

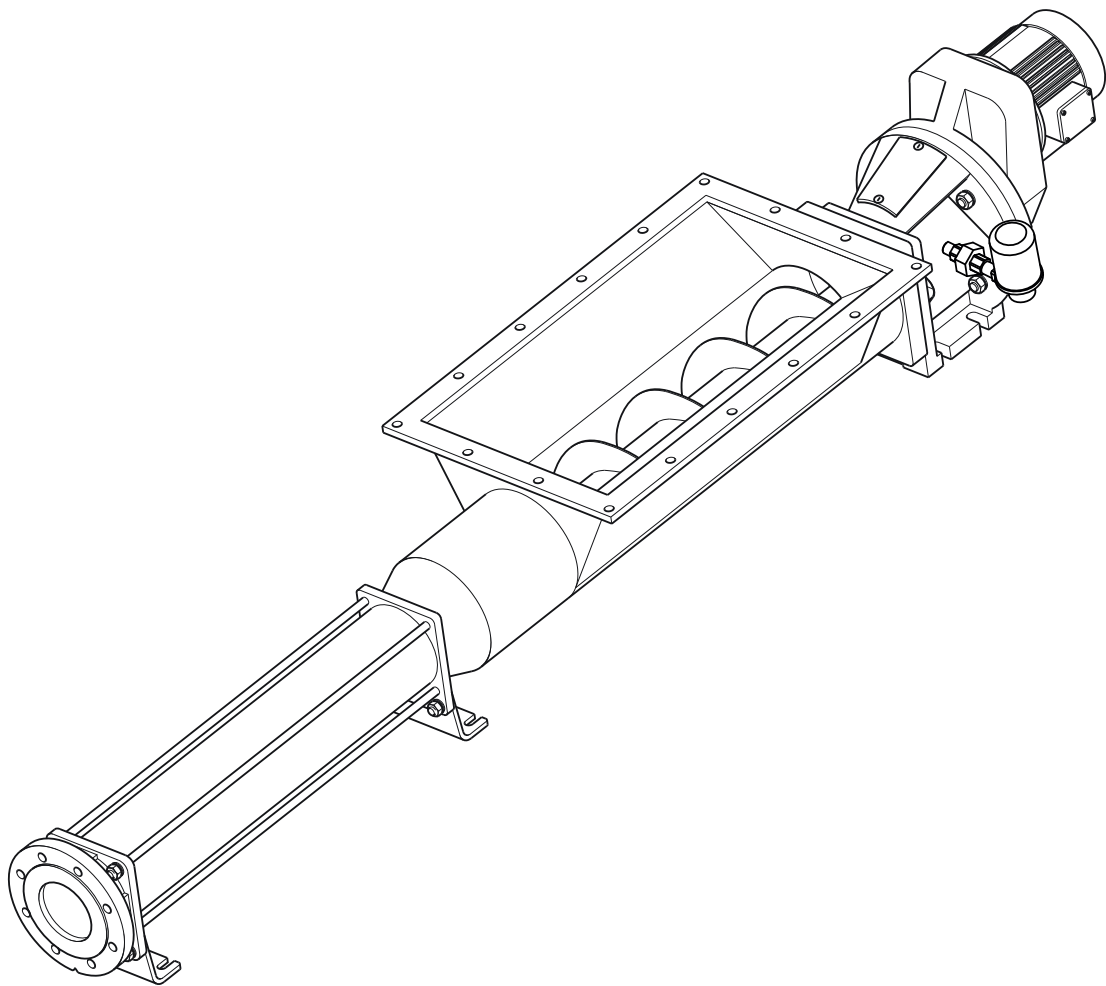
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## PC Cake Pump

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60 Hz

1339-00



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**FR: Déclaration de Conformité**  
**ES: Declaración de Conformidad**  
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**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/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.

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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. Installation****1.1 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.

**1.1.1 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.

**1.1.2 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.

**ii. Vertical mounting**

If it is intended to mount any pump in a vertical position, please consult Sulzer prior to ordering. Where a mechanical seal is fitted it must be provided with a suitable quench system.

**1.2 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.*

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### 1.3 Storage and infrequent operation

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

#### 1.3.1 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.

#### 1.3.2 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.**

### 1.4 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 2) 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.**

## 1.5 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.**

## 1.6 General safety



**All guards and removable maintain-in-place 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. Where Sulzer have supplied a bareshaft pump the onus is on the user to fit adequate guards in compliance with the requirements of the relevant regulations.**



**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 2), 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).

## 1.7 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.**

## 2 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.

### 2.1 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.**

### 2.2 Gland packing

Where a pump is supplied fitted with gland packing (manufactured from a non-asbestos material), the gland will require adjustment during the initial running-in period. Newly packed glands must be allowed to run-in with only finger-tight compression on the gland follower nuts. This should continue for about three days. The gland follower should be gradually tightened over the next week to achieve a leakage rate as shown in the table



below. Gland followers should be adjusted at regular intervals to maintain the recommended leakage flow rate. Under normal working conditions a slight drip from the gland under pressure assists in cooling and lubricating the packing. A correctly adjusted gland will always have a small leakage of fluid.



**When properly adjusted, packed gland sealing systems will always have a small leakage of potentially hazardous fluid. Adequate personal protective equipment must be worn at all times to prevent injury from hazardous leakage.**

**Typical leakage rates from packed glands:**

<b>Up to 2" shaft diameter</b>	2 drops per minute
<b>2 - 3" shaft diameter</b>	3 drops per minute
<b>3 - 4" shaft diameter</b>	4 drops per minute
<b>4 - 5" shaft diameter</b>	5 drops per minute
<b>5 - 6.3" shaft diameter</b>	6 drops per minute

A gland drip is, however, undesirable when handling corrosive, degreasing, or abrasive materials. Under these conditions the gland must be tightened the minimum amount whilst the pump is running, to ensure satisfactory sealing when under pressure, or to stop entry of air when under suction conditions.

The gland leakage of toxic, corrosive or hazardous liquids can cause problems of compatibility with the construction materials of the pumps.

Provision of a gland drain should be considered, especially for the leakage of hazardous products.



**Care is required when adjusting the gland whilst the pump is running.**

### 2.3 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.

Where a pump is supplied without a drive, it is necessary to fit the mechanical seal (supplied separately) prior to fitting the gearbox and motor.

### 2.4 Guards



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

### 2.5 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.

### 2.6 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.

### 2.7 Noise levels

1. The sound pressure level should not exceed 85 dB at 3.25 feet 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.

## 2.8 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.

## 2.9 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.

## 2.10 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.

## 2.11 Cake pumps

Cake pumps have auger feed screws, with or without a bridge breaker system to feed the pumping element. If the pump installation requires that these cannot be enclosed, care must be taken to ensure personnel cannot gain access whilst the pump is operating. If this is not possible an emergency stop device must be fitted nearby.

## 2.12 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.

## 2.13 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.

## 2.14 Adjustable stators

If adjustable stators are fitted then the following steps must be followed for adjusting the clamping devices.

The adjustable stator assembly is designed to give an even compression around the stator circumference. It is designed to be used when pump performance reduces through wear to an unacceptable level, to restore the required flow rate.

The stator compression is increased using the following steps:

1. Release the six locking screws half a turn.
2. Tighten the eight clamp screws until adjustment allowed by releasing the lock screws has been taken up.
3. Repeat steps 1 and 2 until the pump performance has been restored to its former level.

### NOTE

***It is imperative that when adjusting the stator, only sufficient pressure is placed on the stator to enable the capacity of the pump to be reinstated. Over-tightening of the stator could easily result in damage to the driver by overload and so extreme care must be taken when carrying out these adjustments. It is therefore advisable to make the adjustment while the pump is running and power readings can be monitored.***

Removal of adjustable stator :

The procedure for removal of an adjustable stator is the same as that of a standard one, except it is necessary to remove the clamp plates before the stator can be twisted off the rotor.

This can be done by undoing the clamp screws; then releasing the clamp plate by using the locking screws as jacking screws to remove the clamp plates.

Re-assembly will be done using the reverse procedure.

## **2.15 Maintenance of wearing components**

### **2.15.1 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.

### **2.15.2 Drive shaft - packed gland**

The wear rate of the gland area is dependent on many factors such as product abrasivity and speed. Regular gland maintenance will maximise the life of the shaft. Replacement of both the gland packing and shaft will be necessary when shaft sealing becomes difficult to achieve.

### **2.15.3 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.

### **2.15.4 Flexishaft drive pumps**

With this design there are no wearing items to replace in the drive train, however, if during routine inspection the shaft is visibly damaged / distorted or the protective coating is damaged, then this item should be replaced to avoid unexpected breakdowns.

## **2.16 Mechanical speed variators**

Refer to the manufacturers instructions.

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

## **3.0 Assembly and dismantling**

Sections 11 - 14 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 10).

### **3.1 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 nameplate.

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 guarantee referenced in the Terms and Conditions of Sale will be invalidated if replacement items are used that are not approved or manufactured by Sulzer.

### **3.2 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.

## 4 Pump coding

<b>Pump design</b>	Wide inlet			<b>W</b>								
<b>Nominal pump capacity at maximum speed and zero pressure</b>	5 USGPM @ 350 rev/min				<b>3</b>							
	22.5 USGPM @ 350 rev/min				<b>4</b>							
	45 USGPM @ 350 rev/min				<b>5</b>							
	77 USGPM @ 350 rev/min				<b>6</b>							
	126 USGPM @ 350 rev/min				<b>7</b>							
	150 USGPM @ 300 rev/min				<b>8</b>							
	176 USGPM @ 250 rev/min				<b>9</b>							
	216 USGPM @ 200 rev/min				<b>A</b>							
	379 USGPM @ 200 rev/min				<b>B</b>							
	683 USGPM @ 200 rev/min				<b>C</b>							
	947 USGPM @ 200rpm				<b>D</b>							
<b>Pump stages</b>	One							<b>1</b>				
	Two							<b>2</b>				
	Four							<b>4</b>				
	Six							<b>6</b>				
	Eight							<b>8</b>				
<b>Body materials</b>	Cast iron									<b>C</b>		
	Stainless steel									<b>S</b>		
<b>Rotating parts</b>	Alloy steel with HCP										<b>1</b>	
	Stainless steel AISI 316										<b>2</b>	
	Stainless steel AISI 316 + HCP										<b>3</b>	
<b>Rotor Size (temp)</b>	Mk 0 (oversized)										<b>Z</b>	
	Mk 1 (standard)										<b>A</b>	
	Mk 3 (temperature)										<b>C</b>	
	Mk 5 (temperature)										<b>E</b>	
<b>Stator material</b>	Natural										<b>A</b>	
	EPDM										<b>E</b>	
	High nitrile										<b>J</b>	
	Nitrile NBR										<b>R</b>	
	Fluoroelastomer / Viton										<b>V</b>	
	Hypalon										<b>H</b>	
	White NBR										<b>W</b>	
	Polyester based urethane										<b>K</b>	
Polyether based urethane										<b>Y</b>		
<b>Mechanical seal pump design</b>	Standard auger										<b>J</b>	
	Large auger										<b>H</b>	
	Ribbon auger										<b>K</b>	
	Bridge breaker drive options											<b>D</b>
												<b>E</b>
<b>Packed gland pump design</b>	Standard										<b>S</b>	
	Large auger										<b>L</b>	
	Ribbon auger										<b>R</b>	
	Bridge breaker drive options											<b>B</b>
												<b>C</b>
<b>Prime mover arrangements and build selection</b>	Close coupled										<b>1</b>	
											<b>2</b>	
											<b>3</b>	
											<b>4</b>	
	Bareshaft										<b>5</b>	

Example:

**W B 6 C 3 A R E 3**

### 5 Recommended lifting points

1241-00

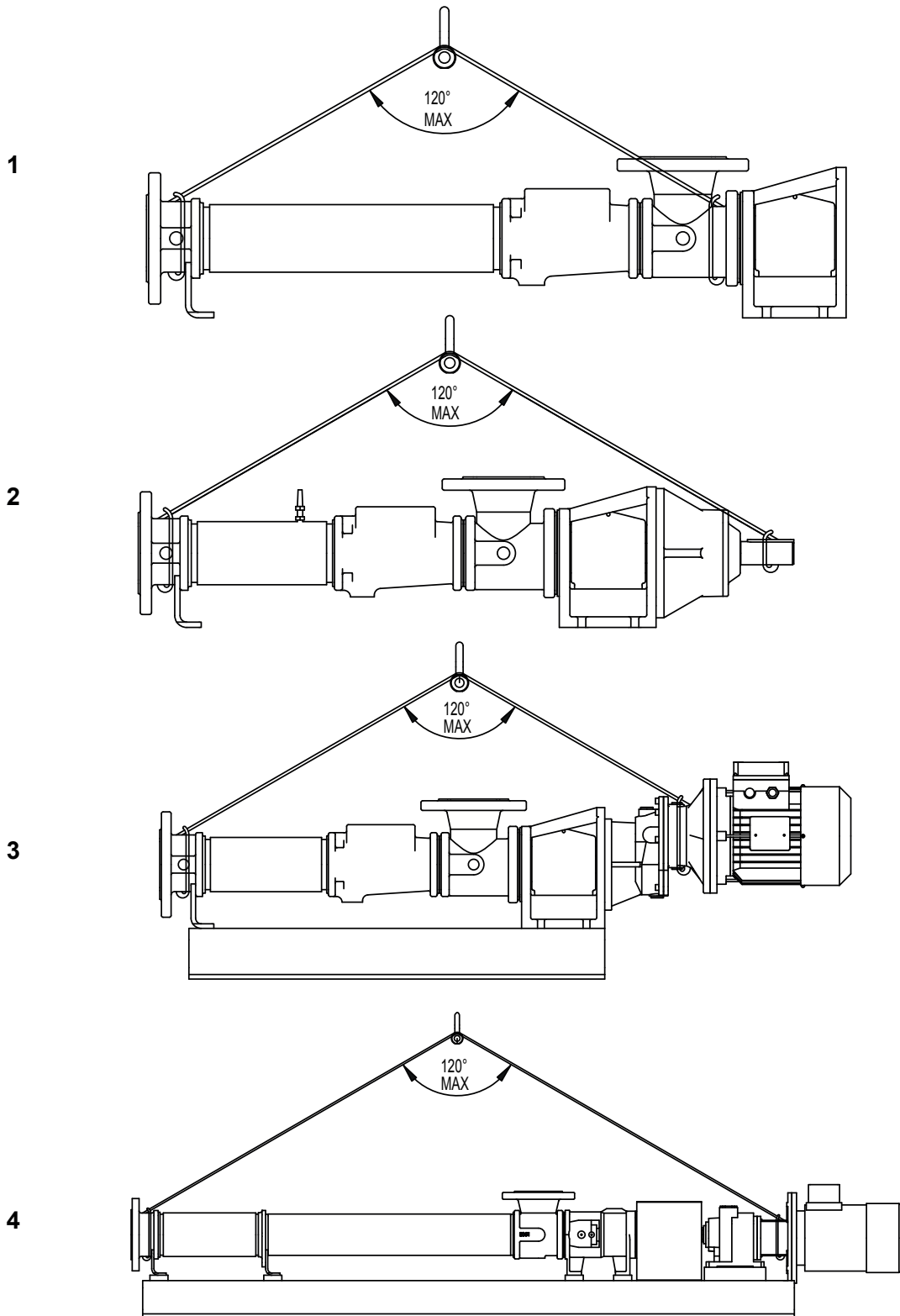


Figure 1. recommended lifting points

\*Choke



## 6 Pump and wear part weights (lb)

### 6.1 Standard auger

Model	Close coupled pump	Bareshaft pump	Stator	Rotor	Auger / Conveyor	Shaft
W32	70.5	88	3.3	3.1	4.6	1.5
W34	97	126	7.7	6.6	5.7	3.5
W41	143	172	4.5	6.2	9.7	1.5
W42	119	148	8.5	10.4	9.7	3.5
W44	170	198.5	17.2	20.5	7.1	6.4
W51	165	183	9.3	12	5.5	3.5
W52	187	216	18.3	20.5	10	6.4
W54	282	333	35.7	37	15.7	9.7
W61	247	275.5	16.8	20.5	10	6.4
W62	311	359	32	34.6	19.6	9.7
W64	458.5	525	62.2	64.4	31.5	9.7
W71	306	355	22.7	32.4	37	9.7
W72	368	419	43	54	37	9.7
W74	630.5	703	83.8	108.7	34	19.2
W81	304	392	30.6	43.9	37	9.7
W82	487	553	58.2	75.8	34	19.2
W84	765	840	113	146.4	39	20.9
W91	485	551	48	62.8	40.3	19.2
W92	635	701	91.3	106.5	40.3	19.2
WA1	566.5	633	65	96	40.3	19.2
WA2	813.5	886	123	157	64.2	20.9
WB1	831	904	121	165.8	62.6	20.9

### 6.2 Large auger

Model	Close coupled pump	Bareshaft pump	Stator	Rotor	Auger / Conveyor	Shaft
W42	187.4	213.8	8.4	10.4	29.1	3.5
W44	233.7	262.3	17.2	20.5	29.1	6.4
W52	244.7	271.2	18.3	20.5	40.1	6.4
W54	330.7	377	35.7	37	40.1	9.7
W62	396.8	485	32	34.6	84.2	9.7
W64	535.7	600	62.2	64.4	76.7	9.7
W72	487.2	535.7	43	54	93.9	9.7
W74	771.6	815.7	83.8	108.7	93.9	19.2
W82	665.8	729.7	58.2	75.8	145.3	19.2
W84	972.2	992	113.3	146.4	145.3	20.9
W92	773.8	835.6	91.3	106.5	170.6	19.2
WA2	-	1146.4	123	156.7	232.1	20.9
WA4	-	1,466	2 x WA2	352.7	170.6	51.6
WB2	-	1477.1	300.0	310.9	170.6	51.6
WB4	-	2072.3	2 x WB2	595.2	170.6	114.6
WC1	-	1400	198.4	335	146.8	51.6
WC4	-	-	2 x 186	1102	-	97
WD1	-	1543.0	264.6	403.4	146.8	51.6

**7 Diagnostic chart**

<b>Symptoms</b>	<b>Possible causes</b>
1. NO DISCHARGE	1. 2. 3. 7. 26. 28. 29.
2. LOSS OF CAPACITY	3. 4. 5. 6. 7. 8. 9. 10. 22. 13. 16. 17. 21. 22. 23. 29
3. IRREGULAR DISCHARGE	3. 4. 5. 6. 7. 8. 13. 15. 29.
4. PRIMING LOST AFTER START	3. 4. 5. 6. 7. 8. 13. 15
5. PUMP STALLS AT START UP	8. 11. 24.
6. PUMP OVERHEATS	8. 9. 11. 12. 18. 20
7. MOTOR OVERHEATS	8. 11. 12. 15. 18. 20.
8. EXCESSIVE POWER ABSORBED BY PUMP	8. 11. 12. 15. 18. 20
9. NOISE AND VIBRATION	3. 4. 5. 6. 7. 8. 9. 11. 13. 15. 18. 19. 20. 22. 23. 27. 31
10. PUMP ELEMENT WEAR	9. 11.
11. EXCESSIVE GLAND OR SEAL WEAR	12. 14. 25. 30.
12. GLAND LEAKAGE	13. 14.
13. SEIZURE	9. 11. 12. 20.
<b>List of causes</b>	<b>Remedial actions</b>
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 overtight	12. Adjust gland see o&m instructions
13. Gland undertight	13. Adjust gland see o&m instructions
14. Gland flushing inadequate	14. Check fluid flows freely into gland
15. Pump speed above rated figure	15. Decrease pump speed
16. Pump speed below rated figure	16. Increase pump speed
17. Belt drive slipping	17. Re-tension belts
18. Coupling misaligned	18. Check and adjust alignment
19. Insecure pump/drive mounting	19. Check and tighten all pump mountings
20. Shaft bearing wear/failure	20. Replace bearings
21. Worn pump element	21. Fit new parts
22. Relief valve chatter	22. Check condition of valve/renew
23. R.V. incorrectly set	23. Re-adjust spring compression
24. Low voltage	24. Check voltage/wiring sizes
25. Product entering packing area	25. Check packing condition and type
26. Drive train breakage	26. Check and replace broken components
27. Negative or very low delivery head	27. Close delivery valve slightly
28. Discharge blocked/valve closed	28. Reverse pump/relieve pressure/clear blockages
29. Stator turning	29. Replace worn parts/tighten up stator bolts
30. Stuffing box 'eats' packing	30. Check for worn shaft and replace
31. Vee belts	31. Check and adjust tension or replace

## 8 Drawing reference numbers

### 8.1 All models

Drawing reference	Description	Drawing reference	Description
01A	Body	38C	Coupling end
01B	Bearing housing	38D	Drive flange
01C	Bearing housing	38E	Paddle shaft
01D	Bearing housing	12B	Anti-rotation ring
02A	Gear box mounting bracket	42A	Thrower
02B	Bearing mounting plate	59A	Access port cover
02C	Bearing block	62A	Support foot
02D	Bearing block	62B	Support foot
06A	Nameplate (SOG)	65A	Gland section
08A	Gland follower	75A	Sleeve (rotor)
10A	Gland packing / mech seal	75B	Sleeve (shaft)
10B	Rotary shaft lipseal (optional)	76A	Adaptor flange
11A	Bearing cover	78A	Spur gear
11B	Bearing cover	95A	Tie bar
11C	Bearing cover	95C	Tie bar
12A	Anti-rotation ring	P601	Hex head bolt
15A	Thrower guard	P602	Spring washer
15B	Guard (gears)	P603	Plain washer
15C	Guard (coupling)	P604	Hex nut
17A	Adaptor ring	P701	Bearing
20B	Gasket gland	P702	Bearing
20E	Gasket - bearing mounting plate	P703	Lipseal
20F	Gasket - bearing block	P704	Lipseal
20G	Gasket - bearing block	P705	Spring retaining clip
20H	Gasket - throat / feed chamber	P706	Spring retaining clip
20M	Gasket - access port	P707	Spring retaining clip
22A	Stator	P708	Spring retaining clip
23A	Throat	P709	Key
23B	Feed chamber	P710	Key
24A	End cover	P711	Pin
25A	Rotor	P712	Pin
27A	Coupling rod bush (rotor)	P713	Grease nipple
27B	Coupling rod bush (shaft)	P714	Grease nipple
27C	Bush (rotor)	P715	Grease nipple
27D	Bush (shaft)	P716	Hex head bolt
28A	Sealing cover (rotor)	P717	Spring washer
28B	Sealing cover (shaft)	P718	Plain washer
29A	Coupling rod pin (rotor)	P719	Hex head bolt
29B	Coupling rod pin (shaft)	P720	Spring washer
29C	Shaft pin	P721	Plain washer
32A	Drive shaft	P722	Stud
32B	Stub shaft (gears)	P723	Spring washer
32C	Stub shaft (gears)	P724	Plain washer
32D	Stub shaft (blank)	P725	Hex nut
32E	Stub shaft (blank)	P726	Hex head bolt
38F	Auger adapter sleeve (rotor)	P727	Spring washer
38G	Auger adapter sleeve (shaft)	P728	Plain washer
35A	Bearing spacer	P729	Hex nut
35B	Yoke shaft	P730	Stud
38A	Conveyor assembly	P731	Spring washer
38B	Coupling end	P732	Plain washer

Drawing reference	Description	Drawing reference	Description
P733	Hex nut	P803	Plain washer
P734	Grub screw	P804	Coupling G"B" flange
P735	Drive screw	P805	Coupling G"B" flange
P736	Plain washer	P806	Coupling insert
P801	Stud	P807	Grub screw
P802	Spring washer	P808	Grub screw

## 8.2 All except W88, WA4, WB2, WC4 & WD1

Drawing reference	Description	Drawing reference	Description
P101	Hex head bolt / stud	P407	Key
P102	Spring washer	P420	Locknut
P103	Plain washer	P421	Locking washer
P104	Hex nut	P422	Socket head cap screw
P105	Drive screw	P423	Socket head cap screw
P106	Hex head bolt	P501	Taper plug
P107	Spring washer	P502	Taper plug
P108	Plain washer	P503	Spring washer
P109	Hex nut	P504	Plain washer
P110	Bearing	P505	Hex nut
P111	Bearing	P506	Spring washer
P112	Lipseal	P507	Plain washer
P113	Lipseal	P508	Hex nut
P120	Hex head bolt	P509	Hex head bolt
P121	Spring washer	P510	Spring washer
P122	Plain washer	P511	Plain washer
P123	Hex nut	P512	Hex nut
P124	Hex head bolt	P513	Hex head bolt
P125	Spring washer	P514	Spring washer
P201	Plug	P515	Plain washer
P202	Hex head bolt	P516	Hex nut
P203	Plain washer	P517	Stud
P204	Hex nut	P518	Plain washer
P401	Toroidal seal ring	P519	Spring washer
P402	Toroidal seal ring	P520	Hex nut
P403	Spiral retaining ring	P530	Socket head cap screw
P404	Spiral retaining ring	P531	Plain washer
P405	Tie sealing cover	P532	Spring washer
P406	Tie sealing cover		

