English

Original Instructions

Installation, Operation and Maintenance Instructions

Compact EZstrip™ Range - Mono™

Z34A - Z3BK

OMMP/042/01
Rev 25, September 2018

Rev.	Date dd/mm/yy	Reason for Issue	Prepared By	Checked By	Approved By
13	15/10/2013	Dual dimensioning added. Revision sheet & new logos added. Note added to fill cupling with oil in vertical position on Section 4 pages 7, 23 & 26	M. Bailey	A. Morris	A. Morris
14	17/12/2014	Added note that suitable quench system must be provided when mounting pump in vertical position to section 1.2.2 ii).	M. Bailey	M. Bailey	C. Griffiths
15	05/02/2015	MK2 version for ANSI only added to coding sheet.	M. Bailey	M. Bailey	C. Griffiths
16	01/04/2015	Section 5 pages 1 & 2 - added tightening sequence diagram & notes.	M. Bailey	M. Bailey	C. Griffiths
17	08/07/2016	Updated manual to new fomat.	M. Bailey	M. Bailey	C. Griffiths
18	01/09/2016	Updated to incorporate MK3 model.	M. Bailey	M. Davies	A. Morris
19	03/01/2017	'X' removed from model references & replaced by '*' on pages 24, 31, 39, 48, 49, 61 & 66	M. Bailey	M. Bailey	A. Morris
20	16/01/2017	EC Declaration updated. Added approved distributors list. Note on page 82 changed to English.Added MK1 torque figues back in.	M. Bailey	M. Bailey	A. Morris
21	30/03/2017	Updated stator clamp torque tightening figures. Added Loctite details to assembly instructions.	M. Bailey	J. Chan	A. Morris
22	05/06/2017	Added additional safety, transport & disposal information to Installation, Operation & Maintenance section. Added general information of pumps with intended & prohibited uses. Nozzle loads added.	M. Bailey	M. Bailey	A. Morris
23	12/12/2017	Added information for mechanically bonded stators	M. Bailey	J. Chan	A. Morris
24	16/03/2018	Removed Distributor contact information & replaced with link to Distributor page on our website	M. Bailey	M. Bailey	A. Morris
25	07/09/2018	Updated weights for MK3 pumps as per JIRA PFTENG-1123	D. Sheldon	M. Bailey	M. Bailey

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Distributors

For local distribution, please refer to our website:
www.mono-pumps.com/en-uk/sales_network

PUMPS AND PUMP UNITS

Where a pump or pump unit is to be installed in a potentially explosive atmosphere ensure that this has been specified at the time of purchase and that the equipment has been supplied accordingly and displays an ATEX nameplate or is supplied with a certificate of conformity. If there is any doubt as to the suitability of the equipment please contact your supplier before commencing with installation and commissioning.

Process liquids or fluids should be kept within specified temperature limits otherwise the surface of pump or system components may become an ignition source due to temperature rises. Where the process liquid temperature is less that 90ºC (194ºF) the maximum surface temperature will not exceed 90ºC (194ºF) provided the pump is installed, operated and maintained in accordance with this manual. Where the process fluid temperature exceeds 90ºC (194ºF) the maximum surface temperature will be equal to the maximum process fluid temperature.

Cavities that could allow the accumulation of explosive gases, such as under guards, should where possible, be designed out of the system. Where this is not possible they should be fully purged before any work is carried out on the pump or system.

Electrical installation and maintenance work should only be carried out by suitably qualified and competent persons and must be in accordance with relevant electrical regulations.

All electrical equipment, including control and safety devices, should be suitably rated for the environment in to which they are installed.

Where there may be a risk of an accumulation of explosive gases or dust non-sparking tools should be used for installation and maintenance.

In addition to causing permanent damage to the stator, dry running of the pump could generate a rapid rise in the temperature of the stator tube or barrel, which could become an ignition source. It is therefore essential that a dry run protection device be fitted. This must shut the pump down immediately should a dry run situation occur. Details of suitable devices are available from your supplier.

To minimise the risk of sparking or temperature rises due to mechanical or electrical overload the following control and safety devices should be fitted in addition to a dry run protection system. A pressure relief system whereby the pump can not generate pressures in excess of the maximum rated pressure or an over pressure device which should shut the pump down when the maximum discharge pressure is exceeded. A control system that will shut the pump down if the motor current or temperature exceed specified limits. An isolator switch that will disconnect all electrical supply to the motor and ancillary electrical equipment and be capable of being locked in the off position. All control and safety devices should be fitted, operated and maintained in accordance with the manufacturer's instructions. All valves on the system should be open when the pump is started otherwise serious mechanical overload and failure may result.

It is important that the pump rotates in the direction indicated on the nameplate. This must be checked on installation and commissioning and after any maintenance has been carried out. Failure to observe this may lead to dry running or mechanical or electrical overload.

When fitting drives, couplings, belts, pulleys and guards to a pump or pump unit it is essential that these are correctly fitted, aligned and adjusted in accordance with the manufacturer's instructions. Failure to do so may result in sparking due to unintended mechanical contact or temperature rises due to mechanical or electrical overload or slipping of drive belts. Regular inspection of these parts must be carried out to ensure they are in good condition and replacement of any suspect part must be carried out immediately.

Mechanical seals should be suitably rated for the environment. The seal and any associated equipment, such as a flushing system, must be installed, operated and maintained in accordance with the manufacturer's instructions.

Where a packed gland seal is fitted this must be correctly fitted and adjusted. This type of seal relies on the process liquid to cool the shaft and packing rings so a constant drip of liquid from the gland section is required. Where this is undesirable an alternative seal type should be fitted.

Failure to operate or maintain the pump and ancillary equipment in line with the manufacturer's instructions may lead to premature and potentially dangerous failure of components. Regular inspection, and where necessary replacement, of bearings and lubrication is essential.

The pump and its components have been designed to ensure safe operation within the guidelines covered by legislation. Accordingly your supplier 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 parts that are not manufactured by or approved by your supplier may affect the safe operation of the pump and it may therefore become a safety hazard to both operators and other equipment. In these circumstances the Declaration provided will become invalid. The guarantee referenced on the Terms and Conditions of Sale will also be invalidated.

EC Declaration as defined by Machinery Directive 2006/42/EC.

The following harmonised standards are applicable: BS EN 809, BS EN ISO 12100:2010

EC Declaration of Incorporation

This declaration is only valid when partly completed machinery has been supplied.

In this case, the machinery meets the requirements of the said directive and is intended for incorporation into other machinery or for assembly with other machinery in order to constitute relevant machinery as defined by the said directive including any amendments, which are valid at the time of supply.

IMPORTANT

This machinery must not be put into service until the relevant machinery into which it is to be incorporated has been declared in conformity to the said directive.

This declaration is only valid when the machinery has been installed, operated and maintained in accordance with these instructions and safety guidelines contained within as well as instructions supplied for equipment assembled with or intended for use with this equipment.

EC Declaration of Conformity

This declaration is not valid for partly completed machinery that has been supplied.

In this case the machinery meets the requirements of the said directive including any amendments which are valid at the time of supply.

We further declare that, where applicable, said machinery also meets the requirements of:

The EMC Directive 2014/30/EU
The Low Voltage Directive 2014/35/EU
The Pressure Equipment Directive 2014/68/EU

IMPORTANT

This declaration is only valid when the machinery has been installed, operated and maintained in accordance with these instructions and safety guidelines contained within as well as instructions supplied for equipment assembled with or intended for use with this equipment.

Mr A. Morris - Director of Pump Technology for NOV PFT UK Ltd., Greengate Way, Middleton, Manchester, England, M24 1SA.

General

The progressive cavity pump is a type of positive displacement pump. The pumping element consists essentially of a fixed rubber stator in the form of a double internal helix and a single helical metal rotor which revolves in the stator and turns on an eccentric path.

The rotor maintains a constant seal inside the stator and this seal travels continuously from one end of the stator to the other, giving a uniform moving cavity.

Intended Use of Pump

Use machine only if it is in good condition and in compliance with these instructions.

This machine must be installed in accordance with statutory regulations and these instructions.

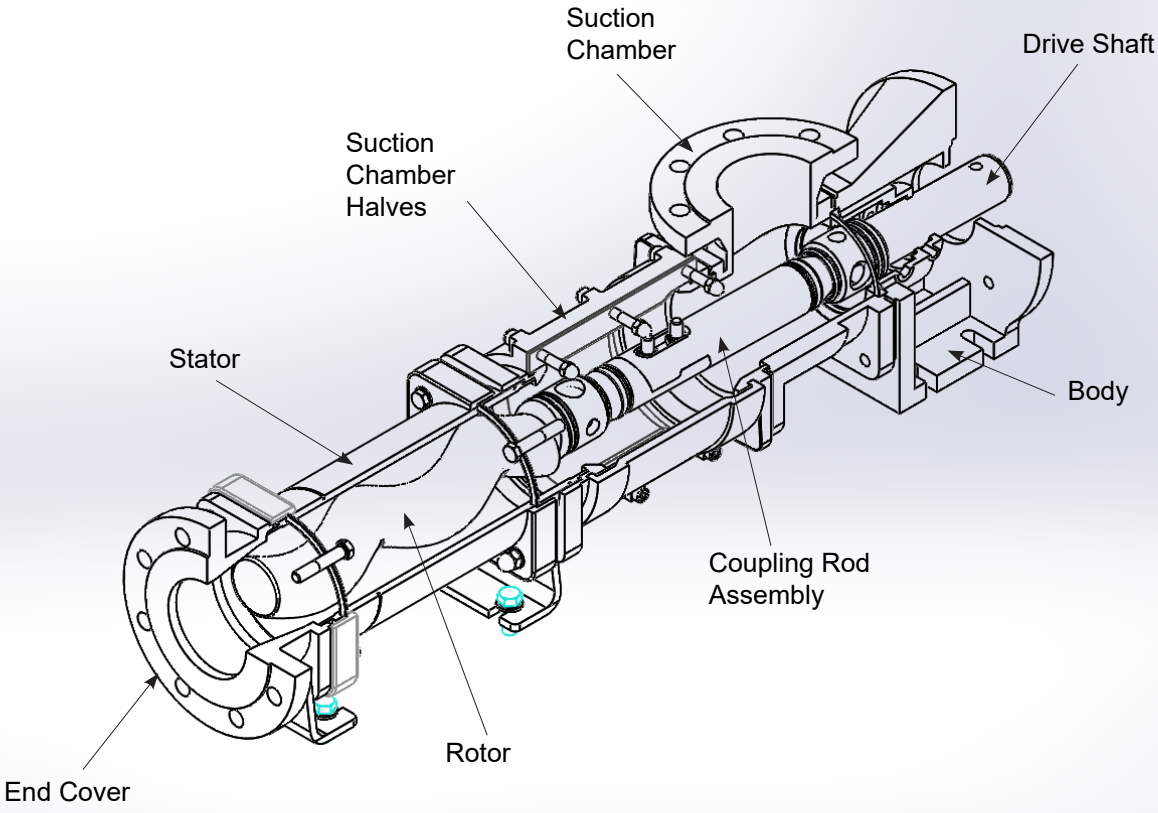
Machine must only be run in accordance with data supplied. Before making any changes, approval must be sought from your Supplier.

Prohibited Uses of Pump

Serious injury to personnel and property damage can be caused by:

- Incorrect use of machine
- Incorrect installation of machine
- Operating machine incorrectly
- Removal of necessary guards or other protective equipment

Pump Design



Installation, Operation & Maintenance

GENERAL DESCRIPTION OF PUMP

The progressive cavity pump is a type of positive displacement pump. The pumping element consists essentially of a fixed rubber stator in the form of a double internal helix and a single helical metal rotor which revolves in the stator and turns on an eccentric path.

The rotor maintains a constant seal inside the stator and this seal travels continuously from one end of the stator to the other, giving a uniform moving cavity.

GENERAL SAFETY

Appropriate PPE must always be worn.

All personnel must be suitable qualified / trained prior to carrying out any work and must comply with all safety warnings.

The Operating and Maintenance manual must always be kept close to the machine.

Instructions must be read prior to carrying out any work.

The machine must be installed correctly to ensure satisfactory & safe operation.

The machine must be maintained to a suitable standard to ensure safety of personnel and satisfactory operation of the machine is achieved.

Ensure adequate ventilation is provided to disperse dangerous concentrations of vapours.

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

The machine must be installed with provision for adequate lighting to ensure effective maintenance can be carried out.

DANGERS CAUSED BY THE MACHINE

Movement of mechanical parts

- Risk of entanglement if guards are not used correctly

Electrical voltages and currents

- Risk of electrocution, shock or burns

Hot surfaces

- Risk of burns

INTENDED USE

Use pump only if it is in good condition and in compliance with these instructions.

This machine must be installed in accordance with statutory regulations and these instructions.

Machine must only be run in accordance with data supplied. Before making any changes, approval must be sought from your Supplier.

FORESEEABLE MISUSE

- Incorrect use of machine
- Incorrect installation of machine
- Removal of guard during operation

ENVIRONMENTAL

These must be taken into account at the place of installation such as:

- abnormal temperature
- high humidity
- corrosive atmospheres
- explosive and/or fire danger zones
- vibrations
- flooding

Type of liquid to be pumped / properties while being pumped:

- flammable
- toxic
- corrosive
- abrasive

Operating System Fluctuations:

- temperature
- pressure
- flow rate
- dry running

TRANSPORT

Comply with any instructions on packaging and/or paperwork.

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, your Supplier's 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 drainage will simplify maintenance and prolong the life of pump components.

Pumps operating on high temperature duties should be allowed to cool sufficiently before anymaintenance 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.

i. **HORIZONTAL MOUNTING**

All ranges excluding P Range your Supplier's 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.

Ensure pipework is connected in a safe manner (refer to nozzle loads) and protected against harmful external effects.

ii. **VERTICAL MOUNTING**

P Range Pumps Only

The P range pumps are intended for vertical installation. Care must be taken when lifting the pump into the vertical position.

Normally 'P' range pumps will be designed with a sole plate that will be bolted to the customers framework.

If the pump is to be mounted in any way other than described above, confirmation of the installation must be agreed with your Supplier. 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.

See section 4.2 prior to starting, for instructions on how to fit constant level oilers (where applicable).

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, your Supplier, should be consulted before proceeding. Normally the Supplier's 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 nonreturn 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 YOUR SUPPLIER HAS 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. 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 your Supplier has 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, YOUR SUPPLIER 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 restarting.

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.

Where fitted, the constant level oiler should be filled with Klubersynth GH6-460 for standard applications or Kluberoil 4UHI 460 for food applications.

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
CB / SB	No	*
Compact	Yes	†
CP0011	No	**
CP0025, CO0800, CP1600	No	*
Dosing	Yes	†
E	Yes	†
Epsilon (inc. Vertical)	Yes	†
EZstrip	Yes	†
G	No	*
Grout Mixer	No	**
Merlin Industrial	Yes	†
Merlin Widethroat	No	**
MM, ML	No	*
Monobloc B	Yes	†
MS	No	**
P	No	*
Placer	No	**
S, SL	Yes	†
W	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, YOUR SUPPLIER MUST BE CONSULTED SO THAT THE SUITABILITYOF 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

SHAFT DIAMETER	NO. OF DROPS PER MINUTE
Up to 50mm (2”)	2
50 – 75mm (2 - 3”)	3
75 – 100mm (3 - 4”)	4
100 – 125mm (4 - 5”)	5
125 – 160mm (5 - 6.3”)	6

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, and in accordance with the U.K. Health and Safety at Work Act 1974, all guards must be replaced after necessary adjustments have been made to the pump.

The onus os on the user to fit the guards in accordance with regulations,

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°C (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 85dB at one metre (3.3 yards) 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.

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:

This procedure should not be used on the CP Pump Range.Please consult our application engineers for a suitable procedure.

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 (167°F) for 20 mins

2. Water rinse @ 80°C (176°) for 20 mins
3. Acid wash @ 50°C (122°F) for 20 mins
4. Water rinse @ 80°C (176°) 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 (4.9 ft/s) to 2.0 m/s (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 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 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.

2.13.2 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 parts from your Supplier to ensure maximum life.

2.13.3 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.

2.14 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

See assembly and dismantling drawings which 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.

3.1 USE OF ITEMS NOT APPROVED OR MANUFACTURED BY YOUR SUPPLIER

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 your Supplier has 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 your Supplier 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 your Supplier.

The seller warrants, for a period of 18 months from delivery or 12 months from installations, whichever is earlier, that new Equipment / Parts of its own manufacture shall conform to the material and technical specifications set forth in the agreement. Goods manufactured by others are sold “as is” except to the extent the manufacturer honours any applicable warranty made by the manufacturer.

3.2 FLOWMETER

For increased accuracy a flowmeter can be provided by your Supplier to monitor the flow rate during pump operation. The flowmeter must be installed on the suction end of the pump. Failure to do so may result in damaging effects.

The flowmeter must be used in accordance with the manufacturers instructions.

3.2 DISPOSAL OF WORN COMPONENTS

	NOTICE
	Environmental
	Drain unit in accordance with regulations **Dispose correctly in accordance with regulations**

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.

4.0 PUMP RANGE SPECIFIC

4.1 DRAINAGE

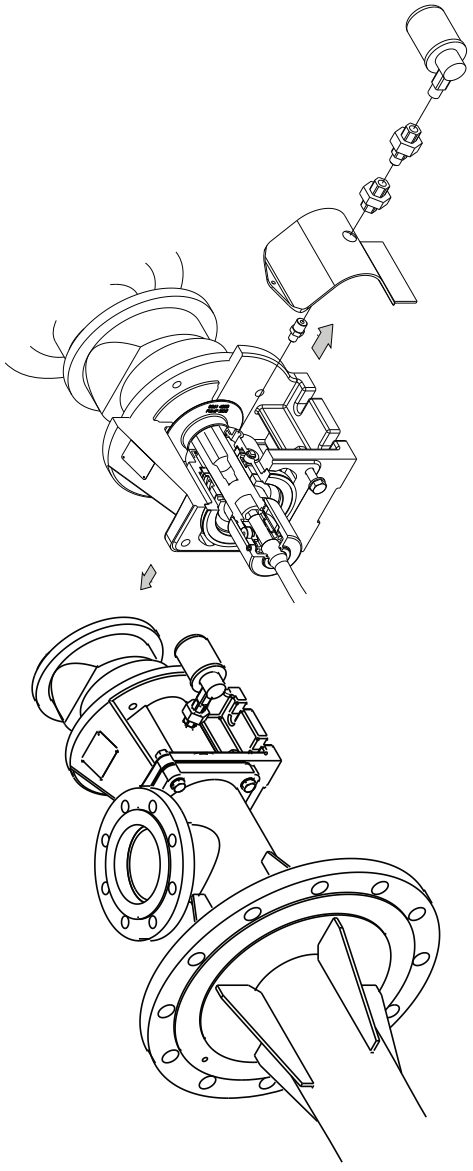
A drainage port may be provided on the suction chamber and/or end cover.

4.2 VERTICAL MOUNTING - EPSILON / P RANGE

These pumps are intended for vertical inst. Care must be taken when lifting the pump into the vertical position.

Normally these pumps will be designed with a sole plate that will be bolted to the customer’s framework.

All vertically mounted pumps require a constant level oiler to be fitted to the gland section in order to prevent the mechanical seals dry running. The oilers will be supplied loose with the pump to avoid damage during transit, so upon receipt of the equipment they will need to be installed prior to operation. Instructions for fitting the oilers are as follows:



4.3 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 while the pump is operating. If this is not possible, an emergency stop device must be fitted nearby.

Nozzle Loads

Maximum Permissible Nozzle Loads for Fabricated Stainless Steel and Mild Steel Suction Chambers and End Covers

Nominal Port Size	Nozzle Force Fx (N)	Nozzle Force Fy (N)	Nozzle Force Fz (N)	Nozzle Moment Mx (N)	Nozzle Moment My (N)	Nozzle Moment Mz (N)
1.1/4" NPT [1]	650	650	650	350	350	350
1.1/2" NPT [1]	650	650	650	350	350	350
50mm	650	650	650	350	350	350
80mm	1040	1040	1040	560	350	350
100mm	1300	1300	1300	700	700	700
150mm	1950	1950	1950	1050	1050	1050
200mm	2600	2600	2600	1400	1400	1400
250mm	3250	3250	3250	1750	1750	1750

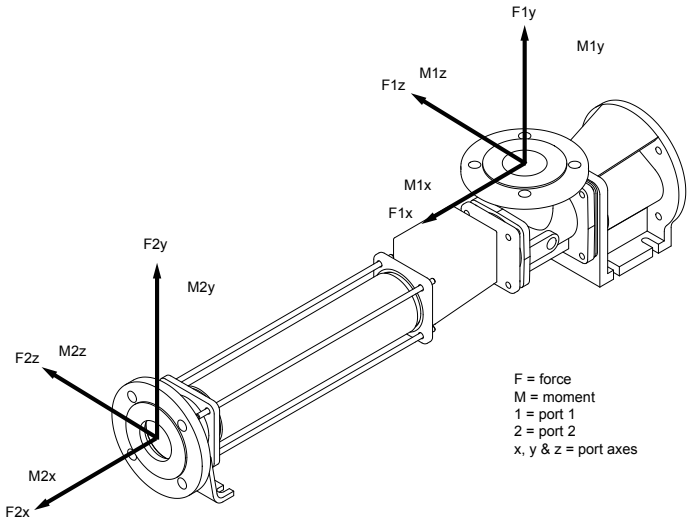
Note 1: Suction chambers and end covers with NPT ports are made from ST material.

Note 2. Where a flange/nipple assembly is used on an NPT port, the maximum permissible nozzle loads are 50% of the values stated above.

Maximum Permissible Nozzle Loads for Cast Iron Suction Chambers and End Covers

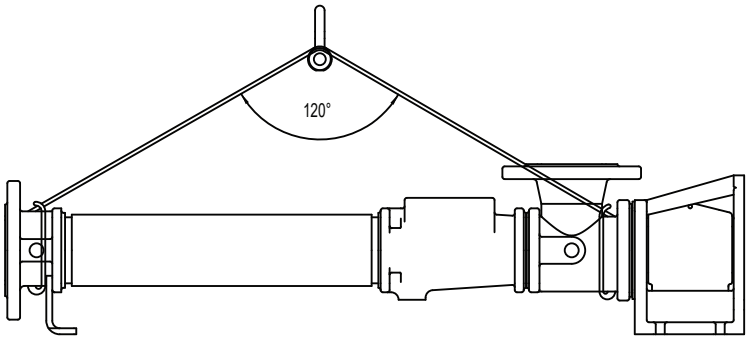
Nominal Port Size	Nozzle Force Fx (N)	Nozzle Force Fy (N)	Nozzle Force Fz (N)	Nozzle Moment Mx (N)	Nozzle Moment My (N)	Nozzle Moment Mz (N)
1.1/4" NPT [1]	650	650	650	350	350	350
1.1/2" NPT [1]	650	650	650	350	350	350
50mm	455	455	455	245	245	245
80mm	728	728	728	392	392	392
100mm	910	910	910	490	490	490
150mm	1950	1950	1950	1050	1050	1050
200mm	2600	2600	2600	1400	1400	1400
250mm	3250	3250	3250	1750	1750	1750

Note that by exceeding the specified loading, the pump body may distort causing joints to leak or even fail. There may also be a detrimental effect on shaft alignment that can cause premature bearing or seal failures.

