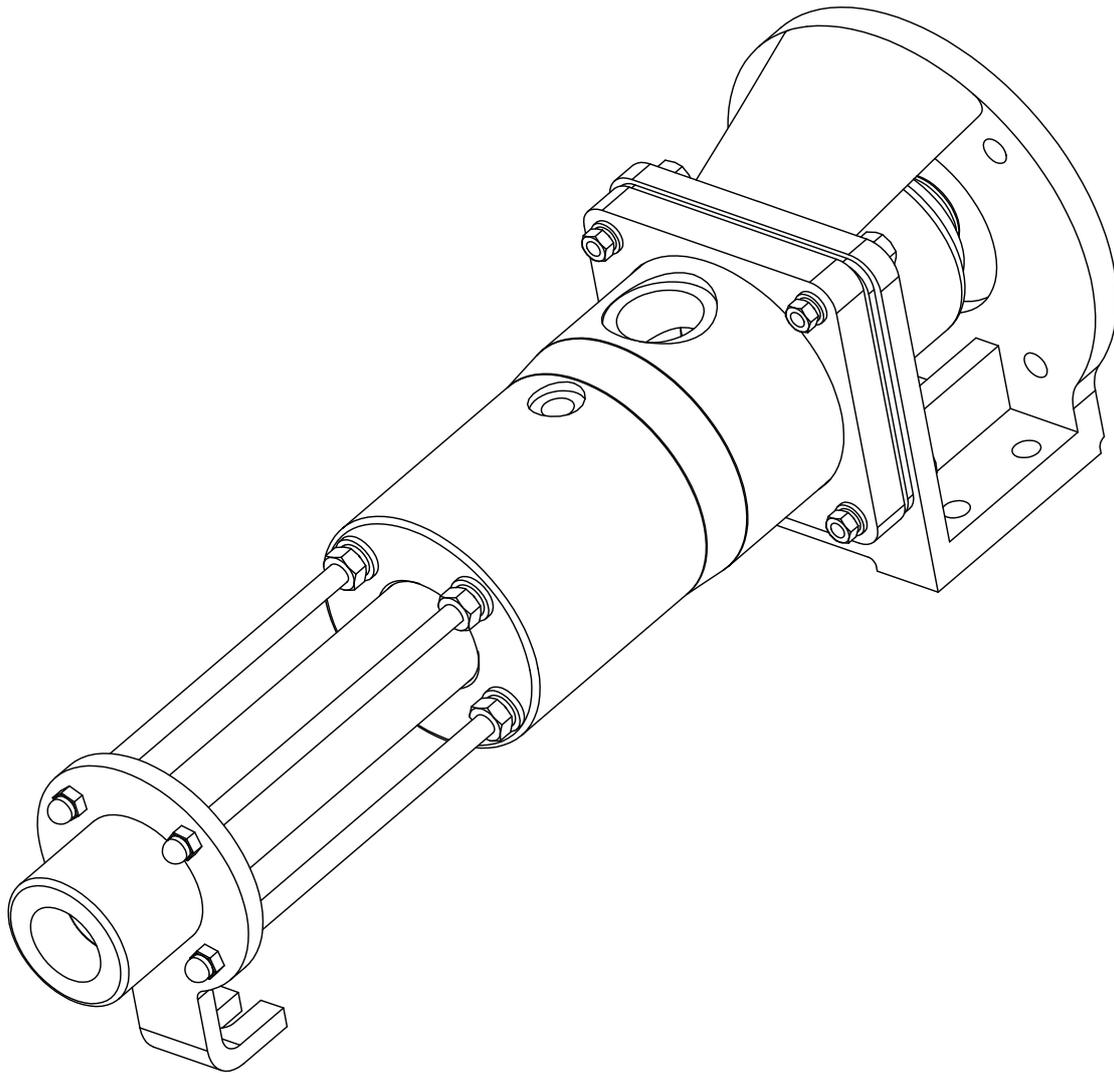


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**PC Dosing Pump**

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1411-00

**EN: Declaration of Conformity**  
**DE: Konformitätserklärung**  
**FR: Déclaration de Conformité**  
**ES: Declaración de Conformidad**  
**IT: Dichiarazione di conformità**  
**NL: Overeenkomstigheidsverklaring**  
**SV: Försäkran om överensstämmelse**  
**NO: Samsvarserklæring**  
**FI: Vaatimustenmukaisuusvakuutus**  
**RU: Заявление о соответствии**

**EN: Manufacturer / Address:**  
**DE: Hersteller / Adresse:**  
**FR: Fabricant / Adresses:**  
**ES: Fabricante / Dirección:**  
**IT: Costruttore / Indirizzo:**  
**NL: Fabrikant / Adres:**  
**SV: Tillverkare / Adress:**  
**NO: Produsent / Adresse:**  
**FI: Valmistaja / Osoite:**  
**RU: Изготовитель / Адрес**

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**EN: Name and address of the person authorised to compile the technical file to the authorities on request:**  
**DE: Name und Adresse der Person, die berechtigt ist, das technische Datenblatt den Behörden auf Anfrage zusammenzustellen:**  
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**RU: Ф.И.О и адрес лица, уполномоченного составлять техническую документацию по требованию органов власти:**

James Wall,  
 Head of Product Safety and Regulations Flow Equipment,  
 Sulzer Management AG,  
 Neuwiesenstrasse 15,  
 8401 Winterthur,  
 Switzerland.

**EN: Declare under our sole responsibility that the products:**  
**DE: Erklärt eigenverantwortlich, daß die Produkte:**  
**FR: Déclarons sous notre seule responsabilité que les produits:**  
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**RU: Заявляем со всей полнотой ответственности, что изделия:**

<b>EN:</b> PC Dosing Pump	<b>SV:</b> PC doseringspump
<b>DE:</b> PC Dosierpumpe	<b>NO:</b> PC doseringspumpe
<b>FR:</b> Pompe de dosage PC	<b>FI:</b> PC Annostelupumppu
<b>ES:</b> Bomba PC dosificadora de cavidad progresiva	<b>RU:</b> Дозировочный насос PC
<b>IT:</b> PC pompa dosatrice monovite	
<b>NL:</b> PC Doseerpomp	

**EN:** To which this declaration relates are in conformity with the following standards or other normative documents

**DE:** Auf die sich diese Erklärung bezieht, den folgenden und/oder anderen normativen Dokumenten entsprechen

**FR:** Auxquels se réfère cette déclaration sont conformes aux normes ou à d'autres documents normatifs

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**NL:** Waarop deze verklaring betrekking heeft, zijn in overeenstemming met de volgende normen of andere normatieve documenten

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**NO:** Som dekkes av denne erklæringen, er i samsvar med følgende standarder eller andre normative dokumenter

**FI:** Joihin tämä vakuutus liittyy, ovat seuraavien standardien sekä muiden sääntöamääraävien asiakirjojen mukaisia

**RU:** К которым применимо данное заявление, соответствуют следующим стандартам или нормативным документам.

- EN:** As defined by Machinery Directive 2006/42/EC, Low Voltage Directive 2014/35/EU, Outdoor Noise Directive 2000/14/EC amended by 2005/88/EC, RoHS 2011/65/EU and (EU) 2017/2102, WEEE 2012/19/EU.
- DE:** Wie definiert in Maschinenrichtlinie 2006/42/EG, Niederspannungsrichtlinie 2014/35/EU, Richtlinie 2000/14/EG über Geräuschemissionen geändert durch Richtlinie 2005/88/EG, RoHS 2011/65/EU und (EU) 2017/2102, WEEE 2012/19/EU.
- FR:** Comme définie par directive Machines 2006/42/CE, directive Basse tension 2014/35/UE, Directive sur le bruit extérieur 2000/14/CE, amendée par la directive 2005/88/CE, RoHS 2011/65/UE et (UE) 2017/2102, DEEE 2012/19/UE.
- ES:** Como se establece en Directiva sobre maquinaria 2006/42/EC, Directiva sobre bajo voltaje 2014/35/UE, Directiva sobre el ruido 2000/14/CE enmendada por 2005/88/CE, RoHS 2011/65/UE y (UE) 2017/2102, RAEE 2012/19/UE.
- IT:** Come definito in Direttiva Macchina 2006/42/CE, Direttiva Bassa tensione 2014/35/UE, Direttiva sull'emissione acustica ambientale 2000/14/CE modificata dalla direttiva 2005/88/CE, RoHS 2011/65/UE e (UE) 2017/2102, RAEE 2012/19/UE.
- NL:** Zoals gedefinieerd door de machinerichtlijn 2006/42/EC, laagspanningsrichtlijn 2014/35/EU, Geluidsemissierichtlijn 2000/14/EG gewijzigd door 2005/88/EG, RoHS 2011/65/EU en (EU) 2017/2102, AEEA 2012/19/EU.
- SV:** Såsom definierats av Maskindirektiv 2006/42/EG, Direktiv om lågspänning 2014/35/EU, Utomhusbullerdirektivet 2000/14/EC ändrat av 2005/88/EC, RoHS 2011/65/EU och (EU) 2017/2102, WEEE 2012/19/EU.
- NO:** I henhold til maskindirektiv 2006/42/EF, lavspenningsdirektivet 2014/35/EU, Utendørsstøydirektiv 2000/14/EU endret av 2005/2005/88/EU, RoHS 2011/65/EU og (EU) 2017/2102, WEEE 2012/19/EU.
- FI:** Määritetty näissä normeissa: Konedirektiivi 2006/42/EY, Matalajännitedirektiivi 2014/35/EU, Ulkona käytettävien laitteiden melupäästöjä koskeva direktiivi 2000/14/EY, jota on muutettu direktiivillä 2005/88/EY, RoHS 2011/65/EU ja (EU) 2017/2102, WEEE 2012/19/EU.
- RU:** В соответствии с директивой по механическому оборудованию 2006/42/EC, директивой по низковольтным устройствам 2014/35/EU, Директива по внешнему шуму 2000/14/EC, дополненная 2005/88/EC, RoHS 2011/65/EU и (EU) 2017/2102, WEEE 2012/19/EU.