## 8.3 WC4 only

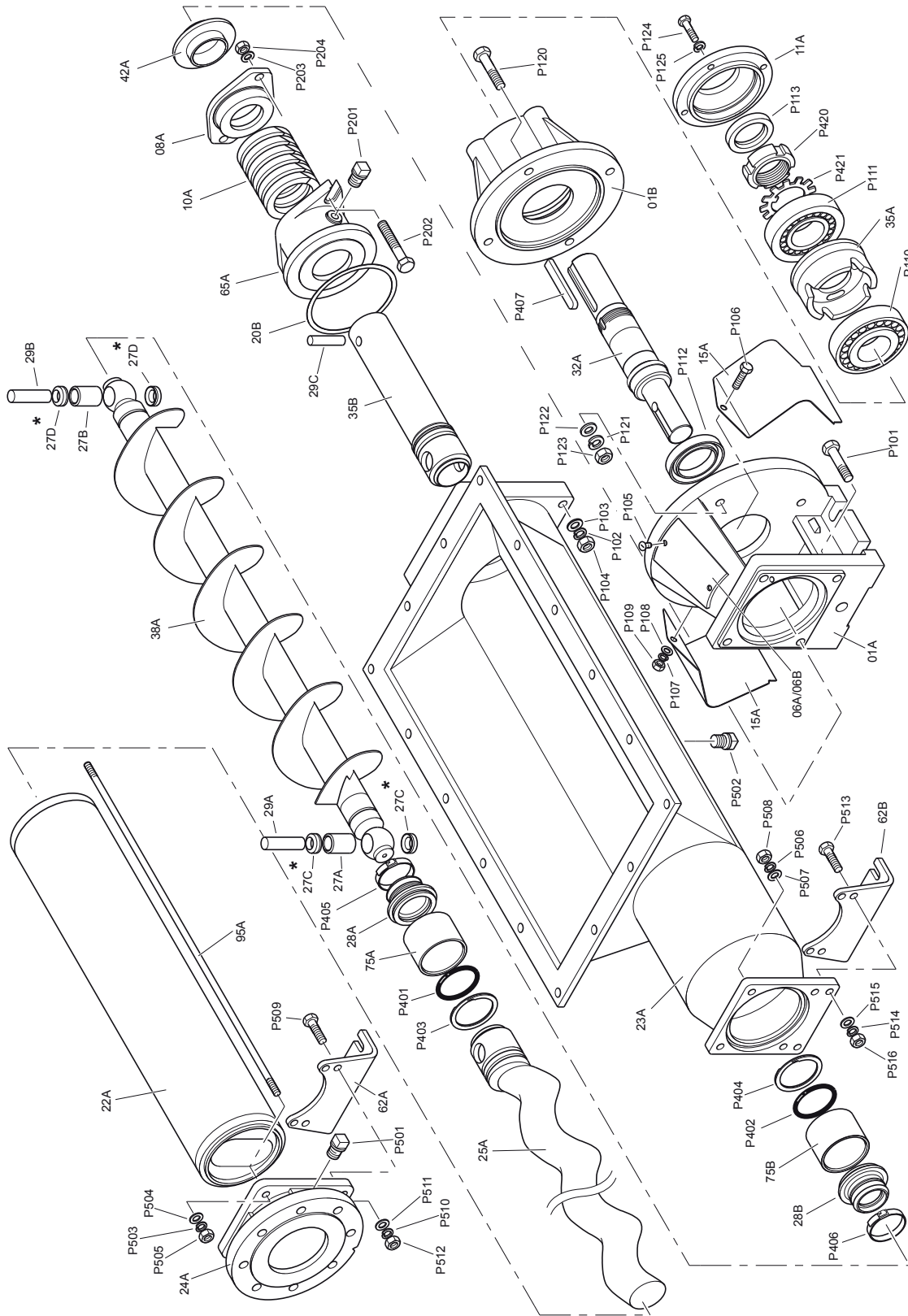
Drawing reference	Description	Drawing reference	Description
P435	Countersunk screw	P437	Toroidal seal ring
P436	Countersunk screw	P438	Toroidal seal ring

## 8.4 W88, W04, W22, W54 & WD1 only

Drawing reference	Description	Drawing reference	Description
P101	Bearing	P430	Socket head cap screw
P102	Bearing	P431	Taper plug
P103	Lipseal	P501	Taper plug
P104	Lipseal	P502	Taper plug
P105	Hex head bolt	P503	Hex nut
P106	Hex nut	P504	Spring washer
P107	Plain washer	P505	Plain washer
P108	Spring washer	P506	Hex nut
P110	Plain washer	P507	Spring washer
P111	Hex head bolt	P508	Plain washer
P112	Spring washer	p509	Hex nut
P201	Hex head bolt	P510	Spring washer
P202	Hex nut	P511	Plain washer
P203	Plain washer	P512	Hex nut
P211	Plug	P513	Spring washer
P402	Tor. seal ring	P514	Plain washer
P405	Tie sealing cover	P515	Stud
P406	Tie sealing cover	P516	Hex nut
P407	Key	P517	Spring washer
P420	Locknut	P518	Plain washer
P421	Locking washer	P519	Hex head bolt
P422	Socket head cap screw	P521	Spring washer
P423	Socket head cap screw	P522	Plain washer
P424	Socket head cap screw	P530	Hex head bolt
P425	Socket head cap screw	P531	Plain washer
P426	Sealing washer	P532	Spring washer
P427	Sealing washer	P540	Clamp
P428	Sealing washer	P550	Hex head bolt
P429	Sealing washer	P551	Hex nut

