English

Installation, Operation and Maintenance Instructions

ITT Flygt Compact Range

MPA619

FLYGT

EC Declaration

ITT Water & Wastewater AB

EU declaration of conformity

Manufacturer:

Company name

Address

Telephone

Representative:

Company name

Address

Telephone

Hereby certify that:

Machine:

Type Serial number

* has been manufactured in accordance with the COUNCIL'S DIRECTIVE concerning convergence of the legislation of Member States with regard to Machinery (98/37/EC (89/392/EEC) + 91/368/EEC + 93/44/EEC + 93/68/EEC), EMC (2004/108/EC), and Low Voltage (LVD 2006/95/EC).

* has been manufactured in accordance with the following harmonized standards and technical specifications.

EN ISO 12100-1, EN ISO 12100-2, EN 809

Technical Manager

Title Name

ITT Water & Wastewater AB

Company name

Signature Date

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.

1.2.1. 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, 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.

1.2.2. 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

All ranges excluding P Range 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.

If the pump is to be mounted in any way other than described above, confirmation of the installation must be agreed with the manufacturer. All the pipework should be independently supported.

1.3.1 HANDLING

During installation and maintenance, attention must be paid to the safe handling of all items. Where a pump or its components weigh in excess of 20 kg (45lb) it is recommended that suitable lifting tackle should be used to ensure that personal injury or damage to components does not occur.

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.

1.3.2 STORAGE AND INFREQUENT OPERATION

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

SHORT TERM STORAGE

Where a pump has to be stored for 6 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.

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.

IMMEDIATELY PRIOR TO INSTALLATION AND STARTING

Before installing the pump 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, the manufacturer, should be consulted before proceeding. Normally the manufacturer 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 2) or pressurising upstream equipment. (Check direction arrow on pump nameplate). The electrical installation should include appropriate isolating equipment to ensure that the pump unit 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.

IMPORTANT

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

1.6 GENERAL SAFETY

GREAT CARE MUST BE TAKEN TO PROTECT ALL ELECTRICAL EQUIPMENT FROM SPLASHING WHEN HOSING DOWN. WHERE THE MANUFACTURER HAVE SUPPLIED A BARESHAFT PUMP THE ONUS IS ON THE USER TO FIT ADEQUATE GUARDS IN COMPLIANCE WITH THE REQUIREMENTS OF THE RELEVANT REGULATIONS.

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 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.

1.7 DUTY CONDITIONS

Pumps should only be installed on duties for which the manufacturer 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, THE MANUFACTURER 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 PUMP ROTATION DETAILS

PUMP RANGE	BI-DIRECTIONAL	COMMENT
Compact	Yes	†
Chroma	Yes	†
Epsilon	Yes	†
W	No	**
G	No	**

* Clockwise when viewed from drive end.
** Anti-clockwise when viewed from drive end.
† Anti-clockwise gives inlet at drive end.

DIRECTIONS OF ROTATION

BEFORE THE DIRECTION OF ROTATION IS CHANGED, THE MANUFACTURER MUST BE CONSULTED SO THAT THE SUITABILITY OF THE PUMP CAN BE CONFIRMED WHEN OPERATING ON THE NEW DUTY.

2.3.1. 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 3 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 small leakage of fluid**.

Typical Leakage Rates from Packed Glands

Up to 50mm shaft diameter	2 drops per minute
50 … 75mm shaft diameter	3 drops per minute
75 … 100mm shaft diameter	4 drops per minute
100 … 125mm shaft diameter	5 drops per minute
125 … 160mm shaft diameter	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 pumps materials of construction.

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

CARE IS REQUIRED WHEN ADJUSTING THE GLAND WHILST PUMP IS RUNNING.

2.3.2 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.

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 50^{o}C.

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

2.7 NOISE LEVELS

1. The noise sound pressure level will 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.

3. For pumps identified below, the noise levels vary between 85 and 95dB but will not exceed 95dB at one metre distance from the pump.

Pump Sizes (based on Epsilon Pumping Element)

Single Stage	Size 12 and above
Two Stage	Size 9 and above
Four Stage	Size 7 and above
Six Stage	Size 7 and above
Eight Stage	Size 6 and above

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 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 & bushes
3. Use of appropriate belts & pulleys correctly tensioned.

2.10 CLEANING PRIOR TO OPERATION

i. **Non Food Use**

During the commissioning of a new pump or recommissioning 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 @ 75°C for 20 mins
2. Water rinse @ 80°C for 20 mins

3. Acid wash @ 50°C for 20 mins
4. Water rinse @ 80°C 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 1.5 to 2.0 m/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 WIDETHROAT PUMPS

Specific pumps may 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 ATMOSPHERES

DO NOT INSTALL IN AN EXPLOSIVE ATMOSPHERE

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 MAINTENANCE OF WEARING COMPONENTS

2.14.1 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.

2.14.2 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.

2.14.3 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.

It is essential to replace all the joint items with genuine parts to ensure maximum life.

2.14.4 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

Section 4 contains 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.

3.1 USE OF ITEMS NOT APPROVED OR MANUFACTURED BY THE MANUFACTURER

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

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

The use of replacement items that are not approved by or manufactured by the manufacturer 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 the manufacturer.

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.

Diagnostic Chart

SYMPTOMS	POSSIBLE CAUSES
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.

LIST OF CAUSES	REMEDIAL ACTIONS
1. INCORRECT DIRECTION OF ROTATION	1. REVERSE MOTOR
2. PUMP UNPRIMED	2. BLEED SYSTEM OF AIR/GAS
3. INSUFFICIENT N.P.S.H. AVAILABLE	3. INCREASE SUCTION HEAD OR REDUCE SPEED/TEMP.
4. PRODUCT VAPORISING IN SUPPLY LINE	4. INCREASE N.P.S.H. 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. FOOTVALVE/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

Drawing Reference Numbers

C1XK AND ABOVE EXCLUDING 4 - STAGE MODELS

DRG. REF	DESCRIPTION
01A	BODY-STD C.I.
10A	MECHANICAL SEAL
15A	THROWER GUARD
20B	GASKET-GLAND
22A	STATOR-MTM NITRILE RUBBER
23A	SUCTION CHAMBER
23B	SUCT CHAMB EXTENSION
24A	END COVER
25A	ROTOR
26A	COUPLING ROD
28A	SEALING COVER
28B	SEALING COVER
29A	COUPLING ROD PIN
29B	COUPLING ROD PIN
29C	SHAFT PIN
32A	DRIVE SHAFT
42A	THROWER
62A	SUPPORT FOOT
65A	MECH SEAL CARRIER
66A	ABUTMENT RING
74A	SLEEVE (ROTOR-SHAFT)
74B	SLEEVE (ROTOR-SHAFT)
95A	TIE ROD
P104	HEX. HD. BOLT
P105	HEX. NUT
P106	WASHER
P107	SNGL. COIL SPR. WASHER
P109	HEX NUT

DRG. REF	DESCRIPTION
P201	TAPER PLUG
P202	TAPER PLUG
P203	HEX. SOC. SETSCREW
P401	TORL SEAL RING
P402	TORL SEAL RING
P403	SPIRAL RET.RING
P404	SPIRAL RET.RING
P405	TIE-SEALING COVER
P406	TIE SEALING COVER
P501	TAPER PLUG
P502	TAPER PLUG
P503	HEX. NUT
P504	WASHER
P505	SNGL. COIL SPR. WASHER
P506	HEX. NUT
P507	WASHER
P508	SNGL. COIL SPR. WASHER
P509	TORL SEAL RING
P510	TORL SEAL RING
P519	TAPER PLUG
P520	HEX. HD. BOLT
P521	HEX. NUT
P522	WASHER
P523	SNGL. COIL SPR. WASHER
P601	HEX HD BOLT
P602	SNGL. COIL SPR. WASHER
P603	WASHER
P604	HEX. NUT

IMPORTANT NOTE

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Drawing Reference Numbers

4 - STAGE MODELS C13D TO C18D

DRG. REF.	DESCRIPTION	DRG. REF.	DESCRIPTION
01A	BODY	P501	HEX NUT
01B	BEARING HOUSING	P502	SPRING WASHER
01C	BODY ADAPTOR	P503	PLAIN WASHER
06A	NAMEPLATE (SOG)	P504	PLAIN WASHER
06B	NAMEPLATE (DOG)	P505	SPRING WASHER
10A	MECHANICAL SEAL/GLAND PACKING	P506	HEX NUT
15A	THROWER GUARD	P507	HEX HEAD SCREW
20A	GASKET-GLAND	P508	PLAIN WASHER
20B	GASKET-GLAND	P509	PLAIN WASHER
22A	STATOR	P510	SPRING WASHER
23A	SUCTION CHAMBER	P511	HEX NUT
23B	SUCTION CHAMBER EXTENSION	P512	STUD
24A	END COVER	P513	PLAIN WASHER
25A	ROTOR	P514	SPRING WASHER
26A	COUPLING ROD	P515	HEX NUT
28A	SEALING COVER	P516	HEAD SCREW
28B	SEALING COVER	P517	PLAIN WASHER
29A	COUPLING ROD PIN	P518	PLAIN WASHER
29B	COUPLING ROD PIN	P519	SPRING WASHER
29C	SHAFT PIN	P520	HEX NUT
32A	DRIVE SHAFT	P522	PLAIN WASHER
42A	THROWER	P526	TAPER PLUG
62A	SUPPORT FOOT	P527	TAPER PLUG
65A	MECH SEAL CARRIER/GLAND SECTION	P528	TAPER PLUG
66A	ABUTMENT RING	P529	SEAL RING
75A	ROTOR/SHAFT SLEEVE	P530	STUD
75B	ROTOR/SHAFT SLEEVE	P531	SPRING WASHER
76A	ADAPTOR FLANGE	P532	PLAIN WASHER
95A	TIE BAR	P533	HEX NUT
P104	HEX HEAD BOLT	P534	STUD
P105	HEX NUT	P535	HEX NUT
P106	PLAIN WASHER	P536	PLAIN WASHER
P107	SPRING WASHER	P537	SPRING WASHER
P108	SPRING WASHER	P538	TORL SEAL RING
P109	HEX NUT	P539	TORL SEAL RING
P201	TAPER PLUG	P601	HEX HEAD BOLT
P202	TAPER PLUG	P602	SPRING WASHER
P401	SEAL RING	P603	PLAIN WASHER
P402	SEAL RING	P604	HEX NUT
P403	SPIRAL RETAINING RING		
P404	SPIRAL RETAINING RING		
P405	TIE - SEALING COVER		
P406	TIE - SEALING COVER		

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C2XB AND BELOW EXCLUDING 4 - STAGE MODELS

DRG. REF.	DESCRIPTION
01A	BODY
06A	NAMEPLATE (SOG)
06B	NAMEPLATE (DOG)
10A	MECHANICAL SEAL
15A	THROWER GUARD ASSEMBLY
20A	GASKET GLAND
20B	GASKET GLAND
20C	SEAL RING
22A	STATOR
23A	SUCTION CHAMBER
23B	SUCTION CHAMBER EXTENSION
24A	END COVER
25A	ROTOR
26A	COUPLING ROD
28A	SEALI NG COVER
28B	SEALING COVER
29A	COUPLING ROD PIN
29B	COUPLING ROD PIN
29C	SHAFT PIN
32A	DRIVE SHAFT
42A	THROWER
47A	ADAPTER PLATE
47B	ADAPTER PLATE
62A	SUPPORT FOOT
65A	MECHANICAL SEAL CARRIER
66A	ABUTMENT RING
75A	SLEEVE
75B	SLEEVE
95A	TIE BAR
P101	HEXAGONAL HEAD BOLT
P102	FLAT WASHER
P104	HEXAGONAL HEAD BOLT
P105	HEXAGONAL NUT
P106	FLAT WASHER
P107	SPRING WASHER
P108	FLAT WASHER
P109	HEXAGONAL NUT

DRG. REF.	DESCRIPTION
P201	PLUG
P202	PLUG
P401	SEAL RING
P402	SEAL RING
P403	SPIRAL RETAINING RING
P404	SPIRAL RETAINING RING
P405	TIE
P406	TIE
P501	PLUG
P502	PLUG
P503	PLUG
P504	HEXAGONAL NUT
P505	SPRING WASHER
P506	FLAT WASHER
P507	HEXAGONAL NUT
P508	SPRING WASHER
P509	FLAT WASHER
P510	HEXAGONAL HEAD BOLT
P511	SPRING WASHER
P512	FLAT WASHER
P513	HEXAGONAL NUT
P515	SEAL RING
P601	HEXAGONAL HEAD BOLT
P602	SPRING WASHER
P603	FLAT WASHER
P604	HEXAGONAL NUT

IMPORTANT NOTE

THE DRAWING REFERENCES SHOWN GIVE THE DESCRIPTION OF ALL THE PARTS DETAILED ON THE EXPLODED DRAWINGS IN THIS SECTION OF THE BOOK. THEREFORE SOME OF THE REFERENCES MAY NOT BE SHOWN ON ANY ONE.

SQUARE INLET - ALL MODELS

DRG. REF.	DESCRIPTION
01A	BODY
06A	NAMEPLATE
10A	MECHANICAL SEAL
15A	THROWER GUARD
20A	INSPECTION COVER GASKET
20B	GLAND GASKET
22A	STATOR
23A	THROAT
24A	END COVER
25A	ROTOR
27A	COUPLING ROD BUSH
27B	COUPLING ROD BUSH
28A	SEALING BOOT
28B	SEALING BOOT
29A	COUPLING ROD PIN
29B	C OUPLING ROD PIN
29C	DRIVE SHAFT PIN
32A	DRIVE SHAFT
38A	CONVEYOR
42A	THROWER
59A	INSPECTION COVER
62A	SUPPORT FOOT
65A	GLAND SECTION
66A	ABUTMENT RING
75A	SHAFT SLEEVE
75B	ROTOR SLEEVE
95A	STATOR TIE BAR

DRG. REF.	DESCRIPTION
P101	HEX SCREW
P102	FLAT WASHER
P103	STUD
P104	HEX BOLT
P105	HEX NUT
P106	FLAT WASHER
P107	SPRING WASHER
P108	SPRING WASHER
P109	HEX NUT
P201	TAPER PLUG
P202	TAPER PLUG
P203	GRUB SCREW
P401	O RING
P402	O RING
P403	SPIRAL RETAINING RING
P404	SPIRAL RETAINING RING
P405	SEALING BOOT TIE
P406	SEALING BOOT TIE
P501	TAPER PLUG
P503	HEX NUT
P504	FLAT WASHER
P505	SPRING WASHER

IMPORTANT NOTE

THE DRAWING REFERENCES SHOWN GIVE THE DESCRIPTION OF ALL THE PARTS DETAILED ON THE EXPLODED DRAWINGS IN THIS SECTION OF THE BOOK. THEREFORE SOME OF THE REFERENCES MAY NOT BE SHOWN ON ANY ONE.

Pump Coding

Range	Monobloc Compact	**C**															
	Monobloc Compact Square Inlet	**S**															
Design Mk No	Monobloc		**1**														
	Monobloc (January 2007)		**2**														
Size	1.3m³/h @ 1750 rpm			**1**													
	3.3m³/h @ 1750 rpm			**2**													
	10m³/h @ 1500 rpm			**3**													
	13m³/h @ 1500 rpm			**X**													
	22m³/h @ 1000 rpm			**4**													
	37m³/h @ 800 rpm			**5**													
	57m³/h @ 700 rpm			**6**													
	79m³/h @ 600 rpm			**7**													
	97m³/h @ 500 rpm			**8**													
	125m³/h @ 450 rpm			**9**													
	165m³/h @ 400rpm			**A**													
	225m³/h @ 350 rpm			**B**													
Stages	Single stage				**A**												
	Two stage				**B**												
	Four stage				**D**												
	Single stage - extended pitch				**K**												
Casing Material	Cast Iron					**C**											
	Stainless steel					**S**											
Rotating Parts [1]	Code 1						**1**										
	Code 5						**5**										
	Code 8						**8**										
Rotor Mk No	Mk 0 (Oversized)							**0**									
	Mk1 (Standard)							**1**									
	Mk3 (Temperature)							**3**									
	Mk5 (Temperature)							**5**									
Stator Material	RA, RR etc.								**R**								
Seal Type	Mechanical Seal									**M**							
	Packed Gland									**P**							
Build Option	Refer to product manual section 2 & 3, drive selections										**A**						
											B						
											H						
/												**/**					
Variation	For special requirements contact the manufacturer												**A**	**1**	**2**	**3**	

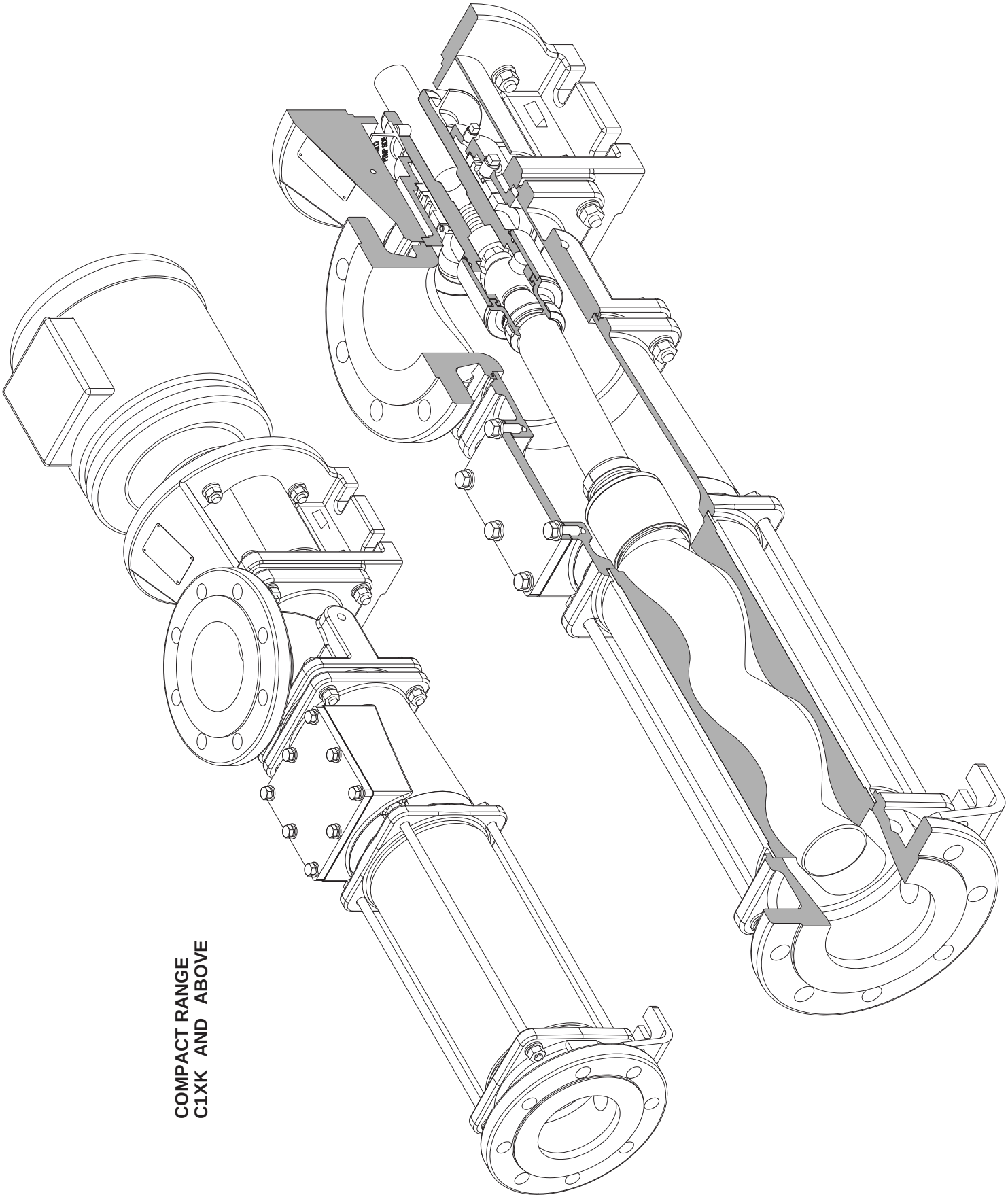
Example

C	**1**	**X**	**A**	**C**	**8**	**1**	**R**	**M**	**A**
C Range	Design Mk 1	Size 0X	Single Stage	Cast Iron	Code 8 Rot Parts	Mk 1 Rotor	Nitrile Stator	Mechanical Seal	Build Option A

Note: Refer to Pre Selection Table for availability of pump models.

[1] : For other material options please contact the manufacturer.