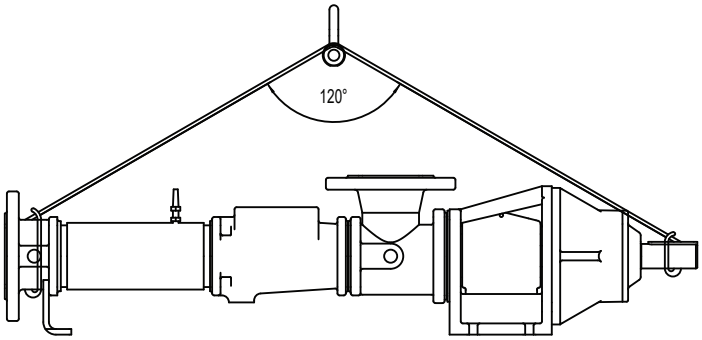


Recommended Lifting Points

1



2



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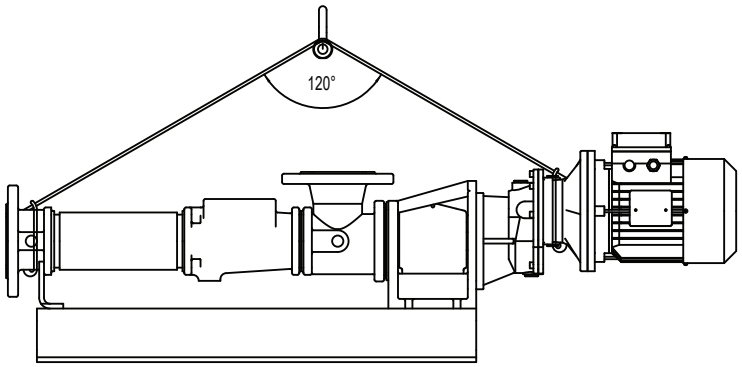

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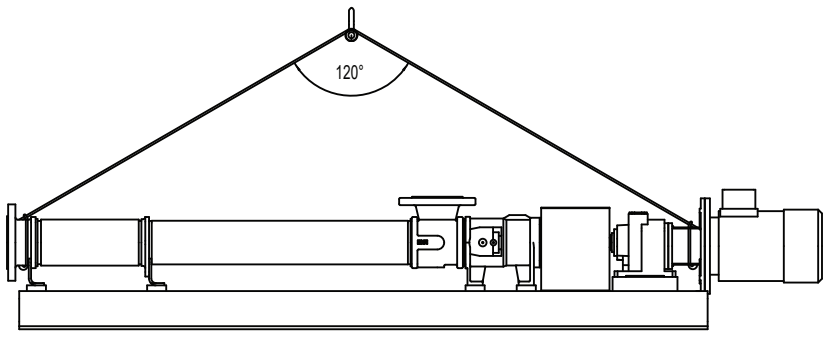
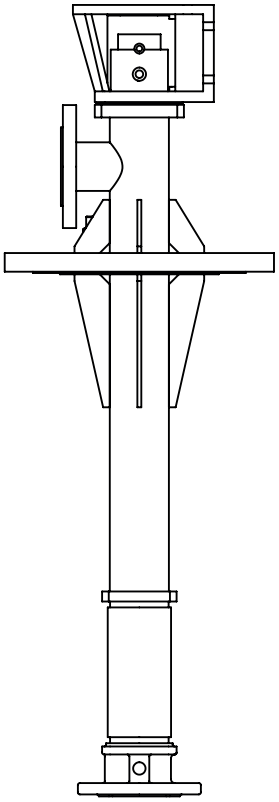


5



Weights

Model	Weight (kg)					
	Pump	Stator	Rotor	Coup Rod/ Joint	Coup Rod/ Joint	Shaft
Z34A	43	4	2.6	0.7	1.1	1.6
Z34B	49	7.5	4.5	0.7	1.1	1.6
Z34D	80	14.4	9.2	1.5	2.3	3.1
Z34K	50	7.6	4.8	0.7	1.1	1.6
Z35A	54	7.1	5.4	0.7	1.1	1.6
Z35B	76	13.4	10.1	1.5	2.3	3.1
Z35D	128	26	18	2.3	3.9	4.3
Z35K	62	13.4	7.4	0.7	1.1	1.6
Z36A	78	12.1	8.4	1.5	2.3	3.1
Z36B	115	23	17	2.3	3.9	4.3
Z36D	211	44.6	31	4.5	10	8.4
Z36K	96	23.2	15.8	1.5	2.3	3.1
Z37A	115	13	13.3	2.3	3.9	4.3
Z37B	138	24.5	24.5	2.3	3.9	4.3
Z37D	297	47.5	48.9	6.3	13.6	9.5
Z37K	140	24.5	25.2	2.3	3.9	4.3
Z38A	133	23	18	2.3	5.2	4.3
Z38B	192	42	34.5	4.5	10	8.4
Z38D	368	80	65.7	6.3	13.6	9.5
Z38K	172	42	34.5	2.3	5.2	4.3
Z39A	191	26.5	26	4.5	10	8.4
Z39B	242	52	52.6	4.5	10	8.4
Z39K	240	52	49.4	4.5	10	8.4
Z3AA	225	42	43.6	4.5	10	8.4
Z3AB	355	80	72.4	6.3	13.6	9.5
Z3AK	296	80	74.3	4.5	10	8.4
Z3BA	392	69	68	6.3	13.6	9.5
Z3BK	513	131	126.8	6.3	13.6	9.5

Pumps with Mech Bond Stators ONLY - Additional details

Model	Weight (kg)					
	Pump	Stator	Rotor	Coupling Rod/Joint	Coupling Rod/Joint	Shaft
Z37B	154	38.3	24.5	4.6	4.9	4.3
Z39A	196	56.7	25.8	12.3	17.9	8.7
Z39B	324	97.9	47.6	12.3	17.9	8.7

Model	Weight (lb)					
	Pump	Stator	Rotor	Coup Rod/ Joint	Coup Rod/ Joint	Shaft
Z34A	94.6	8.8	5.7	1.5	2.4	3.5
Z34B	107.8	16.5	9.9	1.5	2.4	3.5
Z34D	176	31.7	20.2	3.3	5.1	6.8
Z34K	110	16.7	10.6	1.5	2.4	3.5
Z35A	118.8	15.6	11.9	1.5	2.4	3.5
Z35B	167.2	29.5	22.2	3.3	5.1	6.8
Z35D	281.6	57.2	39.6	5.1	8.6	9.7
Z35K	136.4	29.5	16.3	1.5	2.4	3.5
Z36A	171.6	26.6	18.5	3.3	5.1	6.8
Z36B	253	50.6	37.4	5.1	8.6	9.5
Z36D	464.2	98.1	68.2	9.9	22	18.5
Z36K	211.2	51.1	34.8	3.3	5.1	6.8
Z37A	253	28.6	13.3	5.1	8.6	9.5
Z37B	303.6	53.9	24.5	5.1	8.6	9.5
Z37D	653.4	104.5	48.9	13.9	29.9	20.9
Z37K	308	53.9	25.2	5.1	8.6	9.5
Z38A	292.6	50.6	18	5.1	11.5	9.5
Z38B	422.4	92.4	34.5	9.9	22	18.5
Z38D	809.6	176	65.7	13.9	29.9	20.9
Z38K	378.4	92.4	34.5	5.1	11.5	9.5
Z39A	421	58.3	26	9.9	22	18.5
Z39B	532.4	114.4	52.6	9.9	22	18.5
Z39K	528	114.4	49.4	9.9	22	18.5
Z3AA	495	92.4	43.6	9.9	22	18.5
Z3AB	781	176	72.4	13.9	29.9	20.9
Z3AK	651.2	176	74.3	9.9	22	18.5
Z3BA	862.4	151.8	68	13.9	29.9	20.9
Z3BK	1129	288.2	126.8	13.9	29.9	20.9

Pumps with Mech Bond Stators ONLY - Additional details

Model	Weight (lb)					
	Pump	Stator	Rotor	Coupling Rod/Joint	Coupling Rod/Joint	Shaft
Z37B	339.5	84.4	54	10.1	10.8	9.5
Z39A	432	125	56.9	27.1	39.5	19.2
Z39B	714.2	215.8	104.9	27.1	9.5	19.2

Diagnostics

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

Z34A & ABOVE EXCLUDING Z38B

DRG REF	DESCRIPTION
01A	BODY
06A	NAMEPLATE (SOG)
06B	NAMEPLATE (DOG)
10A	MECHANICAL SEAL
15A	THROWER GUARD
20A	GASKET - GLAND
20D	SUCT CHAMB GASKET
22A	STATOR
23A	SUCTION CHAMBER
23C	SUCT CHMB EXT FLANGE (STATOR SIDE)
23D	SUCT CHAMB EXT PIECE (DRIVE SIDE)
23E	SUCT CHAMB HALVES
24A	END COVER
25A	ROTOR
26B	SPLIT COUPLING ROD (ROTOR SIDE)
26C	SPLIT COUPLING ROD (SHAFT SIDE)
27A	COUPLING ROD BUSH
27B	COUPLING ROD BUSH
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
75A	ROTOR/SHAFT SLEEVE
75B	ROTOR/SHAFT SLEEVE
76A	STATOR CLAMP

DRG REF	DESCRIPTION
P104	HEX HEAD BOLT
P105	HEX NUT
P106	PLAIN WASHER
P107	SPRING WASHER
P109	HEX NUT
P201	TAPERED PLUG
P202	TAPERED PLUG
P301	SOCKET CAPSCREW
P302	NYLON NUT
P401	SEAL RING
P402	SEAL RING
P403	SPIRAL RETAINING RING
P404	SPIRAL RETAINING RING
P405	TIE SEALING COVER
P406	TIE SEALING COVER
P501	TAPERED PLUG
P502	HEX HEAD BOLT
P503	STUD
P504	PLAIN WASHER
P505	HEX NUT
P506	DOMED NUT
P507	HEX HEAD BOLT
P508	STUD
P509	PLAIN WASHER
P510	HEX NUT
P511	DOMED NUT
P512	SOCKET CAPSCREW
P513	DOMED NUT
P514	SEAL RING
P515	STUD
P516	PLAIN WASHER
P517	SPRING WASHER
P518	HEX NUT
P519	TAPERED PLUG
P533	SPIRAL RETAINING RING
P601	HEX HEAD BOLT
P602	SPRING WASHER
P603	PLAIN WASHER
P604	HEX NUT

Z38B

DRG REF	DESCRIPTION
01A	BODY
01C	BODY ADAPTOR
06A	NAMEPLATE (SOG)
06B	NAMEPLATE (DOG)
10A	MECHANICAL SEAL
15A	THROWER GUARD
20A	GASKET - GLAND
20B	GASKET - GLAND
20D	SUCT CHAMB GASKET
22A	STATOR
23A	SUCTION CHAMBER
23C	SUCT CHMB EXT FLANGE (STATOR SIDE)
23D	SUCT CHAMB EXT PIECE (DRIVE SIDE)
23E	SUCT CHAMB HALVES
24A	END COVER
25A	ROTOR
26B	SPLIT COUPLING ROD (ROTOR SIDE)
26C	SPLIT COUPLING ROD (SHAFT SIDE)
27A	COUPLING ROD BUSH
27B	COUPLING ROD BUSH
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
75A	ROTOR/SHAFT SLEEVE
75B	ROTOR/SHAFT SLEEVE
76A	STATOR CLAMP

DRG REF	DESCRIPTION
P104	HEX HEAD BOLT
P105	HEX NUT
P106	PLAIN WASHER
P107	SPRING WASHER
P109	HEX NUT
P201	TAPERED PLUG
P202	TAPERED PLUG
P301	SOCKET CAPSCREW
P302	NYLON NUT
P401	SEAL RING
P402	SEAL RING
P403	SPIRAL RETAINING RING
P404	SPIRAL RETAINING RING
P405	TIE SEALING COVER
P406	TIE SEALING COVER
P501	TAPERED PLUG
P502	HEX HEAD BOLT
P503	STUD
P504	PLAIN WASHER
P505	HEX NUT
P506	DOMED NUT
P507	HEX HEAD BOLT
P508	STUD
P509	PLAIN WASHER
P510	HEX NUT
P511	DOMED NUT
P512	SOCKET CAPSCREW
P513	DOMED NUT
P514	SEAL RING
P515	STUD
P516	PLAIN WASHER
P517	SPRING WASHER
P518	HEX NUT
P519	TAPERED PLUG
P520	STUD
P521	PLAIN WASHER
P522	SPRING WASHER
P523	HEX NUT
P524	STUD
P533	SPIRAL RETAINING RING
P601	HEX HEAD BOLT
P602	SPRING WASHER
P603	PLAIN WASHER
P604	HEX NUT

Z39A AND ABOVE

DRG REF	DESCRIPTION
01A	BODY
06A	NAMEPLATE (SOG)
06B	NAMEPLATE (DOG)
10A	MECHANICAL SEAL
15A	THROWER GUARD
20A	GASKET - GLAND
20D	SUCT CHAMB GASKET
22A	STATOR
23A	SUCTION CHAMBER
23C	SUCT CHMB EXT FLANGE (STATOR SIDE)
23D	SUCT CHAMB EXT PIECE (DRIVE SIDE)
23E	SUCT CHAMB HALVES
24A	END COVER
25A	ROTOR
26B	SPLIT COUPLING ROD (ROTOR SIDE)
26C	SPLIT COUPLING ROD (SHAFT SIDE)
27A	COUPLING ROD BUSH
27B	COUPLING ROD BUSH
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
75A	ROTOR/SHAFT SLEEVE
75B	ROTOR/SHAFT SLEEVE
76A	STATOR CLAMP

DRG REF	DESCRIPTION
P104	HEX HEAD BOLT
P105	HEX NUT
P106	PLAIN WASHER
P107	SPRING WASHER
P109	HEX NUT
P201	TAPERED PLUG
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P403	SPIRAL RETAINING RING
P404	SPIRAL RETAINING RING
P405	TIE SEALING COVER
P406	TIE SEALING COVER
P501	TAPERED PLUG
P502	HEX HEAD BOLT
P504	PLAIN WASHER
P506	DOMED NUT
P507	HEX HEAD BOLT
P509	PLAIN WASHER
P512	SOCKET CAPSCREW
P513	DOMED NUT
P514	SEAL RING
P515	STUD
P516	PLAIN WASHER
P517	SPRING WASHER
P518	HEX NUT
P519	TAPERED PLUG
P525	HEX HEAD BOLT
P526	PLAIN WASHER
P527	SPRING WASHER
P528	HEX NUT
P529	HEX HEAD BOLT
P530	PLAIN WASHER
P531	SPRING WASHER
P532	HEX NUT
P533	SPIRAL RETAINING RING
P601	HEX HEAD BOLT
P602	SPRING WASHER
P603	PLAIN WASHER
P604	HEX NUT

Z34D, Z35D & Pumps With Mechanically Bonded Stators

DRG REF	DESCRIPTION
01A	BODY
06A	NAMEPLATE (SOG)
06B	NAMEPLATE (DOG)
10A	MECHANICAL SEAL
15A	THROWER GUARD
20B	GASKET - GLAND
20D	SUCT CHAMB GASKET
22A	STATOR
23A	SUCTION CHAMBER
23C	SUCT CHMB EXT FLANGE (STATOR SIDE)
23D	SUCT CHAMB EXT PIECE (DRIVE SIDE)
23E	SUCT CHAMB HALVES
24A	END COVER
25A	ROTOR
26B	SPLIT COUPLING ROD (ROTOR SIDE)
26C	SPLIT COUPLING ROD (SHAFT SIDE)
27A	COUPLING ROD BUSH
27B	COUPLING ROD BUSH
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
75A	ROTOR/SHAFT SLEEVE
75B	ROTOR/SHAFT SLEEVE
95A	TIE ROD

DRG REF	DESCRIPTION
P104	HEX HEAD BOLT
P105	HEX NUT
P106	PLAIN WASHER
P107	SPRING WASHER
P109	HEX NUT
P201	TAPERED PLUG
P202	TAPERED PLUG
P301	SOCKET CAPSCREW
P302	NYLON NUT
P401	SEAL RING
P402	SEAL RING
P403	SPIRAL RETAINING RING
P404	SPIRAL RETAINING RING
P405	TIE SEALING COVER
P406	TIE SEALING COVER
P501	HEX NUT
P502	SPRING WASHER
P503	PLAIN WASHER
P507	HEX HEAD BOLT
P508	PLAIN WASHER
P509	PLAIN WASHER
P510	SPRING WASHER
P511	HEX NUT
P516	STUD
P518	PLAIN WASHER
P519	SPRING WASHER
P520	HEX NUT
P526	TAPERED PLUG
P528	TAPERED PLUG
P539	SEAL RING
P540	SOCKET CAP SCREW
P541	HEX NUT
P550	HEX HEAD BOLT
P551	PLAIN WASHER
P552	SPRING WASHER
P601	HEX HEAD BOLT
P602	SPRING WASHER
P603	PLAIN WASHER
P604	HEX NUT

Z36D, Z37D & Z38D

DRG REF	DESCRIPTION
01A	BODY
01B	BODY ADAPTOR
06A	NAMEPLATE (SOG)
06B	NAMEPLATE (DOG)
10A	MECHANICAL SEAL
15A	THROWER GUARD
20A	GASKET - GLAND
20B	GASKET - GLAND
20D	SUCT CHAMB GASKET
22A	STATOR
23A	SUCTION CHAMBER
23C	SUCT CHMB EXT FLANGE (STATOR SIDE)
23D	SUCT CHAMB EXT PIECE (DRIVE SIDE)
23E	SUCT CHAMB HALVES
24A	END COVER
25A	ROTOR
26B	SPLIT COUPLING ROD (ROTOR SIDE)
26C	SPLIT COUPLING ROD (SHAFT SIDE)
27A	COUPLING ROD BUSH
27B	COUPLING ROD BUSH
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
75A	ROTOR/SHAFT SLEEVE
75B	ROTOR/SHAFT SLEEVE
95A	TIE ROD

DRG REF	DESCRIPTION
P102	PLAIN WASHER
P104	HEX HEAD BOLT
P105	HEX NUT
P106	PLAIN WASHER
P107	PLAIN WASHER
P109	HEX NUT
P201	TAPERED PLUG
P202	TAPERED PLUG
P301	SOCKET CAPSCREW
P302	NYLON NUT
P401	SEAL RING
P402	SEAL RING
P403	SPIRAL RETAINING RING
P404	SPIRAL RETAINING RING
P405	TIE SEALING COVER
P406	TIE SEALING COVER
P501	HEX NUT
P502	SPRING WASHER
P503	PLAIN WASHER
P516	STUD
P518	PLAIN WASHER
P519	SPRING WASHER
P520	HEX NUT
P526	TAPERED PLUG
P528	TAPERED PLUG
P530	STUD
P531	SPRING WASHER
P532	PLAIN WASHER
P533	HEX NUT
P534	STUD
P535	HEX NUT
P536	PLAIN WASHER
P537	SPRING WASHER
P539	SEAL RING
P540	SOCKET CAP SCREW
P541	HEX NUT
P550	HEX HEAD BOLT
P551	PLAIN WASHER
P552	SPRING WASHER
P601	HEX HEAD BOLT
P602	SPRING WASHER
P603	PLAIN WASHER
P604	HEX NUT

Z3BA, Z3BK

DRG REF	DESCRIPTION
01A	BODY
06A	NAMEPLATE (SOG)
06B	NAMEPLATE (DOG)
10A	MECHANICAL SEAL
15A	THROWER GUARD
20A	GASKET - GLAND
20D	SUCT CHAMB GASKET
22A	STATOR
23A	SUCTION CHAMBER
23C	SUCT CHMB EXT FLANGE (STATOR SIDE)
23D	SUCT CHAMB EXT PIECE (DRIVE SIDE)
23E	SUCT CHAMB HALVES
24A	END COVER
25A	ROTOR
26B	SPLIT COUPLING ROD (ROTOR SIDE)
26C	SPLIT COUPLING ROD (SHAFT SIDE)
27A	COUPLING ROD BUSH
27B	COUPLING ROD BUSH
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
62B	SUPPORT FOOT
65A	MECH SEAL CARRIER
66A	ABUTMENT RING
75A	ROTOR/SHAFT SLEEVE
75B	ROTOR/SHAFT SLEEVE
76A	STATOR CLAMP

DRG REF	DESCRIPTION
P102	PLAIN WASHER
P104	HEX HEAD BOLT
P105	HEX NUT
P106	PLAIN WASHER
P107	SPRING WASHER
P109	HEX NUT
P201	TAPERED PLUG
P202	TAPERED PLUG
P301	SOCKET CAPSCREW
P302	NYLON NUT
P401	SEAL RING
P402	SEAL RING
P403	SPIRAL RETAINING RING
P404	SPIRAL RETAINING RING
P405	TIE SEALING COVER
P406	TIE SEALING COVER
P501	TAPERED PLUG
P502	HEX HEAD BOLT
P504	PLAIN WASHER
P506	DOMED NUT
P507	HEX HEAD BOLT
P509	PLAIN WASHER
P512	SOCKET CAPSCREW
P513	DOMED NUT
P514	SEAL RING
P515	STUD
P516	PLAIN WASHER
P517	SPRING WASHER
P518	HEX NUT
P519	TAPERED PLUG
P529	HEX HEAD BOLT
P530	PLAIN WASHER
P531	SPRING WASHER
P533	SPIRAL RETAINING RING
P601	HEX HEAD BOLT
P602	SPRING WASHER
P603	PLAIN WASHER
P604	HEX NUT

Pump Coding

Range	Monobloc Compact EZstrip	Z														
Design Mark No.	Monobloc		1													
	MK2 (ANSI Only)		2													
	MK3 (01/09/2016)		3													
Size	22m3/h (97 USGPM) @ 1000 rpm			4												
	37m3/h (163 USGPM) @ 800 rpm			5												
	57m3/h (251 USGPM) @ 700 rpm			6												
	79m3/h (348 USGPM) @ 600 rpm			7												
	97m3/h (427 USGPM) @ 500 rpm			8												
	125m3/h (551 USGPM) @ 450 rpm			9												
	165m3/h (727 USGPM) @ 400 rpm			A												
	225m3/h (991 USGPM) @ 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	Code 1						1									
	Code 5						5									
	Code 8						8									
Rotor Mark No	MK 0 (Oversized)							0								
	MK 1 (Standard)							1								
	MK 3 (Temperature)							3								
	MK 5 (Temperature)							5								
Stator Mat'l	RA, RR etc. **1**								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 your Supplier												A	1	2	3
		Z	3	4	A	C	8	1	R	M	A					
Example:		EZstrip Range	Design MK3	Size 04	Single Stage	Cast Iron	Rot. Parts Code 8	Rotor MK1	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 your Supplier.

