English

Original Instructions

Installation, Operation and Maintenance Instructions

Large 2-3 Geometry Compact Pumps
(APP Project)

MPA622

NOV Mono®

One Company, Unlimited Solutions

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Installation, Operation & Maintenance Instructions

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, Mono 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.

1.2.2. 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.

HORIZONTAL MOUNTING

All ranges excluding P Range Mono 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.

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. Guidence is given on page 6 section 1.

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, Mono Pumps Limited, should be consulted before proceeding. Normally the Mono 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 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 MONO PUMPS LIMITED 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 Mono Pumps Limited 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, MONO PUMPS LIMITED 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	†

† Anti-clockwise gives inlet at drive end.

DIRECTIONS OF ROTATION

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

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 sound pressure level should not exceed 85dB at one metre distance from the pump.

2. This is based on a typical installation and does not necessarily include noise from other sources or any contribution from building reverberation or installation pipework

3. It is recommended 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 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.

2.11 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.

2.12 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.

2.13 MAINTENANCE OF WEARING COMPONENTS

2.13.1 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.

2.13.2 COUPLING ROD JOINTS

Regular maintenance and lubrication will maximise life of the joints.

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

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

2.14 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 MONO PUMPS LIMITED

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

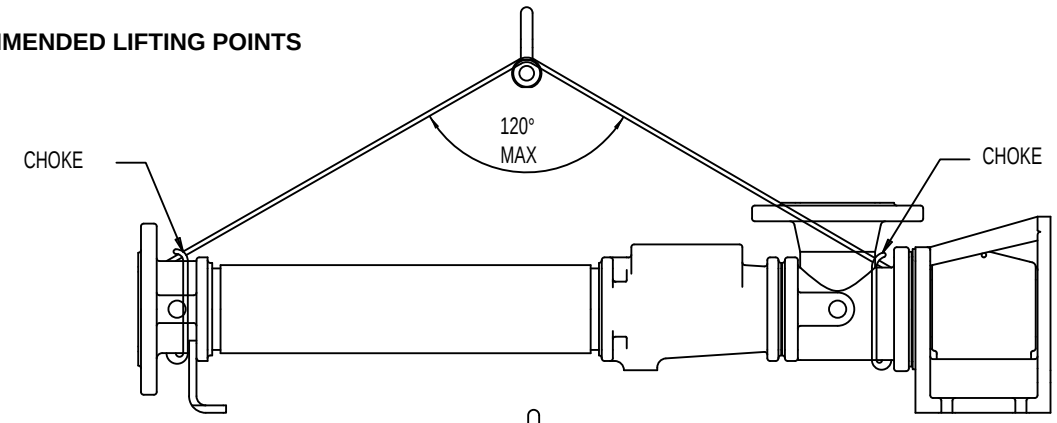
The use of replacement items that are not approved by or manufactured by Mono Pumps Limited may affect the safe operation of the pump and it may therefore become a safety hazard to both operators and other equipment. In these instances the Declaration provided will therefore become invalid. The guarantee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

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.

3.2 RECOMMENDED LIFTING POINTS

1



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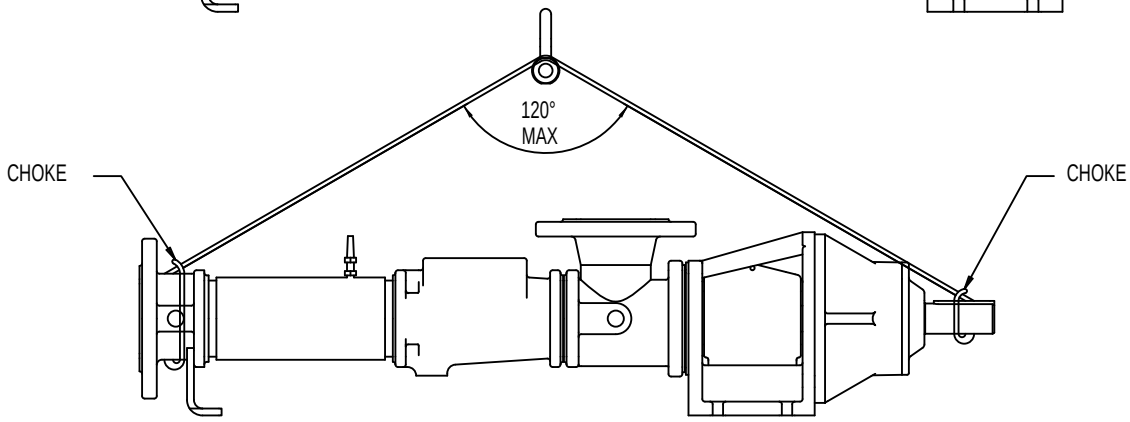

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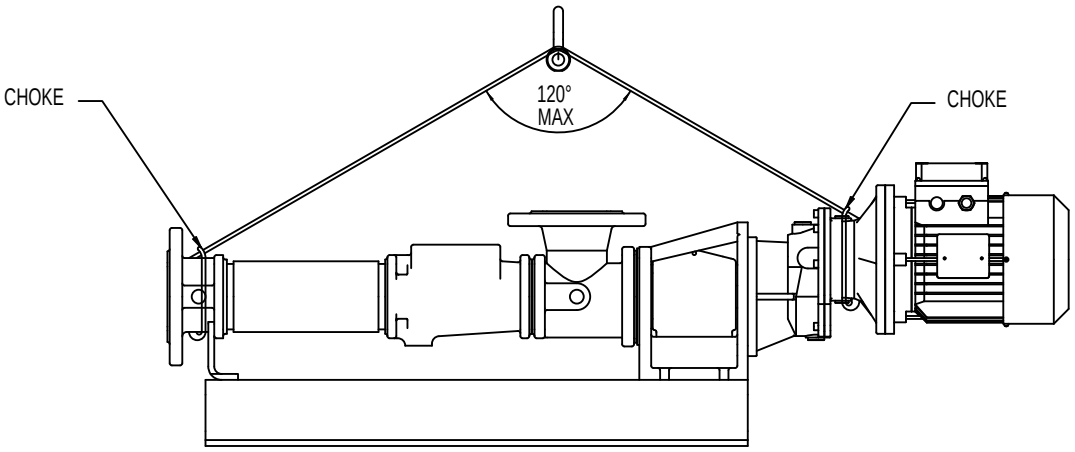

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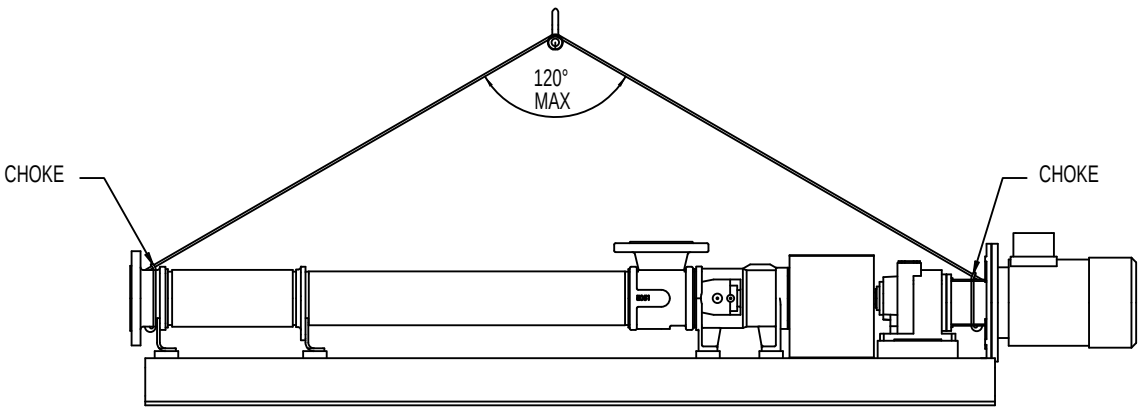


3.3 PUMP AND WEAR PARTS WEIGHTS.

NOTE: Weights are for guidence purpose only. Please refer to the documetation issued with your pump or spares.

Large Compact Range

Model	Weight (kg)				
	Pump	Stator	Rotor	Coupling Rod/Joint	Shaft
C1BB	650	130.0	132.5	21.7	35.4
C1CA	650	85.0	129.1	21.7	35.4
C1CB	950	186.1	263.6	21.9	35.4
C1CK	950	186.1	263.8	21.9	35.4
C1DA	680	121.4	171.3	21.7	35.4
C1DB	862	176.0	186.0	21.7	35.4
C1EB	1213	451.0	262.0	21.7	35.4

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

C1DB BARESHAFT

DRAWING REF.	DESCRIPTION	PART NO.	QUANTITY
01A	BODY - STD	E151 0100	1
08A	GLAND BACKPLATE	C16M 0870	1
10A	MECHANICAL SEAL	BERMANN 140	1
10B	LIPSEAL 100 X 115 X 9R21	S360811P	1
10C	TORL SEAL RING 132 ID X 3 SECT	S304830P	1
11A	BEARING COVER - STD C.I.	E151 1100	1
12A	STATOR ANTI-ROTATION RING	C16M 1200	1
15A	THROWER GUARD (SIZE 15)	E151 1560	1
20B	GASKET-GLAND	E151 2020	1
22A	STATOR	C16M 2205	1
23A	SUCTION CHAMBER	C16M 2340	1
24A	END COVER	C16M 2440	1
25A	ROTOR MK1	C16M 2525	1
26A	COUPLING ROD	C152 2600	1
27A	BUSH	C152 2700	8
28A	SEALING BOOT	C152 2810	2
29A	COUPLING PIN	C152 2900	4
29B	SHAFT PIN	C16M 2920	1
30A	COUPLING YOKE	C152 3010	4
30B	COUPLING BLOCK	C152 3020	2
30C	BEARING WASHER	C152 3030	8
32A	SHAFT	C16M 3255	1
32B	DRVE SHAFT	C16M 3200	1
35A	BEARING SPACER	E151 3500	1
42A	THROWER	C16M 2400	1
62A	SUPPORT FOOT	C16M 6200	1
65A	GLAND SECTION	C16M 6545	1
75A	SLEEVE	C152 7500	4
95A	TIE BAR	C162 9501	4
P101	TAPER ROLLER BEARING	T160900B-APP	1
P102	TAPER ROLLER BEARING	T160900B-APP	1
P103	ROTARY SHAFT LIPSEAL 140 X 115 X 12	S361840P	1
P104	ROTARY SHAFT LIPSEAL 100 X 80 X 12	S361774P	1
P105	STL.HEX.HD.BOLT M24 X 100	K121402F	4
P107	STEEL BRIGHT WASHER M24	W121052F	4
P108	SGL COIL SPRING WASHER M24	W121252F	4
P109	SELF TAPPING SCREW		1
P110	STEEL BRIGHT WASHER M12	W115052F	1

Drawing Reference Numbers

C1DB BARESHAFT (continued)

DRAWING REF.	DESCRIPTION	PART NO.	QUANTITY
P111	STEEL HEX HD SCREW M10 X 30	F114242F	6
P112	SNGL. COIL SPR.WASHER M10	W114252F	6
P113	SKEFKO LOCKNUT KM18 - M90 X	N801180F	1
P114	SKEFKO LOCK WASHER MB18 (M90)	W801180F	1
P203	H.T. SOC.CAP SCREW M12 X 25 LG	A115221F	2
P204	SNGL. COIL SPR.WASHER M12	W115252F	2
P205	1/8 B.S.P. TAPER PLUG	P100132S	2
P301	REC PAR KEY FORM 'C' 20 X 12 X 125	K122081P	1
P401	TORL SEAL RING	S312152P	4
P402	ROLL PIN 30DIA X 160 LG	P317431F	4
P403	ROLL PIN 18DIA X 160 LG	P312431F	4
P404	H.T.STL.HEX.SOC.SETSCREW.M12 X 16	G115161F	8
P405	ROLL PIN 12DIA X 60 LG	P309321F	4
P406	M12 X 20 SOCKET BUTTON HEAD	H115201F	8
P407	CYLINDRICAL ROLLER BEARING 35X	E100350B	8
P408	OILITE THRUST WASHER	W100413P	8
P410	TORL SEAL RING	S304630P	1
P411	TORL SEAL RING	S304630P	2
P501	ST.STL.TAPER PLUG 1" B.S.P.	P100610S	3
P502	STEEL BRIGHT WASHER M30	W123052F	2
P503	STL.SGL.COIL SPRING WASHER M30	W123252F	2
P504	STEEL HEX.NUT M30	N123102F	2
P505	ST.STLTAPER PLUG 3/4" B.S.P.	P100510S	2
P506	STL BRIGHT WASHER M30	W123052F	4
P507	STL.SGL.COIL SPRING WASHER M30	W123252F	4
P508	STEEL HEX.NUT M30	N123102F	4
P513	STL.HEX.HD.SCREW M24 X 65	F121332F	2
P514	STEEL BRIGHT WASHER M24	W121052F	2
P515	STEEL HEX. NUT M24	N121102F	2