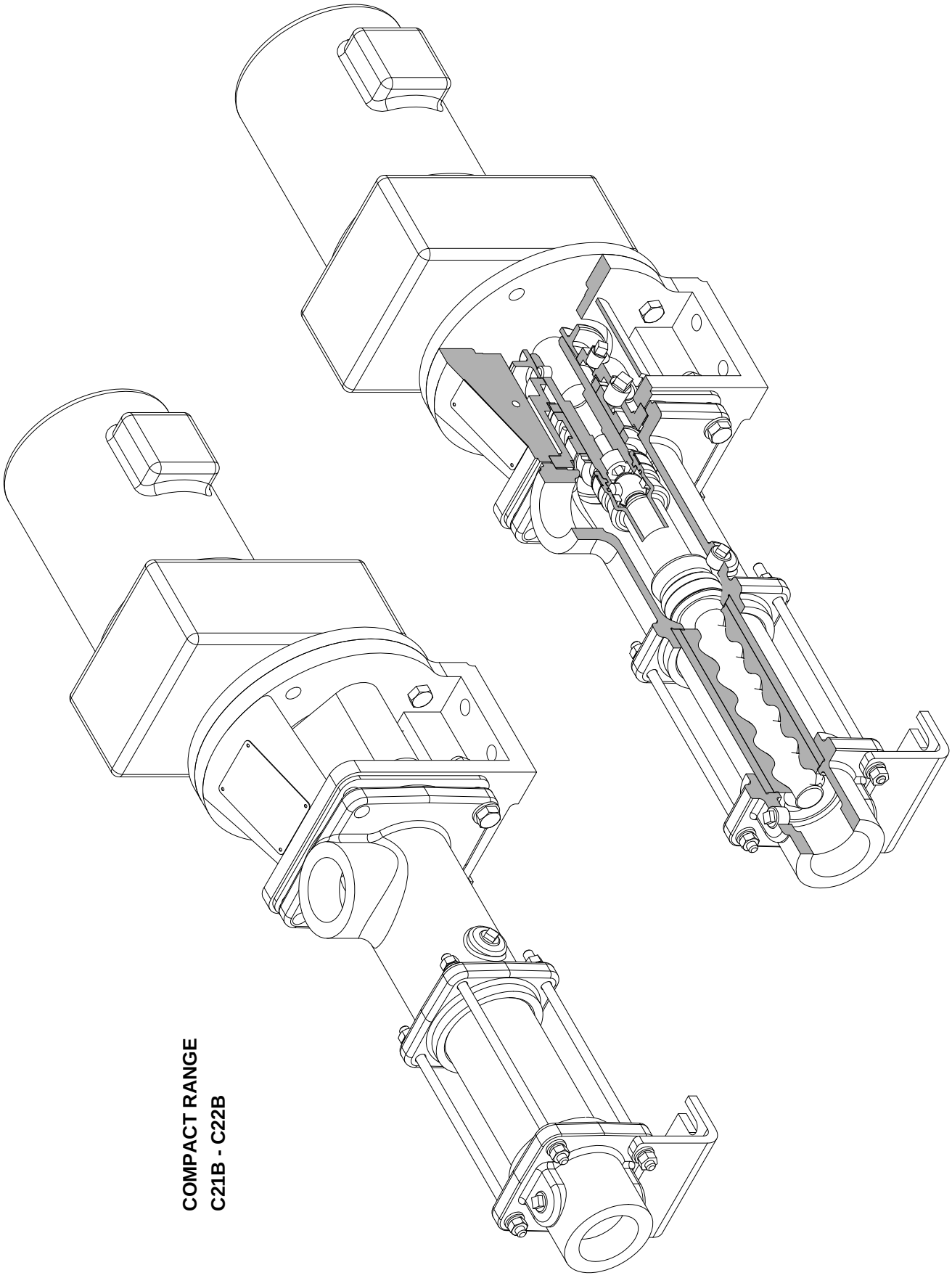
Dismantling & Assembly Diagrams



COMPACT RANGE
C1XK AND ABOVE

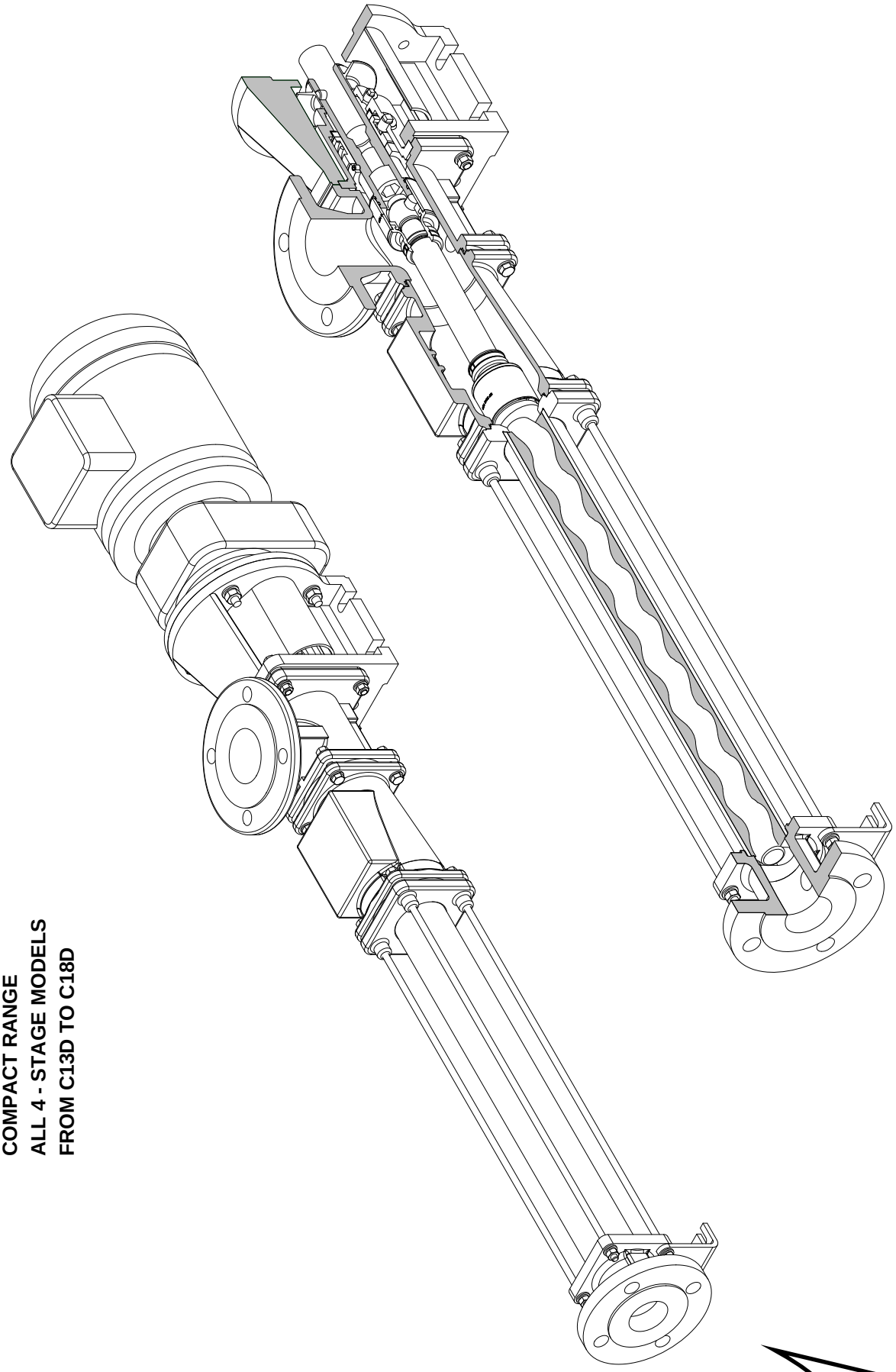
FLYGT

Dismantling & Assembly Diagrams



COMPACT RANGE
C21B - C22B

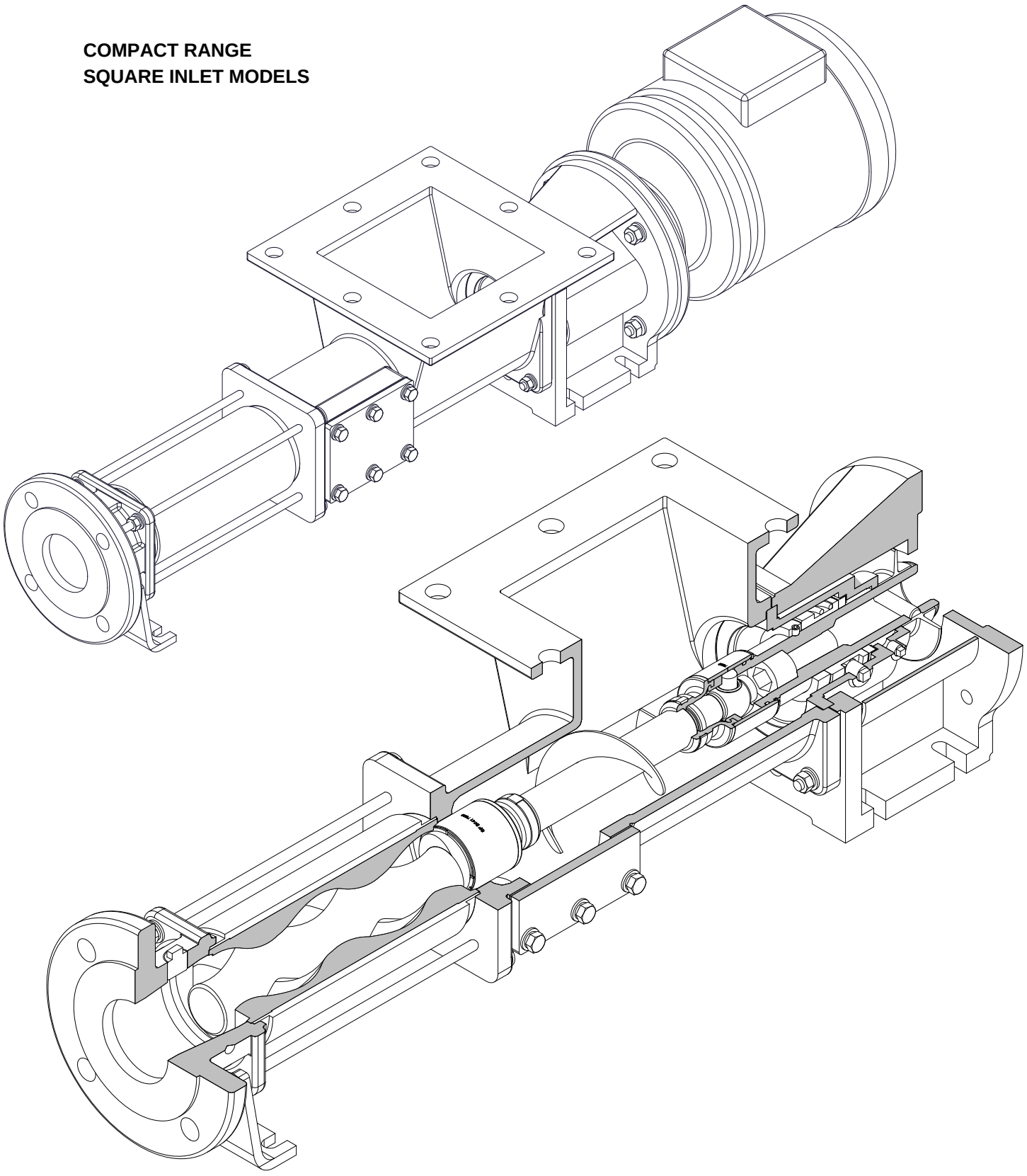
Dismantling & Assembly Diagrams



COMPACT RANGE
ALL 4 - STAGE MODELS
FROM C13D TO C18D

Dismantling & Assembly Diagrams

COMPACT RANGE
SQUARE INLET MODELS



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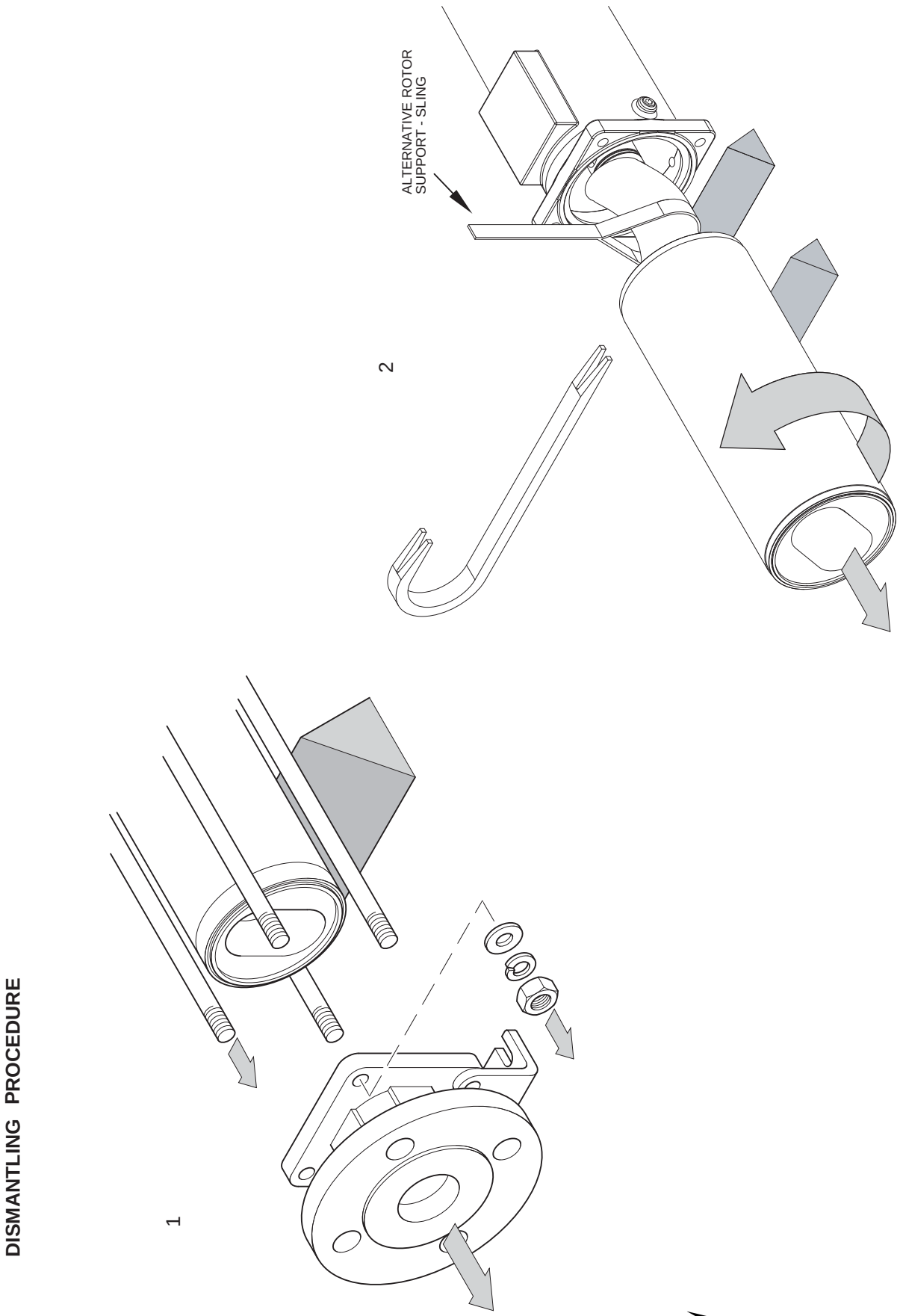
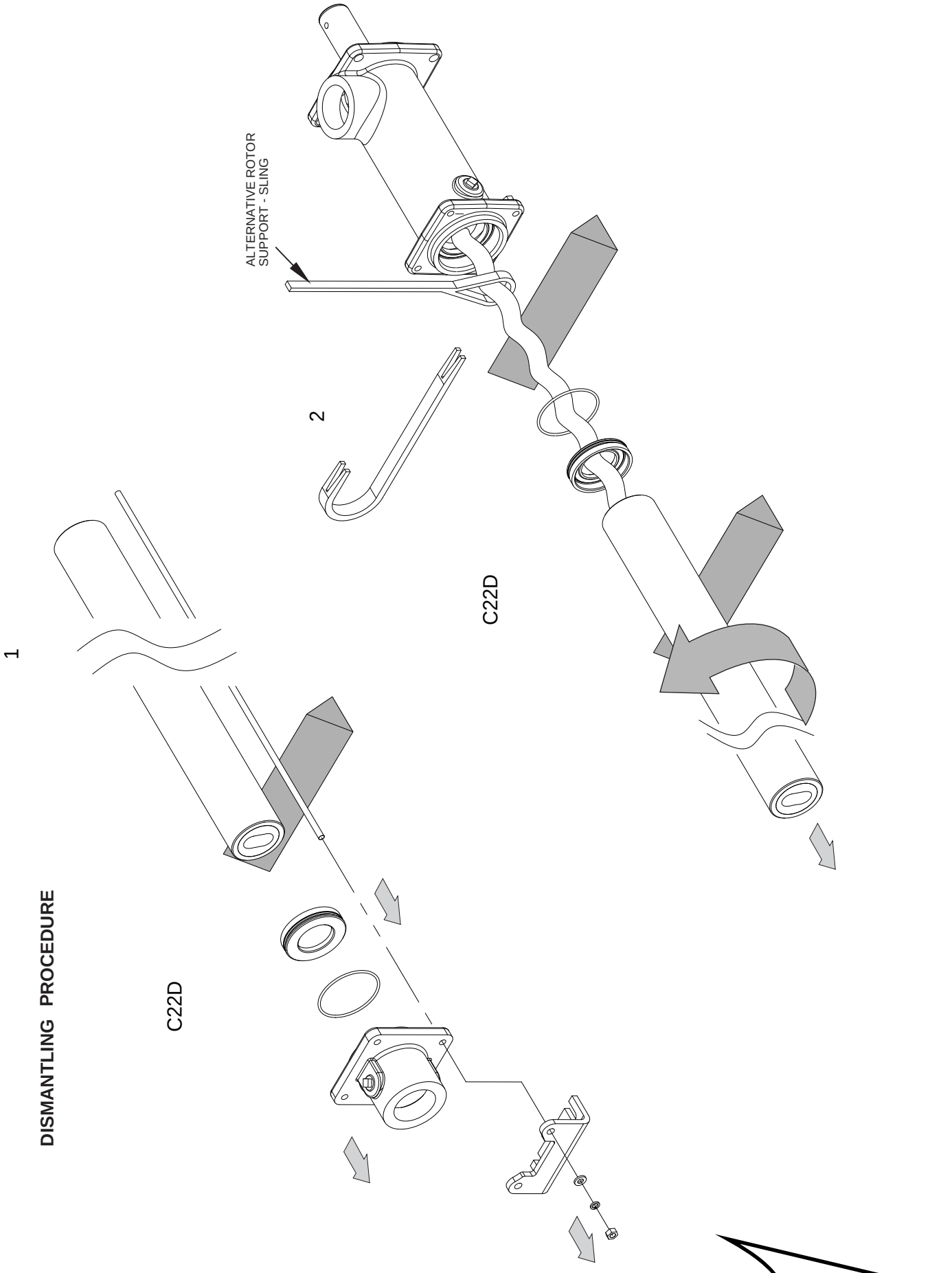
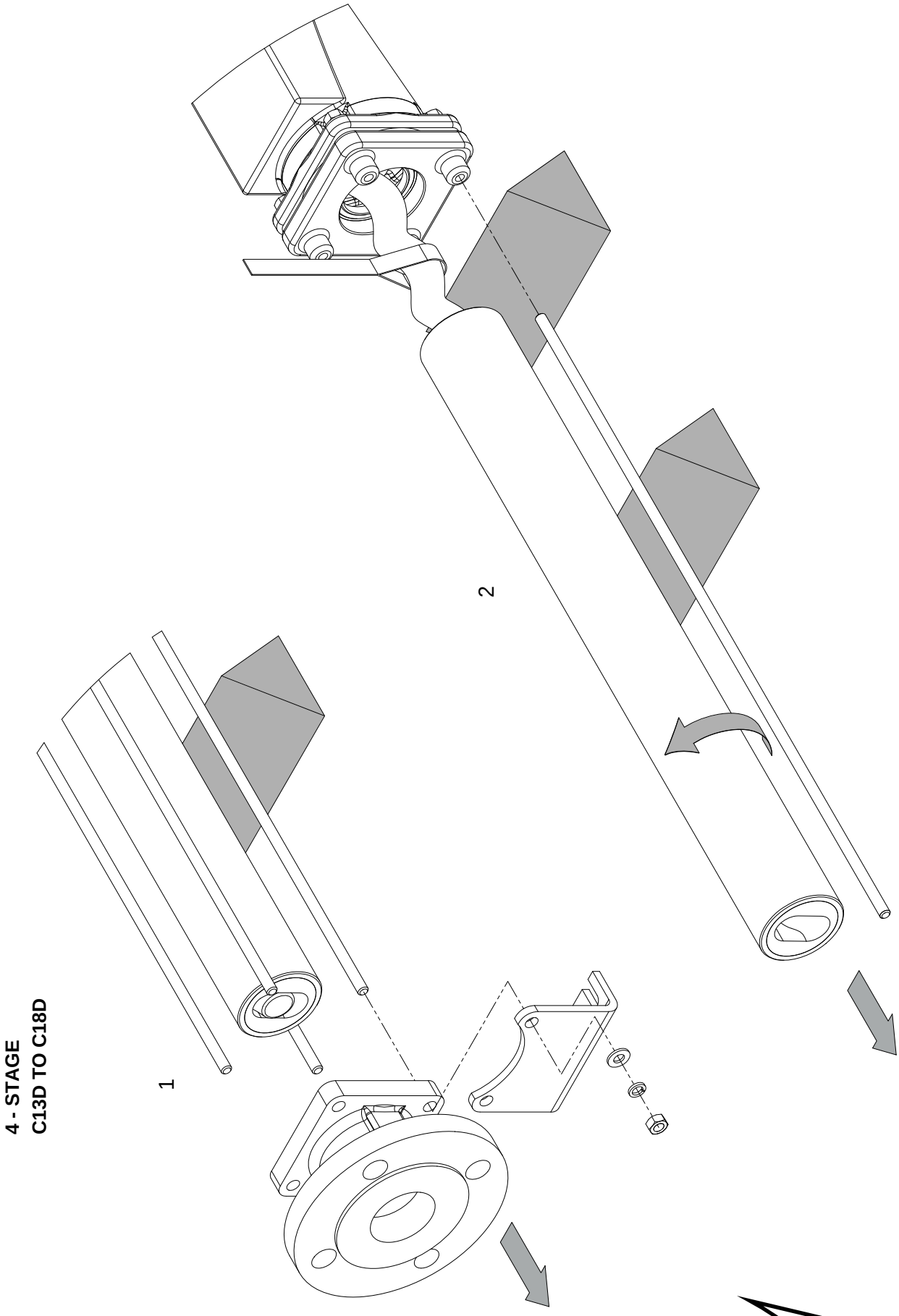
Dismantling & Assembly Diagrams



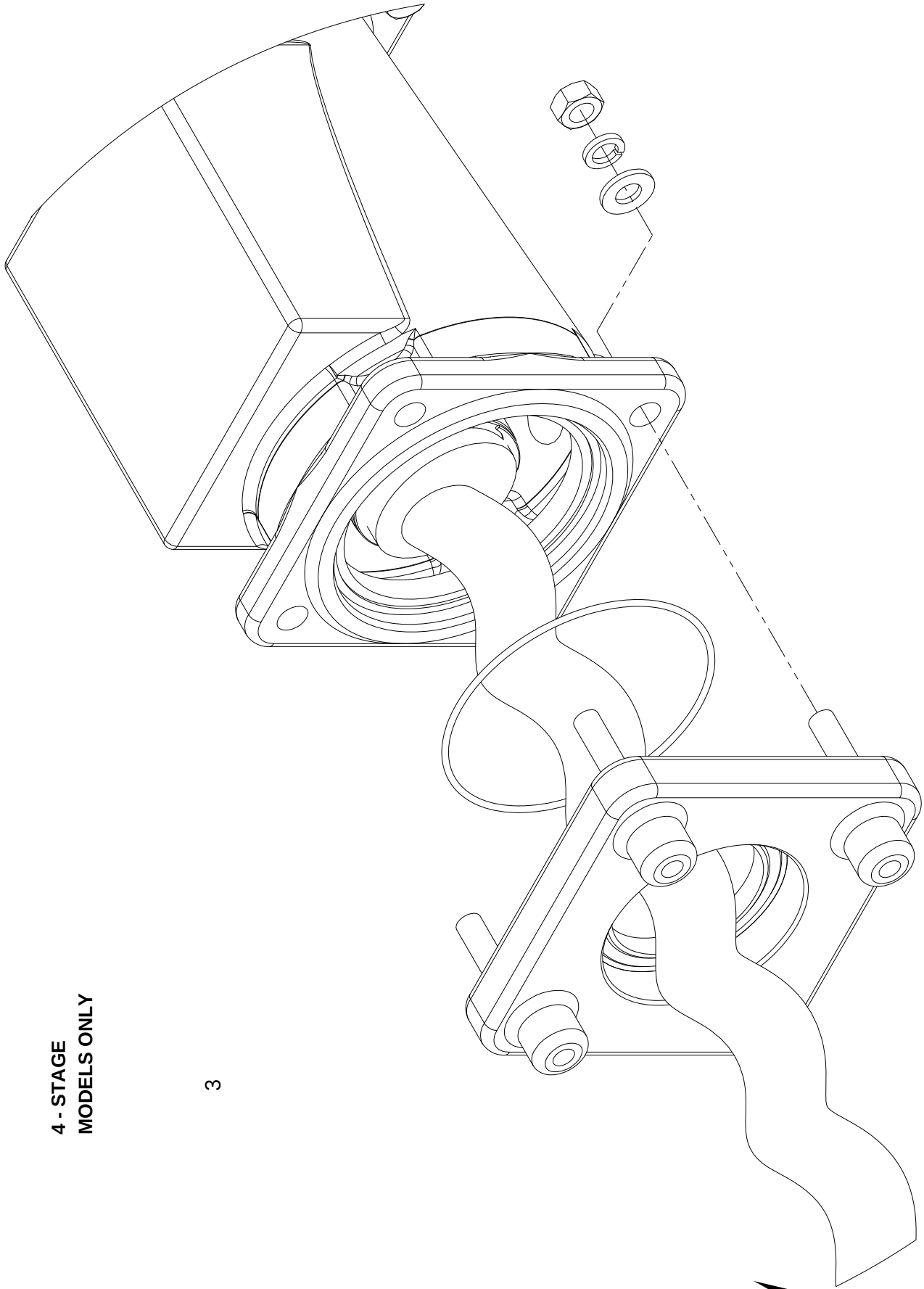
DISMANTLING PROCEDURE

Dismantling & Assembly Diagrams





4 - STAGE
C13D TO C18D



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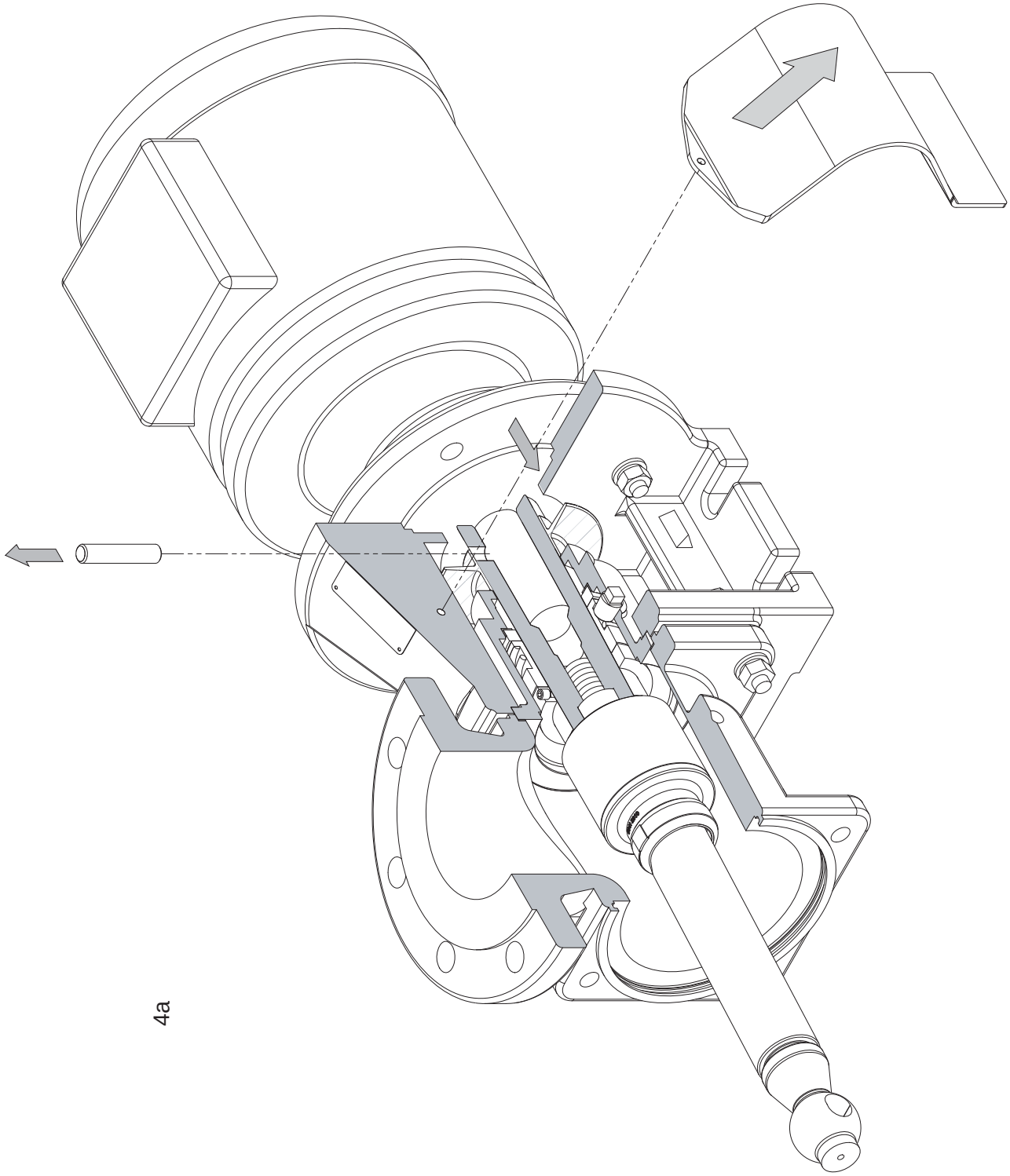
4 - STAGE MODELS ONLY

Dismantling & Assembly Diagrams



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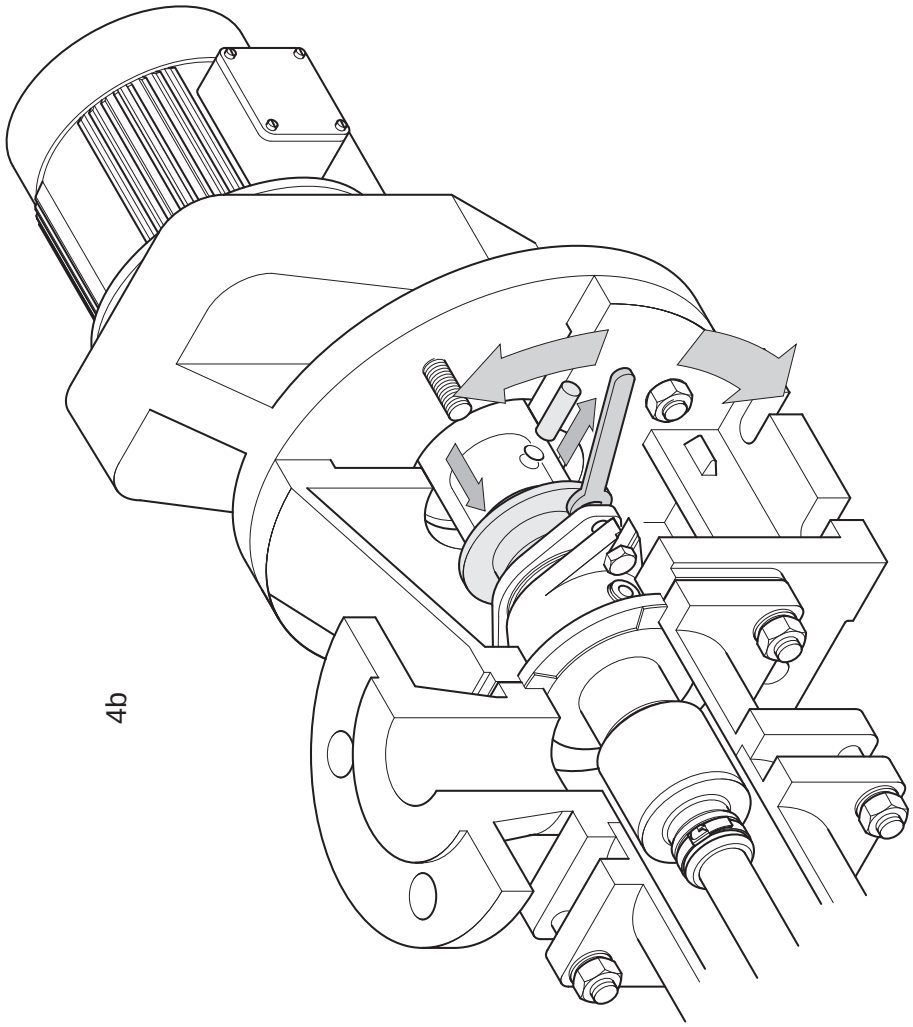
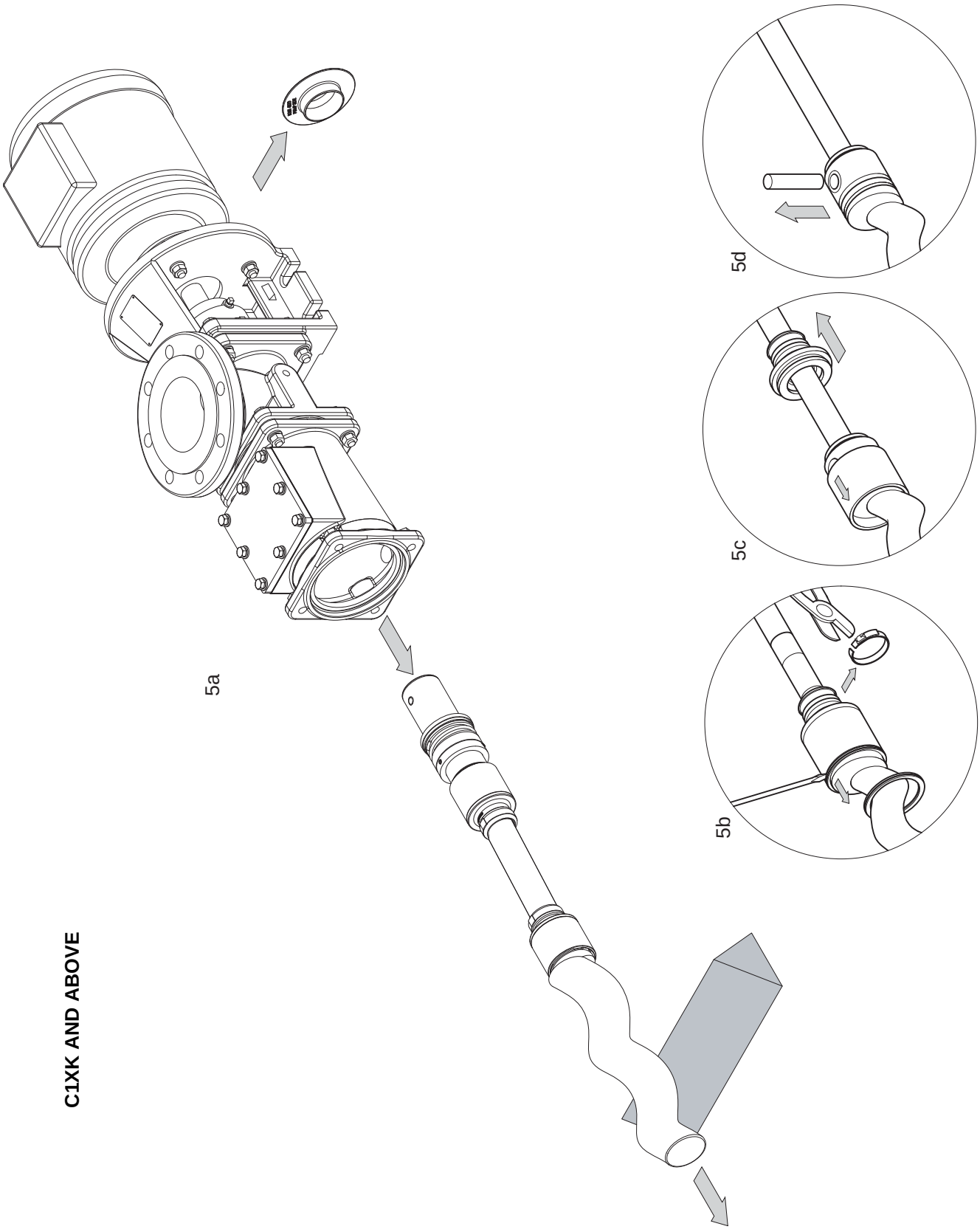