Dismantling - Rotor and Stator Change

Z3*A, Z3*B AND Z3*K

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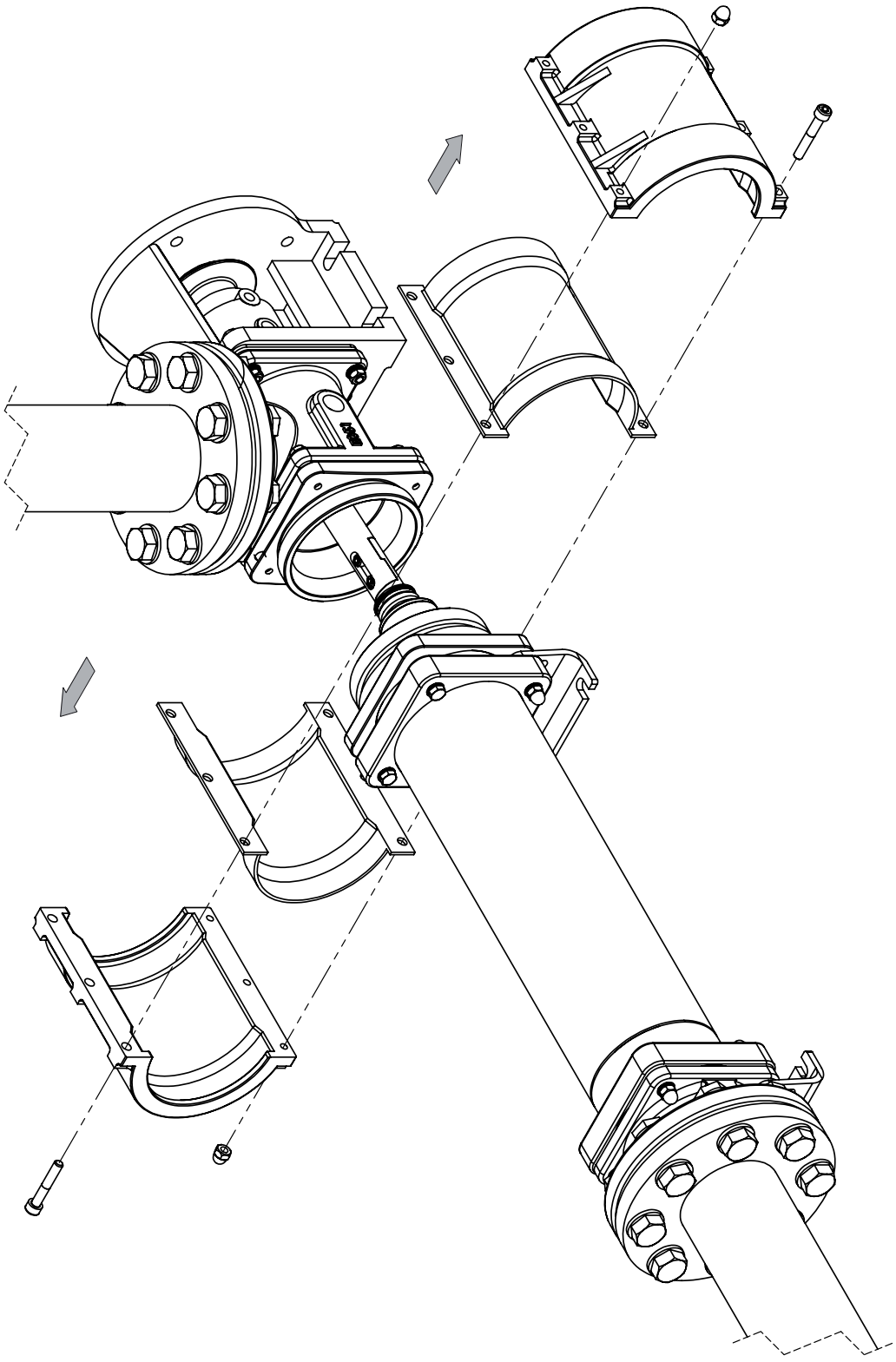

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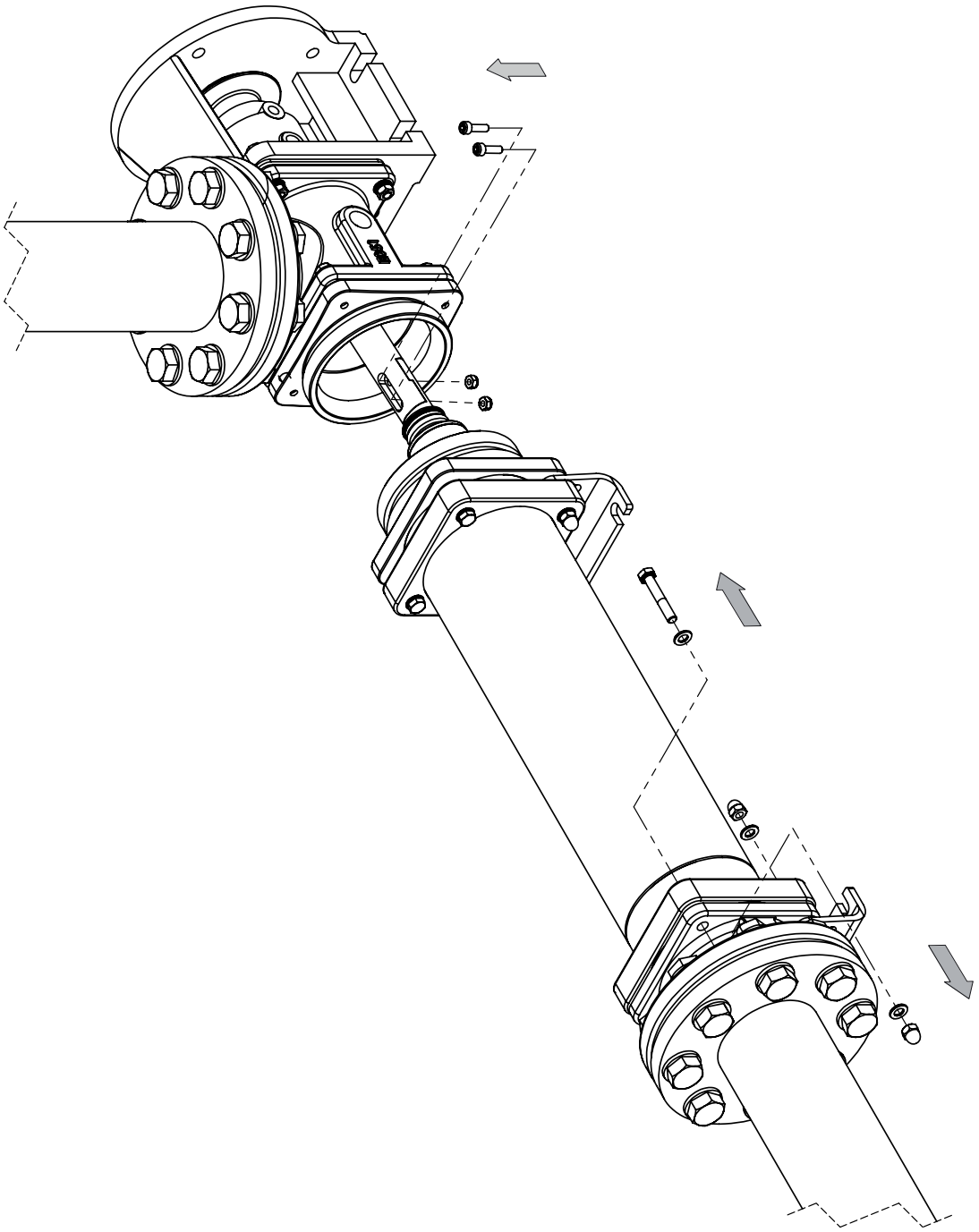

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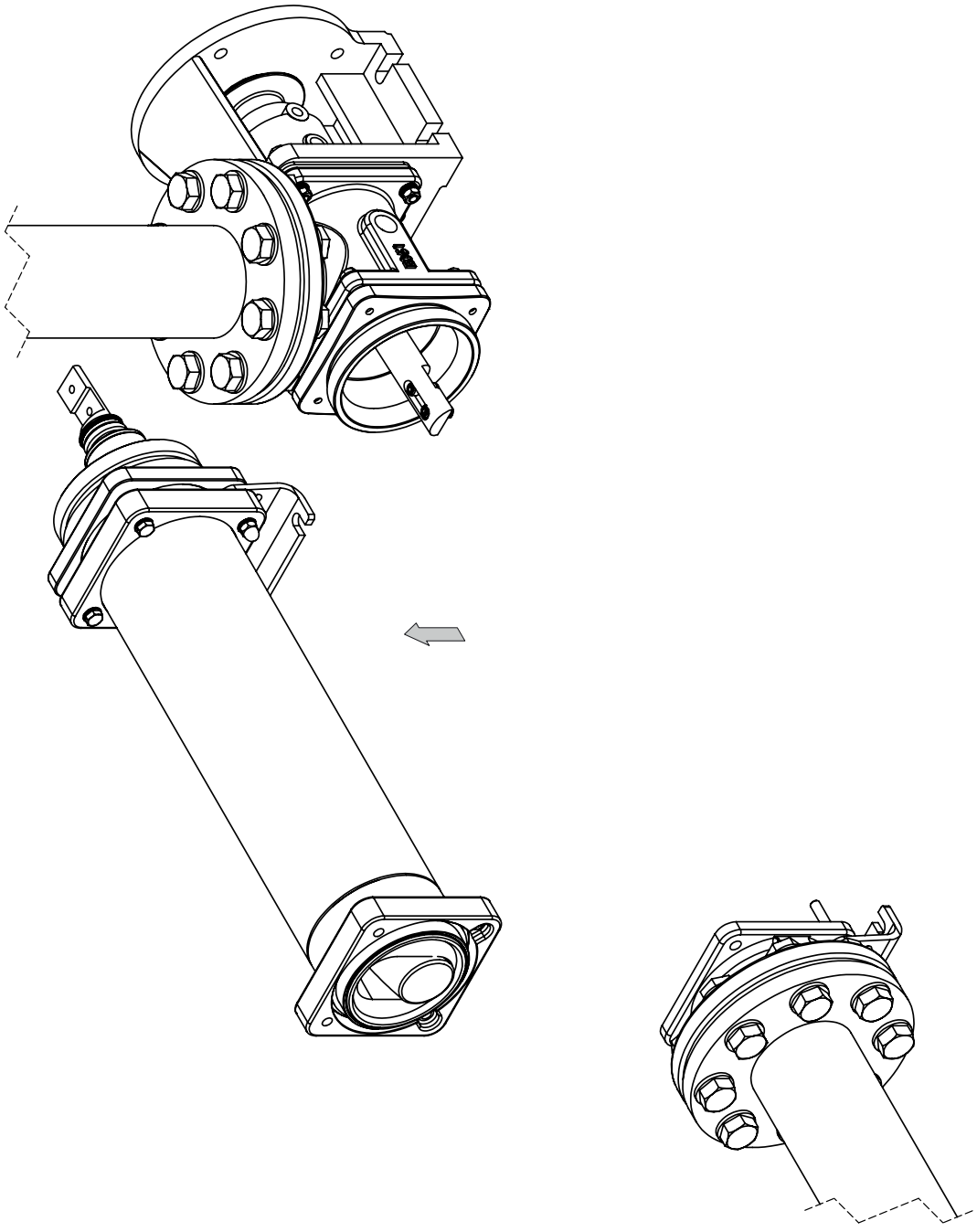

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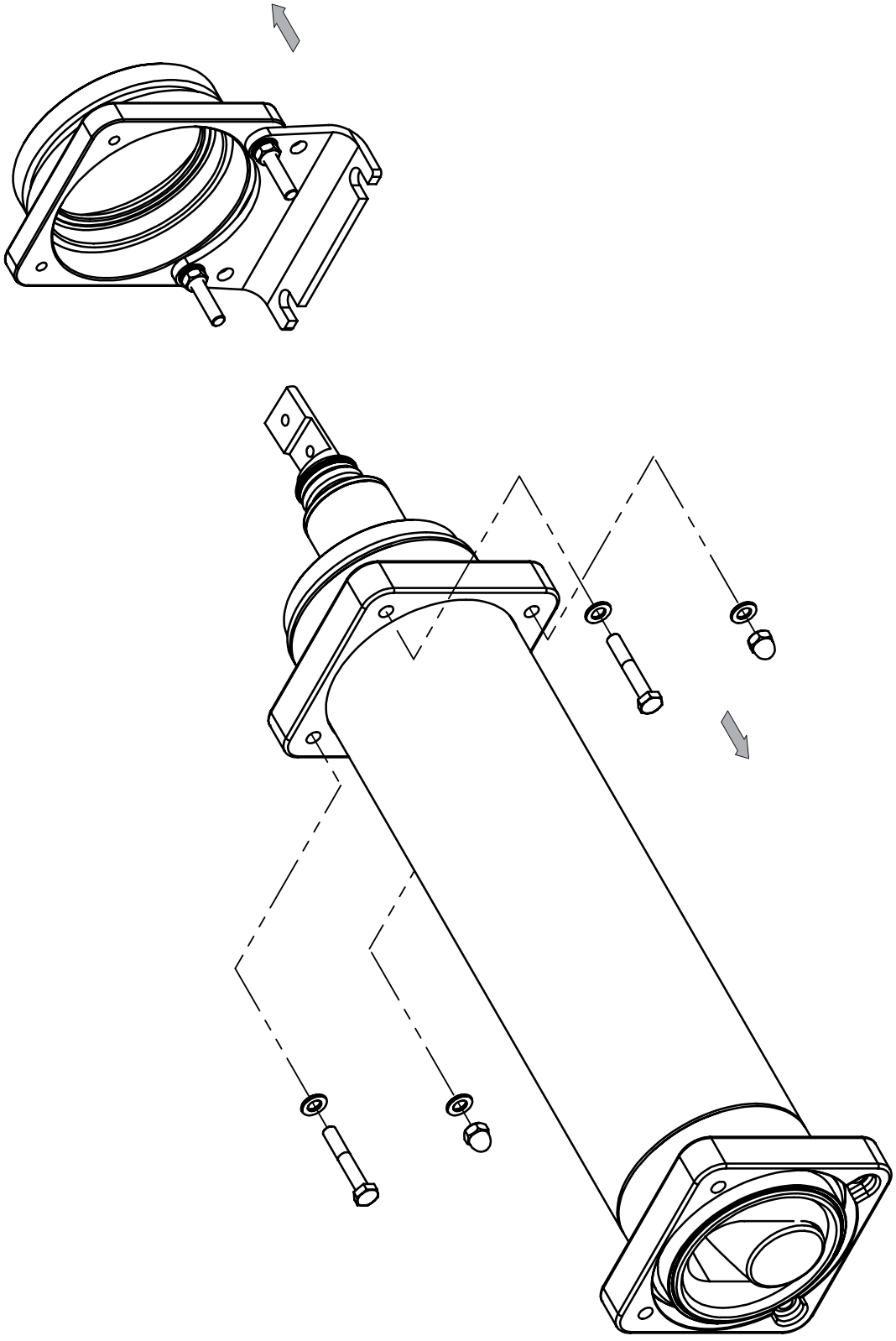

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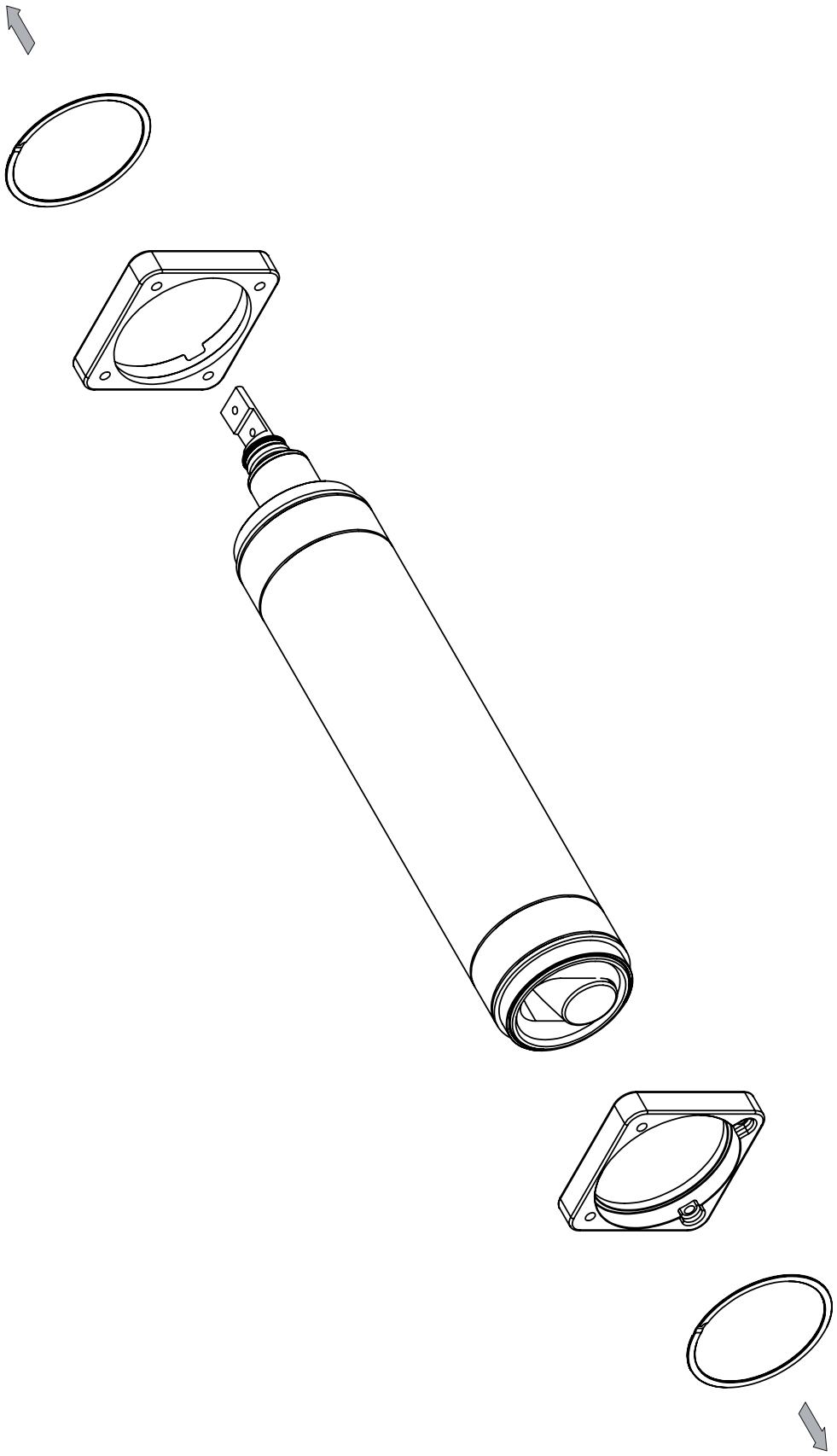

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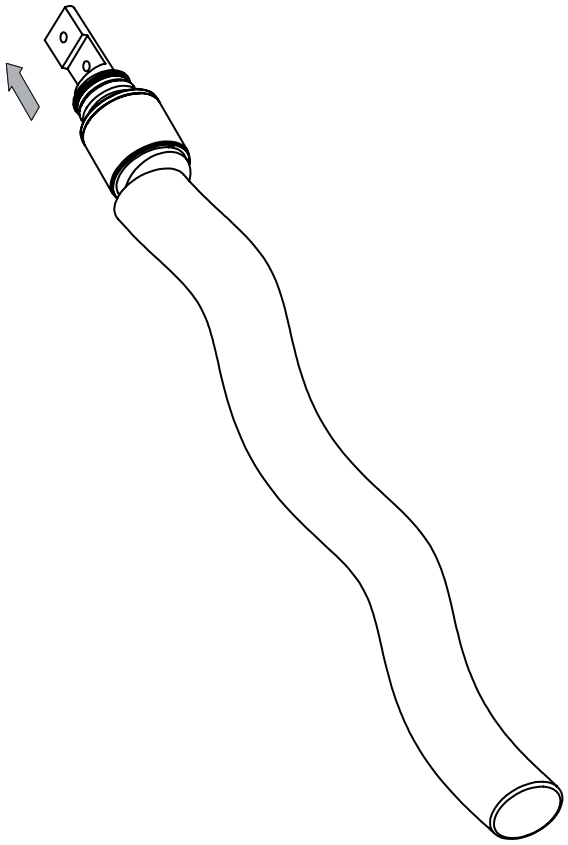