Drawing Reference Numbers

C1EB BARESHAFT

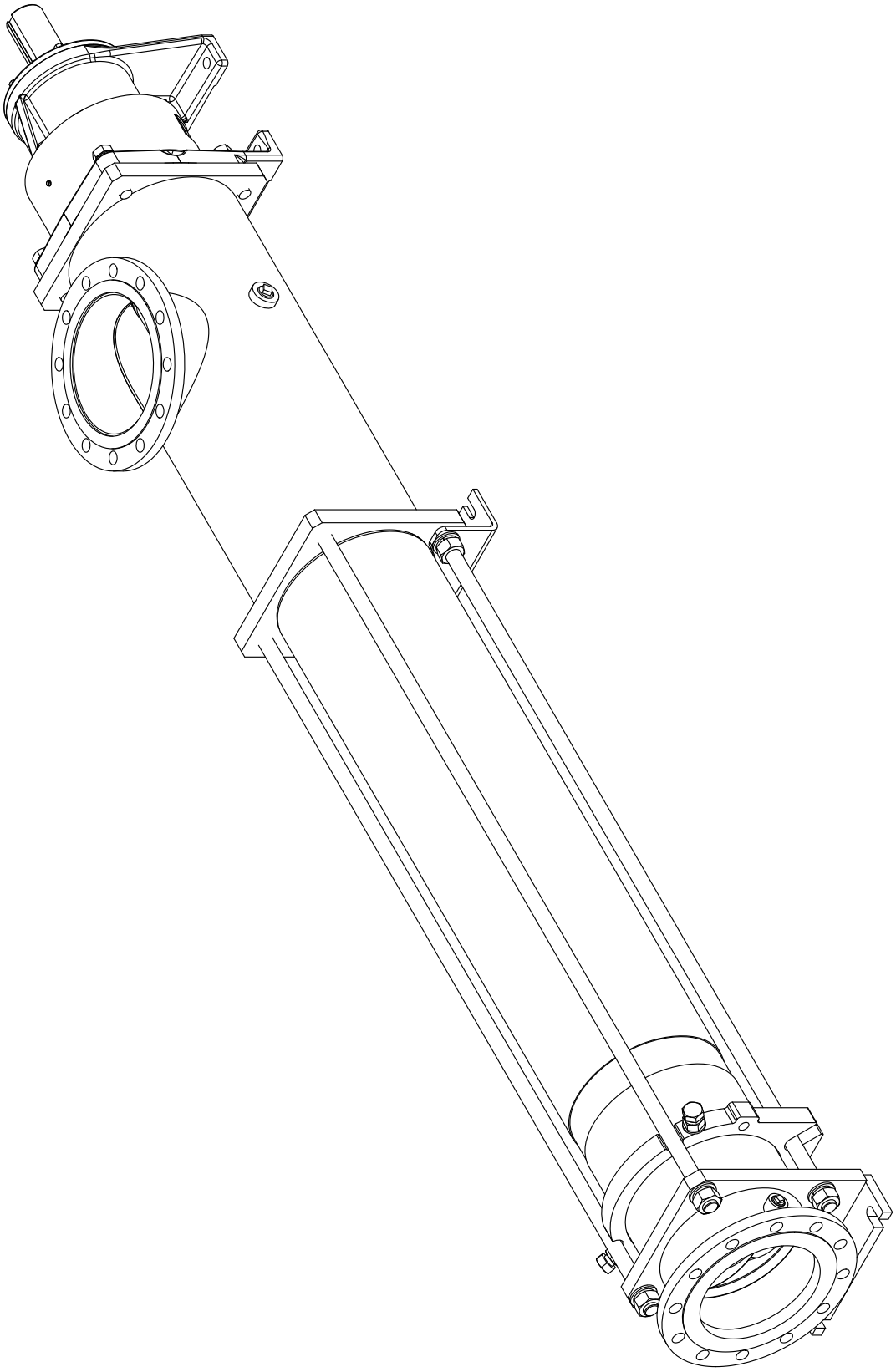
DRAWING REF.	DESCRIPTION	PART NO.	QUANTITY
01A	BODY - STD (MK3)	E088 0115	1
10A	MECHANICAL SEAL	BERGMANN 140	1
11A	BEARING COVER	E088 1115	1
12A	STATOR ANTI-ROTATION RING	C16M 1200	1
15A	THROWER GUARD	E151 1560	1
20B	GASKET-GLAND	E151 2020	1
20C	GLAND BACKPLATE GASKET	C152 2050	1
22A	STATOR	C20M 2205	1
23A	SUCTION CHAMBER	C16M 2340	1
24A	END COVER	C16M 2440	1
25A	ROTOR (MK1)	C20M 2525	1
26A	COUPLING ROD	C152 2600	1
27A	BUSH	C152 2700	8
28A	SEALING BOOT	C152 2810	2
29A	COUPLING PIN	C152 2900	4
29B	SHAFT PIN	C152 2920	1
30A	COUPLING YOKE	C152 3010	4
30B	COUPLING BLOCK	C152 3020	2
30C	BEARING WASHER	C152 3030	8
32A	SHAFT	C152 3255	1
32B	DRIVE SHAFT	C151 3200	1
35A	BEARING SPACER	E088 3515	1
42A	SHAFT THROWER	C152 4200	1
62A	SUPPORT FOOT	C16M 6200	1
65A	GLAND BACKPLATE	C152 6550	1
75A	SLEEVE	C152 7500	4
95A	TIE BAR	C202 9500	4
P101	TAPER ROLLER BEARING	T161000B-APP	1
P102	TAPER ROLLER BEARING	T151000B-APP	1
P103	ROTARY SHIFT LIPSEAL	S361850P	1
P104	ROTARY SHIFT LIPSEAL	S361793P	1
P105	STL.HEX.HD.BOLT M24 X 100	K121402F	4
P107	STEEL BRIGHT WASHER M24	W121052F	2
P108	COIL SPRING WASHER	W121252F	4

Drawing Reference Numbers

C1EB BARESHAFT (continued)

DRAWING REF.	DESCRIPTION	PART NO.	QUANTITY
P109	SELF TAPPING SCREW		1
P110	STEEL BRIGHT WASHER M12	W115052F	1
P111	STL.HEX.HD.SCREW M10 X 30	F114242F	8
P112	SNGL.COIL.SPR.WASHER M10	W114252F	8
P113	SKEFCO LOCKNUT KM20-M100X2	N801200F	1
P114	SKEFCO LOCK WASHER MB20 (M100)	W801200	1
P203	H.T.HEX.SOC.CAP SCREW M20 X 55	A119311F	4
P204	SNGL. COIL SPR.WASHER M20	W119252F	4
P301	REC.PAR.KEY.FORM.'C' 20 X 12 X 125	K122081P	1
P401	TORL.SEAL.RING	S312152P	4
P402	ROLL PIN 30DIA X 160	P317491F	4
P403	ROLL PIN 18DIA X 160	P312491F	4
P404	H.Y.STL.HEX.SOC.SETSCREW.M12 X 16	G115161F	8
P405	ROLL PIN 12DIA X 60	P309321F	4
P406	M12 X 20 SOCKET BUTTON HEAD SC	H115201F	8
P407	CYLINDRICAL ROLLER BEARING	E100350B	8
P408	OILITE THRUST WASHER	W100413P	8
P410	TORL SEAL RING	S304630P	1
P411	TORL SEAL RING	S304630P	2
P501	ST.STL.TAPER PLUG 1" B.S.P.	P100610S	3
P502	STEEL BRIGHT WASHER M30	W123252F	2
P503	STL.SGL.COIL SPRING WASHER M30	W123252F	2
P504	STEEL HEX NUT M30	N123102F	2
P505	ST.STL.TAPER PLUG 3/4" B.S.P.	P100510S	2
P506	STL BRIGHT WASHER M30	W12052F	4
P507	STL.SGL.COIL SPRING WASHER M30	W123252F	4
P508	STEEL HEX.NUT M30	N123102F	4
P513	STL.HEX.HD.SCREW M24 X 65	F121332F	2
P514	STEEL HEX NUT M24	N121102F	2
P515	STEEL BRIGHT WASHER M24	W121052F	2

Dismantling & Assembly Diagrams



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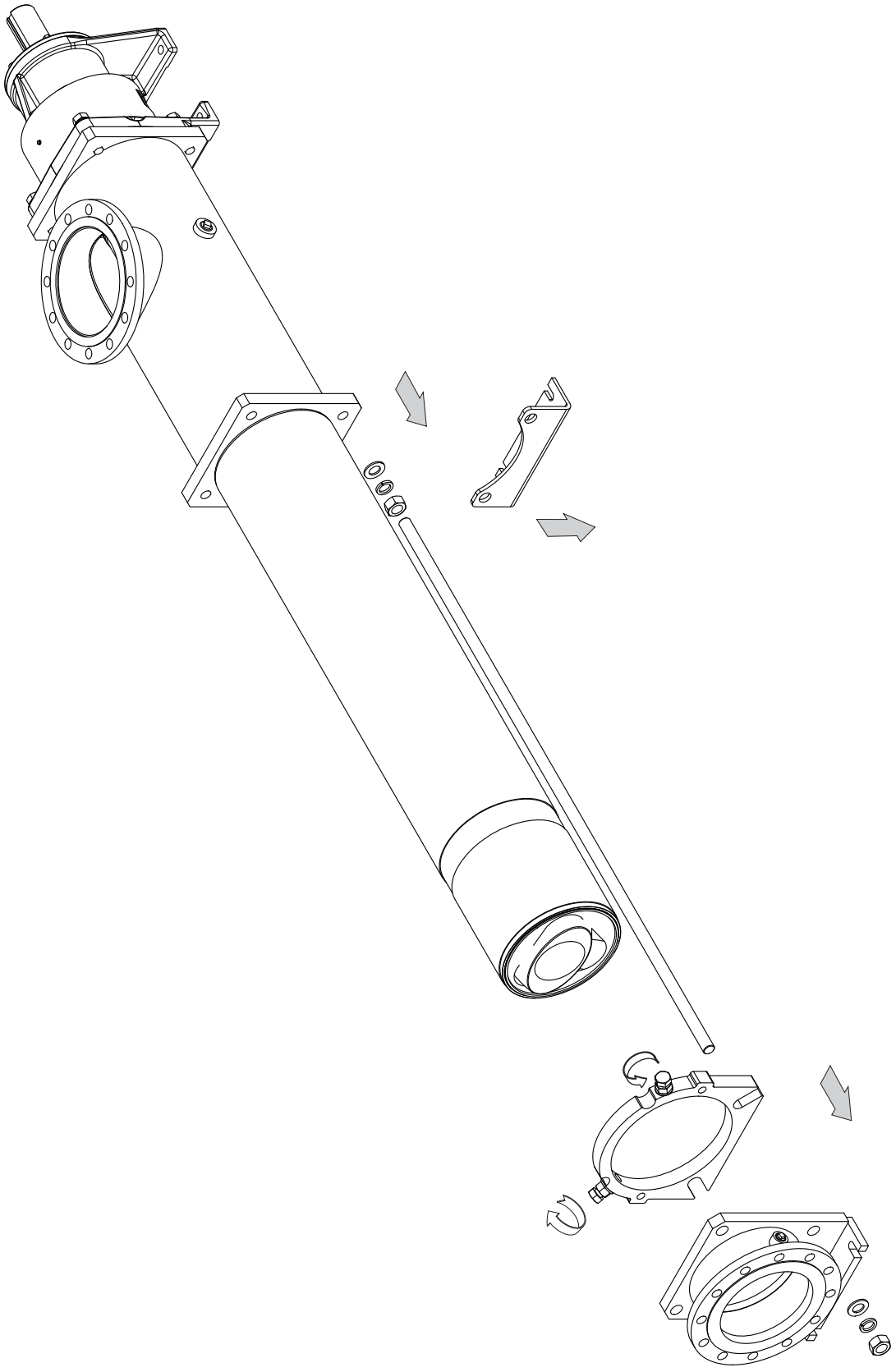
Dismantling Diagrams



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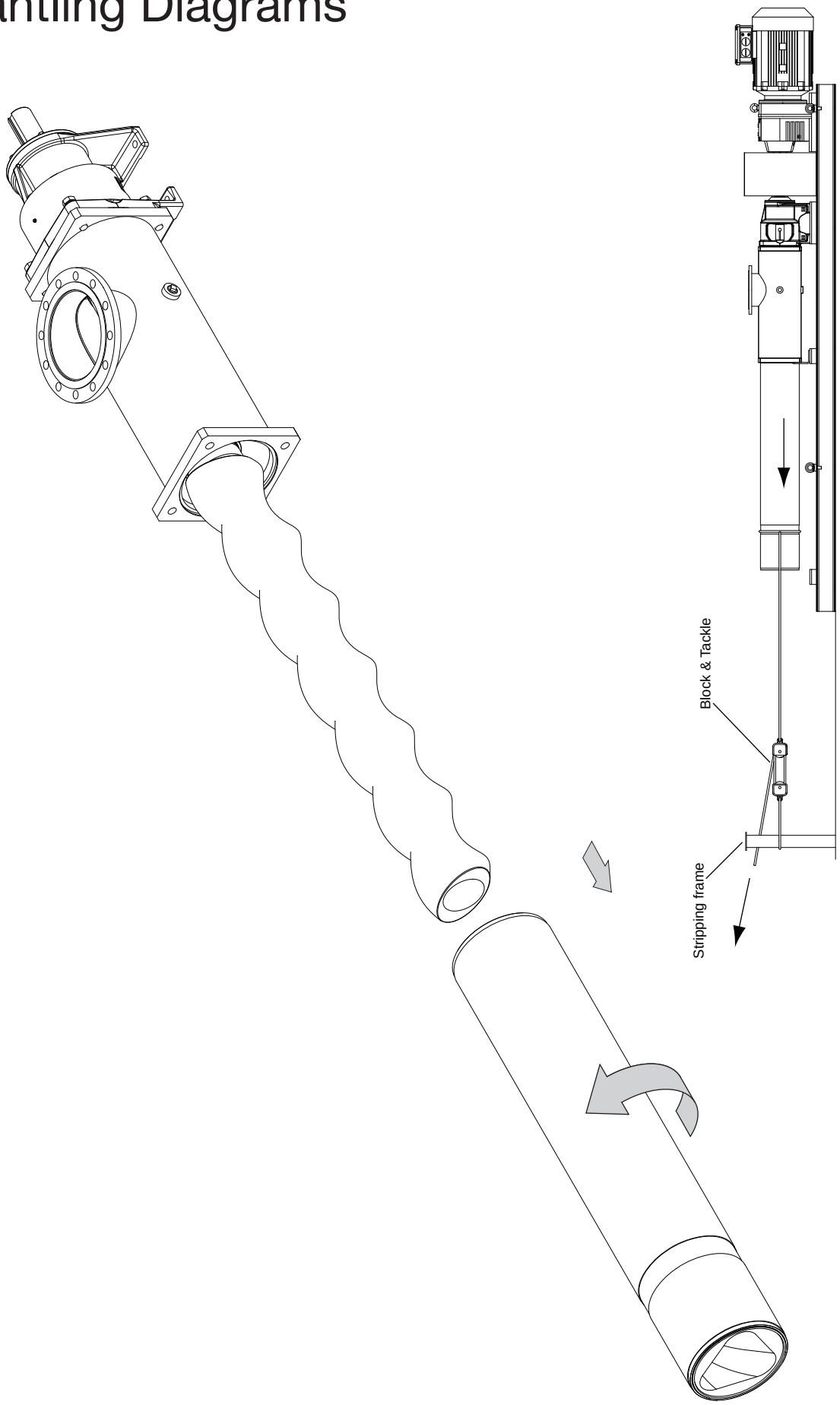

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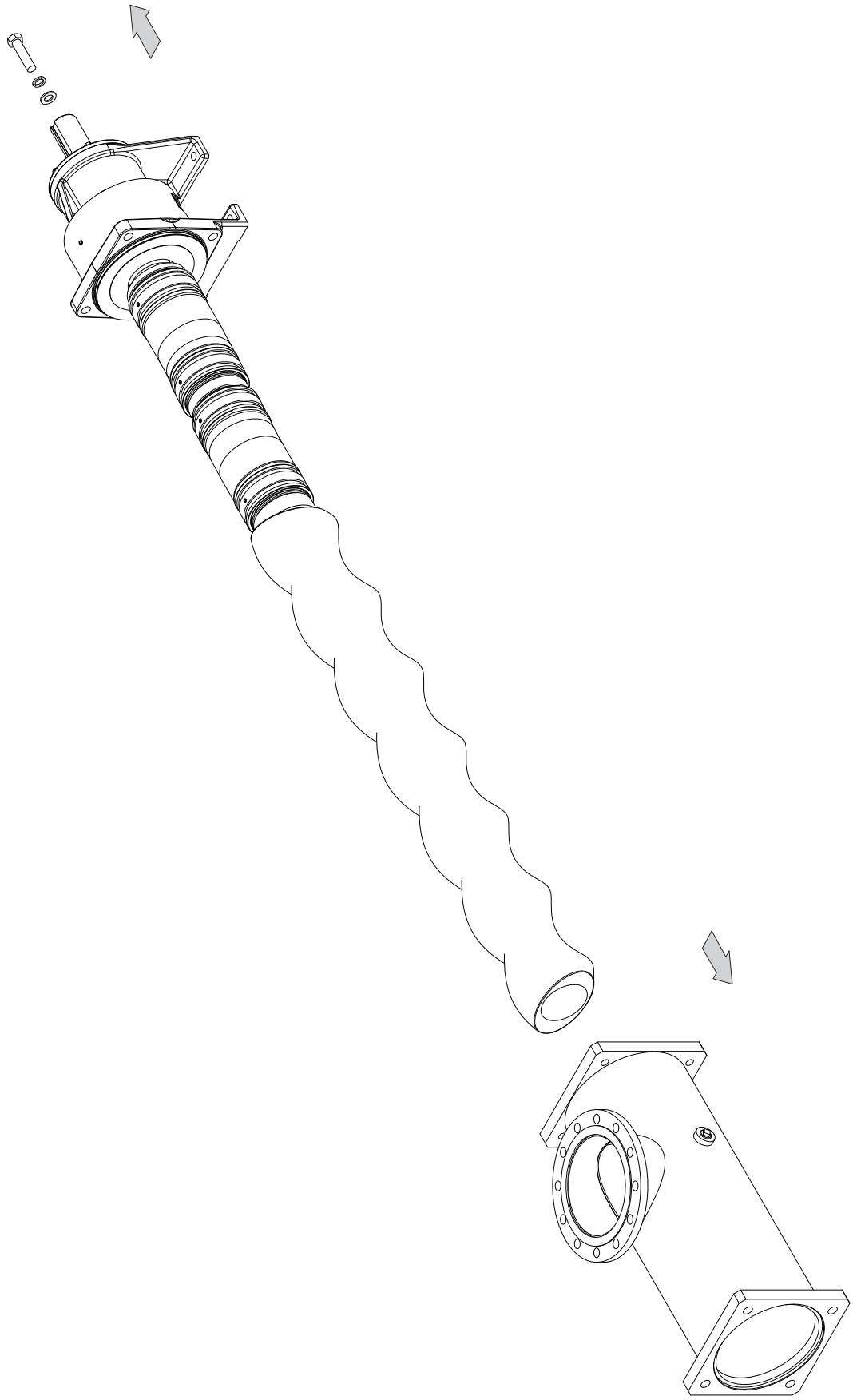