4b

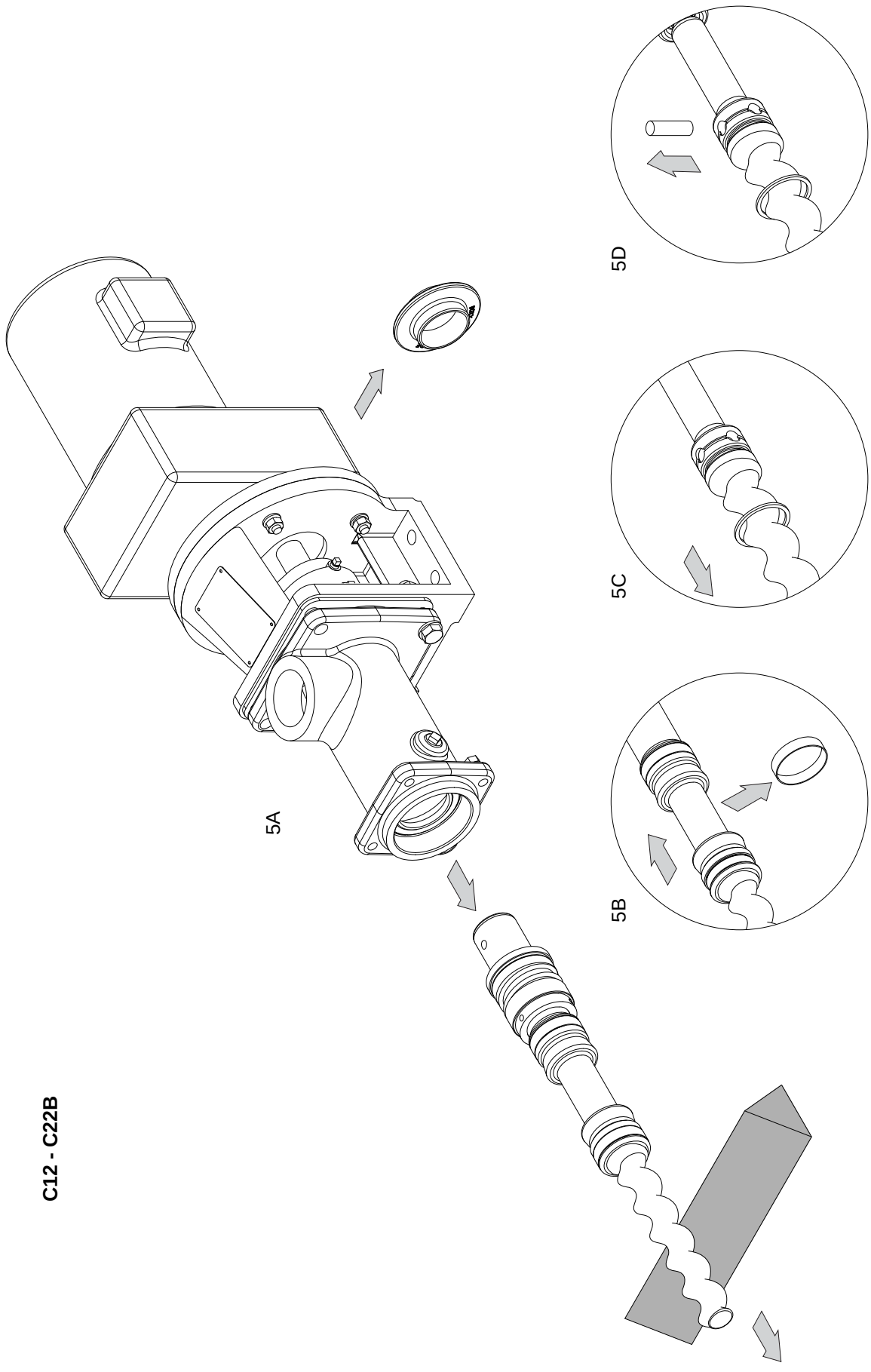
Only applicable if using packed gland pump

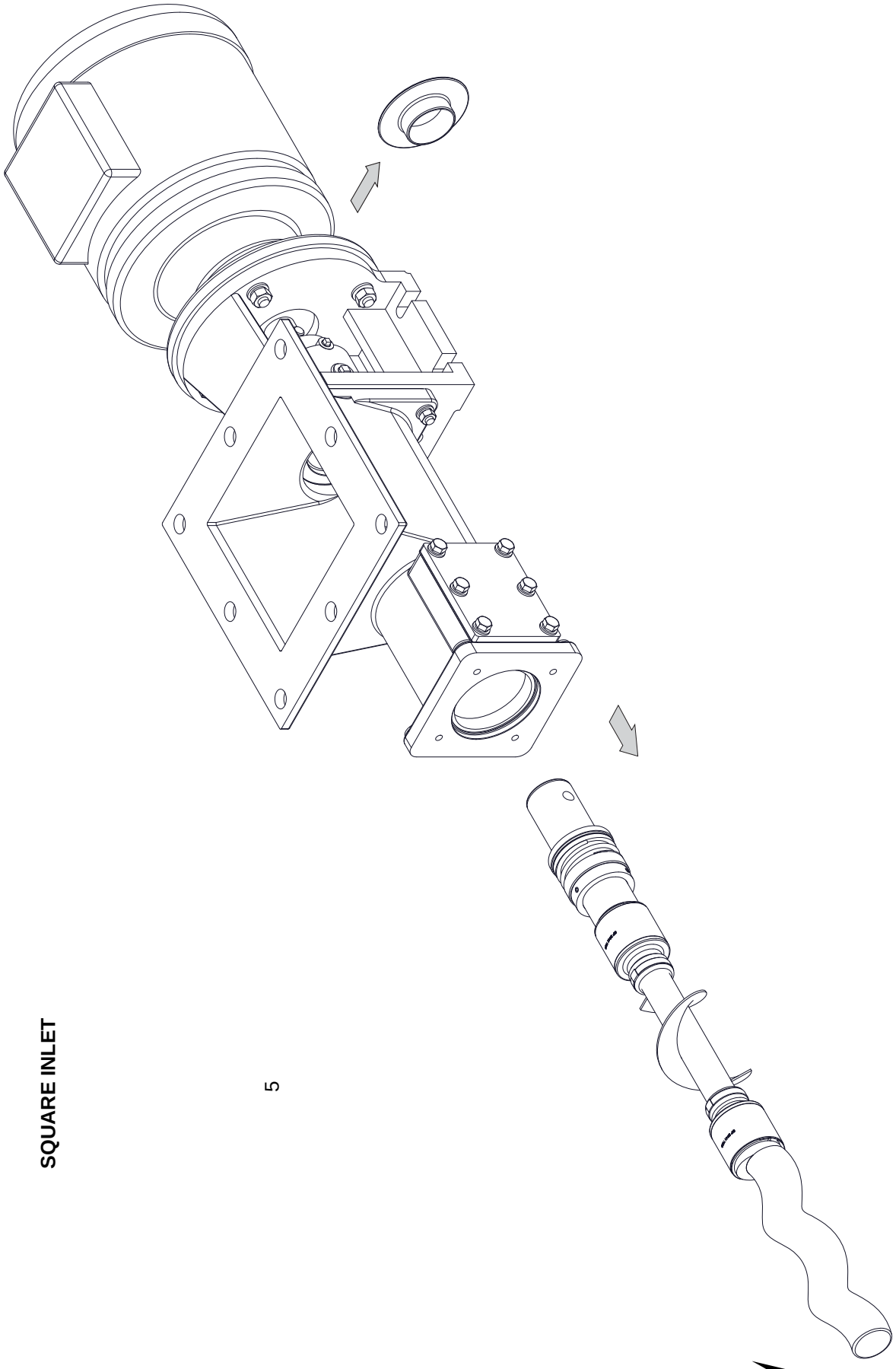
Dismantling & Assembly Diagrams



C1XK AND ABOVE

Dismantling & Assembly Diagrams



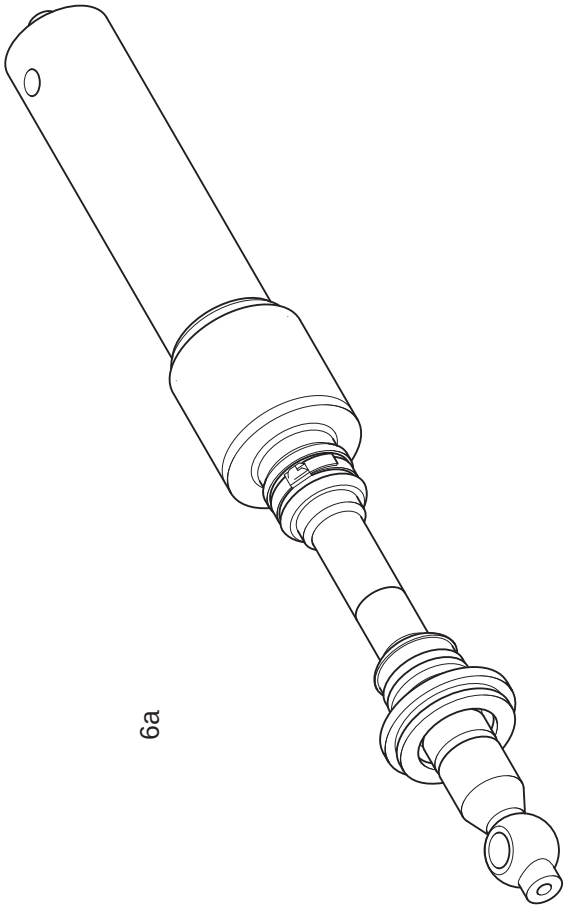


SQUARE INLET

5

Dismantling & Assembly Diagrams

C1XK AND ABOVE



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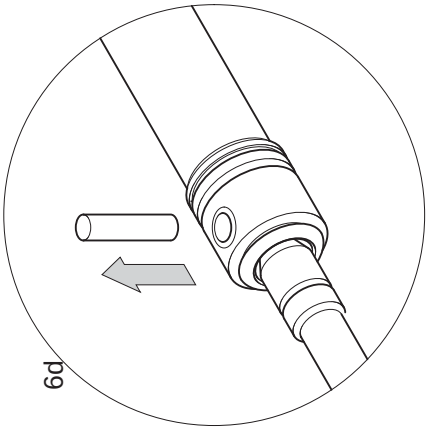

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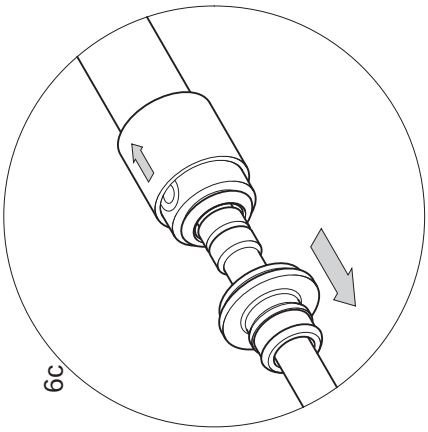

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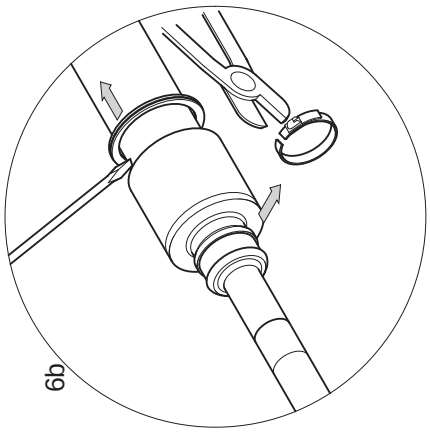
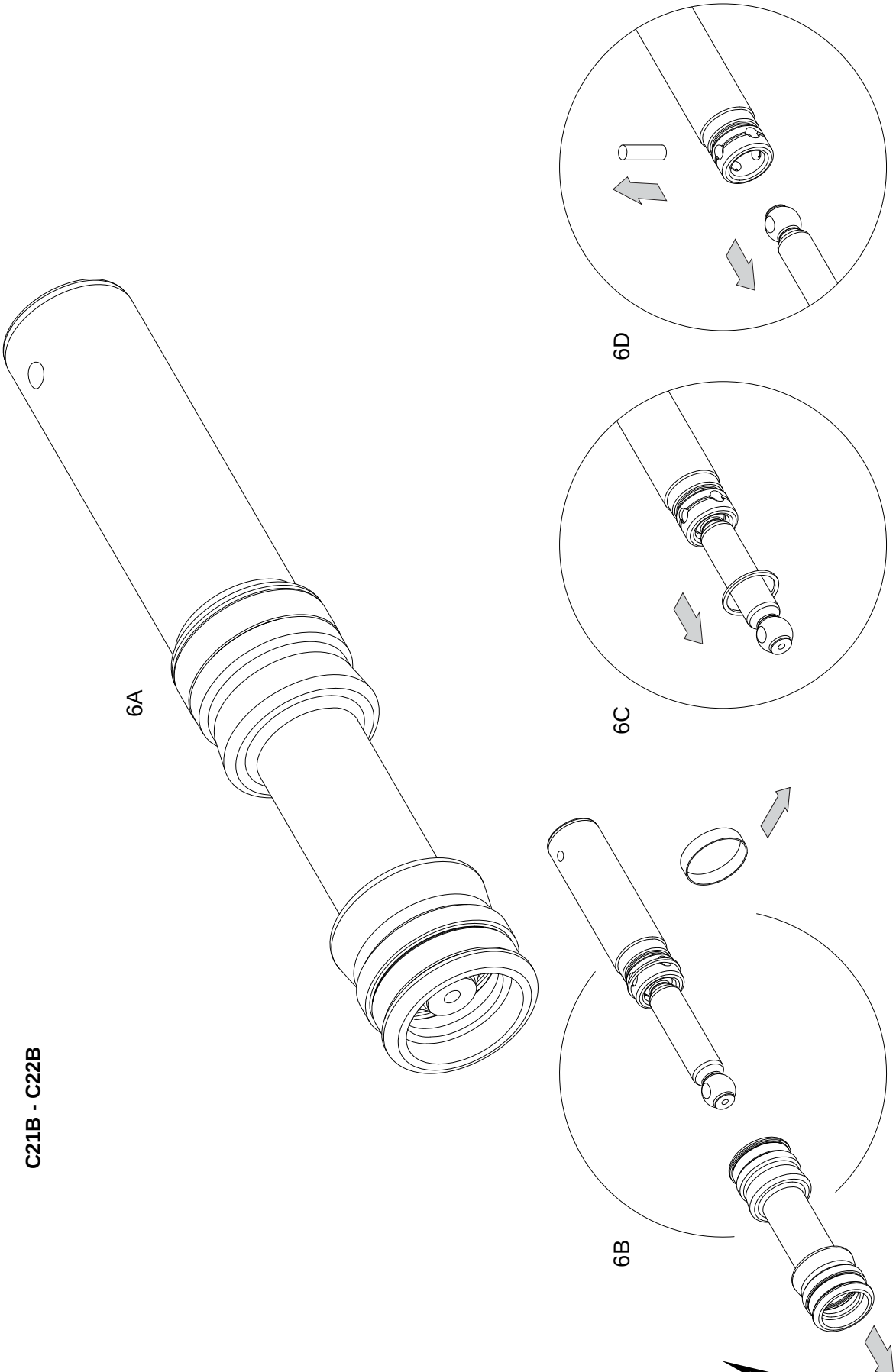
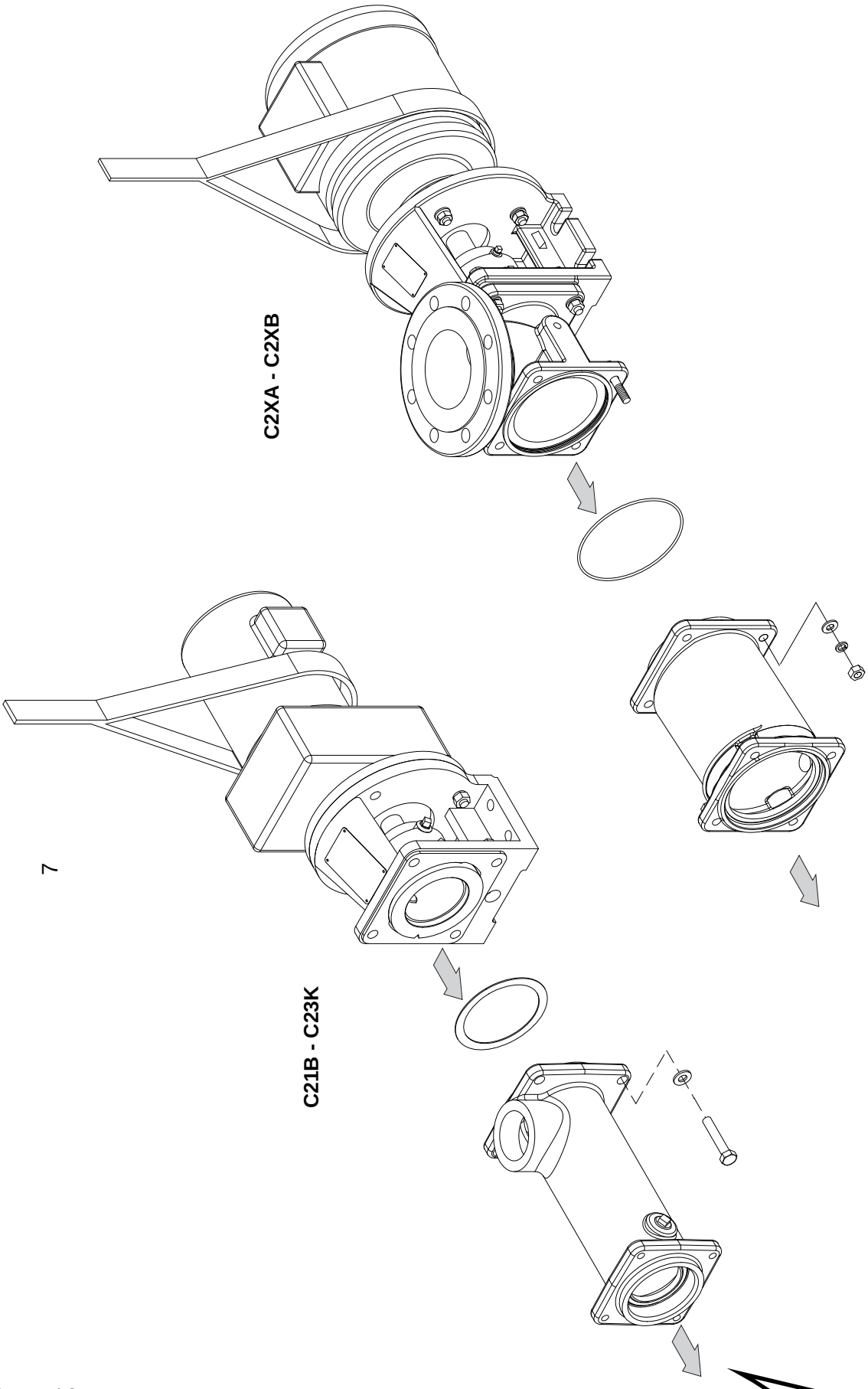