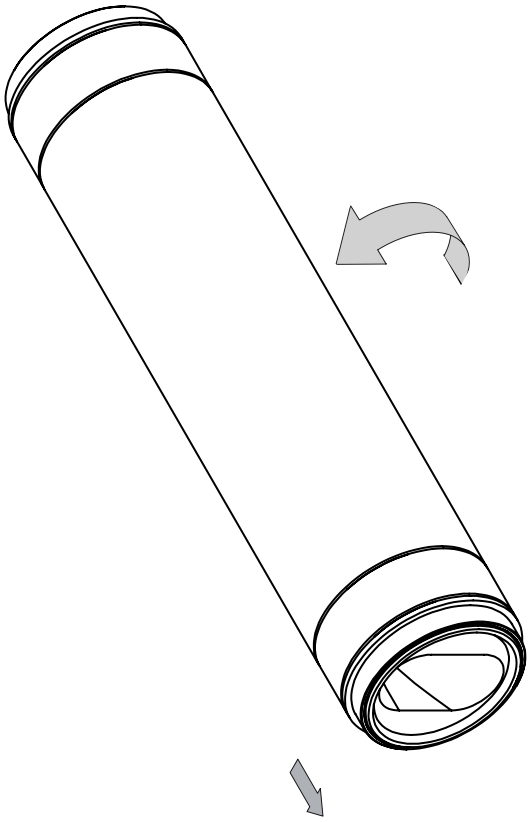

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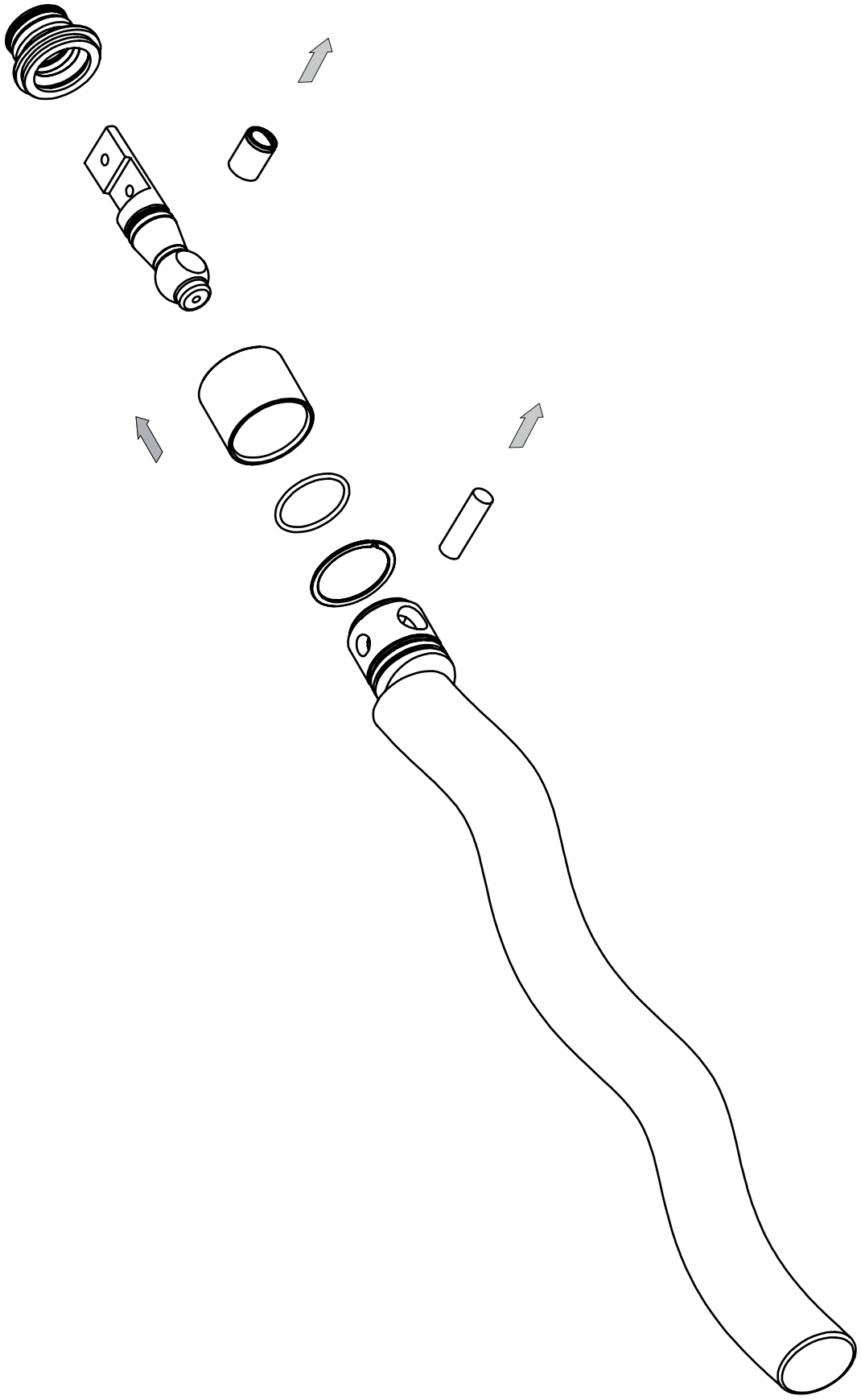

Assembly - Rotor and Stator Change

Z3*A, Z3*B & Z3*K

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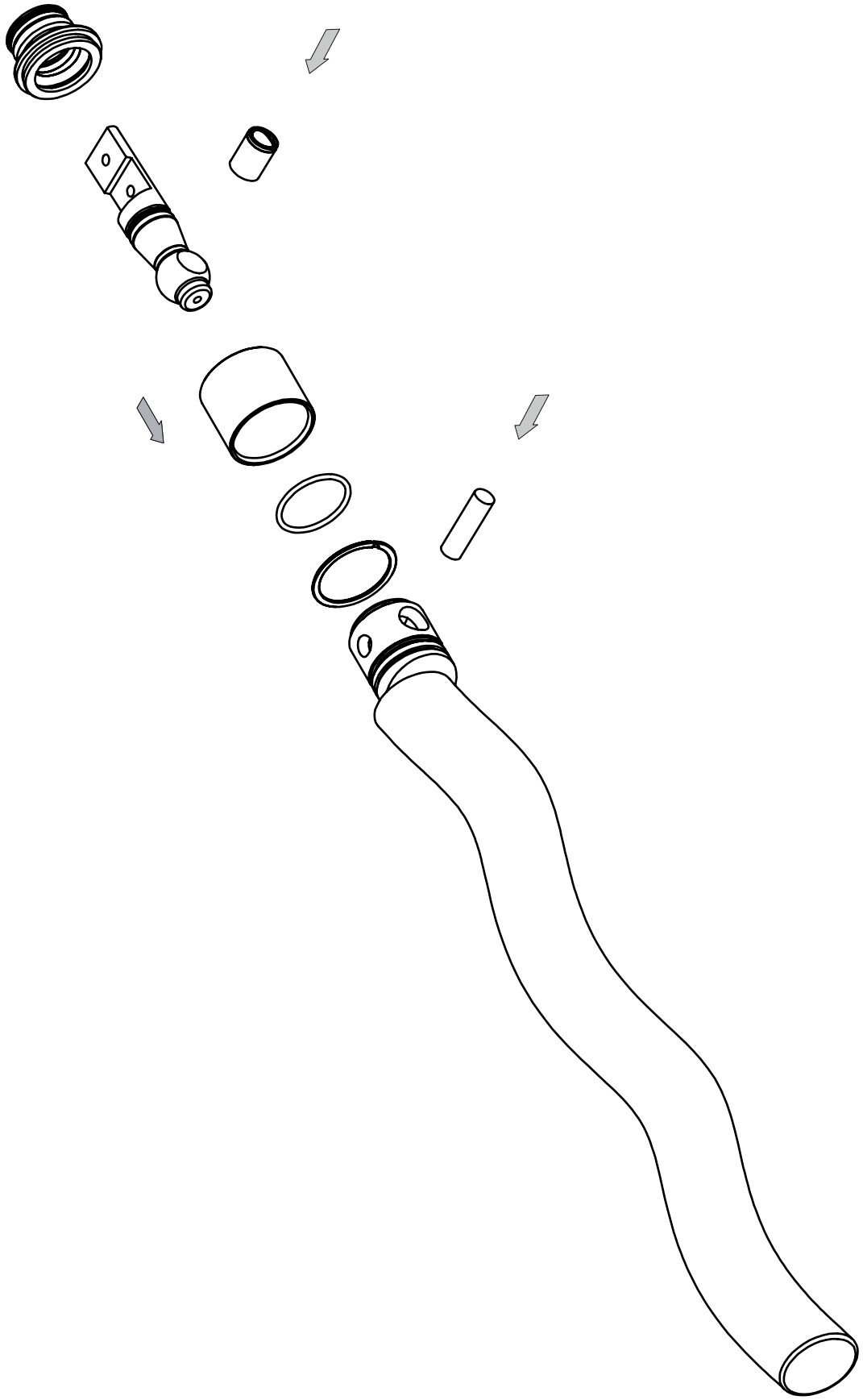

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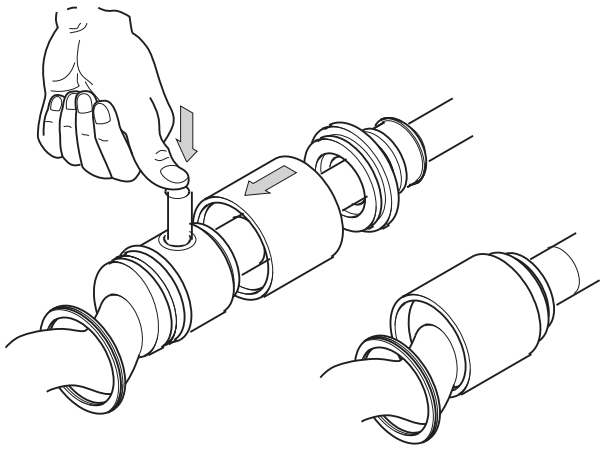

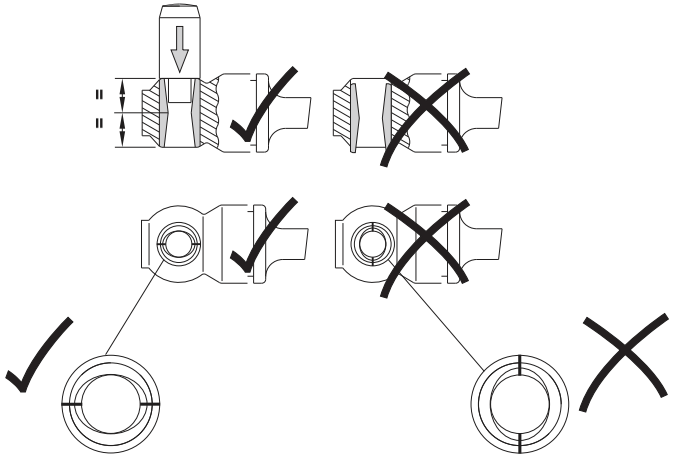

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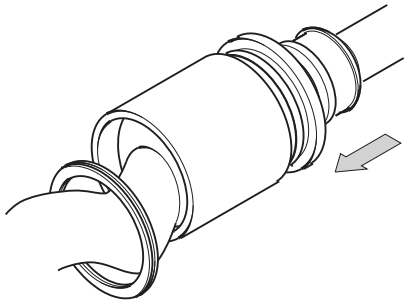

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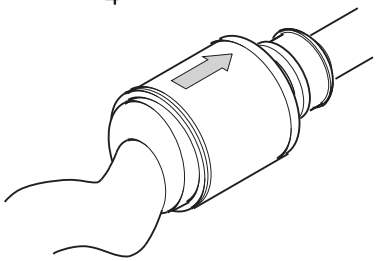

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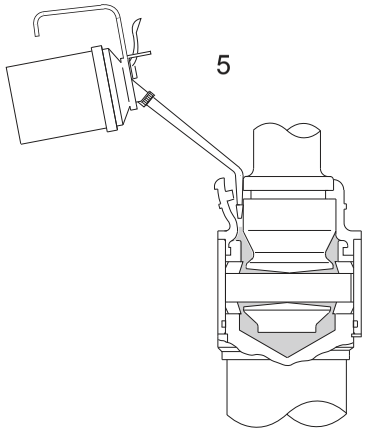

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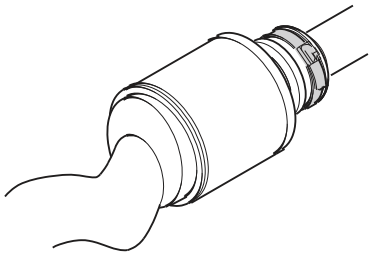

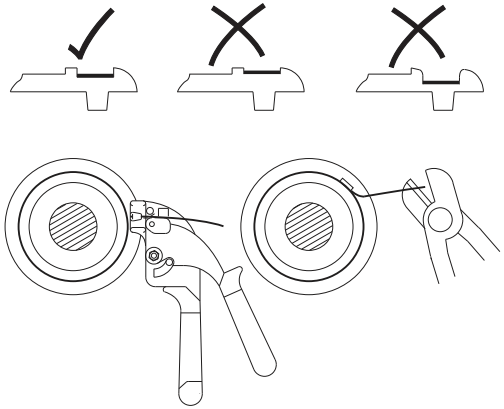

MUST BE FILLED WITH OIL IN THE VERTICAL POSITION

Correct tool available from your Supplier
Part Number: 80D1331

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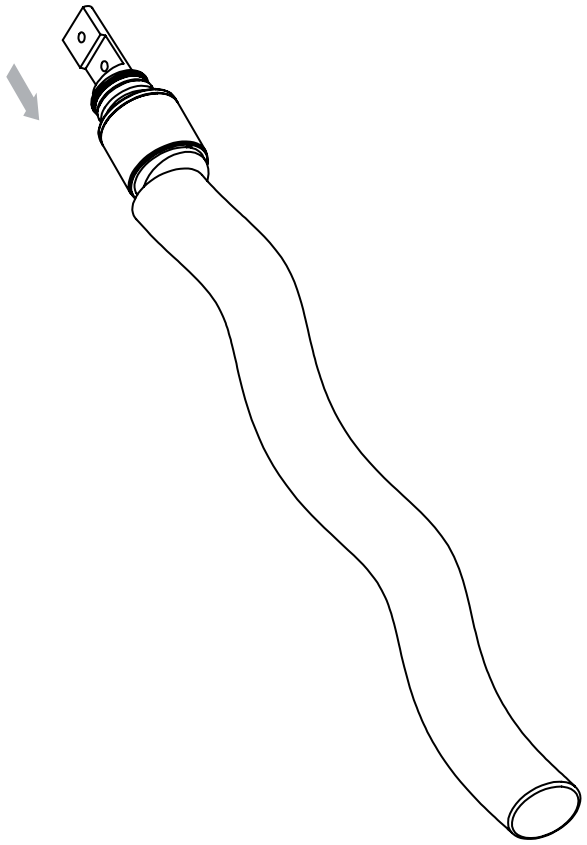

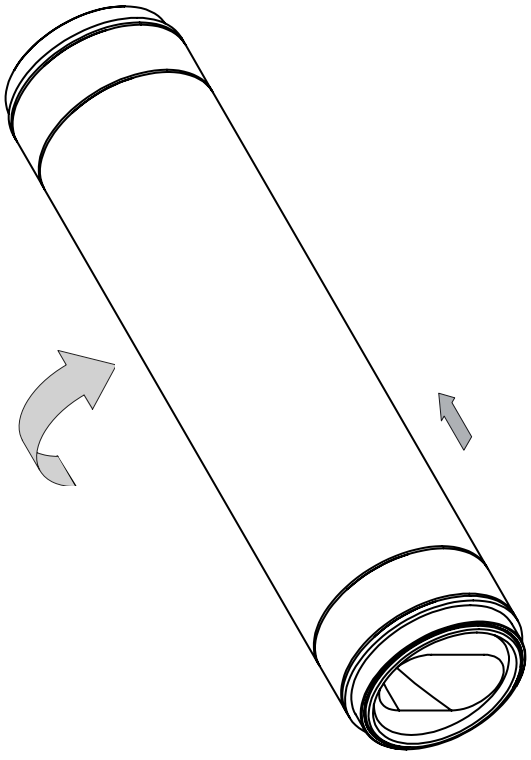

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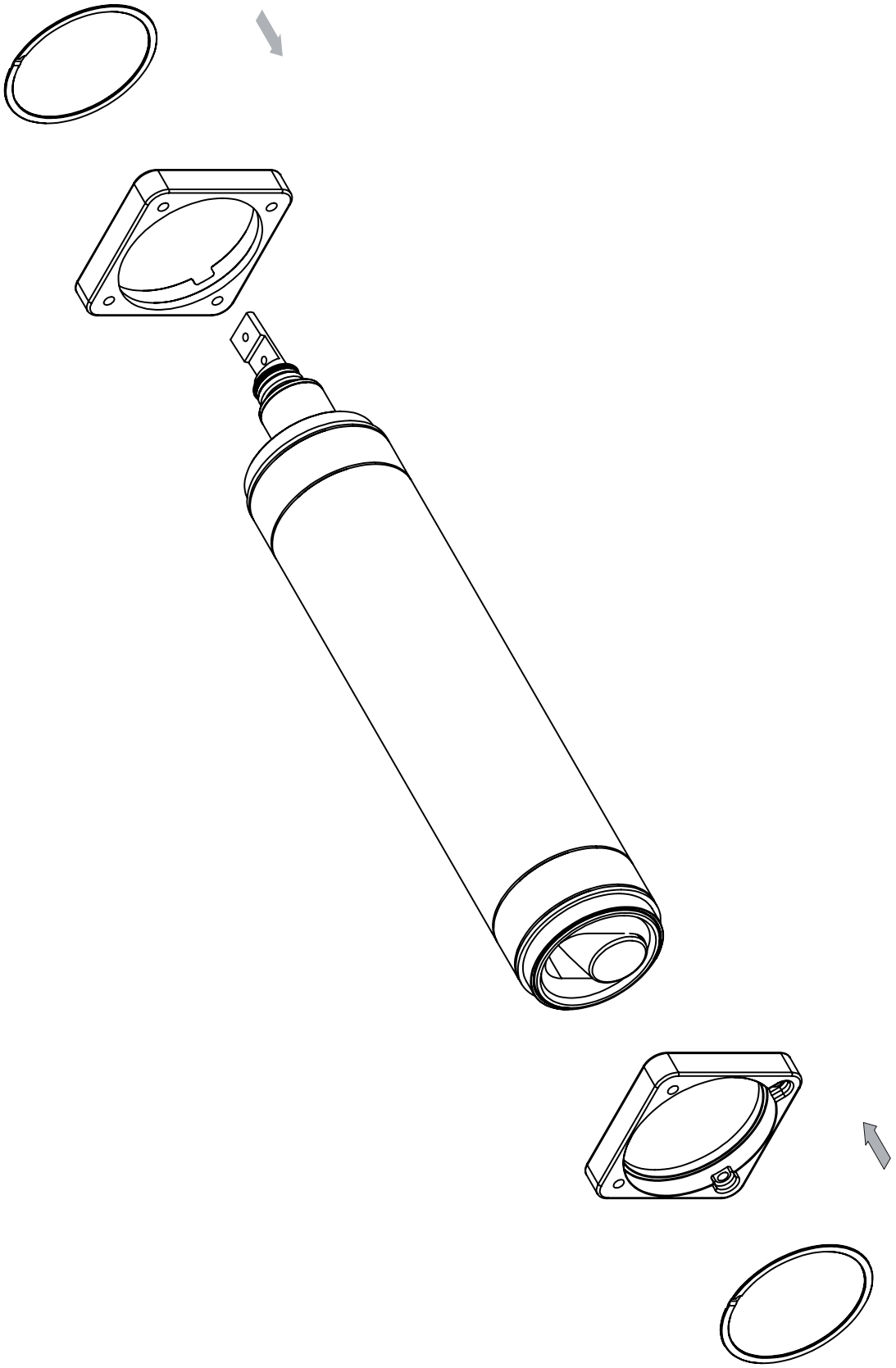

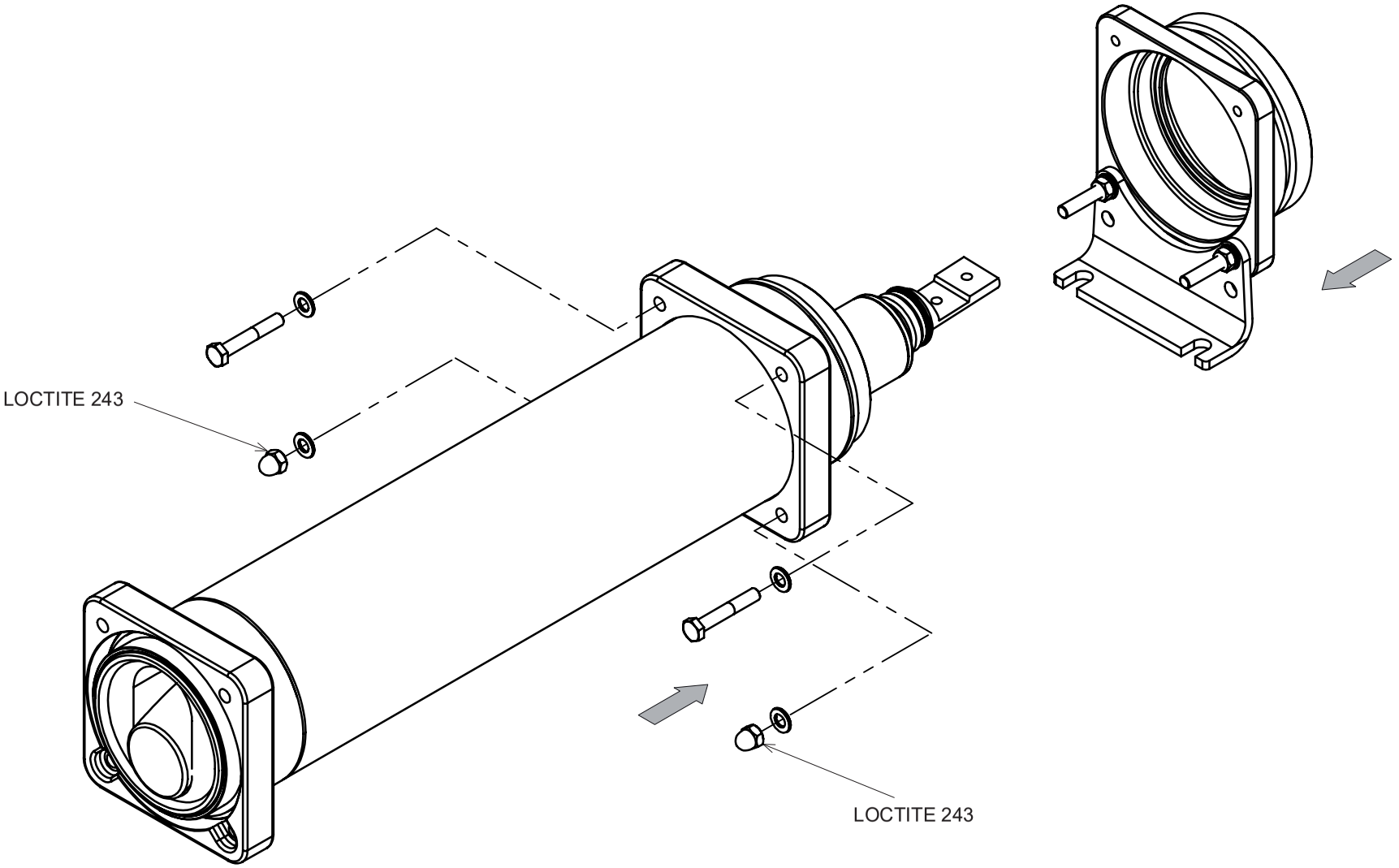
LOCTITE 243
LOCTITE 243

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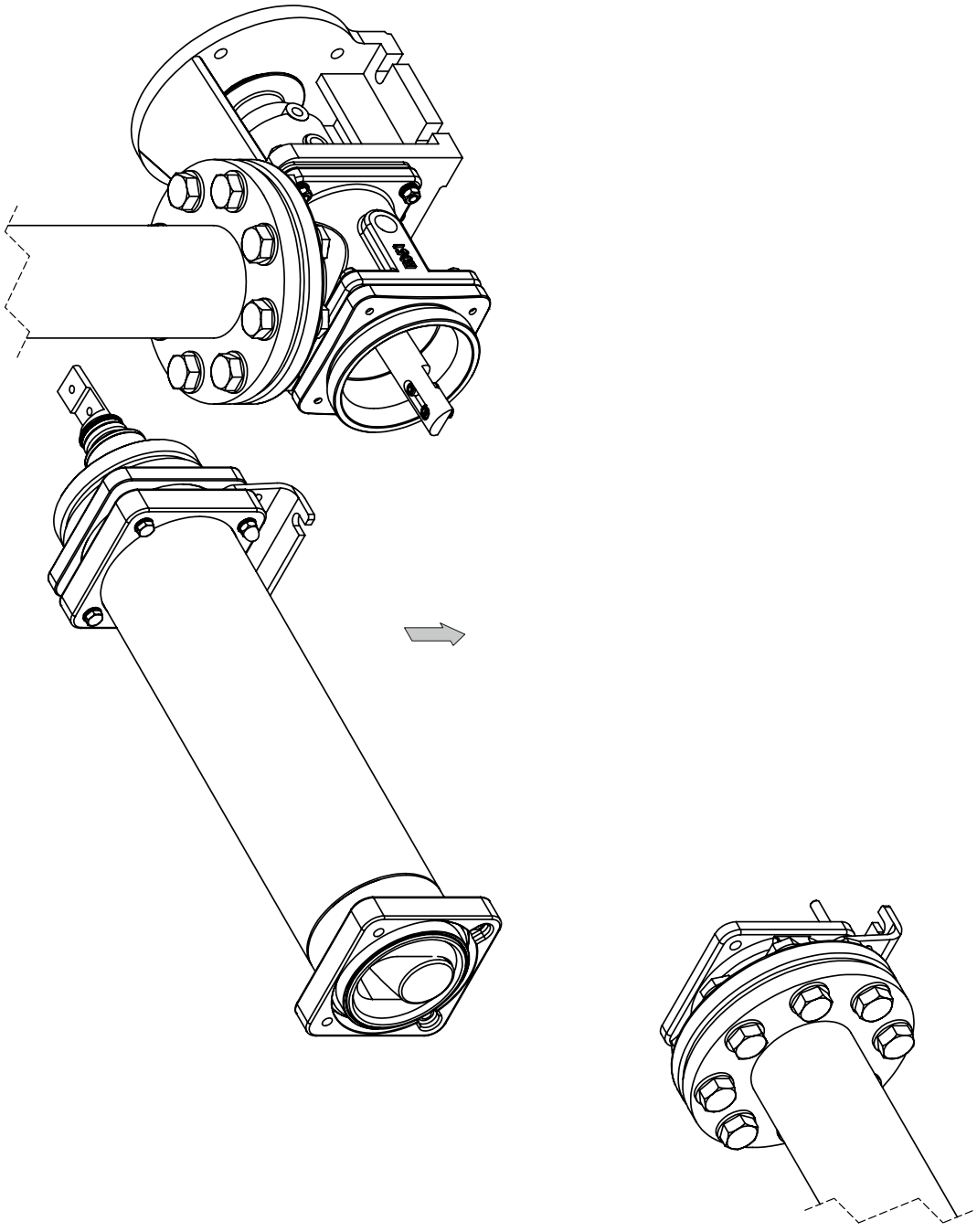