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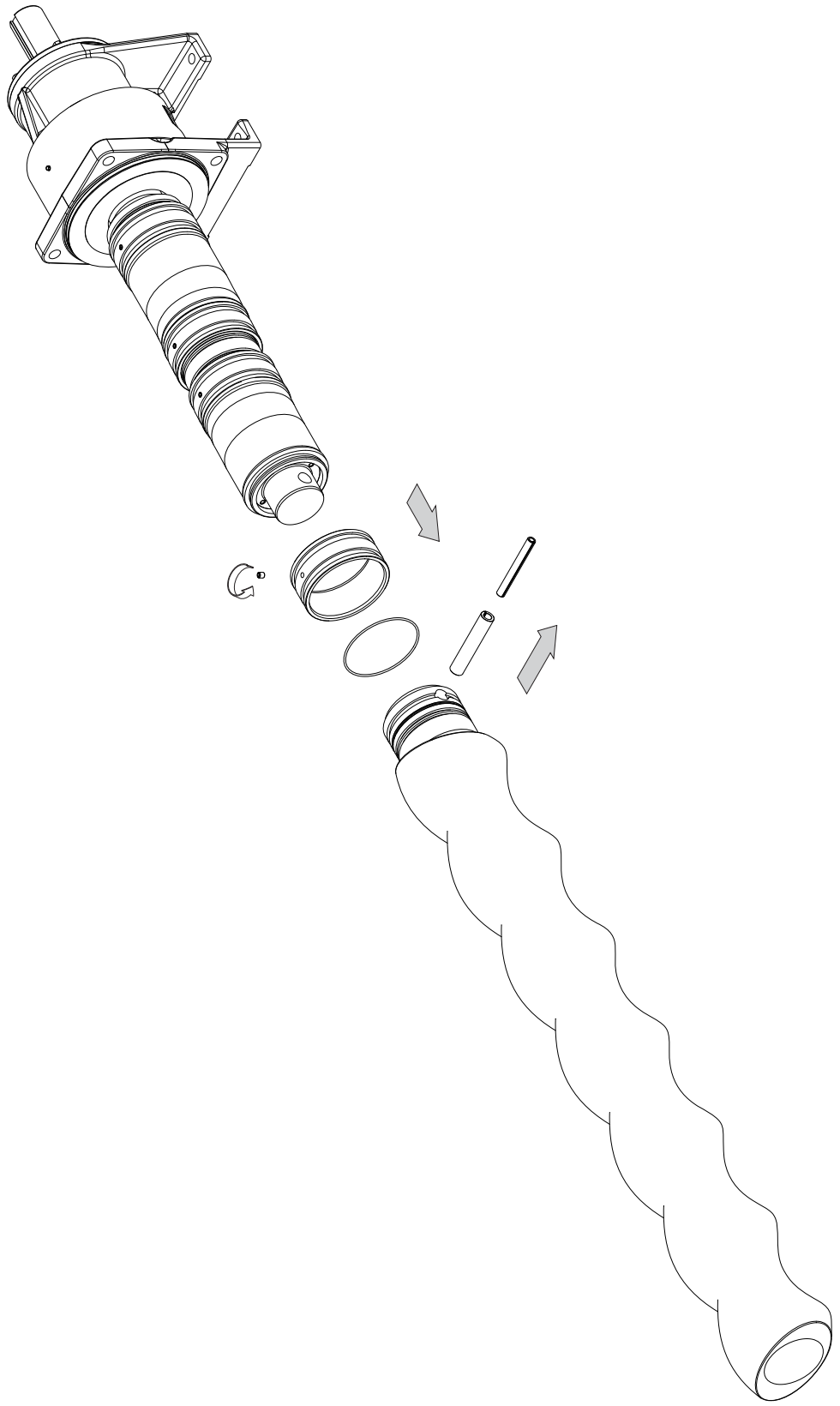

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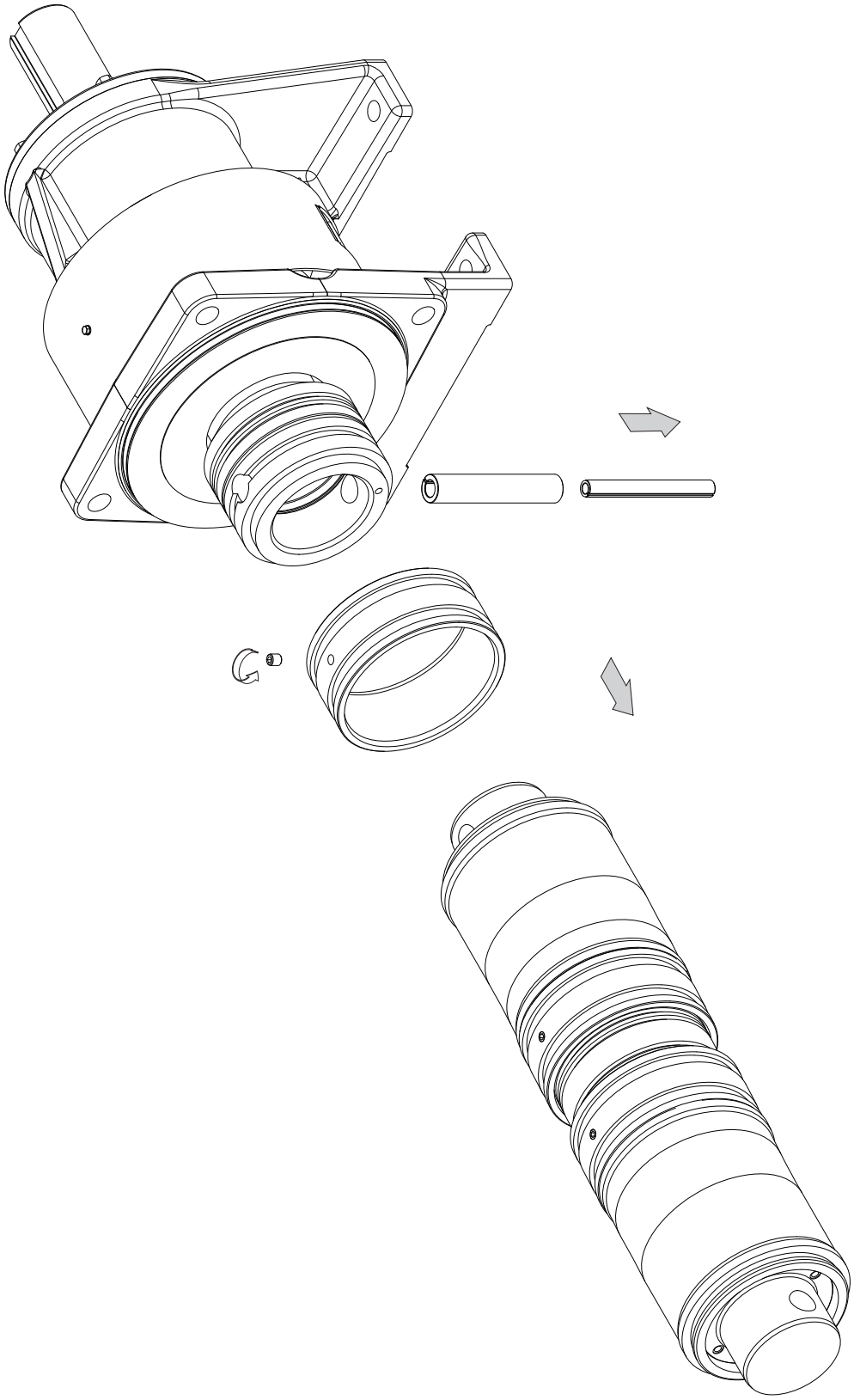

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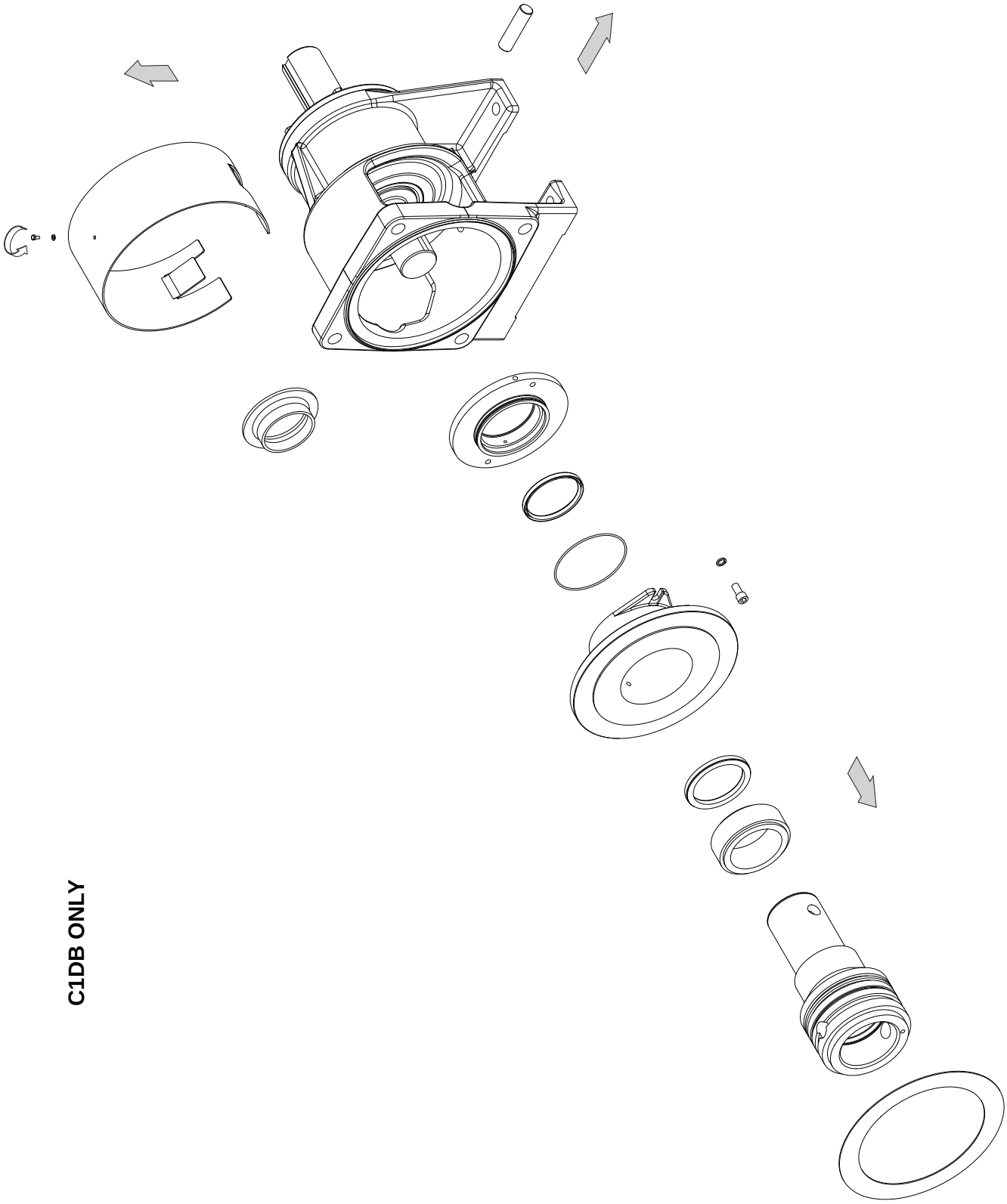

C1DB ONLY

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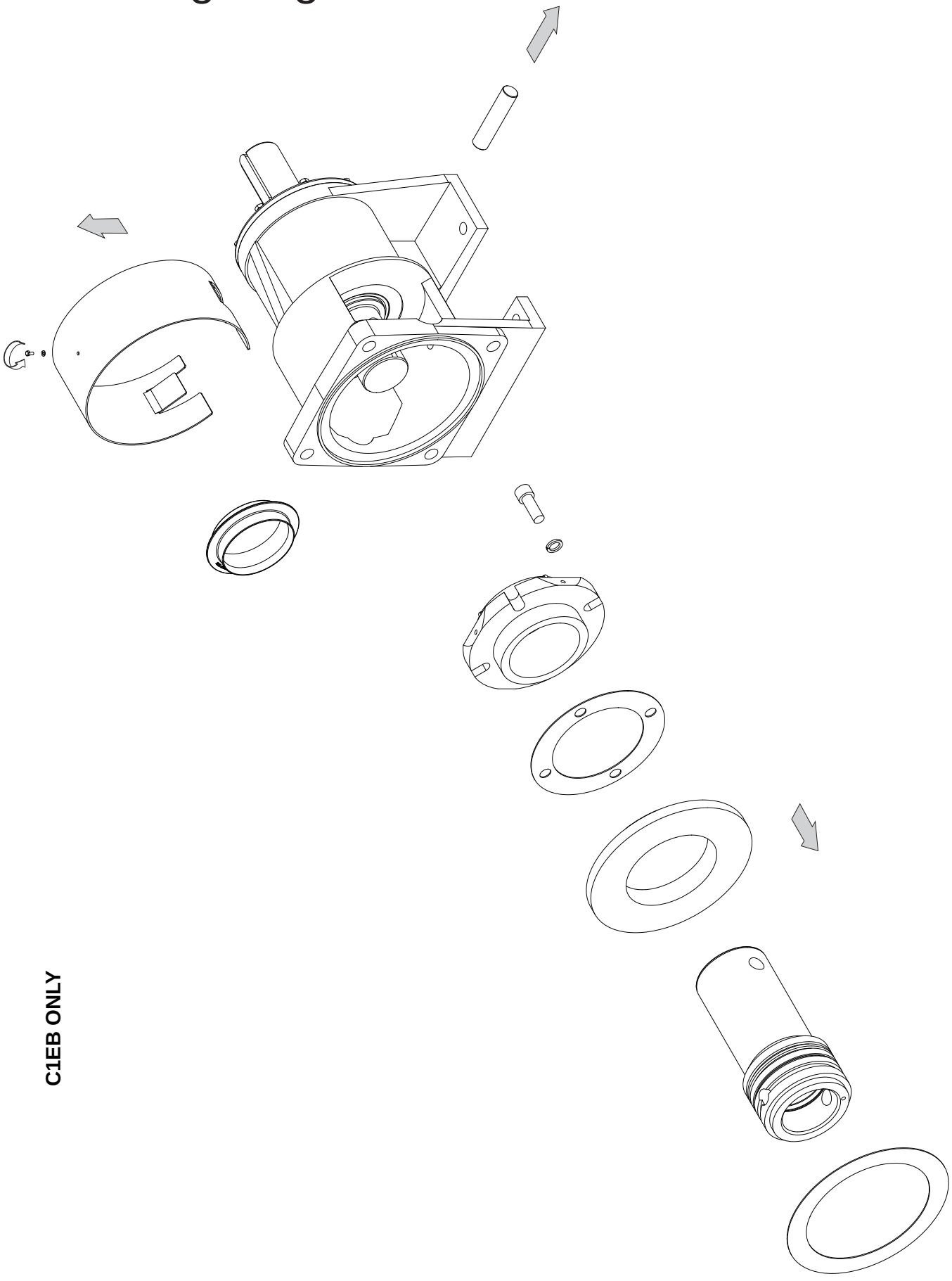

