

## Series RSA

# Chemical Process Pump

for Mechanical Seals, acc. to ASME,

Bearing lubrication: Long life grease or  
oil bath

Bearing pedestal group: 1 and 2



### Keep for future use!

This operating manual must be strictly observed before transport, installation, operation and maintenance

Subject to change without notice.

Reproduction is generally permitted with indication of the source.

© Richter Chemie-Technik GmbH

9285-050-en Revision 11 Edition 07/2010

## List of Contents

<b>List of Contents .....</b>	<b>2</b>	<b>6 Commissioning/Shutdown.....</b>	<b>14</b>
<b>Relevant documents.....</b>	<b>3</b>	6.1 Initial commissioning.....	14
<b>1 Technical data.....</b>	<b>3</b>	6.1.1 Mechanical seals.....	14
1.1 Tightening torques.....	4	6.1.2 Filling the pump housing .....	14
1.2 Type plate, ATEX and housing markings....	4	6.1.3 Start-up.....	14
1.3 Spareparts.....	4	6.2 Operating limits .....	14
<b>2 Safety.....</b>	<b>5</b>	6.2.1 Abrasive media.....	14
2.1 Intended use.....	5	6.2.2 Min./max. flow rate .....	14
2.2 Notes on safety for the customer / operator	6	6.3 Shutdown .....	15
2.3 Notes on safety for maintenance .....	6	6.5 Improper operations and their consequences	15
2.4 Conversion work and production of spare	6	(examples) .....	15
parts by the customer.....	6	<b>7 Maintenance.....</b>	<b>16</b>
2.5 Improper operation .....	6	7.1 Safety-relevant screw fittings.....	16
2.6 Special requirements for explosion protection	6	7.2 Bearing pedestal .....	16
.....	6	7.2.1 Grease for life lubrication .....	16
2.6.1 Filling the unit .....	6	7.2.2 Oil bath lubrication.....	16
2.6.2 Special operating conditions .....	7	7.3 Cleaning.....	17
2.6.3 Chargeable liquids .....	7	7.4 Stand-by pumps.....	17
2.6.4 Identification .....	7	7.5 Notes on dismantling .....	17
2.6.5 Check of the direction of rotation .....	7	7.5.1 Protective clothing.....	17
2.6.6 Mode of operation of the pump .....	7	7.6 Dismantling .....	17
2.6.7 Temperature limits .....	8	7.6.1 Remove slide-in unit.....	17
2.6.8 Maintenance.....	8	7.6.2 Dismantling of bracket chamber.....	17
2.6.9 Electric peripheral equipment.....	8	7.6.3 Dismantling the bearing pedestal long-life grease	18
		lubrication .....	18
		7.6.4 Dismantling the bearing pedestal oil bath	18
		lubrication.....	18
<b>3 Transport, storage and disposal .....</b>	<b>9</b>	7.7 Notes on assembly .....	18
3.1 Return consignments .....	9	7.8 Assembly.....	18
3.2 Disposal.....	9	7.8.1 Assembly bearing pedestal .....	18
<b>4 Product description.....</b>	<b>10</b>	7.8.2 Assembly bracket chamber.....	18
<b>5 Installation.....</b>	<b>10</b>	7.8.3 Final assembly .....	18
5.1 Safety regulations.....	10	7.8.4 Fill bearing pedestal with oil.....	19
5.2 Installation of pump/unit .....	10	7.9 Tests .....	19
5.3 Alignment of pump-coupling-motor .....	10	<b>8 Malfunctions.....</b>	<b>20</b>
5.4 Piping.....	11	<b>9 Sectional drawing .....</b>	<b>21</b>
5.4.1 Nominal size.....	11	9.1 Legend .....	21
5.4.2 Nozzle loads.....	11	9.2 RSA long life grease lubrication.....	22
5.4.3 Suction line.....	11	9.3 RSA oil bath lubrication.....	23
5.4.4 Supply lines.....	11	<b>10 Assembly aids.....</b>	<b>24</b>
5.4.5 Discharge line .....	11	10.1 Impeller wrench for open impeller.....	24
5.4.6 Venting and evacuating.....	12	10.2 Clamping device for SCK single mechanical	24
5.5 Pipe fittings.....	12	seals.....	24
5.6 Monitoring facilities.....	12		
5.7 Drive .....	12		
5.8 Coupling .....	13		
5.9 Final check .....	13		
5.10 Coupling guard .....	13		
5.11 Electric connection .....	13		

## Relevant documents

- ◆ Data sheet
- ◆ Works certificate
- ◆ Sectional drawing:
  - RSA long life grease lubrication 9285-00-3000
  - RSA oil bath lubrication 9285-00-3001
  - External single mechanical seal 9285-00-3021
  - Double mechanical seal 9285-00-3020
- ◆ Installation and operating manual for mechanical seals:
  - External single mechanical seal,
  - Double mechanical seal 9285-060-en
- ◆ Installation drawing 9285-00-3017
- ◆ Dimensional drawing 9285-00-3015
- ◆ Performance curves
- ◆ Spare parts list

- ◆ Operating manual and declaration of conformity motor \*
- ◆ Operating manual and declaration of conformity coupling \*

### Appendix to the operating manual

- ◆ Operational limits 9285-00-3030
- ◆ Declaration of conformity with ATEX
- ◆ Declaration of conformity without ATEX
- ◆ Form for Safety Information Concerning the Contamination QM 0912-16-2001\_en

### On request:

- ◆ Publication: "Centrifugal Pump Operation without NSPH Problems"
- ◆ Publication "Safe Operation of Magnetic Drive Pumps"

\* if contained in the scope of delivery

## 1 Technical data

### Manufacturer :

Richter Chemie-Technik GmbH  
 Otto-Schott-Str. 2  
 D-47906 Kempen  
 Telephone: +49 (0) 2152 146-0  
 Fax: +49 (0) 2152 146-190  
 E-Mail: [richter-info@idexcorp.com](mailto:richter-info@idexcorp.com)  
 Internet: <http://www.richter-ct.com>

Richter EP (Nanjing) Co., LTd.  
 No. 18 Ailing Rd., Moling,  
 Jiangning Dev. Zone  
 211111 Nanjing  
 P.R. China  
 Telephone: +86 (0) 25 / 5275 1718  
 Fax: +86 (0) 25 / 5275 1747  
 E-Mail: [jyin@idexcorp.com](mailto:jyin@idexcorp.com)  
 Internet: <http://www.richter-ct.com>

Authorised person acc. to machine directive  
 2006/42/EG: Gregor Kleining

### Designation :

Single-stage, plastic-lined, chemical centrifugal pump for mechanical seals, series RSA, long life grease or oil bath lubrication

Horizontal design

Technical specifications ASME B73.1, ASME B73/3M, ISO 15783, ISO 5199 and HI standards

Connecting dimensions to ASME B73.1

Flange connecting dimensions:

ASME B16.5 Class 150

ATEX 95 Directive 94/9/EC

Machine Directive 2006/42/EC

### Materials :

Pressure-bearing parts:

Ductile cast iron ASTM A 395 / EN-JS 1049 / stainless steel

Wetted parts:

PFA, PTFE, Al<sub>2</sub>O<sub>3</sub>, FFKM  
 and see data sheet.

**Flow rate :** up to 570 Usgpm (130m<sup>3</sup>/h)  
 (at 3500 rpm)

**Delivery head :** up to 330 ft (100m) (at 3500 rpm)

**Housing discharge pressure :**

max. 275psi (19bar)

**Temperature range :**

Operating conditions to standard	
ASME	ISO
-20 °F (-29 °C) up to 302 °F (150 °C)	-30 °C (-22 °F) up to 150 °C (302 °F)

**Temperature classes as per ATEX :**

see Section 2.6.7.

**Admissible ambient conditions for pumps acc. to directive 94/9/ EG (ATEX 95) :**

**Ambient temperature range:** 4 °F bis 104 °F,  
 - 20 °C bis + 40 °C (higher temperature after consulting the manufacturer)

**Ambient pressure range:** 11,6 psia – 16 psia  
 0,8 bar<sub>abs</sub> – 1,1 bar<sub>abs</sub>

**Noise capacity level :** L<sub>WA</sub> = ≤ 70 dB acc. to  
 DIN EN ISO 9614-2

**Sizes :**

Group 1	Group 2
1,5"x1"x6"	3"x2"x8"
3"x2"x6"	
1,5"x1"x8"	

**Weight :** See data sheet**Dimensions :** See installation drawing**1.1 Tightening torques**

Screws greased, tighten in diametrically opposite sequence.

**Housing screws 901/3**

Size [inch]	No. x size [ASME]	Tightening torque	
		[in-lbs]	[Nm]
1,5"x1"x6"	8 x 1/2"	415	47
3"x2"x6"	8 x 1/2"	415	47
1,5"x1"x8"	10 x 1/2"	390	44
3"x2"x8"	12 x 1/2"	415	47

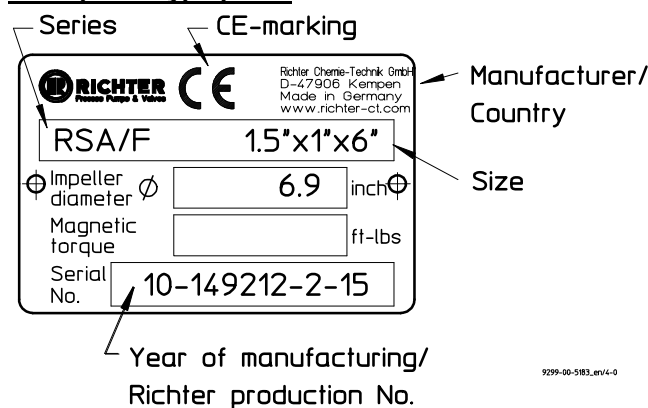
**Pipe screws**, flanges to ASME B16.5 Class 150

DN [inch]	No. x size [ASME]	Tightening torque	
		[in-lbs]	[Nm]
1"	4 x 1/2"	70	8
1 1/2"	4 x 1/2"	135	15
2"	4 x 5/8"	220	25
3"	4 x 5/8"	400	45

**1.2 Type plate, ATEX and housing markings**

The stainless steel type plate is undetachably riveted to the housing.

If the operator attaches his identification, it must be ensured that the pump matches the application in question.