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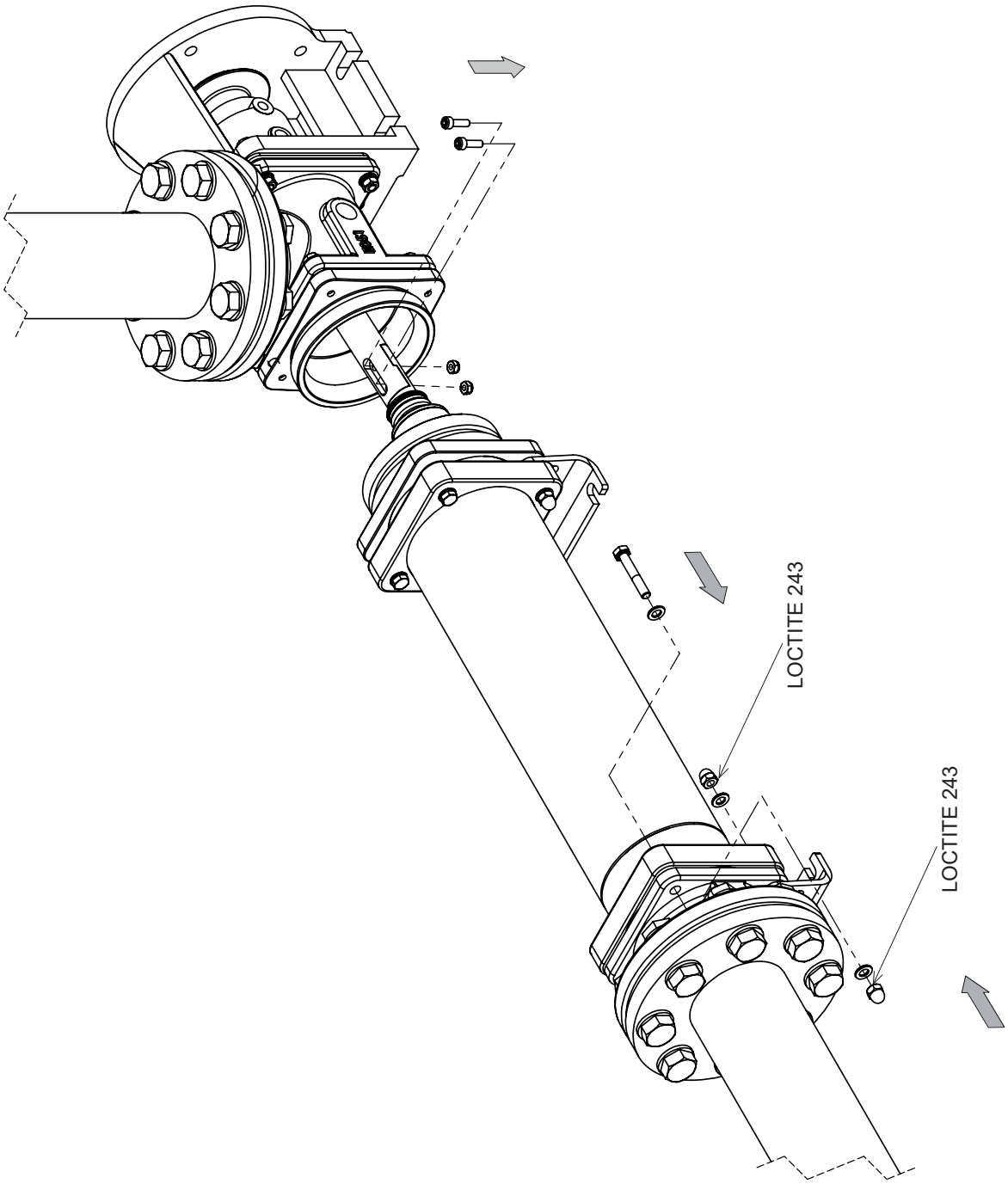

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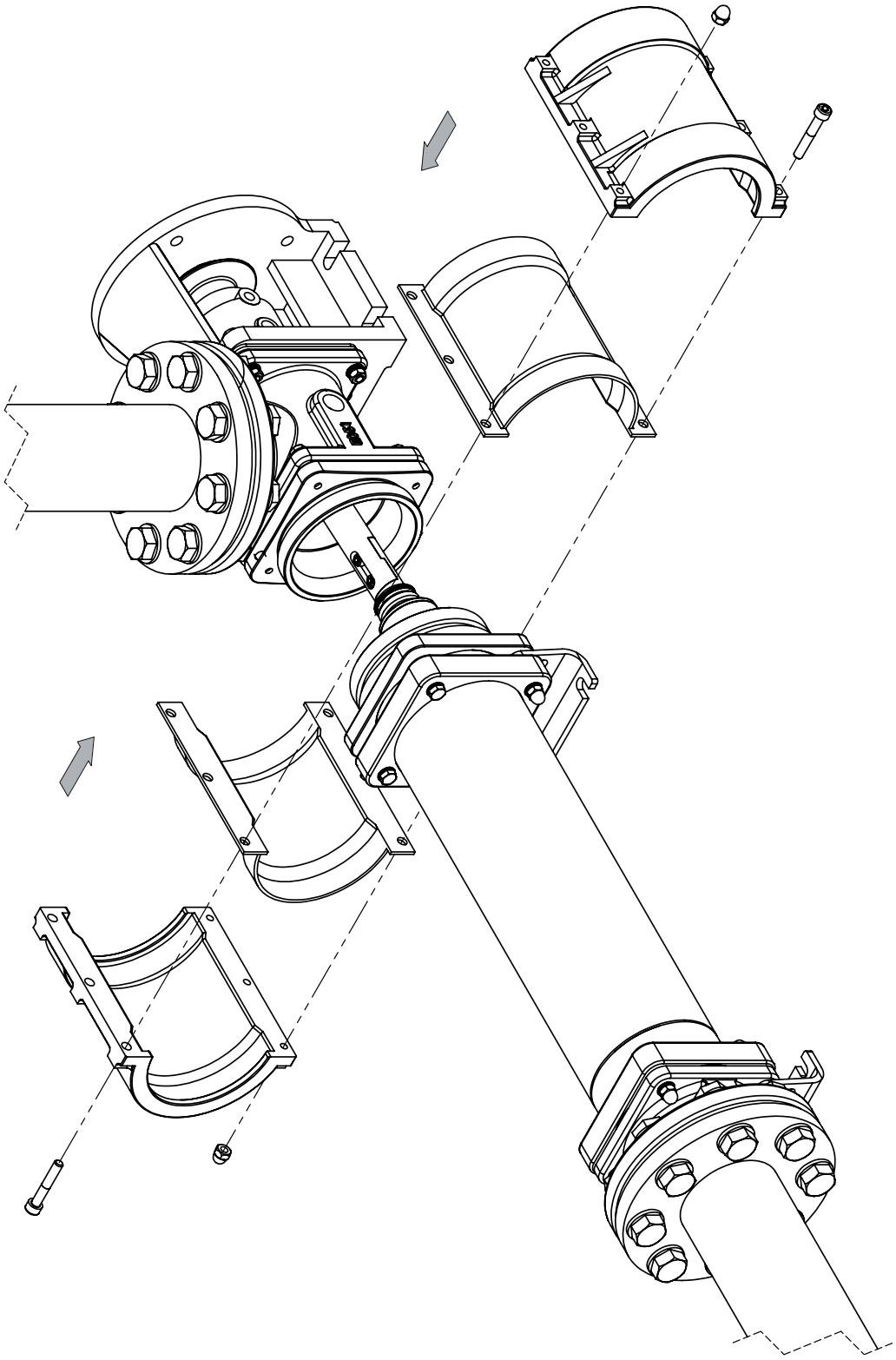

(* Refer to torque settings table)

Complete Dismantling

Z3*A, Z3*B & Z3*K

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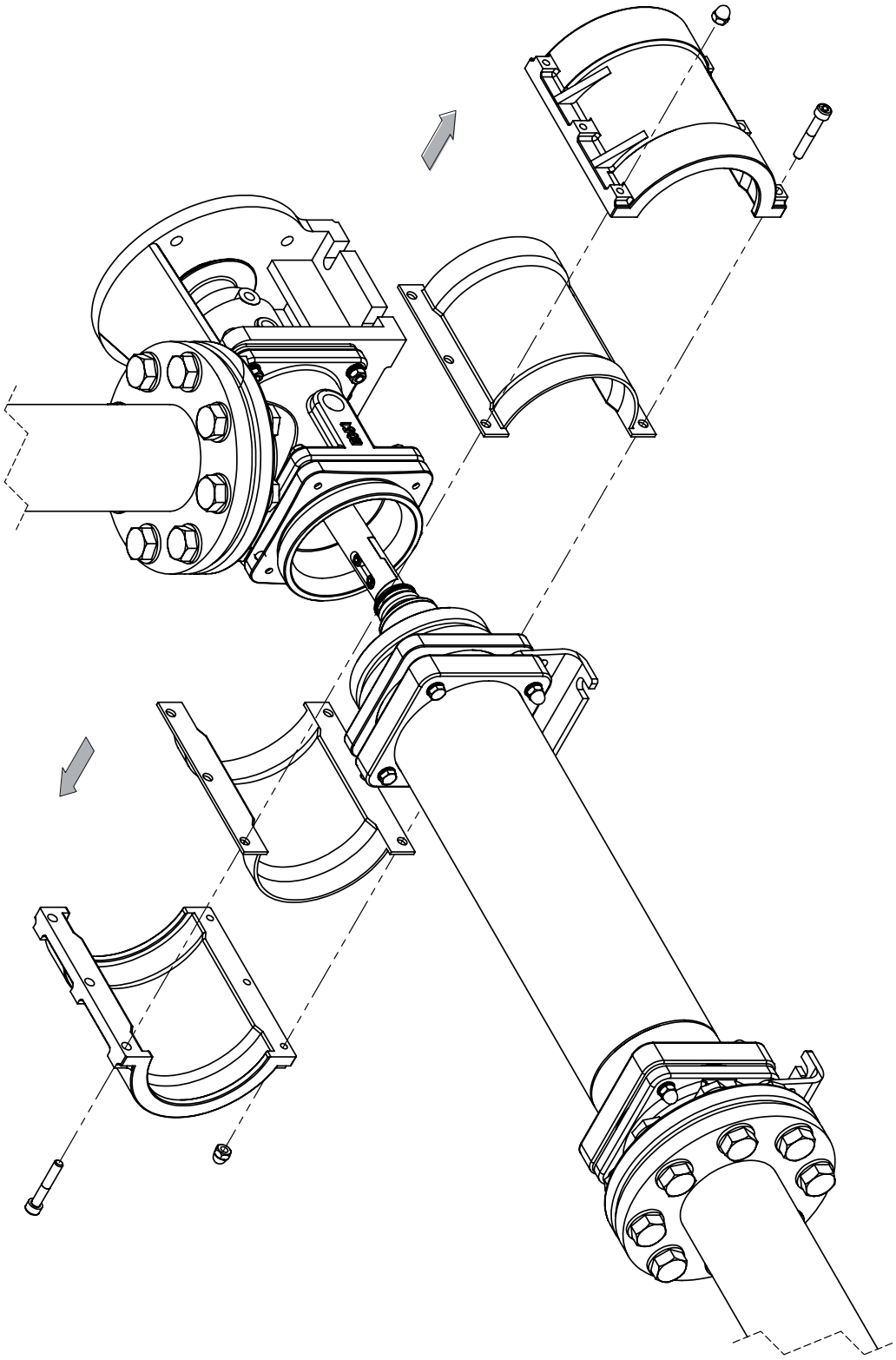

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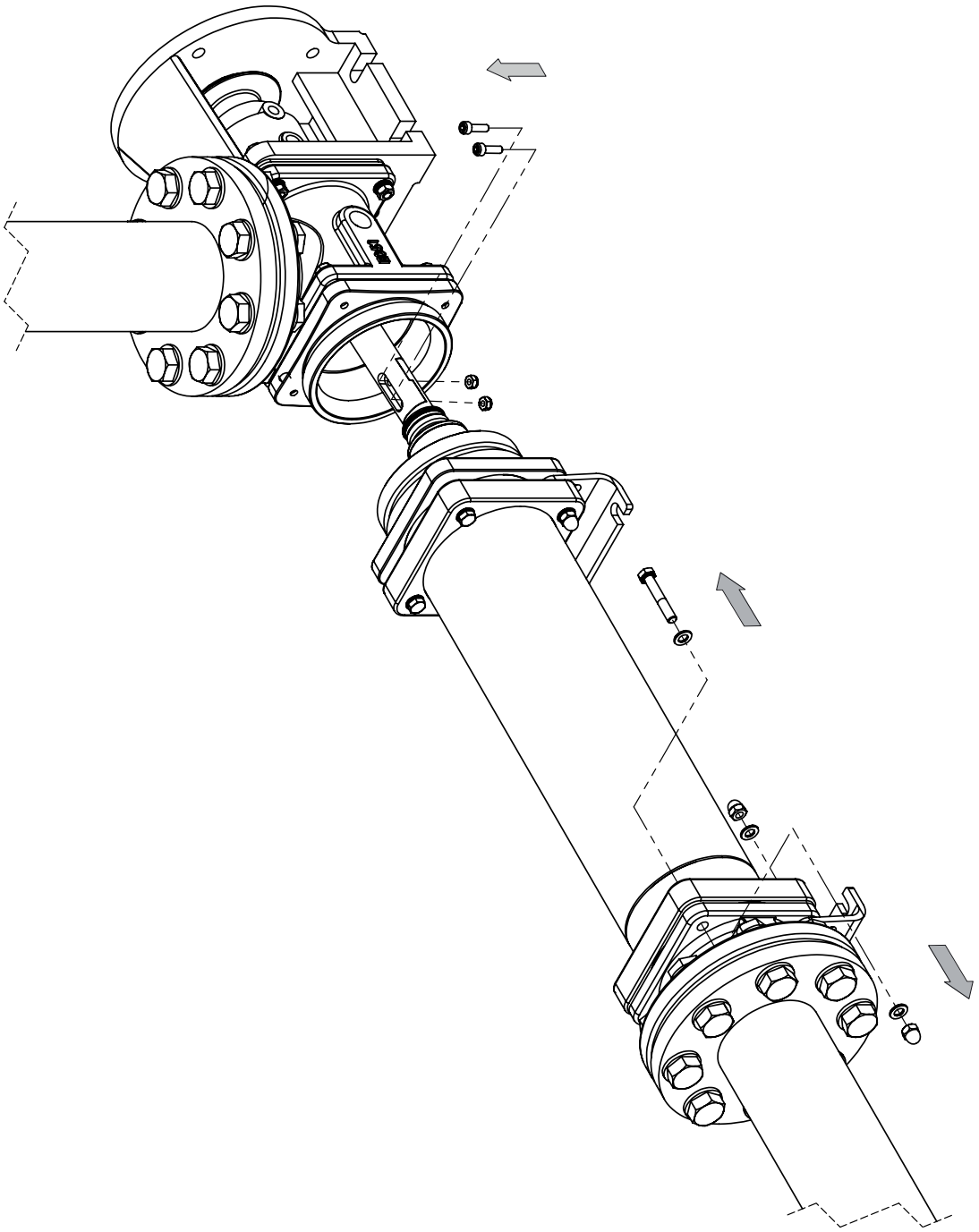

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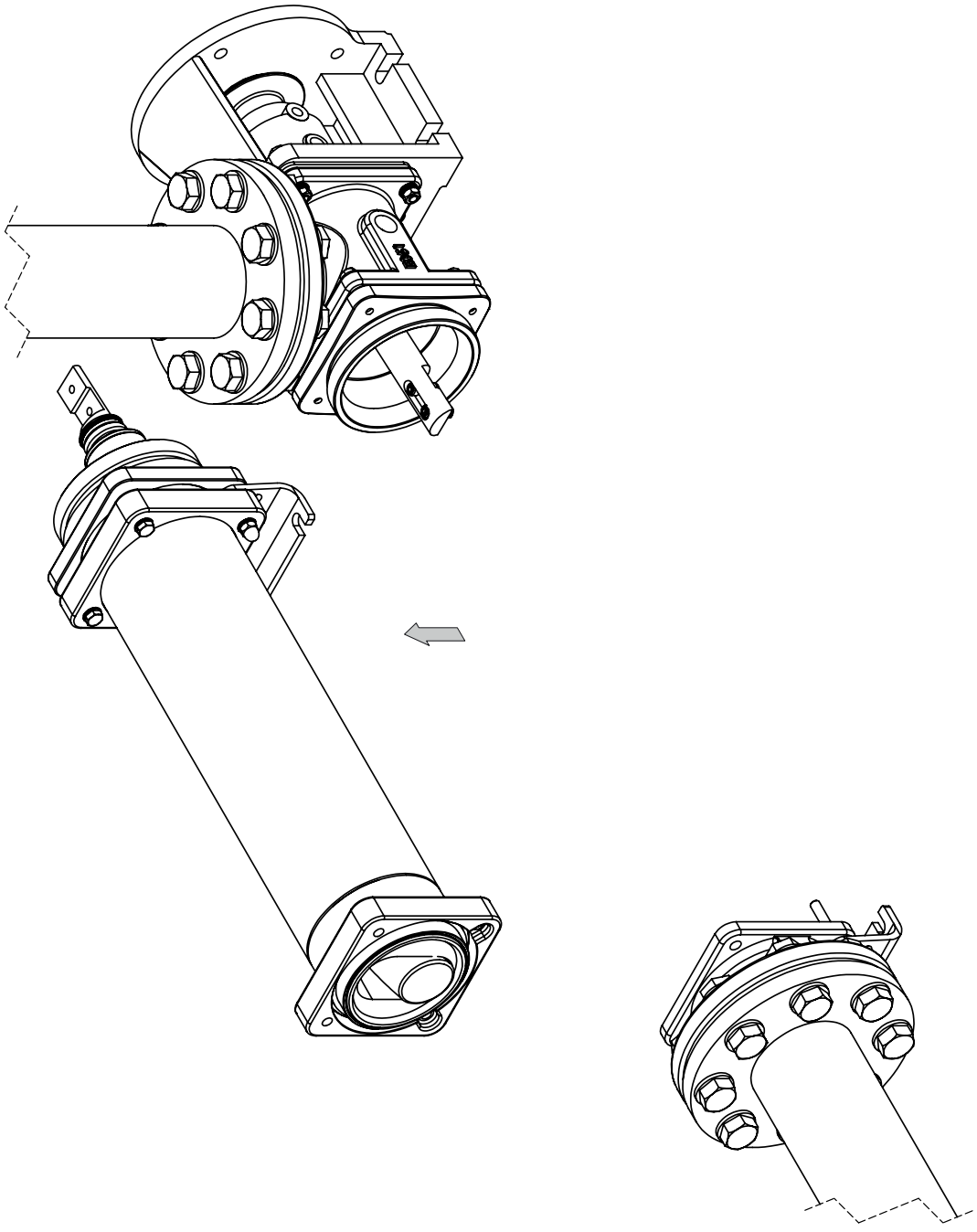