**9 Exploded view drawings**

**9.1 Standard bareshaft, all sizes except W74, W84, W88, WA2, WA4, WB1, WB2, WB4, WC1, WD1**

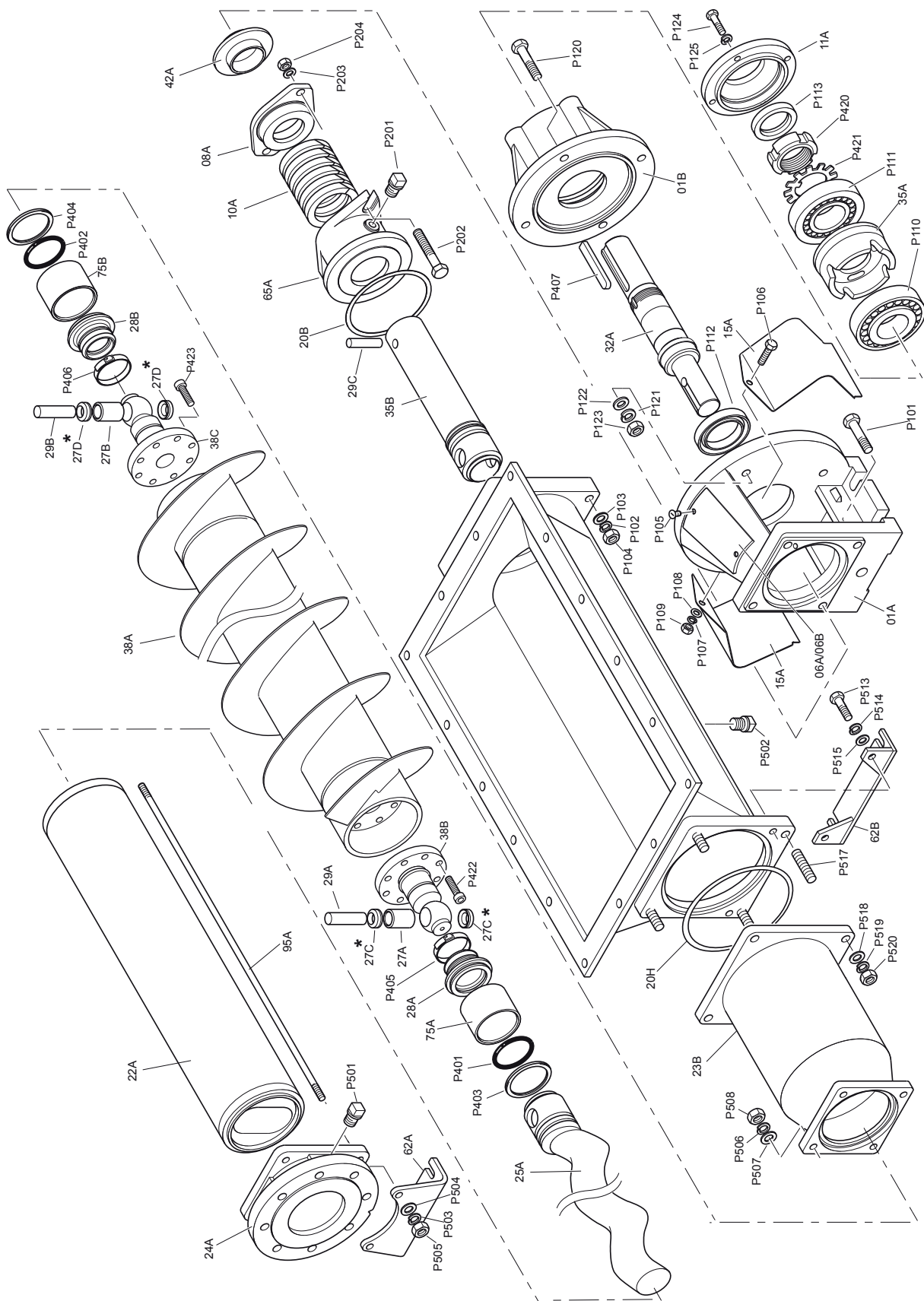


1340-00

\* where fitted



## 9.2 Large auger shaft, all sizes except W74, W84, W88, WA2, WB4

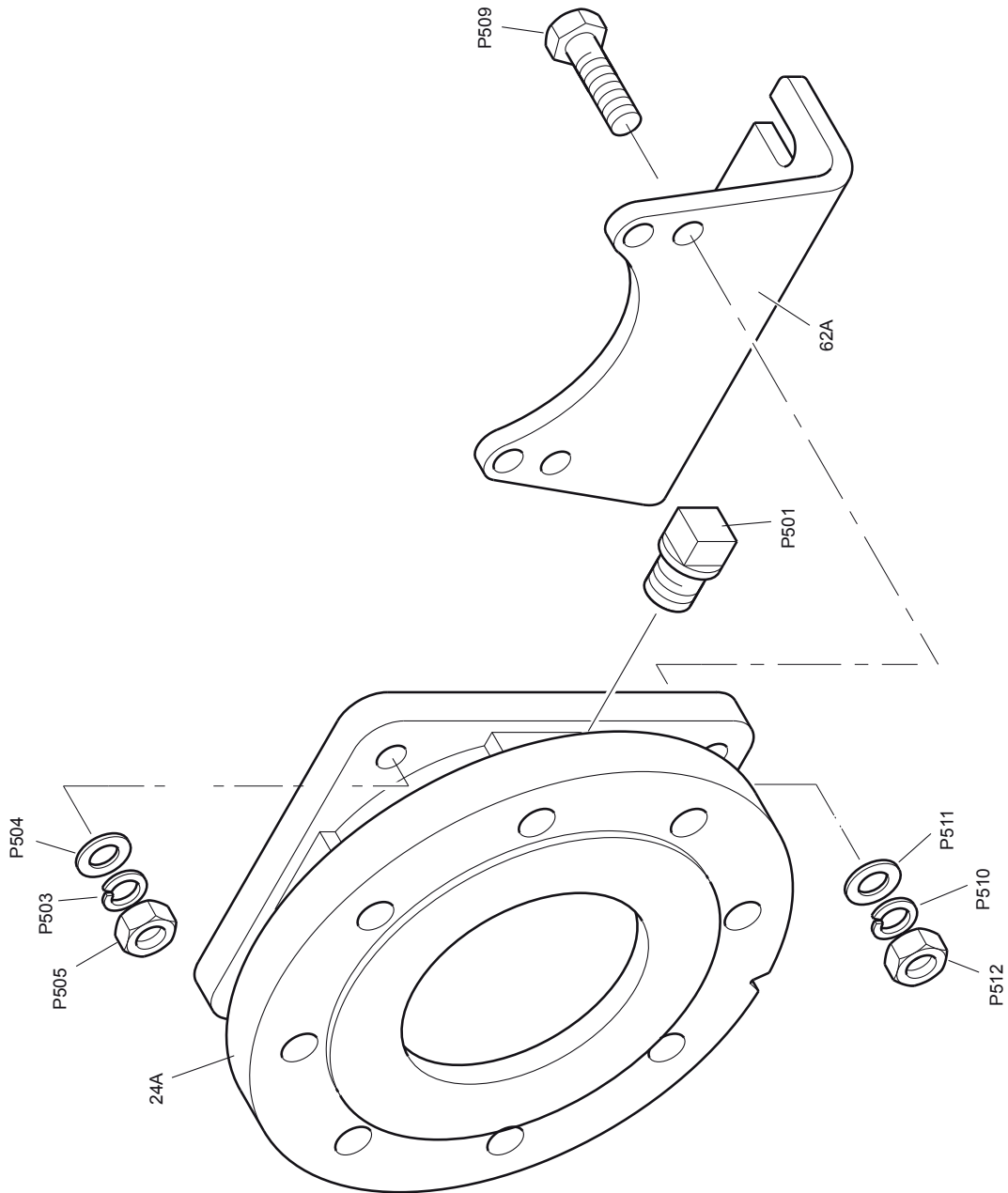


1341-00

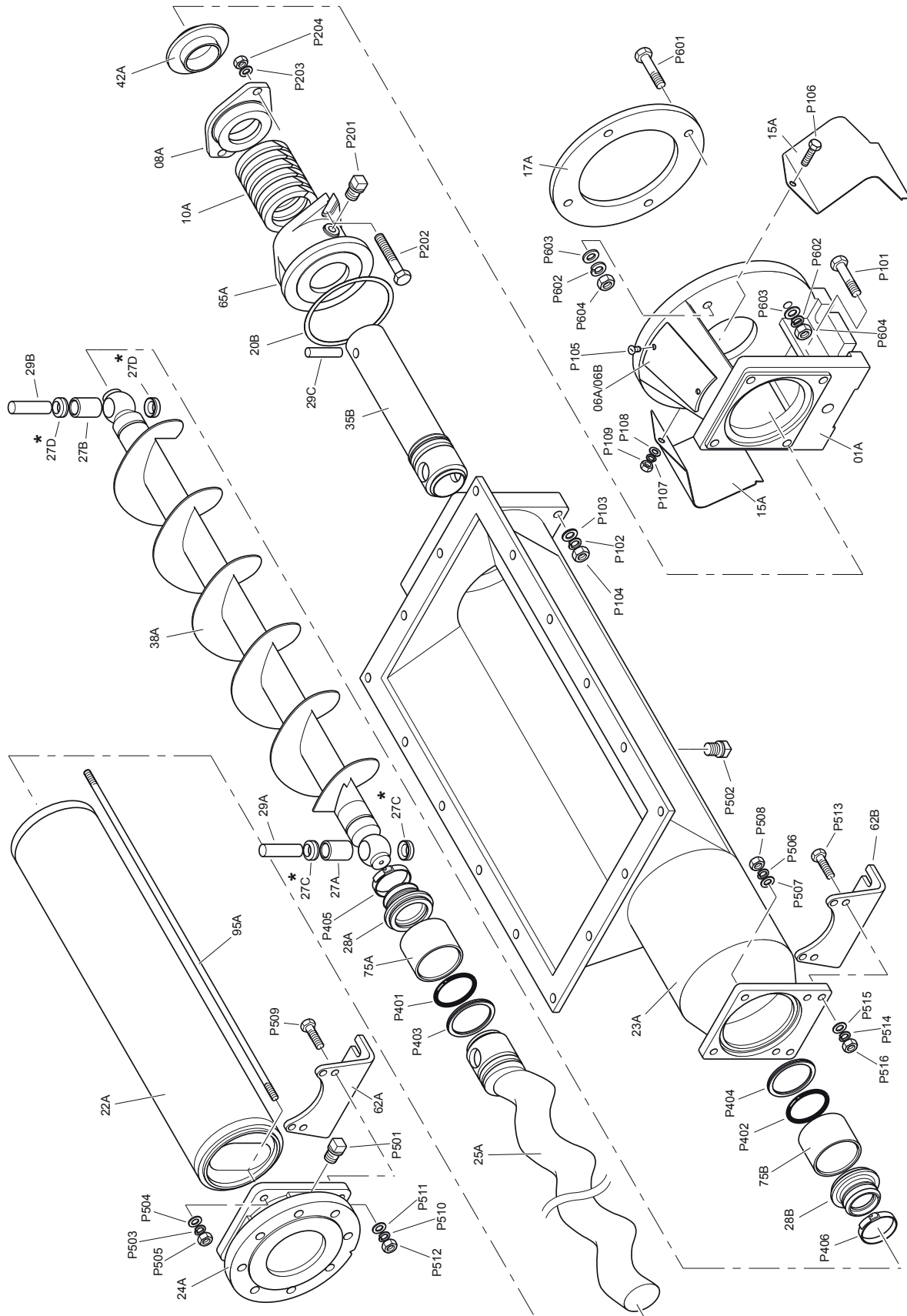
\* where fitted

9.3 Standard bareshaft WA2 only

1342-00

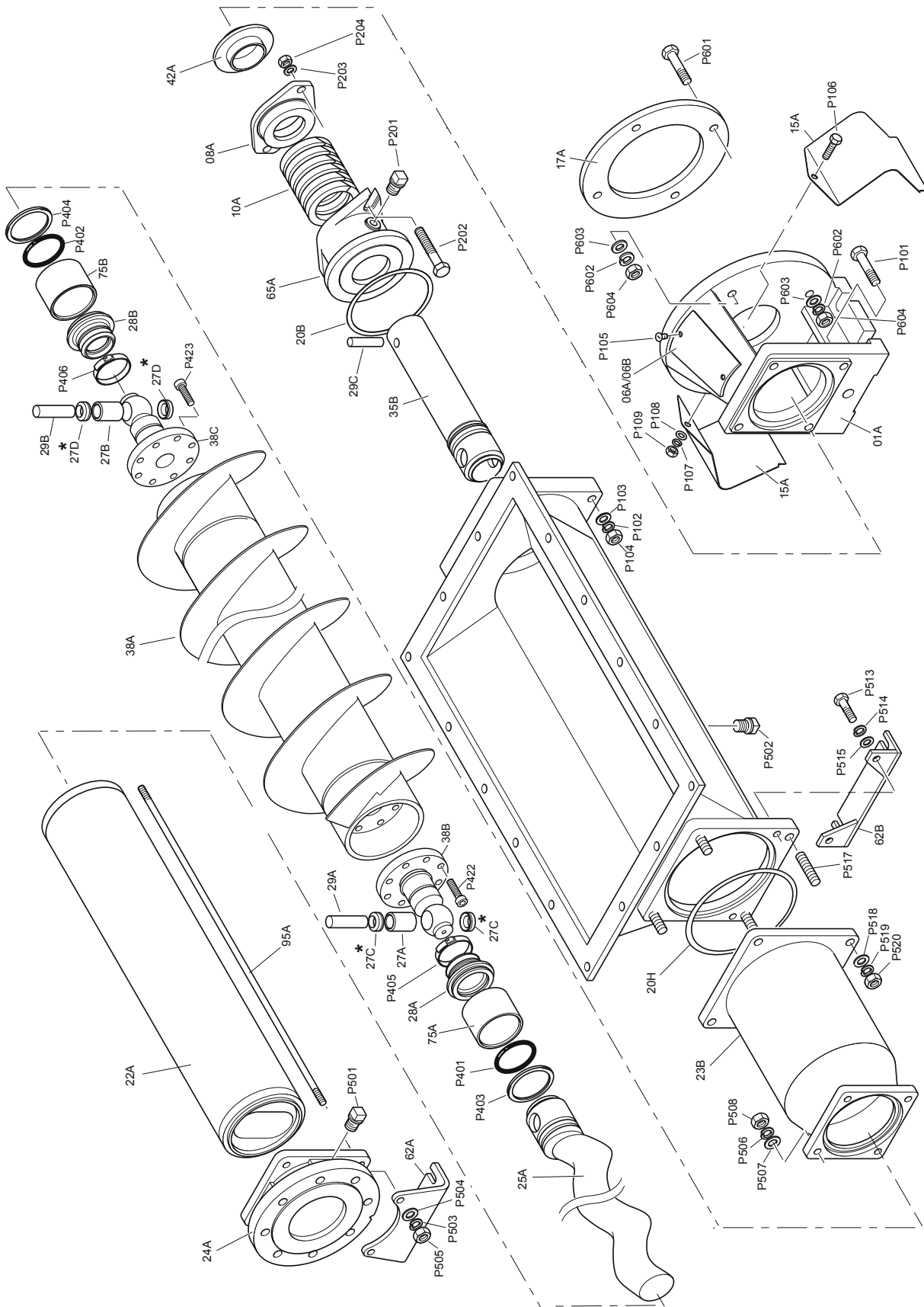


## 9.4 Standard close coupled



\* where fitted

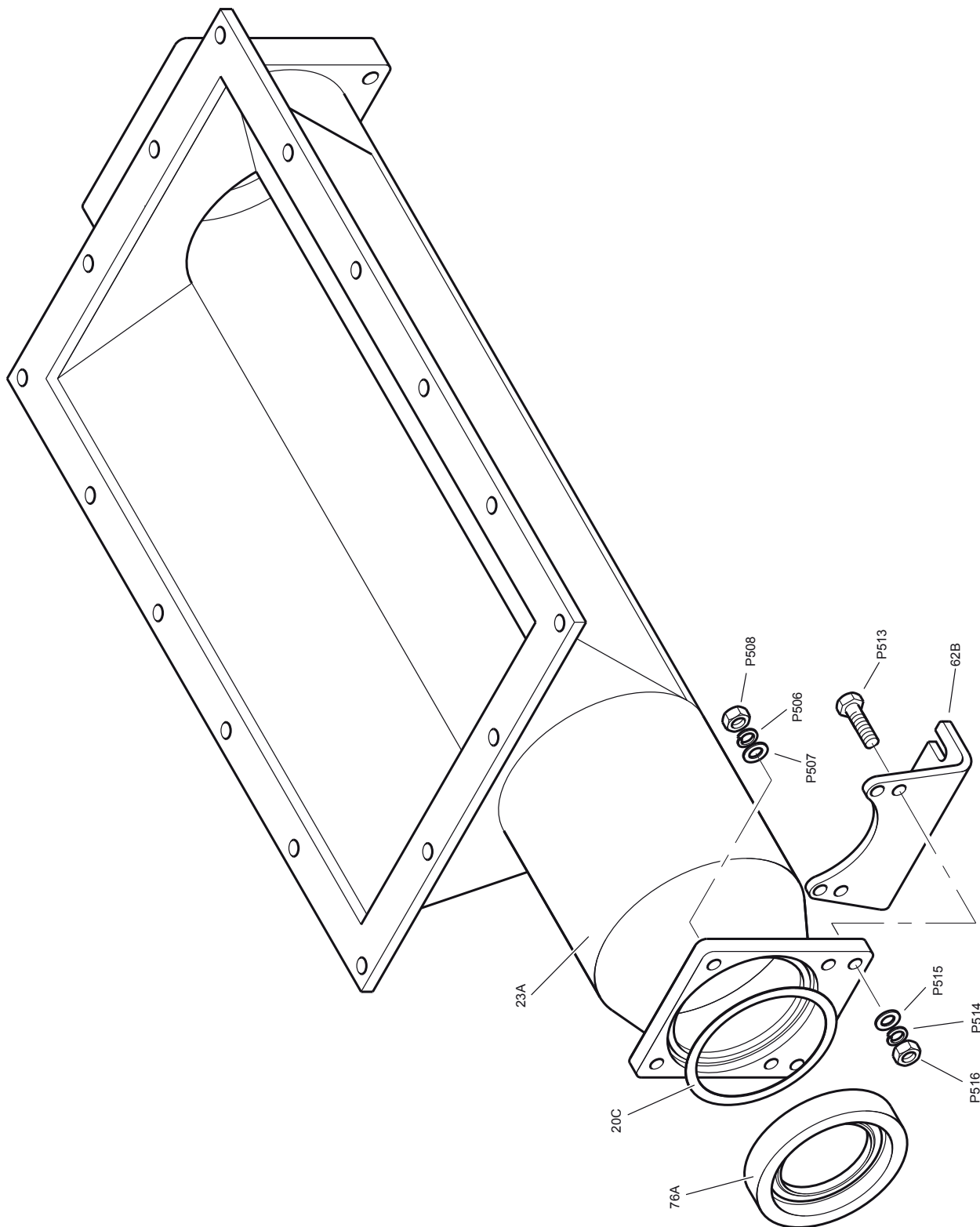
**9.5 Large auger close coupled**



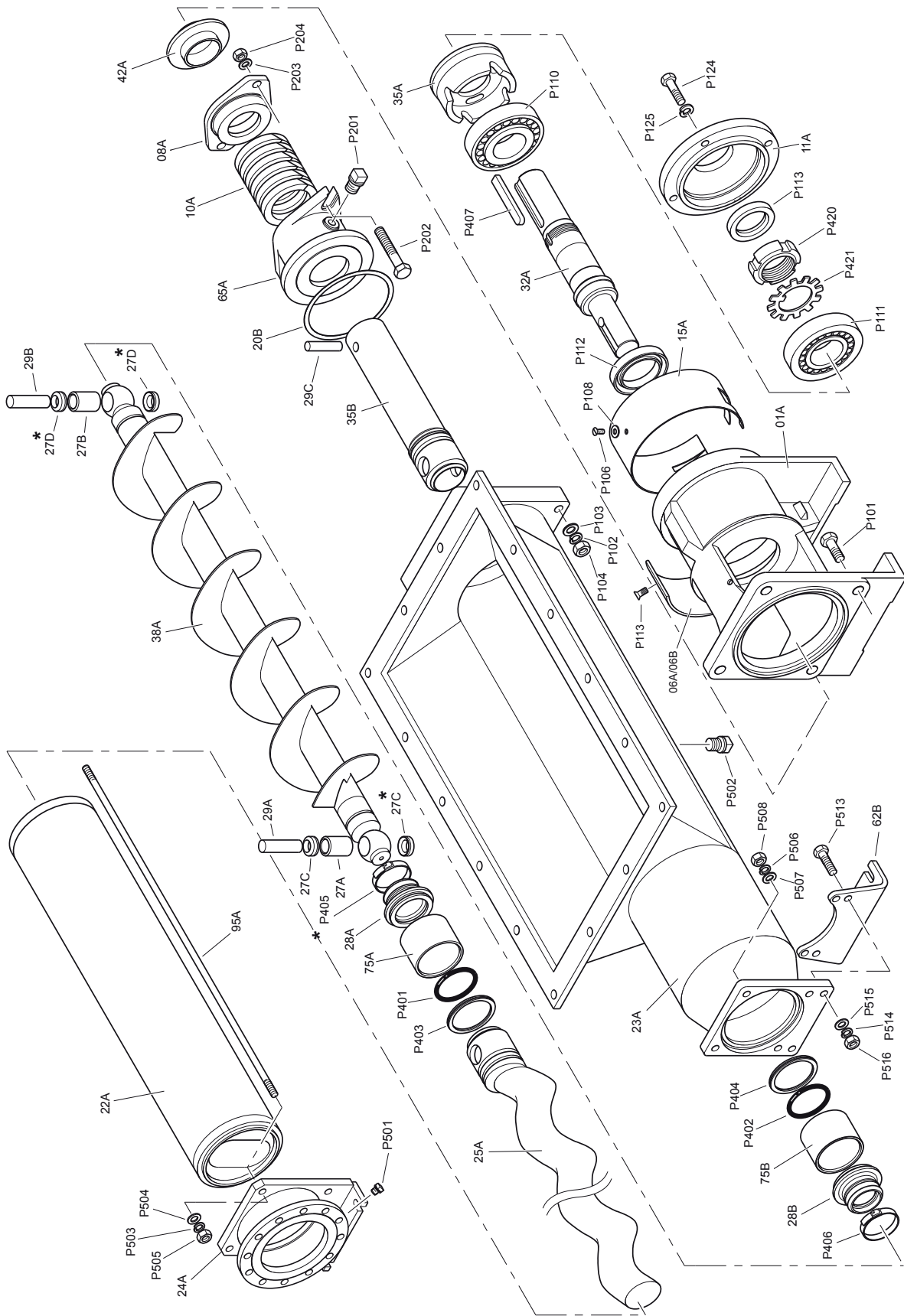
1344-00

\* where fitted

## 9.6 W34



**9.7 Standard bareshaft W74, W84, WA2, WB1 only**

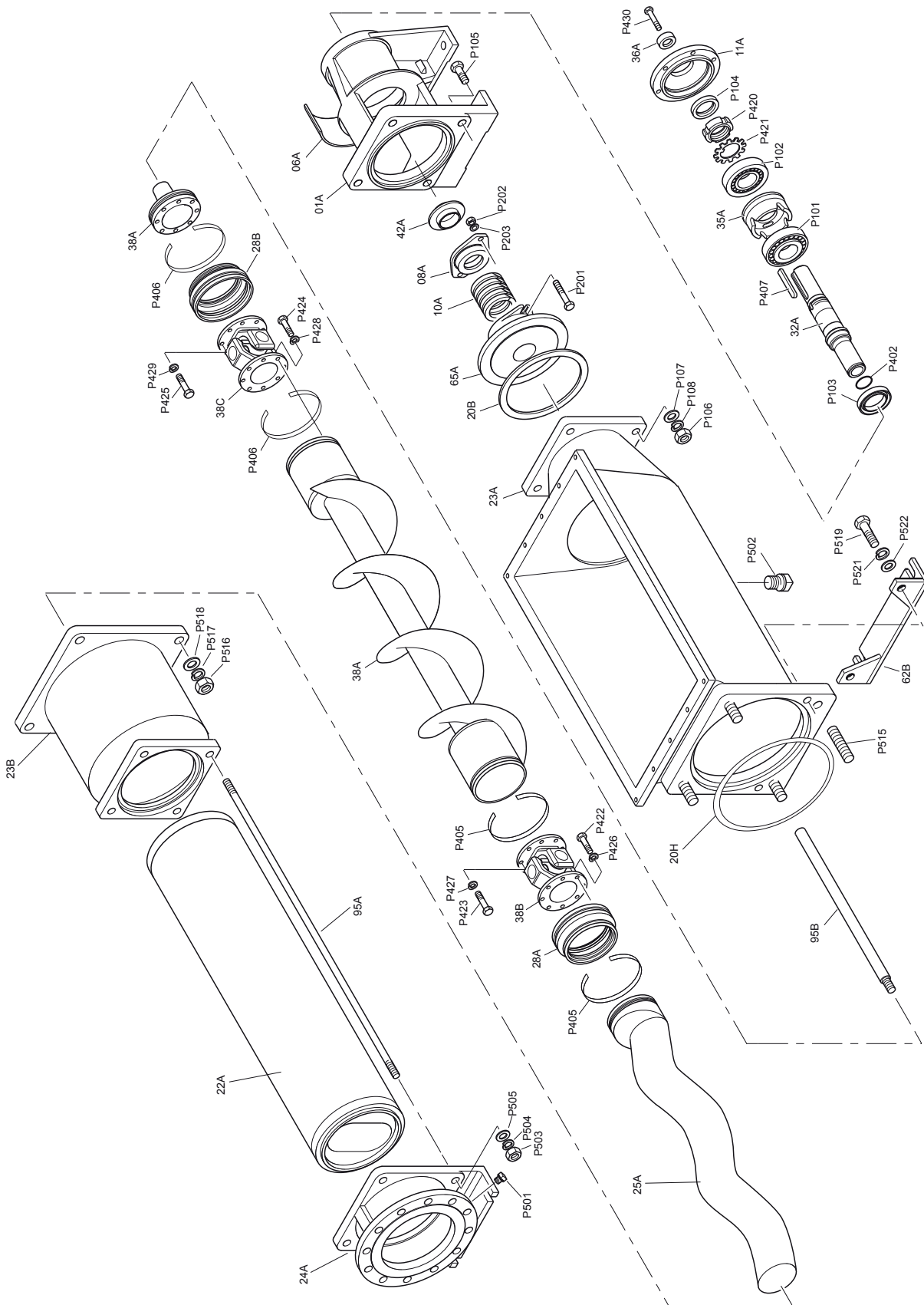


\* where fitted



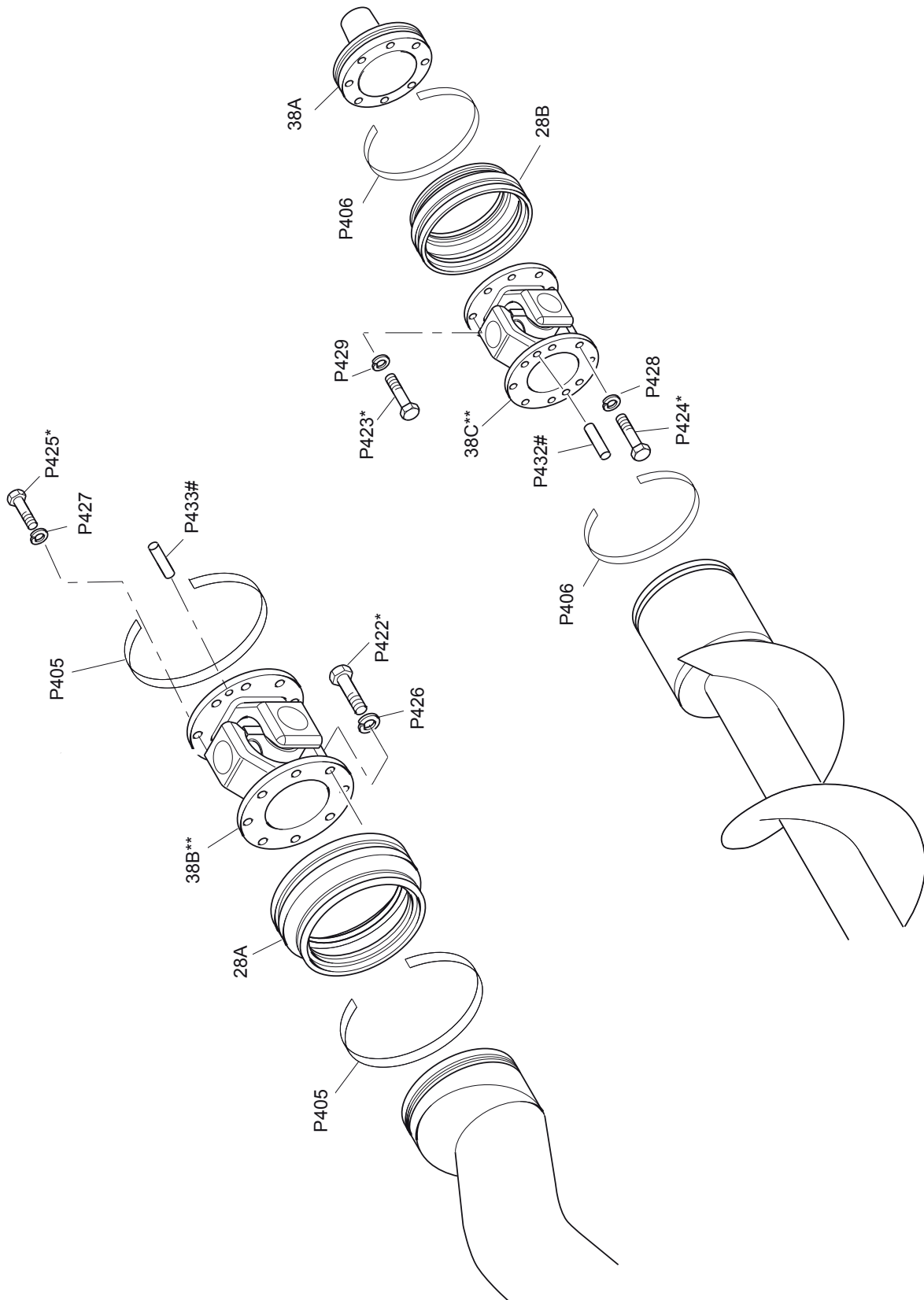


**9.9 Standard bareshaft W88, WA4, WB2, WB4, WC1, WD1 only**



1348-00

## 9.10 Joint detail W088, WA4, WB2, WB4, WC1, WD1 only



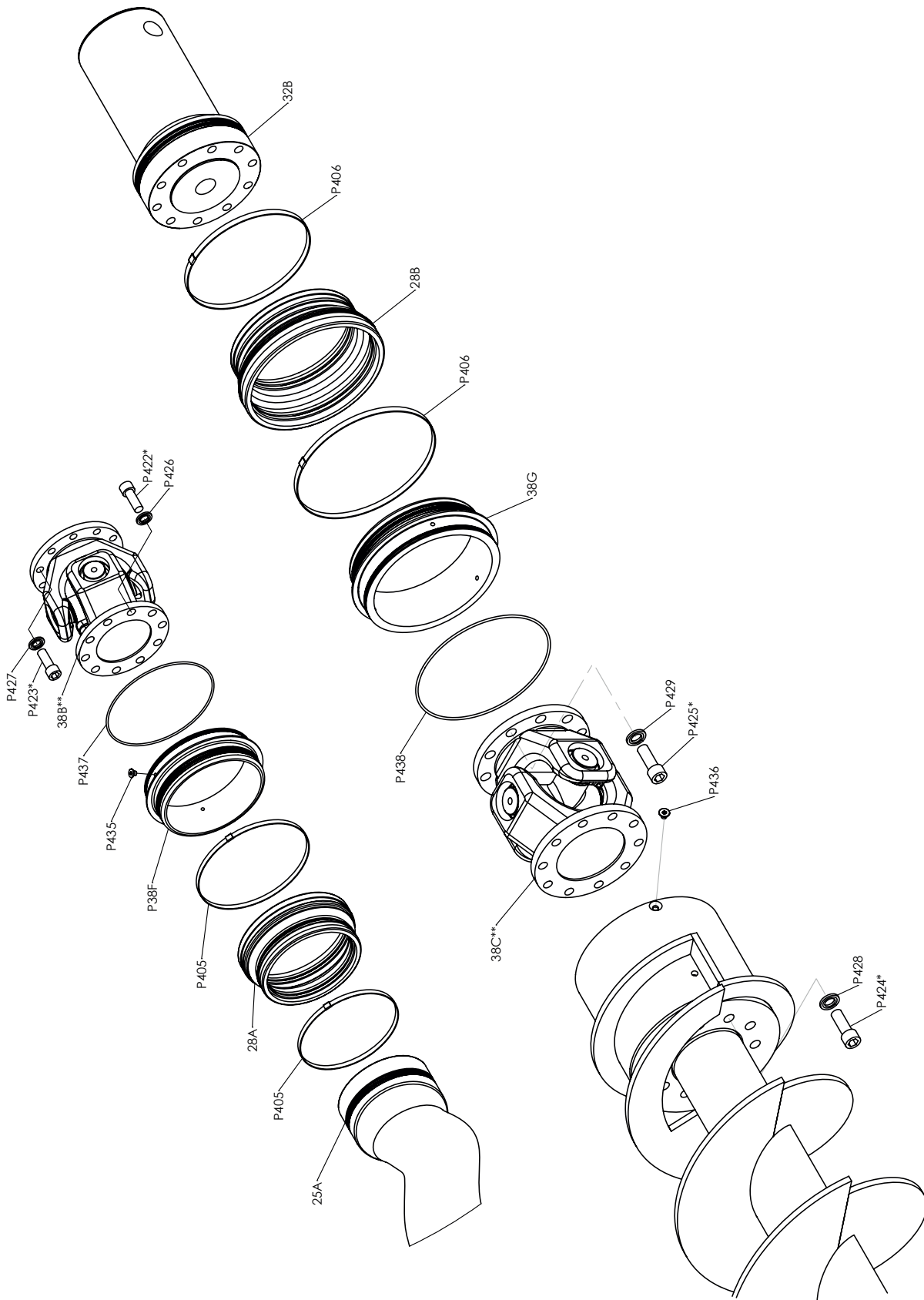
\* P422, P423, P424 and P425 to be fitted using Loctite 242 applied to the threads.

\*\* Flange face of 38B and 38C to be sealed using Loctite 574.

# Dowels P432 and P433 to be fitted using Loctite 638 or equivalent.

9.11 Joint detail WC4 only

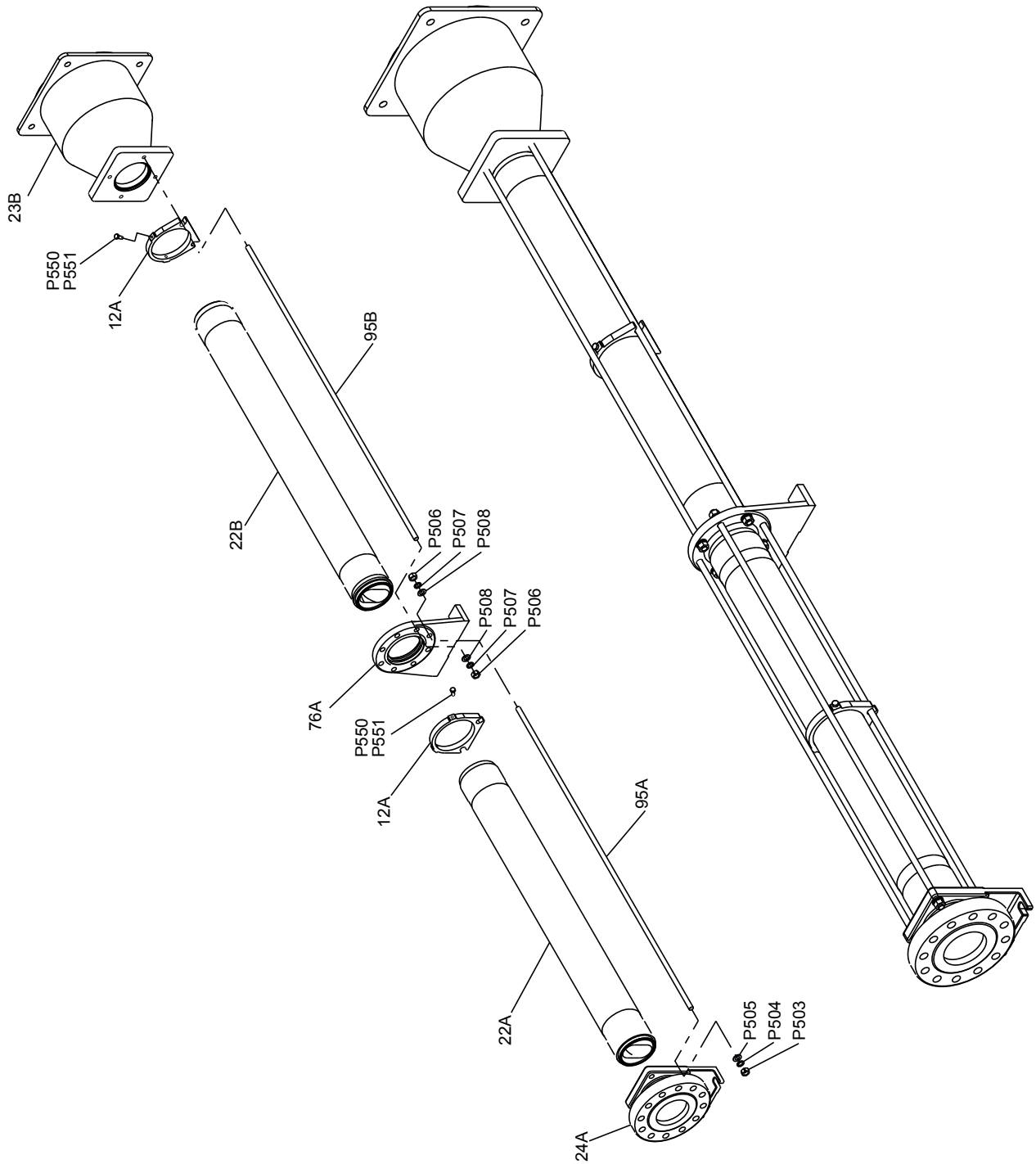
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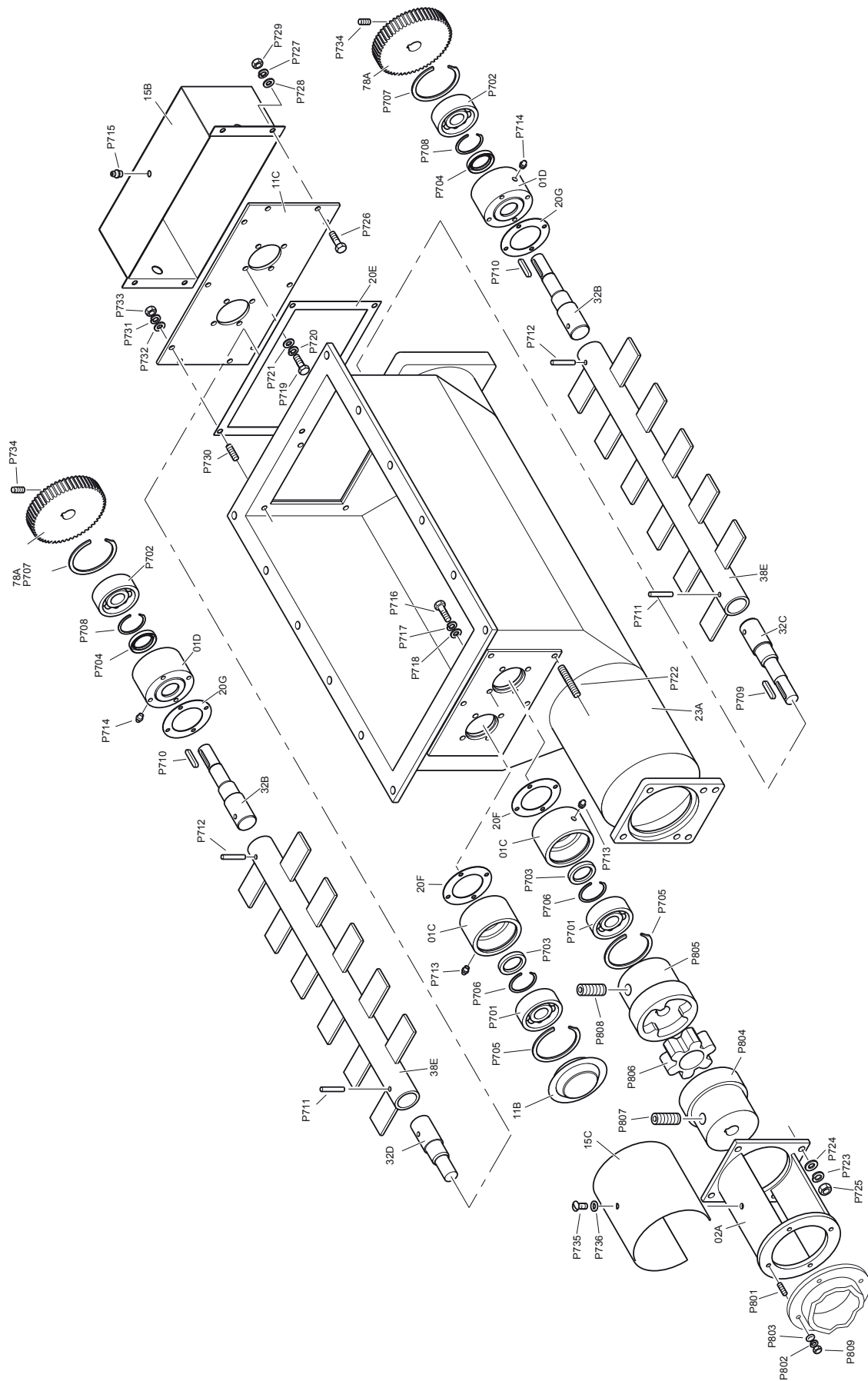
\* P422, P423, P424, P425, P435 and P436 to be fitted using Loctite 242 applied to the threads.

\*\* Flange face of 38B and 38C to be sealed using Loctite 574.