**Example of type plate:**

9299-00-5183\_ev4-0

**ATEX marking:**

9299-00-5193/L-0

**Housing identification:**

The following are visible on the housing according to DIN EN 19:

- ◆ Nominal size
- ◆ Rated pressure
- ◆ Housing material
- ◆ Manufacturer's identification
- ◆ Melt number/Foundry identification
- ◆ Cast date

**1.3 Spareparts**

Spare parts for two years of continuous operation in accordance with DIN 24296 and in consultation with the manufacturer

## 2 Safety

This operating manual contains fundamental information which is to be observed during installation, operation and maintenance.

**It must be read before installation and commissioning!**

This operating manual must always be available at the place of use of the machine/plant.

Observe the safety notes in all the chapters.

Installation, operation and maintenance are to be performed by qualified staff.

The area of responsibility, authority and supervision of the staff must be exactly regulated by the customer.

If the staff do not have the necessary expertise, they are to be trained and instructed.

If necessary, this can be provided by the manufacturer/supplier on behalf of the machine operator.



**General hazard symbol!** People may be put at risk.



**Safety symbol!** The pump and its function may be put at risk if this safety symbol is not observed.



**EU marking!** Explosion-protected equipment must be identified for work in potentially explosive areas.



**Warning of electric power!**

It is imperative to observe signs attached directly to the pump / unit, e.g.:

- ◆ Direction of rotation arrow
- ◆ CE marking

and they are to be kept legible.

**Non-observance of the notes on safety may result in the loss of any and all claims for damages.**

Non-observance may involve the following hazards :

- ◆ Failure of important functions of the machine/plant.
- ◆ Risk to people from electric, mechanical and chemical effects.
- ◆ Risks to the environment through leaks of hazardous substances.

### 2.1 Intended use

- ◆ Richter pumps of the series RSA are plastic-lined centrifugal pumps for the leak-free conveyance of aggressive, toxic, pure and inflammable liquids.
- ◆ Vertical installation of the pumps is only possible with pumps with long life grease-lubricated rolling bearings. In this type of installation the mechanical seal must be designed as a liquid-sealed version or a seal with quench. Please consult the manufacturer.

The observance of the specified physical limits is important for perfect functioning and safe operation, especially with regard to explosion protection to prevent potential sources of ignition (see **Section 2.6**):

- ◆ Make sure that the mechanical seal is always lubricated with liquid.
- ◆ For safe pump operation, we recommend a flow rate which lies between 0.3 and 1.1  $Q_{opt}$ . The maximum operating temperature must never be exceeded. See **Section 2.6.7**. In case of doubt, you must consult the manufacturer.
- ◆ The manufacturer must be consulted in the event of entrainment of gas >2% as well as solids in order to avoid a lack of lubrication and dry-running.
- ◆ The plant NPSH value (NPSHA) should be 0.5 m higher than the NPSH value of the pump (NPSHR). See also **Section 5.4.1**.



Improper operation, even for brief periods, may result in serious damage to the unit.

In connection with explosion protection, potential sources of ignition (overheating, electrostatic and induced charges, mechanical and electric sparks) can result from these inadmissible modes of operation; their occurrence can only be prevented by adhering to the intended use.

Furthermore, reference is made in this connection to the Directive 95/C332/06 (ATEX 118a) which contains the minimum regulations for improving the occupational health and safety of the workers who may be at risk from an explosive atmosphere.



Do not operate the unit above the values specified in the data sheet for the

- ◆ fluid
- ◆ flow rate
- ◆ speed
- ◆ density
- ◆ head
- ◆ operating temperature and
- ◆ motor rating

**Observe the instructions contained in the operating manual or contractual documentation; if necessary, consult the manufacturer.**

All important features are documented in the data sheet included in the scope of delivery.

In the event of operating conditions other than those described in the data sheet, the following are to be checked again:

- ◆ design of the pump
- ◆ design of the accessories
- ◆ resistance of the materials.

## 2.2 Notes on safety for the customer / operator

The following must be observed:

- ◆ The notes on safety contained in this operating manual,
- ◆ the prevailing regulations on accident prevention,
- ◆ in-house work, operating and safety regulations of the customer.
- ◆ Protect hot, cold or moving machine parts from being touched on site.
- ◆ Do not remove any protective facilities when the machine is in operation.
- ◆ Exclude any risks from electricity.
- ◆ Remove leaks of hazardous media (e.g. explosive, toxic, hot) so that there is no risk to people and the environment. Observe statutory regulations.
- ◆ Provide and use protective equipment for the staff.



Caution when using the units in potentially explosive area!  
Prevent inadmissible modes of operation.

## 2.3 Notes on safety for maintenance

- ◆ Strictly, work on the pump/unit may only be performed when it is at a standstill.
- ◆ The pump housing must have reached ambient temperature.
- ◆ The pump housing must be depressurized and drained.
- ◆ It is imperative to observe the procedure for stopping the machine described in this operating manual. See also **Section 6.3**.
- ◆ Decontaminate pumps which convey media hazardous to health.
- ◆ Immediately after completion of the work, re-install all safety and protective facilities or put them into operation again.
- ◆ When installed, the magnetic drives do not represent any risk of environmental impact if the notes on safety are observed (see also **Sections 5.1 and 7.5.2**).
- ◆ Observe the points listed in **Section 6.1** prior to recommissioning.

## 2.4 Conversion work and production of spare parts by the customer

- ◆ Conversion of or changes to the machine are only admissible after consultation with the manufacturer.
- ◆ Only use original spare parts or parts approved by the manufacturer.
- ◆ The use of other parts may annul the liability for any resultant consequences.

## 2.5 Improper operation

- ◆ The operational safety of the machine supplied is only guaranteed if it is used properly in accordance with **Section 2.1** of this operating manual.
- ◆ The operating limits specified in the data sheet must under no circumstances be exceeded.

## 2.6 Special requirements for explosion protection

If the units are used in potentially explosive areas, the measures and notes in **Sections 2.6.1 to 2.6.9** are imperative to guarantee the explosion protection.

### 2.6.1 Filling the unit



During pump operation the wetted interior of the pump must be completely filled with the medium. In this way no potentially explosive atmosphere can arise if chargeable liquids are or were conveyed. Refer also to **Sections 2.6.3 and 2.6.6**.



If the customer cannot ensure this, we recommend that appropriate monitoring facilities be provided.

Also carefully fill auxiliary, heating and cooling systems.



## 2.6.2 Special operating conditions

The pump is normally used to convey aggressive and inflammable liquids.

For safe pump operation, we recommend a flow rate of 0.3 to 1.1  $Q_{opt}$ . If the pump is operated outside this range, it must be ensured that the max. admissible flow rate according to the pump characteristic curve is not exceeded and that the max. admissible operating temperature according to [Section 2.6.7](#) is observed.

If the flow rate is too high, there is a risk that the pressure in the area of the mechanical seal falls until the vapour pressure of the fluid is undershot. As a result, this may lead to dry-running, particularly with the single mechanical seals, involving inadmissible overheating and the destruction of the mechanical seal.

If the flow rate is too low, the medium may heat up so much owing to the fluid friction that the max. admissible surface temperature of the relevant temperature class is exceeded.


Overloading, overheating or non-observance of the design data can result in inadmissible modes of operation and it is therefore imperative to avoid them. The situation is to be remedied by providing appropriate monitoring facilities. See [Section 5.6](#).

The plant NPSH value (NPSHA) should be 0.5 m higher than the NPSH value of the pump (NPSHR to prevent damage to the pump).

## 2.6.3 Chargeable liquids

For operation with chargeable liquids with a conductivity  $<10^{-8}$  S/m inert gas must be used for flushing during drain. See also [Section 6.3](#).

## 2.6.4 Identification

 The identification on the pump relates to the pump section **including mechanical seal**. For classification in a certain temperature class, the data in the operating manuals of the mechanical seal manufacturer and of the pump manufacturer are to be matched for each individual application. A separate declaration of conformity must be provided for the shaft coupling and motor and for other attachments as well as corresponding identification.

Example of the identification of the pump section:

 II2GD IIC TX X.

For assembling the pump with components which are not explosion-protected (e.g. motor, shaft coupling), it is recommended to mask or remove the "potentially explosive" identification from the pump component and, if necessary, from other accessories.

In this case the declaration of conformity applies without ATEX identification.

At surface temperatures which depend primarily on operating conditions, DIN EN 13463-1 Chapter 9.3 allows no temperature class or temperature to be indicated.

The temperature class must be determined by the operator in accordance with [Section 2.6.7](#) "Temperature Limits".

## 2.6.5 Check of the direction of rotation



If there is also a risk of explosion during the installation phase, the check of the direction of rotation must under no circumstances be conducted by briefly switching on the unfilled pump in order to prevent an inadmissible rise in temperature at the plain bearings.



We recommend you to only perform a check of the direction of rotation with the coupling disengaged or with a rotating field instrument. See also [Section 6.1.2](#).

## 2.6.6 Mode of operation of the pump

The pump may only be started with the suction side shut-off element fully opened and the discharge side shut-off element slightly opened. Start-up against a closed check valve is also possible. The discharge side shut-off element is to be regulated to the operating design point directly after run-up.

See also [Section 5.4.1](#).

**Operation with closed shut-off elements in the suction and/or discharge lines is not permitted!**



There is a risk that even after a short time high surface temperatures on the pump housing may occur owing to rapid heating of the liquid in the pump interior.

A rapid rise in the pressure inside the pump involves the risk of overloading to the point of bursting.



**The pump is not to be operated in the unfilled or partly filled condition. If this cannot be ensured, the mechanical seal must be with a quench or liquid-sealed. Otherwise, serious damage to the pump will occur and additional risks to the environment may arise.**

Dry-running cannot only occur with an insufficiently filled interior but also in the event of high gas contents in the liquid medium.

Operation of the pump outside the admissible operating range may also lead to dry-running (e.g. due to evaporation in the interior).

### 2.6.7 Temperature limits



In the normal operating condition the highest temperatures are to be expected at the contact point shaft seal/shaft, on the inner races of the ball bearings and, at high medium temperatures, on the surface of the pump housing.

In the case of liquids >40 °C (>104 °F) the surface temperature of the pump housing is generally lower than the temperature of the liquid as the plastic lining has an insulating effect.



If the pump is heated (e.g. heating jacket), it must be ensured that the temperature classes prescribed in the annex are observed.

The non heated pump surface must have free contact with the environment.



When operating the pump, make sure that an excessive deposit of dust is avoided (possibly regular cleaning). This prevents the pump surface from heating to above the admissible temperature.