C1EB ONLY

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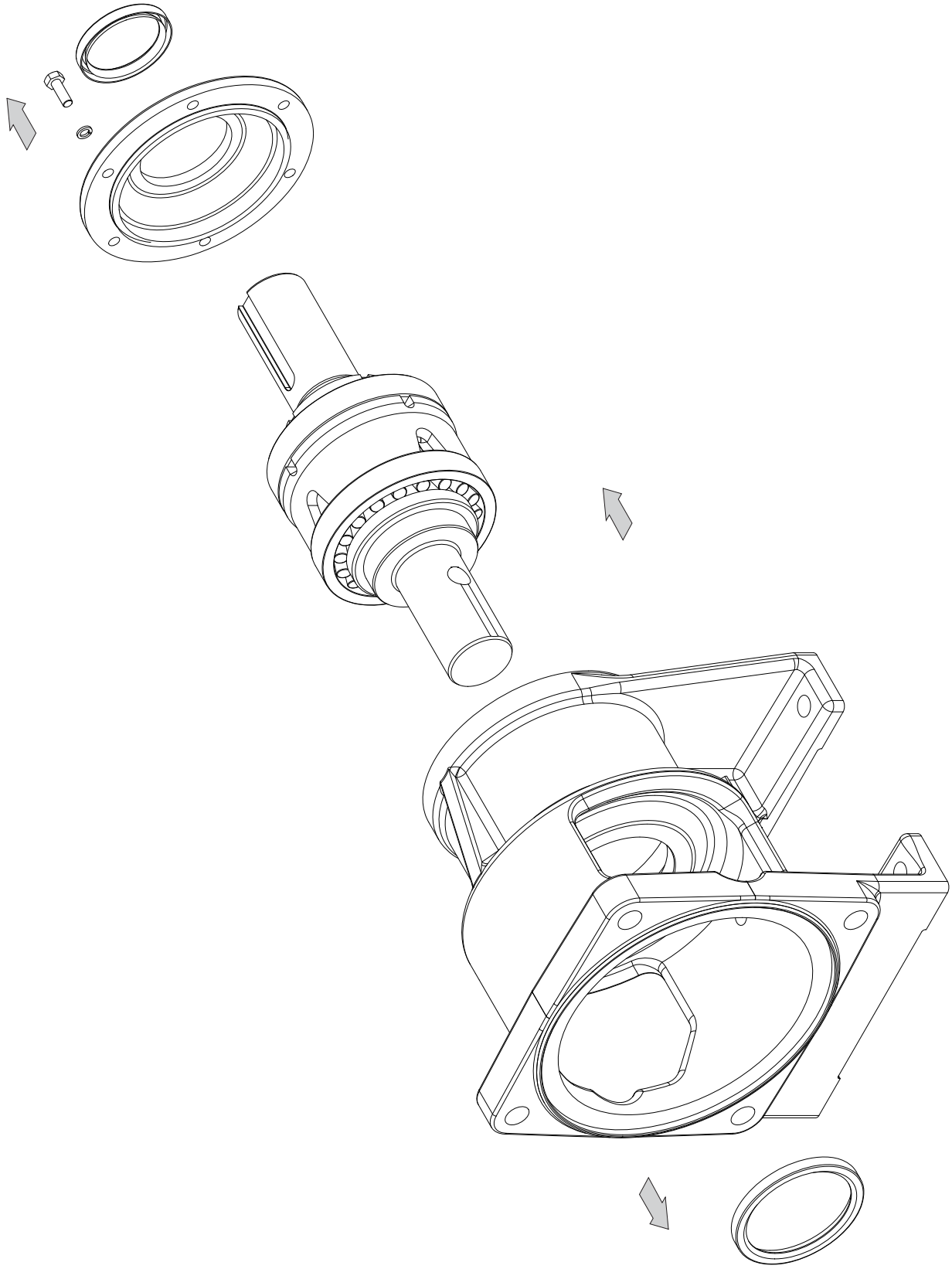

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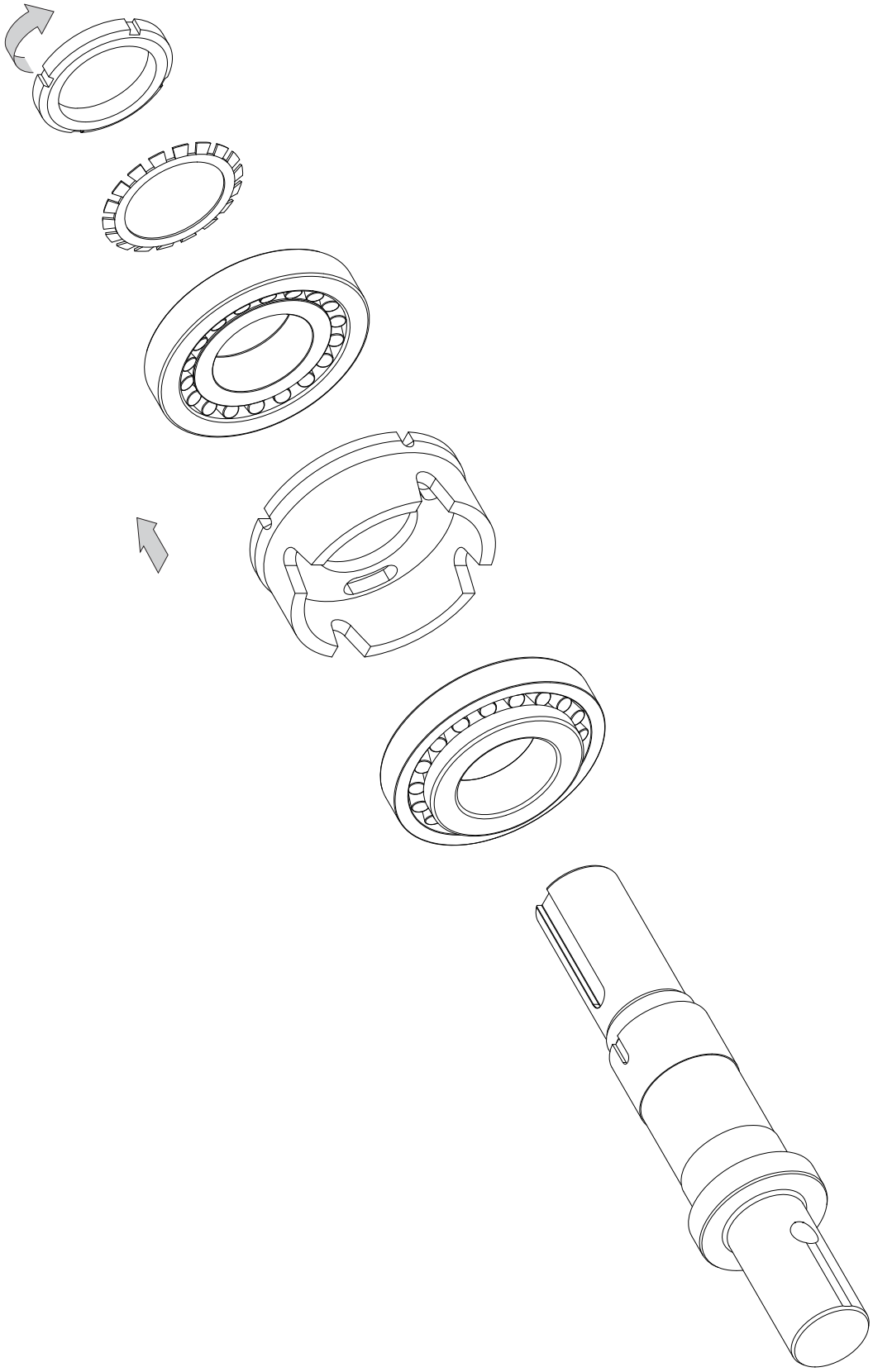

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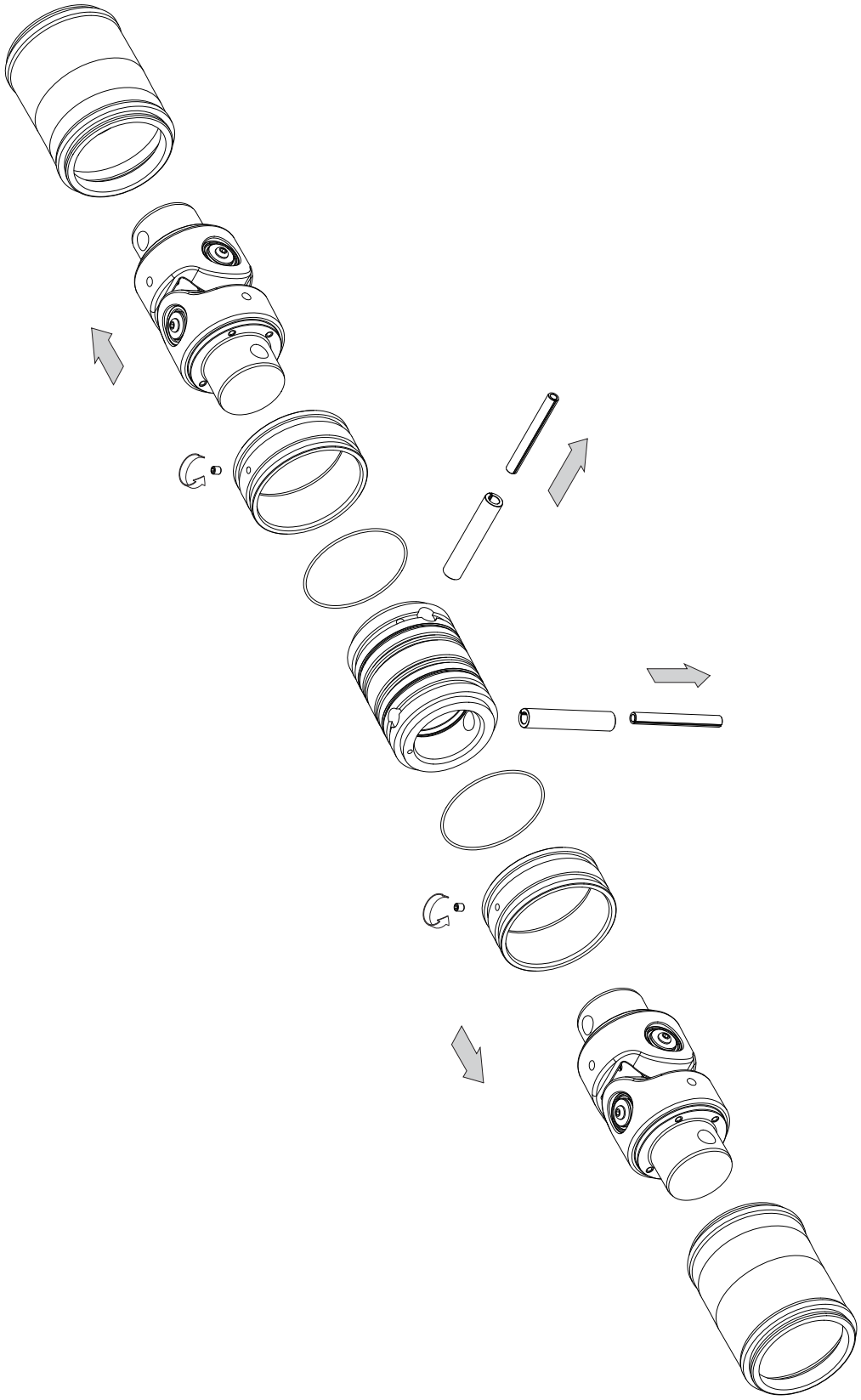