EN ISO 12100:2010, EN 809:1998 + A1:2009 + AC:2010



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25-07-2023

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## Symbols and notices used in this booklet:



Presence of dangerous voltage.



Non-compliance may result in personal injury.

### NOTE

*Important information for particular attention.*

## 1 ATEX warning statements

### 1.1 Pumps and pump units

1. Where a pump or pump unit is to be installed in a potentially explosive atmosphere ensure that this has been specified at the time of purchase and that the equipment has been supplied accordingly and displays an ATEX nameplate or is supplied with a certificate of conformity. If there is any doubt as to the suitability of the equipment please contact Sulzer before commencing with installation and commissioning.
2. Process liquids or fluids should be kept within specified temperature limits otherwise the surface of pump or system components may become an ignition source due to temperature rises. Where the process liquid temperature is less than 194 °F the maximum surface temperature will not exceed 194 °F provided the pump is installed, operated and maintained in accordance with this manual. Where the process fluid temperature exceeds 194 °F the maximum surface temperature will be equal to the maximum process fluid temperature.
3. Cavities that could allow the accumulation of explosive gases, such as under guards, should where possible, be designed out of the system. Where this is not possible they should be fully purged before any work is carried out on the pump or system.
4. Electrical installation and maintenance work should only be carried out by suitably qualified and competent persons and must be in accordance with relevant electrical regulations.
5. All electrical equipment, including control and safety devices, should be suitably rated for the environment into which they are installed.
6. Where there may be a risk of an accumulation of explosive gases or dust, non-sparking tools should be used for installation and maintenance.
7. In addition to causing permanent damage to the stator, dry-running of the pump could generate a rapid rise in the temperature of the stator tube or barrel, which could become an ignition source. It is therefore essential that a dry-run protection device be fitted. This must shut the pump down immediately should a dry-run situation occur. Details of suitable devices are available from Sulzer.
8. To minimise the risk of sparking or temperature rises due to mechanical or electrical overload the following control and safety devices should be fitted in addition to a dry-run protection system:
  - (a) a pressure relief system whereby the pump can not generate pressures in excess of the maximum rated pressure or an over-pressure device which should shut the pump down when the maximum discharge pressure is exceeded.
  - (b) a control system that will shut the pump down if the motor current or temperature exceed specified limits.
  - (c) an isolator switch that will disconnect all electrical supply to the motor and ancillary electrical equipment and be capable of being locked in the off position.
 All control and safety devices should be fitted, operated and maintained in accordance with the manufacturer's instructions. All valves on the system should be open when the pump is started, otherwise serious mechanical overload and failure may result.
9. It is important that the pump rotates in the direction indicated on the nameplate. This must be checked on installation and commissioning and after any maintenance has been carried out. Failure to observe this may lead to dry-running or mechanical or electrical overload.
10. When fitting drives, couplings, belts, pulleys and guards to a pump or pump unit it is essential that these are correctly fitted, aligned, and adjusted, in accordance with the manufacturer's instructions. Failure to do so may result in sparking due to unintended mechanical contact or temperature rises due to mechanical or

electrical overload or slipping of drive belts. Regular inspection of these parts must be carried out to ensure they are in good condition and replacement of any suspect part must be carried out immediately.

11. Mechanical seals should be suitably rated for the environment. The seal and any associated equipment, such as a flushing system, must be installed, operated, and maintained in accordance with the manufacturer's instructions.
12. Where a packed gland seal is fitted this must be correctly fitted and adjusted. This type of seal relies on the process liquid to cool the shaft and packing rings, so a constant drip of liquid from the gland section is required. Where this is undesirable an alternative seal type should be fitted.
13. Failure to operate or maintain the pump and ancillary equipment in line with the manufacturer's instructions may lead to premature and potentially dangerous failure of components. Regular inspection, and where necessary replacement, of bearings and lubrication is essential.
14. The pump and its components have been designed to ensure safe operation within the guidelines covered by legislation. Accordingly, Sulzer have declared the machine safe to use for the duty specified as defined by the Declaration of Conformity that is issued with this instruction manual.
15. The use of replacement parts that are not manufactured by or approved by Sulzer may affect the safe operation of the pump and it may therefore become a safety hazard to both operators and other equipment. In these circumstances the Declaration provided will become invalid. The guarantee referenced on the Terms and Conditions of Sale will also be invalidated.

## **2. Installation**

### **2.1 Installation and safety recommendations**

In common with other items of process plant a pump must be installed correctly to ensure satisfactory and safe operation. The pump must also be maintained to a suitable standard. Following these recommendations will ensure that the safety of personnel and satisfactory operation of the pump is achieved.

#### **2.1.1 General**

When handling harmful or objectionable materials, adequate ventilation must be provided in order to disperse dangerous concentrations of vapours. It is recommended that wherever possible, Sulzer pumps should be installed with provision for adequate lighting, thus ensuring that effective maintenance can be carried out in satisfactory conditions. With certain product materials, a hosing down facility with adequate draining will simplify maintenance and prolong the life of pump components.

Pumps operating on high temperature duties should be allowed to cool sufficiently before any maintenance is carried out.

#### **2.1.2 System design & installation**

At the system design stage, consideration must be given to provision of filler plugs, and the installation of non-return and/or isolating valves. Pumps cannot be reliably used as non-return valves. Pumps in parallel and those with high static discharge head must be fitted with non-return valves.

The pumps must also be protected by suitable devices against over-pressure and dry-running.

##### **i. Horizontal mounting**

Sulzer PC pumps are normally installed in a horizontal position with baseplates mounted on a flat surface, grouted-in and bolted, thus ensuring firm fixing and a reduction in noise and vibration.

The unit should be checked after bolting down to ensure that the alignment of the pump to its prime mover is correct.

## 2.2 Handling



**During installation and maintenance, attention must be paid to the safe handling of all items.**

For safe handling of both bareshaft pumps and pump units (pump/gearbox/motor etc.) slings should be used. The position of the slings will depend upon the specific pump/unit construction and should be carried out by personnel with the relevant experience to ensure that the pump is not damaged and injury to personnel does not occur.

If eyebolts do exist then these should only be used for lifting the individual components for which they are supplied.

**ATTENTION!** **Observe the total weight of the Sulzer units and their attached components! (see nameplate for weight of base unit).**

The duplicate nameplate provided must always be located and visible close to where the pump is installed (e.g. at the terminal boxes / control panel where the pump cables are connected).

**NOTE:** **Lifting equipment must be used if the total unit weight and attached accessories exceeds local manual lifting safety regulations.**

The total weight of the unit and accessories must be observed when specifying the safe working load of any lifting equipment! The lifting equipment, e.g. crane and chains, must have adequate lifting capacity. The hoist must be adequately dimensioned for the total weight of the Sulzer units (including lifting chains or steel ropes, and all accessories which may be attached). The end user assumes sole responsibility that lifting equipment is certified, in good condition, and inspected regularly by a competent person at intervals in accordance with local regulations. Worn or damaged lifting equipment must not be used and must be properly disposed of. Lifting equipment must also comply with the local safety rules and regulations

**NOTE!** **The guidelines for the safe use of chains, ropes and shackles supplied by Sulzer are outlined in the Lifting Equipment manual provided with the items and must be fully adhered to.**

## 2.3 Storage and infrequent operation

The situation where a pump is used infrequently is also covered by the instructions in this section.

### 2.3.1 Short term storage

Where a pump has to be stored for six months or less then the following steps are advised:

1. Store pump inside wherever possible or if this is not feasible then provide protective covering. Do not allow moisture to collect around the pump.
2. Remove the drain plug if fitted. Any inspection plates fitted should also be removed to ensure that the suction housing can drain and dry completely.
3. Loosen the packed gland and inject sufficient grease into the stuffing box. Tighten the gland nut hand tight. If a water flush system is to be used do not grease. A small amount of light oil is recommended for these.
4. See manufacturers instructions for motor/gearbox/drive instructions for storage procedures.

### 2.3.2 Long term storage

If the pump is to be kept in storage for more than six months, then in addition to the above, the following procedures should be carried out regularly (every 2 - 3 weeks if possible):

1. If practicable rotate the pump at least three quarters of one revolution to avoid the rotor setting in the stator.
2. Note, however, that the pump is not to be rotated for more than two revolutions each time because damage could be caused to the rotor/stator elements.



**Before installing the pump after storage please ensure that all plugs and inspection plates are replaced and that excess grease/oil is removed from the stuffing box.**

## 2.4 Electrical



Electrical connection should only be made using equipment suitable for both rating and environment.

Where any doubts exist regarding the suitability of equipment, Sulzer should be consulted before proceeding. Normally the Sulzer pump should be installed with starting equipment arranged to give direct-on-line starting.

Earthing points will be provided on electric drives (if supplied) and it is essential that these are correctly connected. When the motor is being wired and checked for rotation, the start/stop sequence must be instantaneous to prevent dry running (see Section 3) or pressurising upstream equipment (check direction arrow on pump nameplate). The electrical installation should include appropriate isolating equipment to ensure that the pump, drive and motor, or macerator grinder motor is safe to work on.

## 2.5 Pressure relief valves and non-return valves

1. It is recommended that a suitable safety device is installed on the discharge side of the pump to prevent over-pressurisation of the system.
2. It is also recommended that a non-return valve is installed on the discharge side of the pump to prevent reverse flow through the system.

When both are installed it is advised that the relief valve is positioned closer to the pump than the non-return valve.



**The pump must never run against a closed inlet or outlet valve, as this could result in mechanical failure.**

## 2.6 General safety



**All guards and removable covers must be in place and securely fitted while the machine is running.**



**Great care must be taken to protect all electrical equipment from splashing when hosing down.**



**Inspection port covers/ports must not be opened while the machine is running.**

All nuts and bolts, securing flanges and base mounting fixtures must be checked for tightness before operation. To eliminate vibration, the pump must be correctly aligned with the drive unit, and all guards must be securely fixed in position. When commissioning the plant, all joints in the system must be checked thoroughly for leakage.

If, when starting, the pump does not appear to operate correctly (see Section 3), the plant must be shut down immediately and the cause of the malfunction established before operations are recommenced. It is recommended that, depending upon plant system operation, either a combined vacuum and pressure gauge or a vacuum gauge only be fitted to the pump inlet port, and a pressure gauge fitted to the outlet port. These will then continuously monitor the pump operating conditions.