The table below indicates the admissible medium temperature, depending on the pump design, as a function of the temperature class in accordance with EN 13463-1.

Temperature class acc. to EN 13463-1	Limit value of the temperature of the liquid
<b>T6</b> 85 °C (185 °F)	<b>not certified to ATEX</b>
<b>T5</b> 100 °C (212 °F)	
<b>T4</b> 135 °C (275 °F)	<b>130 °C (266 °F) <sup>1) 2)</sup></b>
<b>T3</b> 200 °C (392 °F)	<b>150 °C (302 °F)</b>
<b>T2</b> 300 °C (572 °F)	<b>150 °C (302 °F)</b>
<b>T1</b> 450 °C (842 °F)	<b>150 °C (302 °F)</b>

**Note:** If the operating manual of the mechanical seal demands a lower medium temperature than indicated in the above table, this lower medium temperature is decisive.

1) Long life grease lubrication : no restriction.  
Oil bath lubrication : standard design with shaft seal T3

2) Consult the manufacturer for higher limit values.

If different temperature classes (e.g. pump T4, mechanical seal T3) arise when one medium is used for pumps and the mechanical seal, the lower temperature class (in the above example T3) applies to the entire pump including the mechanical seal.

Observance of the temperature class T4 with oil bath lubrication is not possible with the standard shaft seal.

The plant customer must ensure that the prescribed operating temperature is observed. The maximum admissible temperature of the liquid medium at the pump inlet depends on the temperature class and the selected lining material required in each case.

### 2.6.8 Maintenance



To achieve safe and reliable operation, it must be ensured in inspections at regular intervals that the unit is properly serviced and kept in technically perfect order.

Example: Functioning of the rolling bearings. The mode of operation and operating conditions largely determine the actual service life that can be attained.

Regular checks of the bearing pedestal area can prevent excessive temperatures due to hot-running rolling bearings, or even defective bearing seals. See **Section 7.2**.

In regard to media containing solids, the maintenance intervals must be set by the operator in accordance with the conditions of operation.

If auxiliary systems (e.g. cooling, heating) are installed, check to see whether monitoring facilities are required to ensure their function.

### 2.6.9 Electric peripheral equipment



Electric peripheral equipment, e.g. pressure, temperature and flow sensors etc. must comply with the prevailing safety requirements and explosion protection provisions.



### 3 Transport, storage and disposal



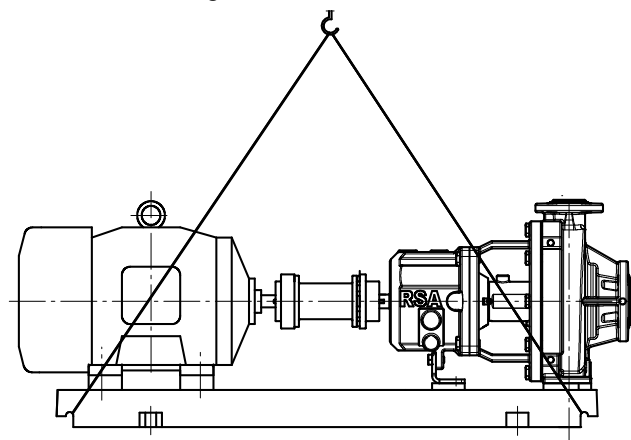
The pump or the unit must be transported properly. It must be ensured that during transport the pump/unit remains in the horizontal position and does not slip out of the transport suspension points.

A pump or motor can be suspended from the ring bolt provided for this purpose.

The suspension points are not suitable for transporting a complete unit, i.e. pump with base plate and motor.

In this case, the slinging points for the ropes on the base plate are to be used. See **Fig. 1**.

The slinging ropes must not be attached to free shaft ends or to the ring bolt of the motor.



**Fig. 1**

**Directly after receipt of the goods, the consignment must be checked for completeness and any in-transit damage.**

Damaged pumps must not be installed in the plant.

Handle goods carefully to prevent damage.

Flange covers serve as protection during transport and must not be removed.

If the unit is not installed immediately after delivery, it must be put into proper storage.

The product should be stored in a dry and vibration-free, well ventilated room at as constant a temperature as possible.

Elastomers are to be protected against UV light.

In general, a storage period of 10 years should not be exceeded. An admissible storage period of 4 years applies to elastomers made of NBR.

In the case of prolonged storage conservation agents on machined component surfaces and packing with a desiccant may be necessary.

#### 3.1 Return consignments



Pumps which have conveyed aggressive or toxic media must be well flushed and cleaned before being returned to the manufacturer's works.

It is **imperative** to enclose a **safety information sheet / general safety certificate** on the field of application with the return consignment.

Pre-printed forms are enclosed with the installation and operating manual.

Safety precautions and decontamination measures are to be mentioned.

#### 3.2 Disposal

Parts of the pump may be contaminated with medium which is detrimental to health and the environment and therefore cleaning is not sufficient.



Risk of personal injury and damage to the environment due to the medium or oil!

- ◆ Wear protective clothing when work is performed on the pump.
- ◆ Prior to the disposal of the pump:
  - Collect any medium, oil etc. which has escaped and dispose of it in accordance with the local regulations.
  - Neutralise any medium residues in the pump.
- ◆ Separate pump materials (plastics, metals etc.) and dispose of them in accordance with the local regulations.

## 4 Product description

The housing dimensions, nominal ratings and technical requirements of the pump series RSA correspond to ASME B73.1, ISO 15783, ISO 5199. The technical requirements of the VDMA 24279 are satisfied.

The sectional drawings show the design of the pump. See **Section 9**.

All components which come into contact with the medium are either plastic-lined or made of other resistant materials, e.g. Al<sub>2</sub>O<sub>3</sub>, FFKM.

The housing **100** and the bracket **344** consist of a metallic shell and are lined or coated with plastic in the wetted area.

Together with the impeller **230**, these 3 components form the hydraulic part of the pump.

The high-strength pump shaft **210** made of special steel is protected against corrosion in the wetted area by a shaft sleeve **524**. It is sealed against the impeller by means of an axially pressed O-ring **412/1** made of FFKM.

The shaft sleeve **524** has a positive connection with the shaft **210** and the shoulder ring **505** by means of the parallel pins **562/1** and is therefore secured against turning.

The static tightness of the pump is guaranteed by the screw fitting of the bracket **344** and the housing **100**. The housing gasket **401** is clamped between both components with the required sealing force.

### Long-life grease lubrication:

The rolling bearing system comprises two grease-filled radial ball bearings **321/1** and **321/2** with sealing on both sides.

### Oil bath lubrication:

The rolling bearing system comprises two radial ball bearings **321/1** and **321/2**, which are supplied with lubricant by an oil bath.

The oil bath is sealed against the atmosphere by two radial shaft seals **421/1**, **421/2** and an O-ring **412/2**.

The bracket chamber is designed so that both single and double mechanical seals can be used.

Further design details are provided in the enclosed drawing. Additional information are provided in the **brochure** and the **product manual**.

## 5 Installation

### 5.1 Safety regulations



Equipment which is operated in potentially explosive areas must satisfy the explosion protection regulations.



People with a pacemaker are at risk from the strong magnetic field of the magnetic drive. It may be life-threatening for them to stay at a distance of less than 20" (500 mm) to the pump.

### 5.2 Installation of pump/unit

The structural work must be prepared in accordance with the dimensions in the installation drawing.

#### Method of installation:

on a grouted base plate and firm foundation.

- Align base plate on the ground foundation.
- Insert foundation bolts and grout base plate.
- Do not tighten the foundation bolts uniformly and firmly until the mortar has set.

Other possibilities of installing the pump are:

- ◆ 4-point installation
- ◆ 4-point installation with base plate.



As soon as additional installations are mounted, the stability of the entire unit installed without a foundation must be checked.

### 5.3 Alignment of pump-coupling-motor



The following information is of a general nature. If necessary, special notes of the coupling and motor manufacturer are to be observed.



After attachment of the base plate on the foundation and connection of the pipes, the alignment of the coupling must be carefully checked and, if necessary, the unit re-aligned with the motor.

- A coupling check and possible re-alignment is also necessary if the pump and motor are supplied on a common base plate and aligned.
- Prior to alignment undo the support bracket **183** and then tighten it without stress.
- The pump is to be aligned in all directions using a spirit level (on shaft/discharge nozzle) (admissible position deviation max. 0.08" in/ft (0,2 mm/m).
- A distance depending on the coupling used is to be observed between the pump and motor shafts. See installation drawing.
- Use supports in the direct vicinity of the bolts foundation/base plate.



Ensure that the unit cannot be started during work without the coupling guard.

## 5.4 Piping

Before the pump is installed, both, the suction and supply lines as well as the discharge line are to be cleaned.

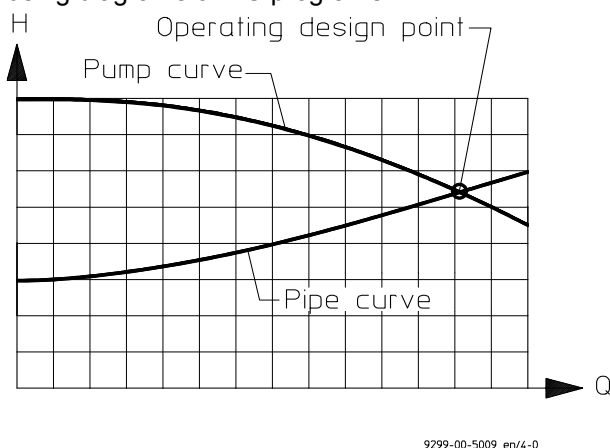
Dirt or damage to the sealing surfaces is best avoided if the flange covers remain on the flanges until just before installation.

Use flange gaskets suitable for the medium.

The screw tightening torques in **Section 1.1** are to be observed for tightening the flange screws.

### 5.4.1 Nominal size

The operating design point of a centrifugal pump lies at the intersection of the pump curve and the pipe curve, see **Fig. 2**. The pump curve is provided by the pump manufacturer. The pipe curve is determined using diagrams or PC programs.



**Fig. 2**

Under no circumstances can the nominal size of the piping be derived from the connected nominal size of the pump.

The pipe nominal size can also be determined using the flow rate as a rough guide.

$$v \text{ (ft/s)} = \frac{Q \text{ (gpm)}}{449 \times A \text{ (ft}^2\text{)}} \quad v \text{ (m/s)} = \frac{Q \text{ (m}^3\text{/s)}}{A \text{ (m}^2\text{)}}$$

The velocity in the suction line should not exceed 6.56 ft/s (2 m/s) and 16.4 ft/s (5 m/s) in the discharge line.