6b

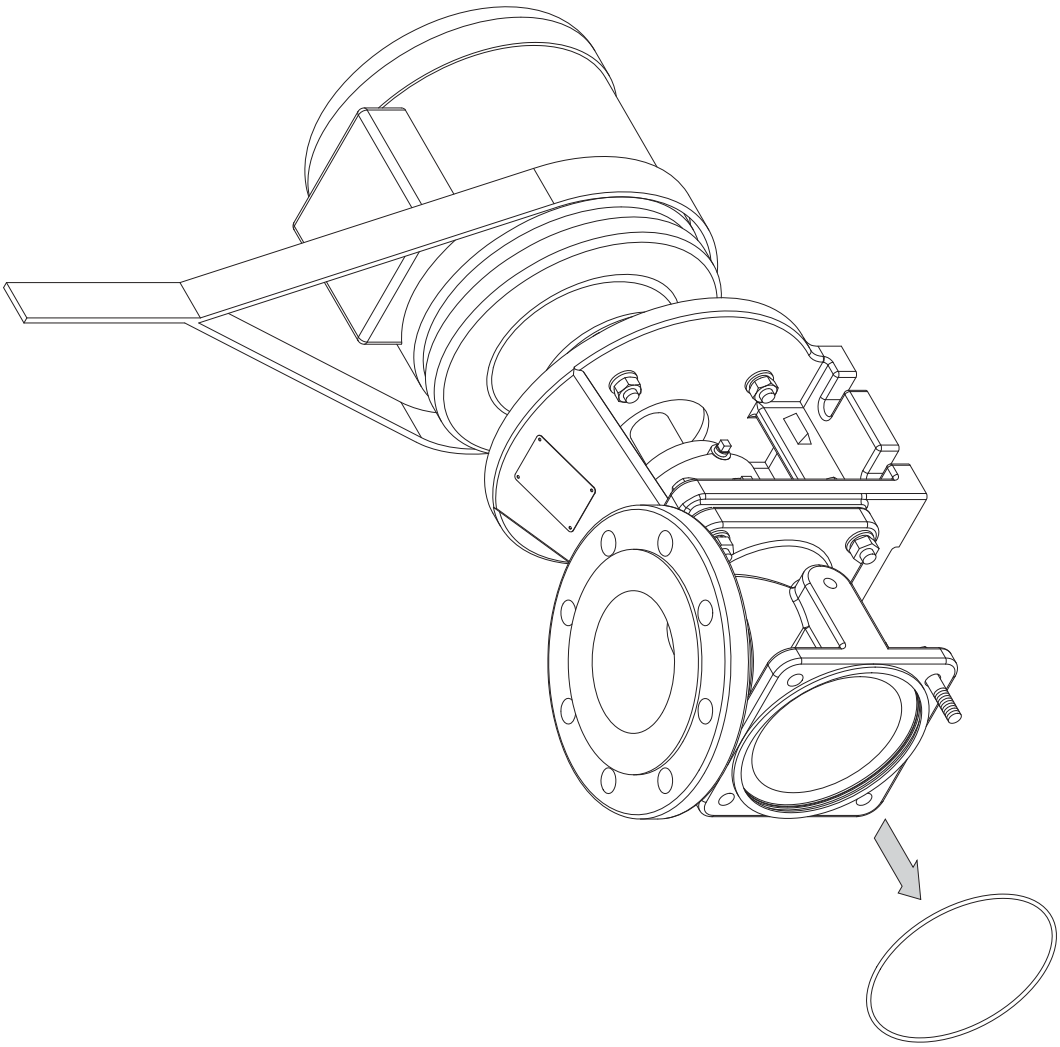
Dismantling & Assembly Diagrams



Dismantling & Assembly Diagrams



Dismantling & Assembly Diagrams



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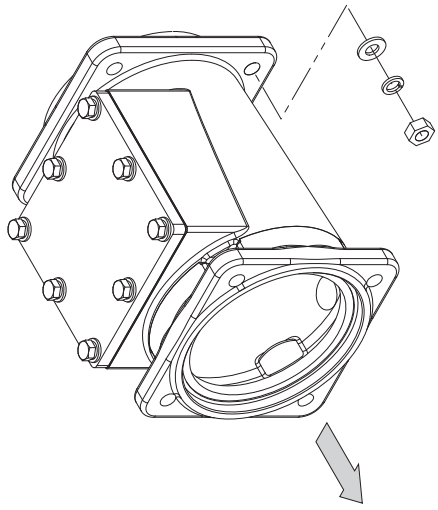
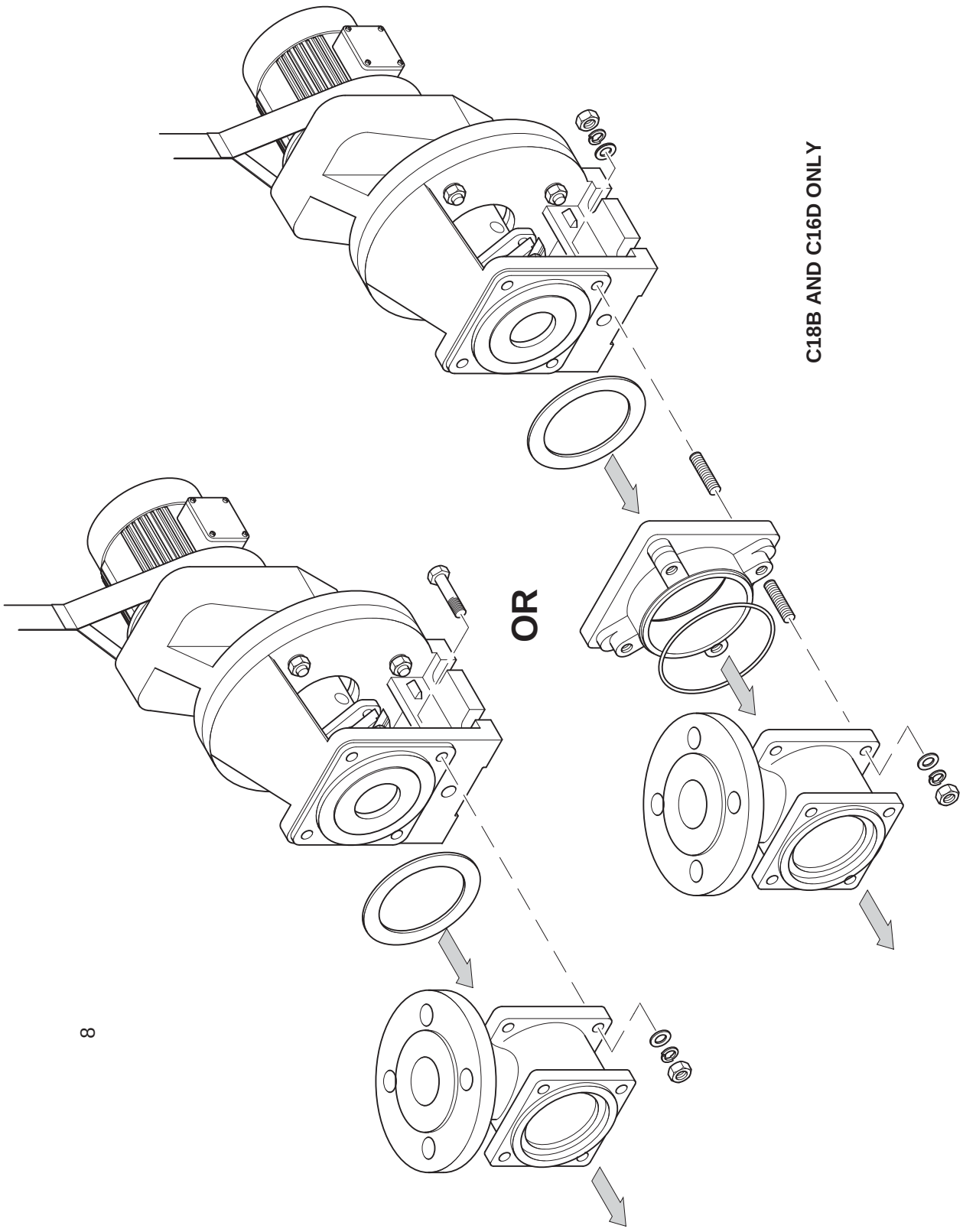
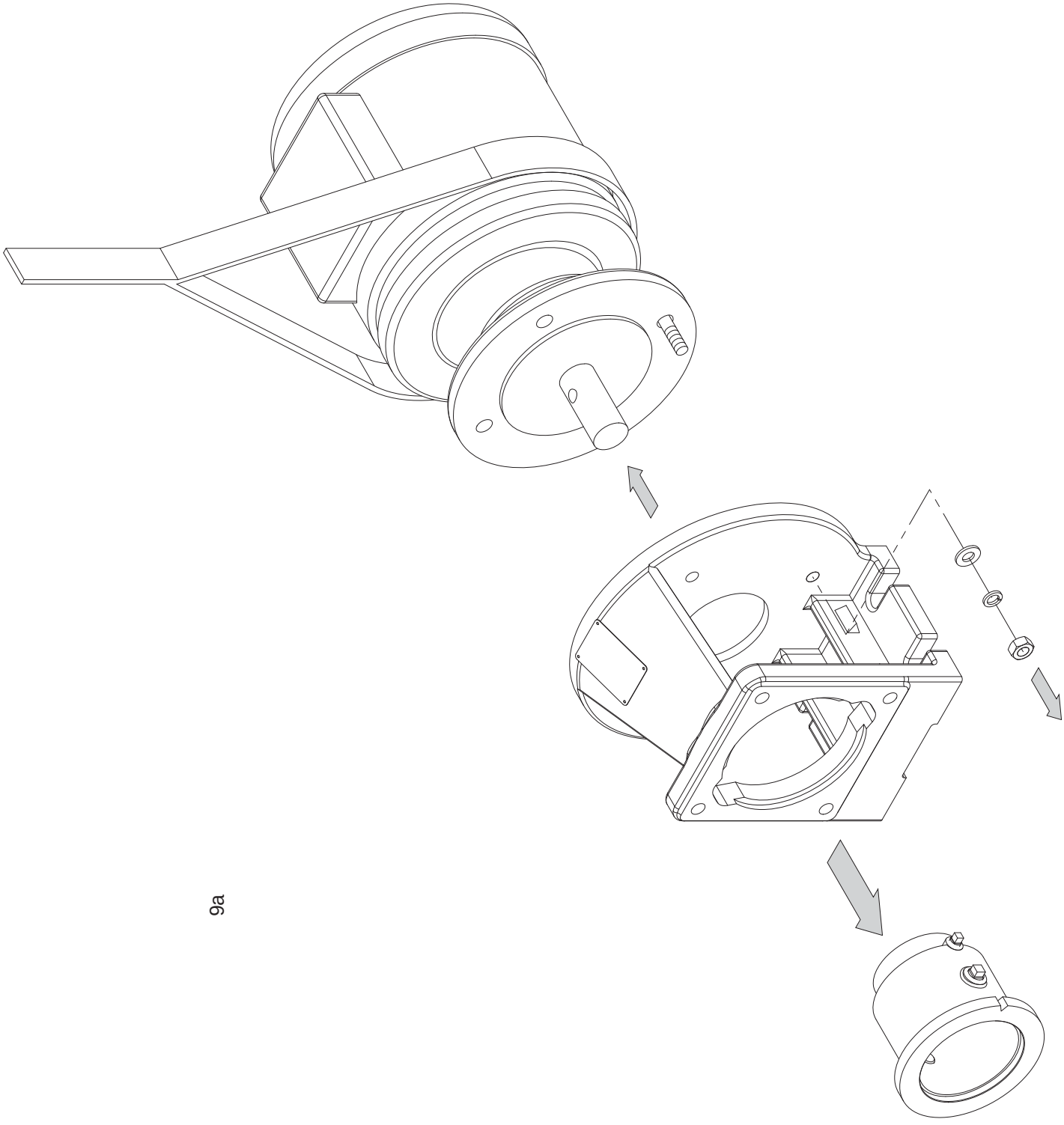


NOT APPLICABLE TO SIZES BELOW C1XK

Dismantling & Assembly Diagrams



Dismantling & Assembly Diagrams



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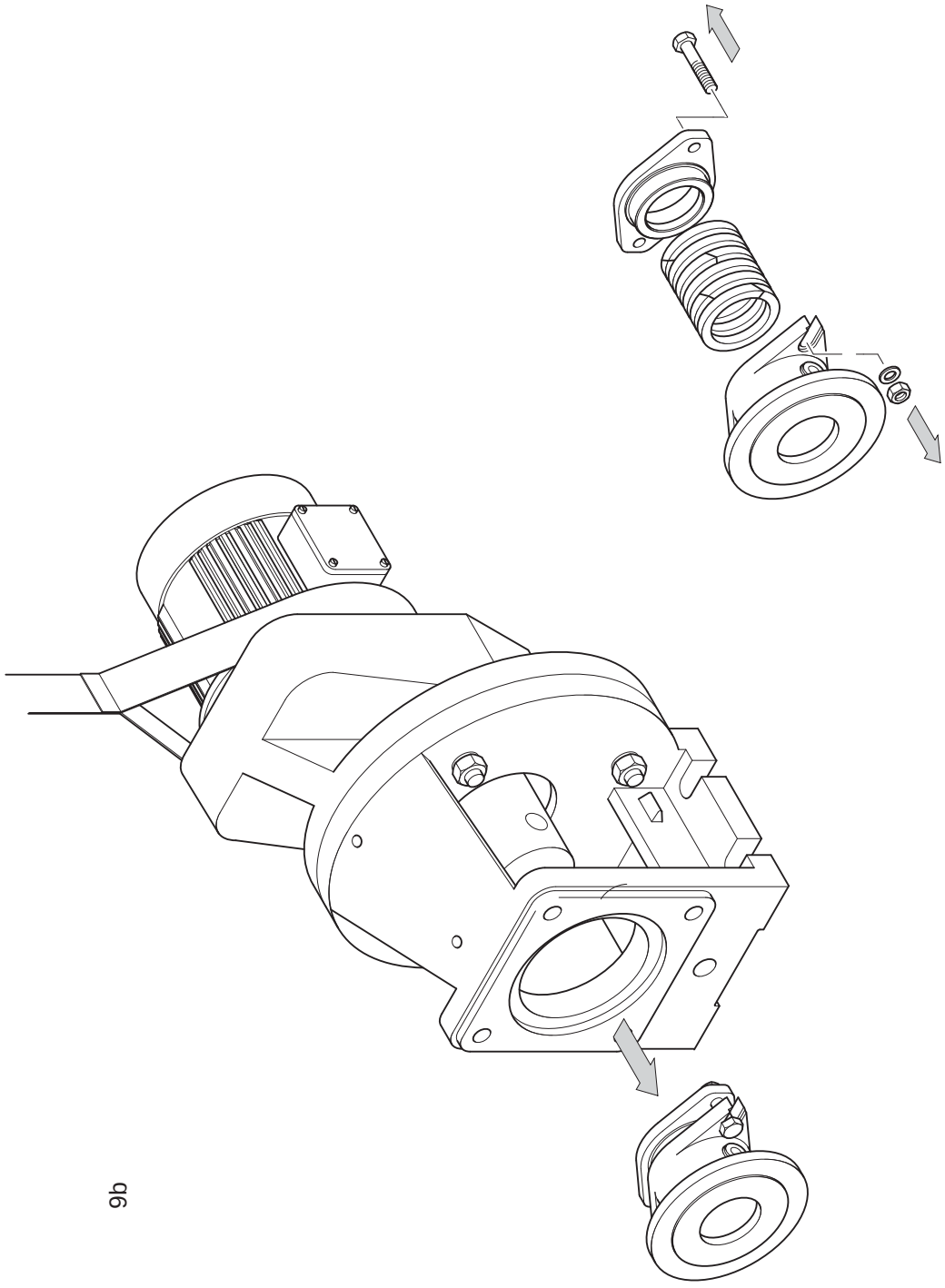
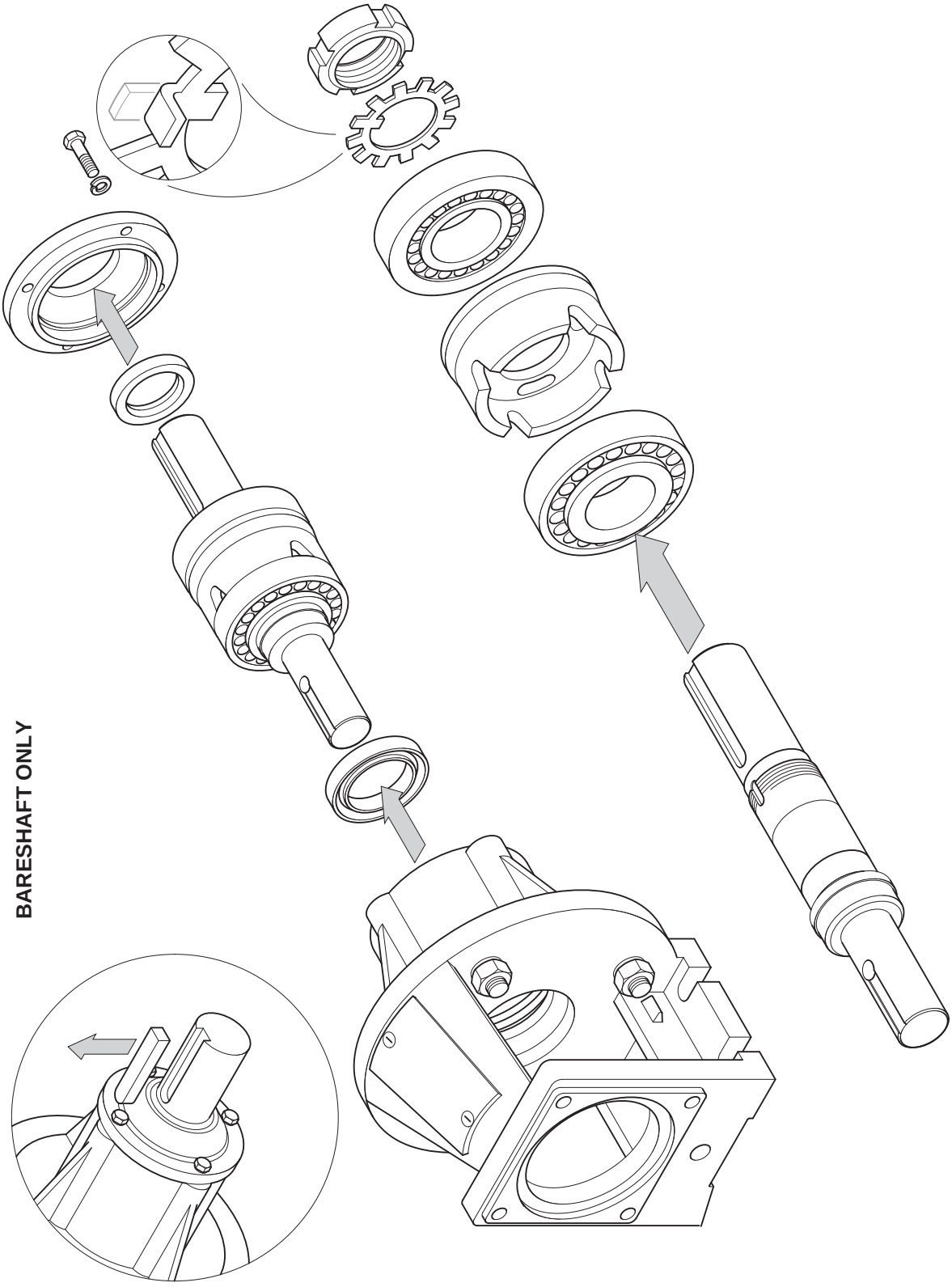


9b

ONLY APPLICABLE IF USING PACKED GLAND PUMP

Dismantling & Assembly Diagrams



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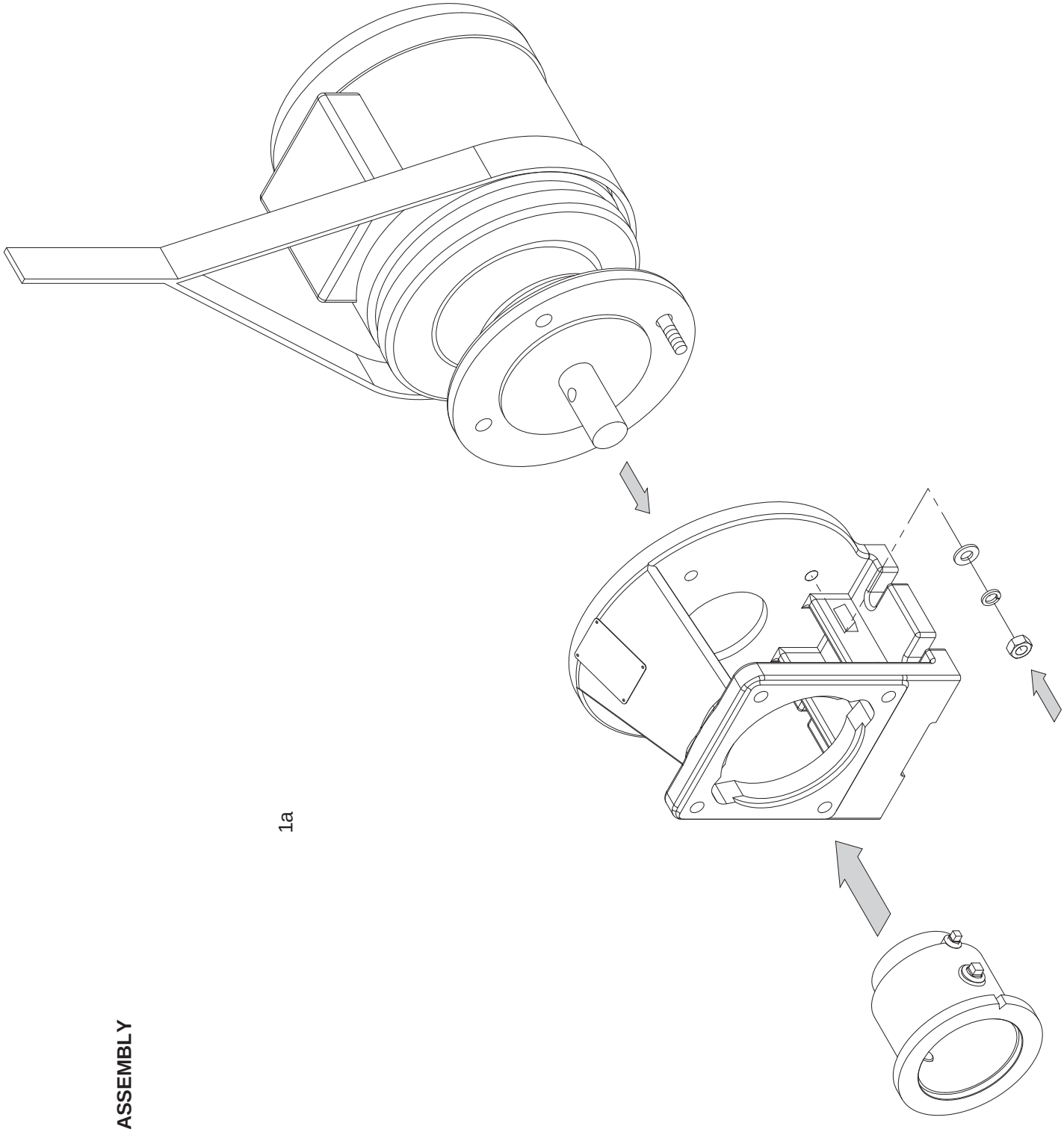
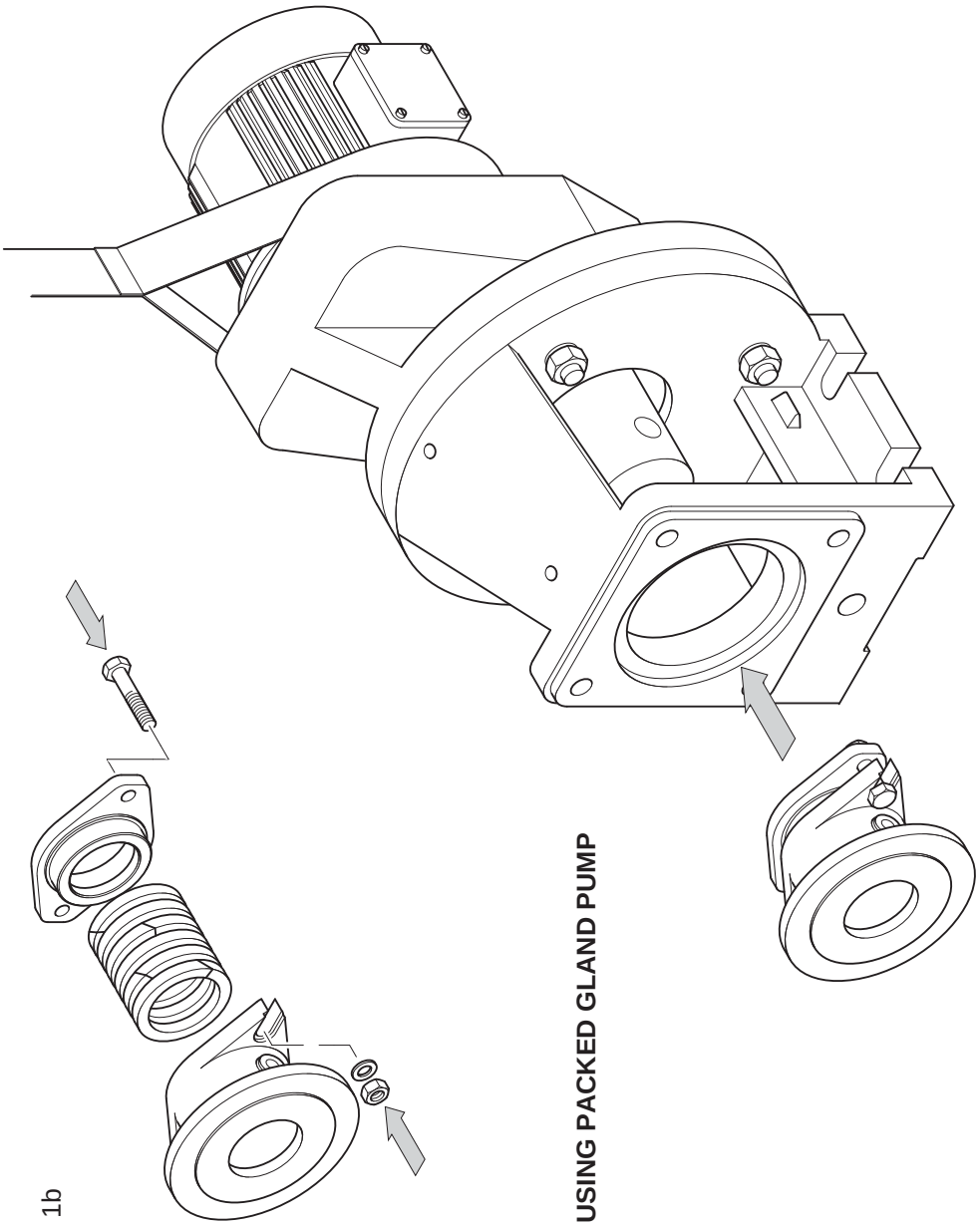