May contain substances from the ECHA SVHC Candidates List (REACH - Regulation (EC) No. 1907/2006).

## 2.7 Duty conditions

Pumps should only be installed on duties for which Sulzer have specified the materials of construction, flow rates, pressure, temperature, speed etc. Where dangerous materials are to be pumped, consideration must be given to the safe discharge from relief valves, gland drains etc.



**If the duty should be changed, Sulzer should be contacted and their recommendations sought in the interest of application, safety of plant, efficiency, and pump life.**

### 3 Start-up procedure

Pumps must be filled with liquid before starting. The initial filling is not for priming purposes, but to provide the necessary lubrication of the stator until the pump primes itself. When the pump is stopped, sufficient liquid will normally be trapped in the rotor/stator assembly to provide lubrication upon re-starting.

If however, the pump has been left standing for an appreciable time, moved to a new location, or has been dismantled and re-assembled, it must be refilled with liquid and given a few turns before starting. The pump is normally somewhat stiff to turn by hand owing to the close rotor/stator fit. However, this stiffness disappears when the pump is running normally against pressure.

#### 3.1 Dry running



**Never run the pump in a dry condition even for a few revolutions or the stator will be damaged immediately. Continual dry running could produce some harmful or damaging effects.**

#### 3.2 Pump rotation details

PC dosing pumps are bi-directional. Anti-clockwise determines that the inlet is at the drive end.



**Before the direction of rotation is changed, Sulzer must be consulted so that the suitability of the pump can be confirmed when operating on the new duty.**

#### 3.3 Mechanical seals - all pumps

When a mechanical seal is fitted to the pump it may be necessary to provide a barrier fluid to some part of the seal. This should be provided in line with the seal manufacturers instructions.

If a barrier fluid is required, the mechanical seal carrier must include a quench port. This can be incorporated by Sulzer upon request.

#### 3.4 Drainage

A drainage port is provided on the suction chamber, however, a drainage port can also be incorporated into the mechanical seal housing upon request.

#### 3.5 Guards



**In the interests of safety, all guards must be replaced after necessary adjustments have been made to the pump.**

#### 3.6 Warning / Control device

Prior to operating the pump, if any warning or control devices are fitted, these must be set in accordance with their specific instructions.

#### 3.7 Pump operating temperature

The range of temperatures the pump surfaces will develop is dependent upon factors such as product temperature and ambient temperature of the installation. There may be instances where the external pump surface can exceed 122 °F.

In these instances, personnel must be made aware of this and suitable warnings/guarding used.

#### 3.8 Noise levels

1. The sound pressure level should not exceed 85dB at one metre distance from the pump.
2. This is based on a typical installation and does not necessarily include noise from other sources or any contribution from building reverberation or installation pipework.
3. It is recommended that the actual pump unit noise levels are ascertained once the unit is installed and running at duty conditions.

#### 3.9 Lubrication

Pumps fitted with bearings should be inspected periodically to see if grease replenishment is necessary, and if so, grease should be added until the chambers at the ends of the bearing spacer are approximately one third full.

Periodic bearing inspection is necessary to maintain optimum bearing performance. The most expedient time to inspect is during periods of regular scheduled equipment downtime for routine maintenance, or downtime for any other reason.

Under tropical or other arduous conditions however, a more frequent examination may be necessary. It is therefore advisable to establish a correct maintenance schedule or periodic inspection.

BP LC2 / Mobilgrease XHP 222 or their equivalent must be used for replenishment.

### 3.10 Pump units

Where a pump unit is dismantled and re-assembled, consideration must be given to ensure that where appropriate the following steps are covered.

1. Correct alignment of pump/gearbox.
2. Use of appropriate couplings and bushes.
3. Use of appropriate belts and pulleys correctly tensioned.

### 3.11 Cleaning prior to operation

#### i. Non-food use

During the commissioning of a new pump or re-commissioning of an overhauled pump, it is advisable to clean the pump prior to the initial operation of the pump in the process.

#### ii. Food use

When a pump has been supplied for a food application, it is important to ensure that the pump is clean prior to initial operation of the pump.

Therefore, it is important that a clean-in-place treatment is executed on the pump at the following times:

1. When the pump is first commissioned for use.
2. When any spare components are fitted into the wetted area of the pump.

#### **A recommended CIP procedure is as follows:**

Caustic wash: LQ94 ex Lever Diversey or equivalent 2% concentration.

Acid wash: P3 Horolith 617 ex Henkel Ecolab or equivalent 1% concentration.

Procedure:

1. Caustic wash @ 167 °F for 20 mins
  2. Water rinse @ 176 °F for 20 mins
  3. Acid wash @ 122 °F for 20 mins
  4. Water rinse @ 176 °F for 20 mins
- CIP flow rates (hence pump speeds) should be maximised to achieve highest level of cleanability. A C.I.P. liquid velocity of 4.9 to 6.6 ft/s is required for removal of solids and soiling. Pumps fitted with CIP by-pass ports will permit higher flow rates without the need to increase pump speed.
  - The use of neat active caustic and acid chemicals is not recommended. Proprietary cleaning agents should be used in line with manufacturers instructions.
  - All seals and gaskets should be replaced with new if disturbed during maintenance.
  - Pump internals should be regularly inspected to ensure hygienic integrity is maintained, especially with respect to elastomeric components and seals, and replaced if necessary. The four stages constitute one cycle and we recommend that this cycle is used to clean the pump before use on food. Once the pump has been commissioned, the cleaning process will depend upon the application. The user must therefore ensure that their cleaning procedures are suitable for the duty for which the pump has been purchased.

### 3.12 Explosive products/hazardous atmospheres

In certain instances the product being pumped may well be of a hazardous nature.

In these installations consideration must be given to provide suitable protection and appropriate warnings to safeguard personnel and plant.

### 3.13 Access ports



**Where access ports are fitted then the following steps must be followed prior to removal:**

1. Pump must be shut down and the electrical supply isolated.
2. Protective clothing should be worn, especially if the pumped product is obnoxious.
3. Remove access plate with care, utilising where possible, drip trays to collect product leakage.

Access ports are included to assist in removing blockages and to allow a visual check on the components within the suction chamber. It is not to be considered as an additional method in dismantling the pump. Re-assembly of the plate should be completed using new gaskets prior to the pump being switched on.

### 3.14 Maintenance of wearing components

#### 3.14.1 Rotor and stator

The wear rate on these components is dependent on many factors, such as product abrasivity, speed, pressure etc. When pump performance has reduced to an unacceptable level one or possibly both items will need replacing.

#### 3.14.2 Coupling rod joints

Regular maintenance and lubrication will maximise life of the joints.

Replacement of one or both joint assemblies, and possibly the coupling rod, may be necessary when wear is apparent.

To ensure maximum life, it is essential to replace all the joint items with genuine Sulzer parts.

### 3.15 Mechanical speed variators

Refer to the manufacturers instructions.

These machines require regular maintenance, which typically includes weekly adjustment through the full speed range.

## 4.0 Assembly and dismantling

Sections 14 and 15 contain the steps to dismantle and re-assemble the pump. All fastenings must be tightened securely and when identified the appropriate torque figures should be used (see Section 13).

### 4.1 Use of items not approved or manufactured by Sulzer

The pump and its components have been designed to ensure that the pump will operate safely within the guidelines covered by legislation.

As a consequence, Sulzer have declared the machine safe to use for the duty specified as defined by the Declaration of Conformity that is issued with this Instruction Manual.

The use of replacement items that are not approved by or manufactured by Sulzer may affect the safe operation of the pump and it may therefore become a safety hazard to both operators and other equipment. In these instances the declaration provided will therefore become invalid. The guarantee referenced in the Terms and Conditions of Sale will also be invalidated if replacement items are used that are not approved or manufactured by Sulzer.

### 4.2 Disposal of worn components



When replacing wearing parts, please ensure disposal of used parts is carried out in compliance with local environmental legislation. Particular care should be taken when disposing of lubricants.



## 7 Diagnostic chart

Symptoms	Possible causes
1. NO DISCHARGE	1. 2. 3. 7. 24. 26. 27.
2. LOSS OF CAPACITY	3. 4. 5. 6. 7. 8. 9. 10. 20. 14. 15. 19. 20. 21. 27
3. IRREGULAR DISCHARGE	3. 4. 5. 6. 7. 8. 13. 27.
4. PRIMING LOST AFTER START	3. 4. 5. 6. 7. 8. 13
5. PUMP STALLS AT START UP	8. 11. 22.
6. PUMP OVERHEATS	8. 9. 11. 12. 16. 18.
7. MOTOR OVERHEATS	8. 11. 12. 13. 16. 18.
8. EXCESSIVE POWER ABSORBED BY PUMP	8. 11. 12. 13. 16. 18.
9. NOISE AND VIBRATION	3. 4. 5. 6. 7. 8. 9. 11. 13. 16. 17. 18. 20. 21. 25. 29.
10. PUMP ELEMENT WEAR	9. 11.
11. EXCESSIVE GLAND OR SEAL WEAR	12. 23. 28.
12. SEIZURE	9. 11. 12. 18.
List of causes	Remedial actions
1. Incorrect direction of rotation	1. Reverse motor
2. Pump unprimed	2. Bleed system of air/gas
3. Insufficient NPSH available	3. Increase suction head or reduce speed/temp.
4. Product vaporising in supply line	4. Increase NPSH available (see 3 above)
5. Air entering supply line	5. Check pipe joints/gland adjustment
6. Insufficient head above supply vessel outlet	6. Raise vessel/increase pipe size
7. Foot valve/strainer obstructed or blocked	7. Clean out suction line/valves
8. Product viscosity above rated figure	8. Decrease pump speed/increase temp.
9. Product temp. above rated figure	9. Cool the product
10. Product viscosity below rated figure	10. Increase pump speed/reduce temp.
11. Delivery pressure above rated figure	11. Check for blockages in delivery line
12. Gland flushing inadequate	12. Check fluid flows freely into gland
13. Pump speed above rated figure	13. Decrease pump speed
14. Pump speed below rated figure	14. Increase pump speed
15. Belt drive slipping	15. Re-tension belts
16. Coupling misaligned	16. Check and adjust alignment
17. Insecure pump/drive mounting	17. Check and tighten all pump mountings
18. Shaft bearing wear/failure	18. Replace bearings
19. Worn pump element	19. Fit new parts
20. Relief valve chatter	20. Check condition of valve/renew
21. R.V. incorrectly set	21. Re-adjust spring compression
22. Low voltage	22. Check voltage/wiring sizes
23. Product entering packing area	23. Check packing condition and type
24. Drive train breakage	24. Check and replace broken components
25. Negative or very low delivery head	25. Close delivery valve slightly
26. Discharge blocked/valve closed	26. Reverse pump/relieve pressure/clear blockages
27. Stator turning	27. Replace worn parts/tighten up stator bolts
28. Stuffing box 'eats' packing	28. Check for worn shaft and replace
29. Vee belts	29. Check and adjust tension or replace