## 9.12 Stator assembly W88, WA4, WB4 only

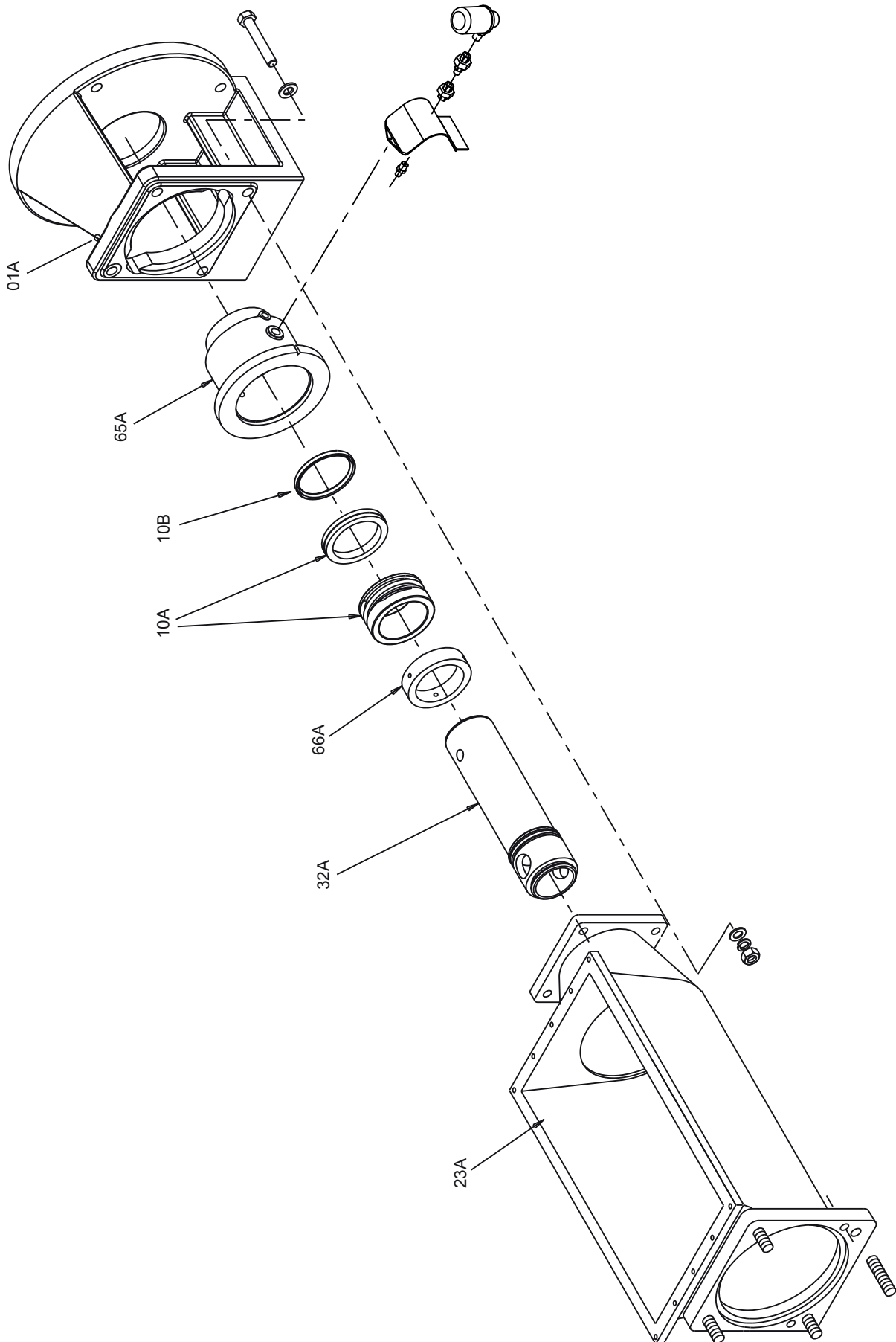


**9.13 Bridge breaker**



1352-00

## 9.14 Mechanical seal



1353-00



**10 Tightening torques (ft/lbf)****Key:**

A = Body / Suction chamber

B = Body / Bearing housing

C = Bearing cover

D = Coupling end / Conveyor assembly

E = Drive-end cap screw

F = Stator tie bars

G = Throat / Feed chamber

H = Pump driver mounting bolts

I = Gearbox mounting bracket bolts

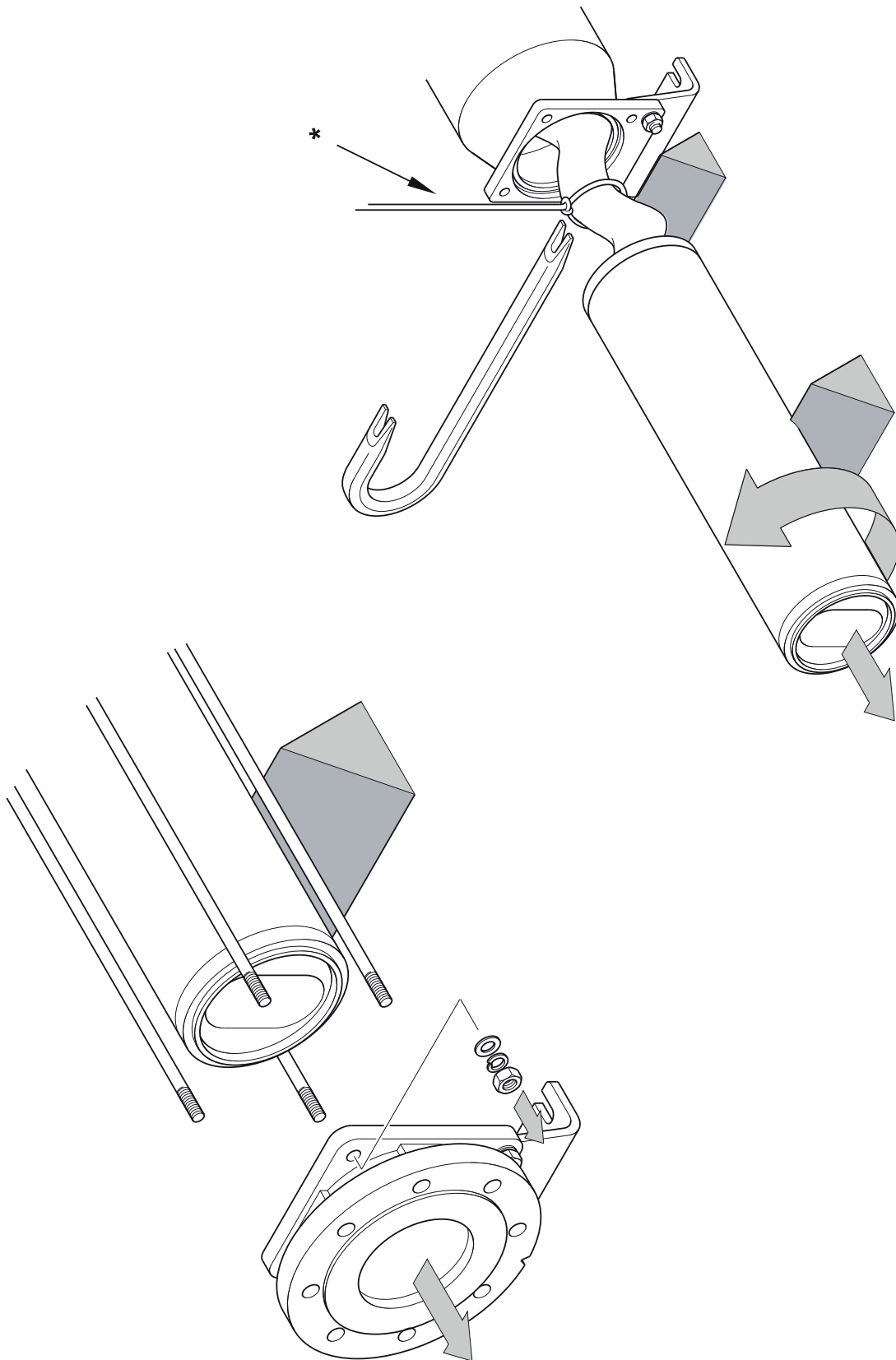
J = Guard gears

K = Bridge breaker mounting bolts

Pump	A		B	C		D		E	F		G		H	I	J	K
	P101 (P104)	P120	P105	P111	P124	P422 P423	P424 P425	P430	P503	P505 P508	P516	P520	P601	P725	P730	P801
W31	8	5.5	-	-	1.5	-	-	-	-	5	-	-	5.5	-	-	-
W32	8	5.5	-	-	1.5	-	-	-	-	5	-	-	5.5	-	-	-
W34	8	10	-	-	6.6	-	-	-	-	8	-	-	9.6	-	-	-
W41	8	10	-	-	6.6	12	-	-	-	8	-	26.5	9.6	10	5.5	5.5
W42	8	10	-	-	6.6	12	-	-	-	8	-	26.5	9.6	10	5.5	5.5
W44	15.5	15	-	-	6.6	12	-	-	-	17.7	-	26.5	14.8	10	5.5	5.5
W51	8	10	-	-	6.6	12	-	-	-	8	-	26.5	9.6	10	5.5	5.5
W52	15.5	15	-	-	6.6	23	-	-	-	8	-	26.5	14.8	10	5.5	5.5
W54	26.5	44	-	-	6.6	23	-	-	-	29.5	-	26.5	44	10	5.5	5.5
W61	15.5	15	-	-	6.6	23	-	-	-	8	-	26.5	14.8	10	5.5	5.5
W62	26.5	44	-	-	6.6	40.5	-	-	-	17.7	-	55.3	44	10	5.5	5.5
W64	66	60	-	-	6.6	40.5	-	-	-	55	-	55.3	60.5	10	5.5	5.5
W71	26.5	44	-	-	6.6	40.5	-	-	-	17.7	-	55.3	44	10	5.5	5.5
W72	26.5	44	-	-	6.6	40.5	-	-	-	17.7	-	55.3	44	10	5.5	5.5
W74	130	-	-	-	12.5	40.5	-	-	-	55	-	55.3	-	10	5.5	5.5
W81	22	44	-	-	6.6	40.5	-	-	-	29.5	-	55.3	44	10	5.5	5.5
W82	66	60	-	-	6.6	40.5	-	-	-	29.5	-	130	60.5	10	5.5	5.5
W84	130	-	-	-	12.5	40.5	-	-	-	88.5	-	130	-	10	5.5	5.5
W88	-	-	225	12.5	-	133	133	411	140	-	332	-	-	14.8	5.5	5.5
W91	66	60	-	-	6.6	40.5	-	-	-	55.3	-	130	60.5	14.8	5.5	5.5
W92	66	60	-	-	6.6	40.5	-	-	-	55.3	-	130	60.5	14.8	5.5	5.5
WA1	66	60	-	-	6.6	40.5	-	-	-	55.3	-	130	60.5	14.8	5.5	5.5
WA2	130	-	-	-	12.5	40.5	-	-	-	55.3	-	332	-	14.8	5.5	5.5
WA4	-	-	225	12.5	-	133	133	411	140	-	332	-	-	14.8	5.5	5.5
WB1	130	-	-	-	12.5	-	-	-	-	88.5	-	-	-	14.8	5.5	5.5
WB2	-	-	225	12.5	-	133	133	411	88.5	-	332	-	-	-	-	-
WB4	-	-	225	12.5	-	236	133	738	221	-	332	-	-	-	-	-
WC1	-	-	225	12.5	-	133	133	411	140	-	332	-	-	-	-	-
WC4	-	-	225	12.5	-	236	236	-	406	-	332	-	-	-	-	-
WD1	-	-	225	12.5	-	133	133	411	140	-	332	-	-	-	-	-

## 11 Dismantling procedures

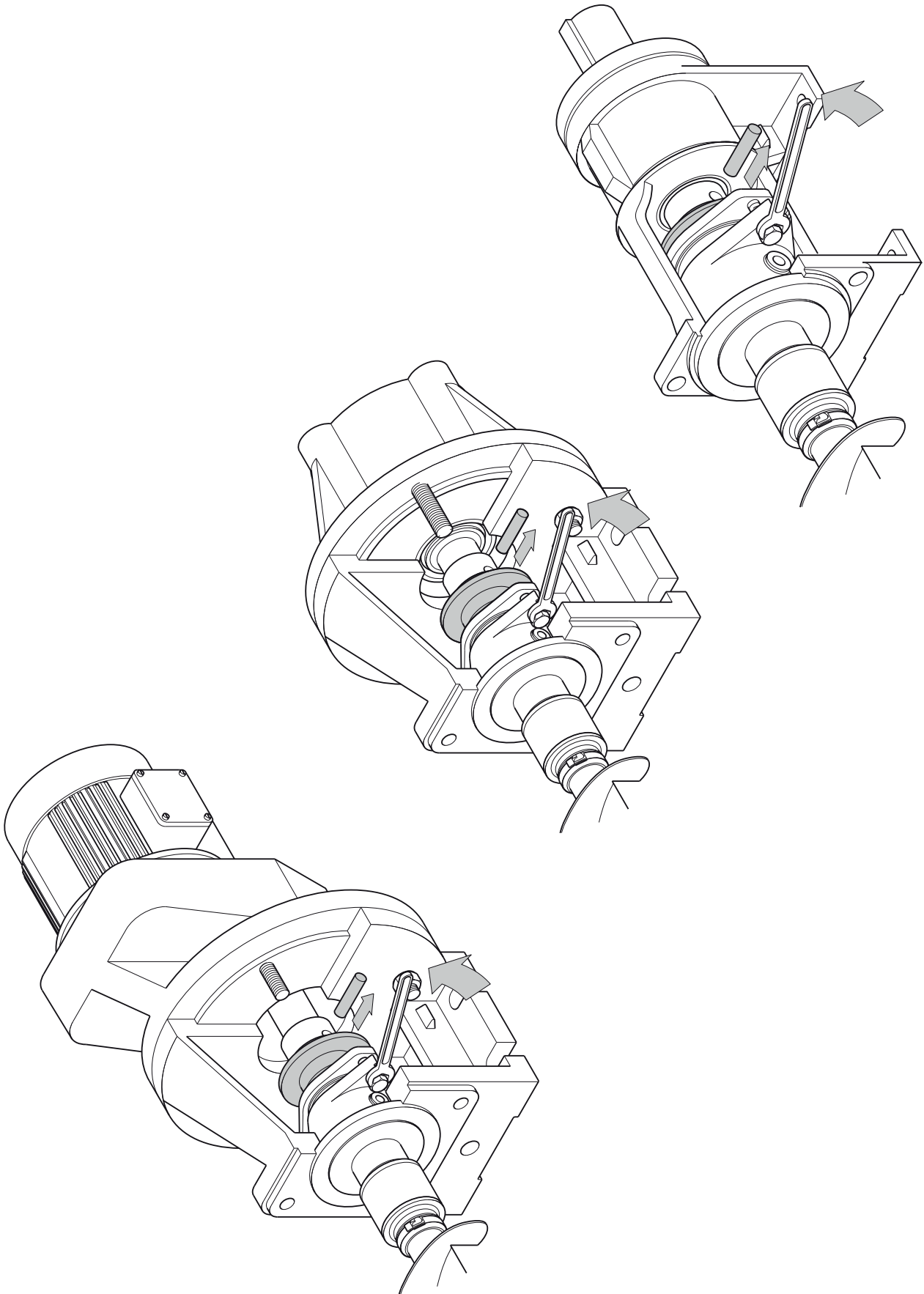
### 11.1



\* Support / sling

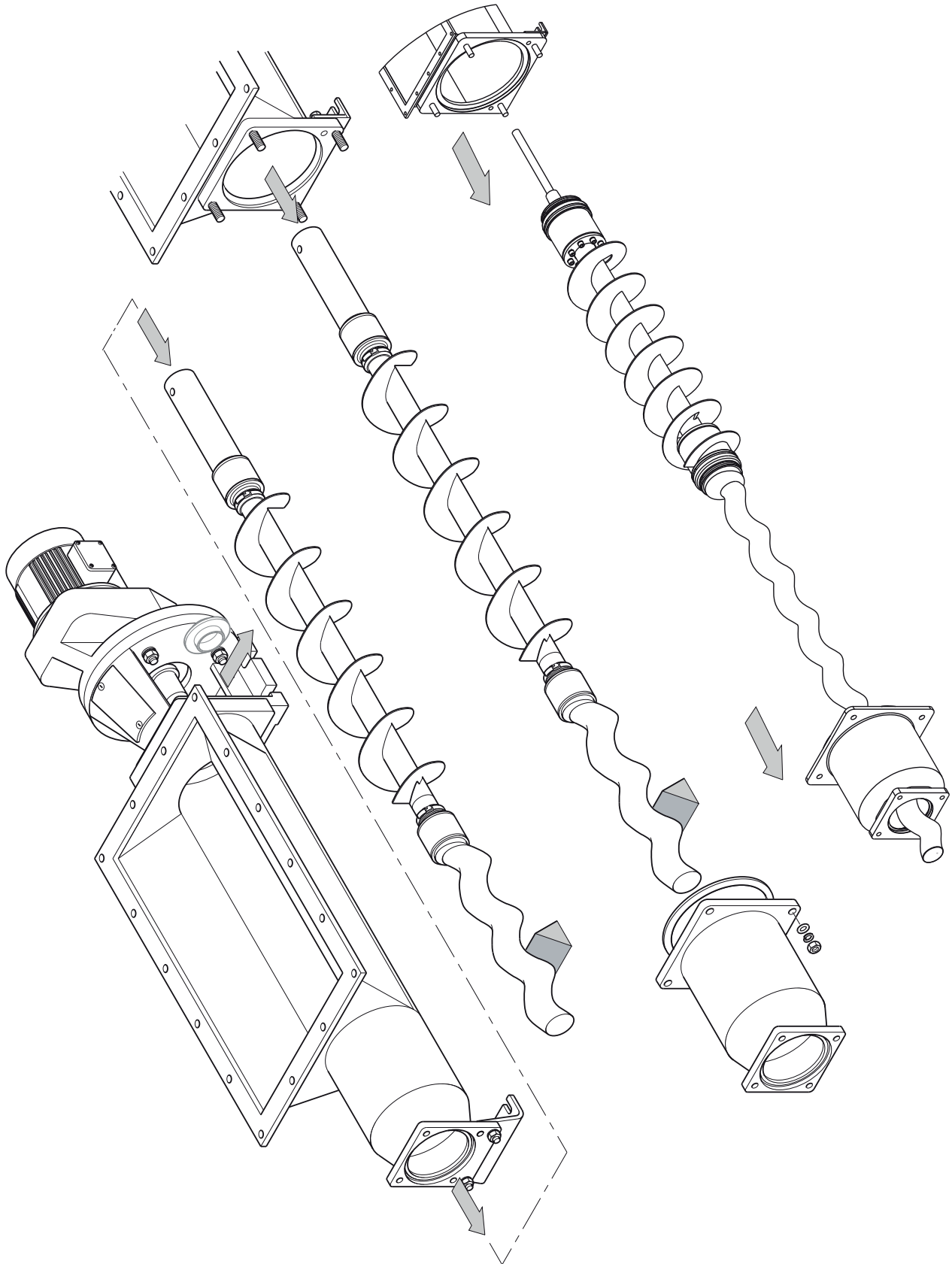
11.2

1.355-00

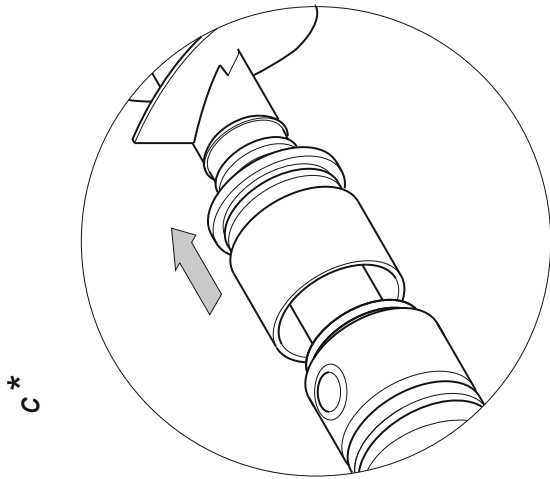


## 11.3

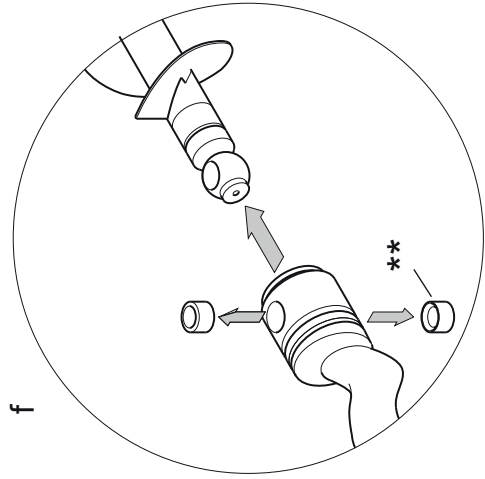
1356-00



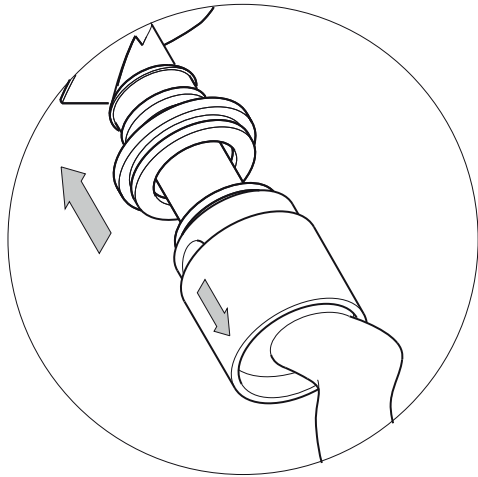
11.4



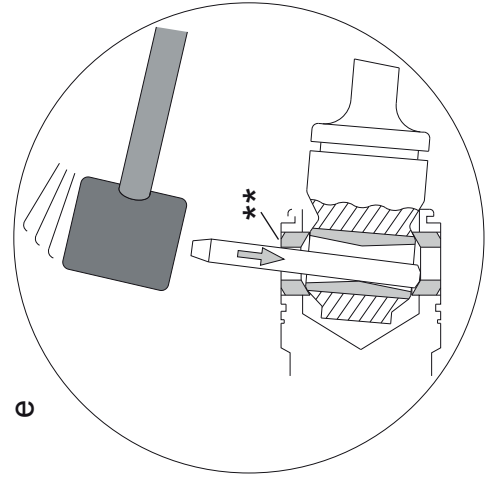
c\*



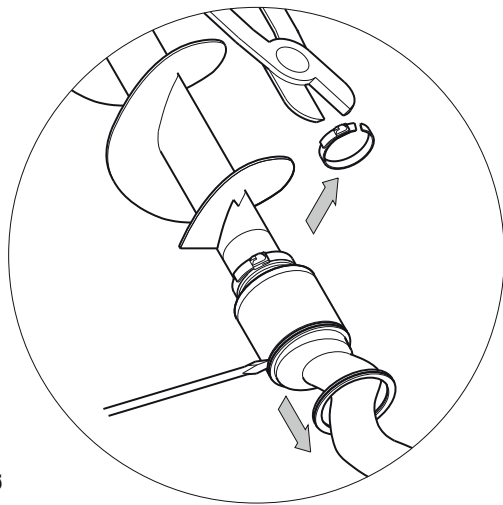
f



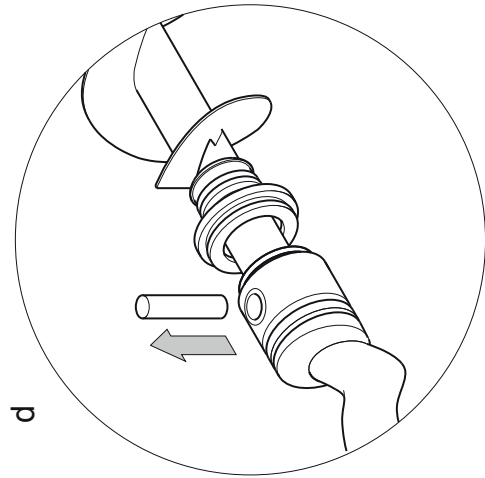
b



e



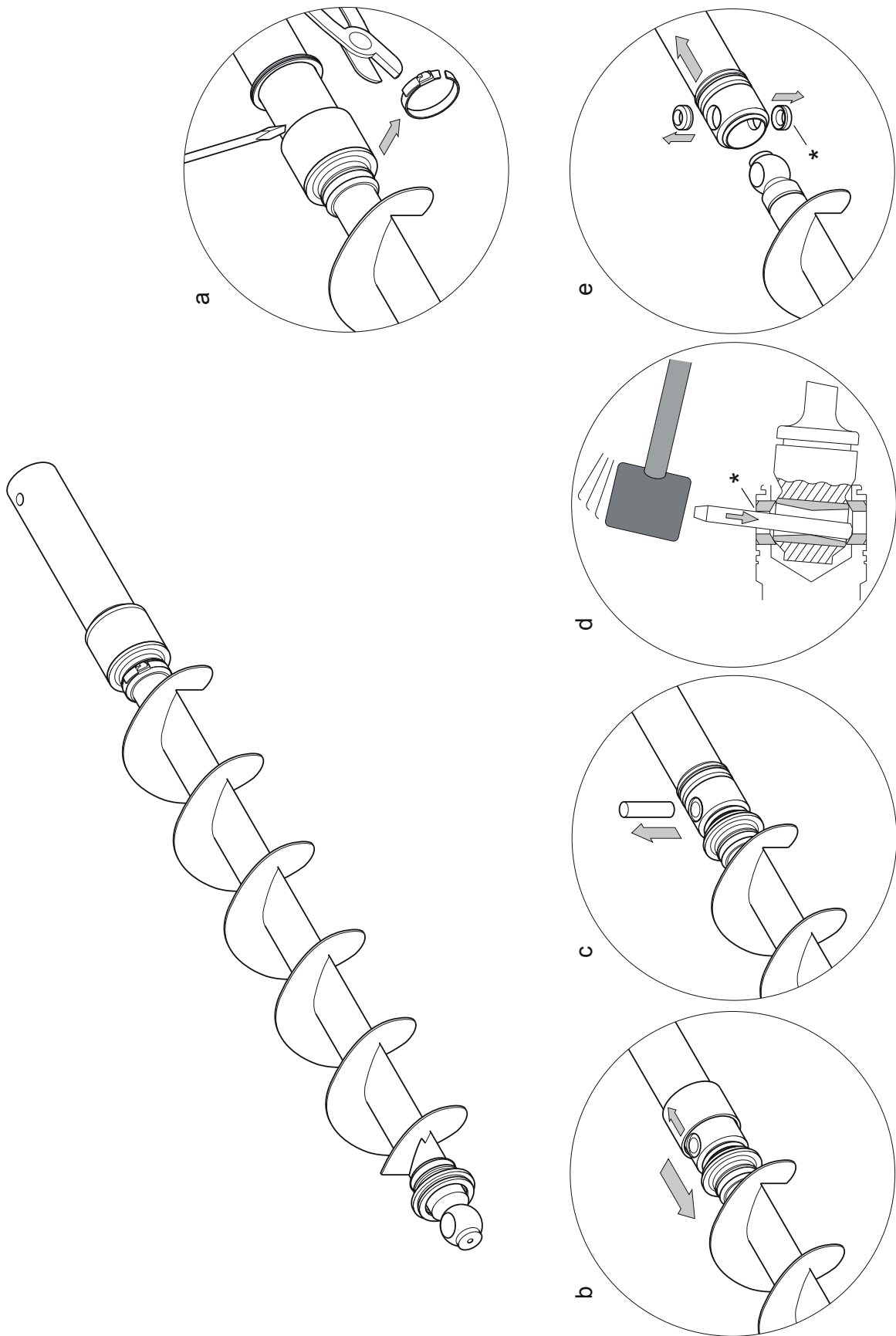
a



d

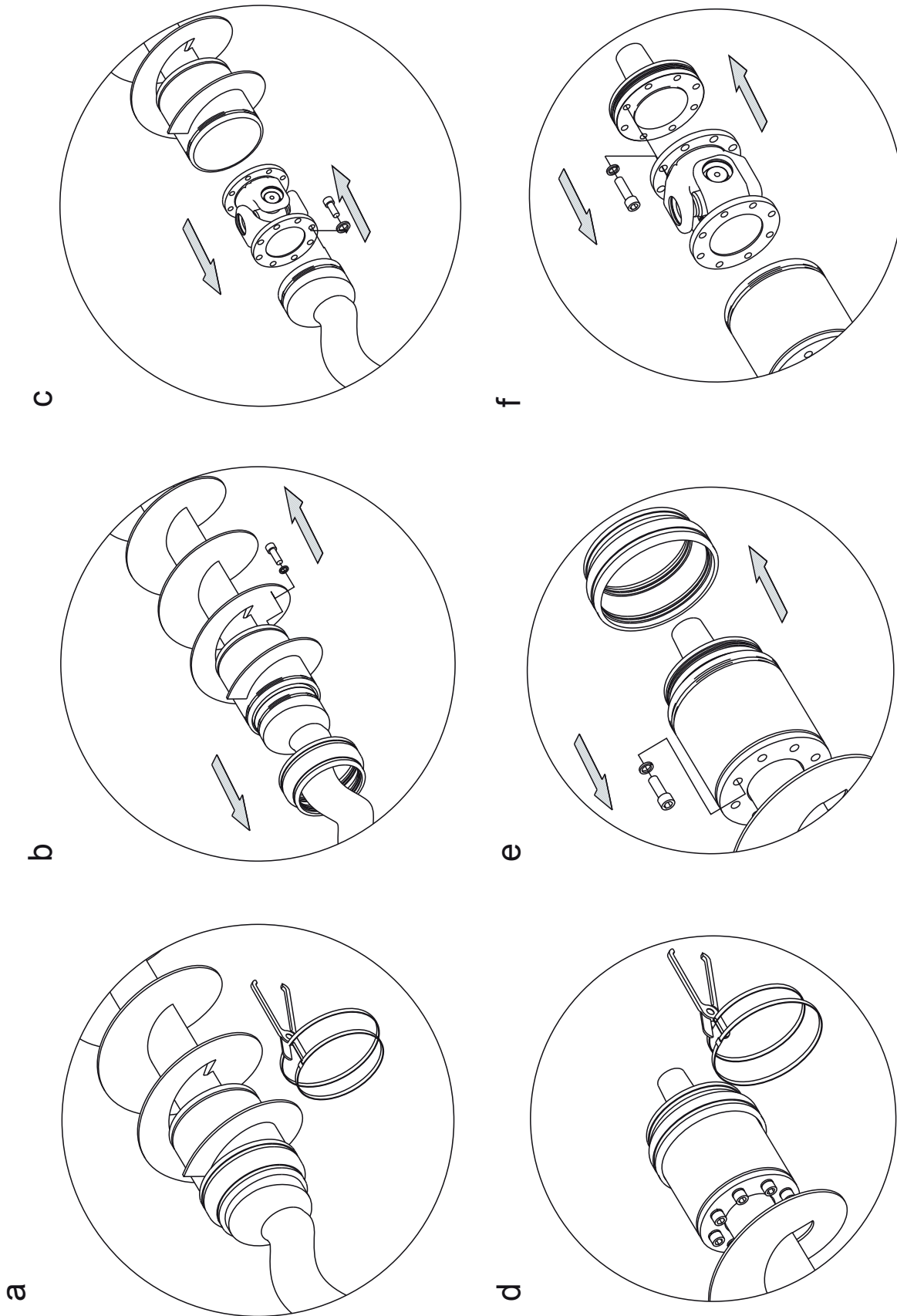
\* Certain models only \*\* Fitted

## 11.5



\* Fitted

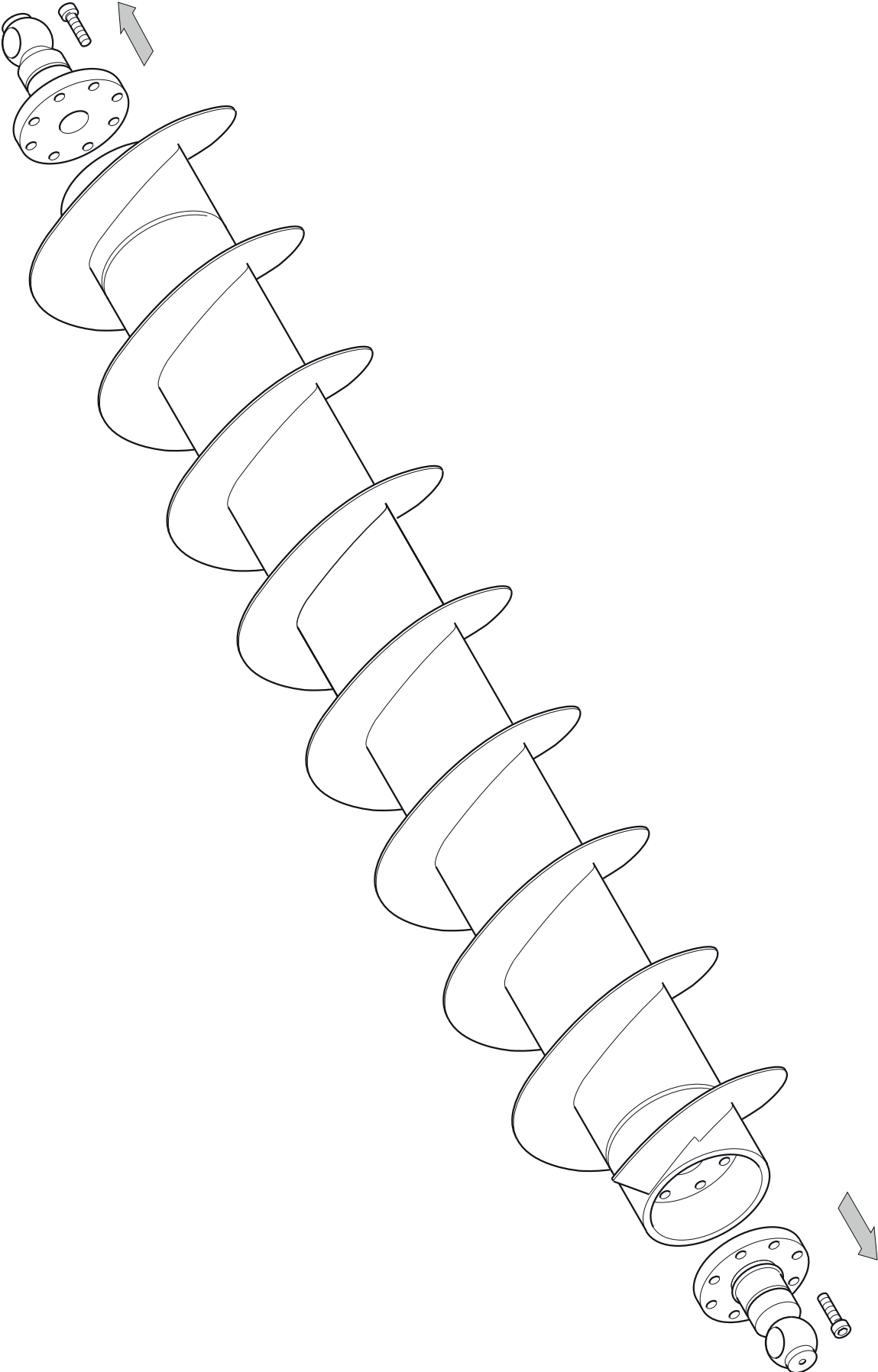
**11.6 W88, WA4, WB2, WB4, WC1, WD1 (cardan joint types only)**