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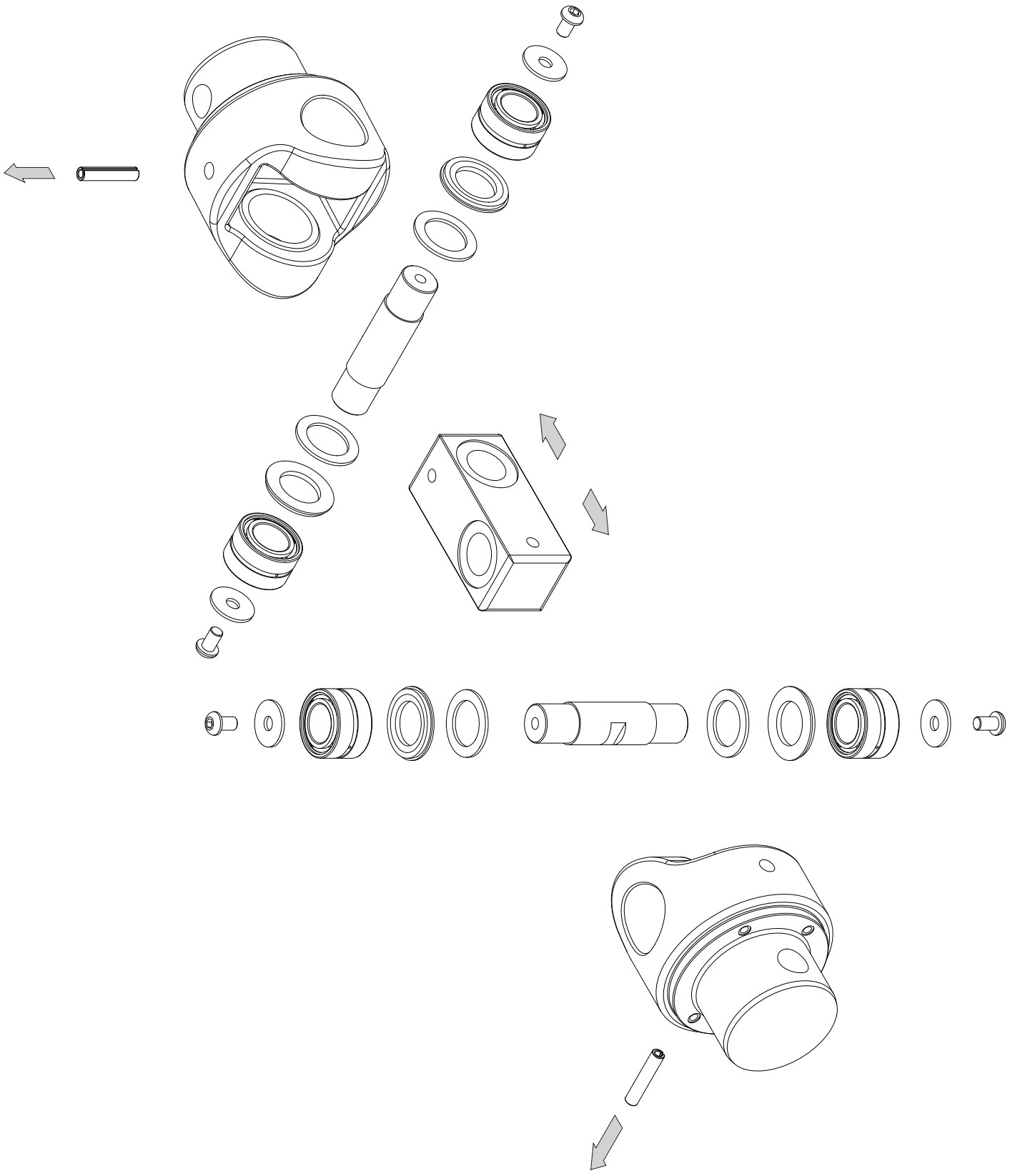
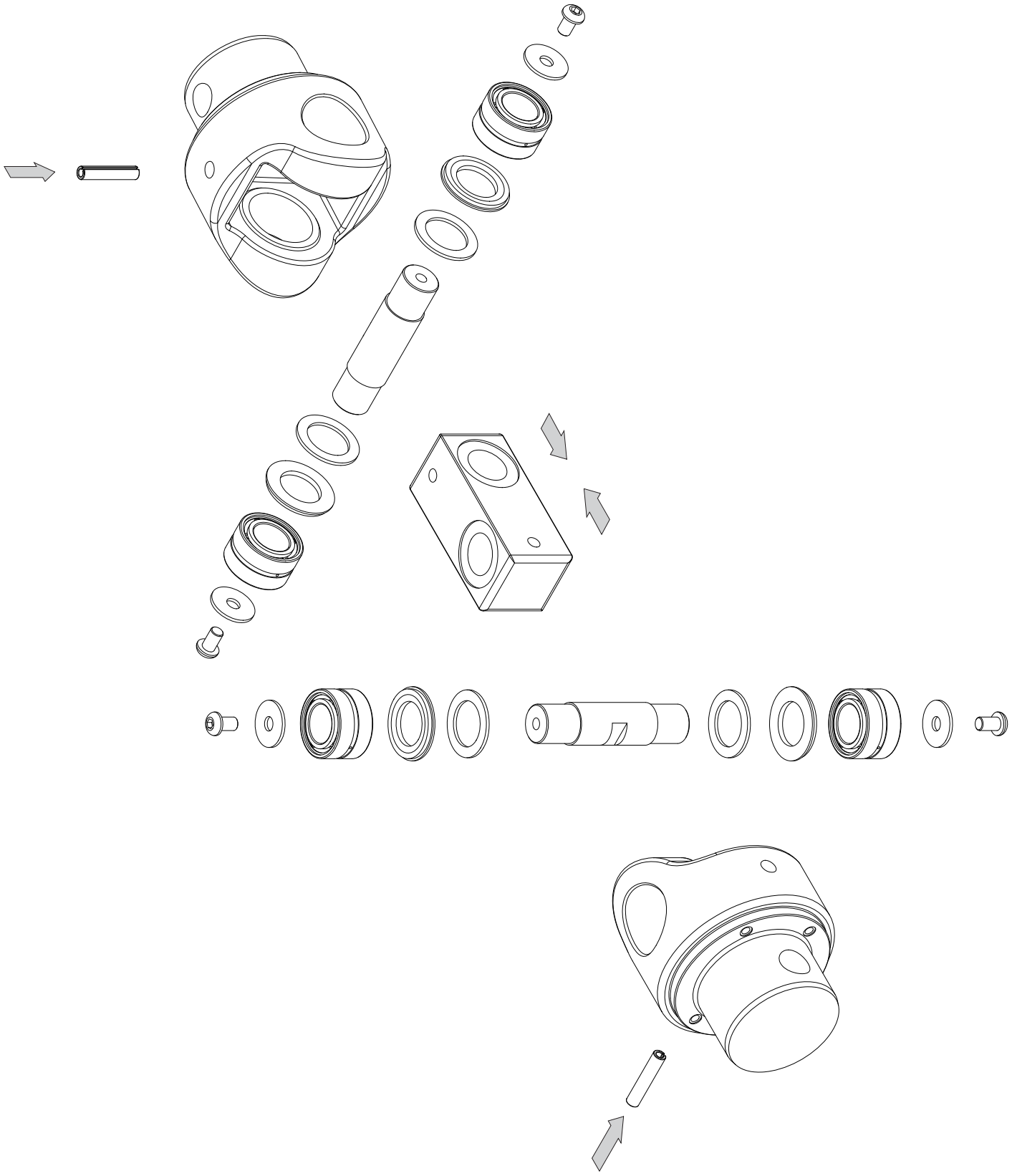


Assembly Diagrams



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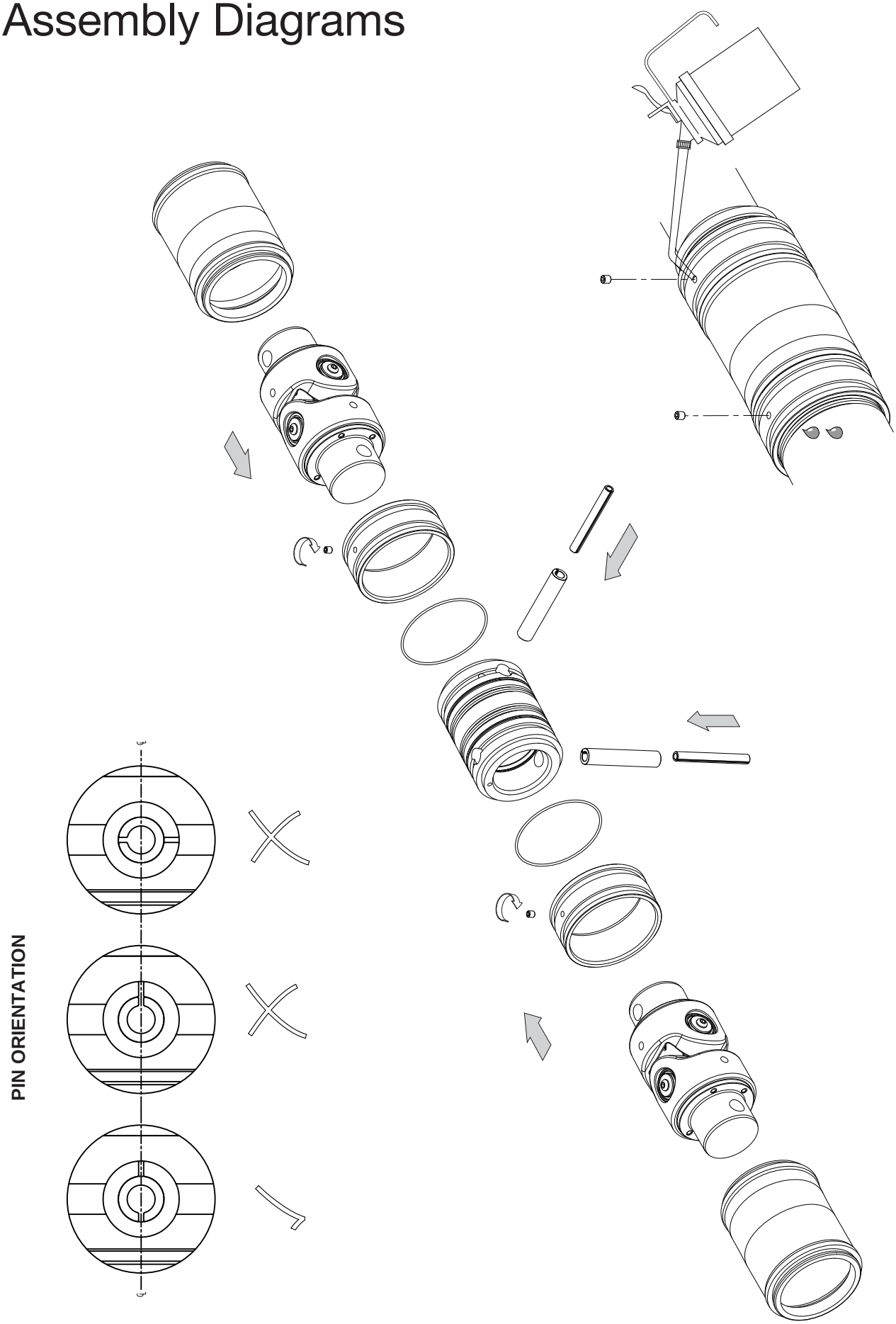

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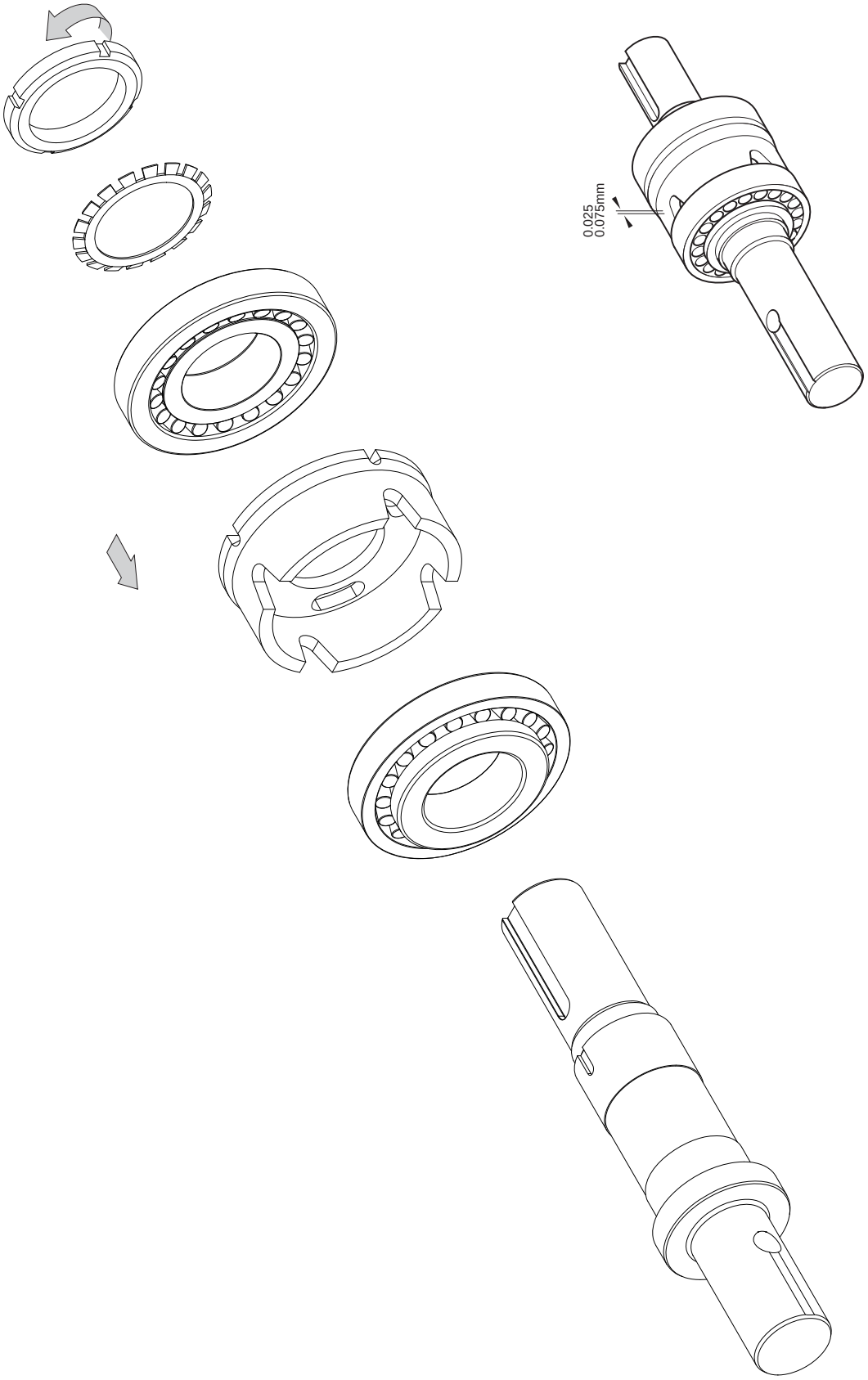
Assembly Diagrams



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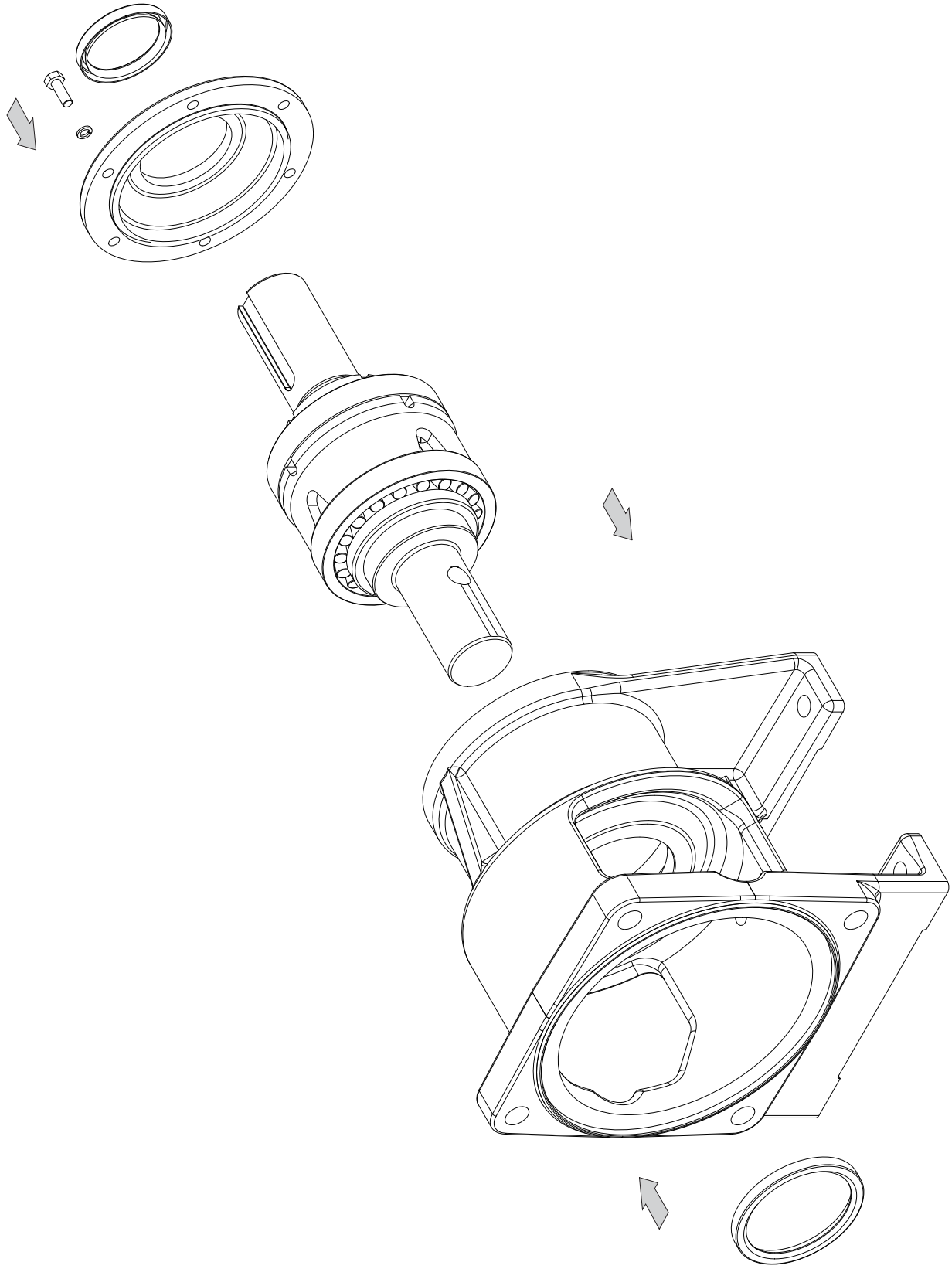