### 8 Recommended lifting points

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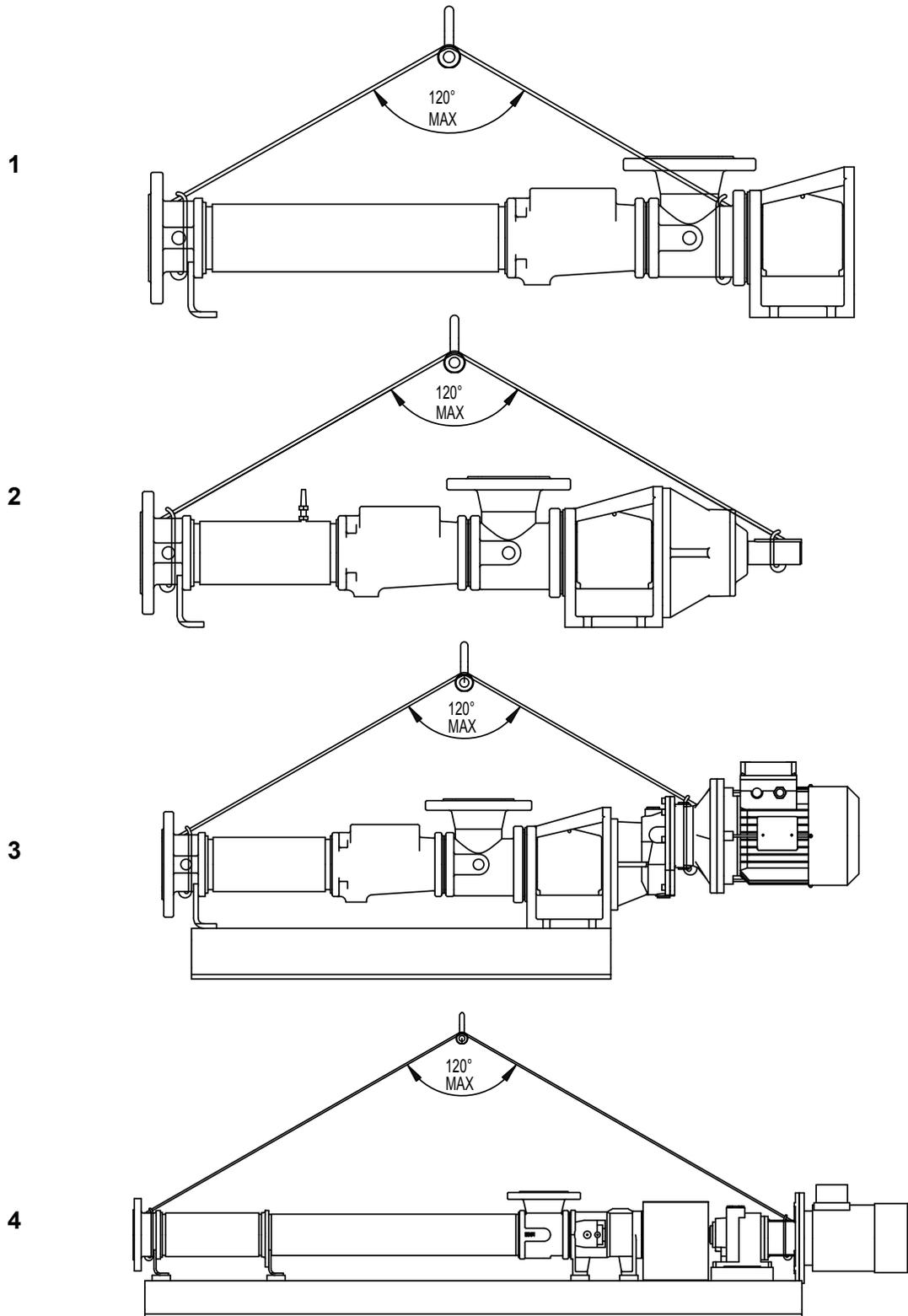
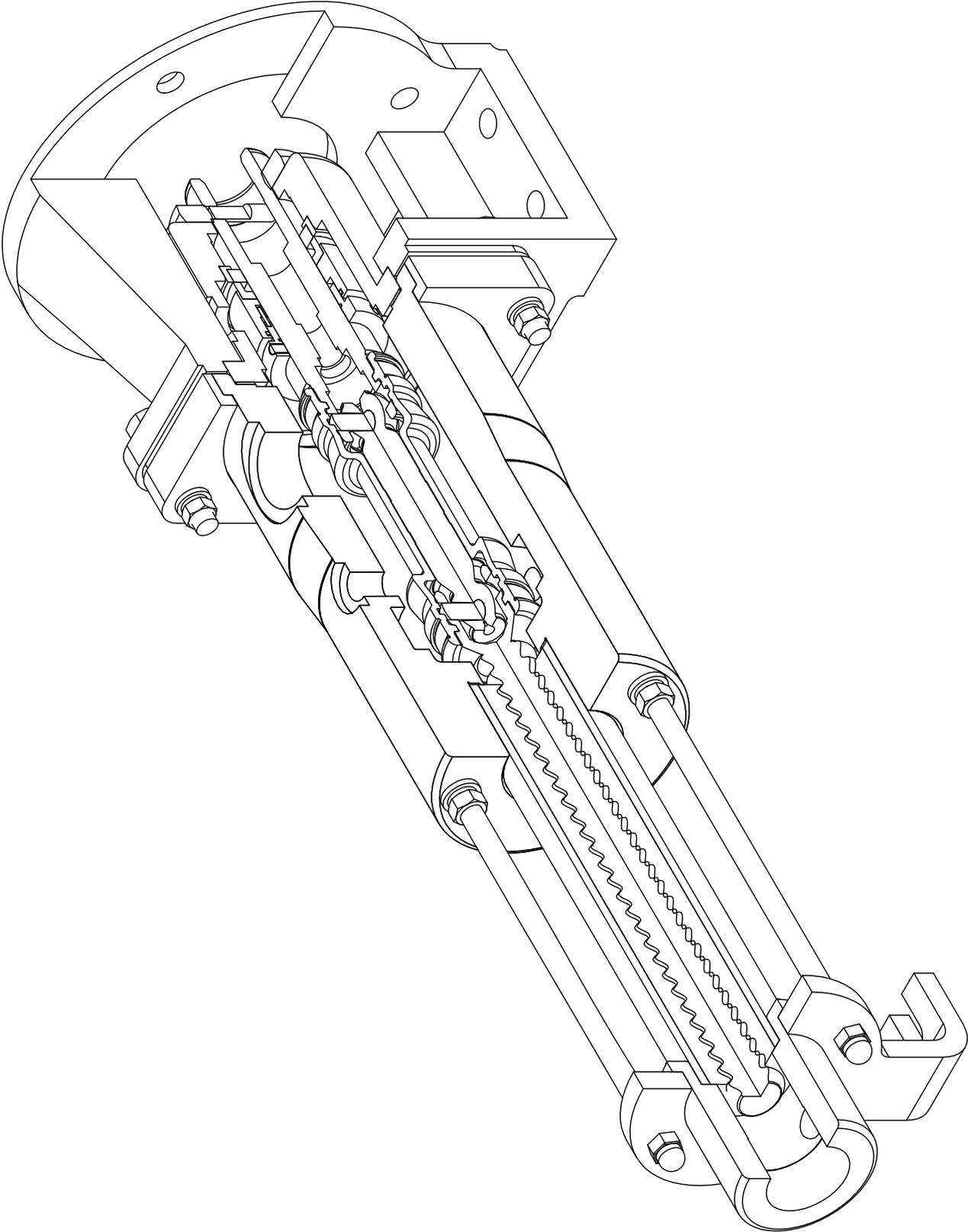


Figure 1. recommended lifting points

**9 Cross-sectional drawing**

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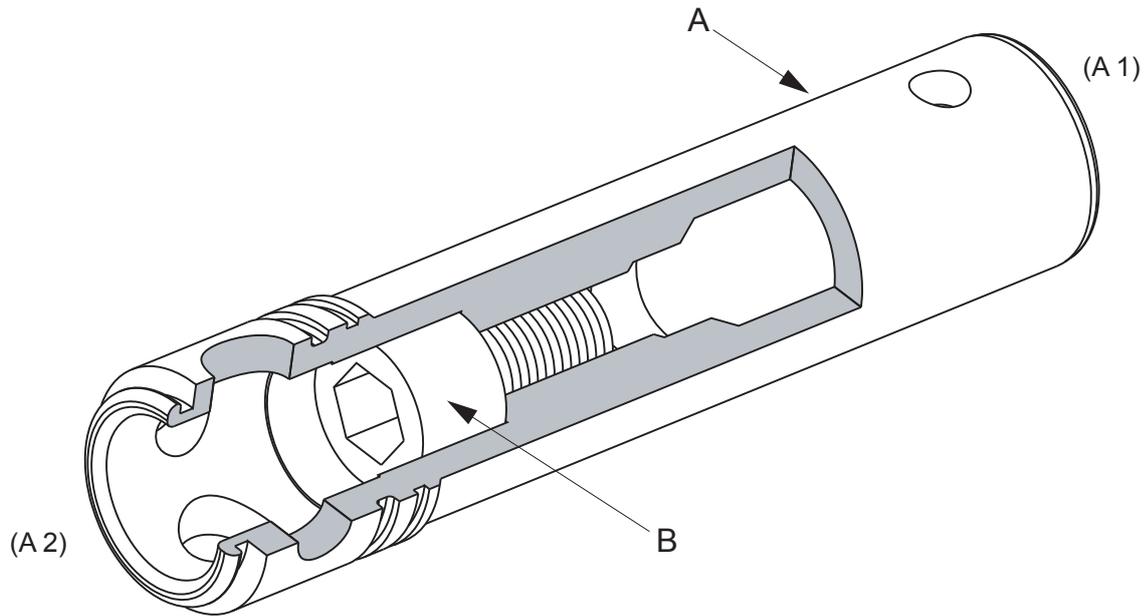