1.359-00



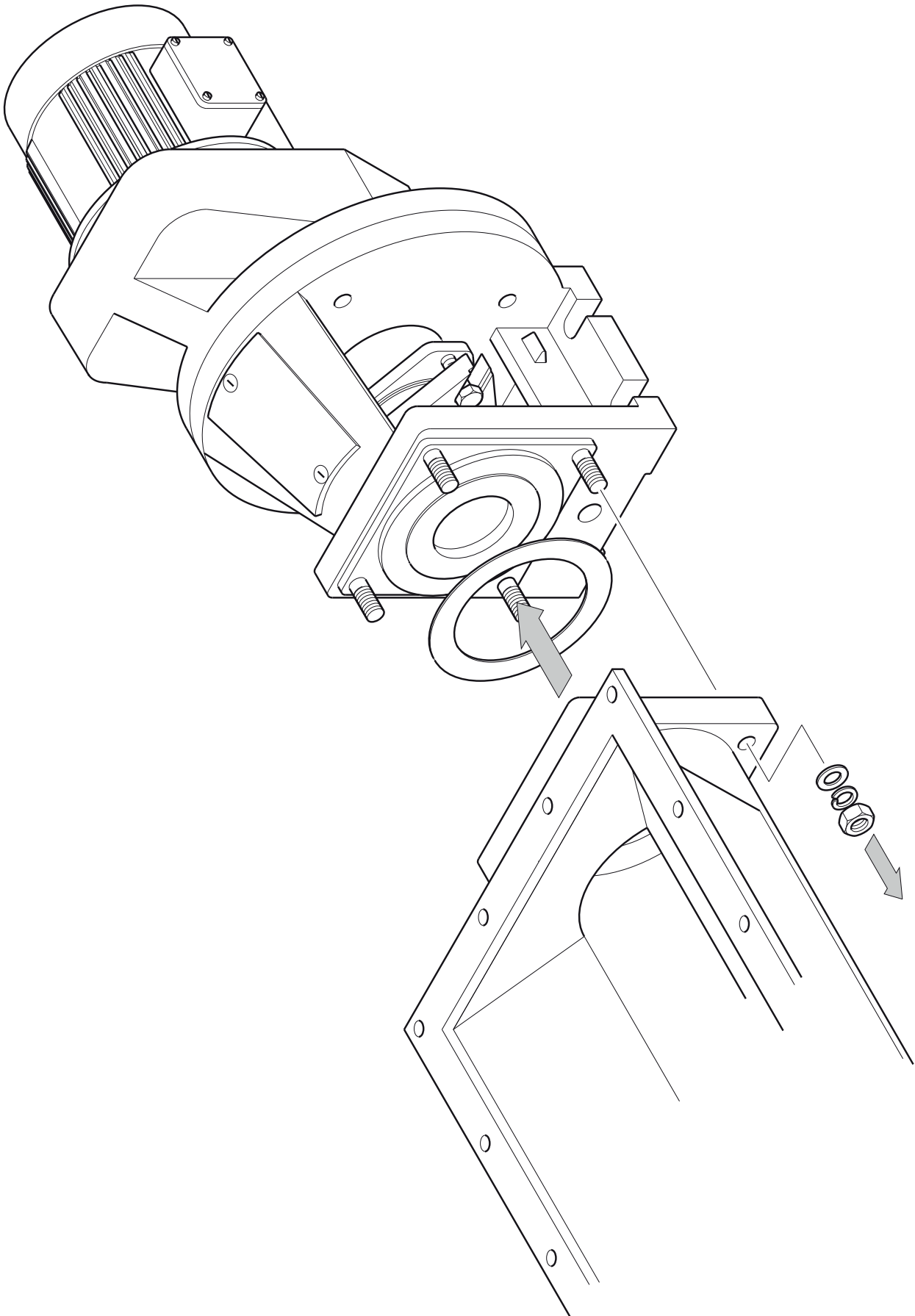
**11.7 Large auger**



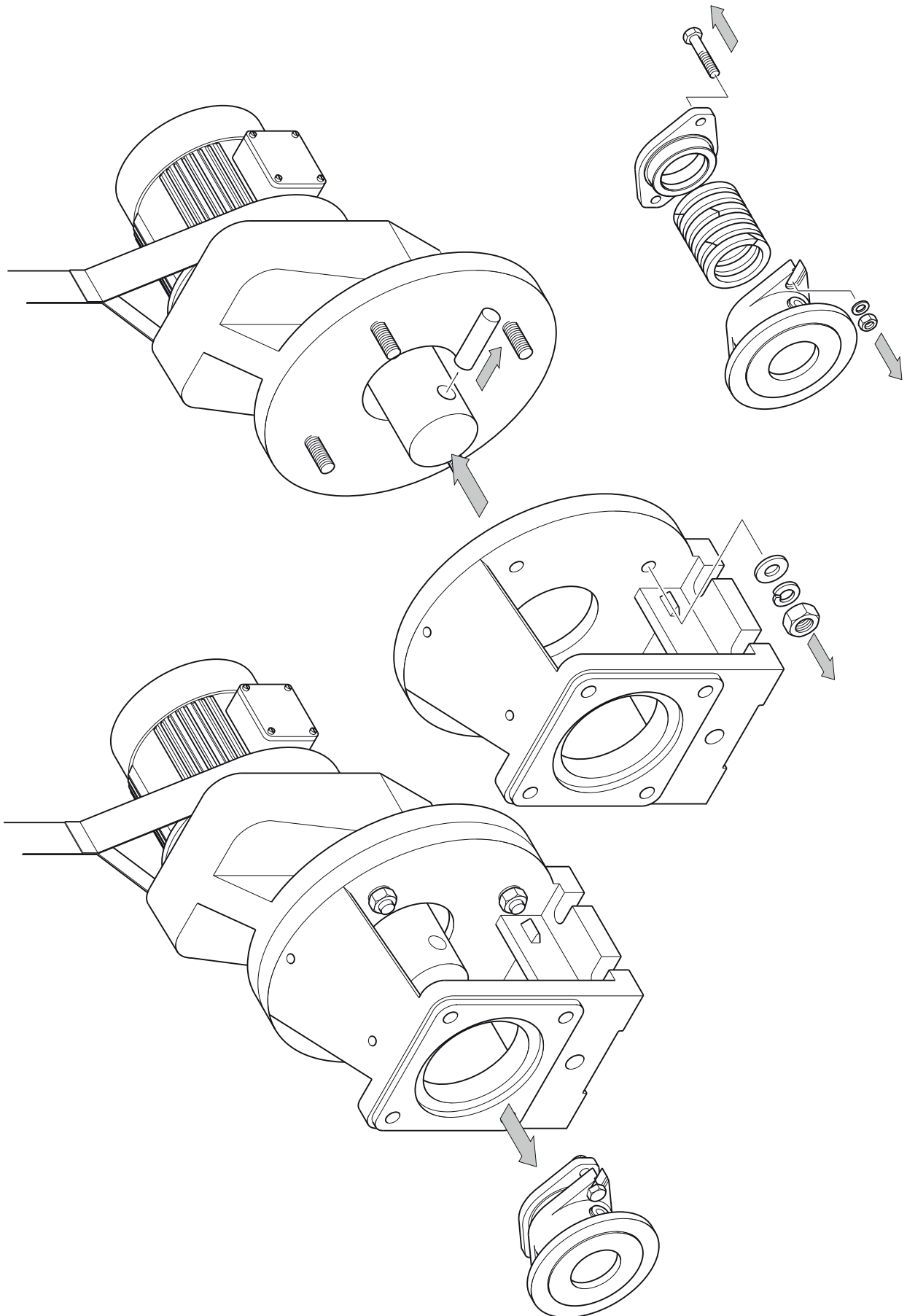
1360-00

11.8

1361-00

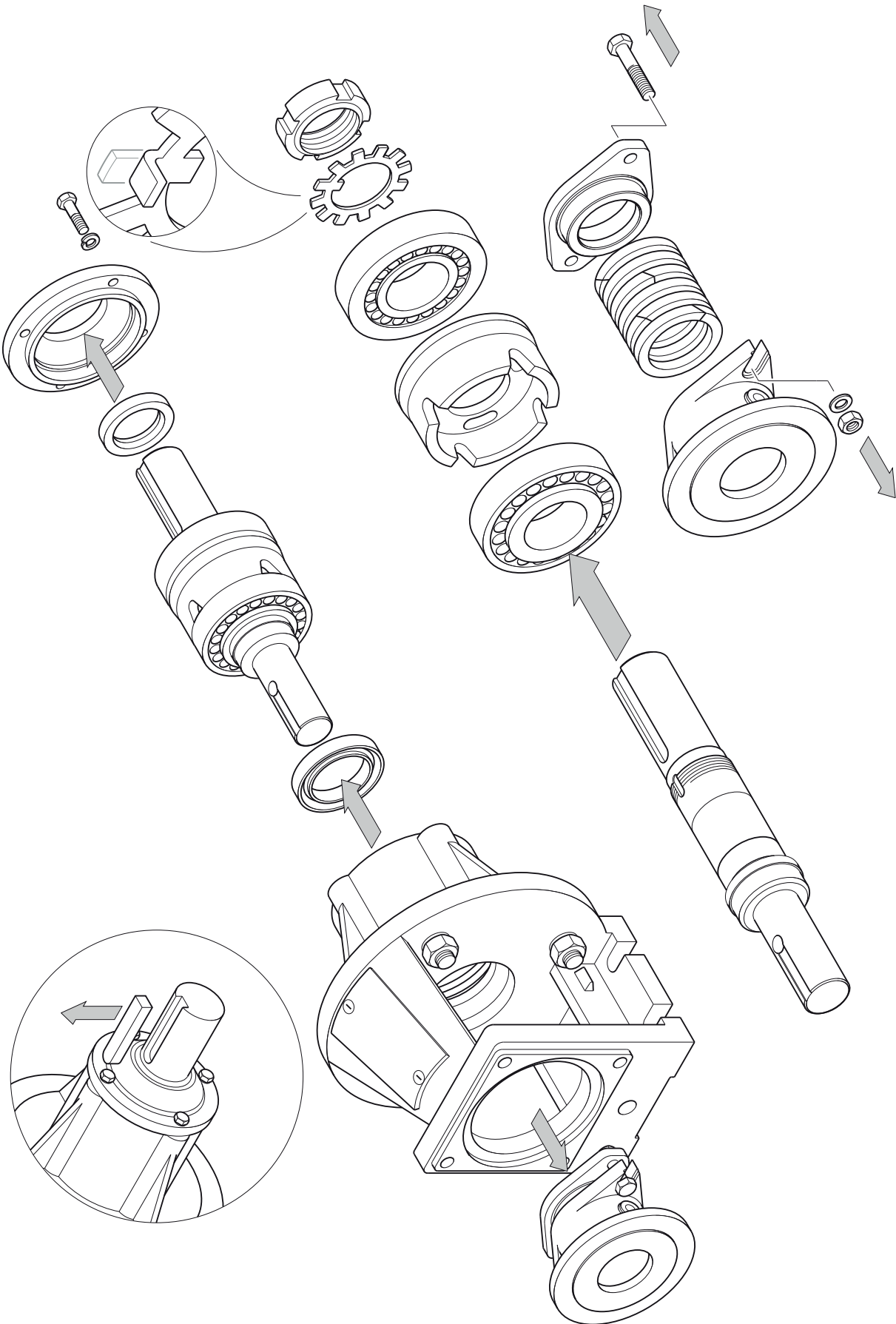


## 11.9 Close coupled only



1362-00

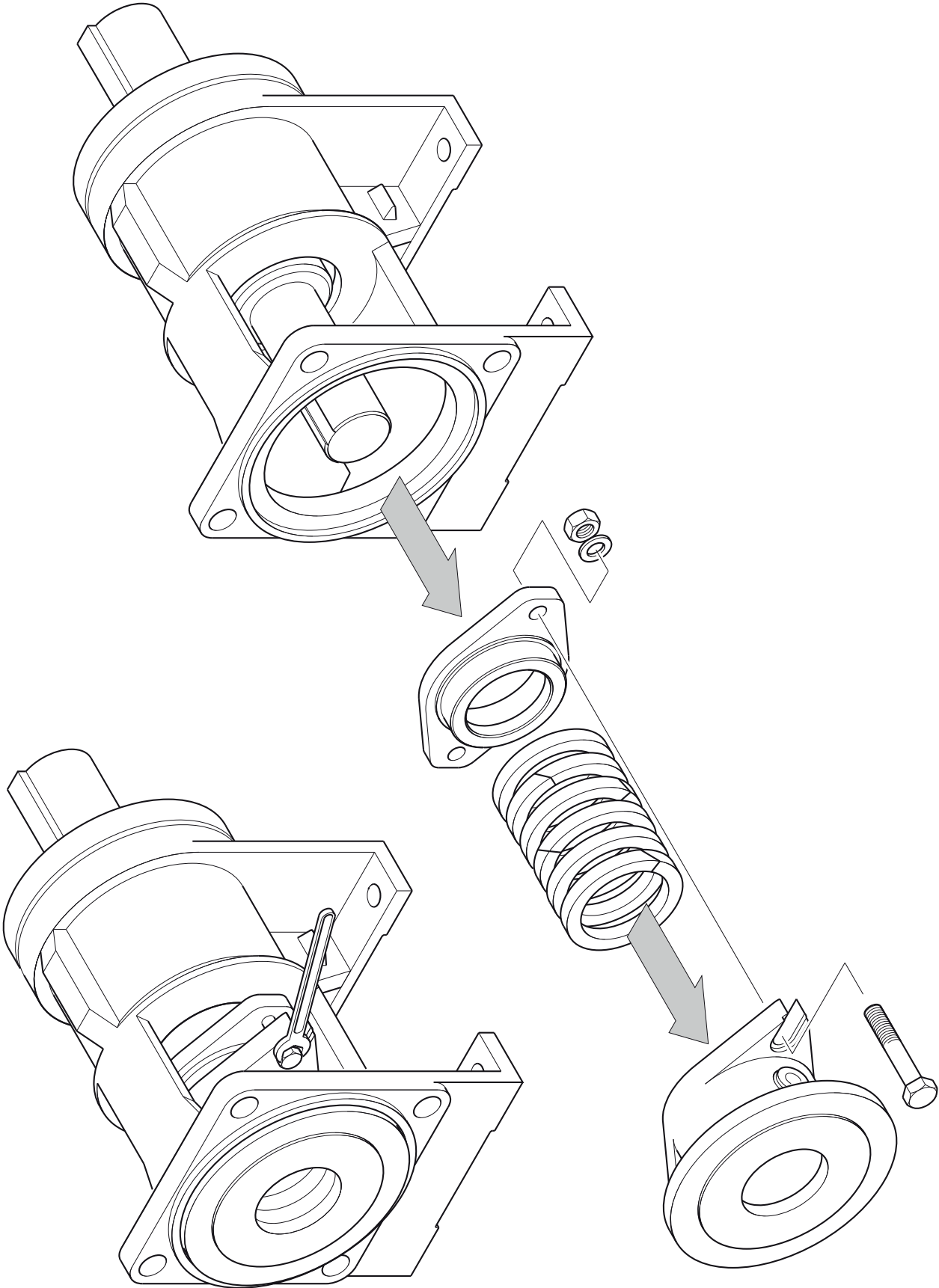
**11.10 Bareshaft only**



1.363-00

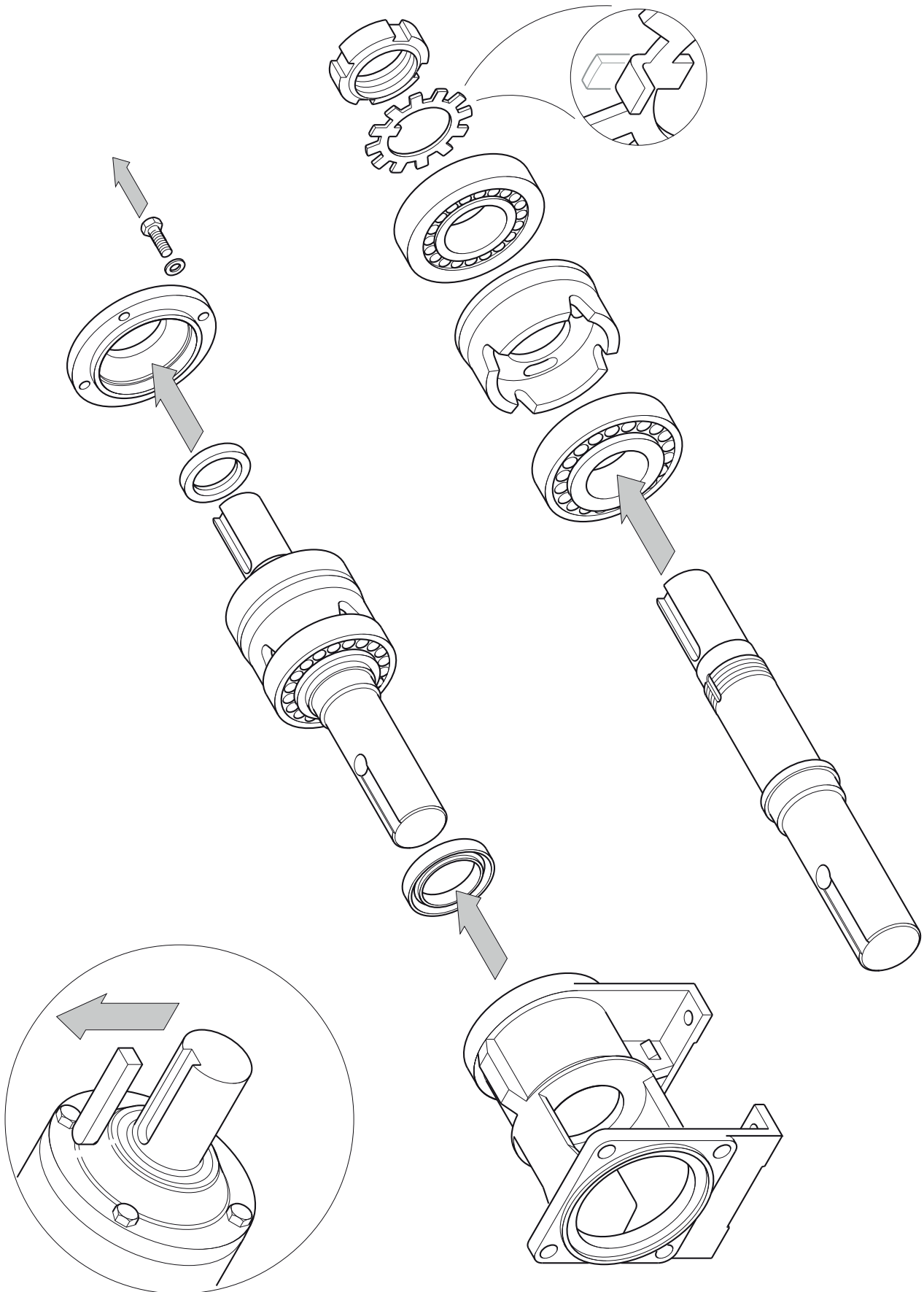
**11.11 Bareshaft W74, W84, W88, WA2, WA4, WB1, WB2, WB4, WC1, WD1 only**

1364-00



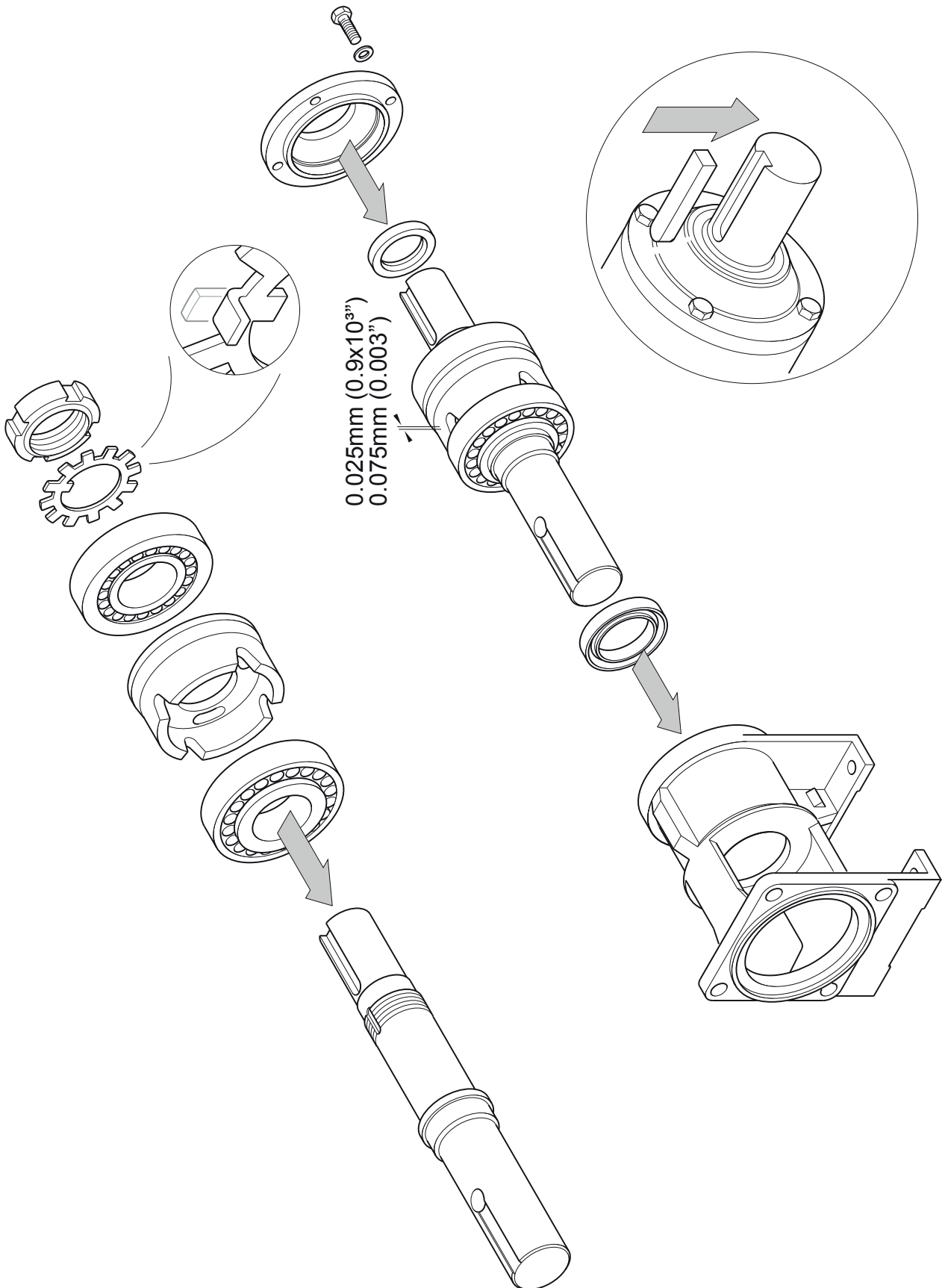
**11.12 Bareshaft W74, W84, W88, WA2, WA4, WB1, WB2, WB4, WC1, WD1 only**