When determining the suction line nominal size, the NPSH value (net positive suction head) must also be observed. The **NPSHR value** required for the pump is specified in the data sheet.



The NPSHR available in the plant should be at least 1.64 ft (0,5 m) higher than the NPSHR required for the pump. Otherwise, this will lead to a drop in the delivery head, cavitation or even failure of the pump.

### 5.4.2 Nozzle loads

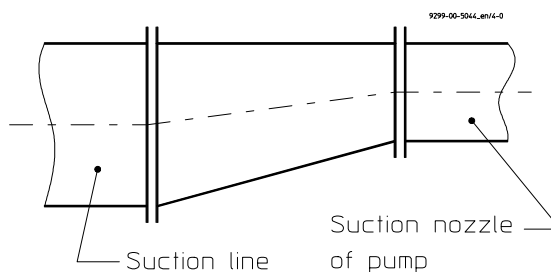
The pump can be subjected to nozzle loads in accordance with ANSI/HI 9.6.2.

Changes in the length of the piping caused by temperature are to be allowed for by appropriate measures, e.g. the installation of expansion joints.

### 5.4.3 Suction line

The suction lines must always be laid on a rising gradient towards the pump. Otherwise, gas bubbles may form which considerably reduce the suction line cross section. Eccentric transition elements must be installed between different pipe diameters.

Valves which disrupt the course of flow should not be installed directly upstream of the pump.



**Fig. 3**

### 5.4.4 Supply lines

Supply lines should vent towards the reservoir and are therefore to be laid with a constant downward gradient towards the pump.

Should the piping internals upstream of the pump be horizontal, a low point can, of course, be located upstream of these internals.

From here the pipe is then laid with an upward gradient to the pump so that the gas bubbles which form here can escape through the pump.

Valves which disrupt the course of flow should not be installed directly upstream of the pump.

### 5.4.5 Discharge line

Do not arrange the shut-off valve directly above the pump but initially provide a transition section.

The discharge nozzle velocity of the medium can – if necessary – be reduced.

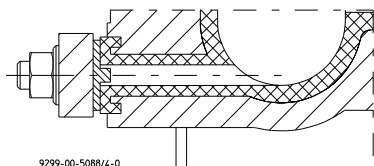
### 5.4.6 Venting and evacuating

Venting can take place into the discharge line or upstream of the discharge valve.

A venting line can also be used as a bypass, drain or flushing line.

The pump housing is fitted with a drain connection as a standard feature. Optionally, the drain bore can be drilled.

See **Fig. 4**.

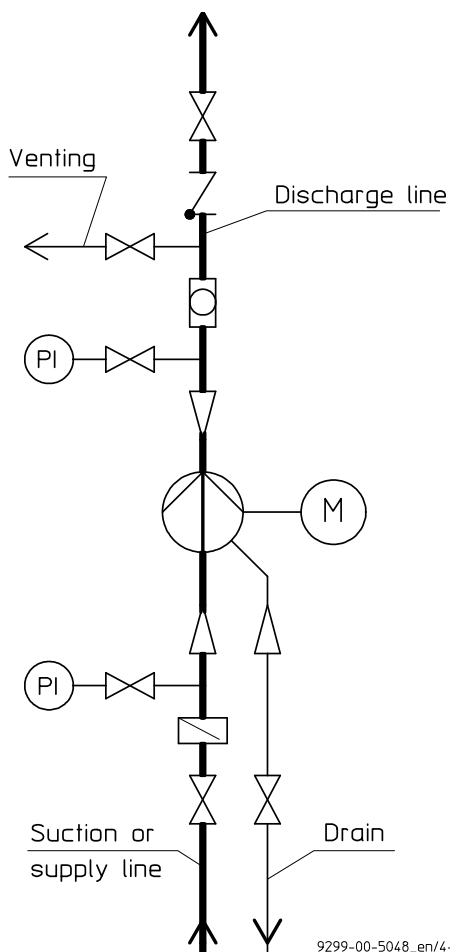


**Fig. 4**

### 5.5 Pipe fittings

The following pipe fittings are available from Richter on request:

- ◆ Shut-off valves
- ◆ Check valves
- ◆ Sight glasses
- ◆ Priming vessels
- ◆ Strainers
- ◆ Pressure gauges



**Fig. 5**

### 5.6 Monitoring facilities



Appropriate monitoring facilities are to be recommended, depending on the requirements placed on operational safety and availability of the unit.

Richter provides information on request and can supply:

- ◆ Flow meters
- ◆ Filling level indicators
- ◆ Motor load monitors

You can obtain the publications "Safe Operation of Magnetic Drive Pumps" and "The Operation of Centrifugal Pumps without NPSH Problems" on request.

### 5.7 Drive

The power consumption of the pump at the operating design point is specified in the data sheet and works certificate.

If the operating design point was not known when the pump was dispatched, the power consumption can be read off the appropriate performance curves.

The max. density, the max. viscosity, power allowances for the relevant mechanical seal and a safety margin are to be taken into account.

Different operating data can be achieved without changing the pump through the use of different speeds, e.g. by means of a frequency converter.

The pump with base plate and motor is illustrated in the **installation drawing**.

Observe the **operating manual of the motor manufacturer**.



A motor with a valid ATEX certificate is to be used if employed in zone 1 and 2.

## 5.8 Coupling

If one coupling half engages with the other, the claw section is normally to be mounted on the drive shaft and the coupling half with the smooth end face on the motor shaft.

Observe the operating manual of the coupling manufacturer.



A coupling with a valid ATEX certificate is to be used if deployed in zone 1 and 2.

Regulations exist, e.g. for the following details:

- ◆ Arrangement of the coupling halves
- ◆ Max. bore diameter
- ◆ Max. transmitted power
- ◆ Spacing of the coupling halves
- ◆ Maximum values for offset and angular misalignment.

Should the pump housing and motor remain on the base plate for repair work, a spacer type coupling is required.

## 5.9 Final check

Check the alignment of the coupling again in accordance with **Section 5.3**.

It must be possible to easily turn the unit at the coupling by hand.

## 5.10 Coupling guard

The pump may only be operated with a coupling guard in accordance with the accident prevention regulations.



It must be ensured that the coupling guard used is either made of spark-free material or the impact test required by the EN 13463 is satisfied without any reservations.

Richter offers both versions.

The operator must ensure that, after the coupling protection has been mounted, the requirements of the machine guideline are fulfilled.

## 5.11 Electric connection

The operator is obligated to connect the assembly in accordance with existing regulations 8 (IEC, VDE, etc.).



Allow only a trained electrician to perform the electrical connection.

Compare the existing mains voltage with the indications on the motor's manufacturer's nameplate and choose a suitable circuit.

A motor protection device (motor-circuit switch) is urgently recommended.



Danger of explosion if the electrical installation is incorrect.



In areas at risk of explosion, IEC 60079-14 must also be observed for the electrical installation.

If the pump is mounted on a base plate, ensuring electrical conduction through the use of a chopper disk or contact disk on the housing foot and support bracket.

The assembly must be grounded in accordance with currently effective regulations, for example, on the base plate.



## 6 Commissioning/Shutdown

### 6.1 Initial commissioning

Normally, the pumps have already been test-run with water.

Unless special agreements have been reached, there may still be some residual amounts of water in the pump. This must be noted in view of a possible reaction with the medium.

#### Long life grease lubrication

**The ball bearings are greased for life. Regreasing is not possible and not necessary.**

For service lives, see [Section 7.2](#).

#### Oil bath lubrication:

**Pour in oil into the bearing pedestal!**

For procedure and the oil grade, see [Sections 7.2](#) and [7.8.5](#).

#### 6.1.1 Mechanical seals

The design and material combination are specified in the data sheet.



The proper condition of the components and the protective facilities must be ensured to prevent any risk from escaping medium.

Before the pump is filled, quench and liquid-sealing devices of the mechanical seal are to be put into operation in accordance with the regulations of the relevant mechanical seal manufacturer.

**The regulations and recommendations of the mechanical seal manufacturer must always be observed.**

See relevant installation and operating manual for the mechanical seal.

#### 6.1.2 Filling the pump housing

- Check to see whether the screws on the suction flange, discharge flange, housing flange and drain flange are tightened. When retightening the housing screws, make sure that the support bracket is undone. Otherwise, the pump could be deformed.

For screw tightening torques see [Section 1.1](#).

- Open the suction line fully so that the medium can flow into the pump.
- Open the discharge valve so that the air in the pump can escape.
- If air cannot be vented into the discharge line, e.g. a drop in pressure in this line is not permitted, venting must be performed upstream of the discharge valve.
- Monitor the venting operation until no air but only liquid emerges.
- Turn the pump shaft at the coupling several times.

- Monitor the venting operation again until no more air emerges.
- Close the discharge valve again until only the minimum flow rate is obtained after the motor has been started.



#### 6.1.3 Start-up

- Check the direction of rotation of the motor with the coupling disengaged or with a rotary field instrument.
- As viewed from the motor, the direction of rotation of the pump is clockwise. See also the **direction of rotation arrow** of the pump.



The pump must not run dry during the check of the direction of rotation.

- Check alignment of the coupling.
- Mount coupling guard.



The pump must be completely filled with liquid.

The maximum admissible flow rate must not be exceeded.



There is a risk that single mechanical seals would run dry in both operating modes.

- Switch the motor on.
- Set the desired flow by opening the discharge valve.

## 6.2 Operating limits



The operating limits of the pump/unit in terms of pressure, temperature, power and speed are entered in the data sheet and it is imperative to observe them!

### 6.2.1 Abrasive media



If liquids with abrasive constituents are conveyed, increased wear at the pump is to be expected. The inspection intervals should be reduced compared with the usual times.

### 6.2.2 Min./max. flow rate

The operating range generally recommended lies at  $0.3 Q_{opt}$  to  $1.1 Q_{opt}$ . Consult the manufacturer for operation outside this range and observe [Section 2.6.2](#).

## 6.3 Shutdown

- Close discharge valve down to the position "minimum flow rate"
- Switch motor off.
- Close discharge valve completely.

Only close the suction line if the pump is to be evacuated or dismantled.



For all work on the machine, make sure that the motor cannot be inadvertently switched on.



If the pump is to be evacuated or flushed, observe the local regulations.



