surface
c Square SW 14	

## 7.2 Mounting of fittings

### 7.2.1 Final assembly

The final assembly of the pre-mounted pipes is made in the connecting pipe by tightening the nut with 1/6 turn above the point of the clearly perceptible force increase. Also after any further loosening, the nut can be tightened again without increased force - approx. 1/6 turn. The connecting pipe has to be held by means of a key.

The final assembly of the pre-mounted fitting is made in the factory by at least 1/2 turn of the nut. Starting from the point of the increased expenditure of force.

## 7.3 Pre-assembly

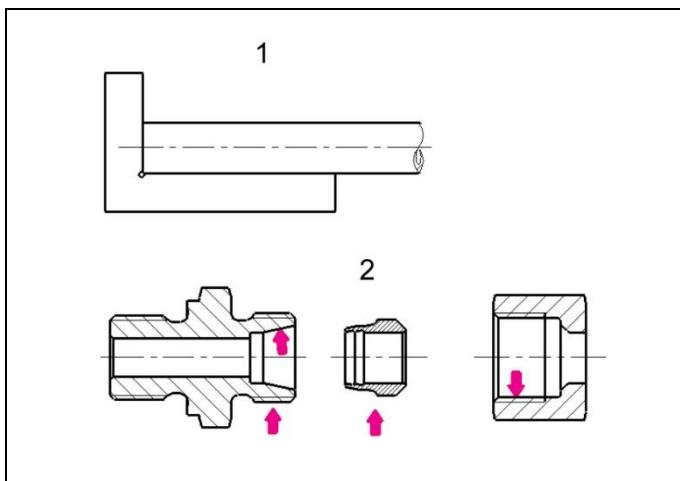


Figure 4: Pre-assembly - Pipe and fitting

1. Rectangularly saw off the pipe and slightly debur inside and outside (Pos. 1). Do not use pipe cutters.
2. Oil the thread and cone of the connecting pipe, the interior of the nut and the cutting ring (Pos. 2).

### Note

Do not use grease, since grease particles could enter into the oil circuit.

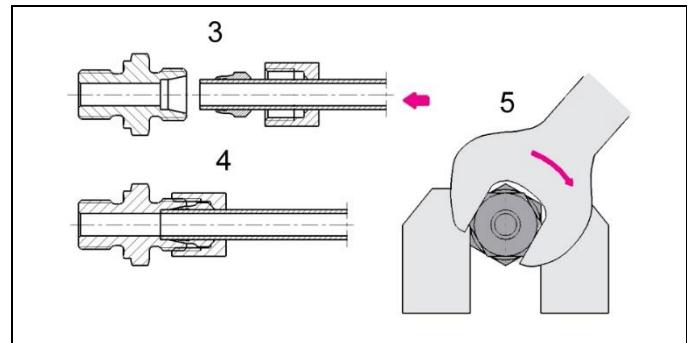


Figure 5: Pre-assembly - sliding

3. Slide the cutting ring and the nut onto the pipe (Pos. 3).

### Note

Pay attention to the correct position of the cutting ring - otherwise incorrect mounting may occur.

4. Clamp the connecting pipe in a vice and manually screw on the nut as far as possible. Mark the position of the nut to control the prescribed turns. Push the pipe until the stop in the cone - otherwise no cutting process can be effected. Tighten the nut with a wrench approx. 1 1/2 turns. The pipe must not rotate. Connect the pipe by G1/4.

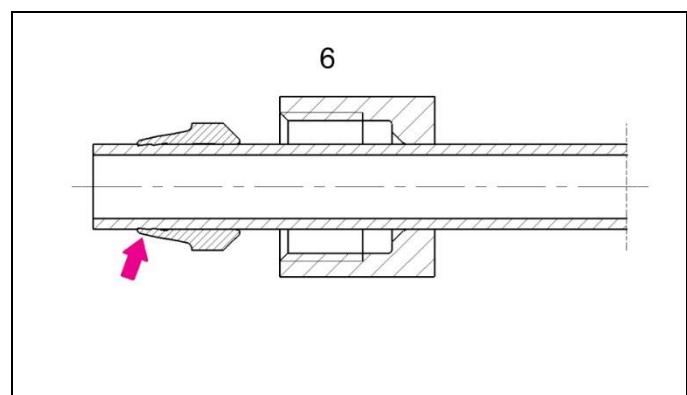


Figure 6: Pre-assembly - control of the cutting

5. Loosen the nut for checking purposes of the cutting. The bulged pipe material must cover the front cutting ring surface (Pos. 5). If not, retighten slightly.