1365-00



## 12 Assembly procedures

### 12.1 Bareshaft W74, W84, W88, WA2, WA4, WB1, WB2, WB4, WC1, WD1 only

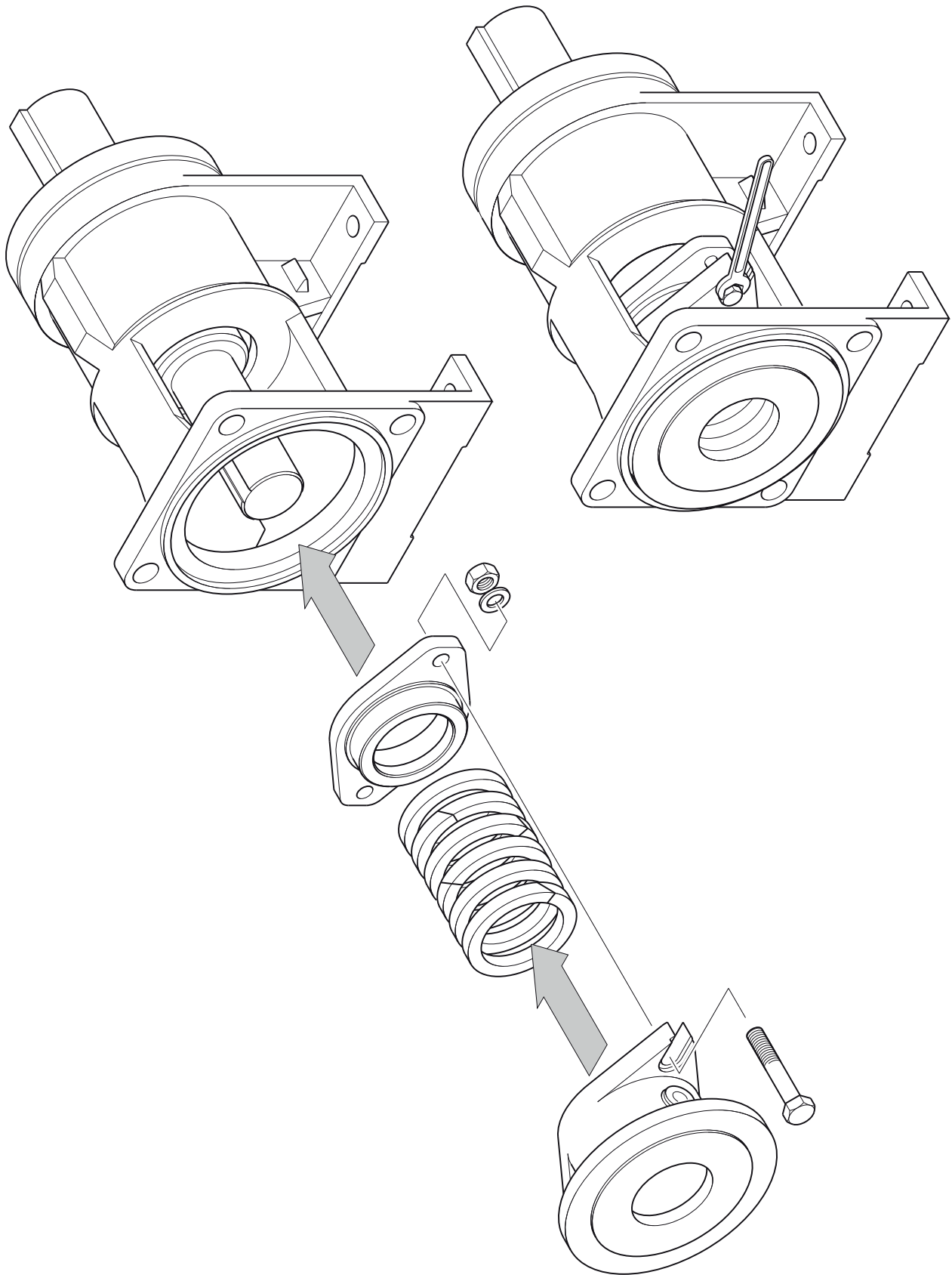


1366-00



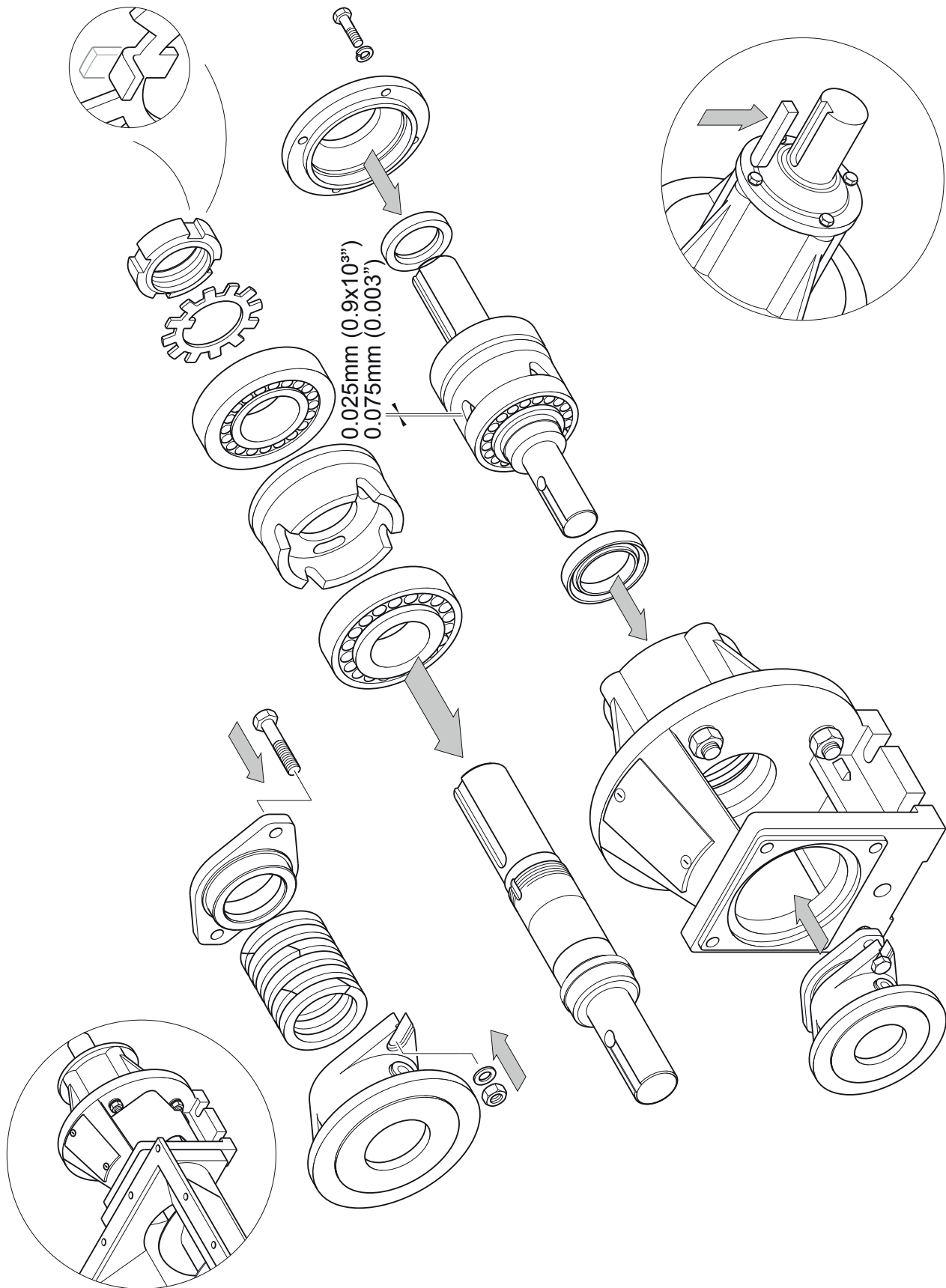
**12.2 Bareshaft WB1, WB2, WB4, WC1, WD1 only**

1.367-00



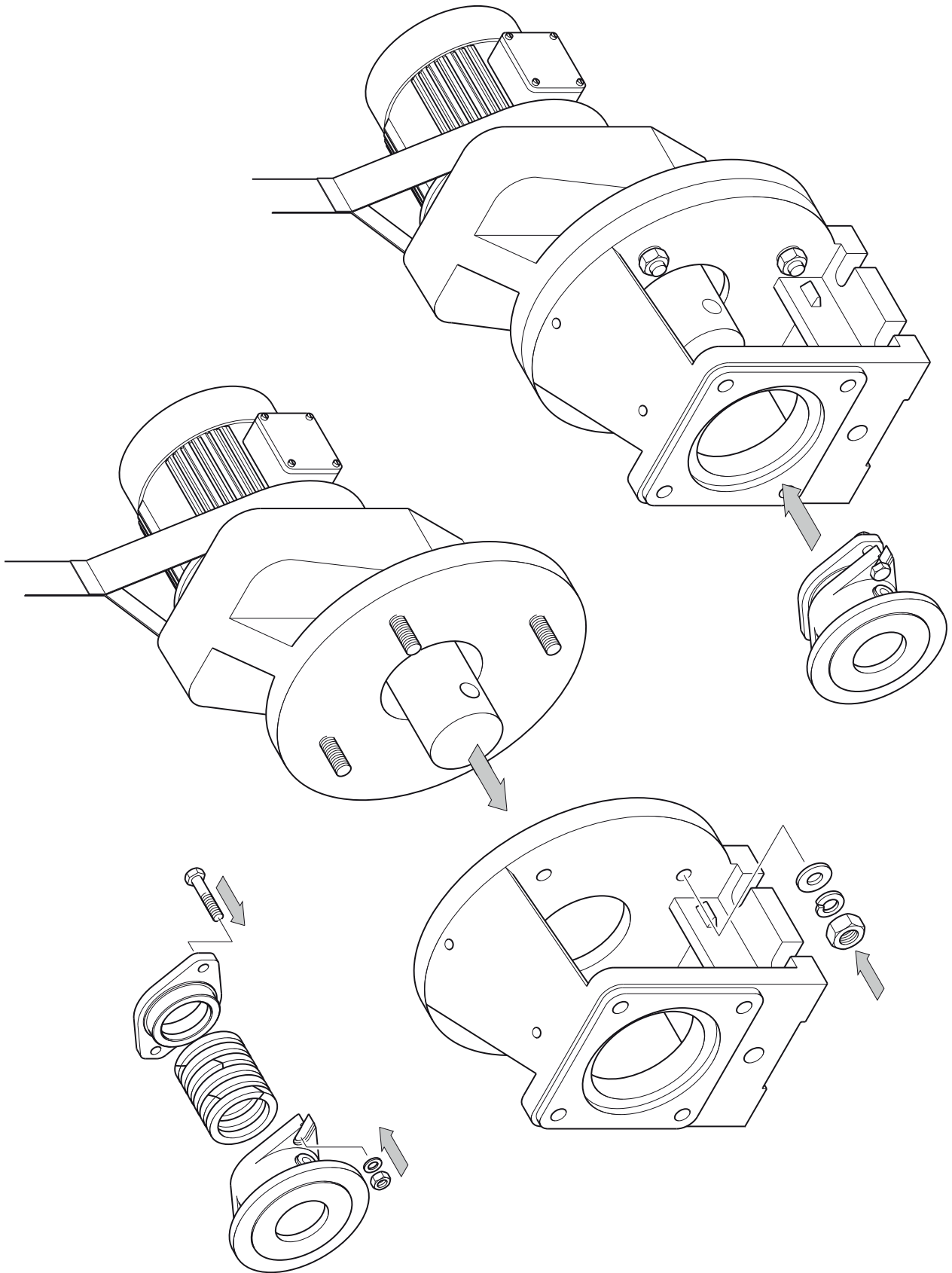
## 12.3 Bareshaft only

1368-00



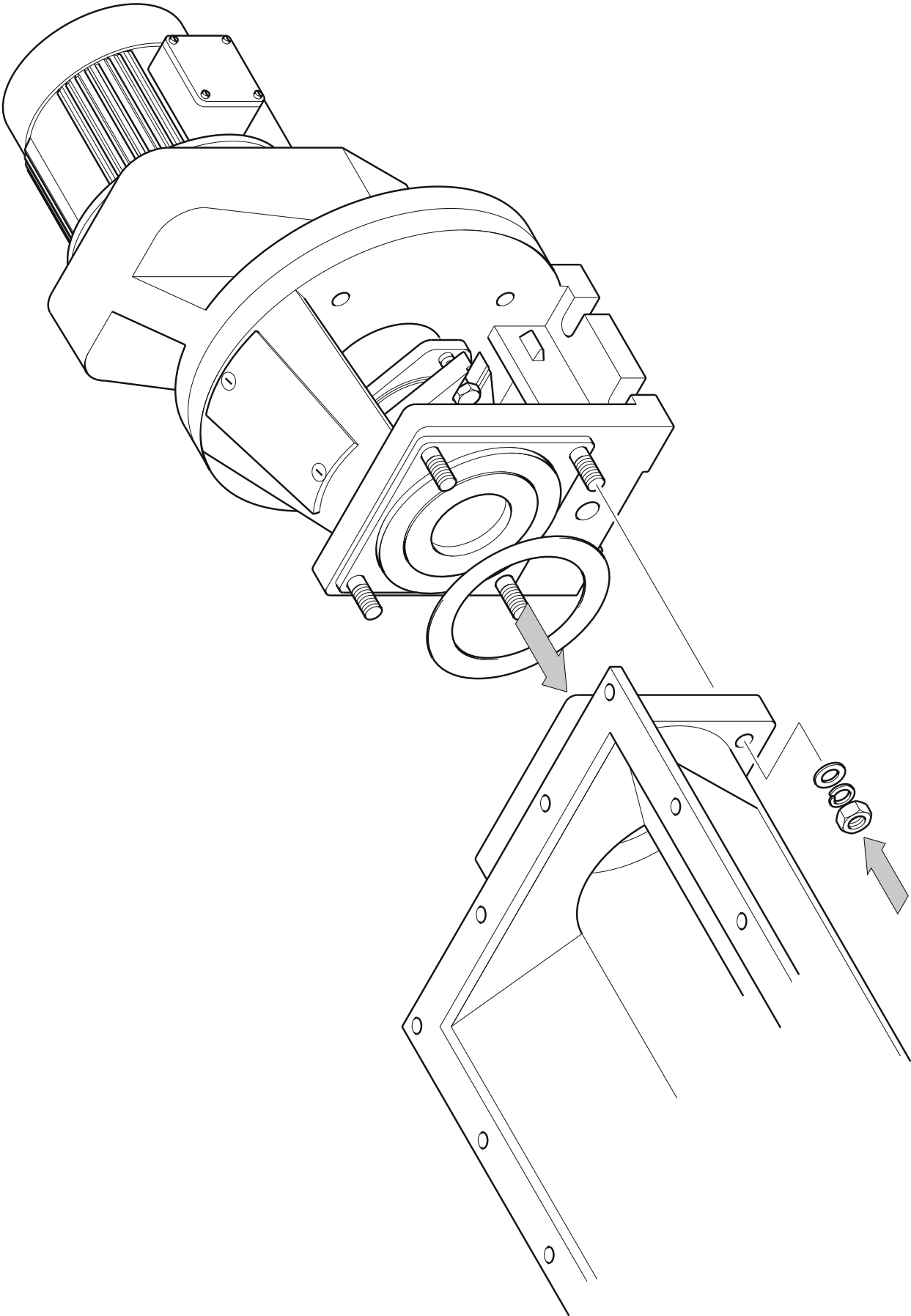
**12.4 Close coupled only**

1369-00

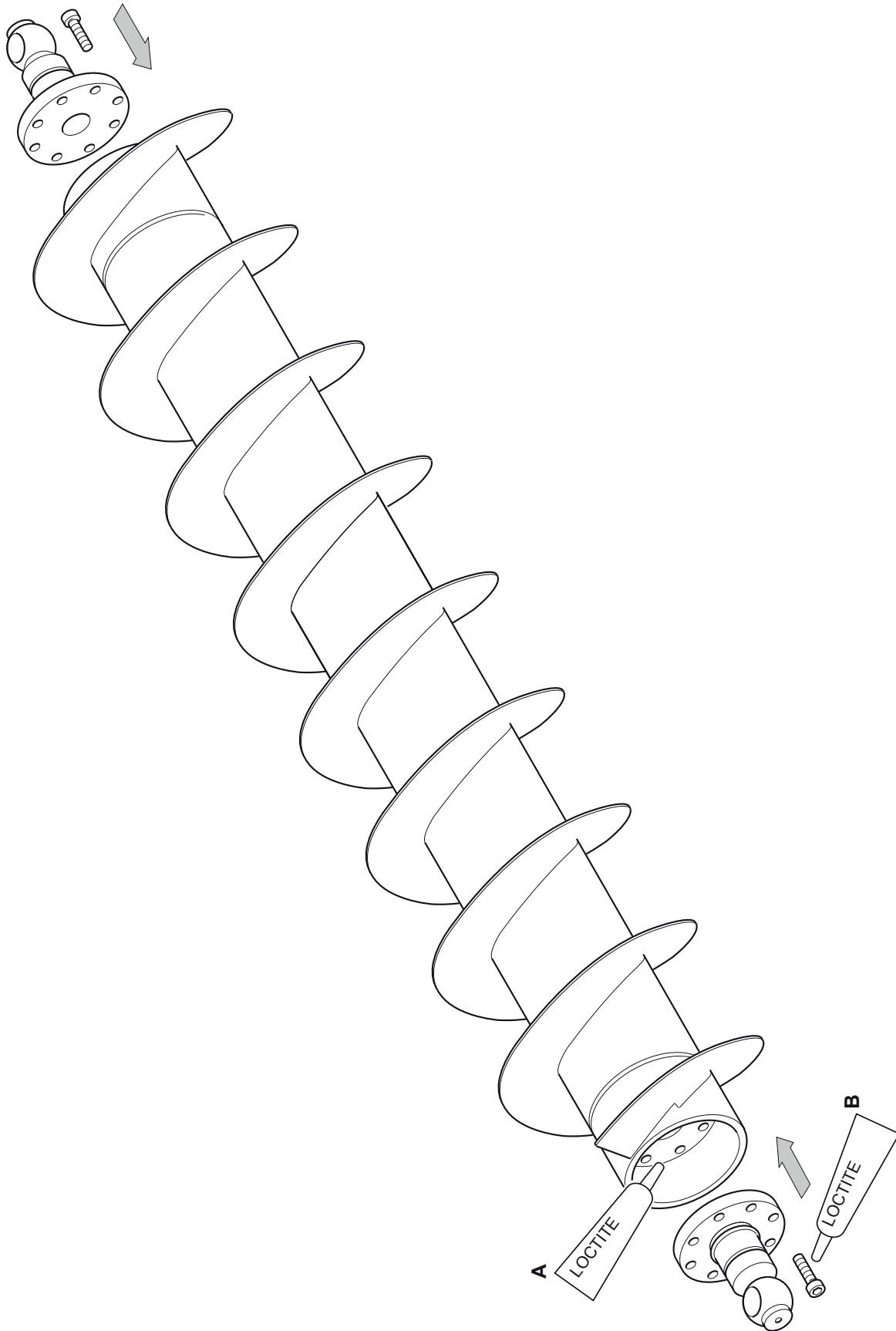


12.5

1370-00



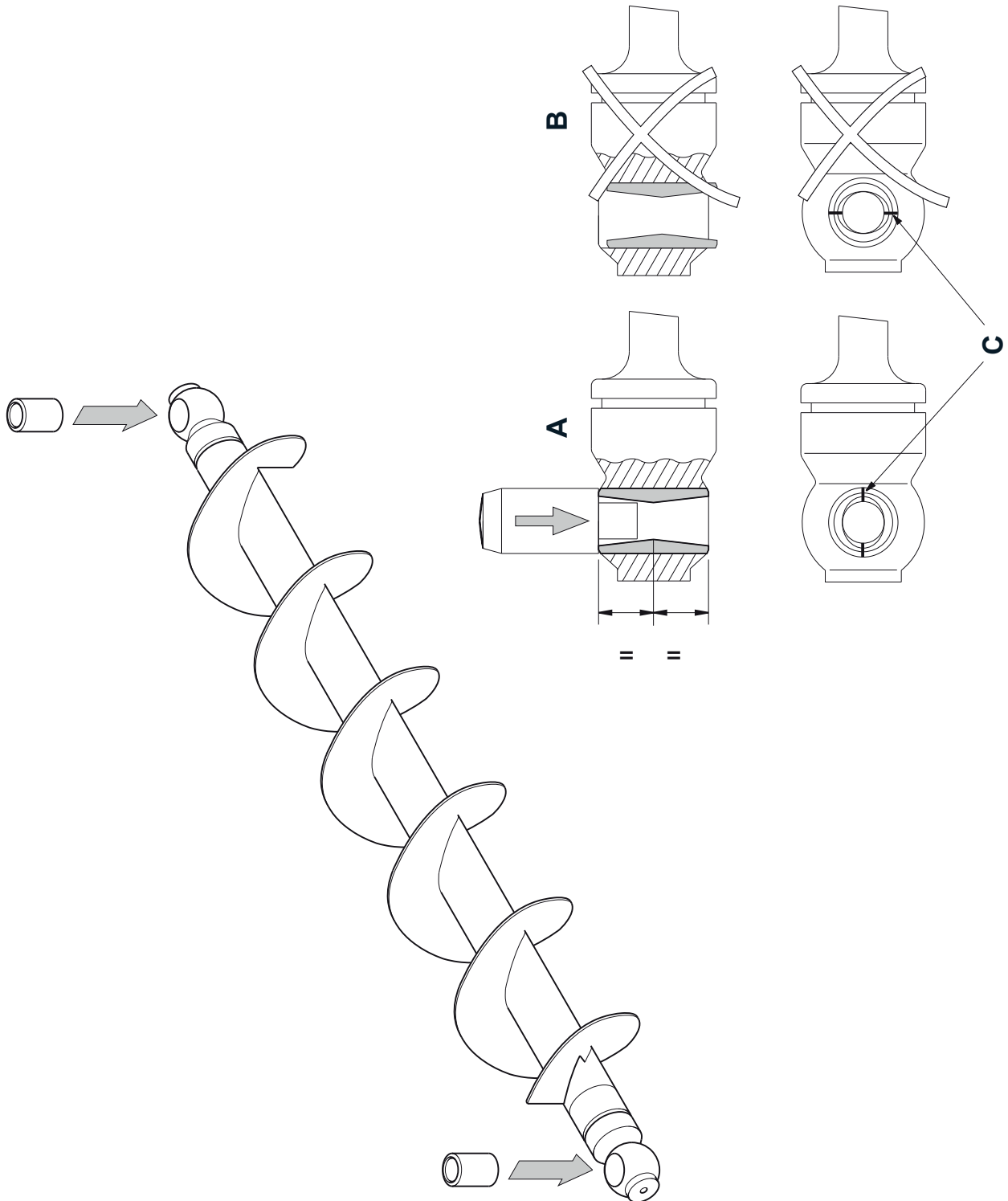
**12.6 Large auger**



1371-00

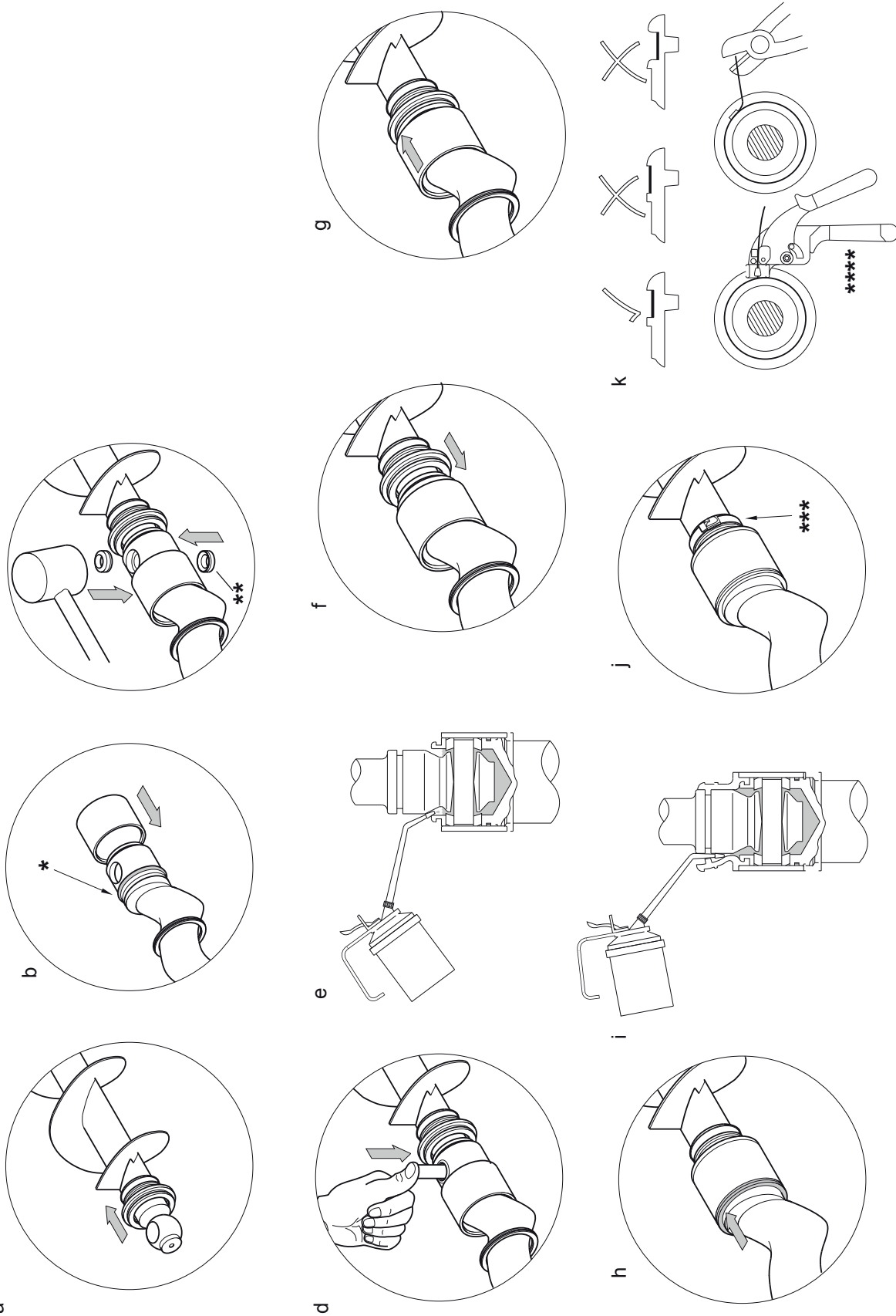
A = Liquid gasket B = Thread sealant

12.7



A = Correct B = Incorrect C = Alignment marks

12.8

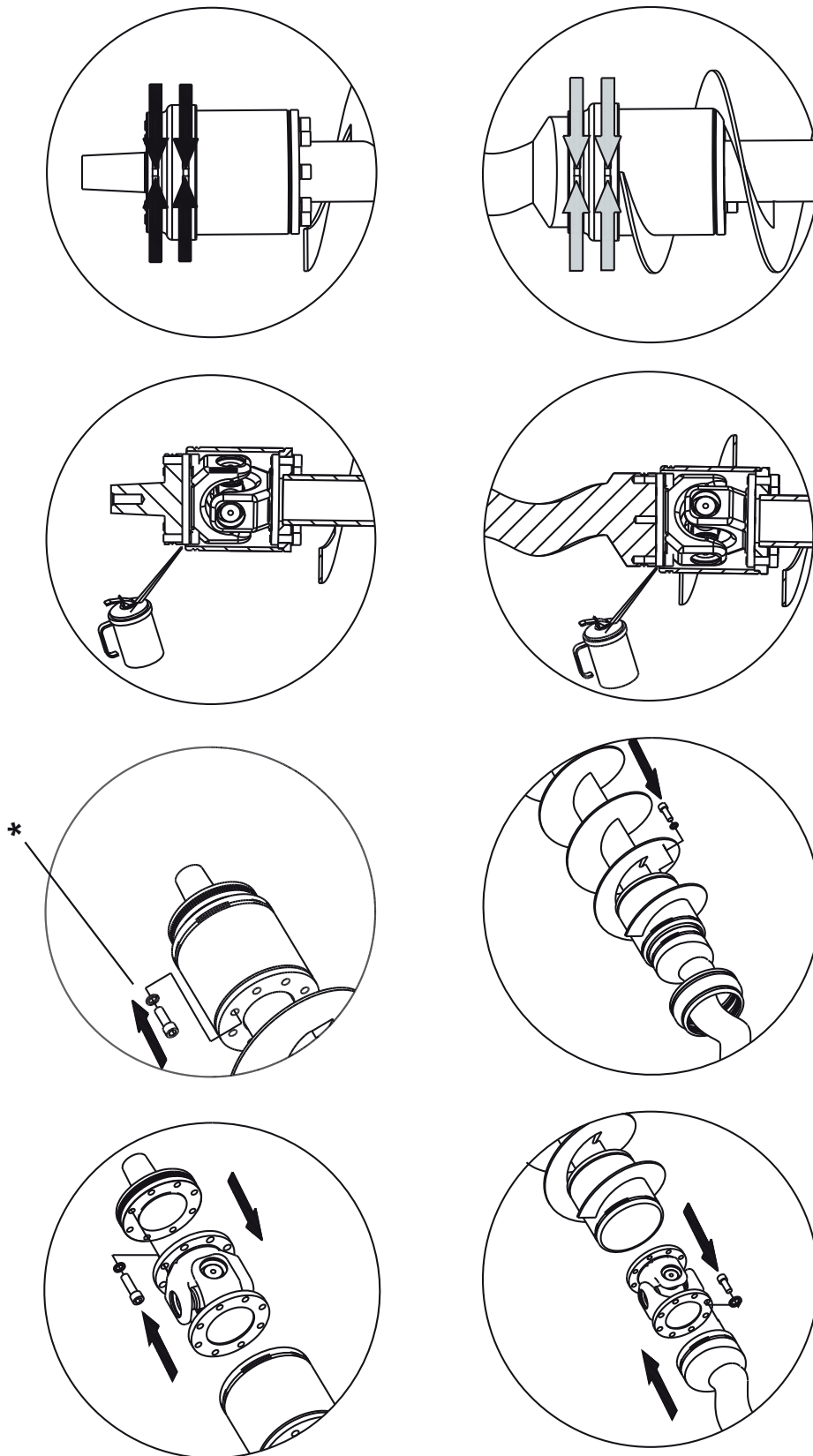


1373-00

\* Fit new sealing ring    \*\* Where fitted    \*\*\* Fit retaining clamp



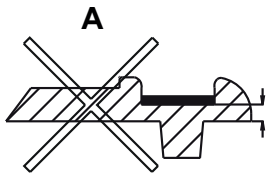
## 12.9 W88, WA4, WB2, WB4, WC1, WD1 (cardan joint types only)



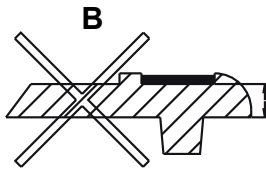
\* Important: use correct sealing washer.