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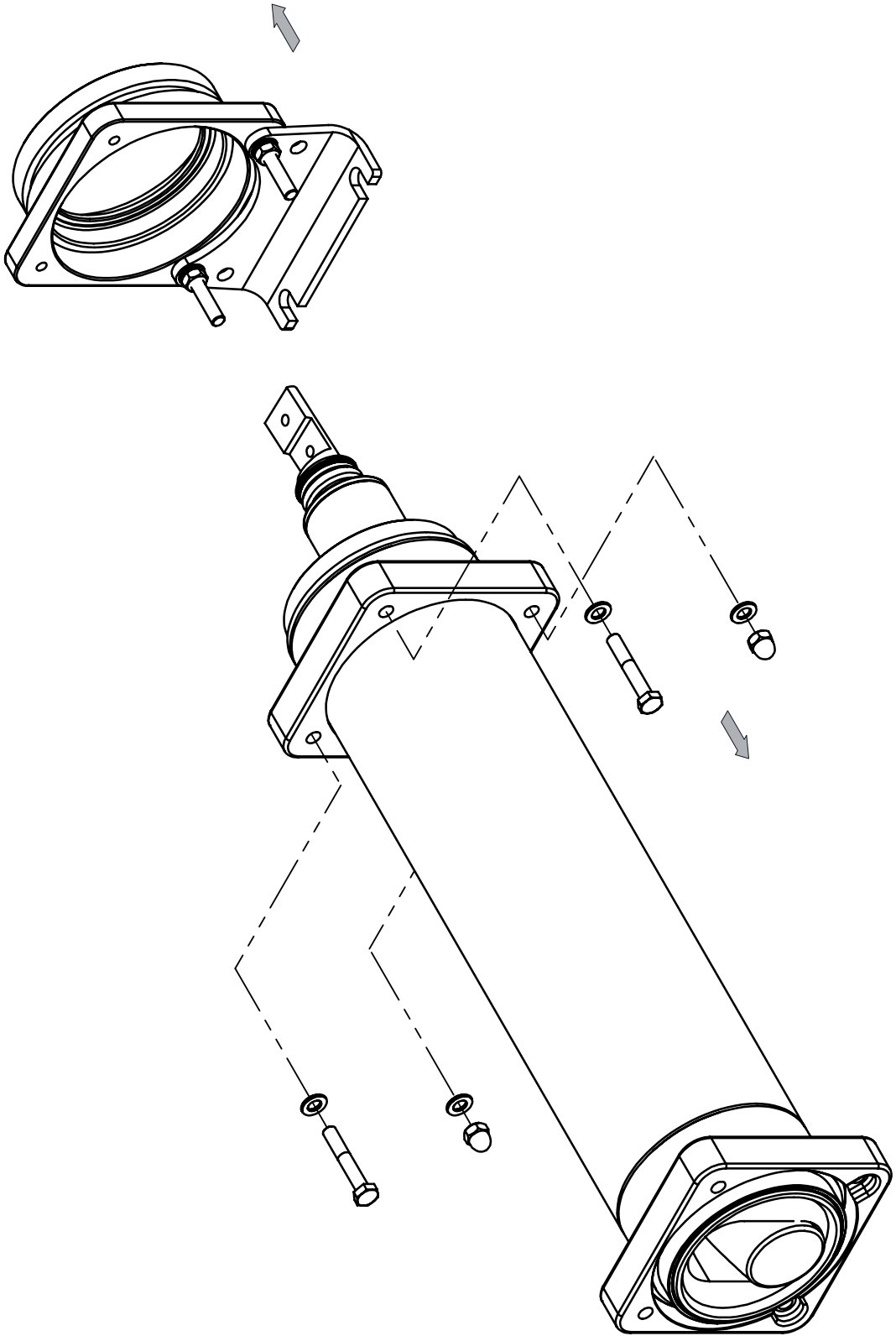

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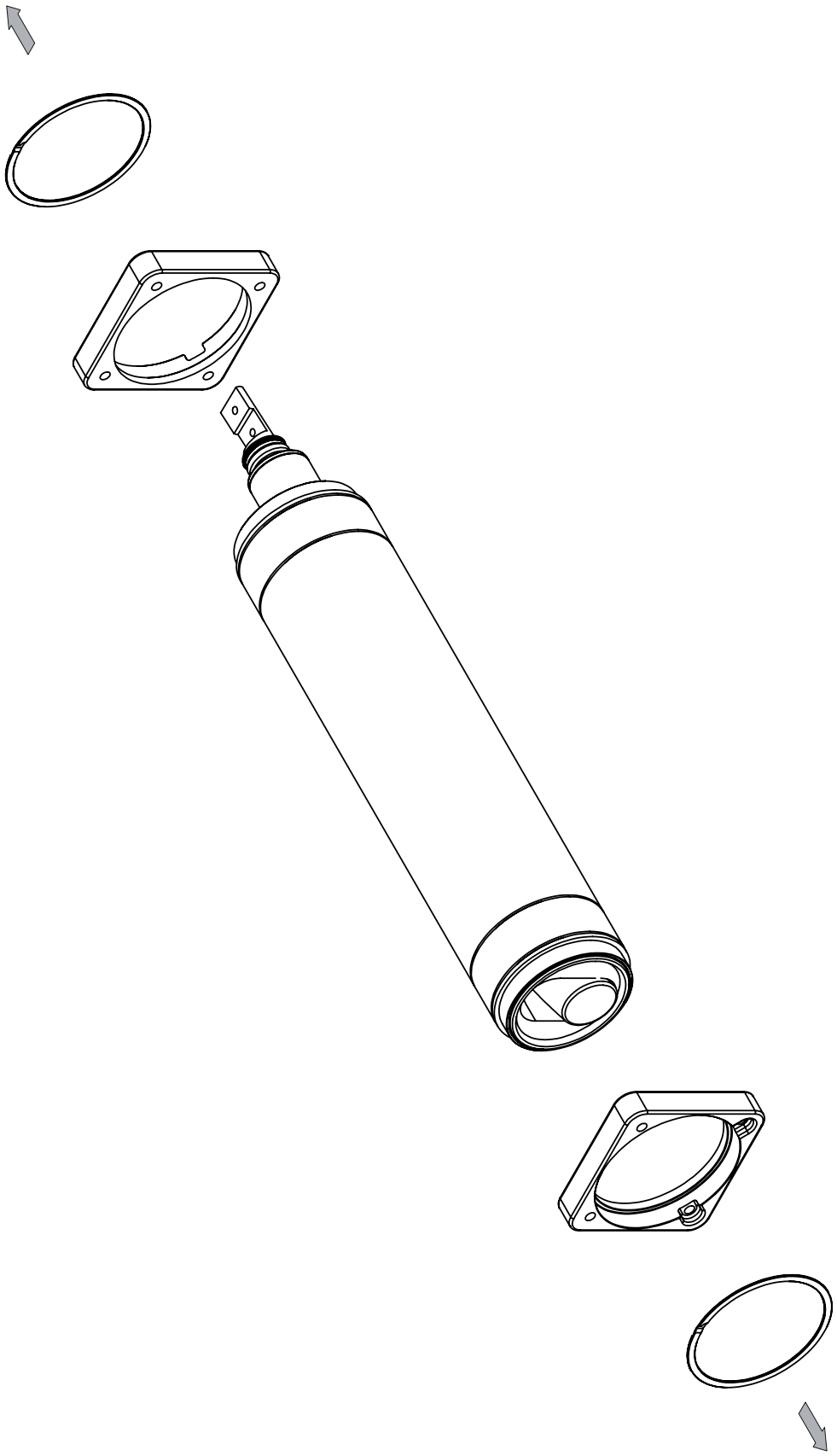

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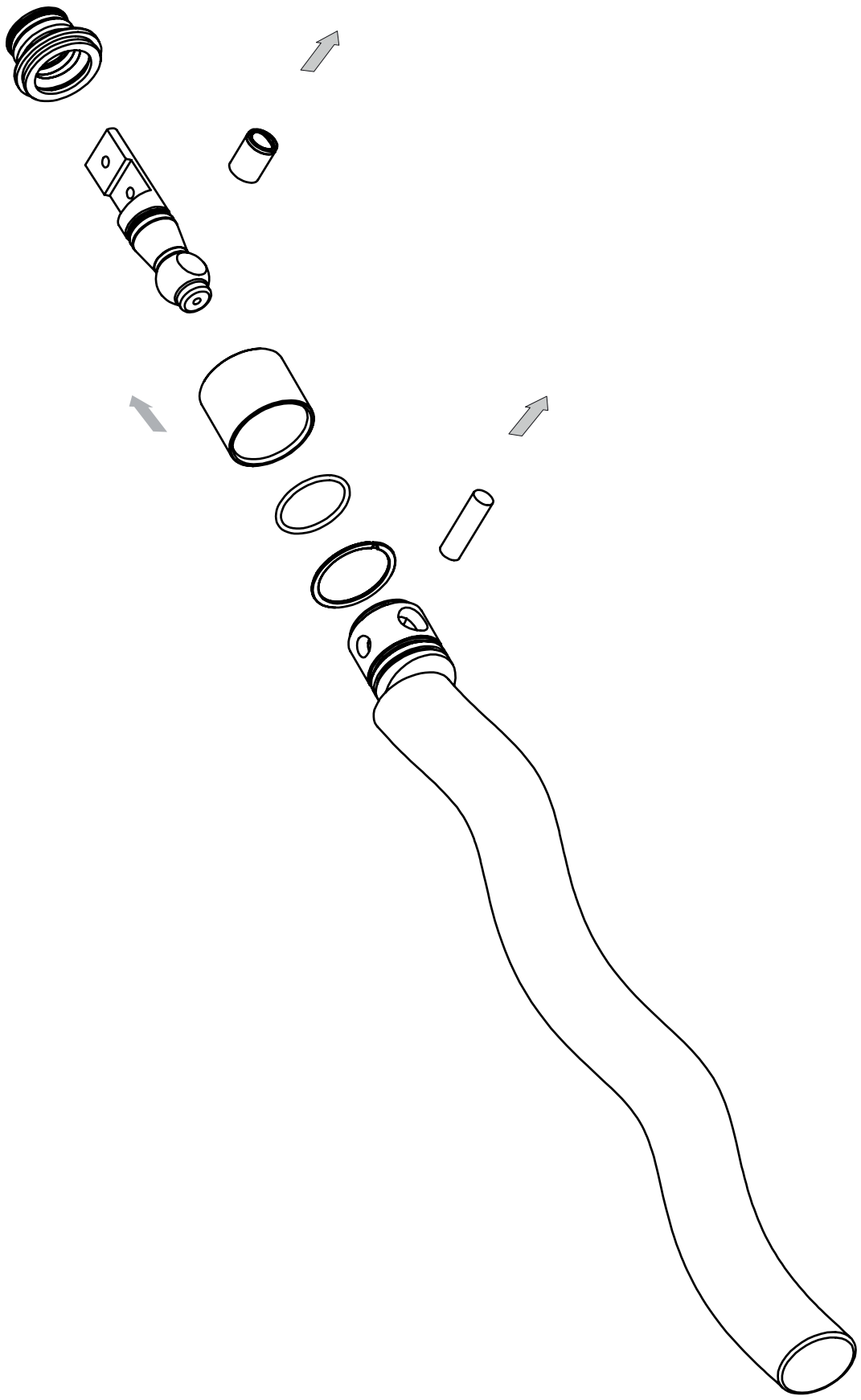

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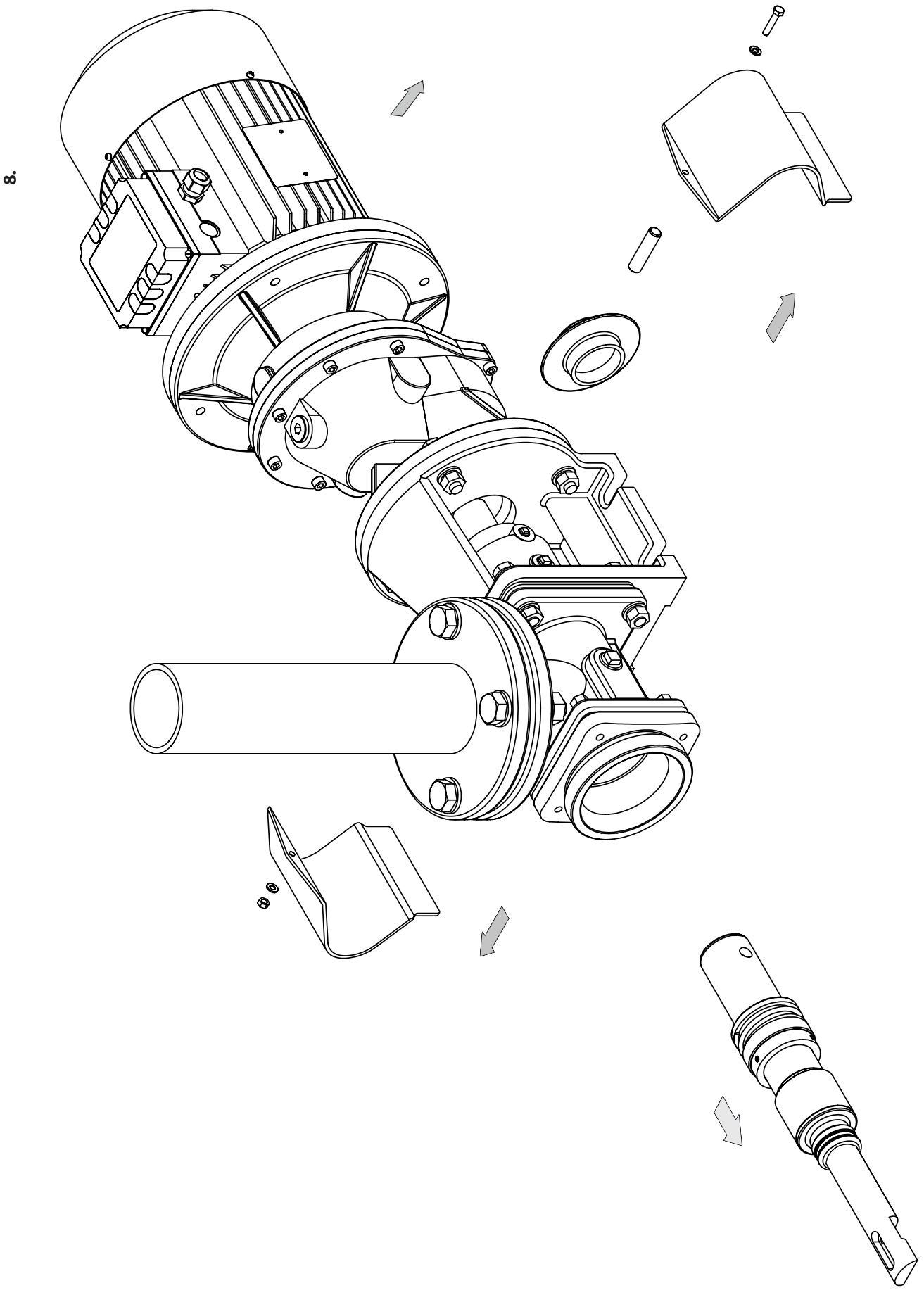
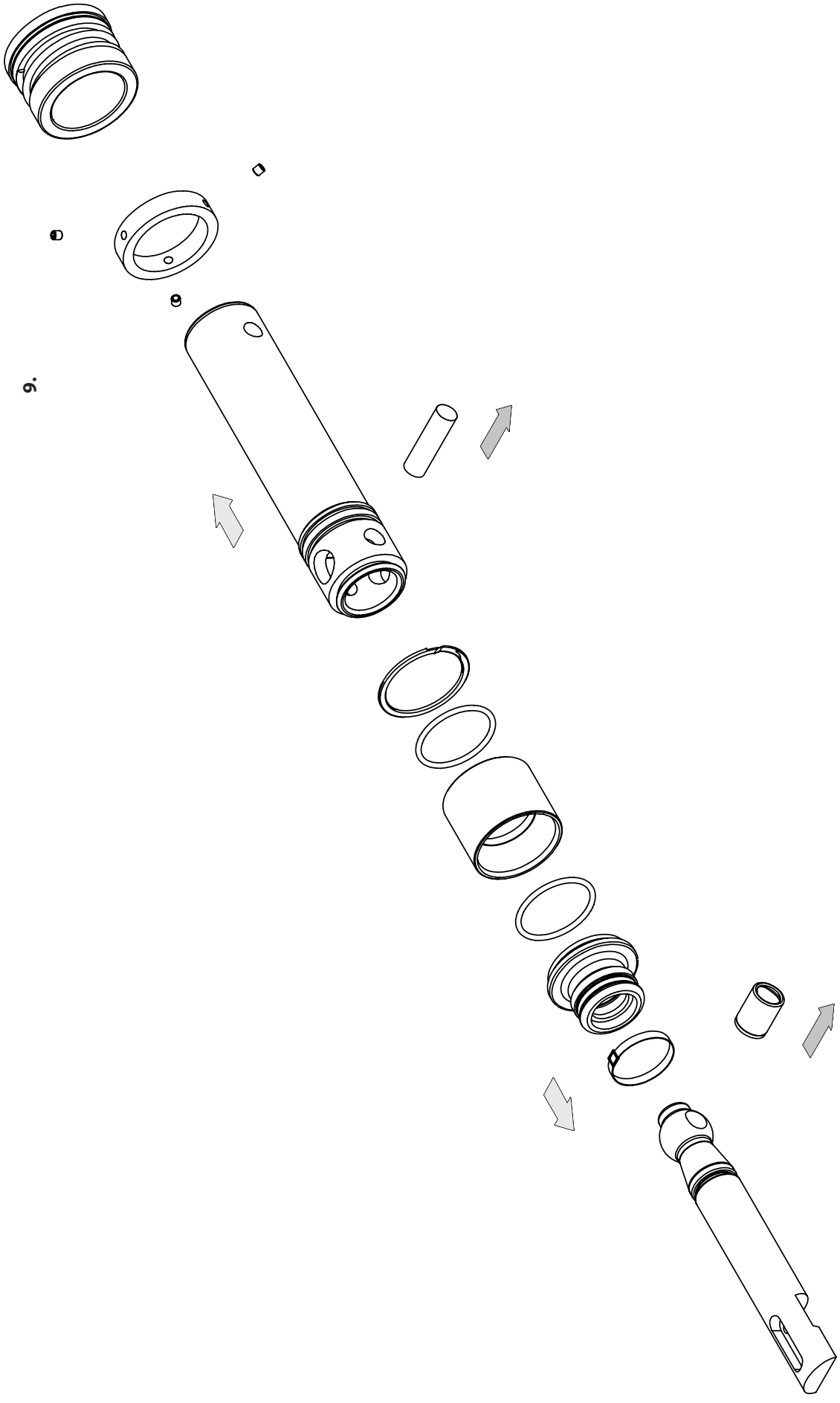
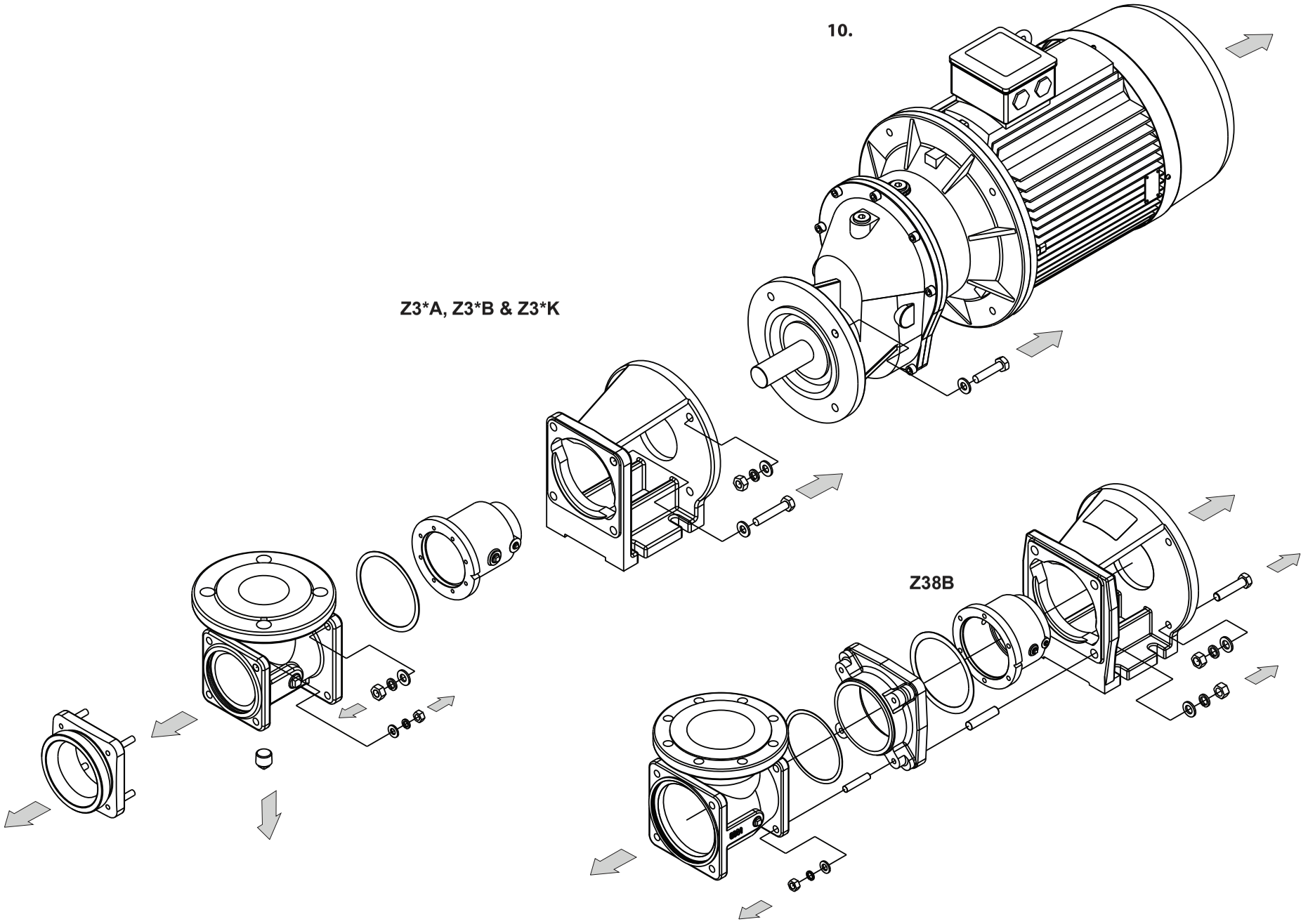
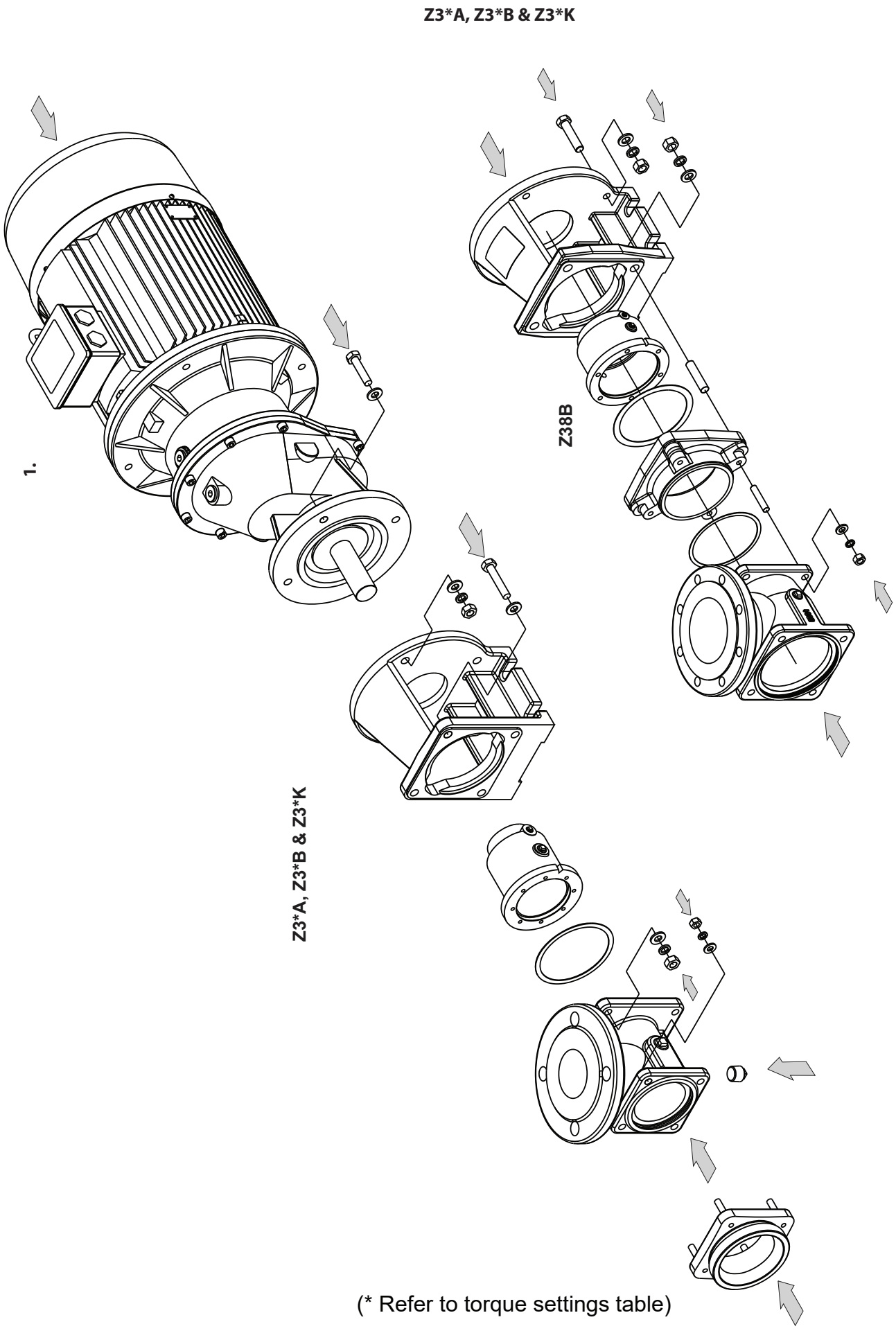