If the pump has been operated with a chargeable liquid, it must be filled with inert gas (e.g. nitrogen) to prevent an explosive atmosphere.

If the pump is to be dismantled, quench or liquid-sealing devices of the mechanical seal are to be shut down in accordance with the regulations of the relevant mechanical seal manufacturer.

It is recommended to wait one hour before the pump is dismantled from the plant to permit static peak charges to be eliminated.

If the pump is returned to the manufacturer's, clean the pump very thoroughly.

See also [Section 3.1](#).

## 6.4 Improper operations and their consequences (examples)



Improper operation, even for brief periods, may result in serious damage to the unit.

In connection with explosion protection, potential sources of ignition (overheating, electrostatic and induced charges, mechanical and electric sparks) can result from these inadmissible modes of operation; their occurrence can only be prevented by adhering to the intended use.

### Pump is started up without medium :

- ◆ The plain bearing in the pump may be destroyed.
- ◆ Other pump components may be destroyed due to overheating.

### Suction line not opened or not opened fully :

- ◆ Pump is cavitating – material damage to pump and plain bearings
- ◆ Pump does not attain the required delivery head or flow rate.
- ◆ Pump may be destroyed due to overheating.

### Discharge valve opened too much :

- ◆ Pump may be destroyed due to overheating.

Axial thrust too great.

### Discharge valve closed too much :

- ◆ Pump can cavitate. Particularly severe with an empty discharge line.
- ◆ Risk of pressure surge.
- ◆ Possible damage to the plain bearings.
- ◆ Magnetic drive may stop.
- ◆ Motor may be overloaded.

### Suction valve and discharge valve closed :

- ◆ Destruction due to rapid overheating and sharp rise in pressure.

### Control of the pump with the suction valve :

- ◆ Cavitation – the volume may only be regulated on the discharge side. Cavitation – the volume may only be regulated on the discharge side.

### Overrun of the admissible gas content:

- ◆ The flow may stop.
- ◆ Switch pump and vent off for renewed conveyance.
- ◆ Make sure that the gas content is not exceeded, as described in the intended use.

### Pumps with quench or pressurisation system :

#### Pump is started up without quench or pressurisation system :

- ◆ The mechanical seal on the atmosphere side is already destroyed after a few revolutions.

#### Pump is started up with too low a sealing liquid pressure :

- ◆ The process medium can enter the liquid seal system and destroy the metallic parts of the mechanical seal.

#### Too high pressure of the quench medium :

- ◆ The wetted O-ring can be pressed into the process medium.

#### Sealing liquid consumption too high :

- ◆ Is the pump not running smoothly?
- ◆ Can a leak be seen on the mechanical seal housing?
- ◆ Does the leak come from a static sealing point?
- ◆ Or from a sliding surface on the atmosphere side?
- ◆ Or from connection points of the supply or discharge lines?
- ◆ If no exterior leak is visible, the missing sealing liquid enters the product. Repair the wetted mechanical seal.

## 7 Maintenance

### 7.1 Safety-relevant screw fittings

After initial loading by the operating pressure and operating temperature the tightening torques of all connection screws must be checked at the following points:

- ◆ casing (housing) - lantern
- ◆ suction flange
- ◆ discharge flange
- ◆ draining flange
- ◆ seal housing – bracket with double mechanical seals
- ◆ screw connections of the thermosiphon system with double mechanical seals.

See also **Section 6.1.1, para. 1.**

Other inspections are to be performed regularly, depending on the operating requirements.

### 7.2 Bearing pedestal



The temperature of the bearing pedestal is not to exceed more than 122 °F (50 °C) and under no circumstances 176 °F (80 °C).

If higher temperatures do occur, call in qualified staff without delay. If this is not possible, the pump must be shut down and taken out of service.

In many cases a vibration measurement is recommended to detect bearing wear in good time.

#### 7.2.1 Grease for life lubrication

Grease fill bearings of the series 2RS are installed as standard features. The grease is lithium-saponified. The admissible temperature range is – 22 °F to 230 °F (– 30 °C to + 110 °C).

The rolling bearings are designed for an L<sub>10</sub> service life of > 17,500 hours. The service life of the grease filling guaranteed by the bearing manufacturers is given in the following table.

Size	Bearing size > Service life
Group 1	6207-2RS / 15000 hr*
Group 2	6210-2RS / 15000 hr*

\* at bearing temperature < 122 °F (50 °C)  
at bearing temperature 158 °F (70 °C) approx. 7500 hr

If the pump is serviced, it is recommended to also replace the bearings as a precaution.



In potentially explosive works it is advisable to monitor the condition of the rolling bearings.

### 7.2.2 Oil bath lubrication

We recommend a mineral oil with the following characteristics for an expected bearing temperature of about 158 °F (70 °C):

Viscosity index : approx. 85

Kinematic viscosity at 104 °F (40 °C) :  
appr. 40  $\frac{\text{mm}^2}{\text{s}}$

A fully synthetic gear oil to ISO VG 220 is to be used for temperatures below – 68 °F (– 20 °C).

**Replacing the bearings:** The ball bearings are designed for an L<sub>10</sub> service life of >17,500 hours. We recommend 17.500 working hours respectively every 3 years a change of bearing should be made.

**Oil changes:** 1x per year at bearing temperatures of about 122 °F (50 °C).

Every 6 months at bearing temperatures of about 158 °F (70 °C).

At higher temperatures more frequently in accordance with the regulations.

When the pump is serviced, it is recommended to replace the bearings and shaft seals as a precaution and to pour in fresh oil.

**Oil level check:** The oil level is to be regularly checked on the constant level oiler **638/1** to ensure safe operation.

It must be ensured that there is always oil in the constant level oiler; it must under no circumstances be completely drained.



In potentially explosive works it is advisable to monitor the condition of the ball bearings

If there is a suspicion that splash water could have entered the bearing pedestal, the oil must be replaced immediately. Even small amounts of water in the oil reduce the service life of the ball bearings to a fraction of the normal service life.

## 7.3 Cleaning

Care must be taken when cleaning the pump to ensure that it is not exposed to a strong water jet.

The ingress of water into the bearing pedestal will substantially impair ball bearing lubrication.

## 7.4 Stand-by pumps

If a pump is on stand-by, it is to be started up from time to time. Regularly turn the shaft by hand in the direction of rotation.

This operation is to be performed more often for pumps which are exposed to very strong vibrations from the plant.

When dismantling the pump from the plant, drain it, thoroughly clean it, seal with flange covers and store in accordance with the instructions.

## 7.5 Notes on dismantling

- ◆ All repair and maintenance work is to be performed by skilled staff using appropriate tools and original spare parts.
- ◆ Is the necessary documentation available?
- ◆ Has the pump been shut down, drained and flushed in accordance with the regulations?  
See also **Section 6.3**.
- ◆ If no new assembly is performed immediately after dismantling, the plastic and ceramic components in particular must be stored carefully.
- ◆ Dismantling can be checked using the sectional drawings in **Section 9** and the components available.

### 7.5.1 Protective clothing



Even if the pump has been properly evacuated and flushed, residue of the medium may still remain in the pump, e.g. between sealing surfaces or in the bearing seats or in the can.

Plastic components may absorb medium which gradually emerges from the material after flushing.



Proper protective clothing is to be worn.

## 7.6 Dismantling

**There are two possibilities for dismantling:**

1. Dismantling the complete pump from the plant.
2. Dismantling the complete slide-in unit as the pump housing can remain in the plant connected to the piping.

If the coupling installed is a spacer-type coupling, the motor can also remain in the plant.

Dismantling of the complete pump is described here.

- Undo support bracket **183** from the base plate.
- Disconnect sealing liquid pressure or quench lines from the pump by undoing the screw fittings **917/1** and **917/2** (see Installation and Operating Manual Mechanical Seal 9285-060-en).

If the housing **100** remains in the plant, leave the housing gasket **401** in the centering to protect the housing sealing surface.

### 7.6.1 Remove slide-in unit.

- Deposit pump vertically on the workbench with the suction nozzle facing downwards. For this purpose, use a soft, clean and smooth base.
- Undo screws **901/3** from the connection housing/lantern.
- Disconnect the slide-in unit from the centering of the housing **100**. Use the forcing thread in the bracket flange provided for this purpose.
- After disconnection, the unit can be raised with a crane. A thread is provided in the drive shaft for accommodating a crane lug.
- Deposit slide-in unit and then clamp it in a vice so that the shaft is secured and the impeller is freely accessible from the top.

### 7.6.2 Dismantling of bracket chamber

- Unscrew the impeller **230** from the shaft **210** using a strap wrench or special impeller wrench (see Assembly aids in **Section 10**). As a result, the O-ring **412/1** and shaft sleeve **523/1** are removed.
- Undo hex. screws **901/10** of the connection bearing pedestal/bracket.
- Remove bracket **344** from the centering of the bearing pedestal **330**. The forcing thread in the bearing pedestal flange can be used for this purpose.
- For dismantling the mechanical seal, refer to the relevant Installation and Operating Manual 9285-060-en.

### 7.6.3 Dismantling the bearing pedestal long-life grease lubrication

- Remove bearing pedestal unit from the vice and deposit horizontally on the workbench.
- Undo hex. socket screws **914/6** and remove the rear bearing cover **361** from the bearing pedestal **330**.
- Pull or push the shaft **210** including rolling bearings out of the bearing pedestal **330**.
- Remove circlips **932/1** and **932/2** from the shaft **210**.
- Remove rolling bearings **321/1** and **321/2** from the shaft **210** using a pulling-off device.

### 7.6.4 Dismantling the bearing pedestal oil bath lubrication

- Remove bearing pedestal unit from the vice and deposit horizontally on the workbench.
- Undo hex. socket screws **914/6** and remove the rear bearing cover **361** including the O-ring **412/2** and rotary shaft seal **421/1** from the bearing pedestal **330**.
- Pull or push shaft **210** including rolling bearings out of the bearing pedestal **330**.
- Remove circlips **932/1** and **932/2** from the shaft **210**.
- Remove rolling bearings **321/1** and **321/2** from the shaft **210** using a pulling-off device.
- To change the rotary shaft seals **421/1** and **421/2**, press them out of the rear bearing cover **361** or the bearing pedestal **330**.