1a

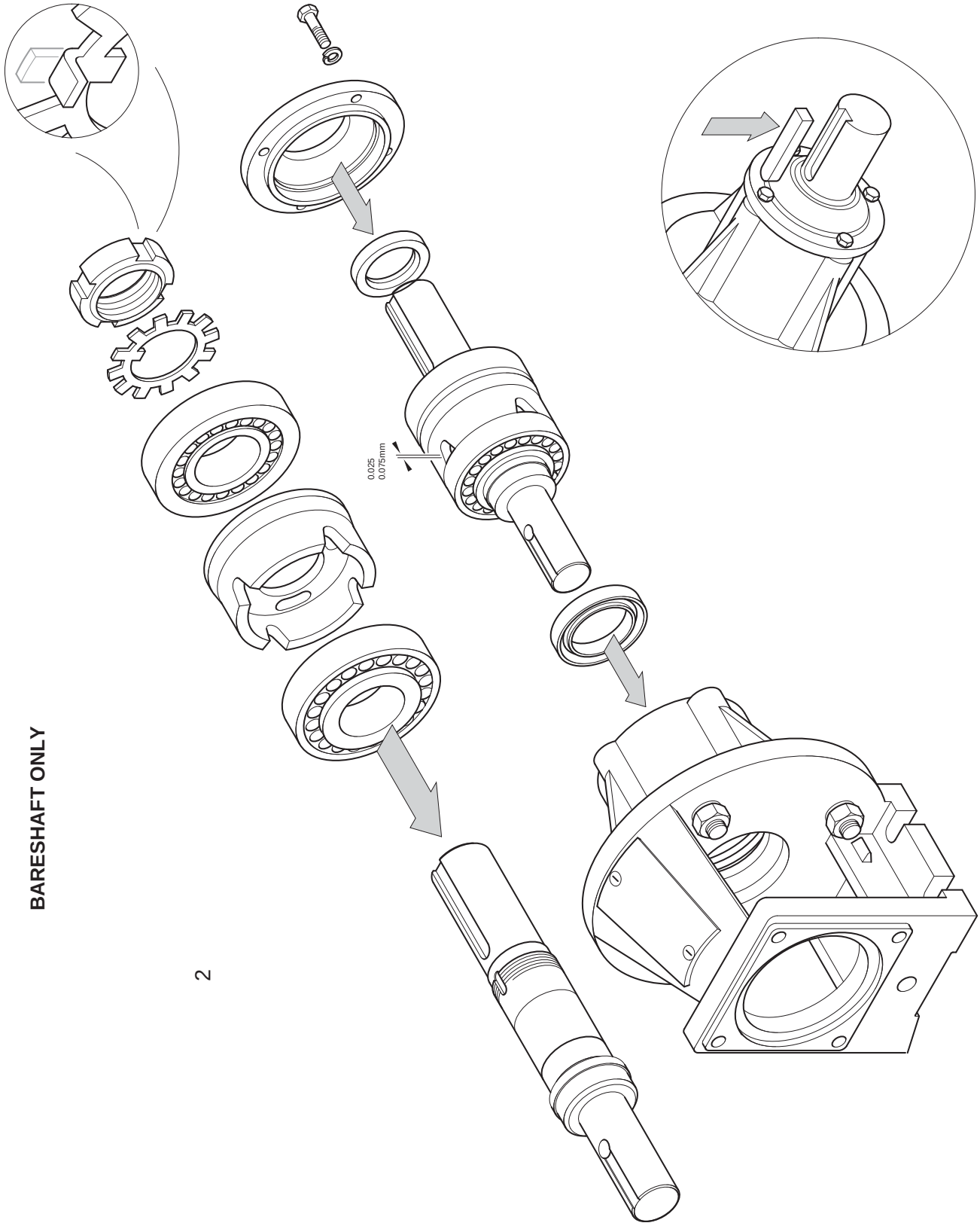
ASSEMBLY



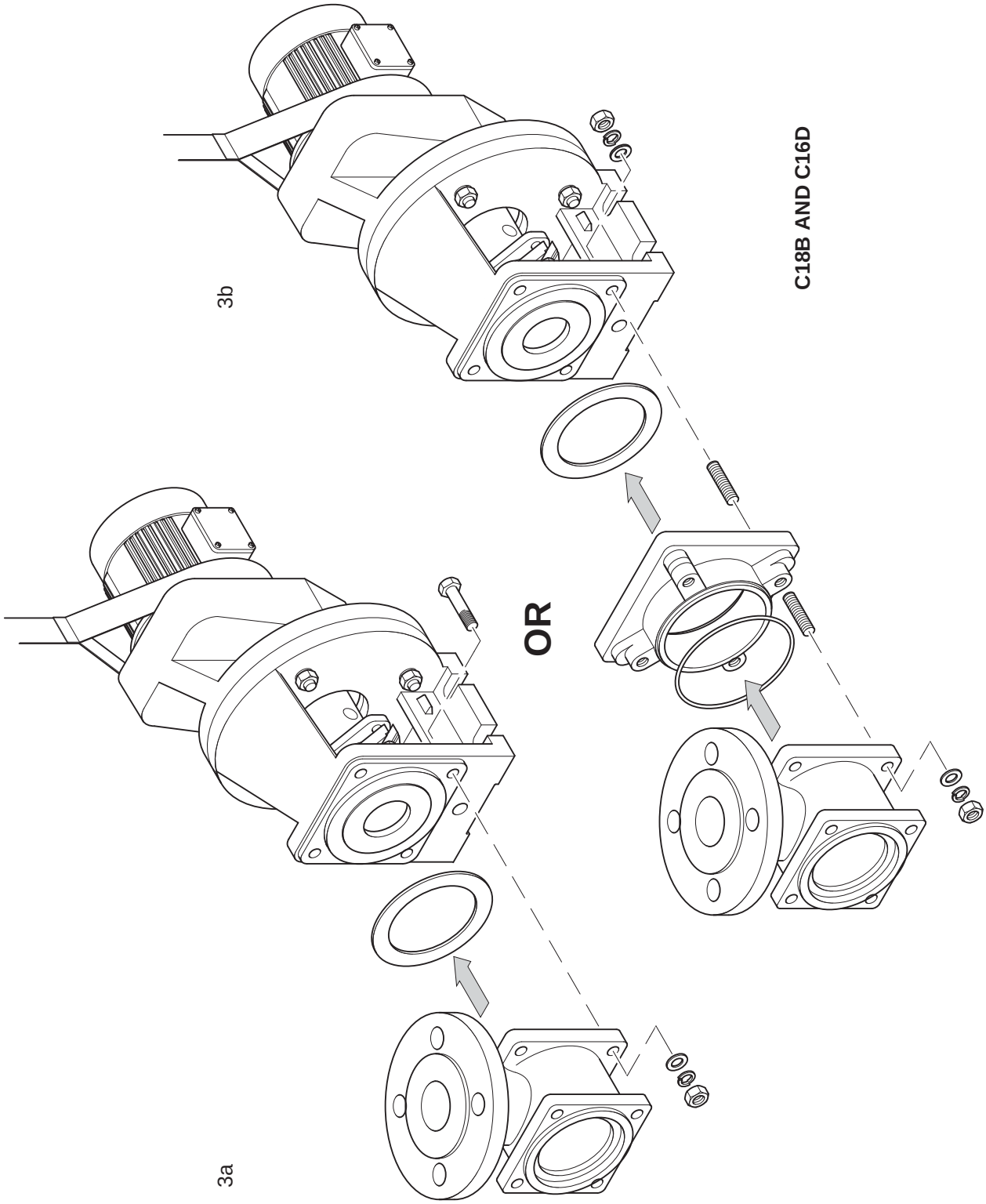
1b

ONLY APPLICABLE IF USING PACKED GLAND PUMP

Dismantling & Assembly Diagrams

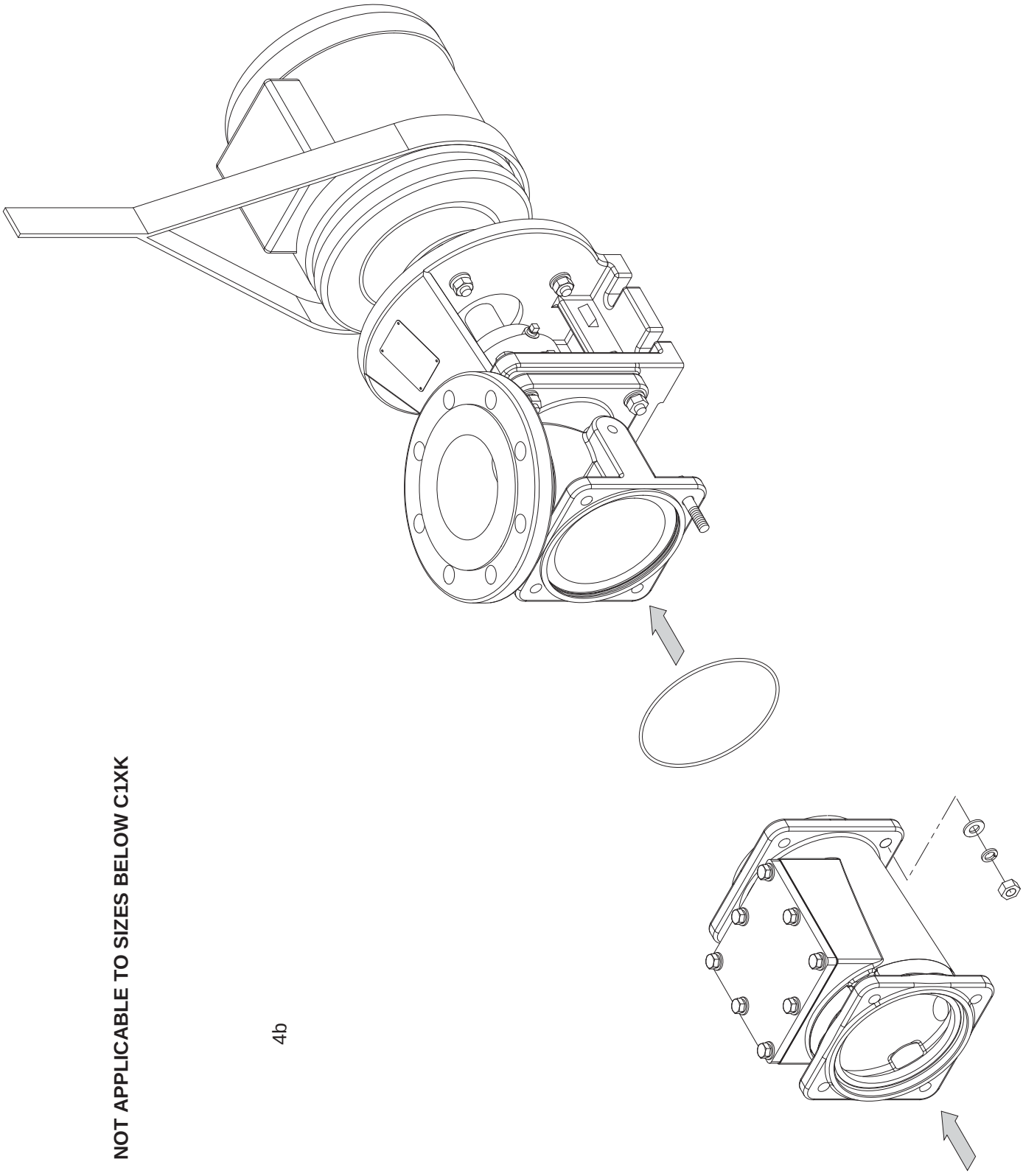


Dismantling & Assembly Diagrams



FLYGT

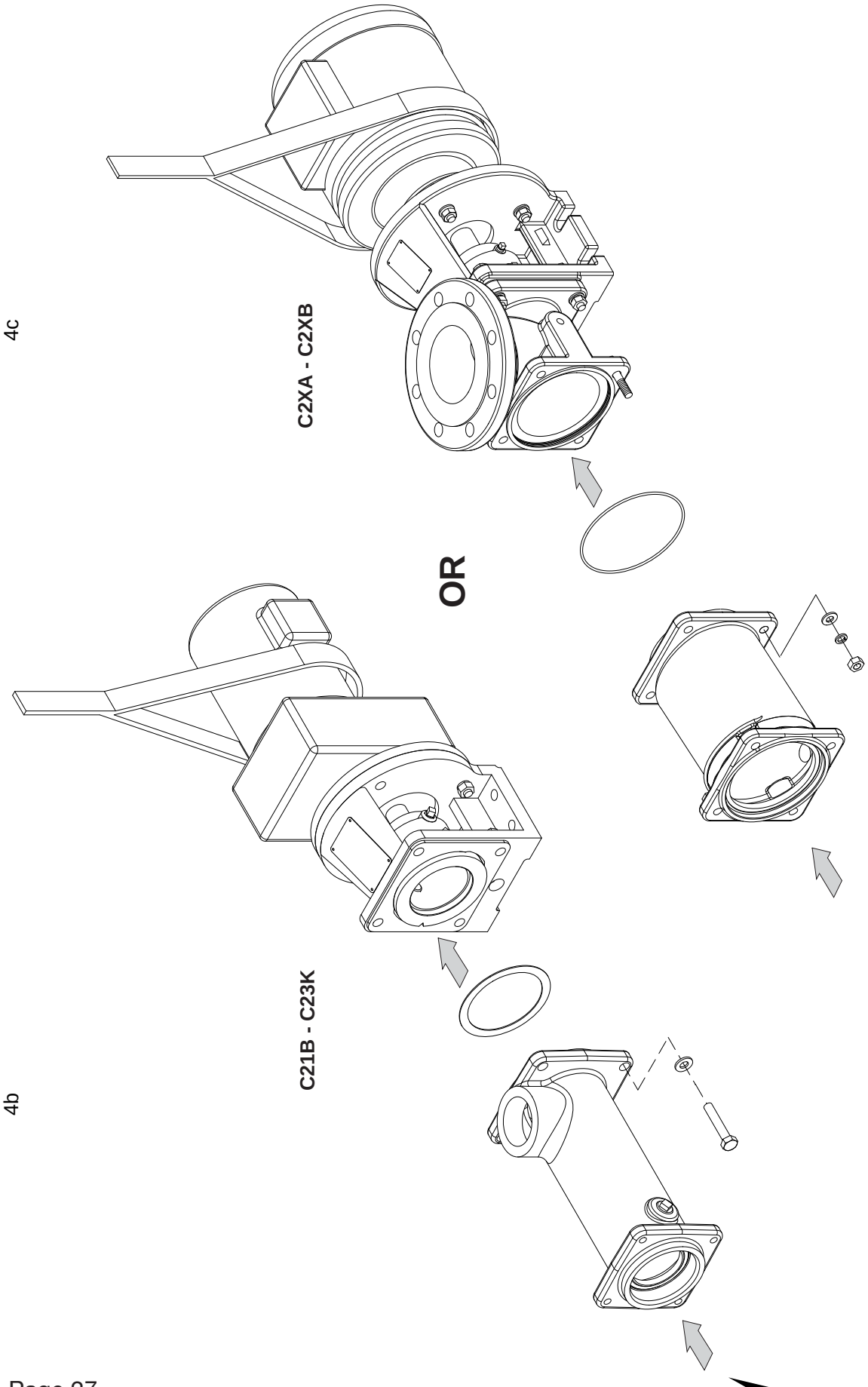
Dismantling & Assembly Diagrams



NOT APPLICABLE TO SIZES BELOW C1XK

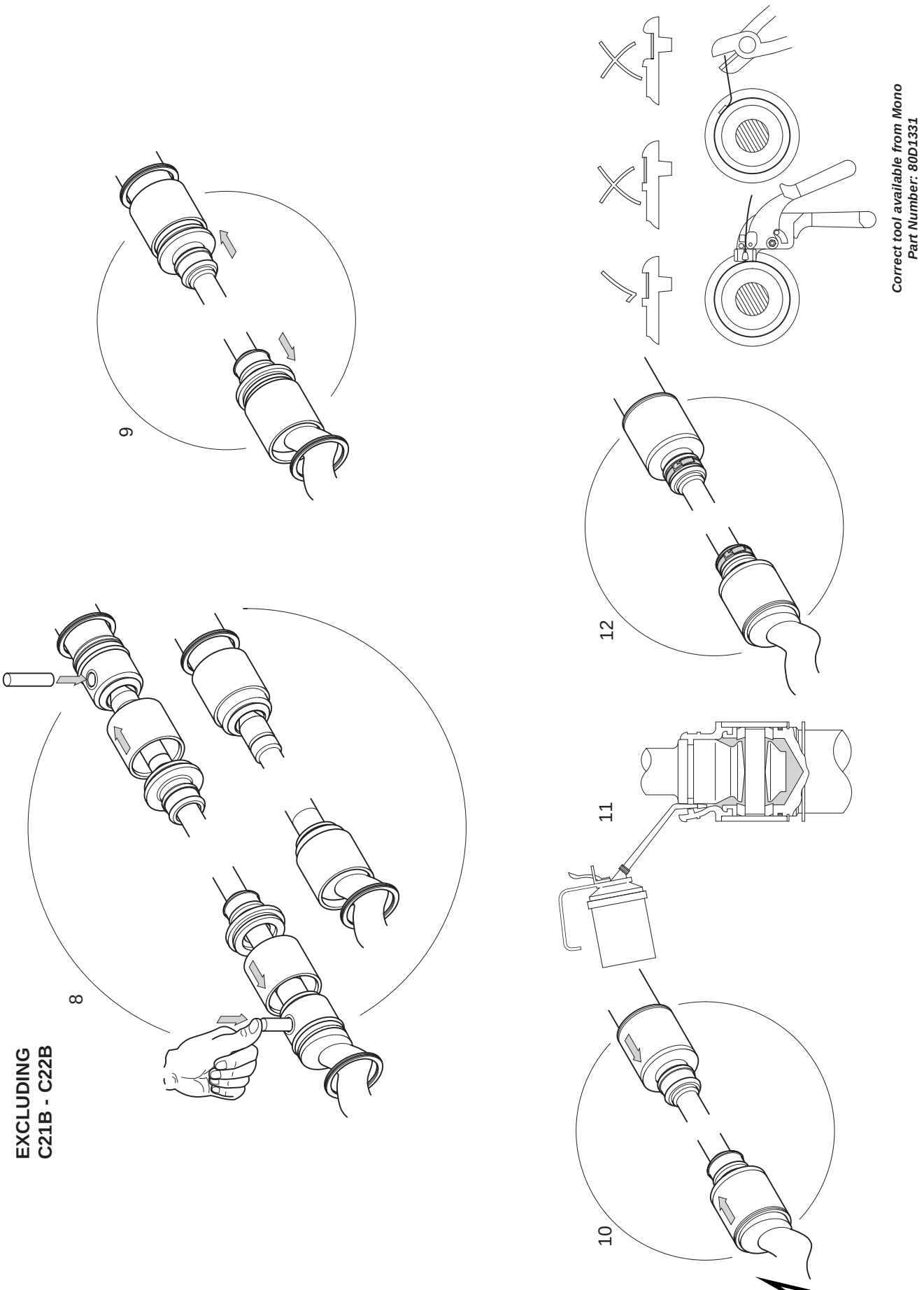
4b

Dismantling & Assembly Diagrams



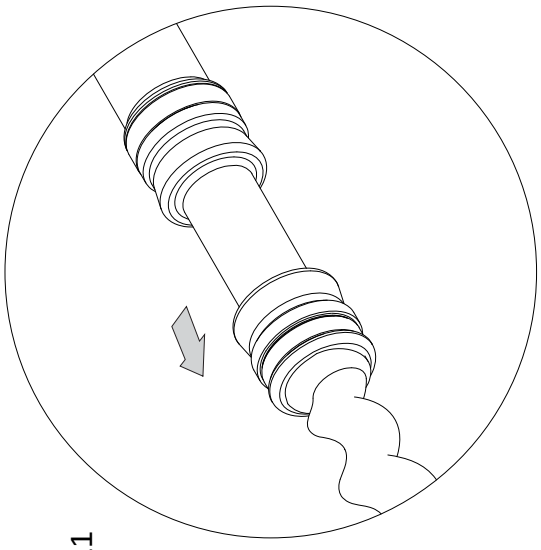
Dismantling & Assembly Diagrams

Dismantling & Assembly Diagrams



Dismantling & Assembly Diagrams

Dismantling & Assembly Diagrams



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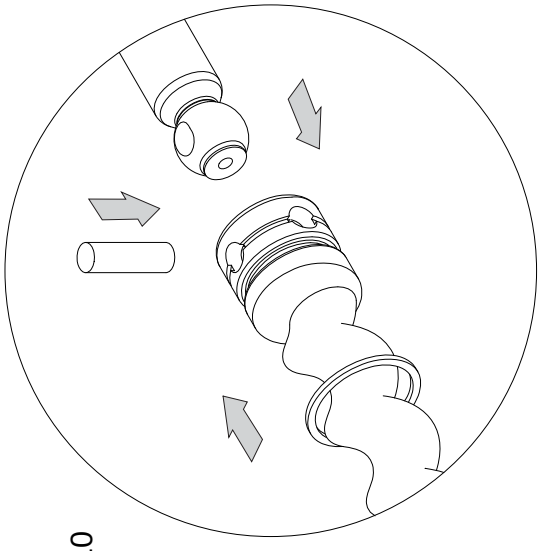
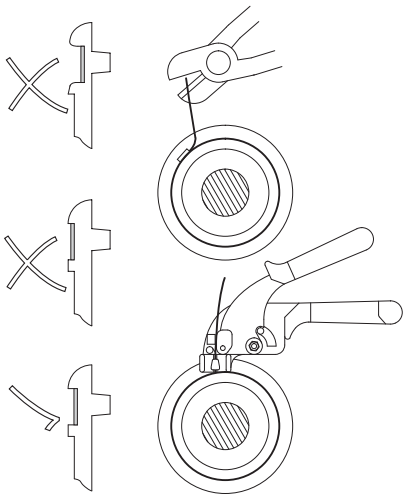
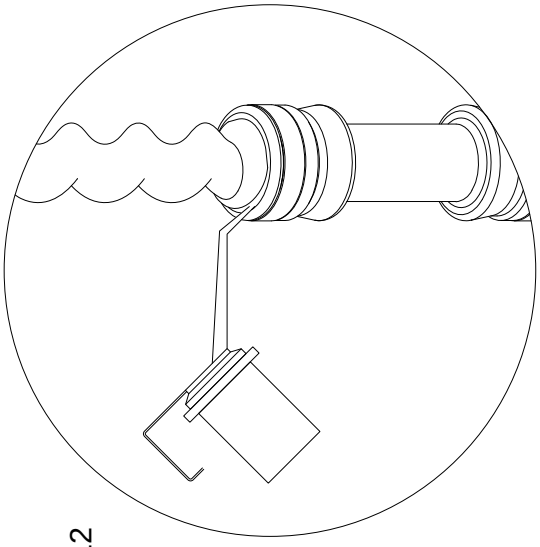