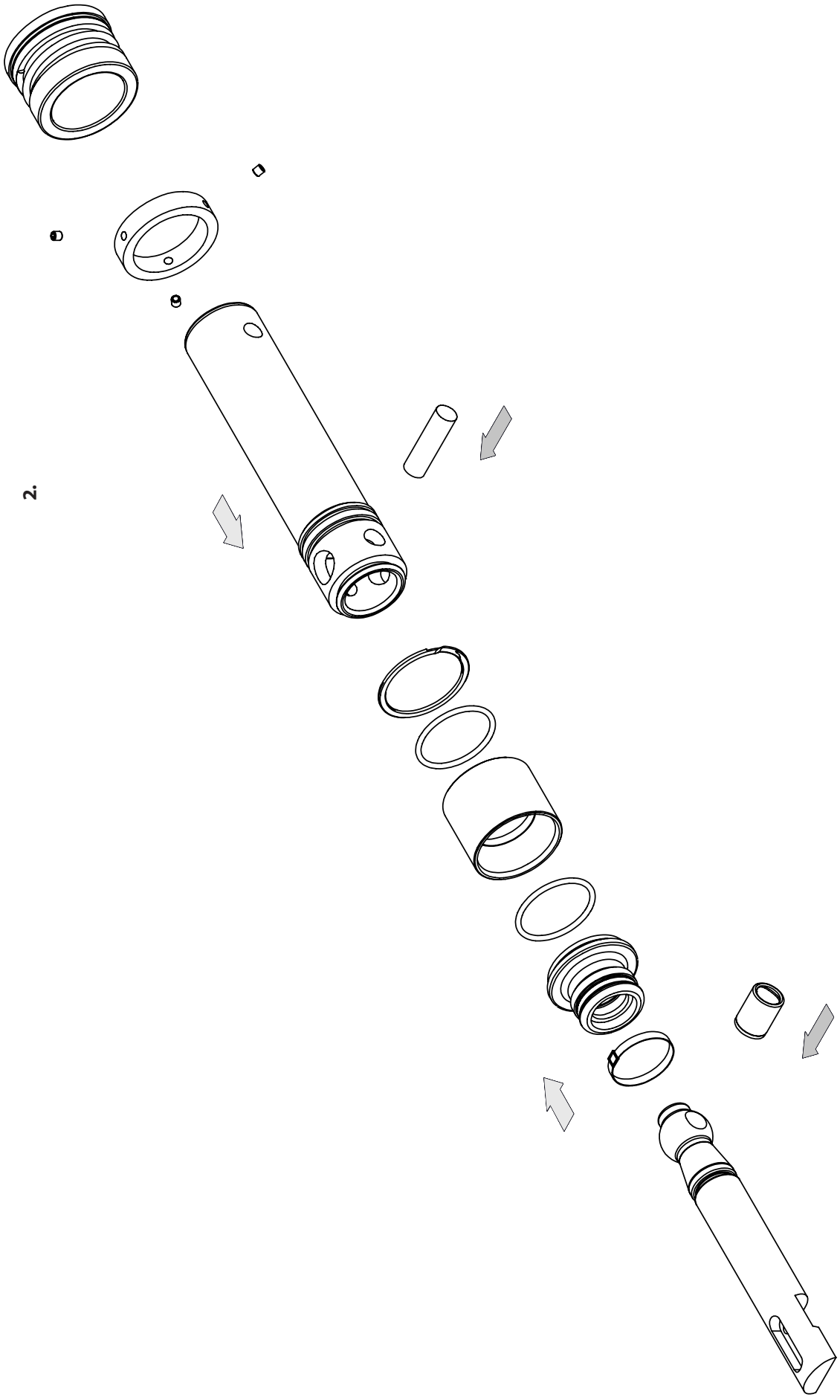



10.
Z3*A, Z3*B & Z3*K
Z38B

Complete Assembly



(* Refer to torque settings table)



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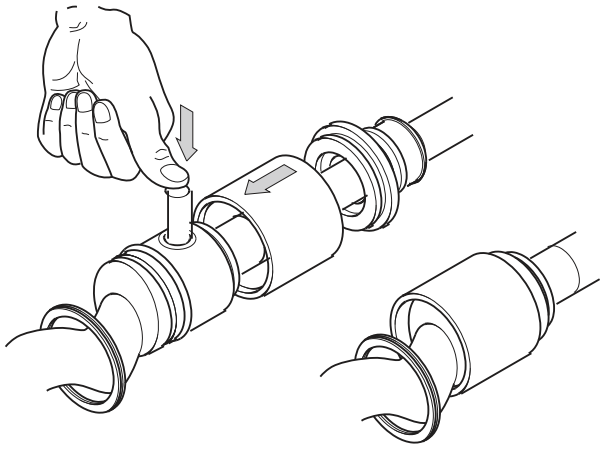

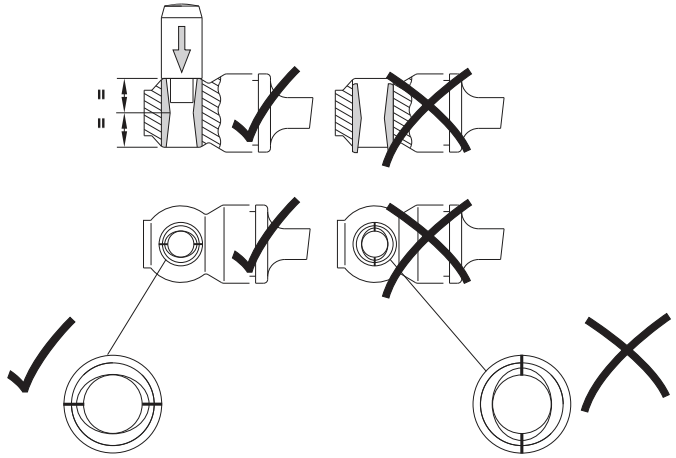

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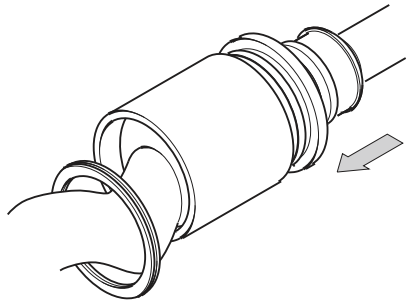

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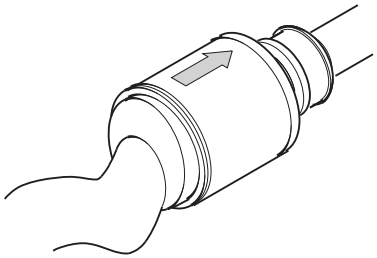

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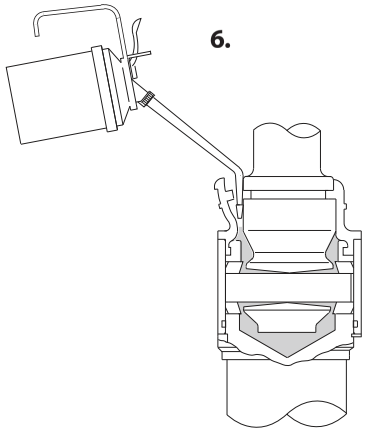

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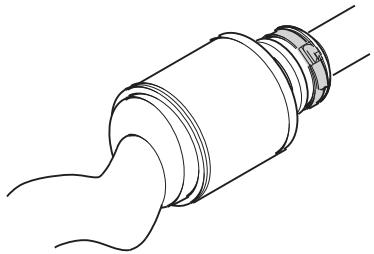

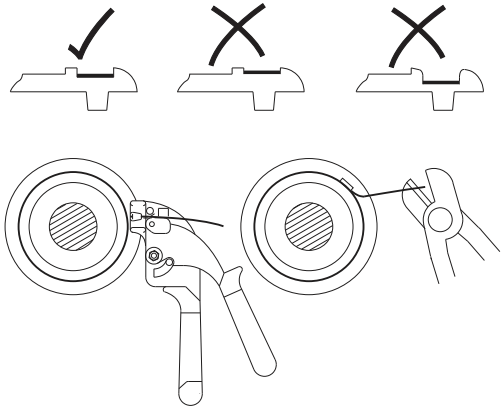

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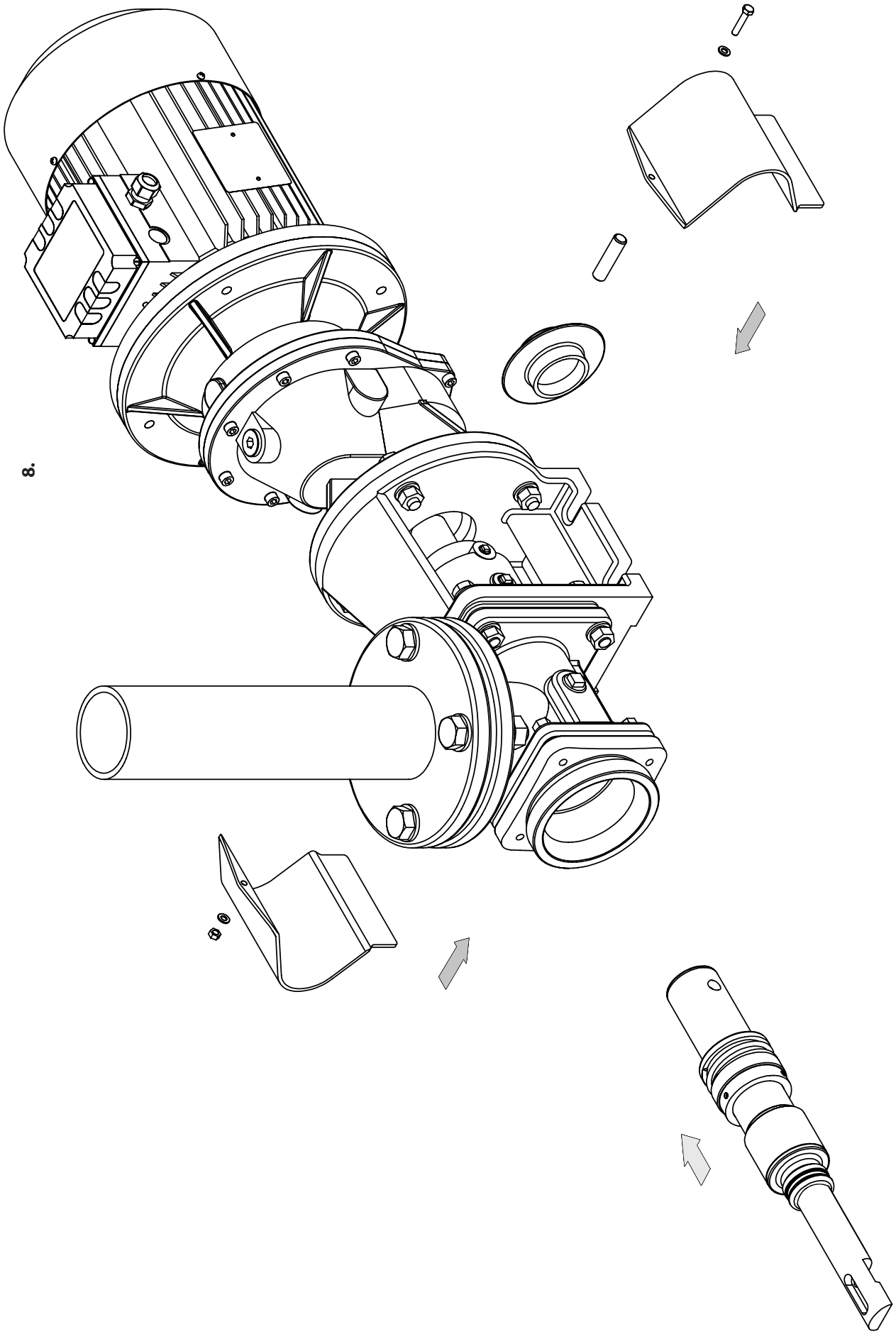

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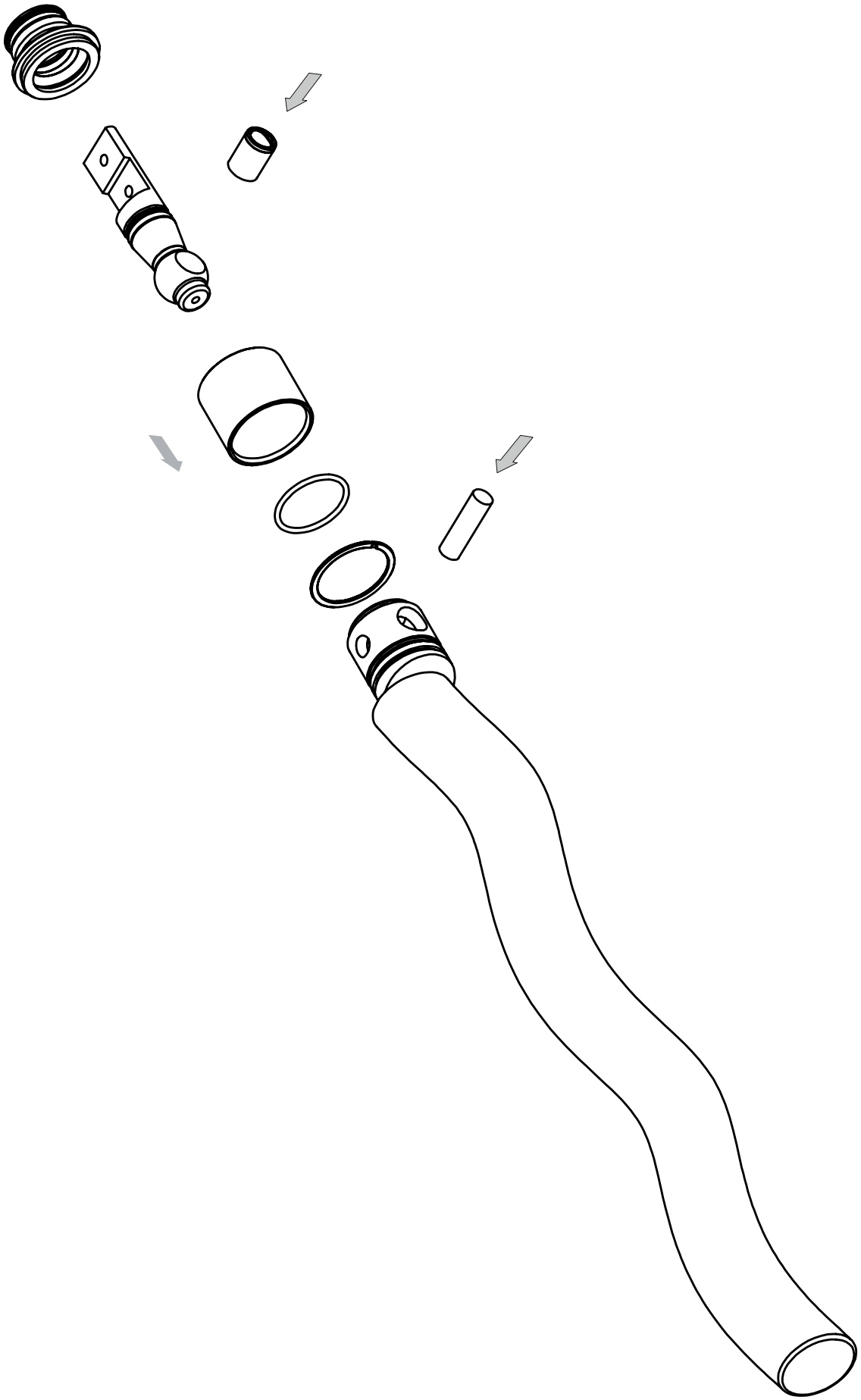

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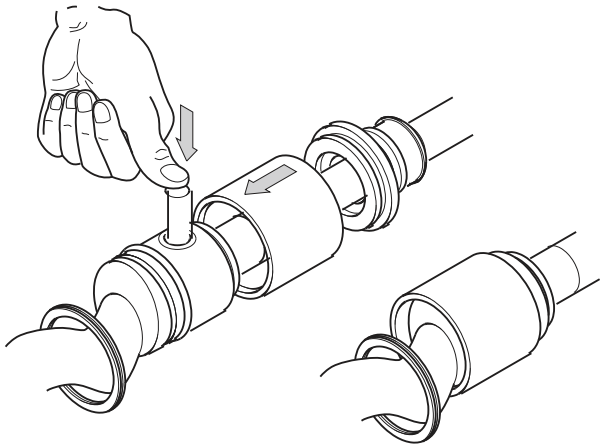

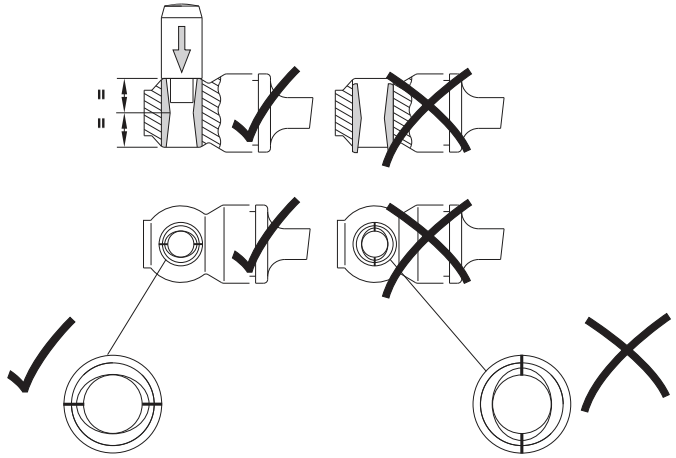

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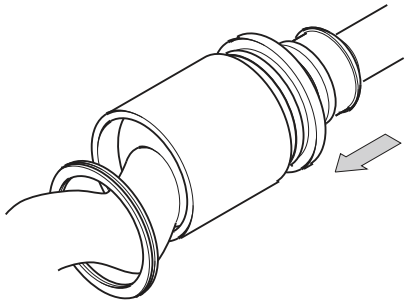

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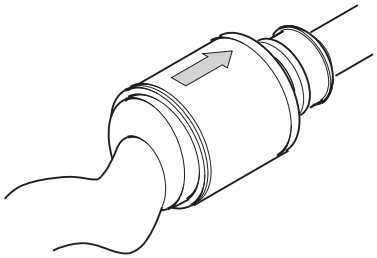

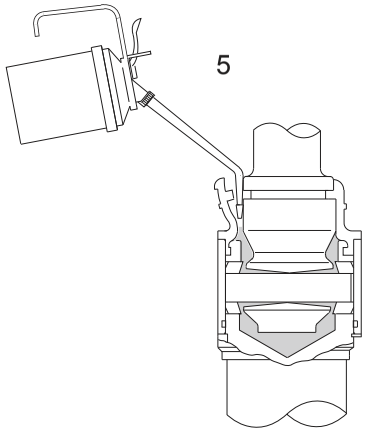

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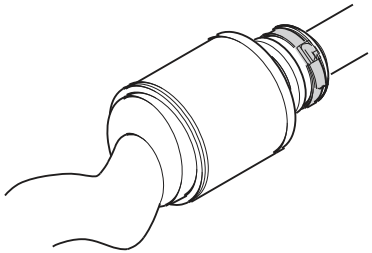
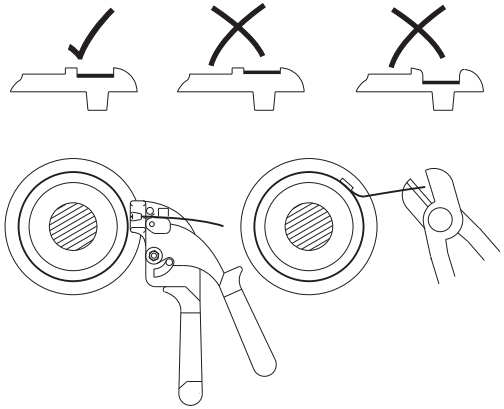