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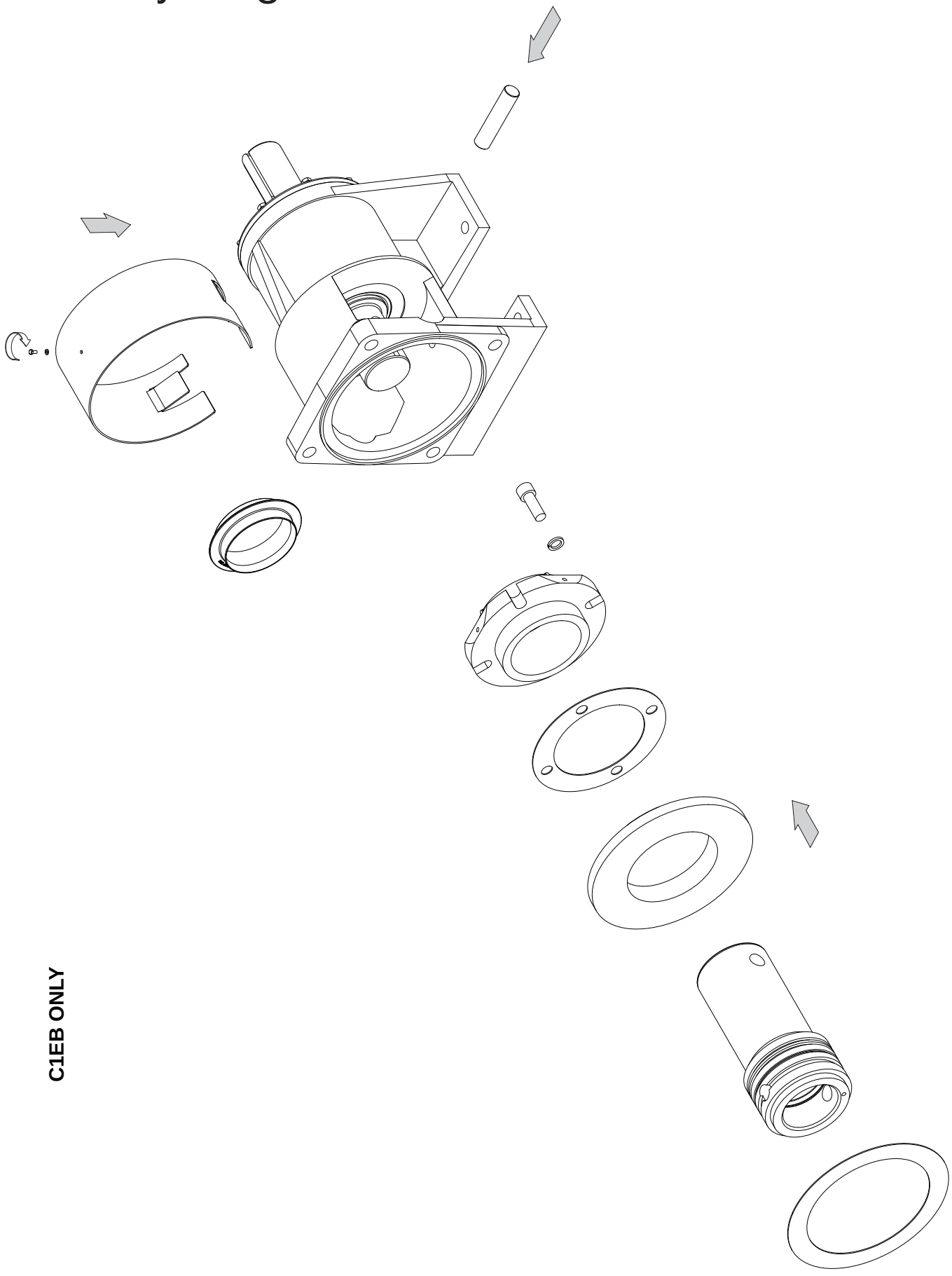

C1EB ONLY

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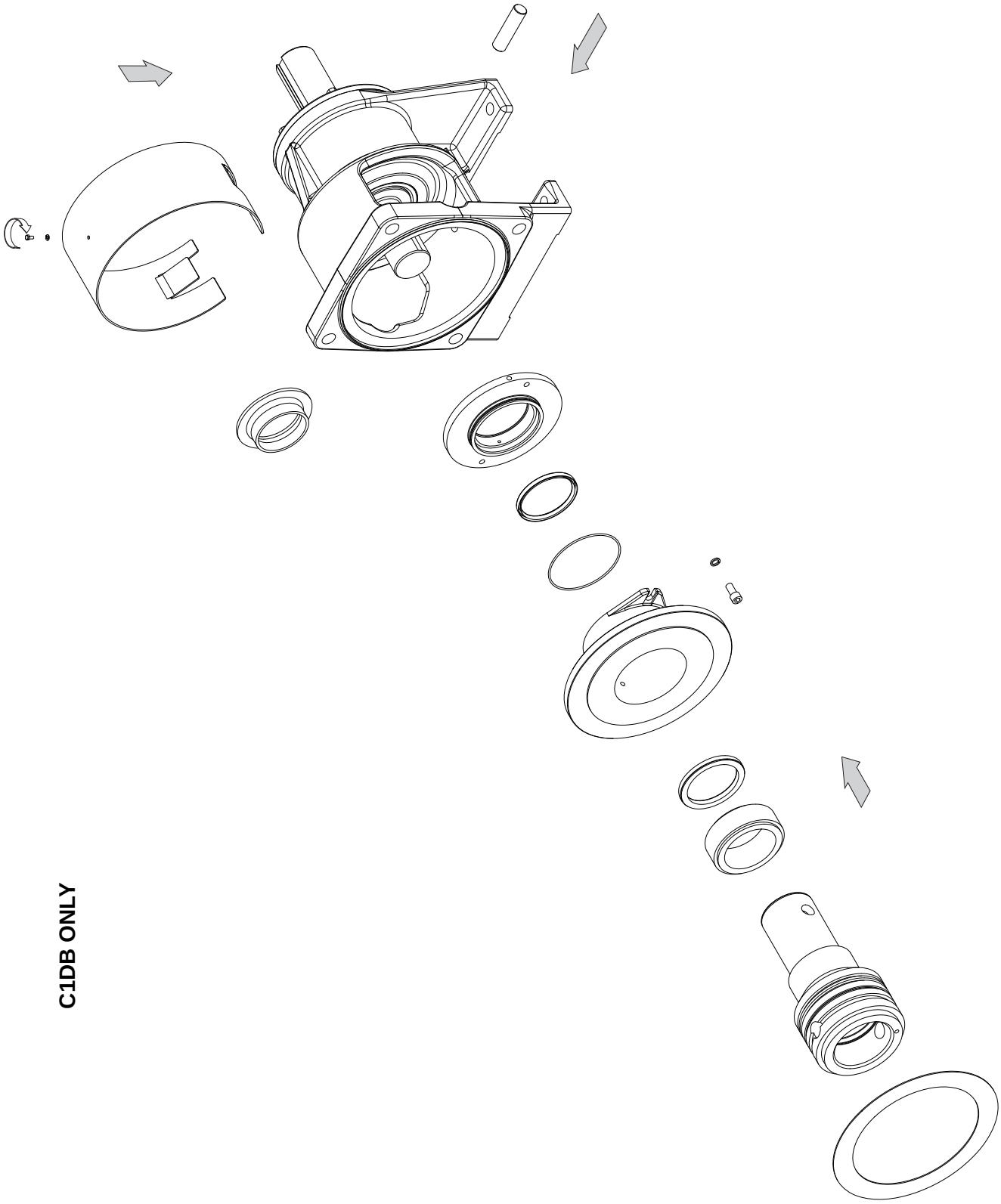
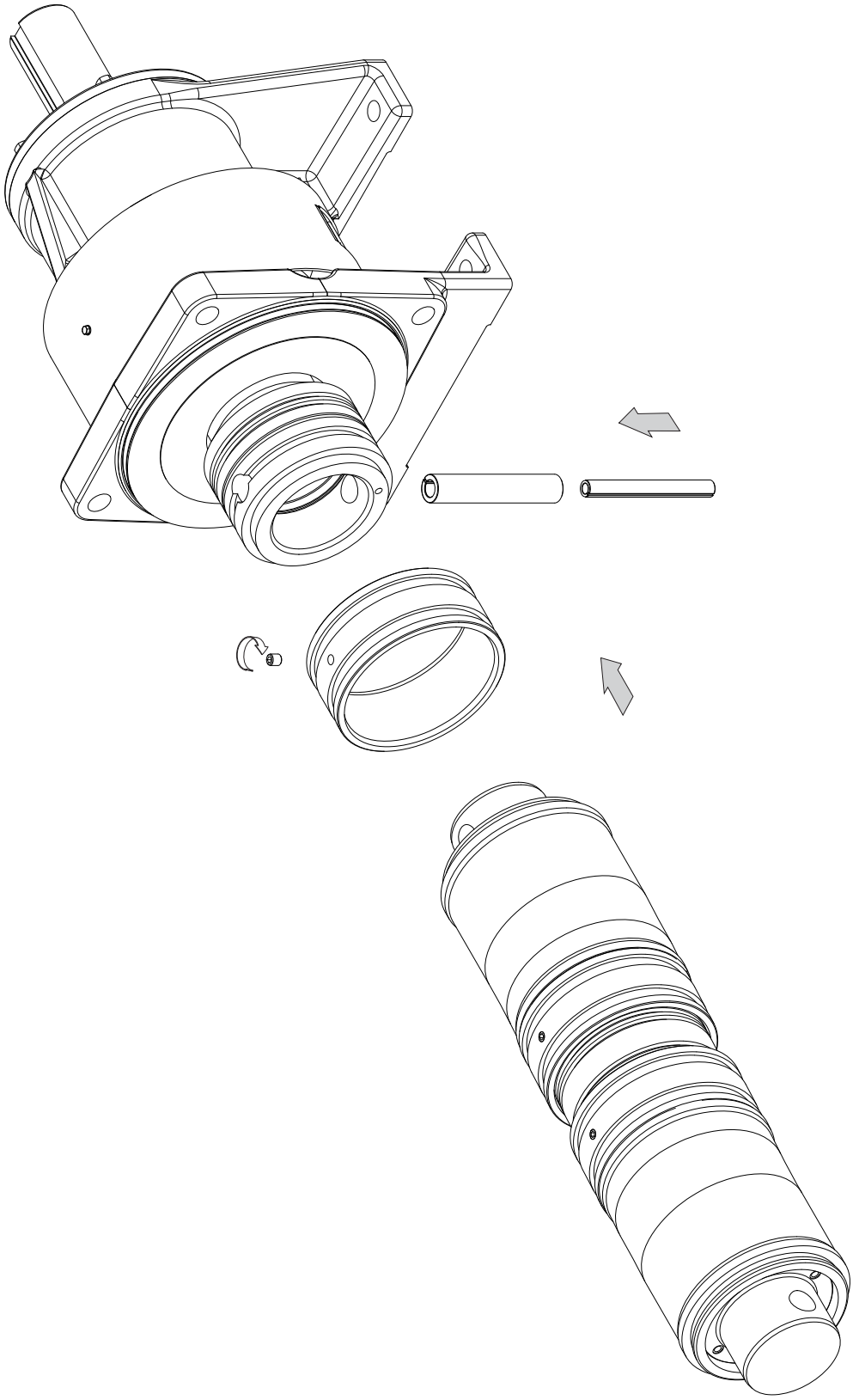


C1DB ONLY

Assembly Diagrams



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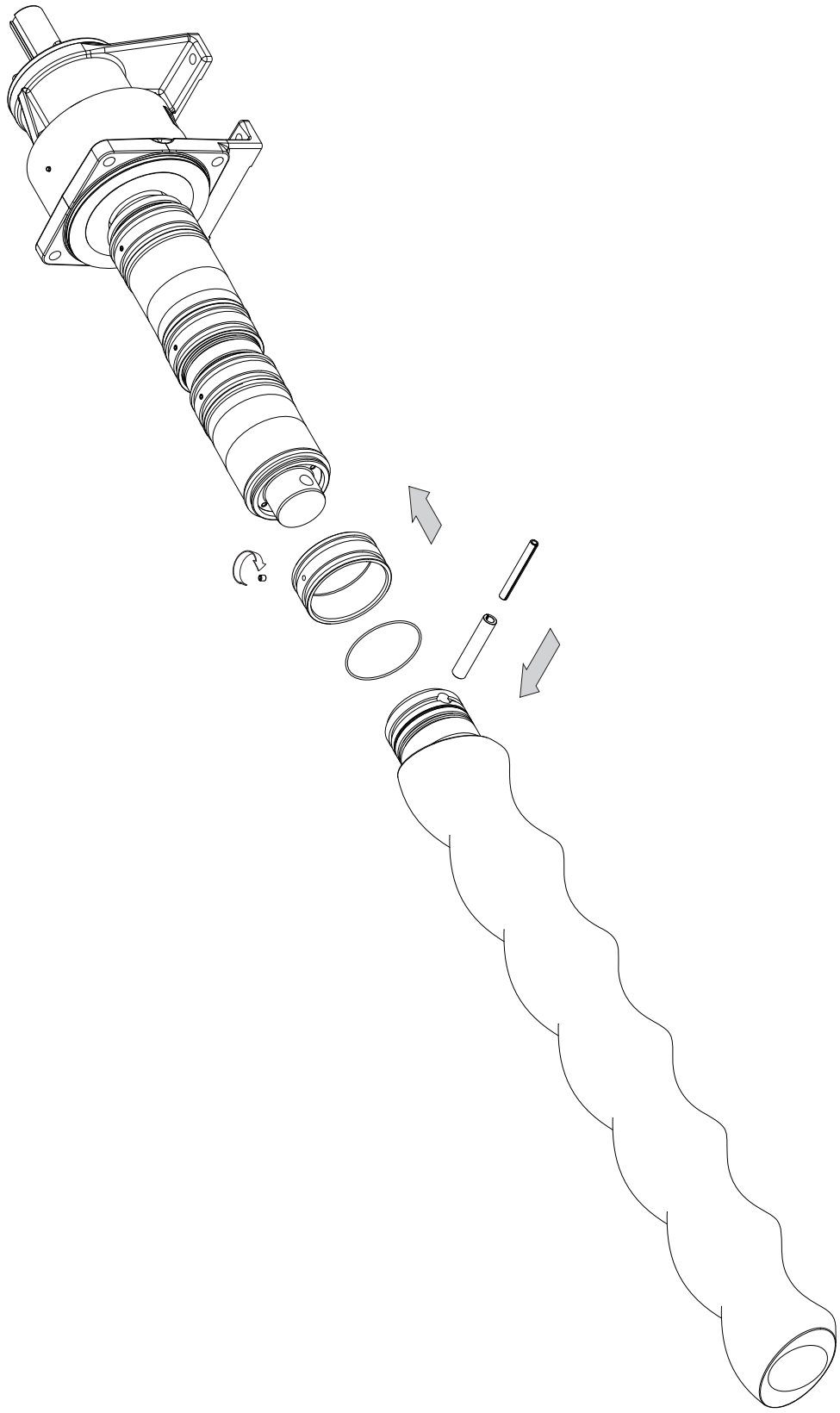