## 7.7 Notes on assembly

- ◆ Use original spare parts. See also **Section 2.4**.
- ◆ Do not use defective parts.
- ◆ Has the pump been shut down, drained and flushed in accordance with the regulations? See also **Section 6.3**.
- ◆ Apply Anti-Seize special assembly paste (e.g. from Weicon) to the fitting surfaces (not any stainless steel surfaces) and screw thread prior to assembly.
- ◆ Check whether all parts fit and only then assemble.
- ◆ Important dimensions (centerings, bearing fits or bearing play) are to be checked prior to assembly; perform a trial assembly if required.
- ◆ We recommend that the housing gasket **401** and the shaft sleeves **523/1**, **523/2**, **523/3** be replaced during every new assembly.

## 7.8 Assembly

A complete assembly process is described in the following.

Sub-sections can be deduced from this. See also **Section 7.5**.

### 7.8.1 Assembly bearing pedestal

#### Oil bath lubrication

- Insert rotary shaft seals **421/1** and **421/2** into the relevant fittings of the rear bearing cover **361** or bearing pedestal **330**.
- Insert O-ring **412/2** into the groove of the rear bearing cover **362**.

#### Long-life grease and oil bath lubrication

- Press rolling bearings **321/1** and **321/2** onto the shaft **210**.



#### **Caution!**

**Different rolling bearing sizes!**

- Mount circlips **932/1** and **932/2**.
- Push complete drive shaft into the bearing pedestal **330**.
- Mount rear bearing cover and tighten hex. socket screws **914/6**.

**Tightening torque group 1 = 150 in-lbs (17Nm)**

**Tightening torque group 2 = 177 in-lbs (20Nm)**

- Clamp complete bearing pedestal with the coupling side of the shaft **210** in a vice.

### 7.8.2 Assembly bracket chamber

- For installation of the mechanical seal, refer to the relevant Installation and Operating Manual 9285-060-en.
- Insert shaft sleeve **523/1** and O-ring **412/1** into the impeller **230**.
- Screw impeller unit onto the shaft **230** and tighten with a strap wrench or special impeller wrench (**see Section 10**).

### 7.8.3 Final assembly

- Deposit the housing **100** on a workbench, for example, with the suction nozzle facing downwards. Protect the plastic working strip against damage with a suitable support.
- Insert housing gasket **401** into the centering of the housing **100**.
- Carefully insert pre-assembled slide-in unit into the centering of the housing.
- Alternatively, the unit can be mounted using a crane. For this purpose, a thread is provided in the drive shaft to accommodate a crane lug.
- Tighten screws **901/3** in diametrically opposite sequence.



### 7.8.4 Fill bearing pedestal with oil

#### Oil quantities:

For group 1 appr. 14 oz (400 ml)

For group 2 appr. 52 oz (1540 ml)

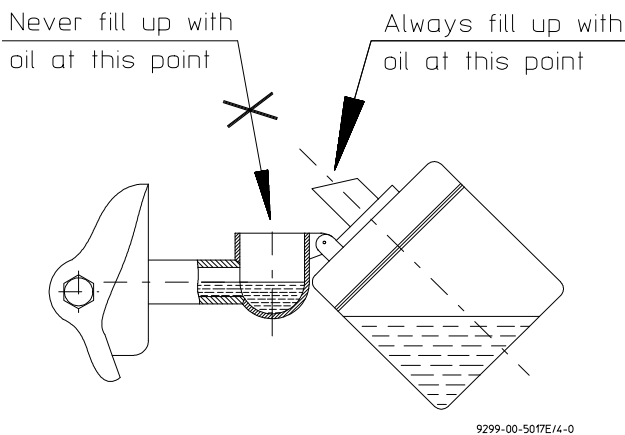
Groups see **Section 1**.

#### Type of oil:

See **Section 7.2.2**.

#### Procedure for filling with oil:

- Tilt constant level oiler **638/1**.
- Fill the oiler with oil.
- Swing the constant level oiler into the vertical position.
- If the oil level still falls too much, pour more oil into the oiler.



**Fig. 6**

### 7.9 Tests

On request, the pumps are tested with water at the manufacturer's.

The operating data measured are then documented in a works test certificate.

If, during a test after repairs, discrepancies compared with the works certificate are discovered, the following people can be called in:

1. in-house pump office
2. The manufacturer Richter or its local agent

The following conveying data can be checked using the **pump performance curves**:

- ◆ Flow rate
- ◆ Head
- ◆ Power requirement
- ◆ NPSHR

## 8 Malfunctions



Faults may result from inadmissible modes of operation. Improper operation, even for brief periods, may result in serious damage to the unit.

In connection with explosion protection, potential sources of ignition (overheating, electrostatic and induced charges, mechanical and electric sparks) can result from these inadmissible modes of operation; their occurrence can only be prevented by adhering to the intended use.

See also **Section 6.5**.

Should there be any uncertainty about the remedy to be applied, please inquire at the in-house pump office or at the pump manufacturer's.

### No delivery :

- ◆ Is the pump filled and vented?
- ◆ Is the suction line open, vented, cleaned and correctly laid?
- ◆ Is the discharge line open, vented, cleaned and correctly laid?
- ◆ Is the geodetic head too high?
- ◆ Is air being drawn in?
- ◆ Has the magnetic drive stopped?

### Flow rate too low :

- ◆ Have the pump, suction line and discharge line been completely vented, filled and cleaned?
- ◆ Have any strainers installed been cleaned?
- ◆ Are all shut-off devices open?
- ◆ Is the geodetic head too high?
- ◆ Is the NPSHA too low or the NPSHR too high?
- ◆ Are the pipe resistances too high?
- ◆ Is the viscosity too high?
- ◆ Is the direction of rotation correct?
- ◆ Is the speed too low or the impeller diameter too small?
- ◆ Are pump parts worn?
- ◆ Gas in the medium?

### Flow rate too high :

- ◆ Is the geodetic head too low?
- ◆ Are the pipe or nozzle resistances too low?
- ◆ Is the pump speed too low or the impeller diameter too large?

### Delivery pressure too high :

- ◆ Is the speed too high or the impeller diameter too large?
- ◆ Is the density too high?

### Motor consumes too much electricity :

- ◆ Is the flow rate, density or viscosity too high?
- ◆ Is the speed too high or the impeller diameter too large?
- ◆ Is the coupling correctly aligned?
- ◆ Can the pump shaft be turned properly?

### Pump does not run smoothly or creates noises :

- ◆ Is the coupling well aligned?
- ◆ Are the coupling elements worn?
- ◆ Are the rolling bearings damaged?
- ◆ Are parts of the hydraulics damaged?
- ◆ Is the flow rate too low or too high?
- ◆ Is the impeller balanced?
- ◆ Is the pump twisted?
- ◆ Is there foreign matter in the pump?

### Temperature of the rolling bearings is too high :

- ◆ How high is the actual temperature measured?
- ◆ How high may it be acc. to the operating manual?
- ◆ Is the running-in phase already over?
- ◆ Deficient lubricant?
- ◆ Overaging / wear?

### Leak from the pump :

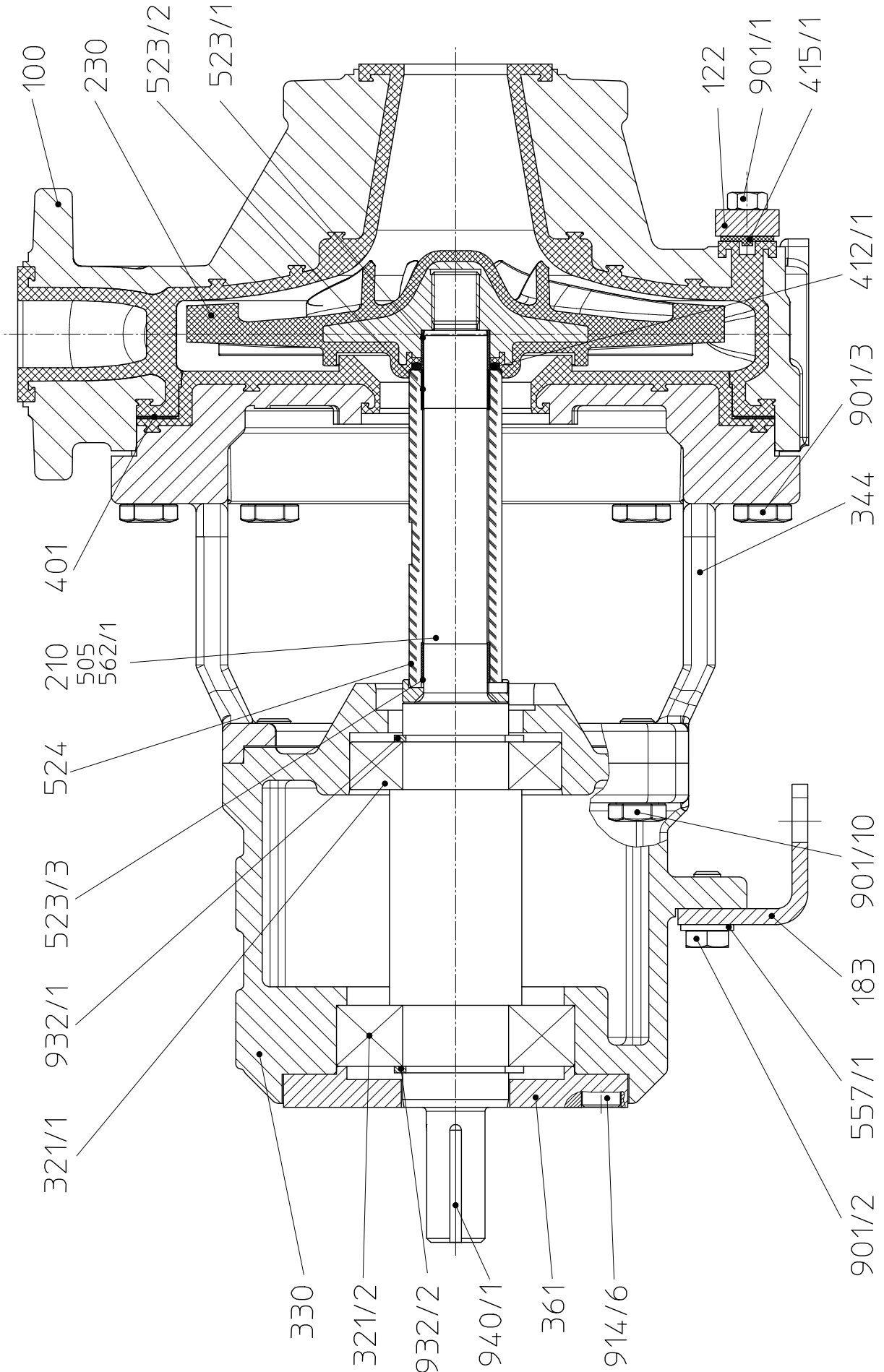
- ◆ Are all screws tightened to the correct tightening torque?
- ◆ Were the sealing surfaces assembled in a clean state?
- ◆ Have approved gaskets been installed?