### Note

Due to the spring effect of the cutting ring it can be still rotated - no faulty operation.

## 7.4 Assembly of the pressure gauge

### 7.4.1 Safety note

#### ⚠ CAUTION

##### Damage of components!

The admissible performance data of the product, see chapter "technical characteristics", may not be exceeded.

Before assembly, start up and operation, please make sure that the correct pressure measuring device was selected with regard to indication range, version and due to specific measuring conditions the suitable material (corrosion) with regard to the metering material. The maximum loads have to be kept to guarantee the measuring precision and the service life (see technical data).

### 7.4.2 Mechanical connection

According to the general technical specification for pressure gauges (e.g. EN 837-2).

When screwing in the devices the required force must not be applied through the housing, but with appropriate tools only through the provided wrench flat.

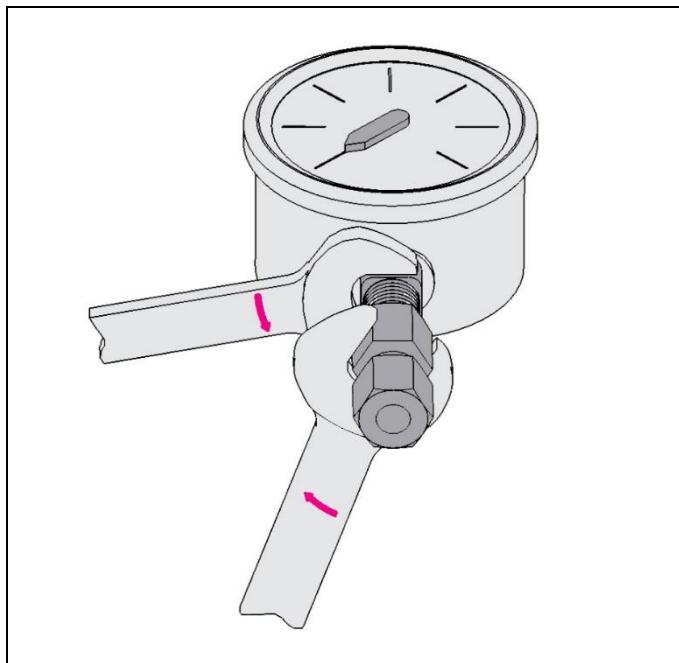


Figure 7: Mounting with open-ended wrench

To seal the pressure gauge connection with cylindrical thread at the sealing surface (Pos. e) use pressure gauge fittings (accessory) to bring the pressure gauge to the position where it can be read best.

### 7.4.3 Demands on the installation point

If the line to the pressure gauge is not stable enough for a vibration-free mounting, fixing should be made by means of a pressure gauge support (possibly by a flexible capillary line).

The devices have to be protected against coarse contamination and strong fluctuations of the environmental temperature. The EN 837-2 "Selection and installation recommendations for pressure gauges" should be considered.

## 8 Maintenance

#### ⚠ WARNING

##### Burning due to hot surface!

- In operating conditions, surface temperatures of more than 70 °C can appear at the product.
- All maintenance and repair works must only be effected in cooled mode or with safety gloves.

### 8.1 Cleaning

The product must be cleaned from dirt, swarf and liquids at regular intervals.

### 8.2 Regular checks

#### ⚠ WARNING

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

Defect or leaking fittings and pressure gauges have to be exchanged.

The fittings and pressure gauges are maintenance free.

#### General information

1. Check tightness and leakage of hydraulic connections (visual control).

#### Pressure gauge

2. The measuring precision of the pressure gauge should be monitored by regular checks.

#### ⓘ Note

The checks or a new calibration has to be effected by trained personnel with appropriate equipment.

## 9 Technical characteristics

### 9.1 Cutting ring unions as per DIN 2353, seamless precision steel pipes,

**Tightening torques for screwed plugs with cutting edge type B and sealing ring type E**

Series	Pipe Ø	Thread	Tightening torque [Nm]	
			Type B	Type E
L	6	G1/8 A	18	18
L	8	G1/4 A	35	35
L	10	G1/4 A	35	35
L	15	G1/2 A	140	90
S	8	G1/4 A	55	55
S	10	G3/8 A	90	80
S	16	G1/2 A	130	115

**Tightening torques for swivel banjo couplings with cutting edge and KDS ring**

Series	Pipe Ø	Thread	Tightening torque [Nm]	
			Cutting edge	KDS ring
L	6	G1/8 A	18	18
L	8	G1/4 A	45	40
L	10	G1/4 A	45	40
L	15	G1/2 A	120	90
S	8	G1/4 A	45	40
S	10	G3/8 A	70	65
S	16	G1/2 A	120	110

**9.2 Pressure gauges for pipe mounting**
**Hydraulic oils**

Admissible hydraulic oils (see data sheet A 0.100).