10

C21B - C22B ONLY

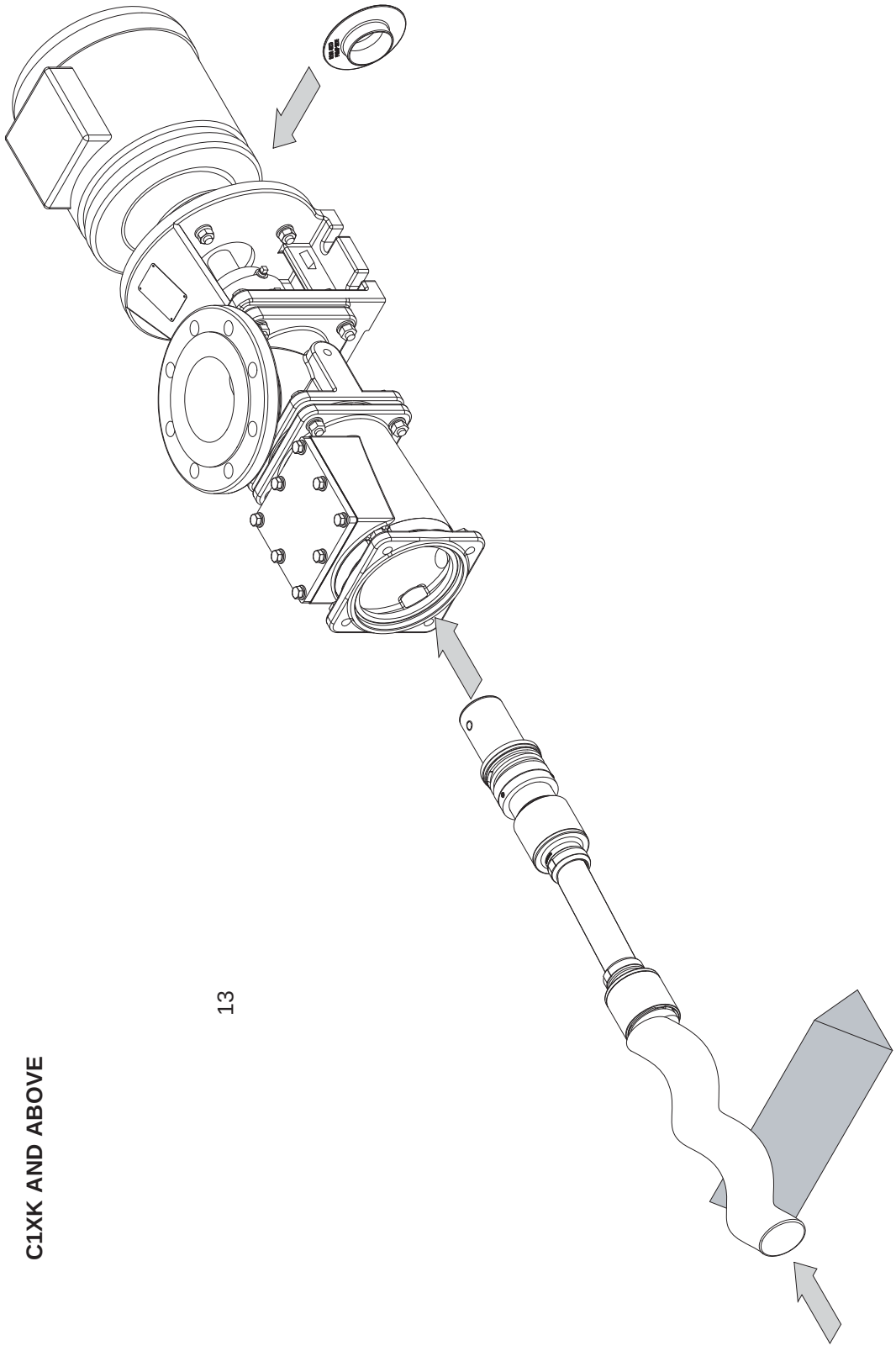


Correct tool available from Mono Part Number: 80D1331



12

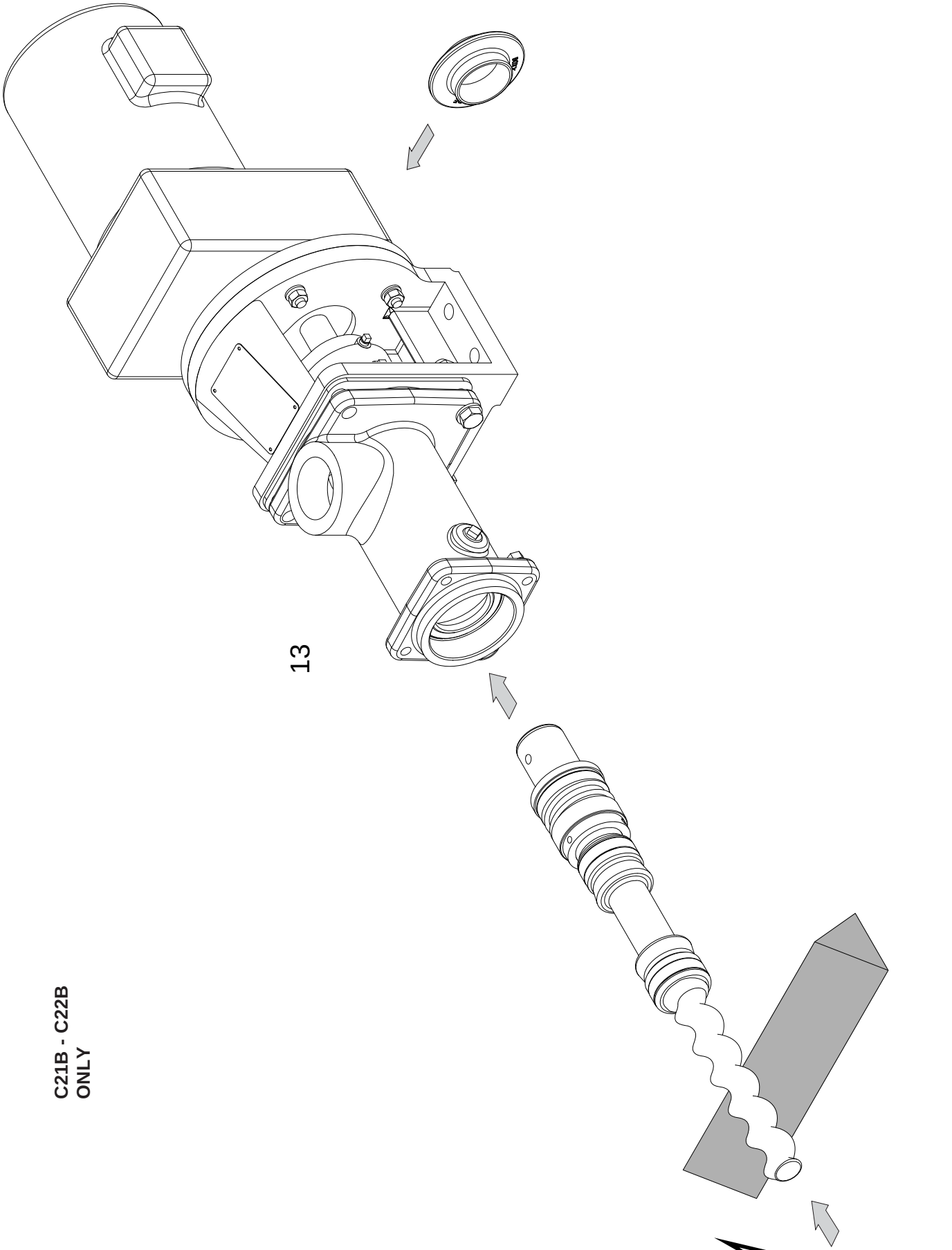
Dismantling & Assembly Diagrams

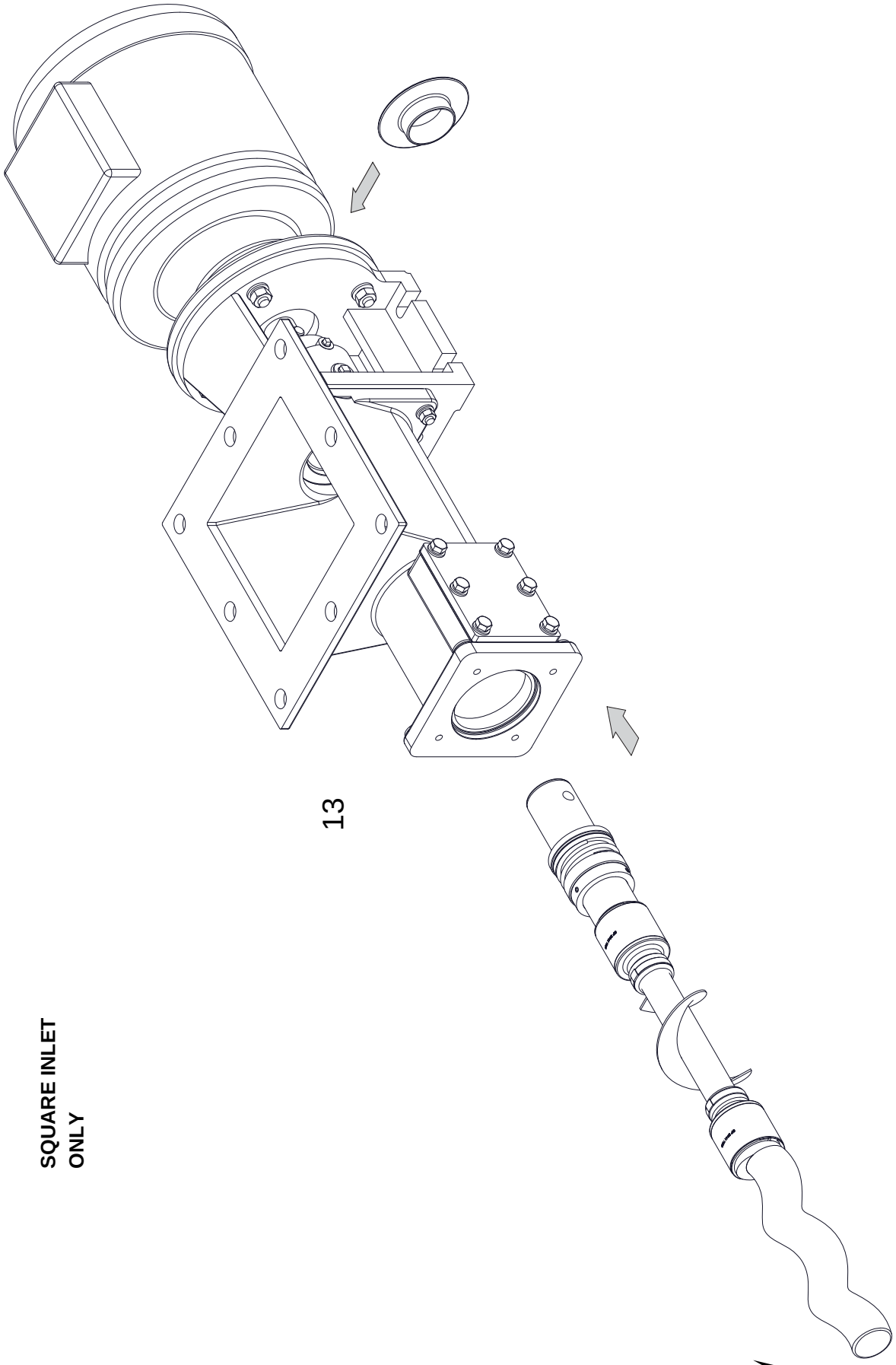


13

C1XK AND ABOVE

Dismantling & Assembly Diagrams

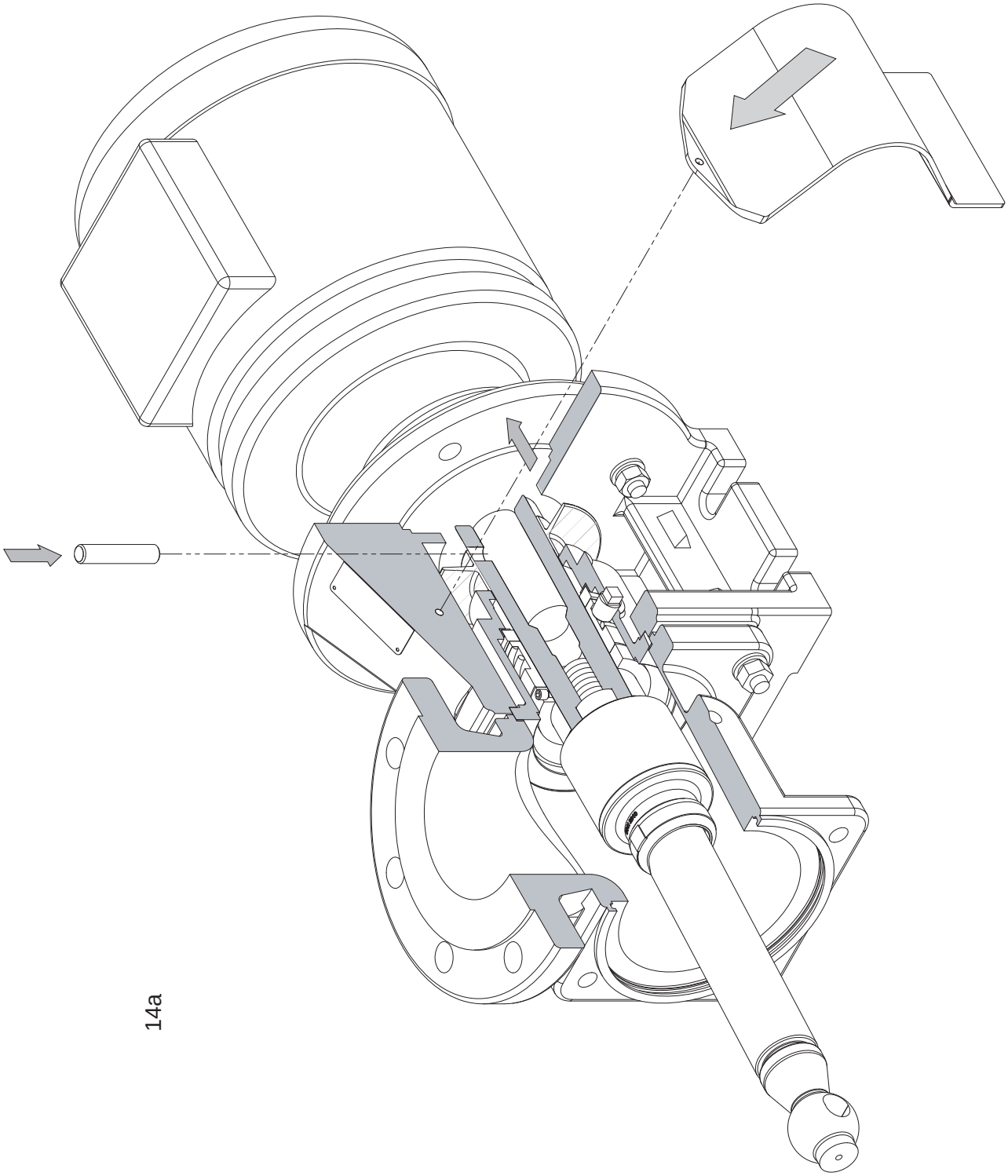




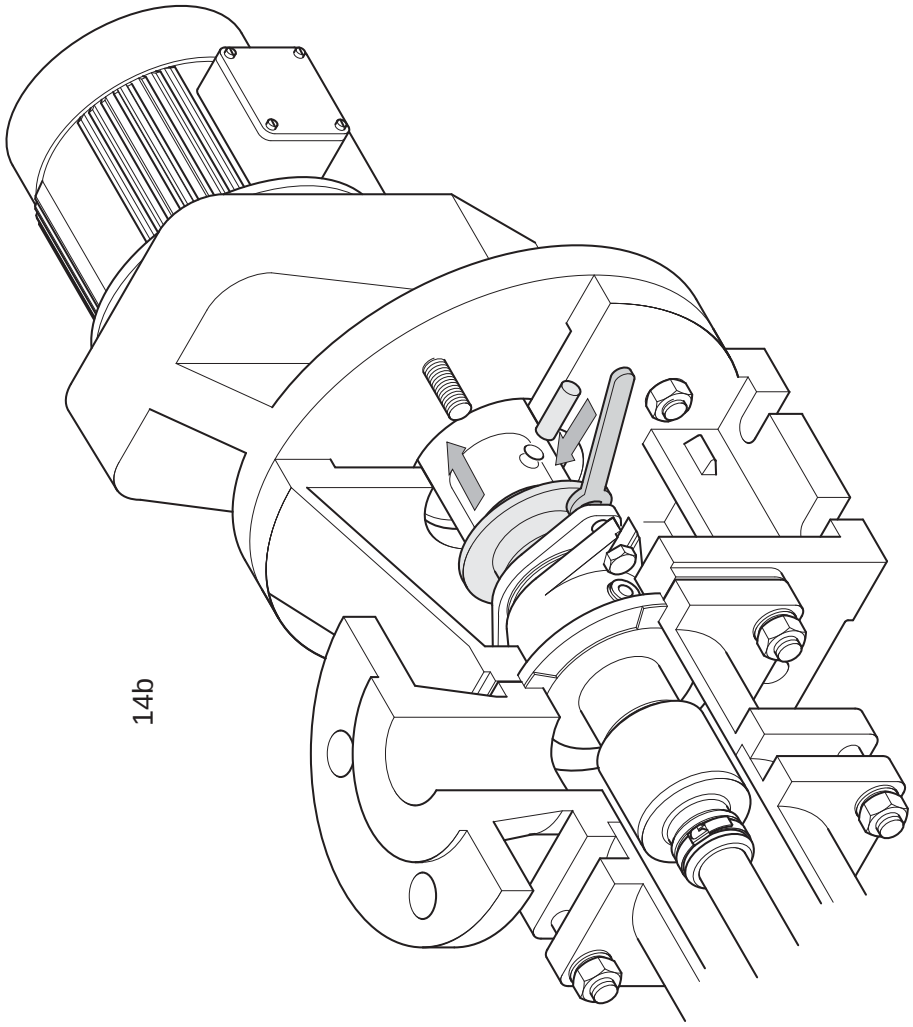
13

SQUARE INLET
ONLY

Dismantling & Assembly Diagrams



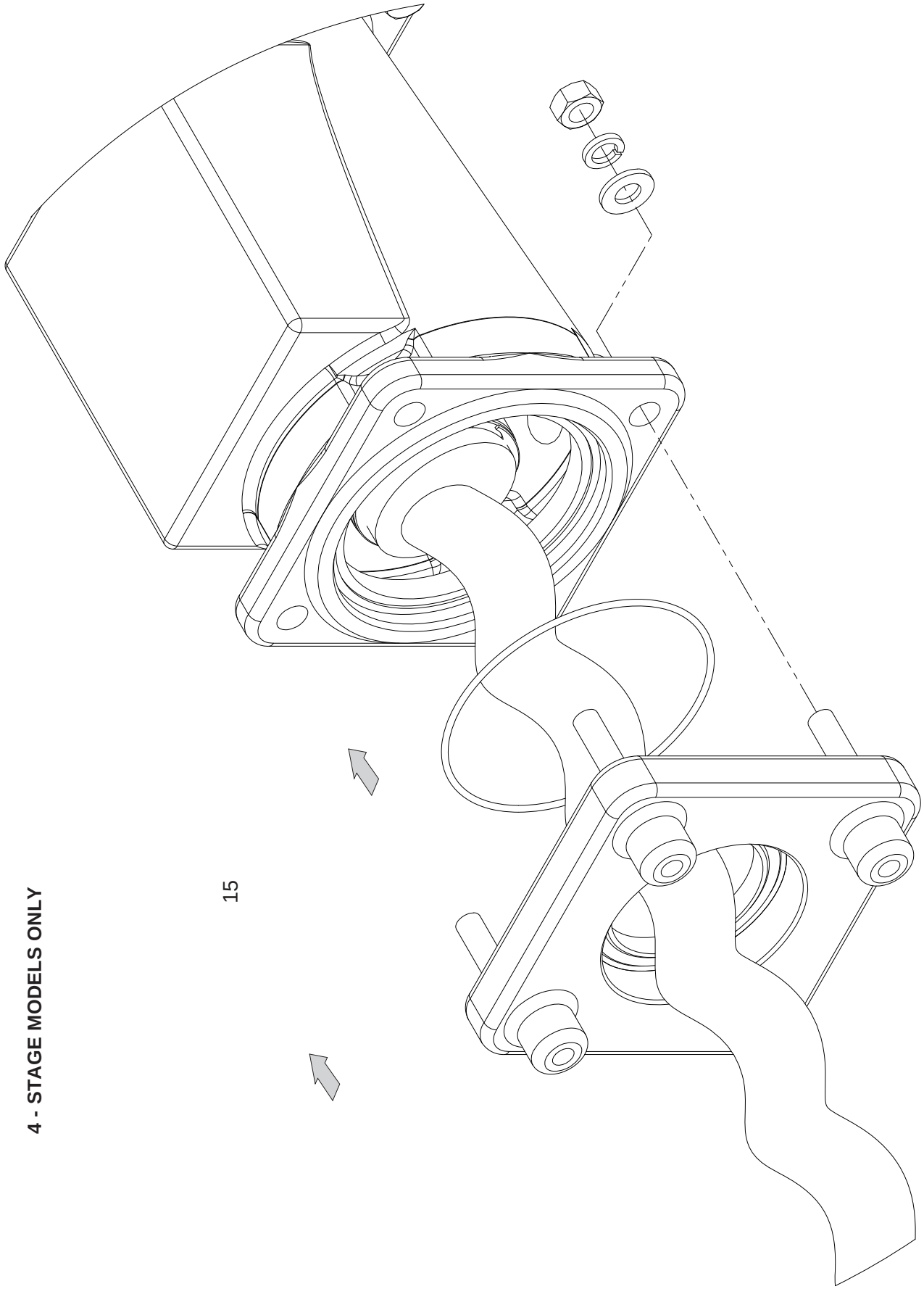
14a



14b

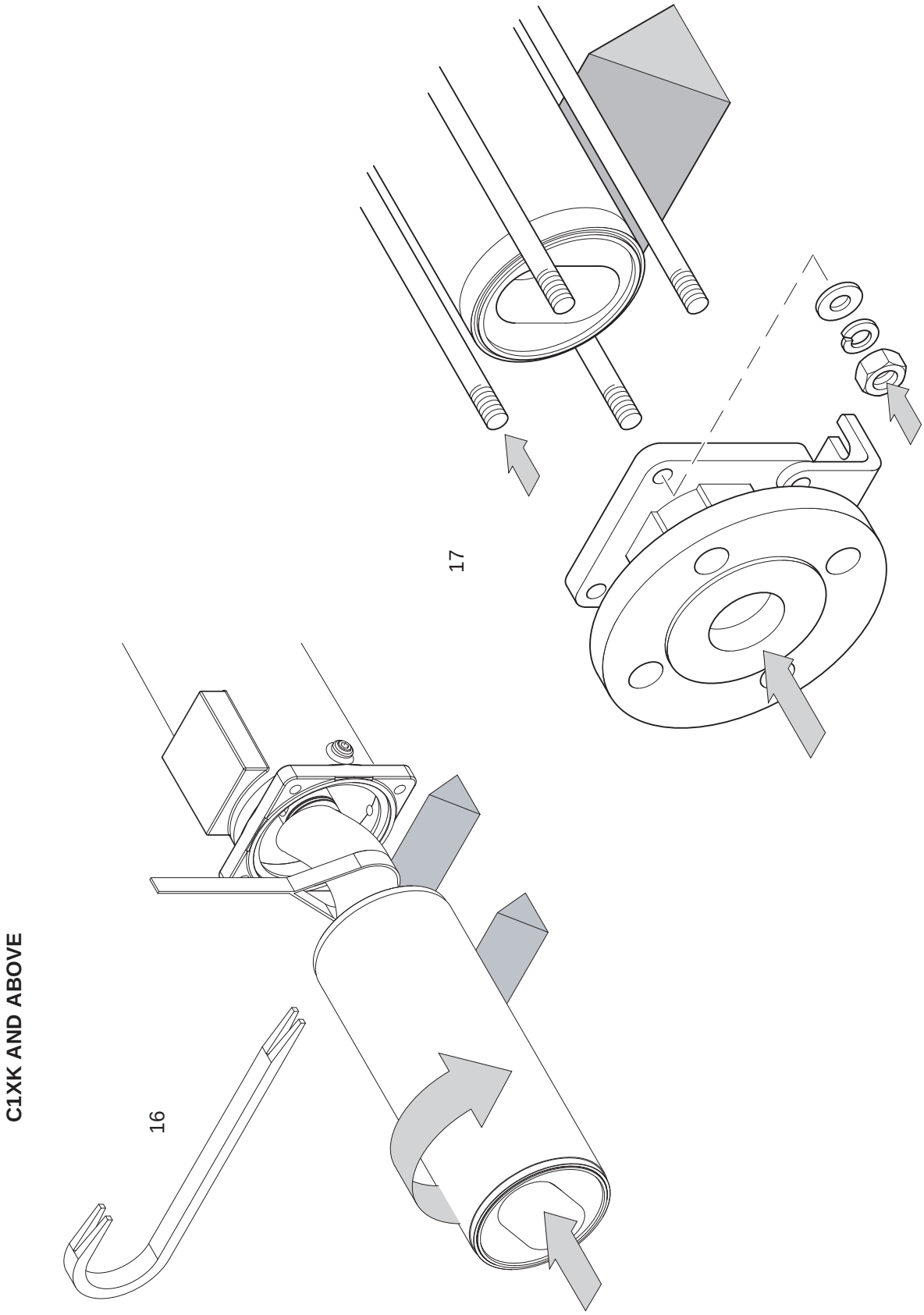
ONLY APPLICABLE IF USING PACKED GLAND PUMP

Dismantling & Assembly Diagrams

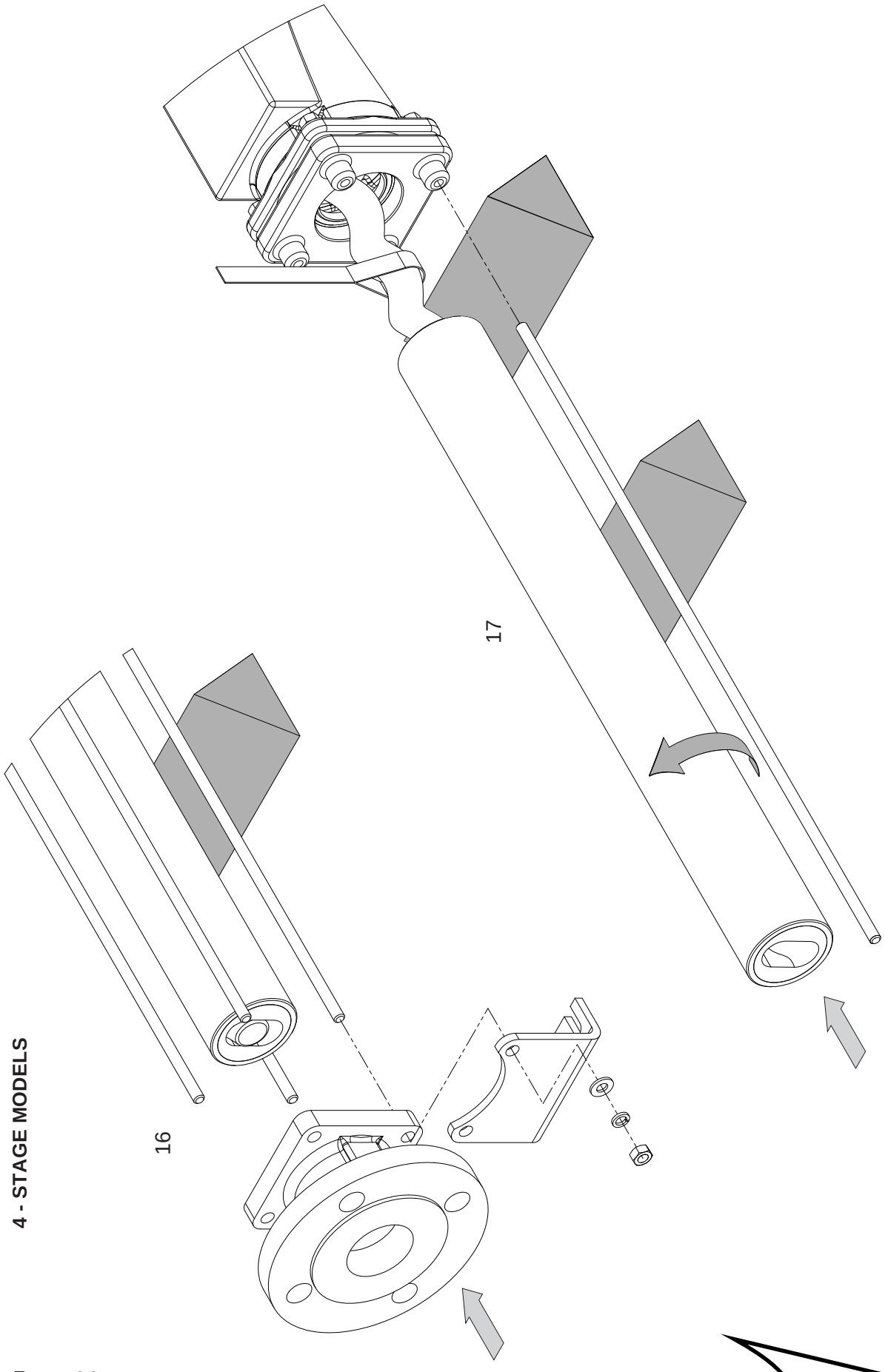


4 - STAGE MODELS ONLY

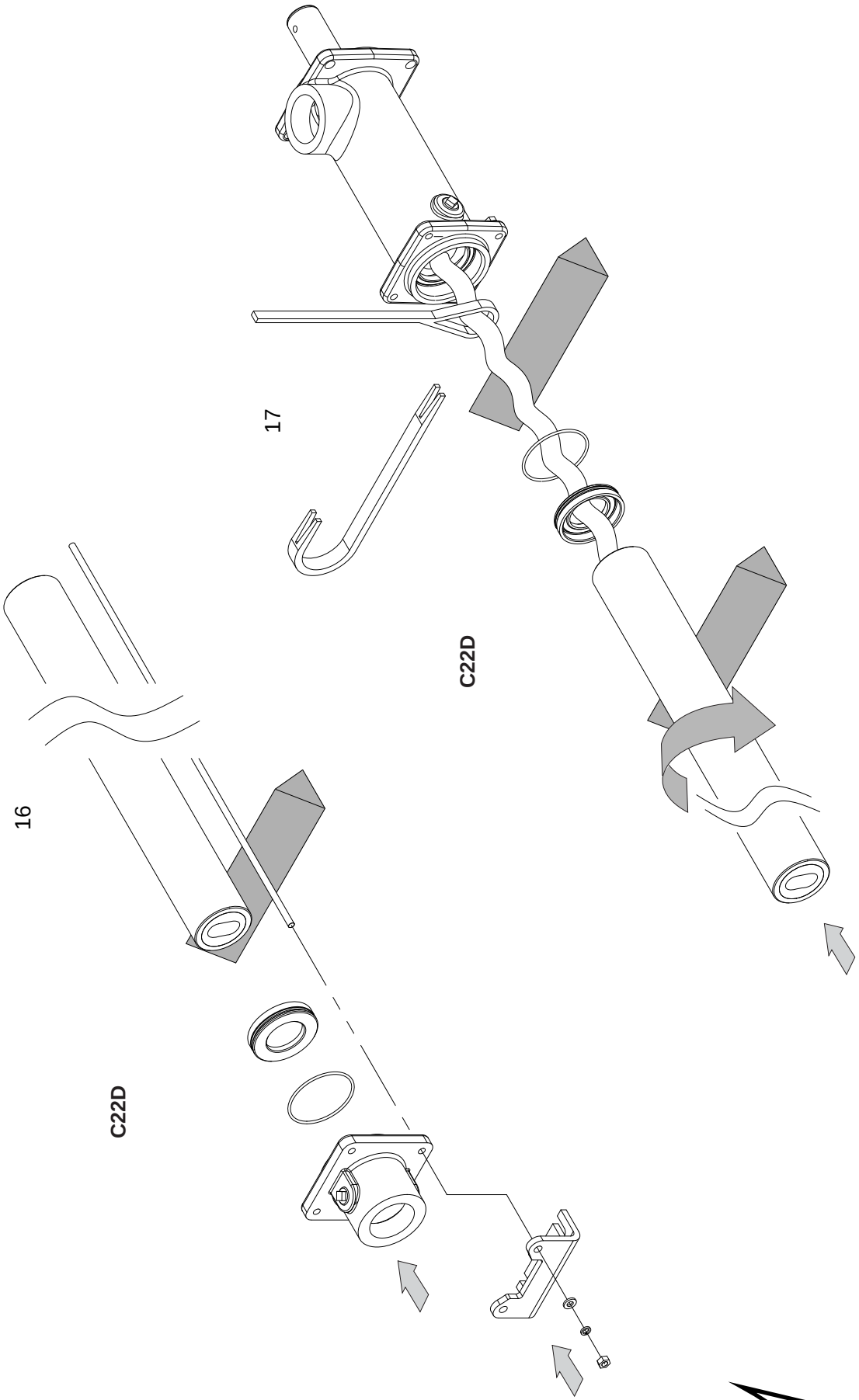
Dismantling & Assembly Diagrams



Dismantling & Assembly Diagrams



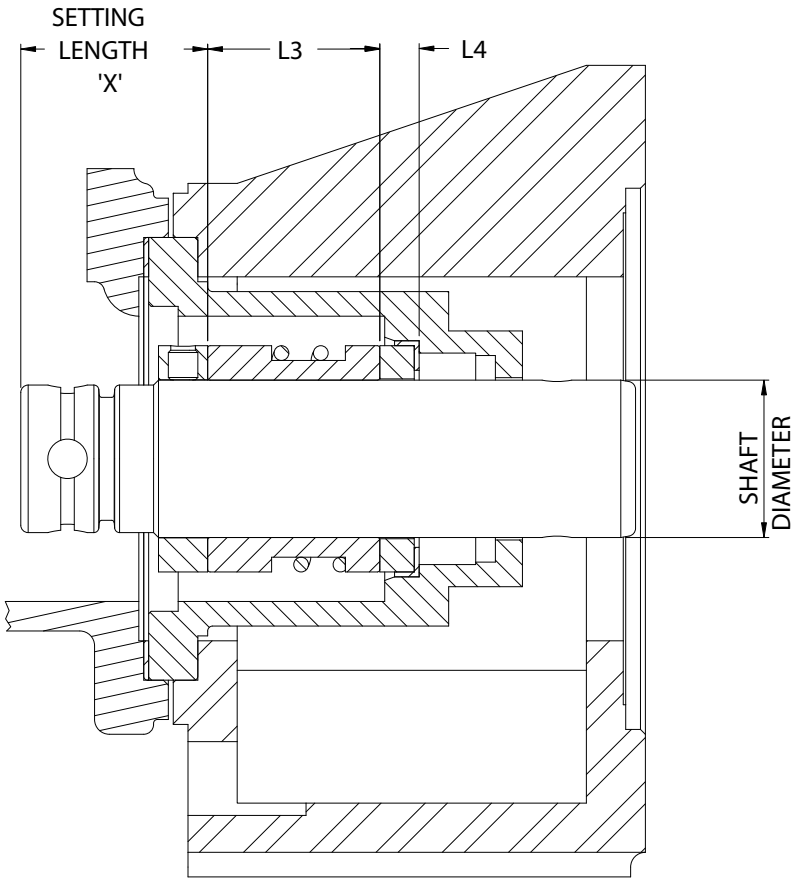
Dismantling & Assembly Diagrams



FLYGT

MPA619

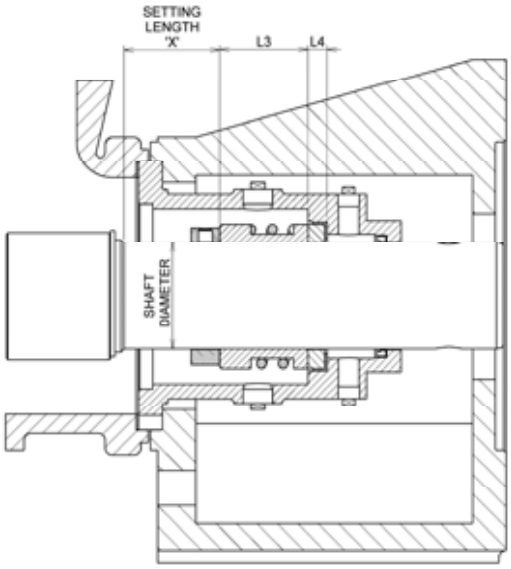
Setting Length - Mechanical Seal



Pump Size	Drive Type	Shaft Diameter mm	Seal Part No.	Seal Working Length L3 mm	Seat Length L4 mm	Setting Distance 'X' mm
C21B C21D C22A C22B	Pin Joint	32	M032139G	35.5	7	38

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 85mm which uses 'BS' type.
This table is not necessarily compatible with any other seal type - check with the manufacturers Technical Dept.

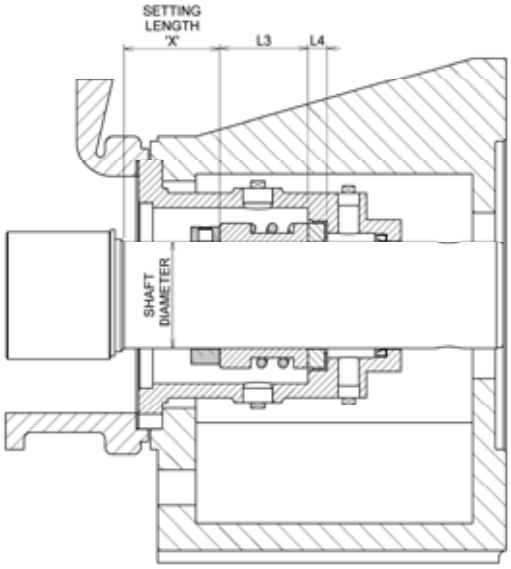
Setting Length - Mechanical Seal



Pump Size	Drive Type	Shaft Diameter mm	Seal Part No.	Seal Working Length L3 mm	Seat Length L4 mm	Setting Distance 'X' mm
C22D C23A C23B C23K C2XA C2XB C1XK	Pin Joint	32	M032139G	35.5	7	16
C13D C14A C14B C14K C15A C15K	Pin Joint	45	M045139G	37	8	41
C1XD C14D C15B C16A C16K	Pin Joint	55	M055139G	37.5	10	34.5
C15D C16B C17A C17B C17K C18A C18K	Pin Joint	65	M065139G	40.5	12	33.5

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 85mm which uses 'BS' type.
This table is not necessarily compatible with any other seal type - check with the manufacturers Technical Dept.