**10 Drawing reference numbers**

<b>Drawing reference</b>	<b>Description</b>	<b>Drawing reference</b>	<b>Description</b>
01A	Body	P101	Hexagonal head bolt
06A/B	Nameplate	P104	Hexagonal head bolt
10A	Mechanical seal	P105	Hexagonal nut
15A	Thrower guard	P106	Flat washer
20A	Gasket	P107	Plain washer
22A	Stator		
23A	Suction chamber	P405	Tie-sealing cover
24A	End cover	P406	Tie-sealing cover
25A	Rotor		
26A	Coupling rod	P501A	Plug
28A	Sealing cover	P504	Spring washer
29A	Coupling rod pin	P505	Hexagonal nut
29B	Coupling rod pin	P506	Flat washer
29C	Shaft pin		
32A	Drive shaft	P601	Hexagonal head bolt
42A	Thrower	P602	Spring washer
47A	Support foot	P603	Flat washer
65A	Mechanical seal carrier	P604	Hexagonal nut
76A	Support plate		
95A	Tie bar		



**12 Drive shaft assembly with plug**



1296-00

**A: Drive shaft.**

A1 = Motor shaft end, A2 = Coupling rod end.

**B: Cap head screw (grade 12.9).**

Threads to be sealed with Loctite 5910 or equivalent

**Note:** this screw may be removed to allow a jacking bolt to be used to aid removal of the drive shaft from the gearbox shaft.

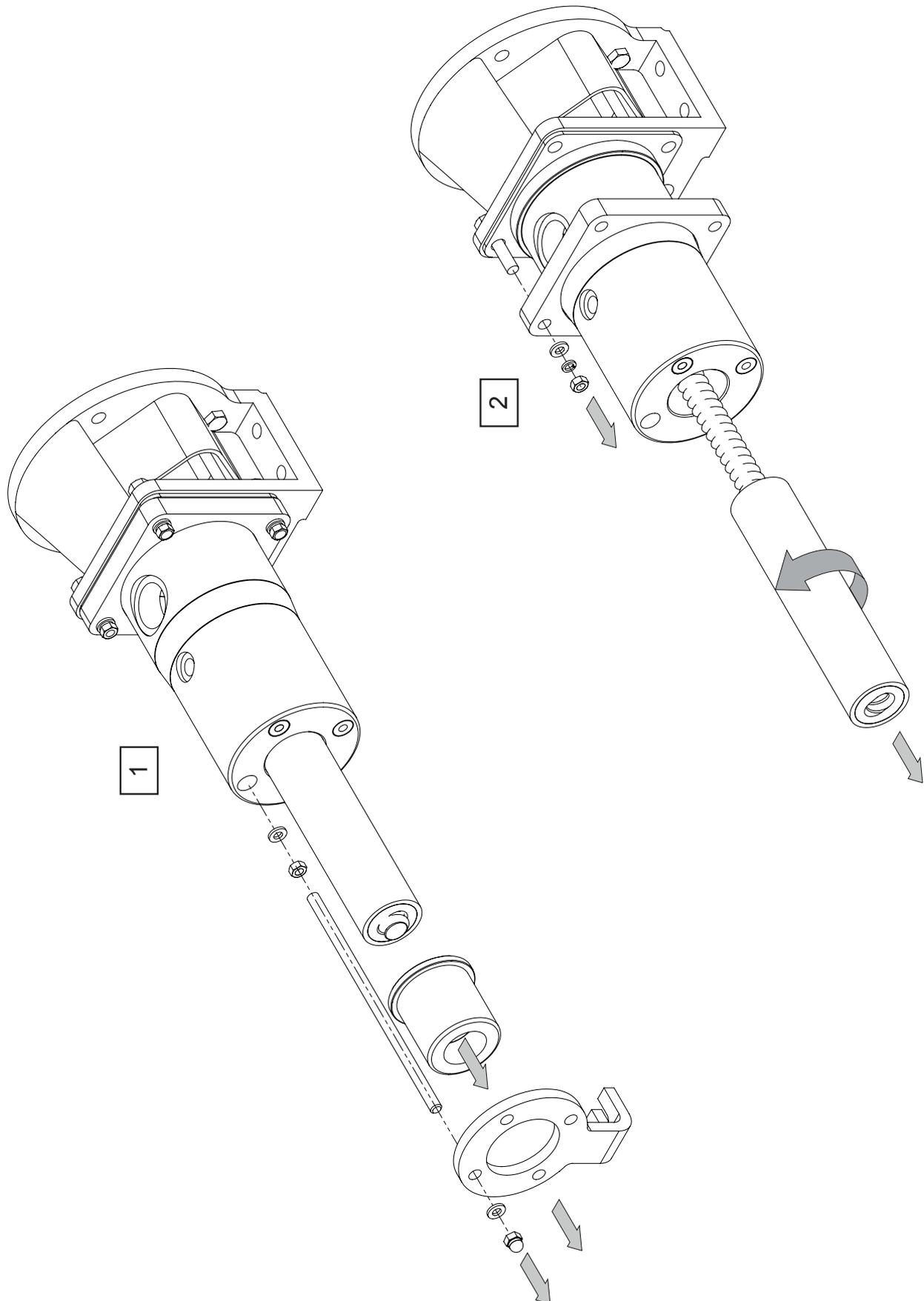
**NOTE**                    *Ensure the cap head screw is tightened and sealed before assembling with coupling rod.*