## 9 Sectional drawing

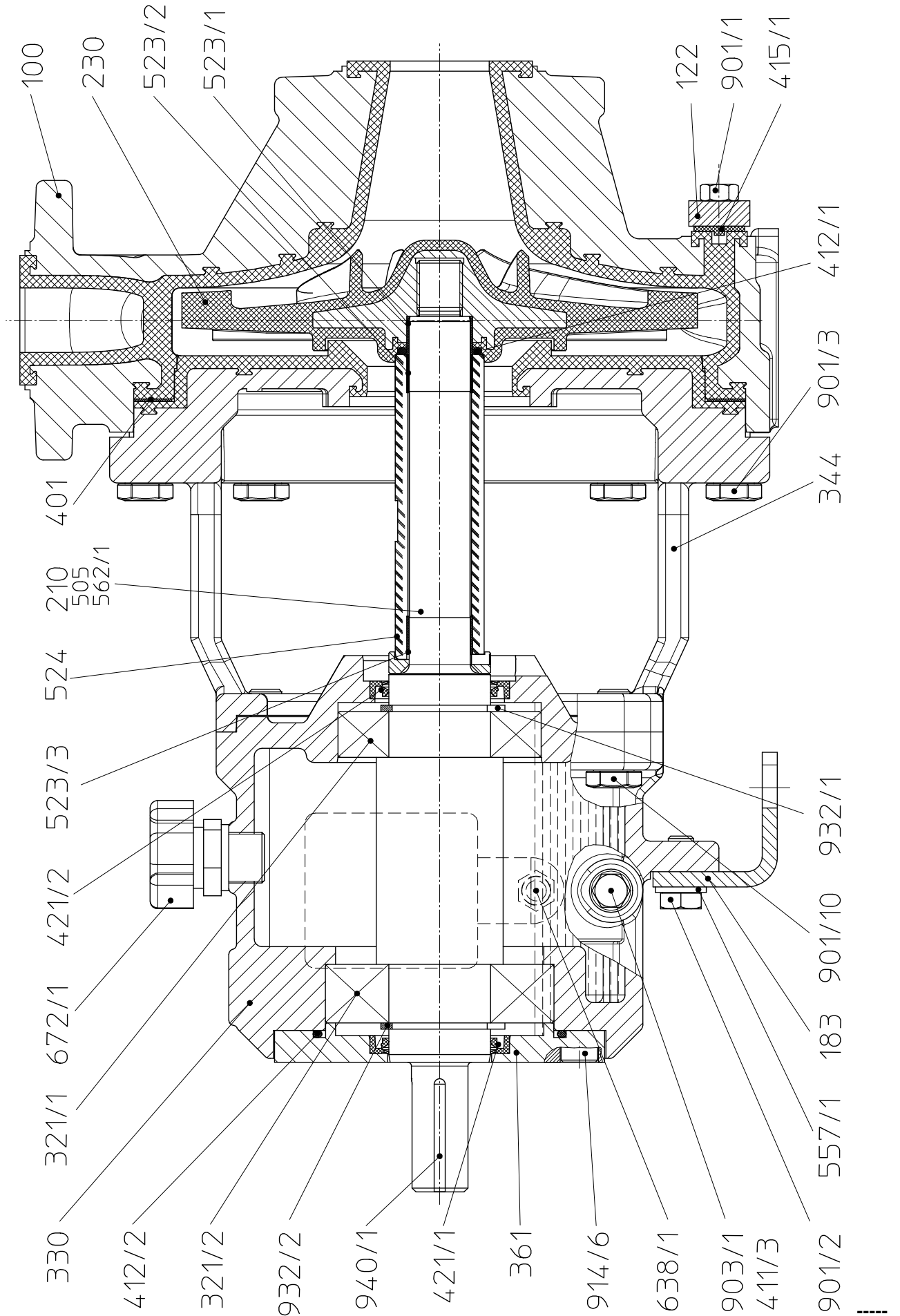
### 9.1 Legend

<b>100</b>	casing (housing)	<b>411/3</b>	seal ring
<b>122</b>	blind cover	<b>421/x</b>	Rotary shaft seal
<b>183</b>	support bracket	<b>638/1</b>	constant-level-oiler
<b>210</b>	shaft	<b>672/1</b>	venting/filling plug
includes:		<b>903/1</b>	hex. head screw plug
<b>505</b>	shoulder ring		
<b>562/1</b>	parallel pin		
<b>230</b>	impeller		
<b>321/x</b>	radial ball bearing		
<b>330</b>	bearing pedestal		
<b>344</b>	bracket		
<b>361</b>	rear bearing cover		
<b>401</b>	housing gasket		
<b>412/x</b>	o-ring		
<b>415/1</b>	centering gasket		
<b>523/x</b>	shaft sleeve		
<b>524</b>	shaft sleeve		
<b>557/1</b>	contact disc		
<b>901/x</b>	hex. screw		
<b>914/6</b>	hex. socket screw		
<b>932/x</b>	circlip		
<b>940/1</b>	key		

9.2 RSA long life grease lubrication



9.3 RSA oil bath lubrication





## 10 Assembly aids

### 10.1 Impeller wrench for open impeller

Pump size	No. of vanes	Ident. No.
RSA 1,5"x1"x6"	7	
RSA 3"x2"x6"	7	
RSA 1,5"x1"x8"	6	
RSA 3"x2"x8"	6	

#### Product description

The torque to be transmitted, either during loosening or tightening, is achieved by the fact that the parallel pins of the impeller wrench engage in the spaces in the (open) impeller. The impeller is turned into the position you want by turning the impeller wrench clockwise or counterclockwise.

### 10.2 Clamping device for SCK single mechanical seals

Pump size	Ident. No.
RSA group 1, WSH Ø 35 mm	
RSA group 2, WSH Ø 45 mm	

#### Product description

In order to be able to set the check dimension (1 mm), the single mechanical seal clamping device is inserted between the lantern and the single mechanical seal. Owing to the lever action the single mechanical seal is pushed in the axial direction and positioned by means of a cylinder head screw.

Baureihe/Series/Série

Ausführung

Magnetkupplungspumpe

**RSA**

Design

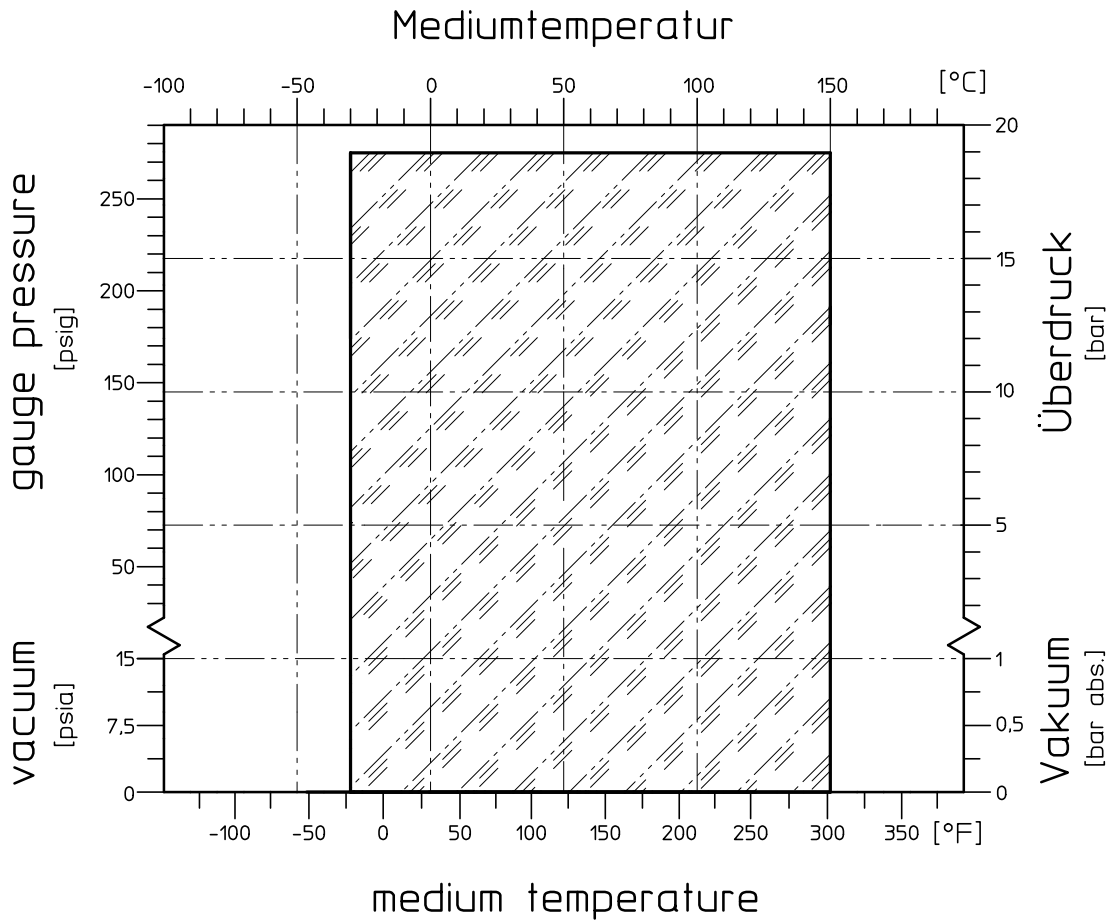
Magnet drive pump

Construction

Pompe à entraînement magnétique



**Einsatzgrenzen / operating limits**



Modification techniques possibles sans réservations!  
 Graphique non à l'échelle!  
 Dimensions variables uniquement revêtues d'une signature!

This leaflet is subject to alteration!  
 Drawing not to scale!  
 Certified for construction purposes only when signed!

Technische Änderungen vorbehalten!  
 Nicht maßstäblich!  
 Maße nur mit Unterschrift verbindlich!