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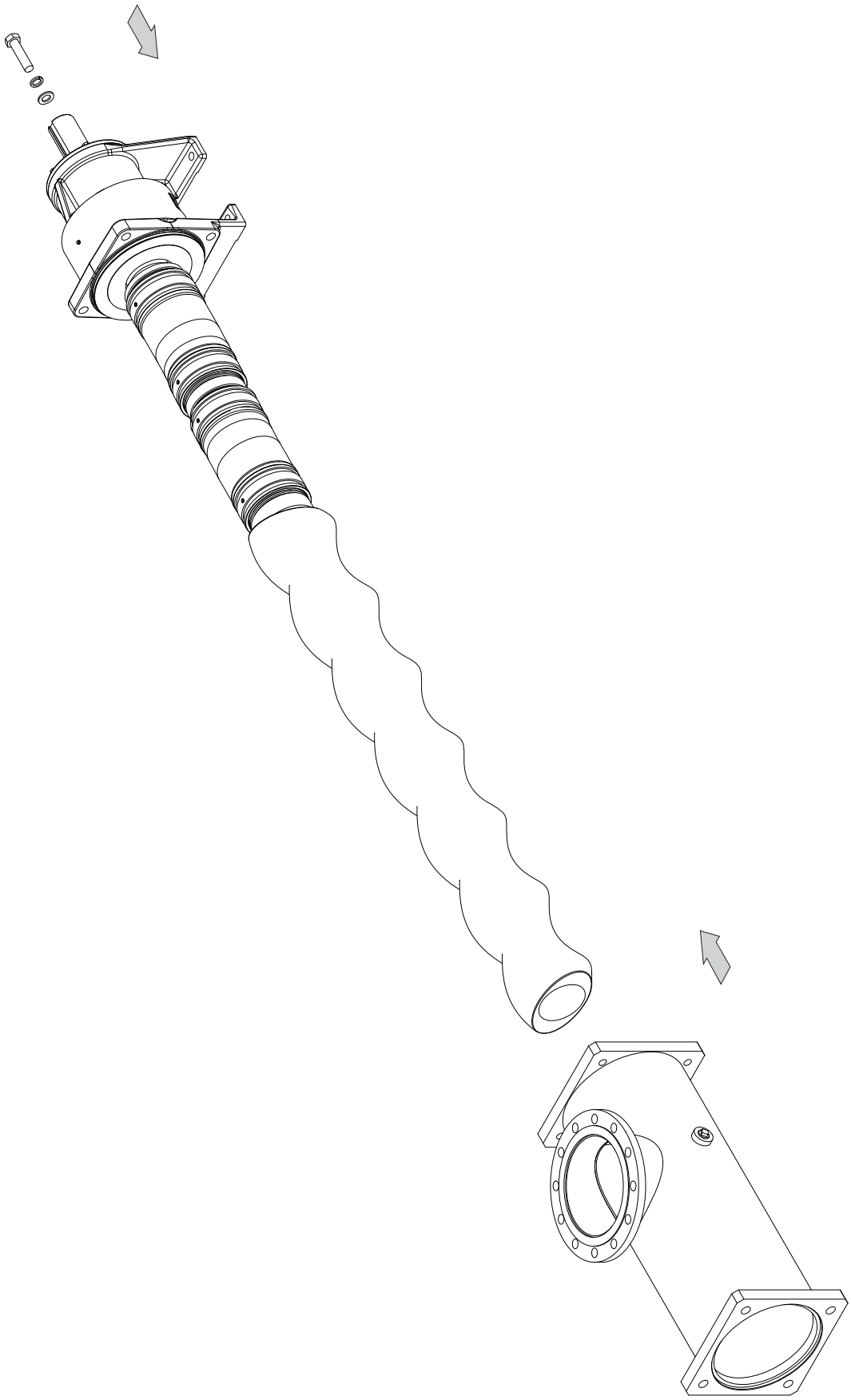

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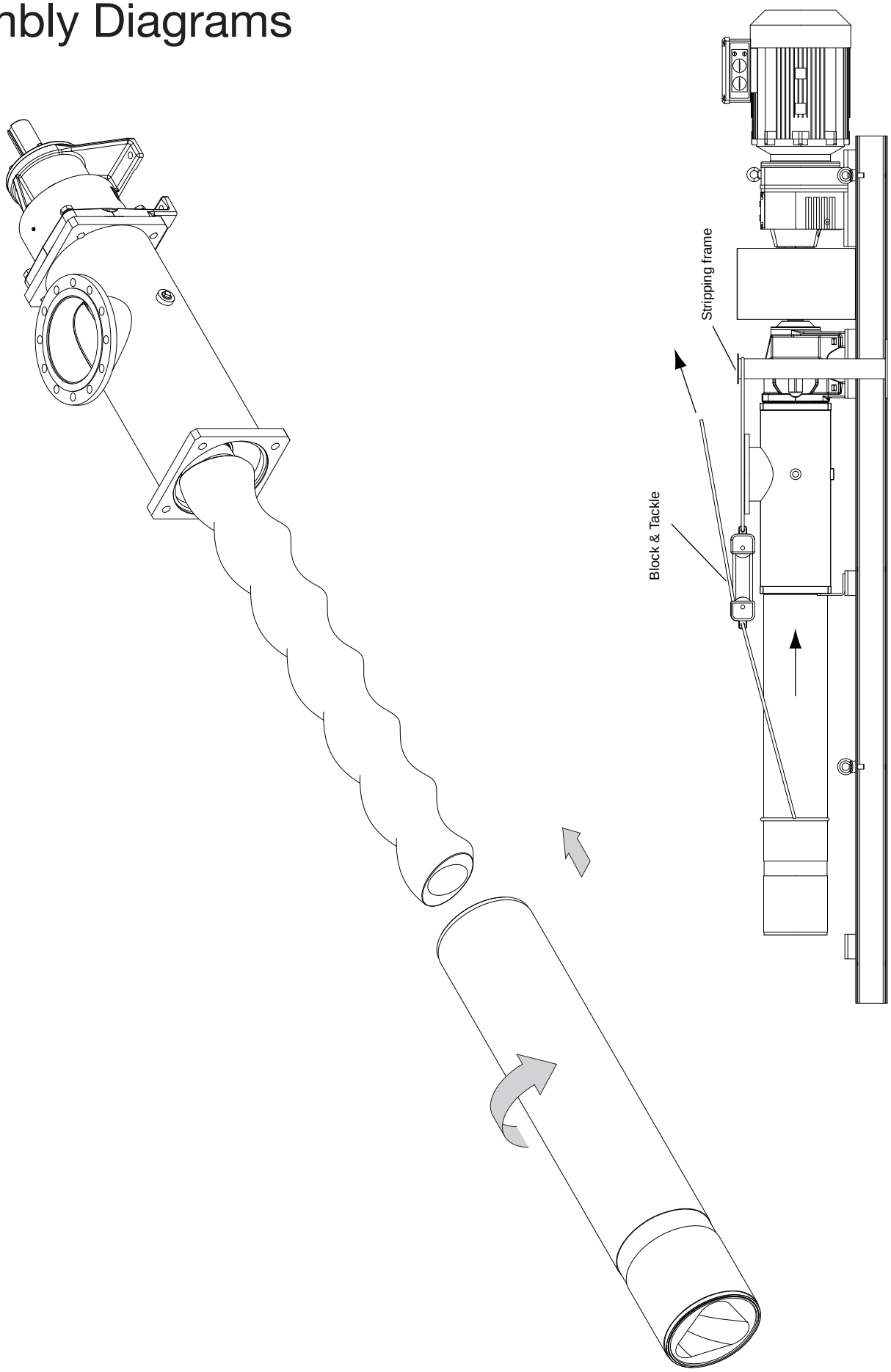

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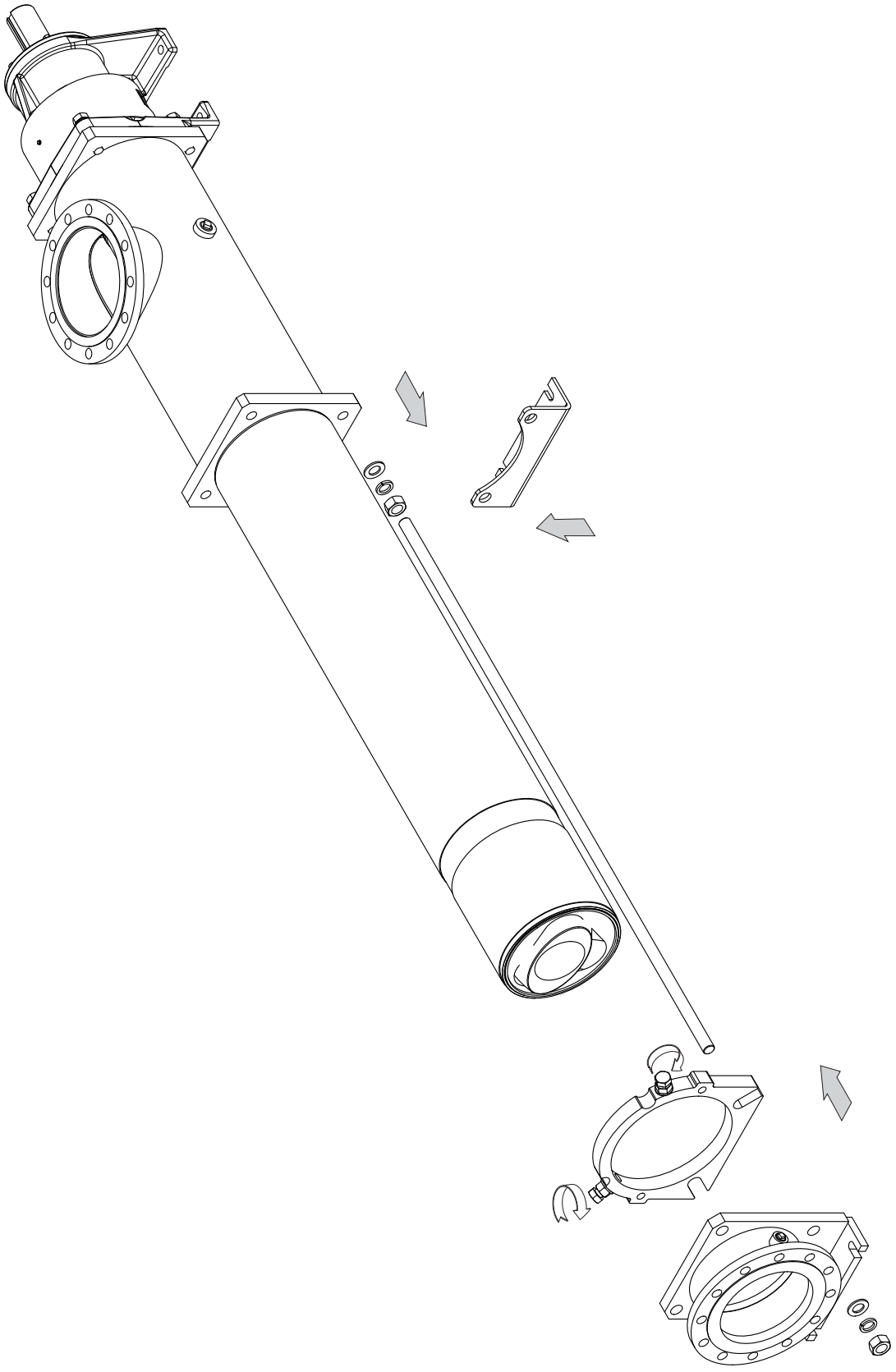
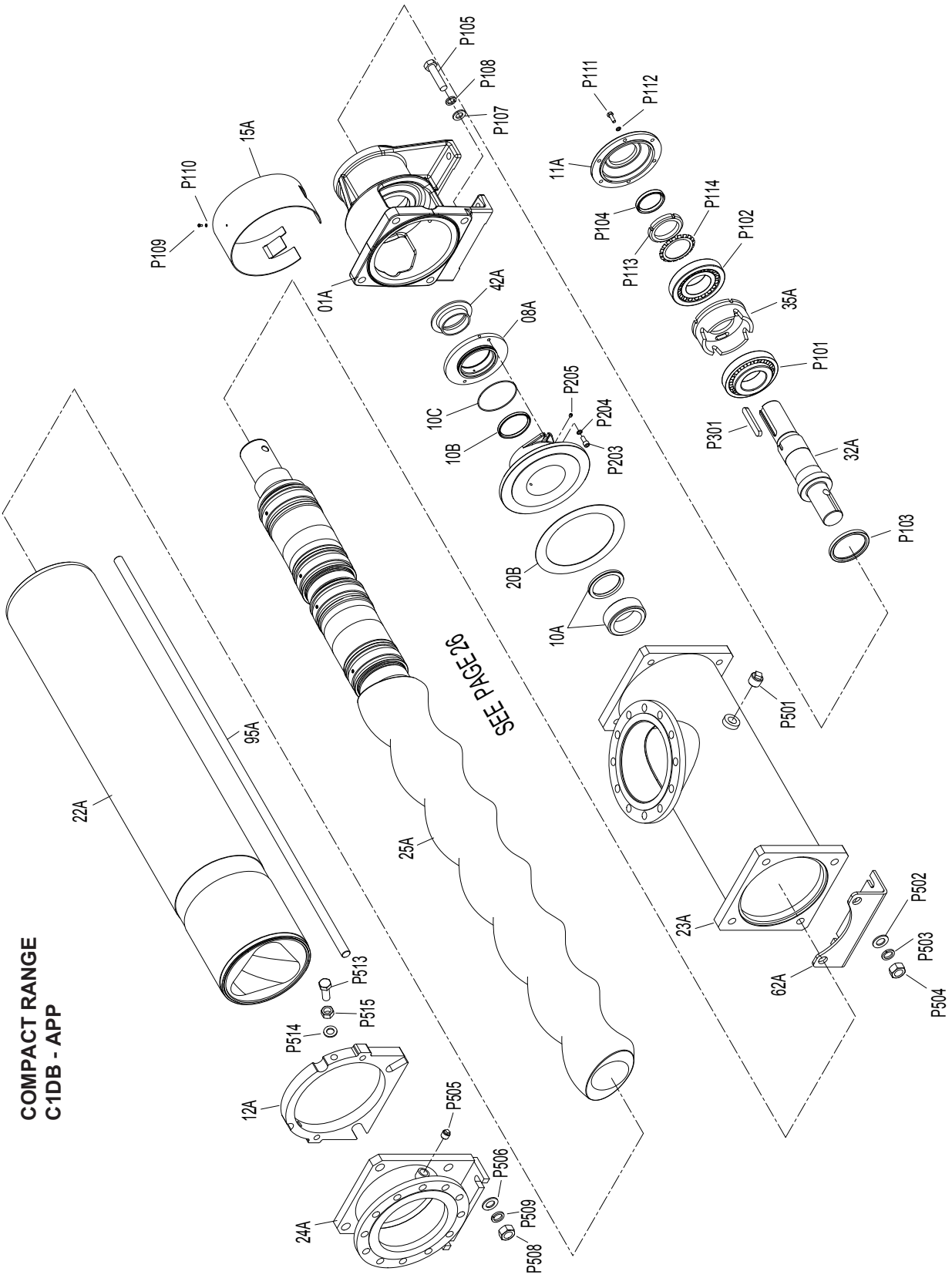