Note: refer to pages 29 and 30 for details of sealing compounds to be used.

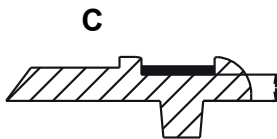
**12.10 Fitting of sealing cover retaining clamp**



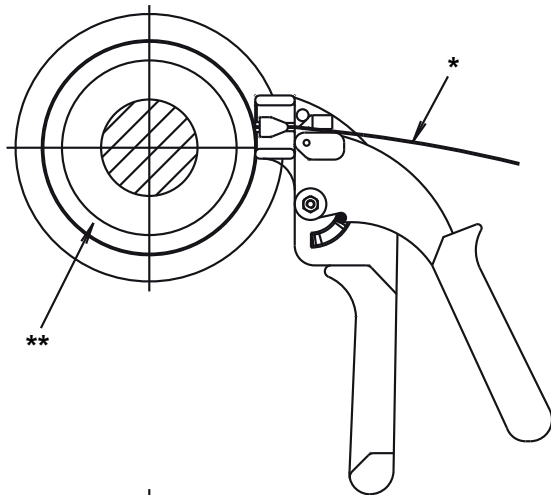
**A** = Tension too tight



**B** = Tension too loose



**C** = Correct tension

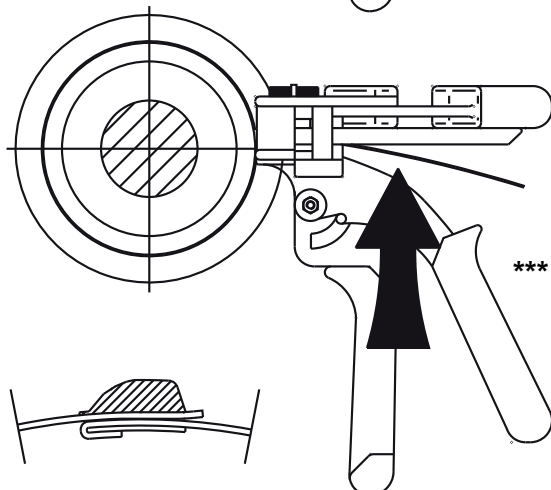


1. Loop clamp around sealing cover and insert tip through head. Pull clamp up snug on sealing cover by hand.

2. Place tool on clamp as shown.

3. Squeeze handles as many times as necessary to achieve correct tension.

4. To remove excess banding, rotate tool  $\frac{1}{4}$  -  $\frac{1}{2}$  turn whilst maintaining handle pressure. Alternatively cut with snips.



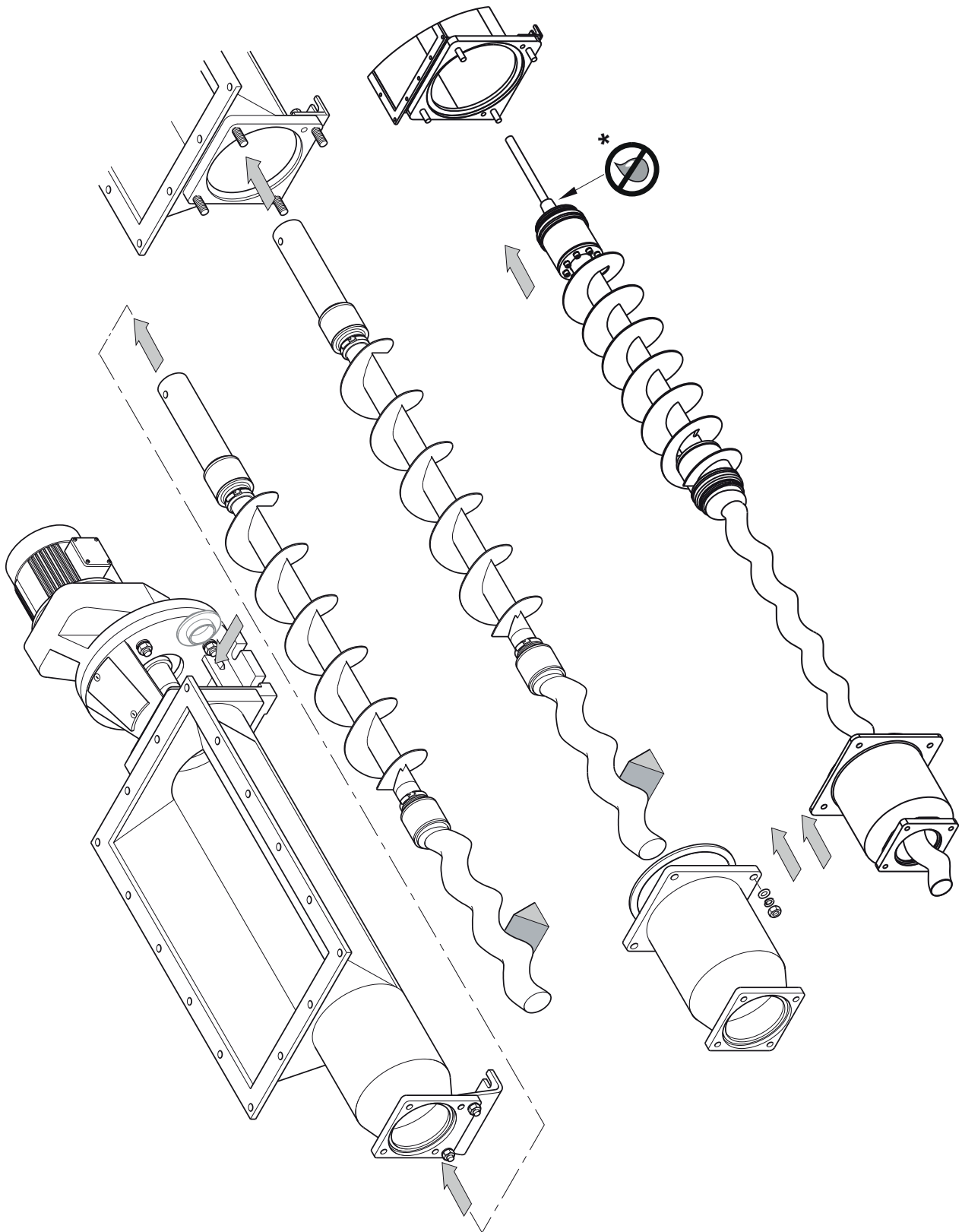
**Note:** Ensure cut off point is flush with end of buckle as shown opposite. Clamp may loosen if cut too short.

\* Clamp

\*\* Sealing cover

## 12.11

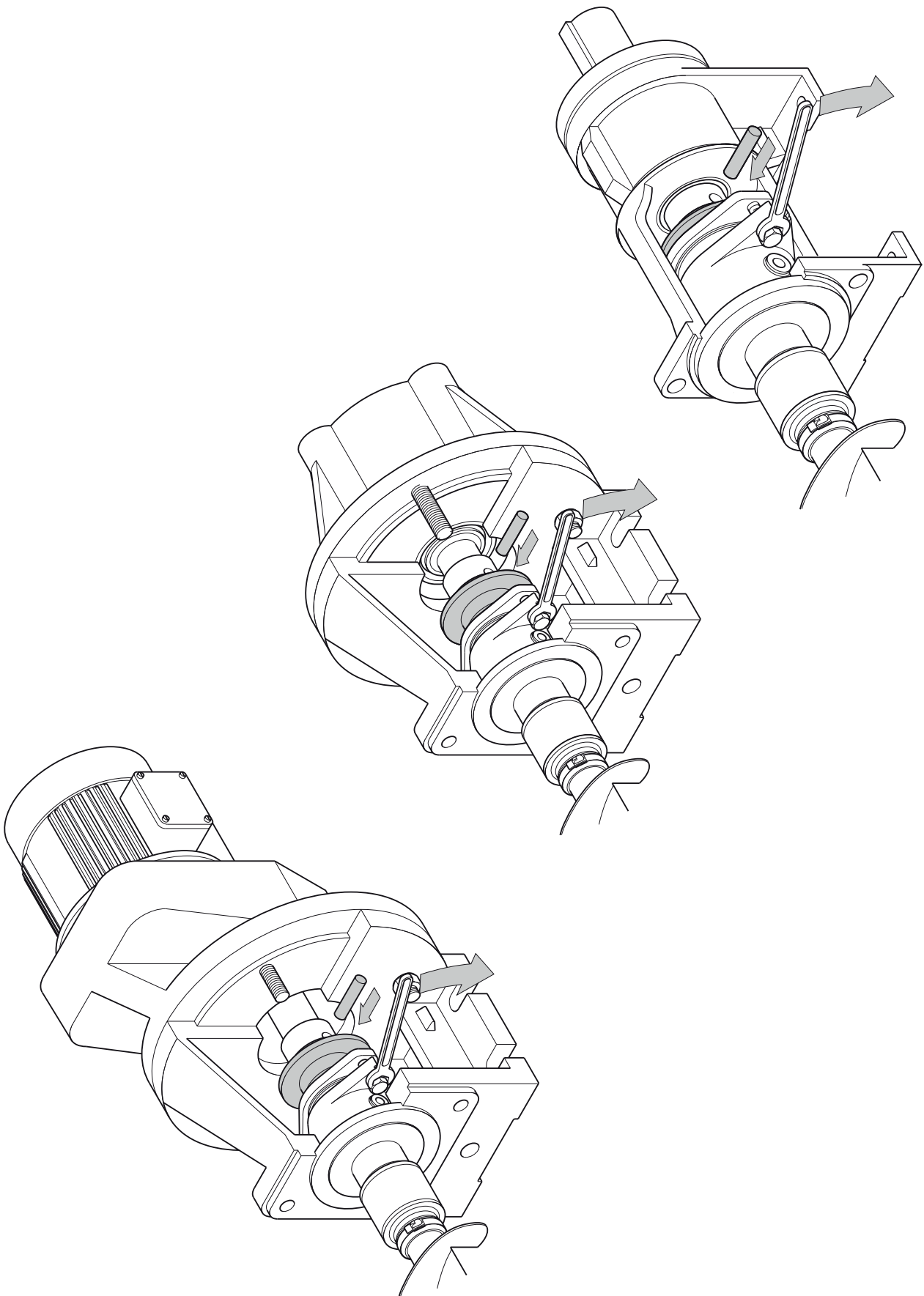
1376-00



\* No oil

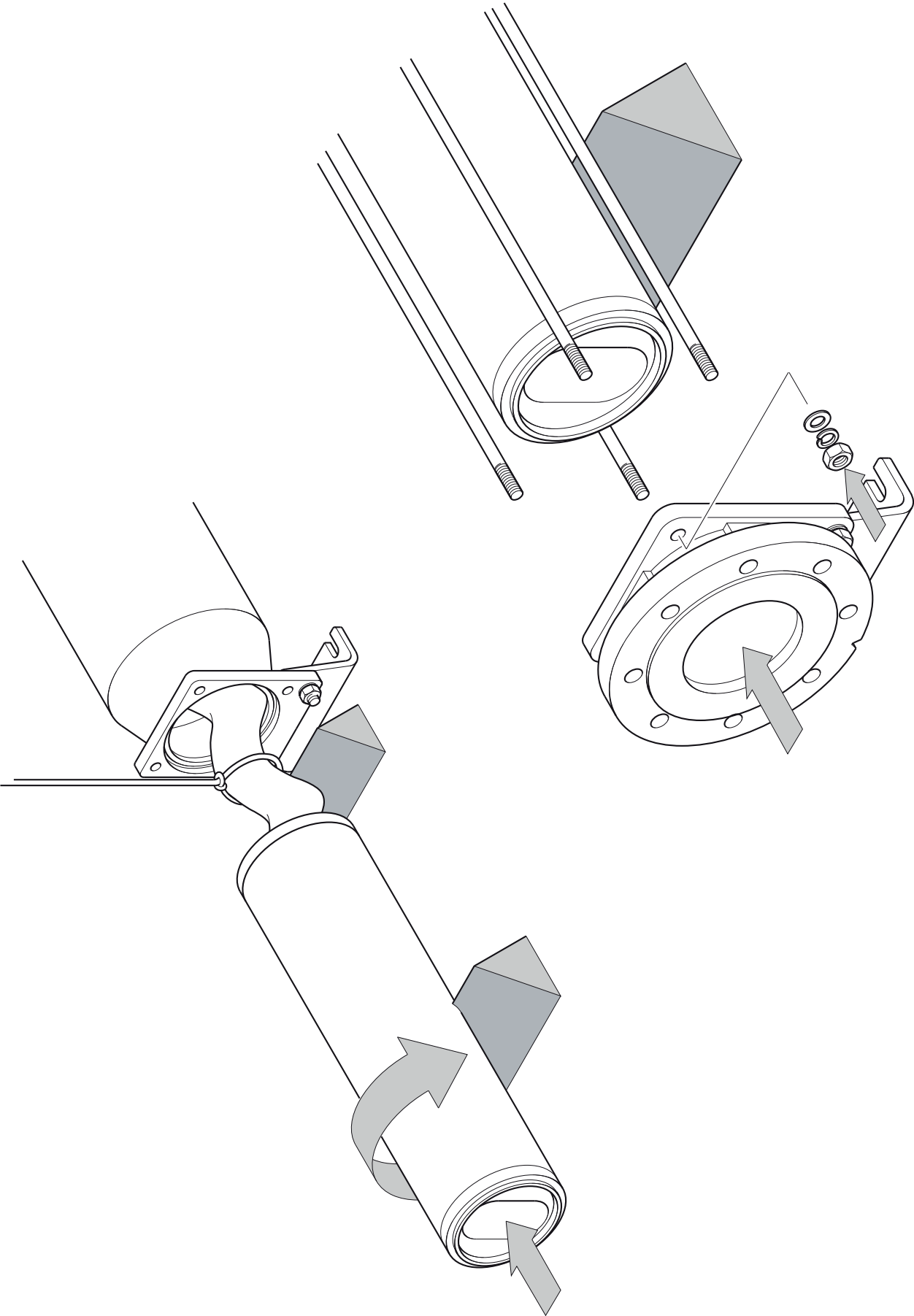
12.12

1377-00



12.13

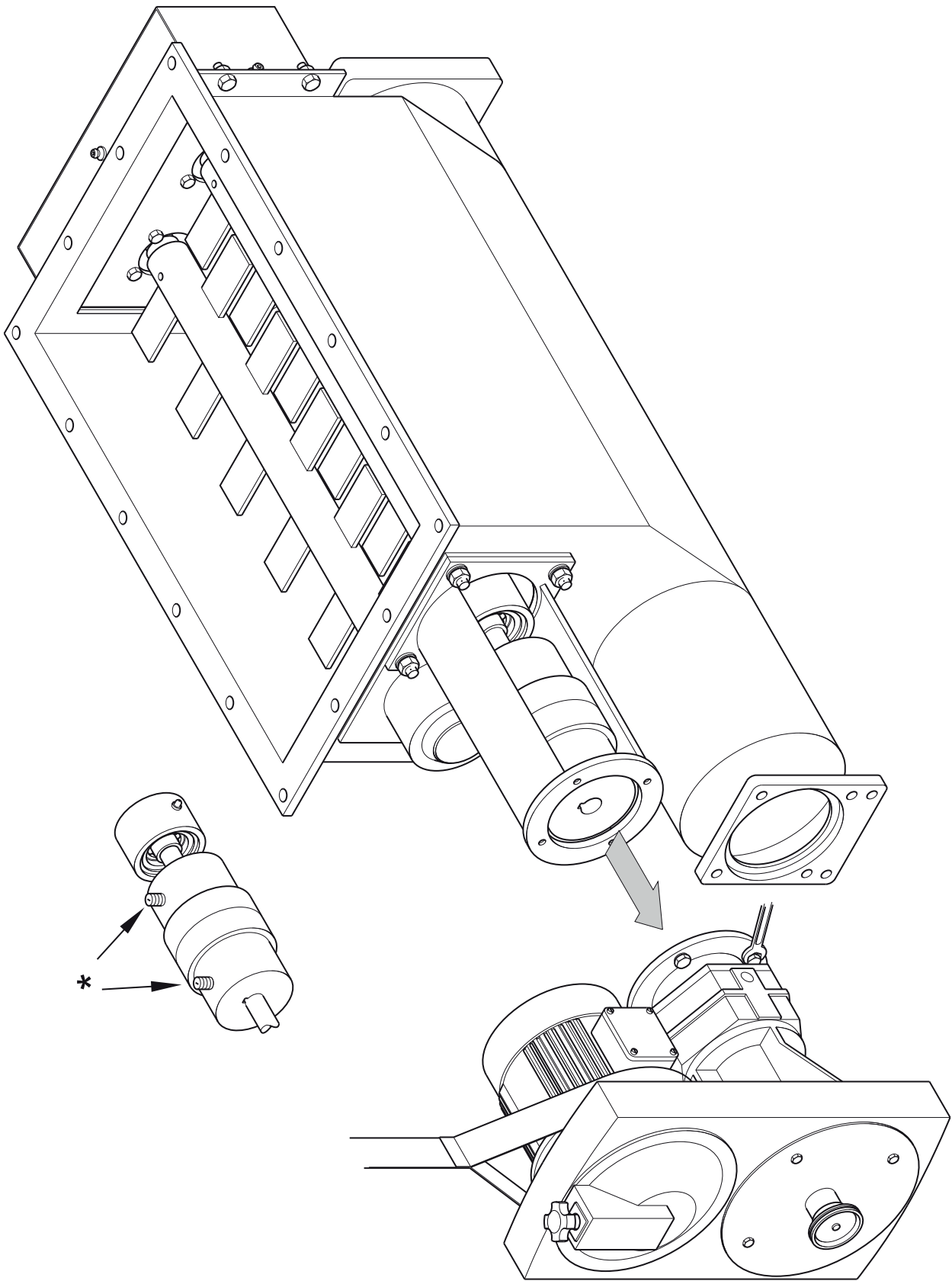
1378-00



### 13 Dismantling procedures - bridge breaker

#### 13.1

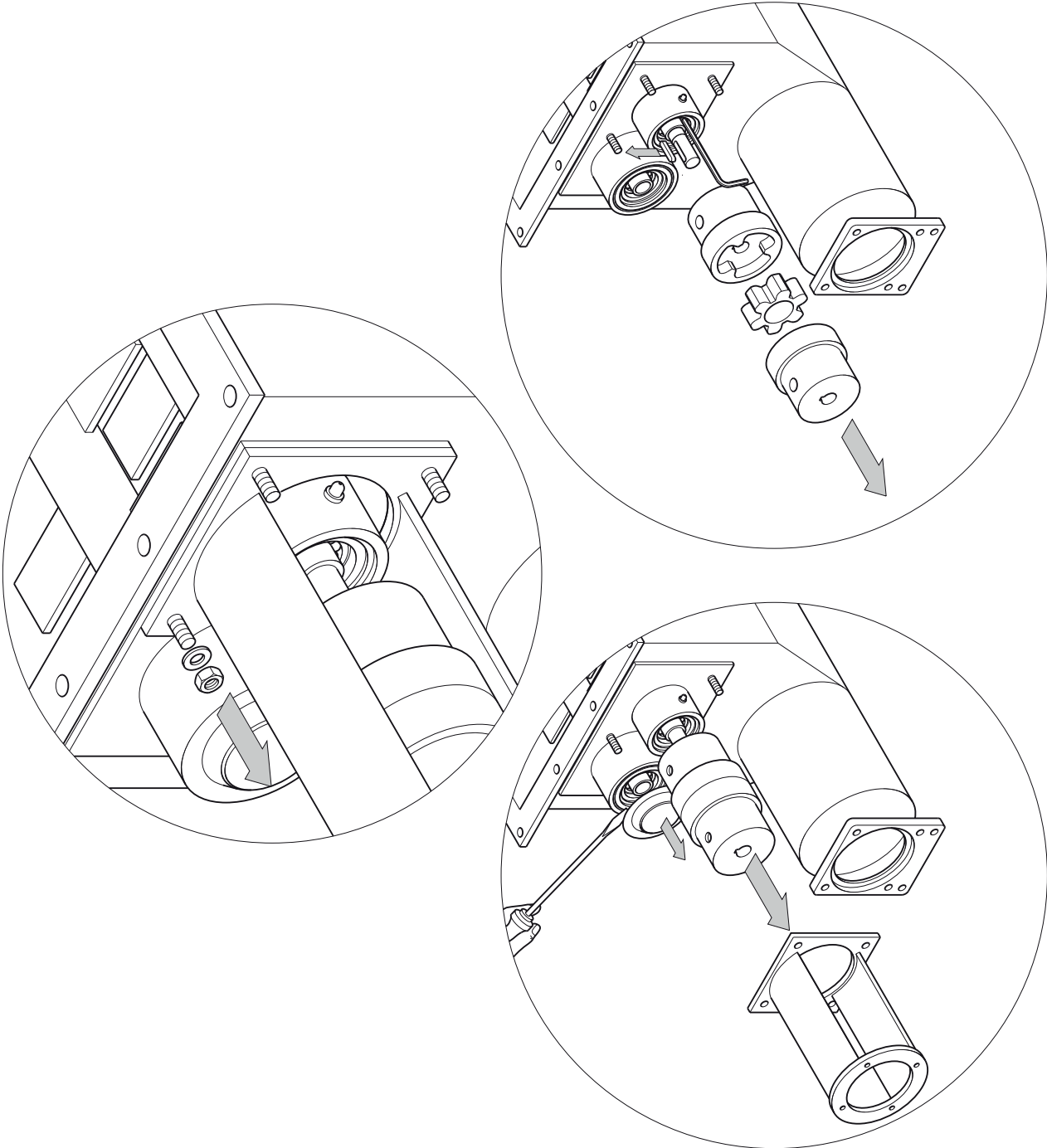
1379-00



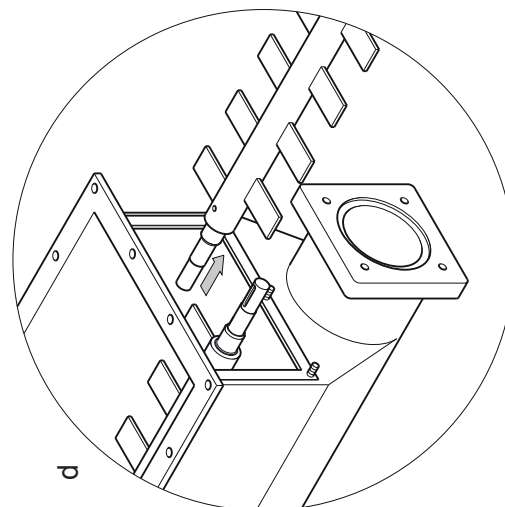
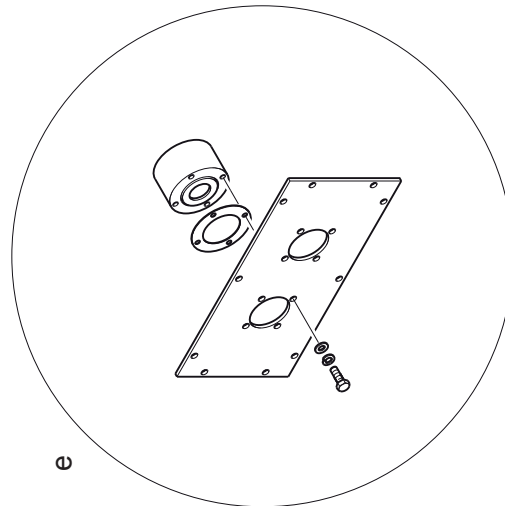
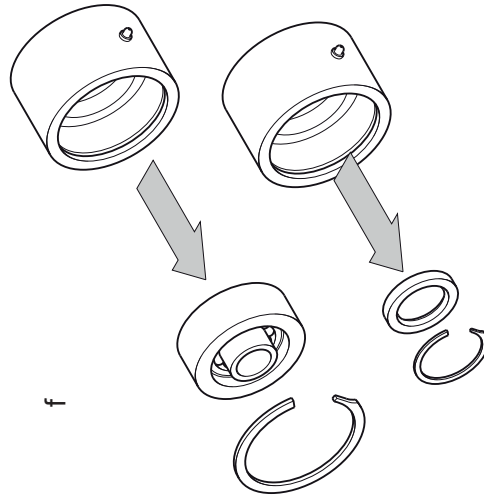
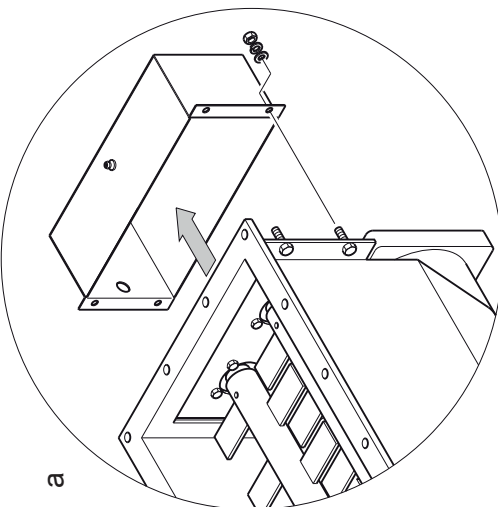
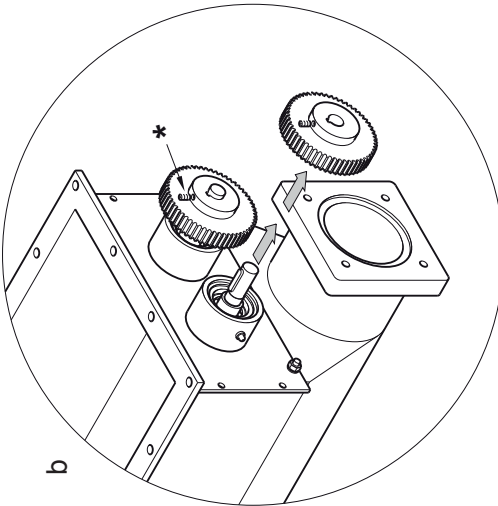
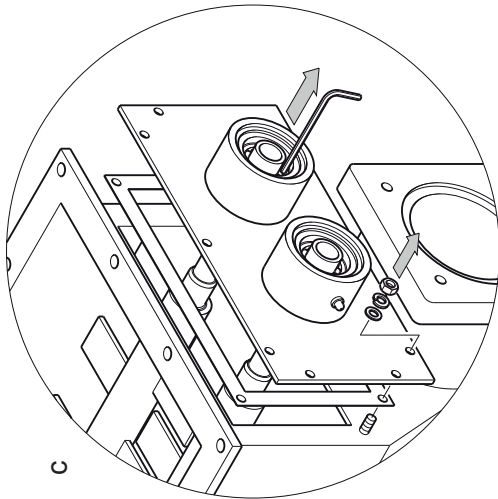
\* Loosen set screws