**13 Tightening torques (lbf/ft)**

Pump size	Suction chamber	Stator tie bar
	P105	P505
012	7.4	2.2
006		
003		
015		

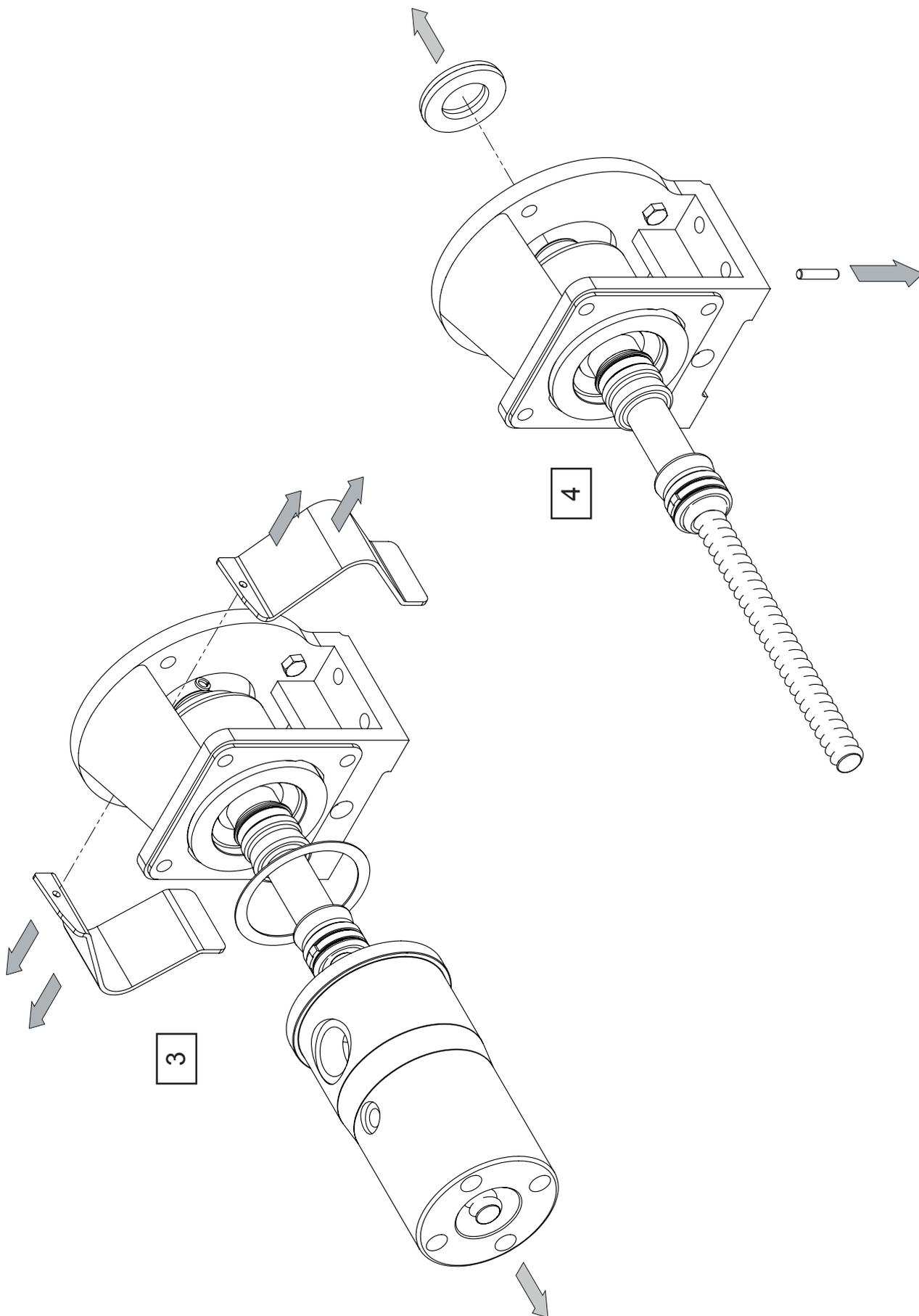
## 14 Dismantling procedures

### 14.1



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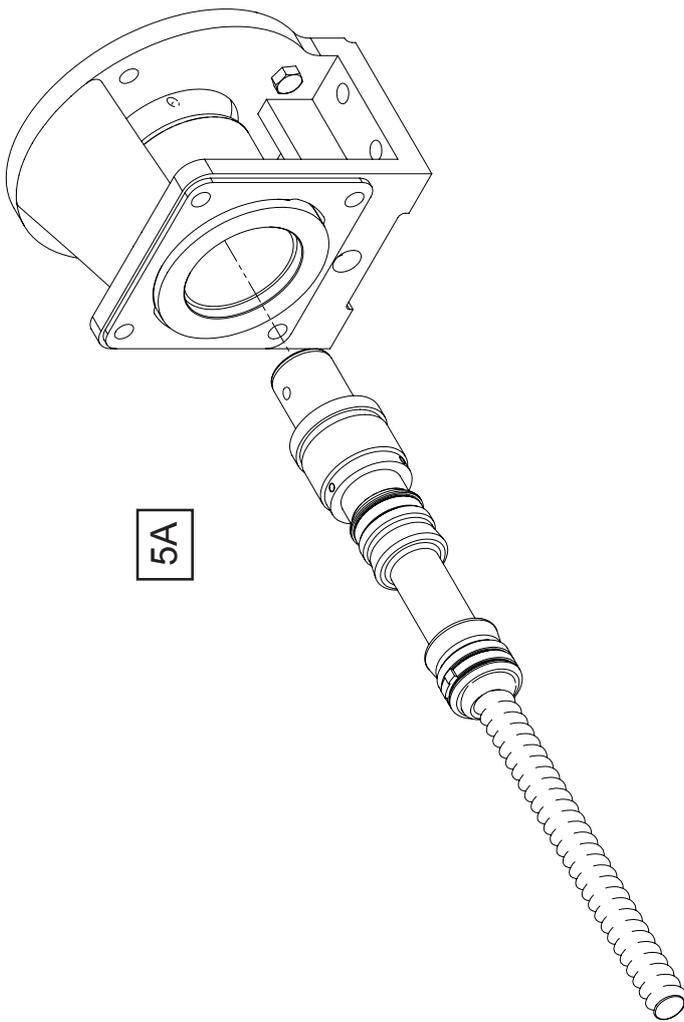
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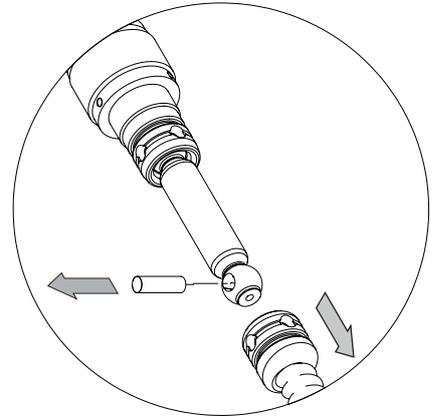
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## 14.3

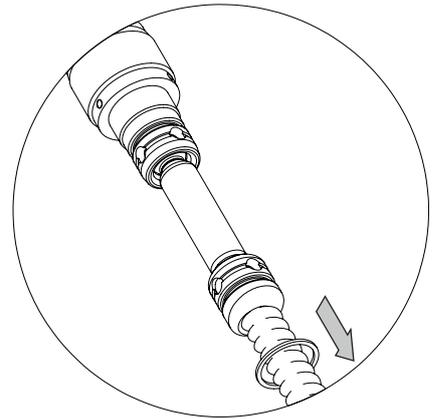
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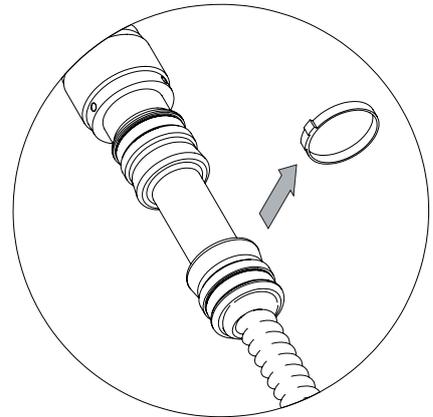
5D



5C

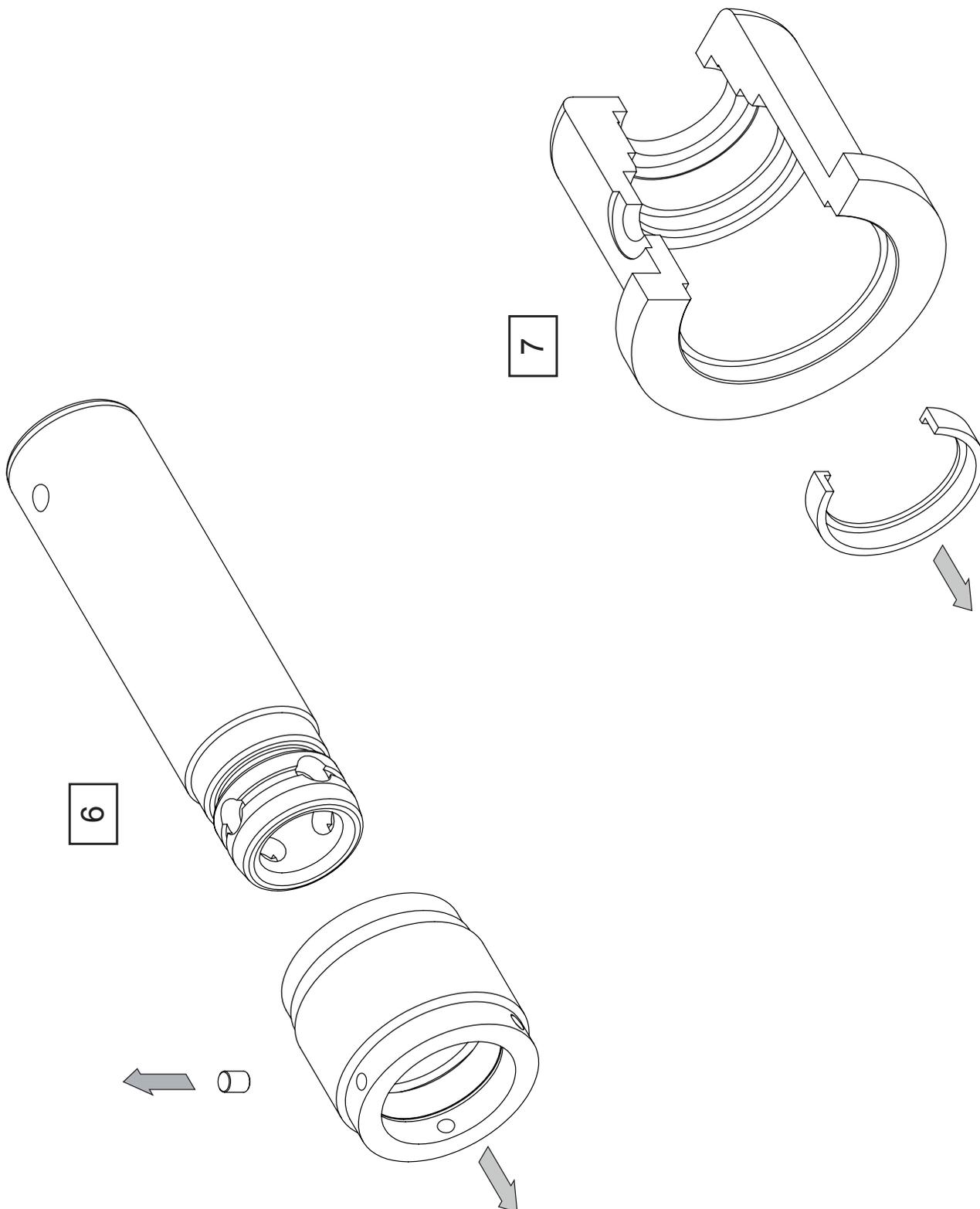


5B



14.4

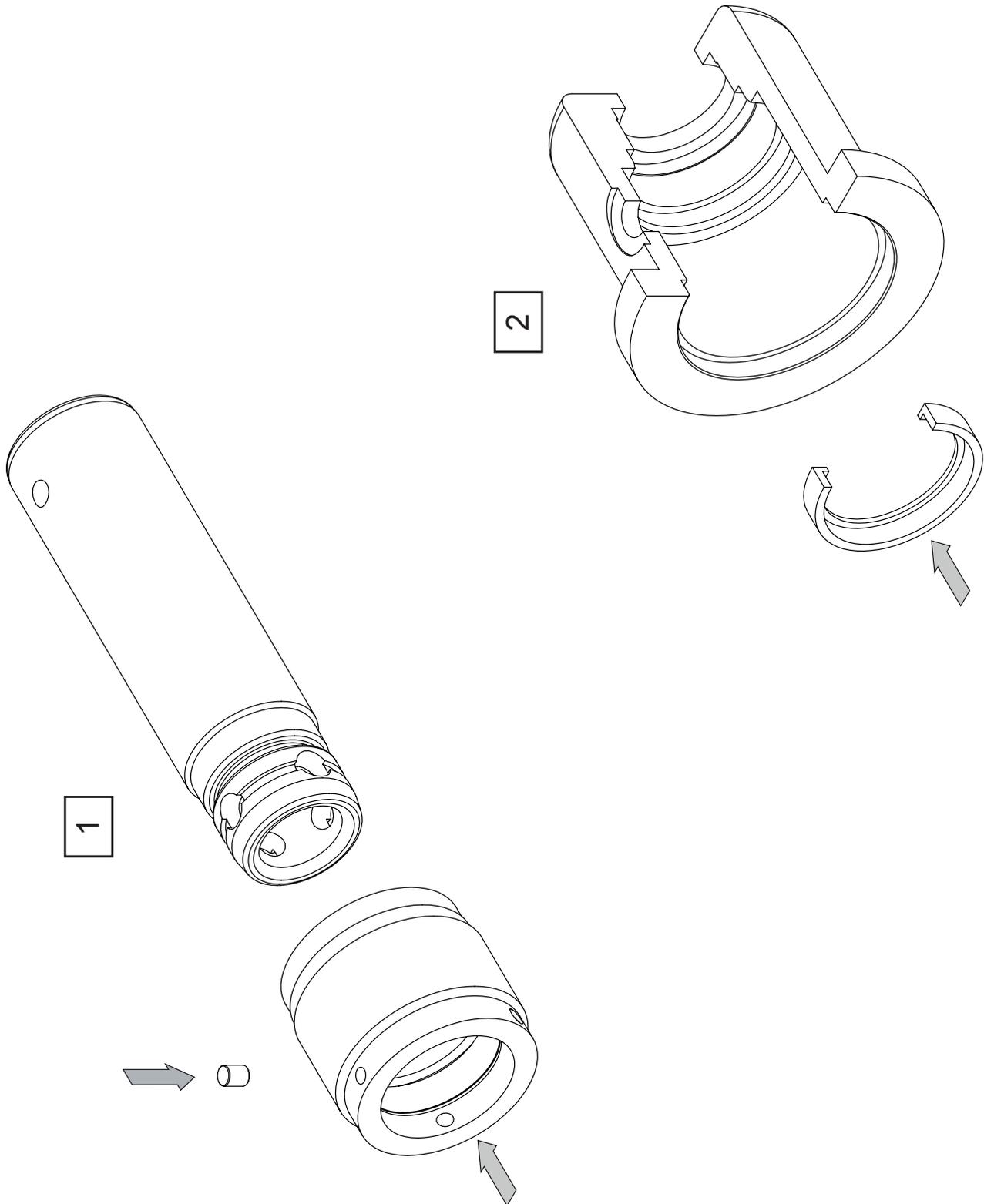
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## 15 Assembly procedures