**CE Konformitätserklärung** nach EN ISO//IEC 17050  
**Declaration of Conformity** according to EN ISO//IEC 17050

Produkt	Chemiekreiselpumpe für Gleitringdichtungen freies Wellenende oder als Aggregat <sup>1)</sup>		
Product	Chemical Centrifugal Pump for Mechanical Seals Bare shaft or as unit <sup>1)</sup>		
Baureihe Series	SCK, SCK-X, SCK-S RSA, RSI		
EU-Richtlinien	2006/42/EG Maschinenrichtlinie 94/9/EG Explosionsschutzrichtlinie ATEX		
EU-Directive	Machinery Directive Equipment explosive atmosphere		
Modul	Interne Fertigungskontrolle Production Quality Assurance		
Angewandte harmonisierte Normen	EN 14121 EN 809 Applied harmonised Standards EN 13463-1		
Kennzeichnung	2006/42/EG	2006/42/EC	<b>CE</b> II 2 GD IIC TX X <sup>1)</sup>
Marking	94/9/EG	94/9/EC	

Die technische Dokumentation nach Richtlinie 94/9EG ist bei der u.a. benannten Stelle hinterlegt.  
 The technical documentation is filed by below mentioned notified body according to directive 94/9/EC.  
 Physikalische-Technische Bundesanstalt (PTB), D-38116 Braunschweig

Baureihe Series	Registrier-Nr. Registered #	Baureihe Series	Registrier-Nr. Registered #
SCK	03ATEXD070	RSA	03ATEXD062
SCK-X	03ATEXD070	RSI	
SCK-S	03ATEXD070		

Das Unternehmen Richter Chemie-Technik GmbH bescheinigt hiermit, dass die o.a. Baureihen die grundsätzlichen Anforderungen der aufgeführten Richtlinien und Normen erfüllt.  
 Richter Chemie-Technik GmbH confirms that the basic requirements of the above specified directives and standards have been fulfilled.


Bevollmächtigt für die Zusammenstellung der technischen Unterlagen nach 2006/42/EG: A. Linges  
 Authorised person compiled the technical files according to 2006/42/EG:

1) Gilt nicht für das Aggregat nach 94/9/EG (ATEX Leitfaden Juni 2009 Abschn. 3.7.5 2.a)  
 1) Not valid for the unit according to 94/9/EG (ATEX Guideline June 2009 Paragraph 3.7.5 2.a)

Kempen, 01.03.2010



G. Kleining  
 Leiter Forschung & Entwicklung  
 Manager Research & Development



A. Linges  
 Leiter Qualitätsmanagement  
 Quality Manager

**CE Konformitätserklärung** nach EN ISO/IEC 17050  
**Declaration of Conformity** according to EN ISO/IEC 17050

Produkt Chemiekreiselpumpe für Gleitringdichtungen  
als Aggregat  
*Product Chemical Centrifugal Pump for Mechanical Seals  
as unit*

Baureihe SCK, SCK-X, SCK-S  
Series RSA, RSI

EU-Richtlinien 2006/42/EG Maschinenrichtlinie  
*EU-Directive Machinery Directive*

Modul Interne Fertigungskontrolle  
*Production Quality Assurance*

Angewandte EN 14121  
harmonisierte Normen EN 809  
*Applied harmonised  
Standards*

Kennzeichnung 2006/42/EG  
*Marking*



Das Unternehmen Richter Chemie-Technik GmbH bescheinigt hiermit, dass die o.a. Baureihen die grundsätzlichen Anforderungen der aufgeführten Richtlinien und Normen erfüllt.  
*Richter Chemie-Technik GmbH confirms that the basic requirements of the above specified directives and standards have been fulfilled.*

Bevollmächtigt für die Zusammenstellung der technischen Unterlagen nach 2006/42/EG:  
*Authorised person compiled the technical files according to 2006/42/EG:*

A. Linges

Kempen, 01.07.2010

G. Kleining  
Leiter Forschung & Entwicklung  
*Manager Research & Development*

A. Linges  
Leiter Qualitätsmanagement  
*Quality Manager*

## Safety Information / **Declaration of No Objection** Concerning the Contamination of Richter-Pumps, -Valves and Components

### 1 SCOPE AND PURPOSE

Each entrepreneur (operator) carries the responsibility for the health and safety of his employees. This extends also to the personnel, who implements repairs with the operator or with the contractor.

Enclosed declaration is for the information of the contractor concerning the possible contamination of the pumps, valves and component sent in for repair. On the basis of this information for the contractor is it possible to meet the necessary preventive action during the execution of the repair.

Note: The same regulations apply to repairs **on-site**.

### 2 PREPARATION OF DISPATCH

Before the dispatch of the aggregates the operator must fill in the following declaration completely and attach it to the shipping documents. The shipping instructions indicated in the respective manual are to be considered, for example:

- Discharge of operational liquids
- remove filter inserts
- lock all openings hermetically
- proper packing
- Dispatch in suitable transport container
- Declaration of the contamination fixed **outside!!** on the packing



# Declaration about the Contamination of Richter Pumps, -Valves and Components

The repair and/or maintenance of pumps, valves and components can only be implemented if a completely filled out declaration is available. If this is not the case, delay of the work will occur. If this declaration is not attached to the devices, which have to be repaired, the transmission can be rejected.

**Every aggregate has to have it's own declaration.**

This declaration may be filled out and signed only by authorized technical personnel of the operator.

Contractor/dep./institute : _____		Reason for transmitting <input checked="" type="checkbox"/> Please mark the applicable	
Street : _____		<b>Repair:</b> <input type="checkbox"/> subject to fee <input type="checkbox"/> Warranty	
Postcode, city: _____		<b>Exchange:</b> <input type="checkbox"/> subject to fee <input type="checkbox"/> Warranty	
Contact person: _____		<input type="checkbox"/> Exchange/ Replacement already initiated/received	
Phone : _____ Fax : _____		<b>Return:</b> <input type="checkbox"/> Leasing <input type="checkbox"/> Loan <input type="checkbox"/> for credit note	
<b>End user :</b> _____			
<b>A. Details of Richter-product:</b>		<b>Failure description:</b>	
Classification: _____		Equipment: _____	
Article number: _____		Application tool: _____	
Serial number: _____		Application process: _____	
<b>B. Condition of the Richter-product:</b>		<b>Contamination :</b>	
	no <sup>1)</sup>      yes    no		no <sup>1)</sup> yes
Was it in operation ?	<input type="checkbox"/>   <input type="checkbox"/> <b>→</b>	toxic	<input type="checkbox"/> <input type="checkbox"/>
Drained (product/operating supply item) ?	<b>↓</b>   <input type="checkbox"/> <input type="checkbox"/>	caustic	<input type="checkbox"/> <input type="checkbox"/>
All openings hermetically locked!	<b>↓</b>   <input type="checkbox"/> <input type="checkbox"/>	inflammable	<input type="checkbox"/> <input type="checkbox"/>
Cleaned ?	<input type="checkbox"/>   <input type="checkbox"/> <input type="checkbox"/>	explosive <sup>2)</sup>	<input type="checkbox"/> <input type="checkbox"/>
If yes, with which cleaning agent:		mikrobiological <sup>2)</sup>	<input type="checkbox"/> <input type="checkbox"/>
and with which cleaning method:		radioactive <sup>3)</sup>	<input type="checkbox"/> <input type="checkbox"/>
	<b>←</b>	other pollutant	<input type="checkbox"/> <input type="checkbox"/>
<sup>1)</sup> if "no", then forward to D. <b>←</b> <sup>2)</sup> Aggregates, which are contaminated with microbiological or explosive substances, are only accepted with documented evidence of an approved cleaning. <sup>3)</sup> Aggregates, which are contaminated with radioactive substances, are not accepted in principle.		<b>↓</b>	
<b>C. Details of the discharged materials (must be filled out imperatively)</b>			
1. <b>With which materials did the aggregate come into contact ?</b> Trade name and/or chemical designation of operational funds and discharged materials, material properties, e.g. as per safety data sheet (e.g. toxic, inflammable, caustic)			
X Trade name: _____		Chemical designation: _____	
a) _____		_____	
b) _____		_____	
c) _____		_____	
d) _____		_____	
2. <b>Are the materials specified above harmful to health ?</b>		no    yes	<b>←</b>
		<input type="checkbox"/> <input type="checkbox"/>	
3. <b>Dangerous decomposition products during thermal load ?</b>		<input type="checkbox"/> <input type="checkbox"/>	
<b>If yes, which ones ?</b>			

**D. Mandatory declaration:** We assure that the data in this explanation are truthful and complete and as a signatory I am able to form an opinion about this. We are aware that we are responsible towards the contractor for damages, which results from incomplete and incorrect data. We commit ourselves to exempt the contractor from claims for damages of thirds resulting from incomplete or incorrect data. We are aware that we are directly responsible towards thirds, irrespective of this declaration, which belongs in particularly to the employees of the contractor consigned with the handling repair of the product.

Name of the authorized person (in block letters): \_\_\_\_\_

\_\_\_\_\_ Date

\_\_\_\_\_ Signature

Company stamp

**FAX****Fax No. ()****Pages (incl. cover sheet) ()****To:**

()

Richter Chemie-Technik GmbH  
Otto-Schott-Straße 2  
D-47906 KempenTelefon +49 (0) 21 52/146-0  
Telefax +49 (0) 21 52/146-190richter-info@richter-ct.com  
www.richter-ct.comContact person:  
()Reference:  
()Extension:  
- ()E-Mail Address:  
()Date:  
()**Your order No.:** ()**Our Kom. No.:** ()**Serial No.:** ()

Dear Sirs,

The compliance with laws for the industrial safety obligates all commercial enterprises to protect their employees and/or humans and environment against harmful effects while handling dangerous materials.

The laws are such as: the Health and Safety at Work Act (ArbStättV), the Ordinance on Harzadous Substances (GefStoffV, BIOSTOFFV), the procedures for the prevention of accidents as well as regulations to environmental protection, e.g. the Waste Management Law (AbfG) and the Water Resources Act (WHG)

An inspection/repair of Richter products and parts will only take place, if the attached explanation is filled out correctly and completely by authorized and qualified technical personnel and is available.

In principle, radioactively loaded devices sent in, are not accepted.

Despite careful draining and cleaning of the devices, safety precautions should be necessary however, the essential information must be given.

The enclosed declaration of no objection is part of the inspection/repair order. Even if this certificate is available, we reserve the right to reject the acceptance of this order for other reasons.

Best regards  
RICHTER CHEMIE-TECHNIK GMBHEnclosures

()