13.2

1380-00



13.3



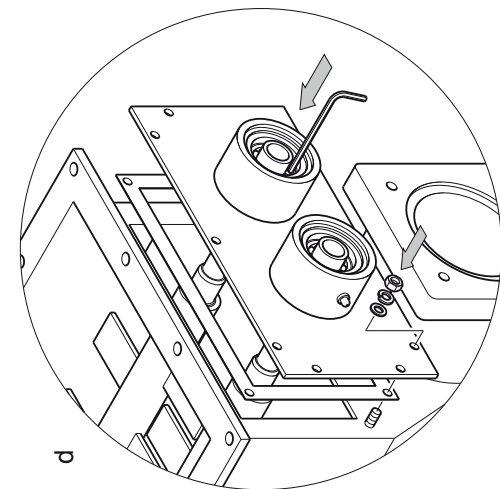
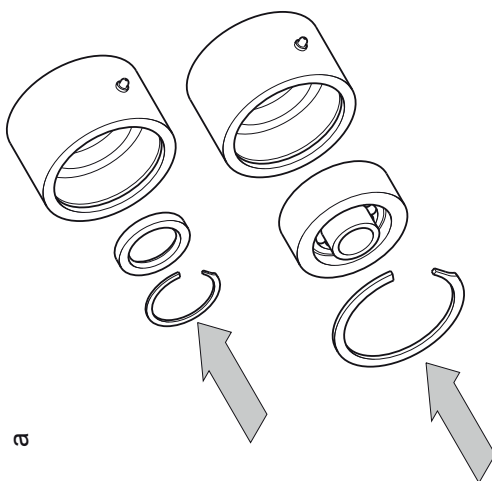
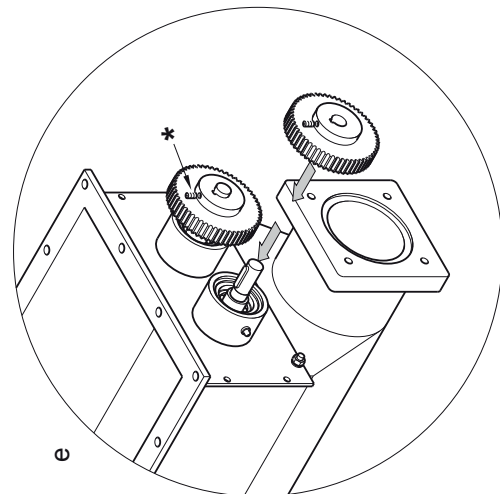
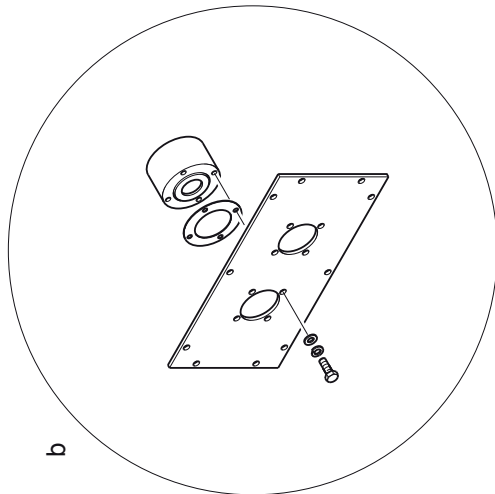
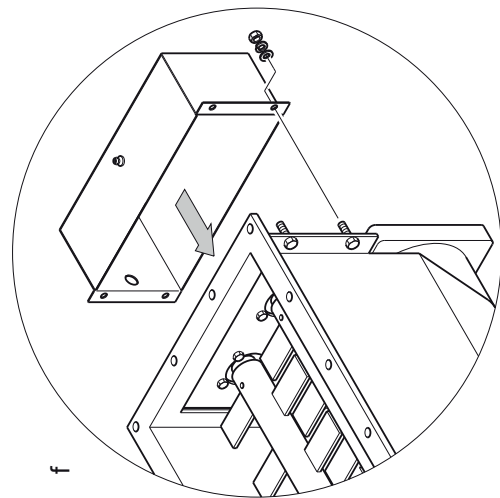
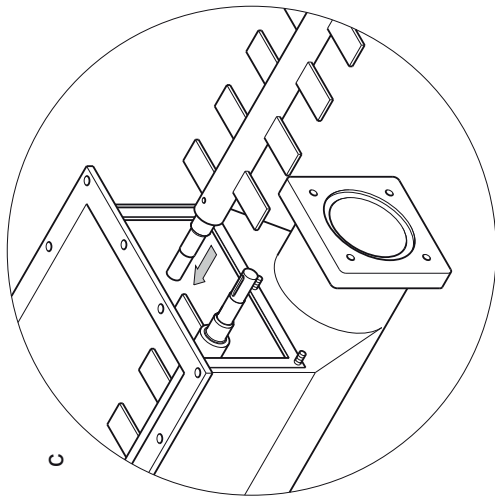
\* Loosen set screws

1381-00



## 14 Assembly procedures - bridge breaker

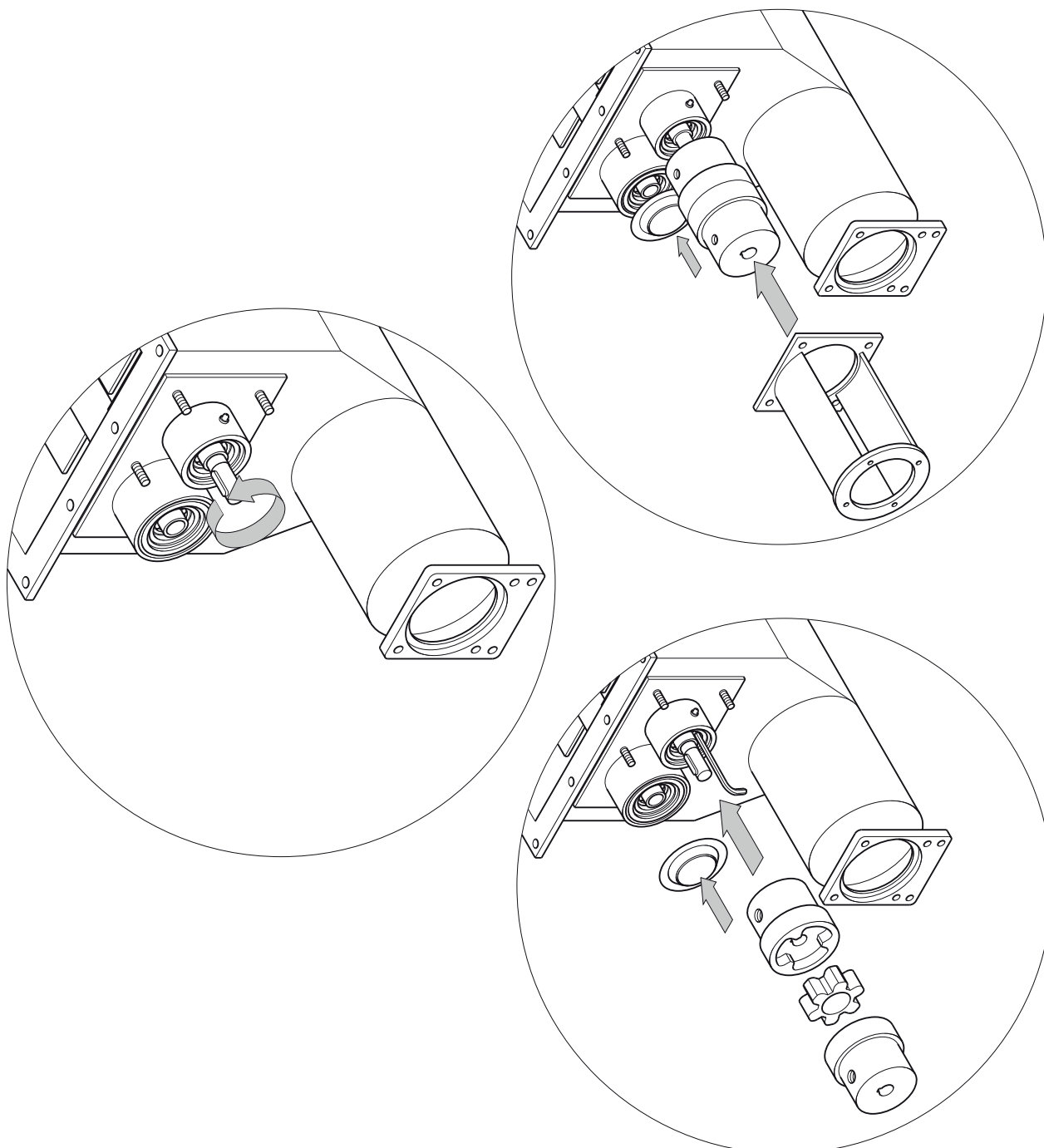
### 14.1



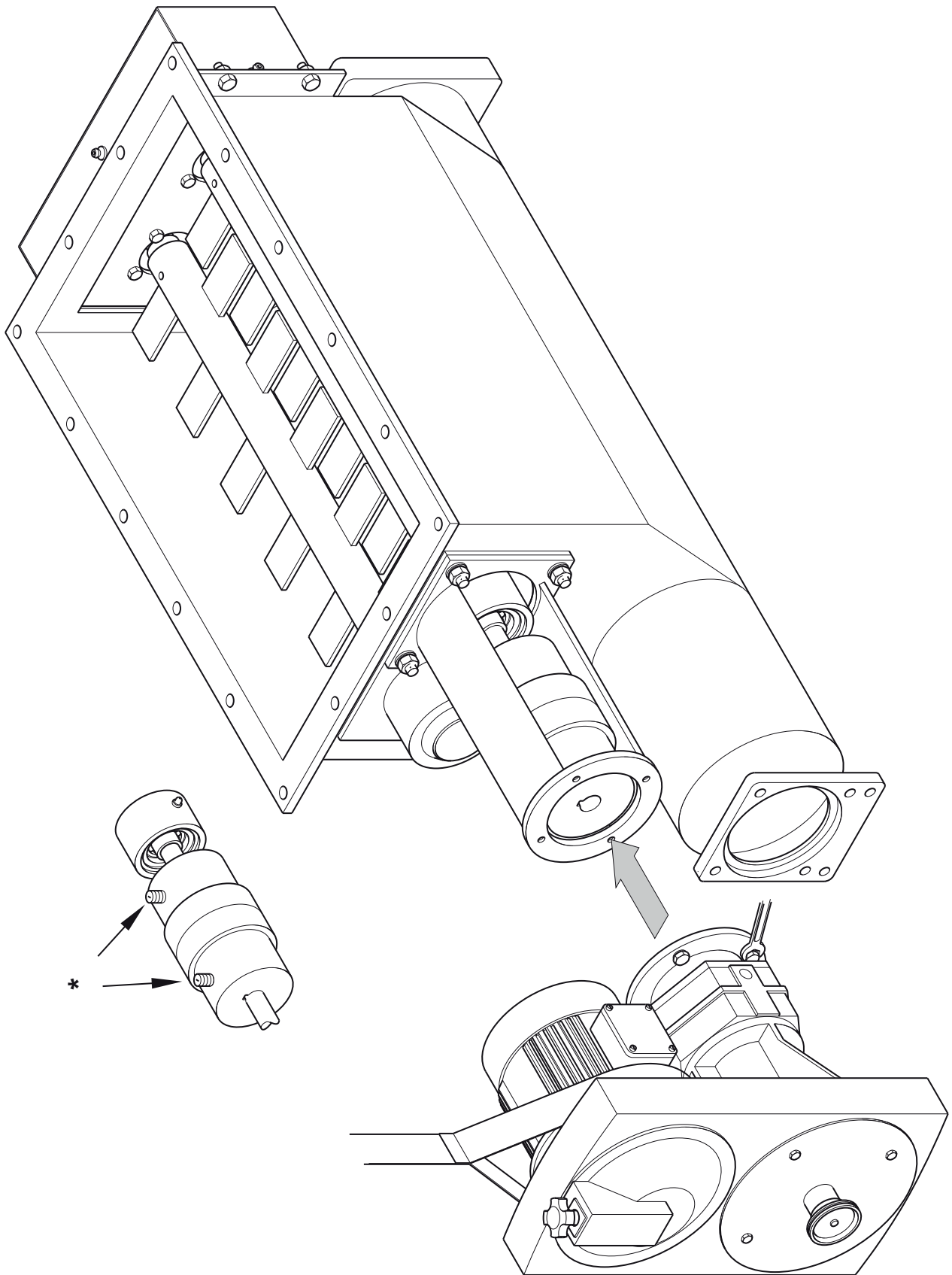
\* Tighten set screws

14.2

1389-00



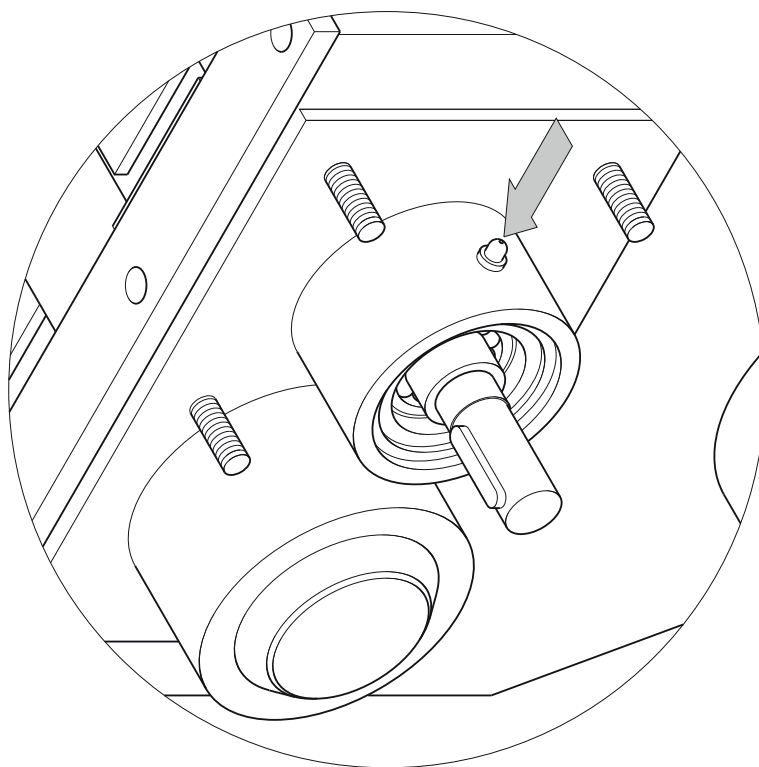
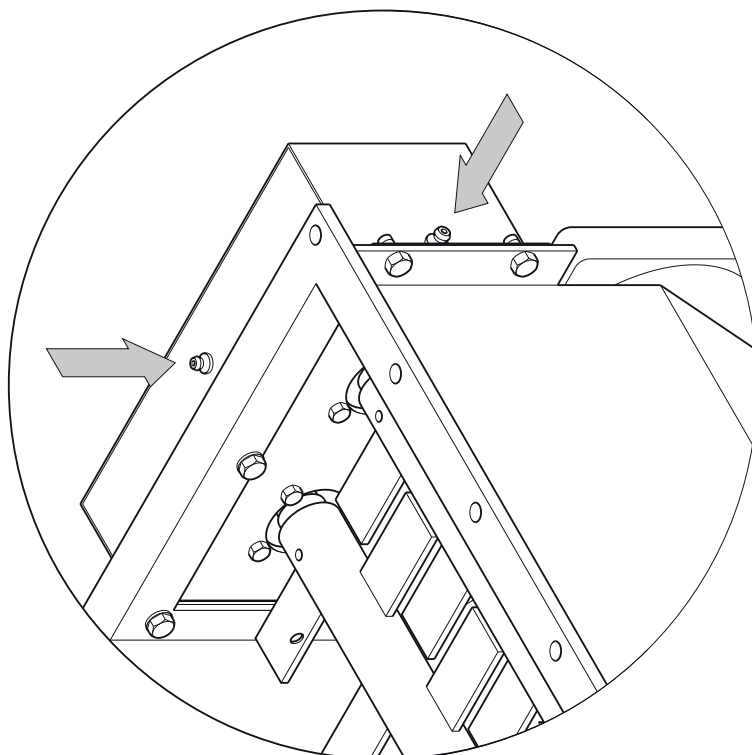
## 14.3



\* Tighten set screws

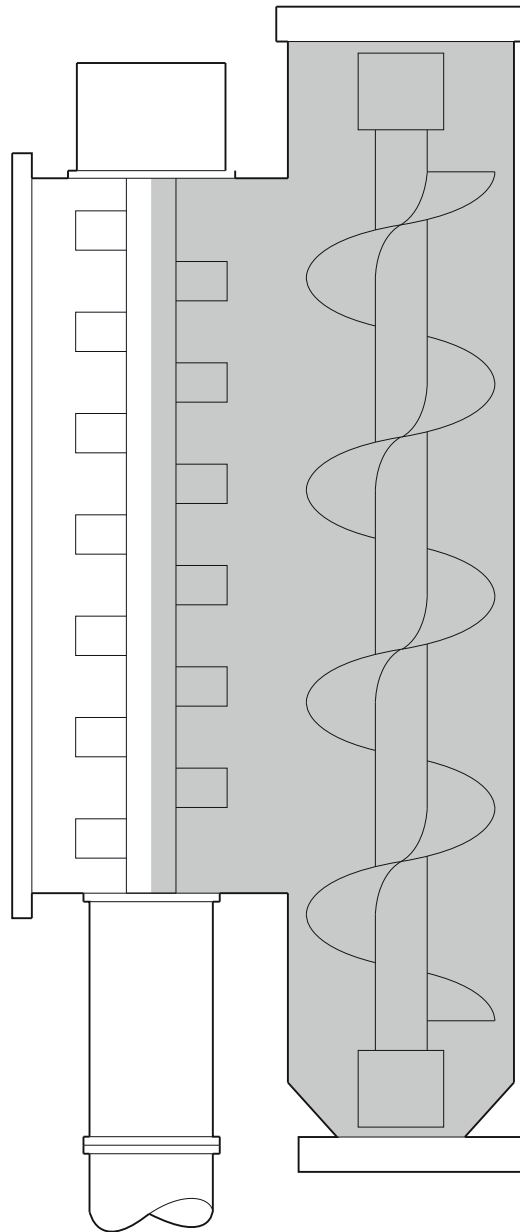
**14.4**

1385-00

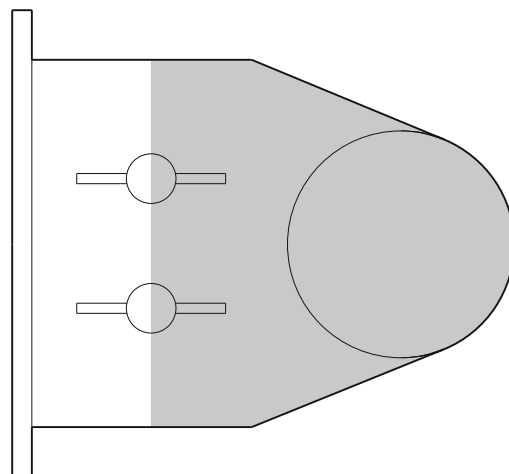


Above positions should be generously charged with the recommended grease using the grease nipples provided.

**14.5 Recommended product level when using pumps fitted with bridge breakers**



1386-00



**15 Helical flight conveyor drive joint lubrication**

Model	Joint lubrication capacity per joint (in <sup>3</sup> approx.)*	Non-food applications		Food applications
		Recommended	Suitable alternative	
W31 W32	0.5	KLUBERSYNTH GH6-460 OIL	MOBIL GEAR OIL SHC 320	KLUBEROIL 4 UHI 460
W34 W41 W42	0.9		MOBIL GEAR OIL SHC 320	
W44 W52 W61	1.8			
W54 W62 W71 W72 W81	2.4		MOBILITH SHC 007 SEMI-FLUID GREASE	
W64 W82 W91 W92 WA1	4.0		MOBIL GEAR OIL SHC 320	
W74 W84 W02 WA2	7.3			
W88 WA4 WB2 WB4 WC1 WD1	91.5		MOBIL GEAR OIL SHC 320	
WC4	244			

\*Joint capacities are for guidance only. Joints should always be completely filled on assembly with recommended lubricants only. Insufficient or incorrect lubrications may result in premature wear.

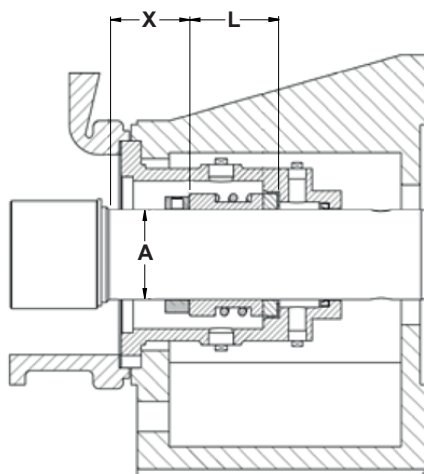
Where fitted, the mechanical seal constant level oiler should be filled with Klubersynth GH6-460 oil.

## 16 Recommended lubrication and service intervals

Components	Lubrication		Service comments
	All applications except food	Food applications only	
Pump drive joints	See section 15		Inspect and lubricate as necessary every 4000 operating hours.
Pump bearings (where fitted)	BP Energrease LC2 or Equivalent		Inspect and re-grease if necessary every 12 months.
Geared drivers (where fitted)	As recommended by the manufacturer		
Bridge breaker bearings (where fitted)	BP Energrease LC2 or Equivalent		Re-grease every 12 months.
Bridge breaker seal shaft assembly (where fitted)	BP Energrease LC2 or Equivalent	Rocol white food grease or equivalent	Re-charge every 3 months. Inspect and clean every 12 months.
Bridge breaker drive gears (where fitted)	BP Energrease LC2 or Equivalent		Re-grease every 3 months.
Mechanical seal constant level oiler (where fitted)	Klubersynth GH6-460		Check daily for the first week and weekly thereafter. Replenish as necessary.



Above service and lubrication intervals are for guidance only to ensure maximum component life. Pump will operate for considerably longer periods without attention depending on service conditions.

**17 Setting lengths for mechanical seals**

1298-00

Pump size	Drive type	A Shaft diameter inches	Seal part no.	L Seal working length inches	X Setting distance inches
W31 W32	Pin joint	1.3"	M032139G	1.7"	0.63"
W34 W41 W42 W51	Pin joint	1.8"	M045139G	1.78"	1.6"
W44 W52 W61	Pin joint	2.2"	M055139G	1.94"	1.4"
W54 W62 W71 W72 W81	Pin joint	2.6"	M065139G	2.1"	1.3"
W64 W82 W91 W92 WA1	Pin joint	3.4"	M085139G	2.4"	1.29"
W74 W84 WA2 WB1	Pin joint	3.4"	M085139G	2.4"	0.3"

**NOTE**

*All seal working lengths are to DIN L1K dimensions. This table is not to be used for standard or DIN L1N working length seals. All seals use 'M' type seat except for 3.3" which uses 'BS' type or 'M' type. This table is not necessarily compatible with any other seal type - please check with Sulzer.*



# SERVICE LOG

Date	Hours of Operation	Comments	Sign