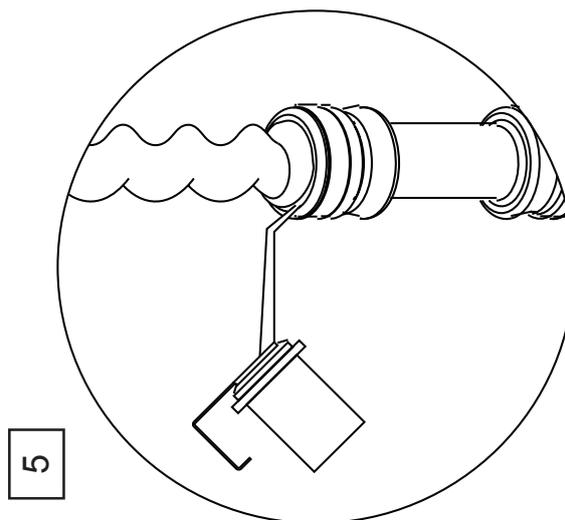
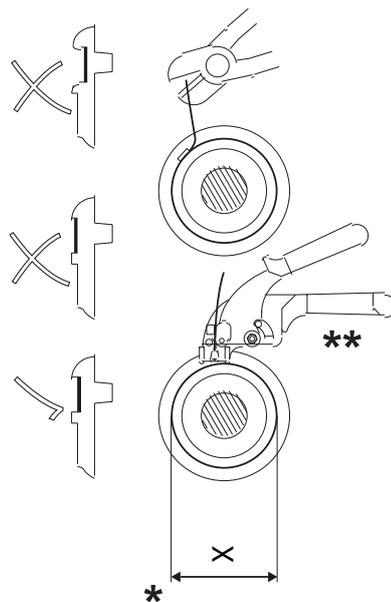
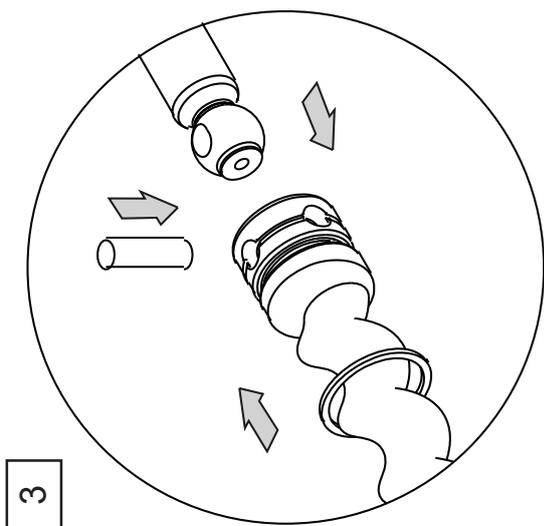
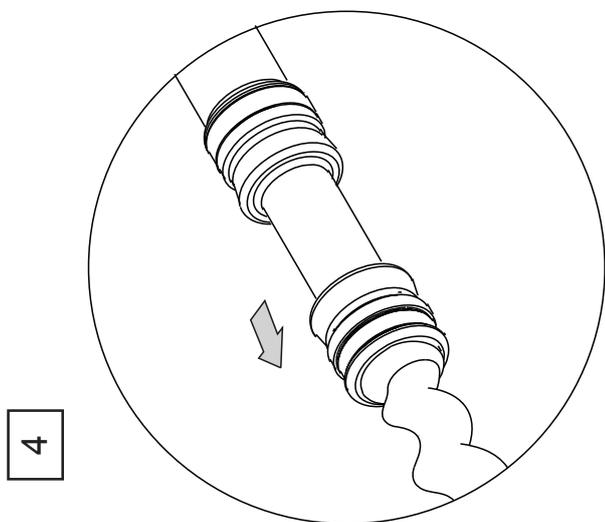
### 15.1

1418-00



15.2

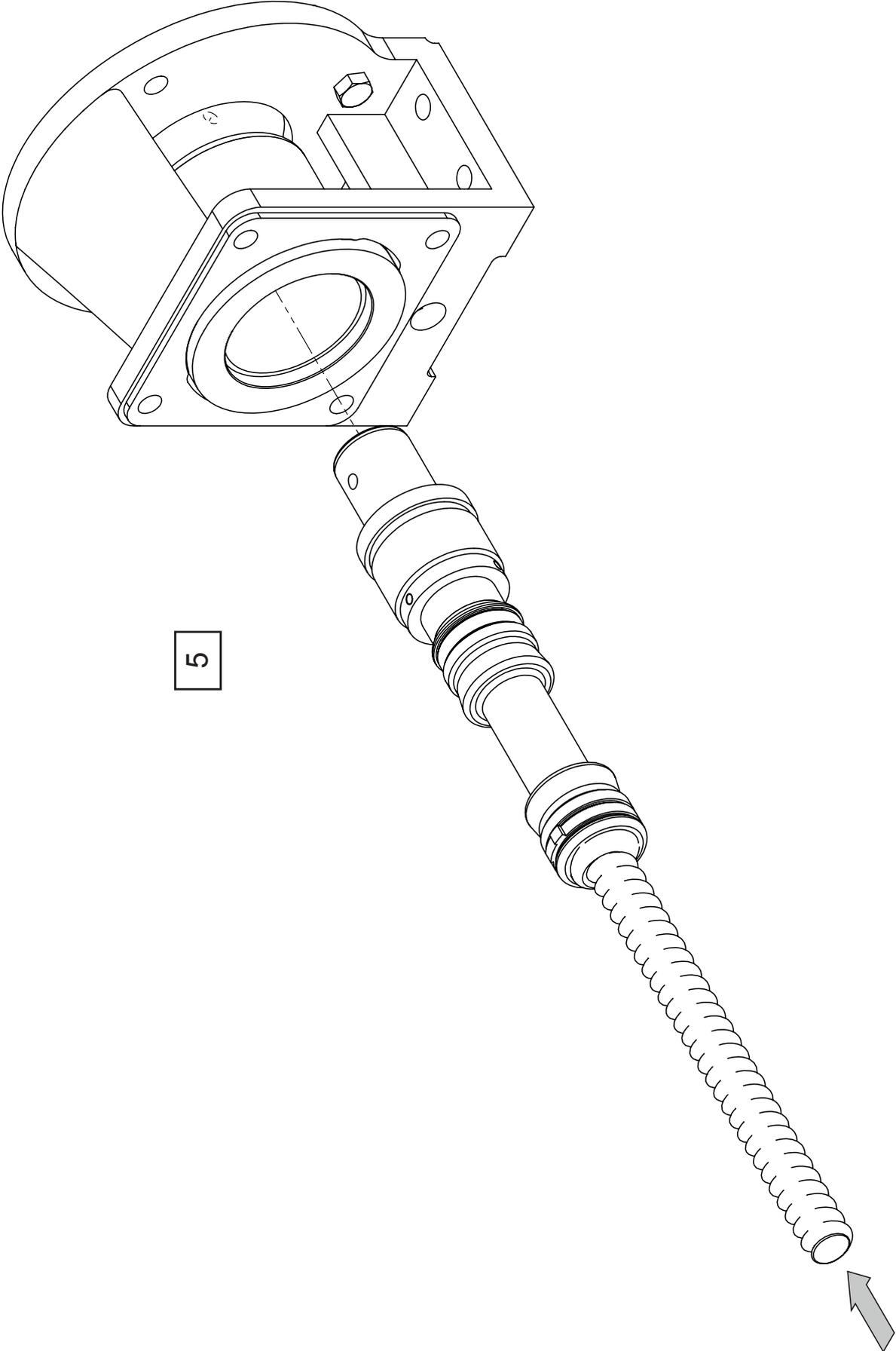
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\* Compressed diameter (X): 39.50 - 40mm. Do not tighten below 39.4 mm