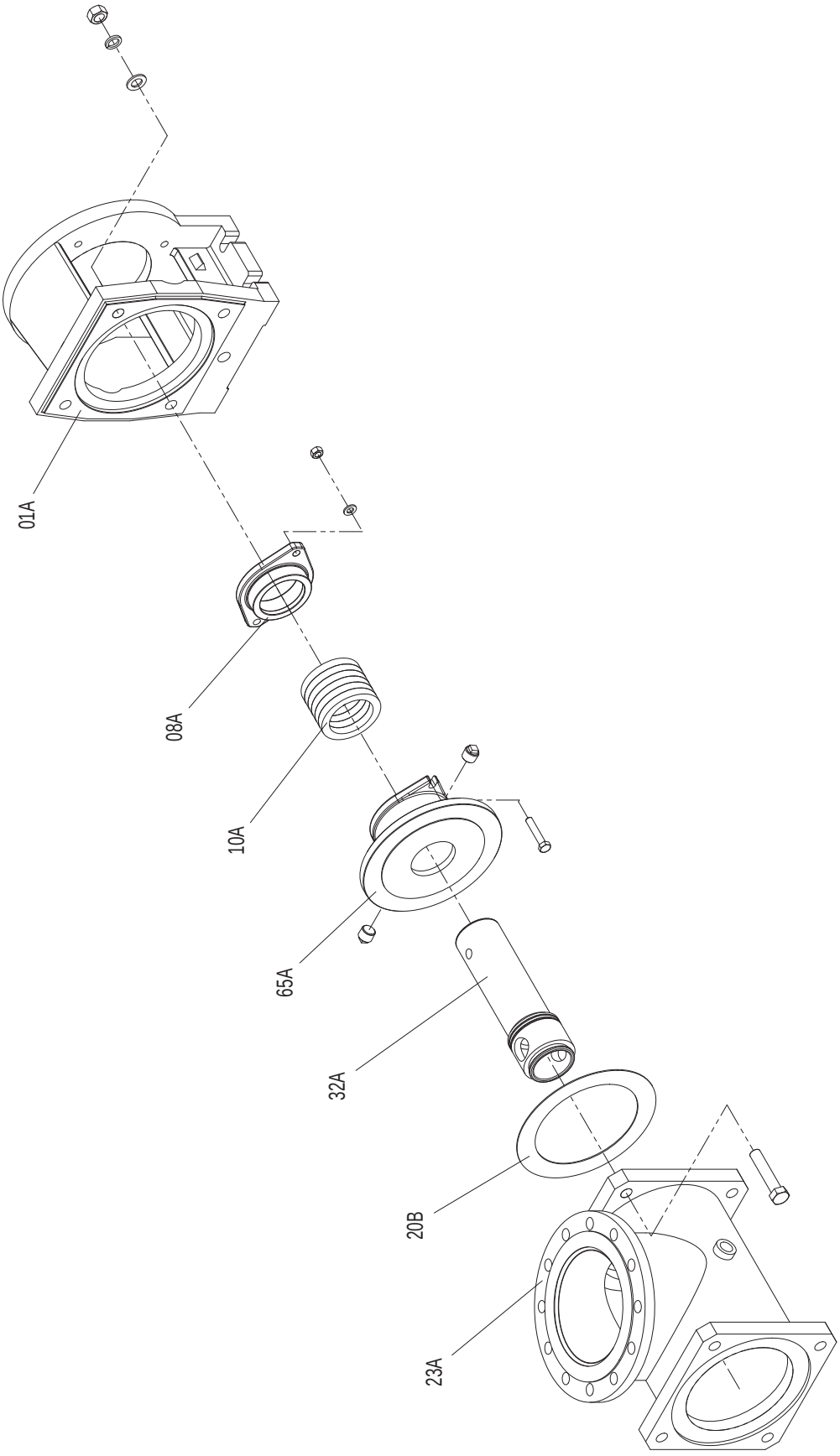
Setting Length - Mechanical Seal



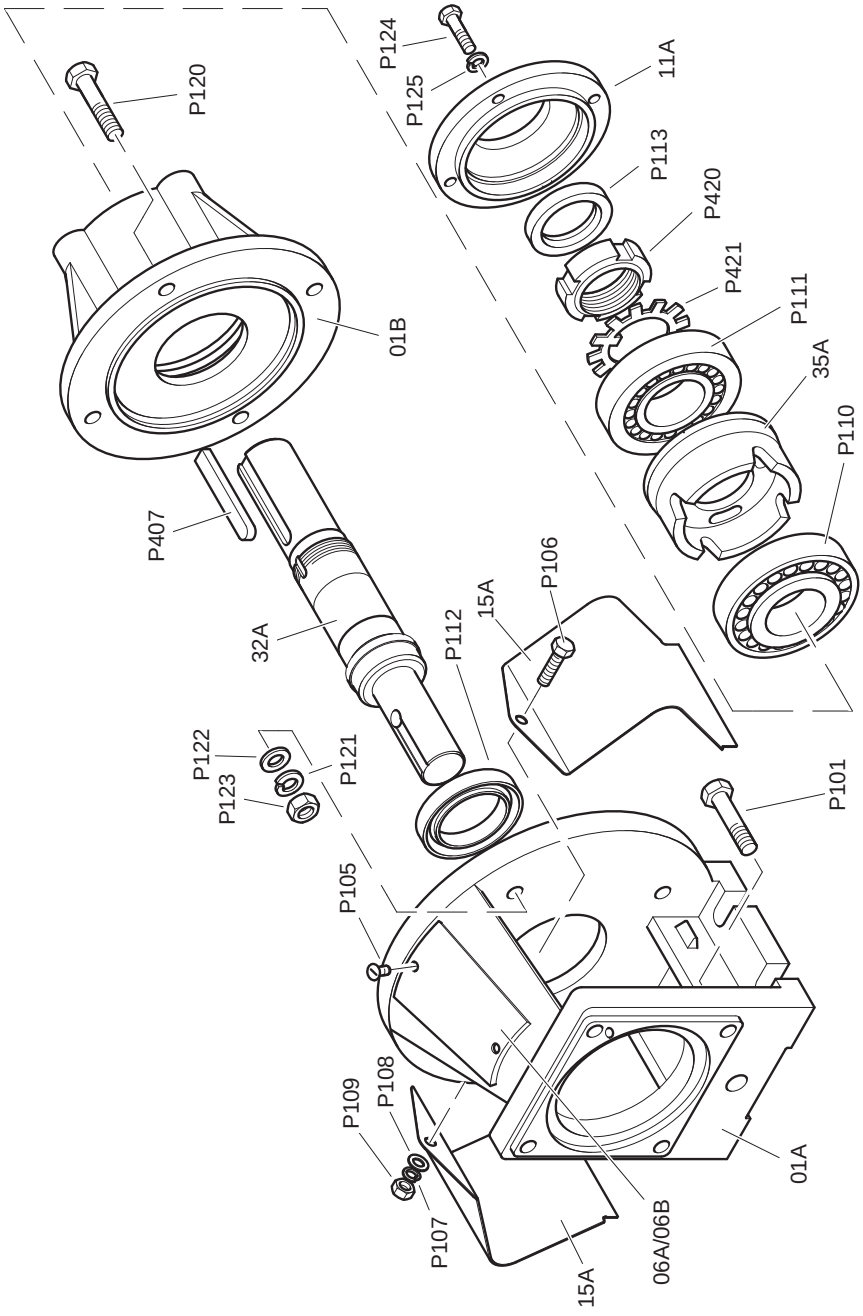
Pump Size	Drive Type	Shaft Diameter mm	Seal Part No.	Seal Working Length L3 mm	Seat Length L4 mm	Setting Distance 'X' mm
C16D C18B C19A C19B C19K C1AA C1AK	Pin Joint	85	M085139G	47.5	12.5	33
C17D C1AB C1BA C1BK	Pin Joint	85	M085139G	47.5	12.5	58

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 85mm which uses 'BS' type.
This table is not necessarily compatible with any other seal type - check with the manufacturers Technical Dept.

Exploded Views - Packed Gland



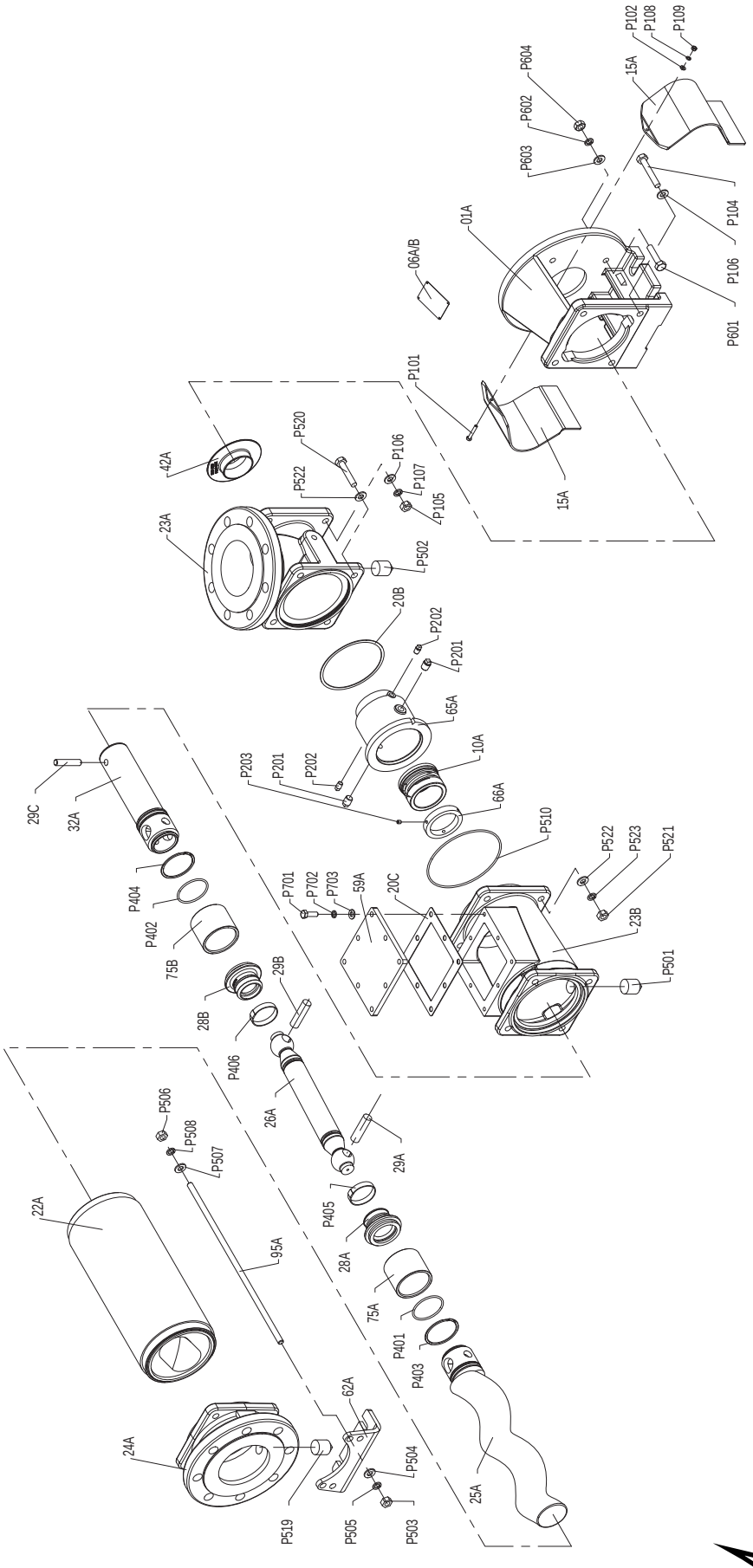
Exploded Views



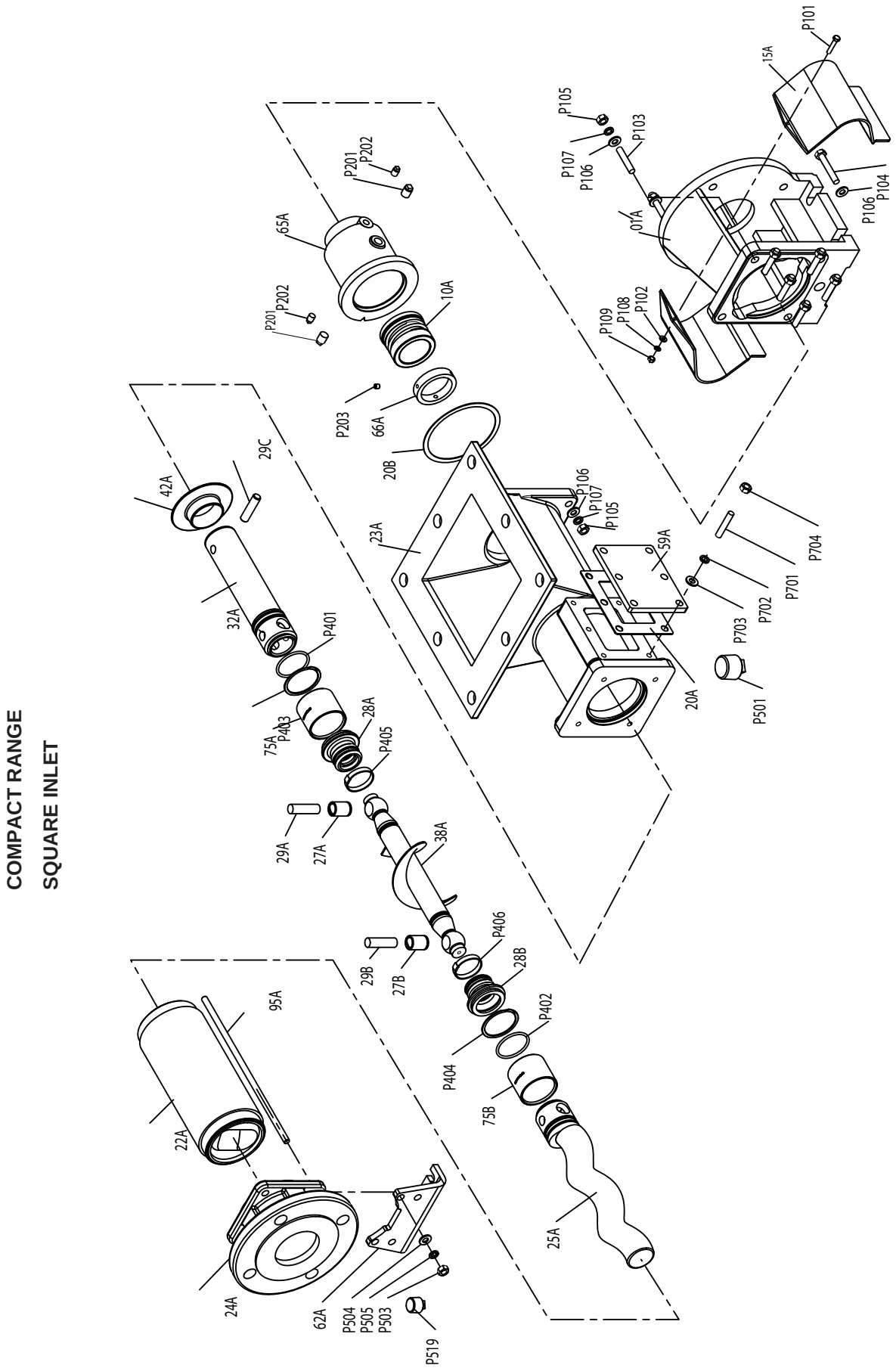
BEARING HOUSING ONLY

Exploded Views

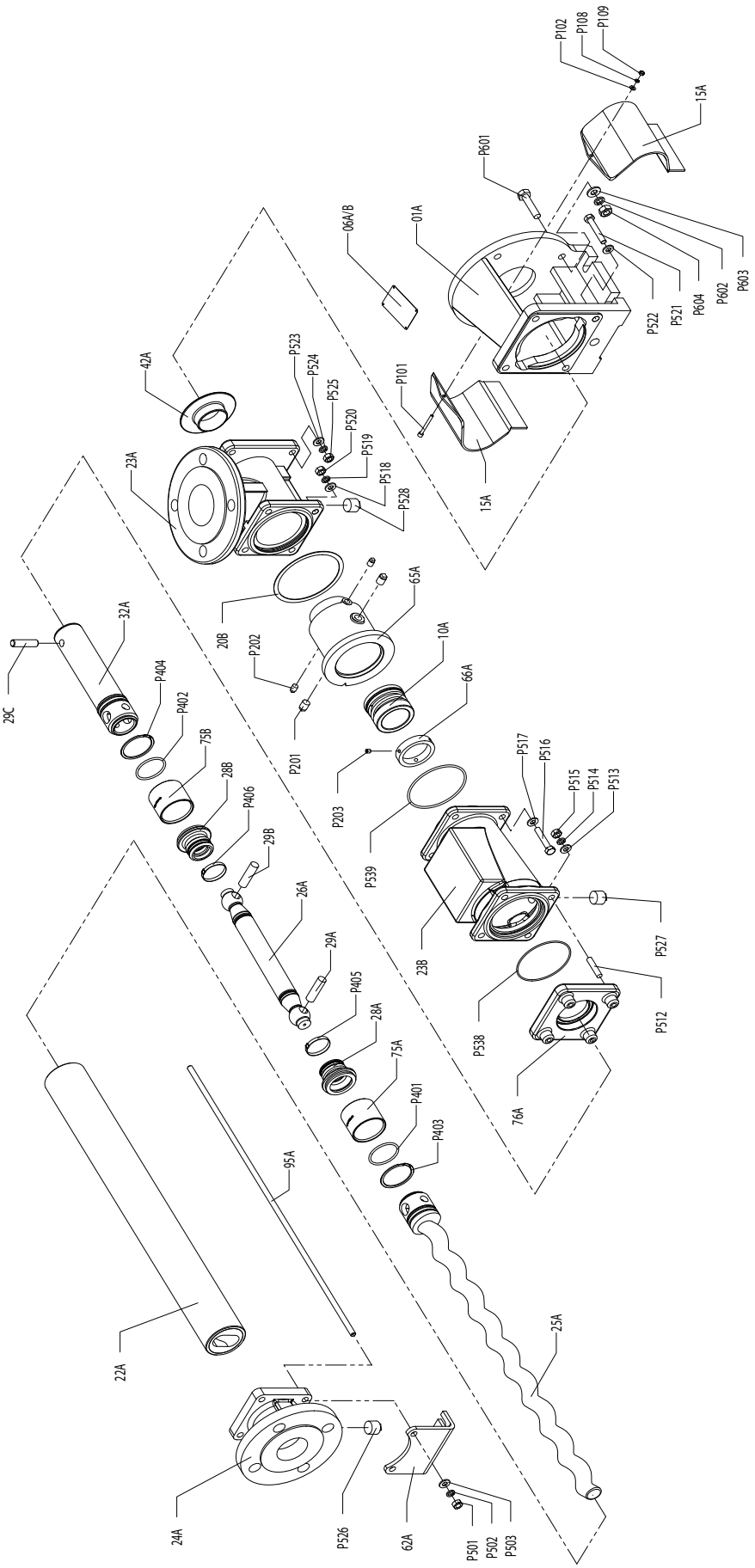
COMPACT RANGE
C1XK AND ABOVE
EXCLUDING **C18B, C1AB, C1BA & C1BK**