**Admissible environmental and operating temperatures**

Environment: -20 up to +60 °C

Hydraulic oil: max. +100°C

Mounting of the pressure gauge has to be made in such a way that the admissible environmental and measuring media temperature limits are neither will be fallen below nor exceeded, also the influence of convection and thermal radiation is to be considered. The temperature influence on the display accuracy has to be taken into account.

**Process connection**

CrNi steel 316L,

Connecting position radially bottom

External thread G 1/4 B, SW 14

**Measuring element**

CrNi steel 316L,

< 100 bar: Circular design

≥ 100 bar: Screw design

**Motion work**

CrNi steel

**Instrument dial**

Aluminium, white: scaling, black

NG 63 with stop pin

**Needle**

Aluminium, black

**Body**

CrNi steel with fracture-proof dividing wall (solid front) and a blow-out back wall, indicating ranges  $\leq 0 \dots 16$  bar (connecting position bottom) for compensation of internal pressure ventable and reclosable

**Sight glass**

Multi-layer safety glass

**Filling liquid (type 233.30)**

Glycerine 99.7 %

**9.3 Max. operating pressures for cutting ring unions and pressure gauges for pipe mounting**
**NOTE**

Max. operating pressures of the described fittings see data sheet F 9.300.

**NOTE**
**Further information**

- For further technical data see ROEMHELD data sheet.

**10 Storage**

For protection against mechanical damages, leave the ROEMHELD

pressure gauge in the original packing until mounting.

Storage temperature range -40 °C to +70 °C

Protect pressure gauge against humidity and dust.

**11 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.

**12 Declaration of manufacture**
**Manufacturer**

Römhled GmbH Friedrichshütte

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35321 Laubach, Germany

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www.roemheld.com

**Declaration of manufacture of the products**
**Cutting ring unions**

are designed and manufactured in line with the relevant versions of the directives **89/37/EC and/or 2006/42/EC** (EC MSRL) and in compliance with the valid technical rules and standards.

In accordance with EG-MSRL and EN 982 these products are components that are not ready for use and are exclusively designed for the installation into an incomplete machine / machine.

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 89/37/EC and/or 2006/42/EC).

## 13 Declaration of conformity

### 13.1 Validity of documentation

This document is valid for the following products:

Pressure gauge for fittings as per data sheet F 9.300.

The following types or part numbers are concerned:

- Glycerin filling and plug  
9820-000, 9821-000, 9810-000, 9822-000, 9823-000
- Glycerin filling and screw plug, wrench size SW 9 or closed housing  
9822-005, 9823-005, 9846-000

are designed and manufactured in line with the relevant versions of the directives **89/37/EC and/or 2006/42/EC** (EC MSRL) and in compliance with the valid technical rules and standards.

In accordance with EG-MSRL and EN 982 these products are components that are not ready for use and are exclusively designed for the installation into an incomplete machine / machine.

**The products correspond to the pressure equipment directive 97/23/EC:**

- The pressure gauges are "pressure retaining equipments" as per article 1, paragraph 2.1.4
- The volume of pressurised housings of ROEMHELD pressure gauges is < 0.1 L
- A CE marking is made in accordance with fluid group 1G as per appendix 2, diagram 1 for an admissible operating pressure > 200 bar

Unmarked devices are manufactured as per article 3 paragraph 3 "sound engineering practice".

### 13.2 List of the used standards

**EN 837-1** Bourdon tube pressure gauges; dimensions, metrology, requirements and testing

**EN 837-2** Selection and installation recommendations for pressure gauges

**EN 837-3** Diaphragm and capsule pressure gauges; dimensions, metrology, requirements and testing

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 89/37/EC and/or 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 IV was prepared for the products.

*iV. Thnk*

Responsible person for the documentation:  
Dipl.-Ing. (FH) Jürgen Niesner, Tel.: +49(0)6405 89-0.