Exploded Views



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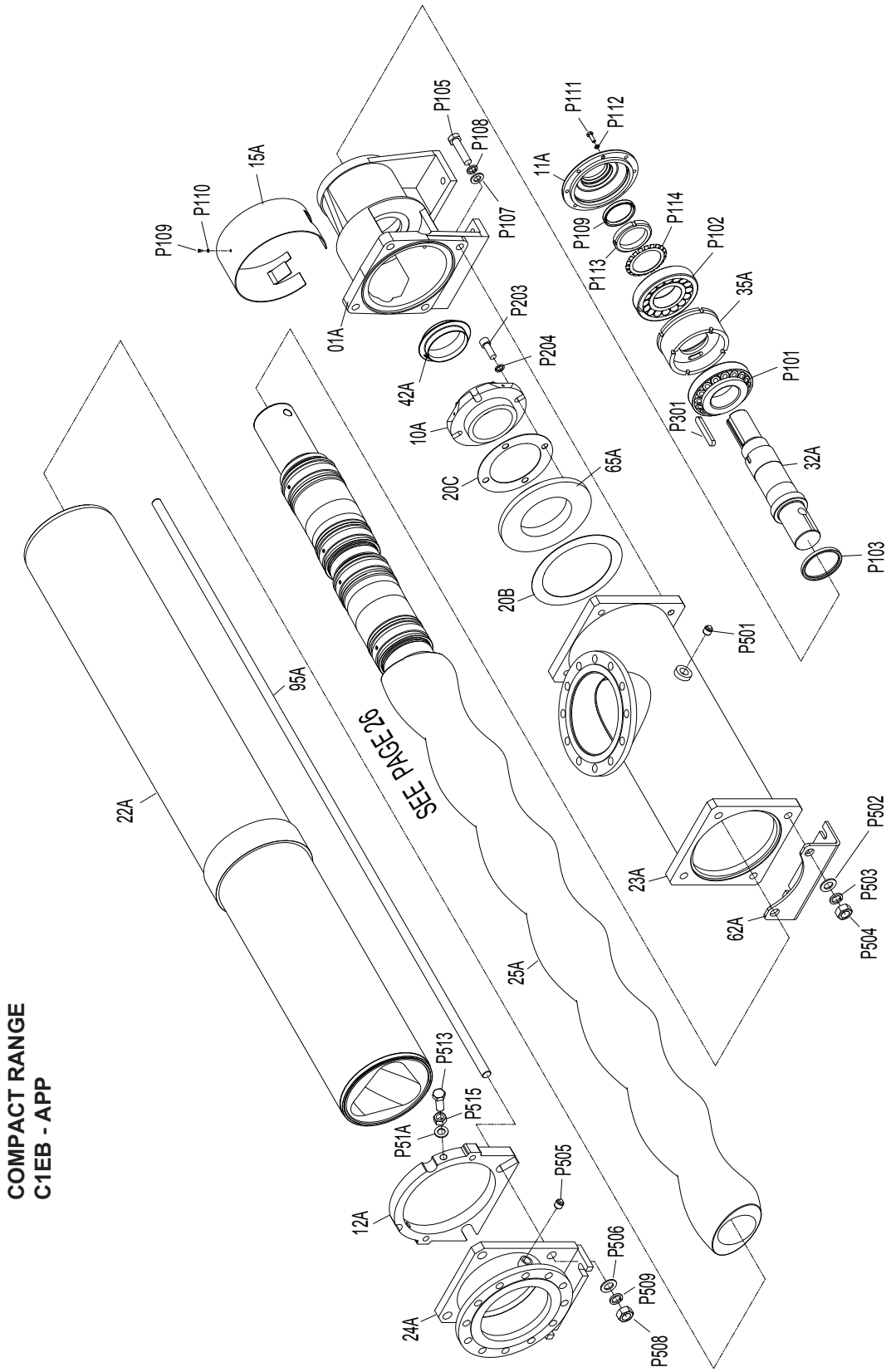
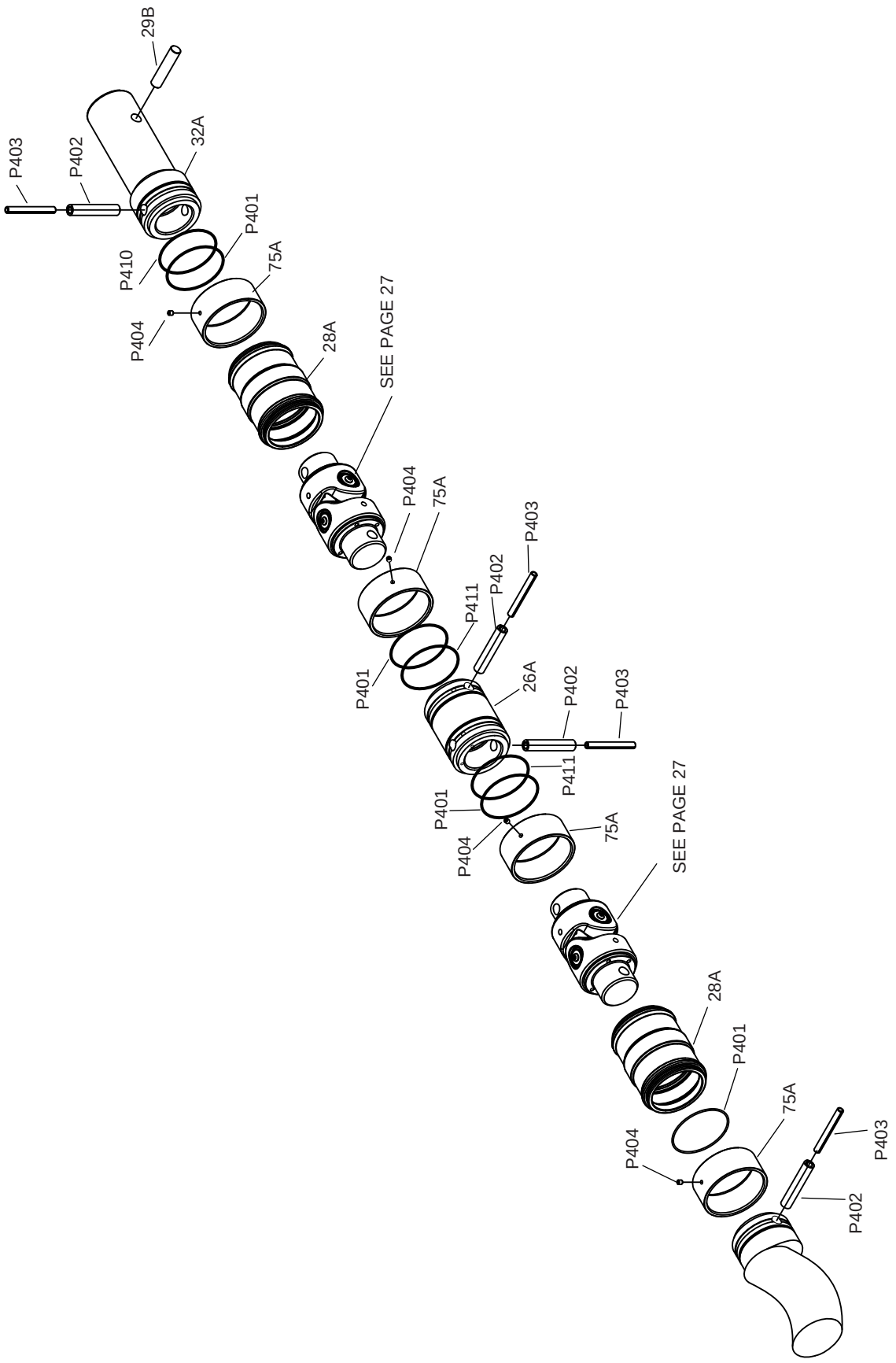
Exploded Views



Exploded Views



DRIVE TRAIN ASSEMBLY

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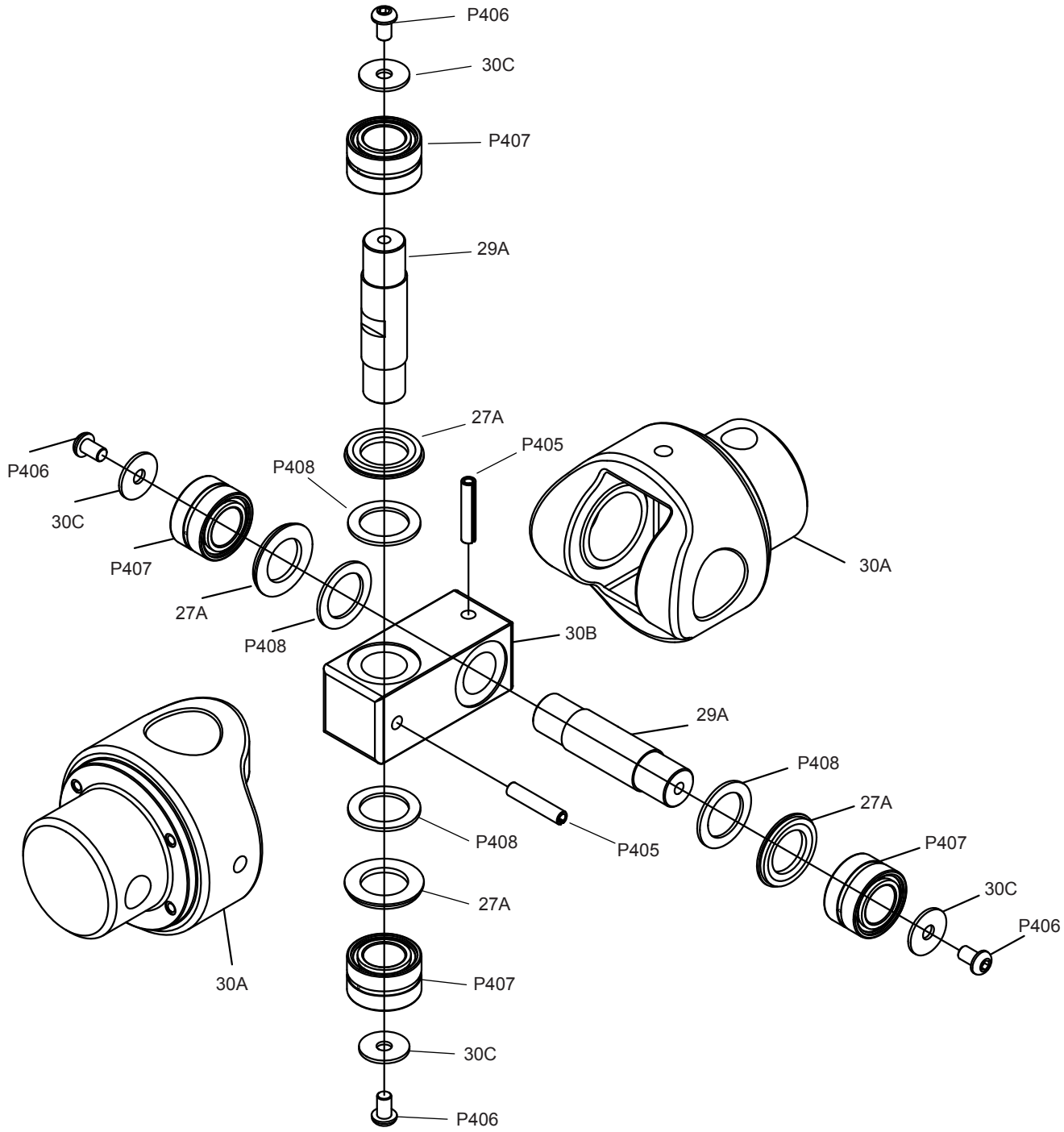
Exploded Views

CARDEN JOINT ASSEMBLY



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Torque Tightening Figures

Pump Size	Body/Suction Chamber (Nm)			Stator Tie Bars (Nm)	Bearing Cover (Nm)
	P526	P104	P530	P508, P504	P111
C1DB	190			450	17
C1EB	190			450	17

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

Lubrication Schedule - Pumps

Pump Lubrication										
Pump Model	Pin Joint Lubrication						Pump Bearing Housing Lubrication			
	Approximate Joint Lubrication Capacity Per Joint, milliliter (Two Joints Per Pump)	Lubricant Type				Relubrication and Inspection Interval	Lubricant Quantity	Lubricant Type	Relubrication and Inspection Interval
		Recommended	Alternative 1	Alternative 2	Alternative 3				
C22AS51VMH/H7PC	6	Manufacturer: Kluber Lubrication, Kluber Syntheso D460 EP Oil	Manufacturer: Mobil, Mobilith SHC 007 Semi-Fluid Grease	Manufacturer: Mobil, Mobil Gear Oil SHC SHC 320	Manufacturer: Shell, Shell Retinax CSZ	Every 4000 Operating Hours	As required Grease should be added until the chambers at the ends of the bearing spacer are approximately one third full	BP Energrease LC2	Every 12 months
C23AS50RMH/H7PC	12								
C23KS51EMH/H7NX	12								
	12								
	12								
C14KS51EMH/H7PC	22								
	22								
C14KS83RMH/H7PC	22								
C15KS53EMH/H7PC	22								
	22								
	22								
C16KS83RMH/H7PC	45								
	45								
C17DS51RMH/H7PC	175								
C18KS53EMH/H7PC	55								
C18KS81RMH/H7PC	55								
C19BS83RMH/H7PC	95								
C19KS53EMH/H7PC	95								
	95								
C19KS81RMH/H7PC	95								
	95								
	95								
	95								
C1AKS83RMH/H7PC	95								
	95								
	95								
C1BKS53EMH/H7PC	175								
	175								
C1DBS81RMH/HAP1	1600								
	1600								
	1600								
	1600								
C1EBS81RMH/HAP2	1600								
	1600								
	1600								

Lubrication Schedule - Drives

Pump Model	SEW Gearbox Model	Gearmotor Lubrication									Gearmotor Anti-Friction Bearings Lubrication			
		Lubricant Quantity in liters Per Gearmotor	Alternative Lubricant Type (ISO NIGI)								Relubrication and Inspection Interval	Lubricant Quantity		Lubricant Type		Relubrication and Inspection Interval
			1	2	3	4	5	6	7	8	9		Gear unit input side (i.e. motor side)	Gear unit output side (i.e. output shaft side)	Gear unit input side (i.e. motor side)	Gear unit output side (i.e. output shaft side)	
C22AS51VMH/H7PC	R17DT80K4	0.25	Manufacturer: Mobil, Mobilgear 630 (VG 220)	Manufacturer: Shell, Shell Omala 220 (VG220)	Manufacturer: Klüber Lubrication, Klüberoil GEN 1-220 (VG220)	Manufacturer: Aral, Aral Degol BG (VG220)	Manufacturer: BP, BP Energol GR-XP 220 (VG220)	Manufacturer: Tribol, Tribol 1100/220 (VG220)	Manufacturer: Texaco, Meropa 220 (VG220)	Manufacturer: Optimol, Optigear BM 220 (VG220)	Manufacturer: Fuchs, Renolin CLP 220 (VG220)	Every 3,000 operating hours for the first 6 months. Thereafter, every 10,000 operating hours.	Fill the cavities between the rolling elements one third full with grease	Fill the cavities between the rolling elements one third full with grease	Manufacturer: Shell, Alvania RL3	Manufacturer: Mobil, Mobilux EP2	Every 3,000 operating hours for the first 6 months. Thereafter, every 10,000 operating hours.
C23AS50RMH/H7PC	R17DT80N4	0.25														
S51EMH/H7NX	R17DT80N4	0.25														
	R17DT80N4	0.25														
	R17DT80N4	0.25														
S51EMH/H7PC	R37DV100M4	0.30														
	R37DV100M4	0.30														
C14KS83RMH/H7PC	R37DV100M4	0.30														
C15KS53EMH/H7PC	R57DV100L4	0.80														
	R57DV100L4	0.80														
	R77DV132S4	1.20														
	R77DV132S4	1.20														
S83RMH/H7PC	R77DV132S4	1.20														
	R67DV132S4	1.10														
C17DS51RMH/H7PC	R87DV160L4	2.30														
C18KS53EMH/H7PC	R87DV160L4	2.30														
C18KS81RMH/H7PC	R87DV160M4	2.30														
C19BS83RMH/H7PC	R87DV160L4	2.30														
C19KS53EMH/H7PC	R97DV180M4	4.60														
	R97DV180L4	4.60														
S81RMH/H7PC	R97DV180M4	4.60														
	R97DV180M4	4.60														
	R97DV180M4	4.60														
S83RMH/H7PC	R107DV180L4	6.00														
	R107DV180L4	6.00														
	R107DV180L4	6.00														
.S53EMH/H7PC	R107DV225S4	6.00														
	R107DV225S4	6.00														
C1DBS81RMH/HAP1	R137DV250M4	10.00														
	R137DV250M4	10.00														
	R137DV250M4	10.00														
	R137DV250M4	10.00														
C1EBS81RMH/HAP2	R147DV280S4	15.40														
	R147DV280S4	15.40														
	R147DV280S4	15.40														
	R147DV280S4	15.40														

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