Exploded Views



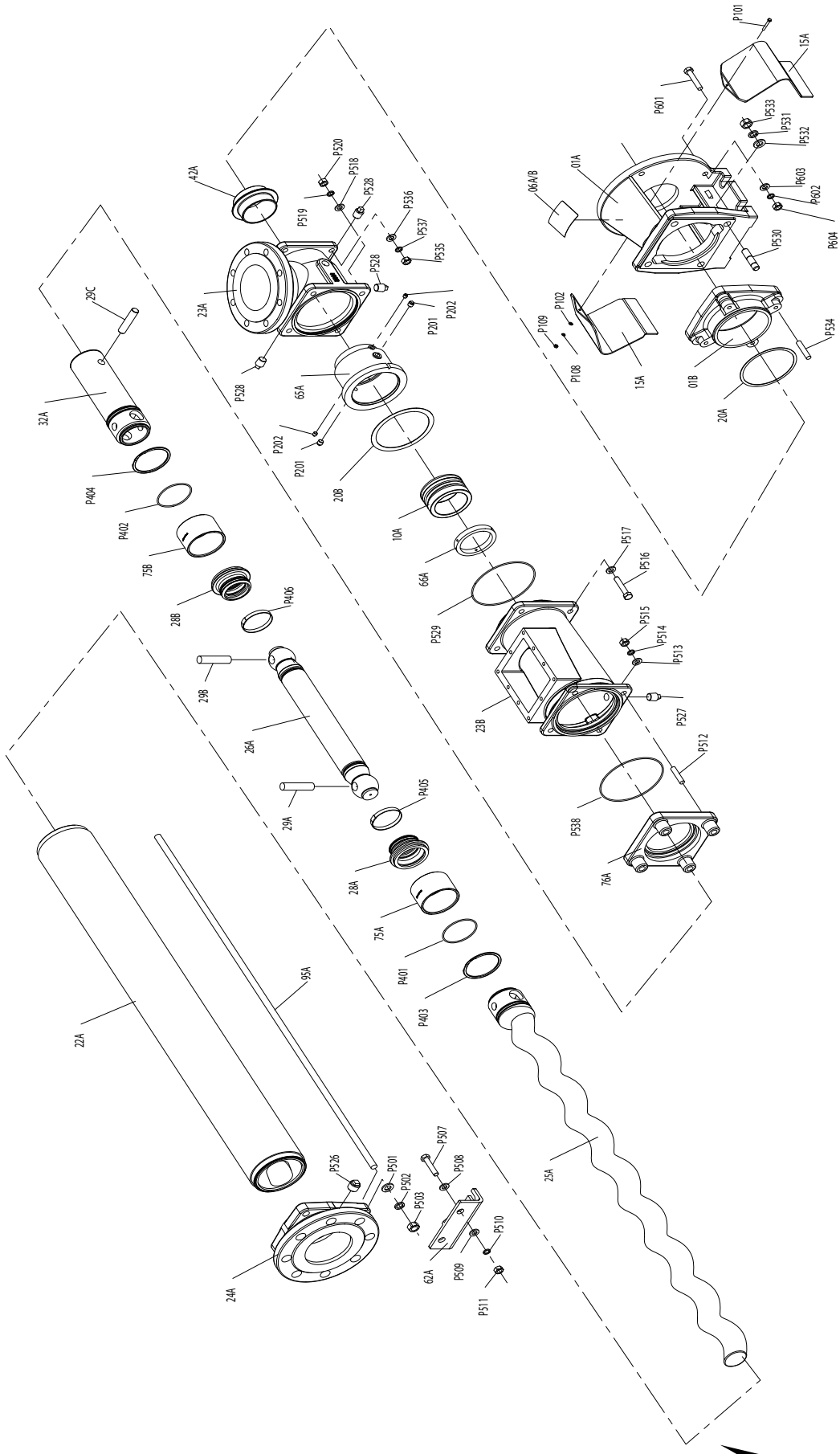
Exploded Views



COMPACT RANGE
4 - STAGE
C13D TO C18D
EXCLUDING C16D

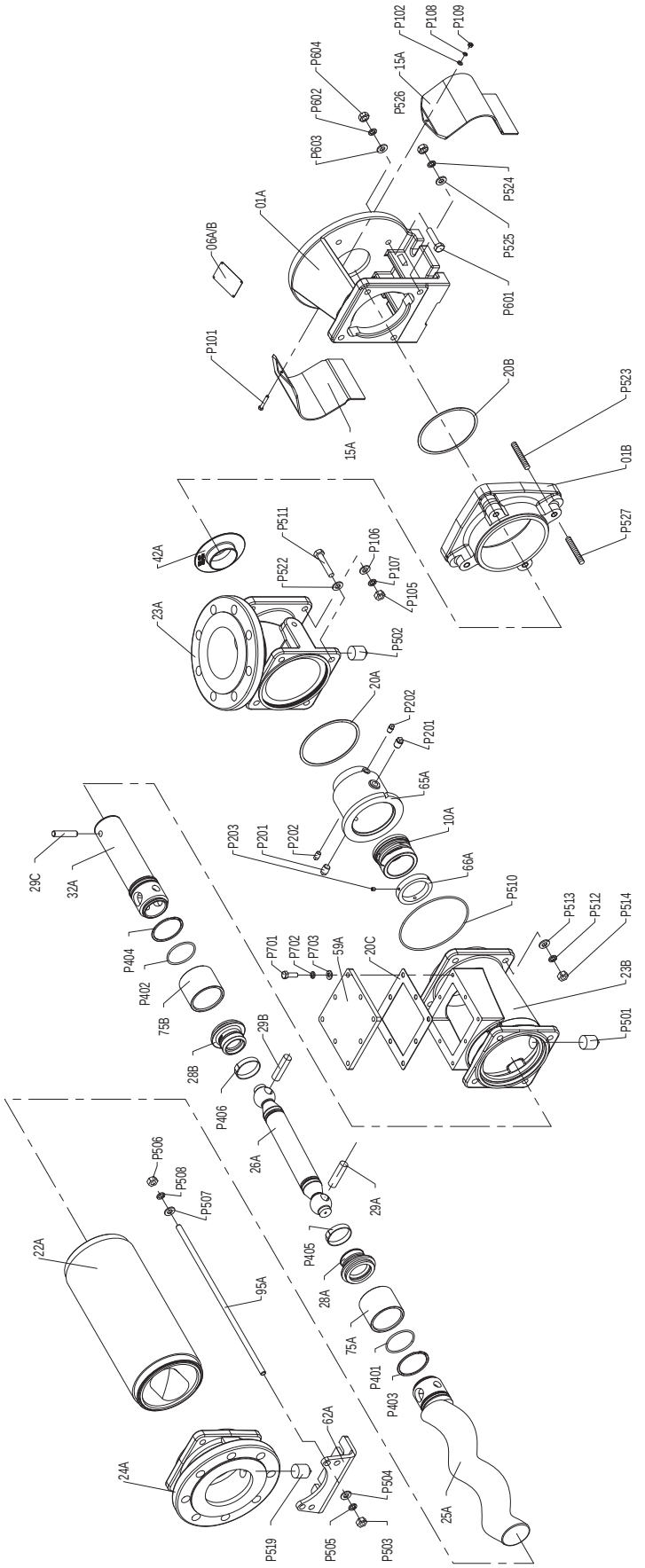
FLYGT

Exploded Views



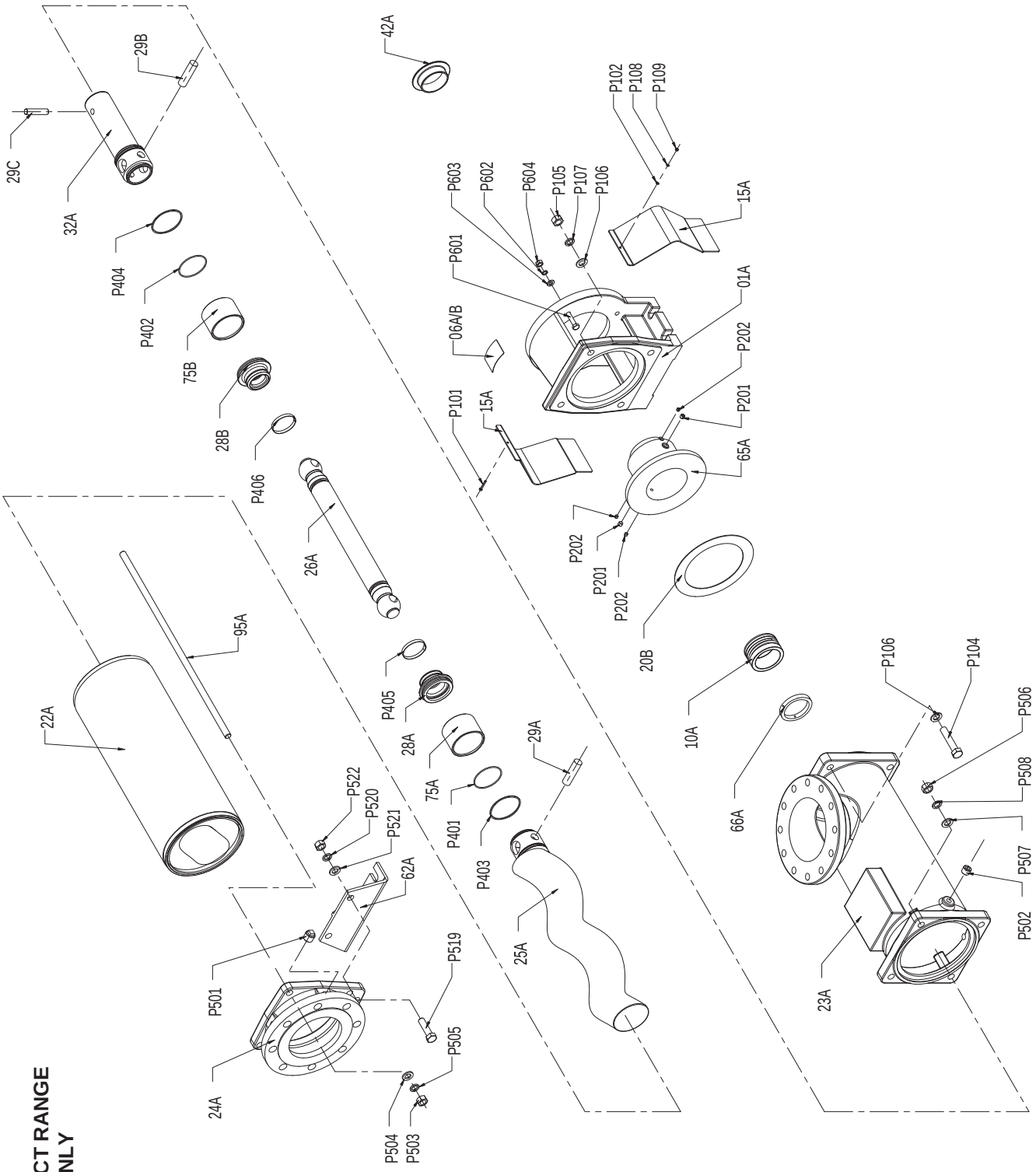
COMPACT RANGE
4 - STAGE C16D

Exploded Views



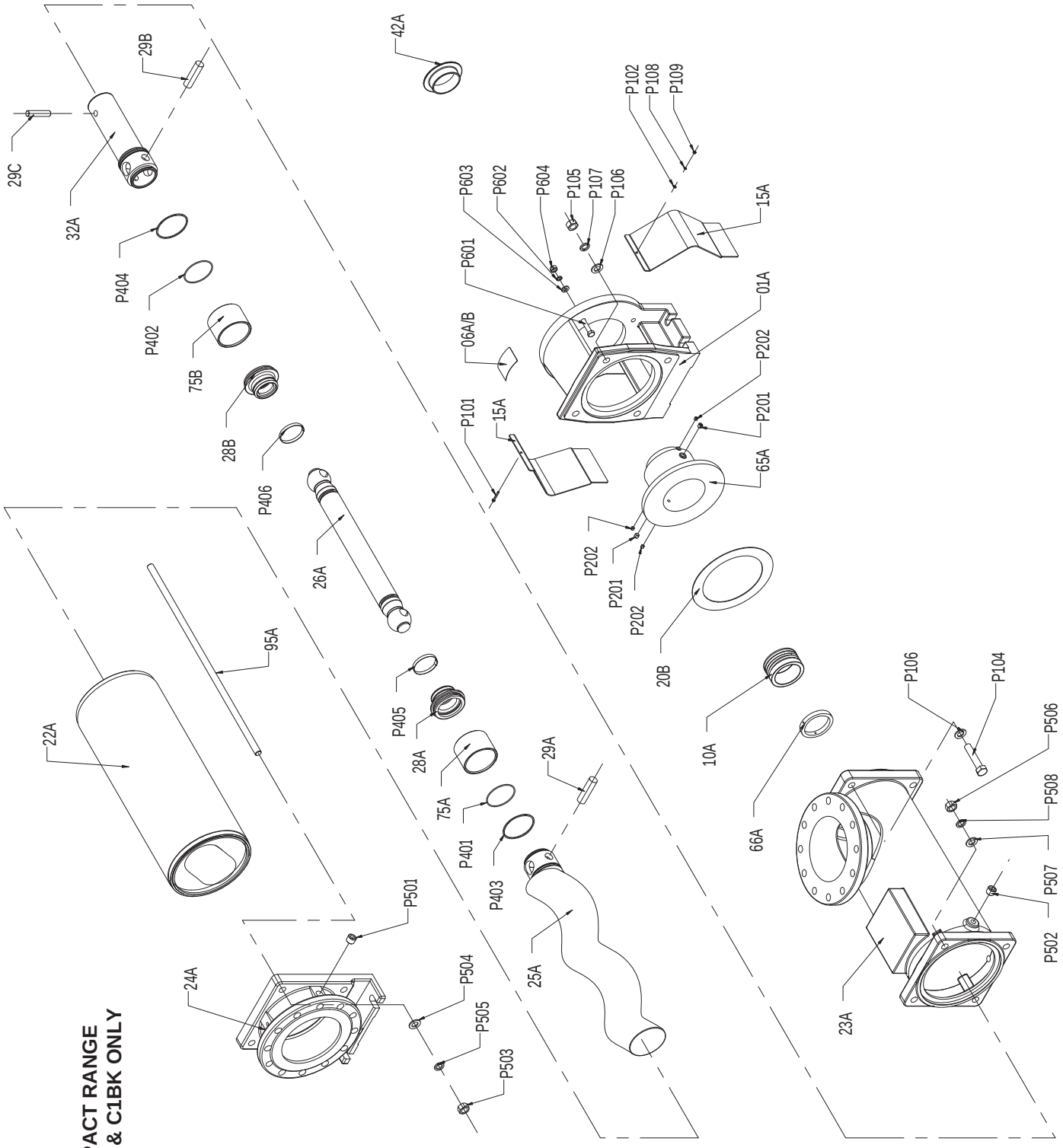
COMPACT RANGE
C18B ONLY

Exploded Views

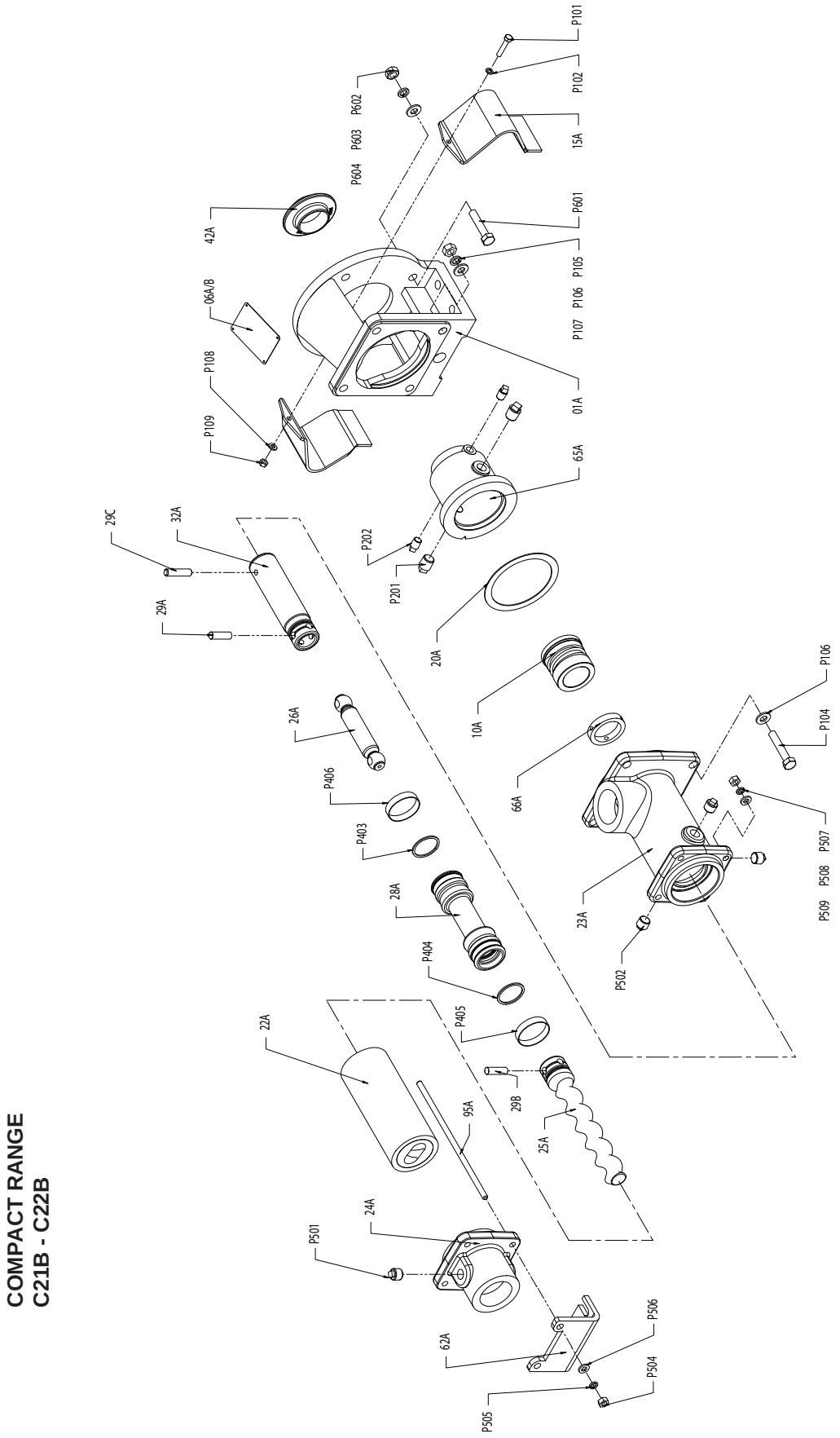


COMPACT RANGE
C1AB ONLY

Exploded Views

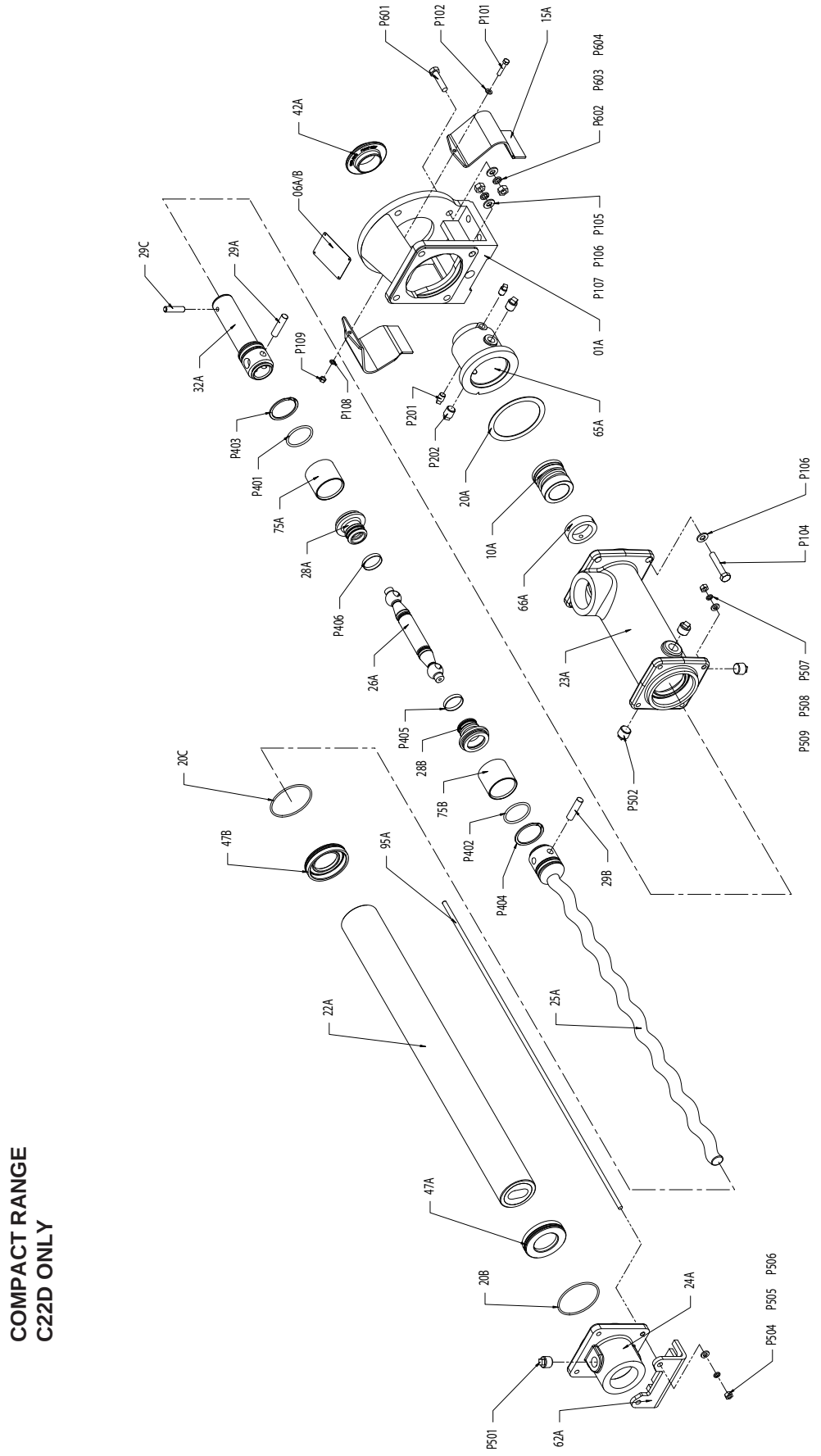


Exploded Views



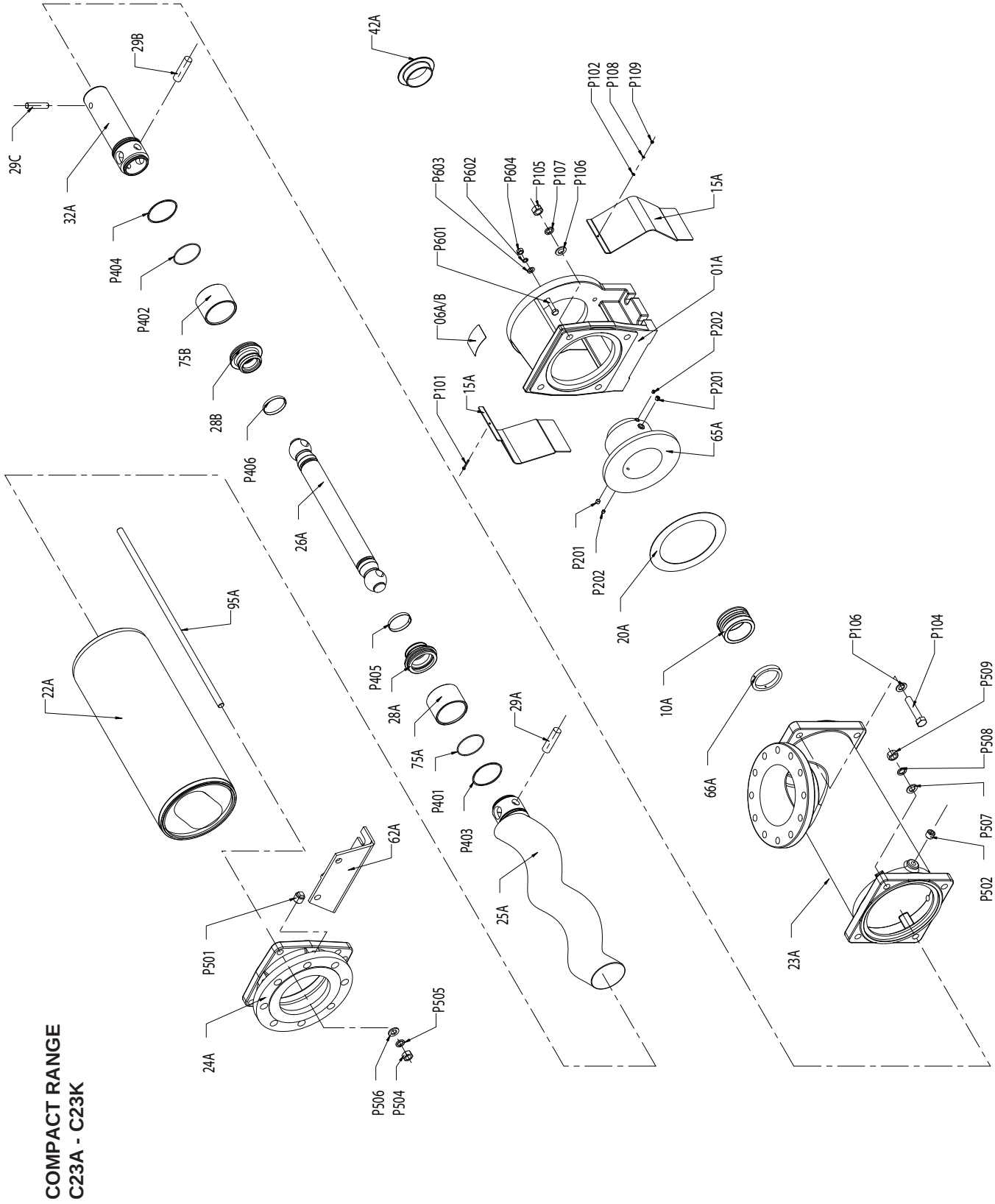
COMPACT RANGE
C21B - C22B

Exploded Views

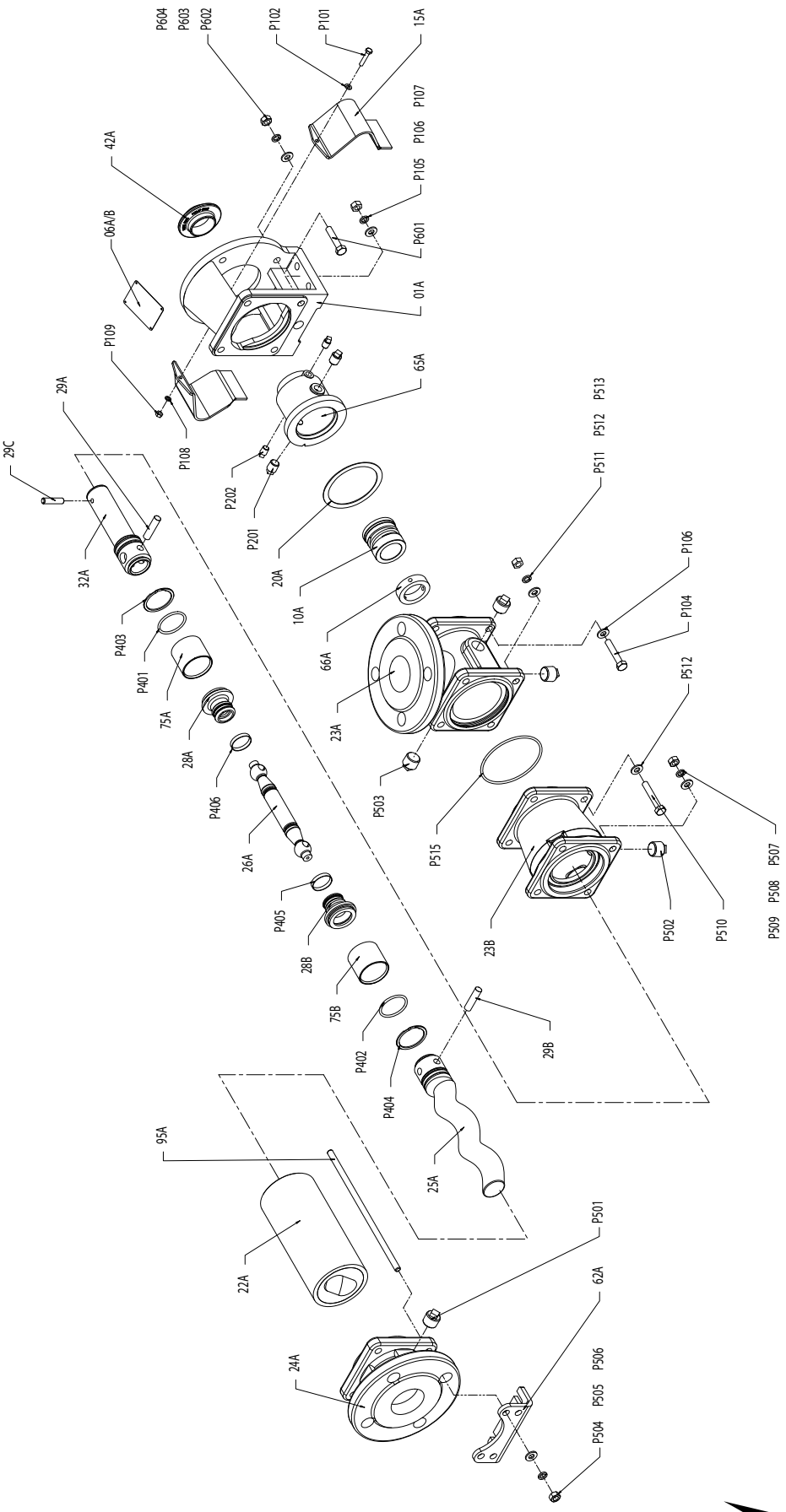


COMPACT RANGE
C22D ONLY

Exploded Views



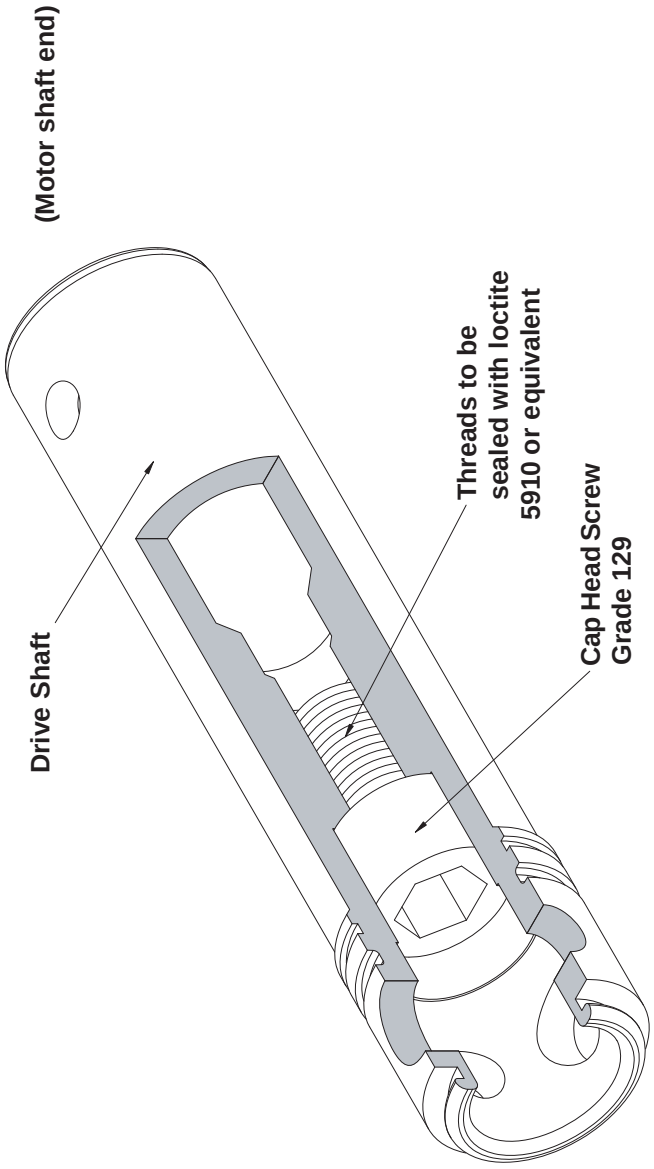
Exploded Views



COMPACT RANGE
C2XA - C2XB ONLY

FLYGT

Drive Shaft Assembly with Plug



NOTE: ENSURE THE CAP HEAD SCREW IS TIGHTEND & SEALED BEFORE ASSEMBLING WITH COUPLING ROD

Torque Tightening Figures

PUMP SIZE	BODY/SUCT. CHAMBER Nm P526	P105	P530	STATOR TIE BARS Nm P506 P503
C1XK		10		10
C14A		11		11
C14K		11		11
C14B		11		11
C15A		11		11
C15K		21		11
C15B		21		11
C16A		21		24
C16K		21		24
C16B		36		24
C17A		36		24
C17K		36		24
C17B		36		24
C18A		36		40
C18K		36		40
C18B	50	-	36	40
C19A		90		75
C19K		90		75
C19B		90		75
C1AA		90		75
C1AK		90		75
C1AB		90		75
C1BA		176		120
C1BK		176		120

Note: Torque tolerances are +/-5% of stated nominal figures.

Torque Tightening Figures

4 - STAGE C13D TO C18D

PUMP SIZE	BODY/SUCTION CHAMBER			STATOR TIE BARS	ADAPTOR FLANGE	SCTN. CHMB./SCTN. CHMB. EXT.
	Nm			*Nm*	*Nm*	*Nm*
	P533	*P105*	*P535*	*P501*	*P515*	*P520*
C13D		11		11	11	11
C1XD		21		11	11	11
C14D		21		21	11	11
C15D		40		40	21	21
C16D	50	-	40	75	40	40
C17D		176		75	75	-
C18D		176		120	75	-

Note: Torque tolerances are +/-5% of stated nominal figures.

Torque Tightening Figures

C2XB AND BELOW

PUMP SIZE	SUCTION CHAMBER/ SUCTION EXT. Nm P105	STATOR TIE BARS Nm P504, P507
C21B	10	4
C21D	10	4
C22A	10	4
C22B	10	4
C22D	10	4
C23A	10	4
C23B	10	4
C23K	10	4
C2XA	10	10
C2XB	11	10

Note: Torque tolerances are +/-5% of stated nominal figures.

Pin Joint Lubrication

PUMP MODEL	JOINT LUBRICATION CAPACITY (APPROX.) PER JOINT (ml)*	NON-FOOD APPLICATIONS ONLY		FOOD APPLICATIONS
		RECOMMENDED	SUITABLE ALTERNATIVE	
C21B C21D C22A C22B	6	KLUBER SYNTHESO D460 EP OIL	MOBILITH SHC 007 SEMI-FLUID GREASE SHELL RETINAX CSZ MOBIL GEAR OIL SHC 320	KLUBEROIL 4 UHI 460
C22D C23A C23B C23K C2XA C2XB C1XK	12			
C13D C14A C14B C14K C15A	22			
C1XD C14D C15B C16A C16K	45			
C15D C16B C17A C17B C17K C18A C18K	55			
C16D C18B C19A C19K C1AA C1AK	95			
C17D C18D C1AB C1BA C1BK	175			

Recommended Lubrication & Service Intervals

COMPONENTS	ALL APPLICATION EXCEPT FOOD	FOOD APPLICATIONS ONLY	SERVICE COMMENTS
PUMP DRIVE JOINTS	SEE SECTION 5 PAGE 2		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		
NOTE: 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			

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