\*\* Correct tool available from your supplier. Part number: 80D1331

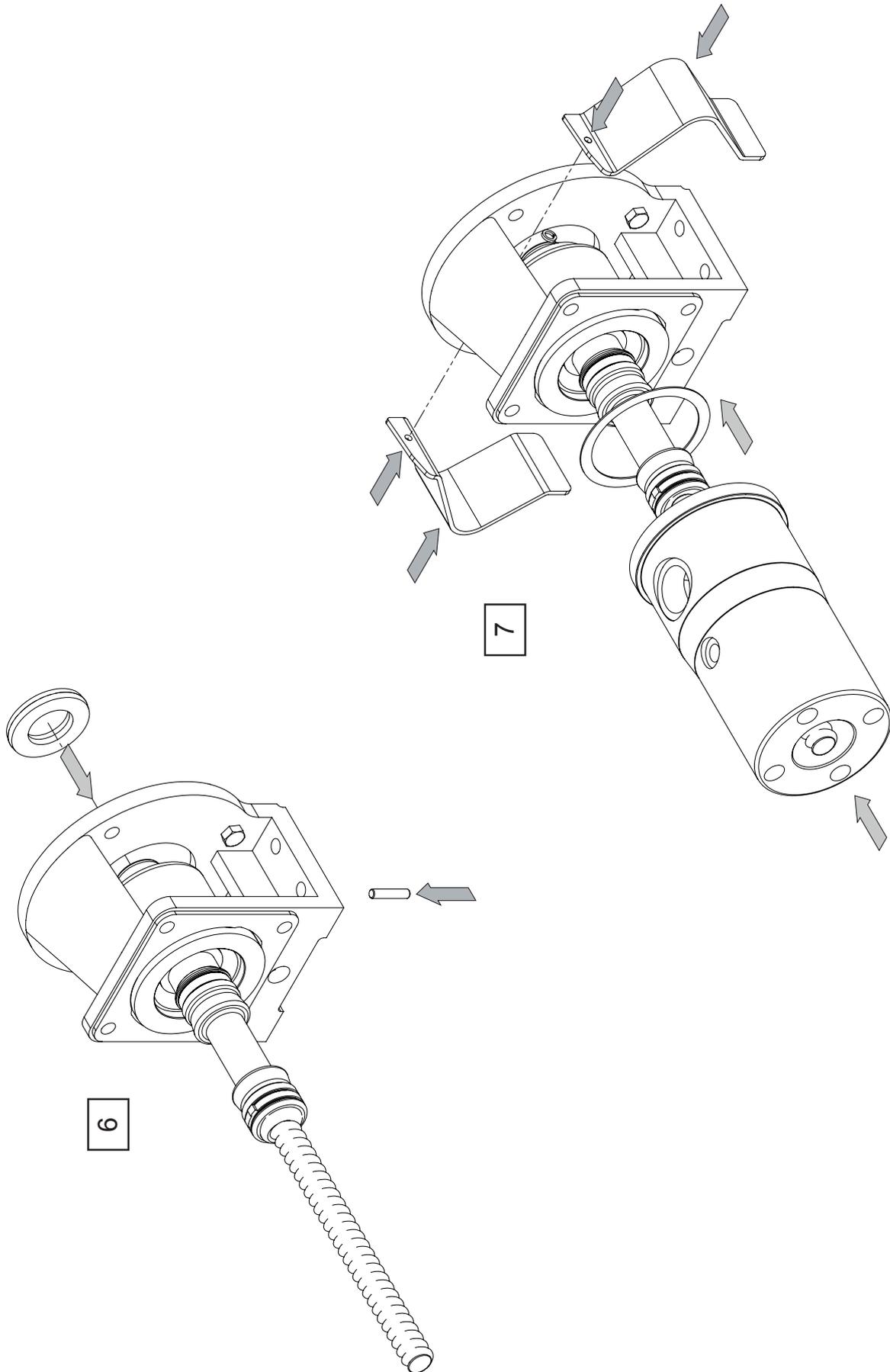
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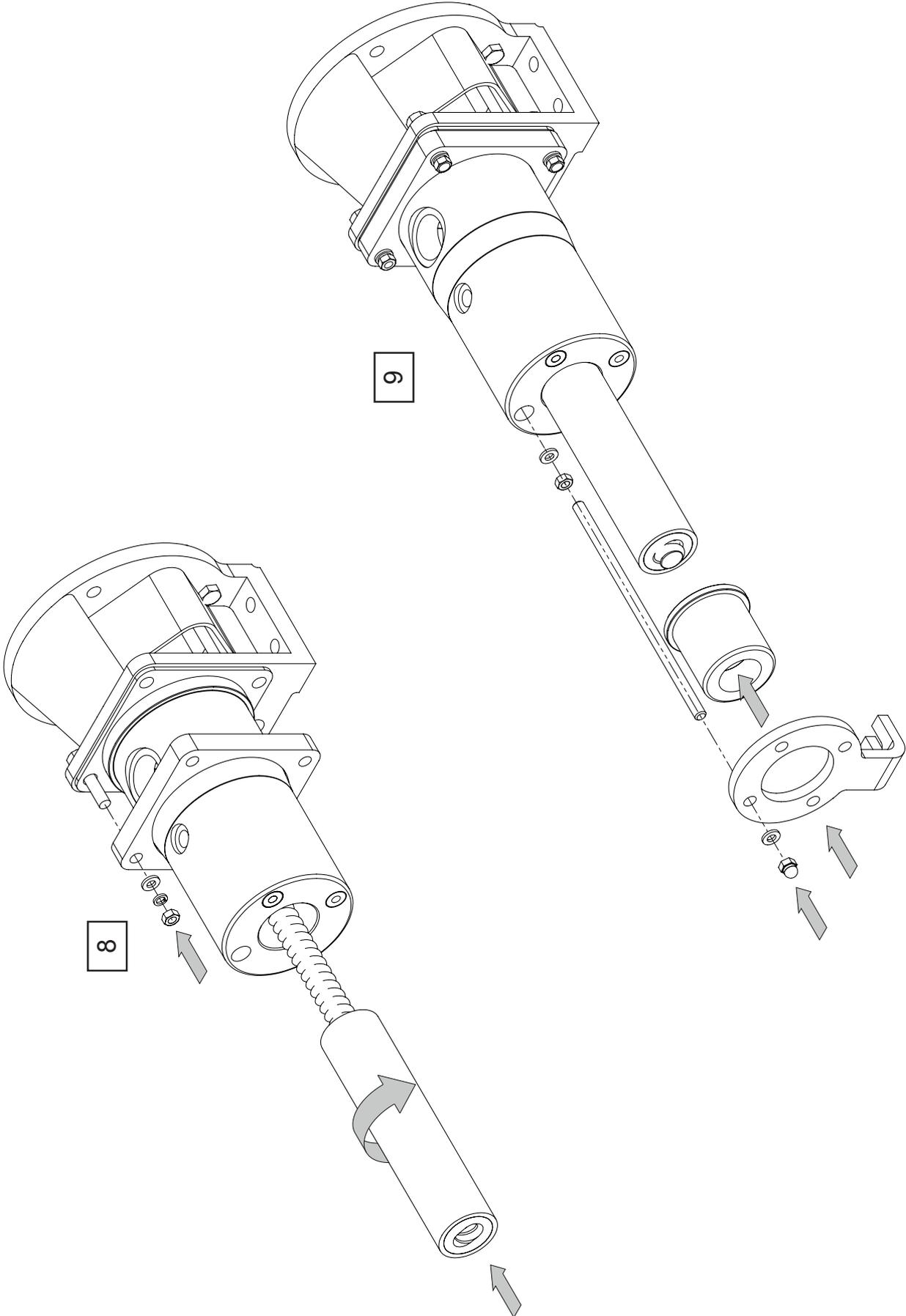
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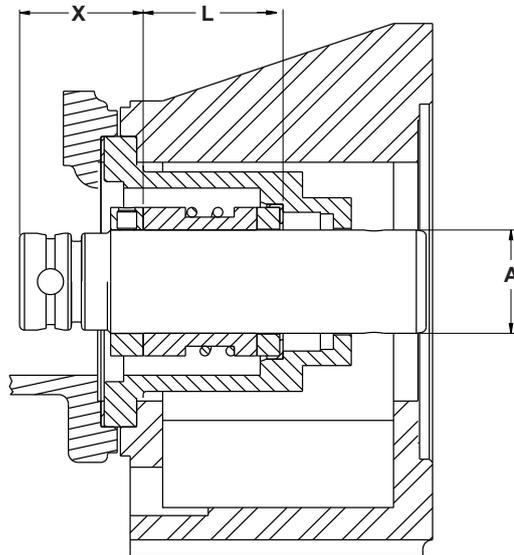
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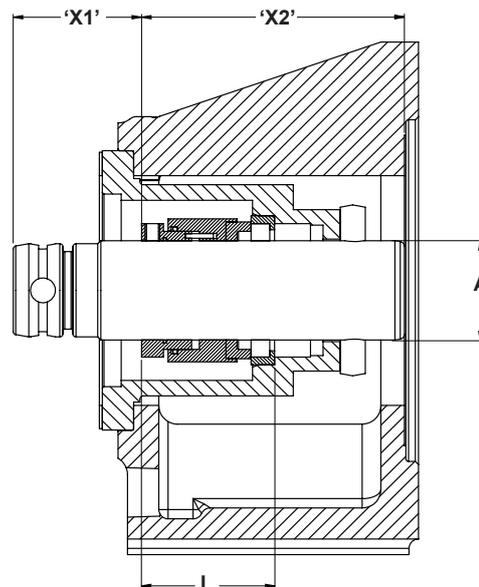
**16 Setting lengths for mechanical seals (inches)**

Metal parts	A Shaft diameter	Seal part no.	L Seal working length	X Setting distance
Stainless 316	1.26	M032195G	1.28	1.63



1297-00

Metal parts	A Shaft diameter	Seal part no.	L Seal working length	X1 Setting distance	X2 Setting distance
Hastelloy NH	1.26	M032192G	1.57	1.59	3.33



1424-00

**NOTE**

*These tables are not to be used for standard or DIN L1N working length seals. All seals use 'M' type seat except for 3.35" which uses 'BS' type or 'M' type. These tables are not necessarily compatible with any other seal type - please check with Sulzer.*

## 17 Pin joint lubrication

Model	Joint lubrication capacity per joint (inches <sup>3</sup> approx.)	Non-food applications		Food applications
		Recommended	Suitable alternative	
<b>LY2</b> <b>LW4</b> <b>LV8</b> <b>LT9</b>	0.37	KLUBERSYNTH GH6-460	MOBIL GEAR OIL SHC 320  MOBILITH SHC 007 SEMI-FLUID GREASE  SHELL RETINAX CSZ	KLUBEROIL 4 UHI 460