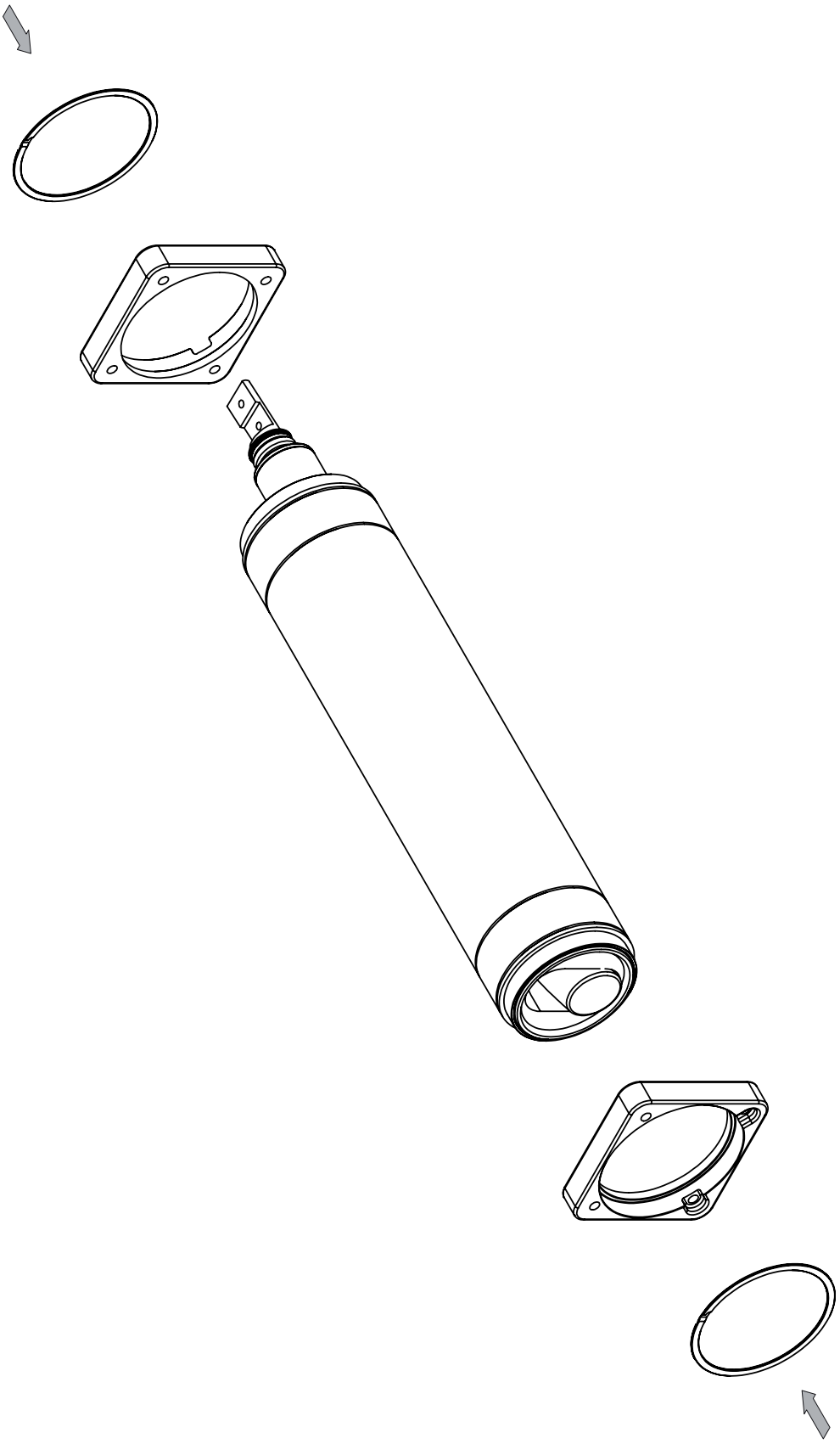


MUST BE FILLED WITH OIL IN THE VERTICAL POSITION

Correct tool available from your Supplier
Part Number: 80D1331

15.

16.



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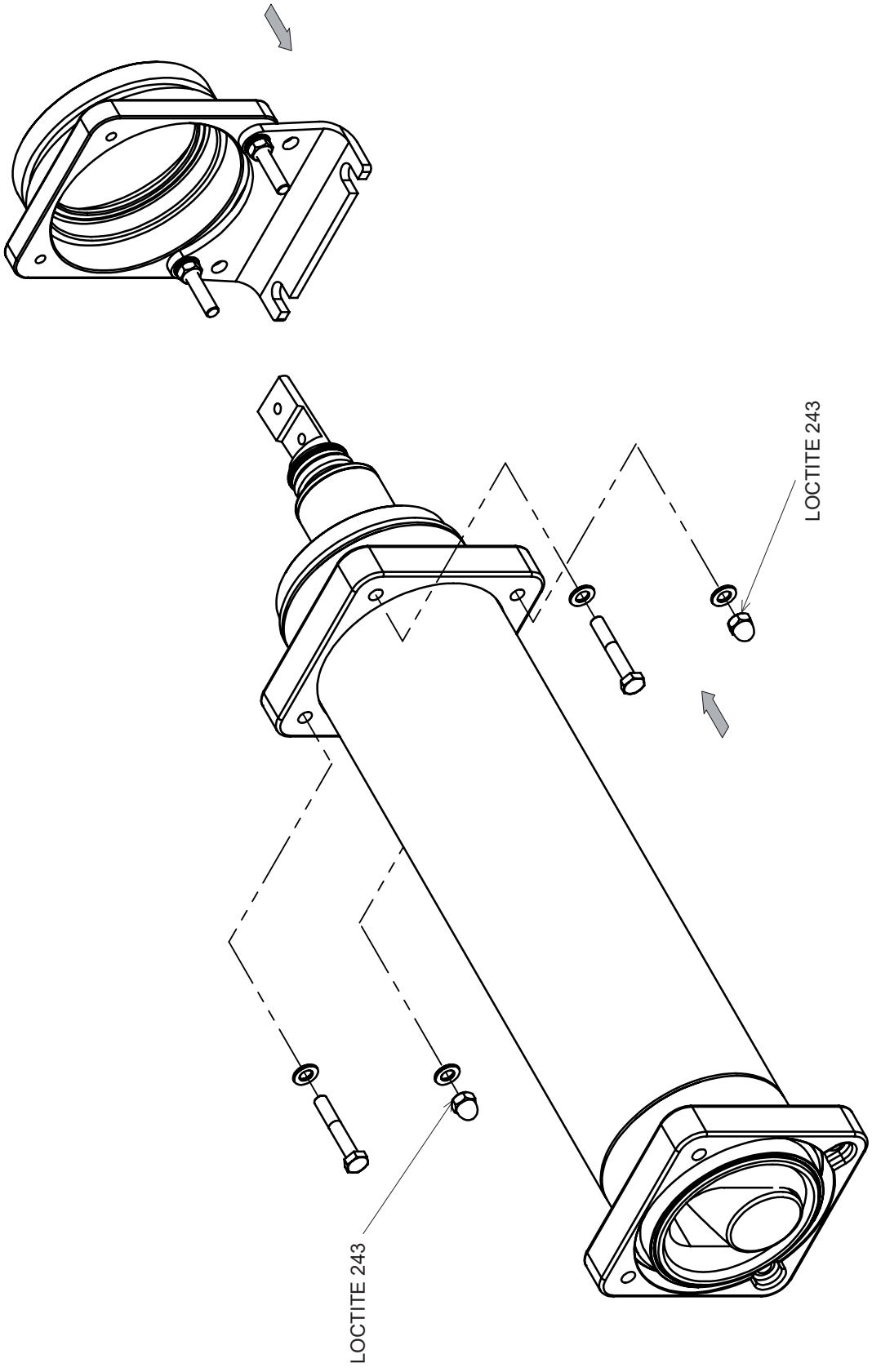

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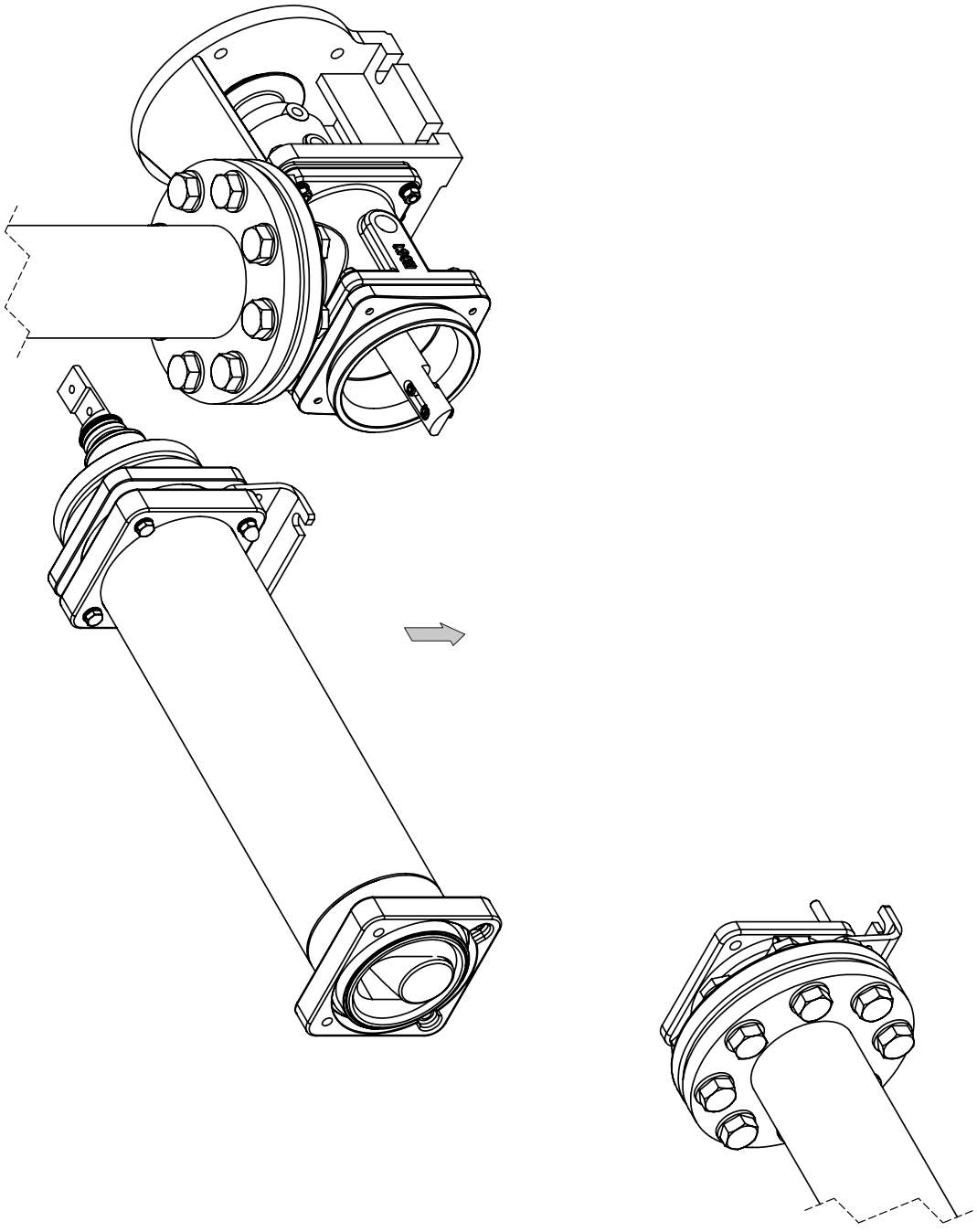

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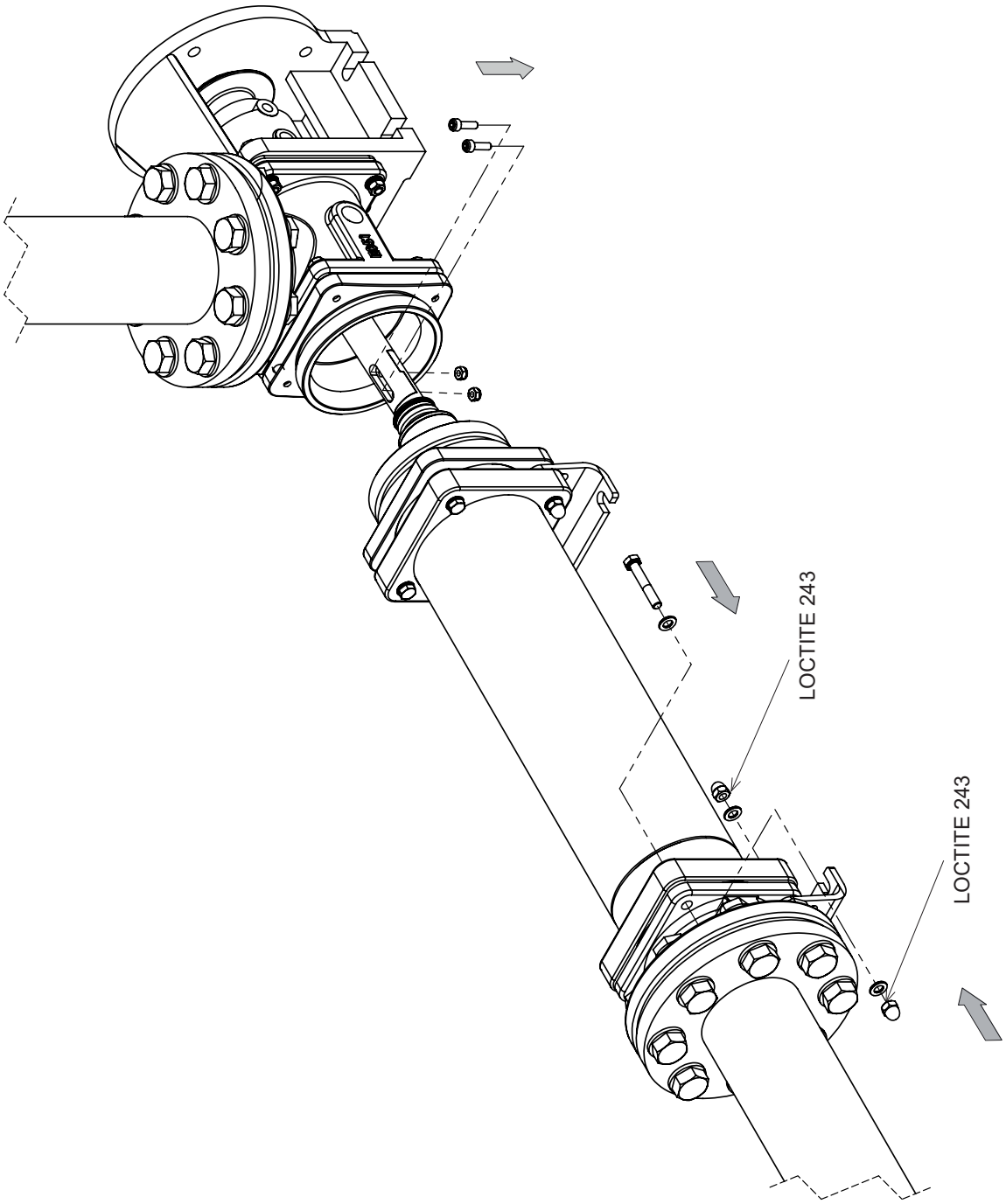

(* Refer to torque settings table)

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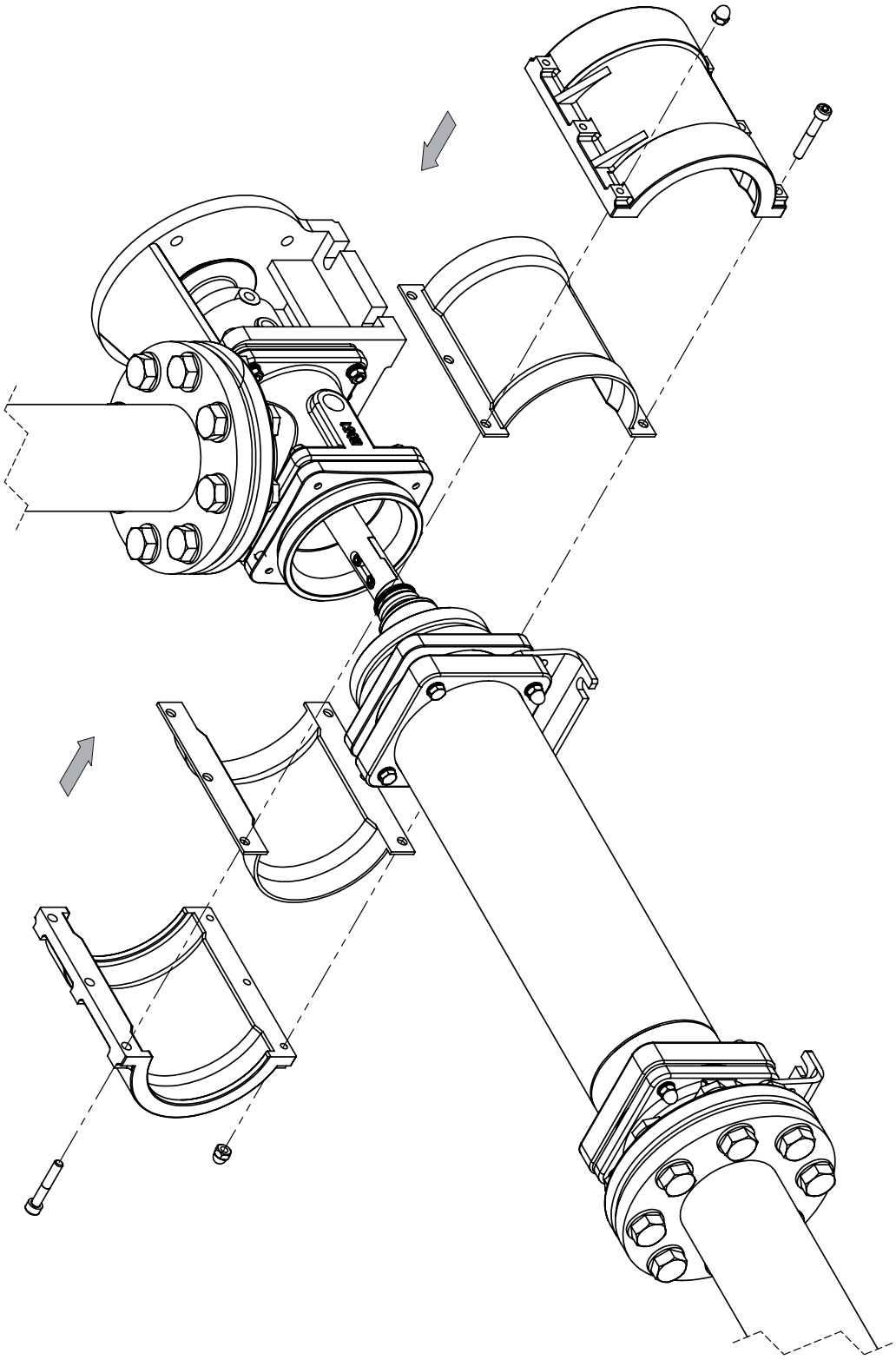
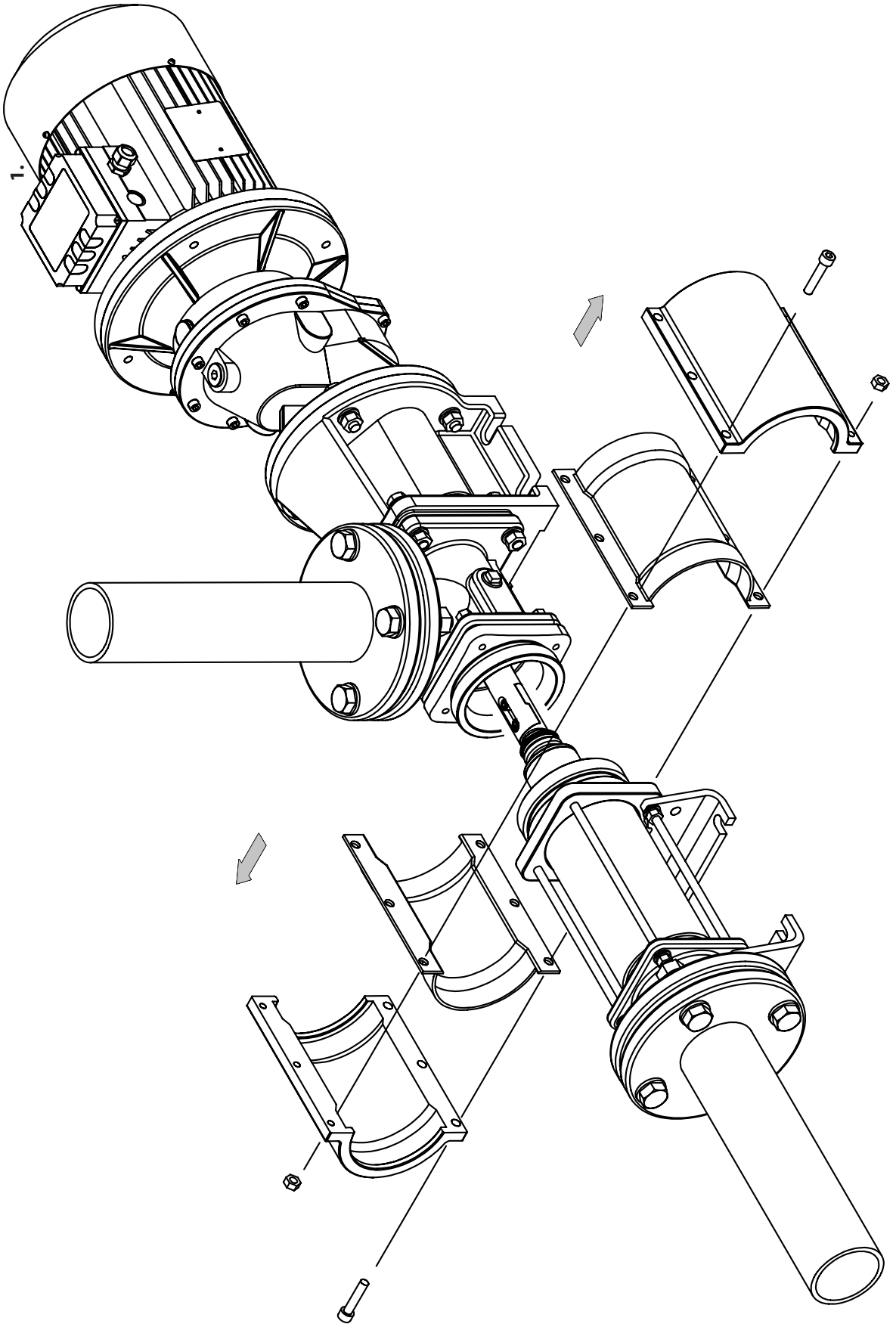


(* Refer to torque settings table)

Dismantling - Rotor and Stator Change for Mechanically Bonded Stators

Z3*D & PUMPS WITH MECHANICALLY BONDED STATORS



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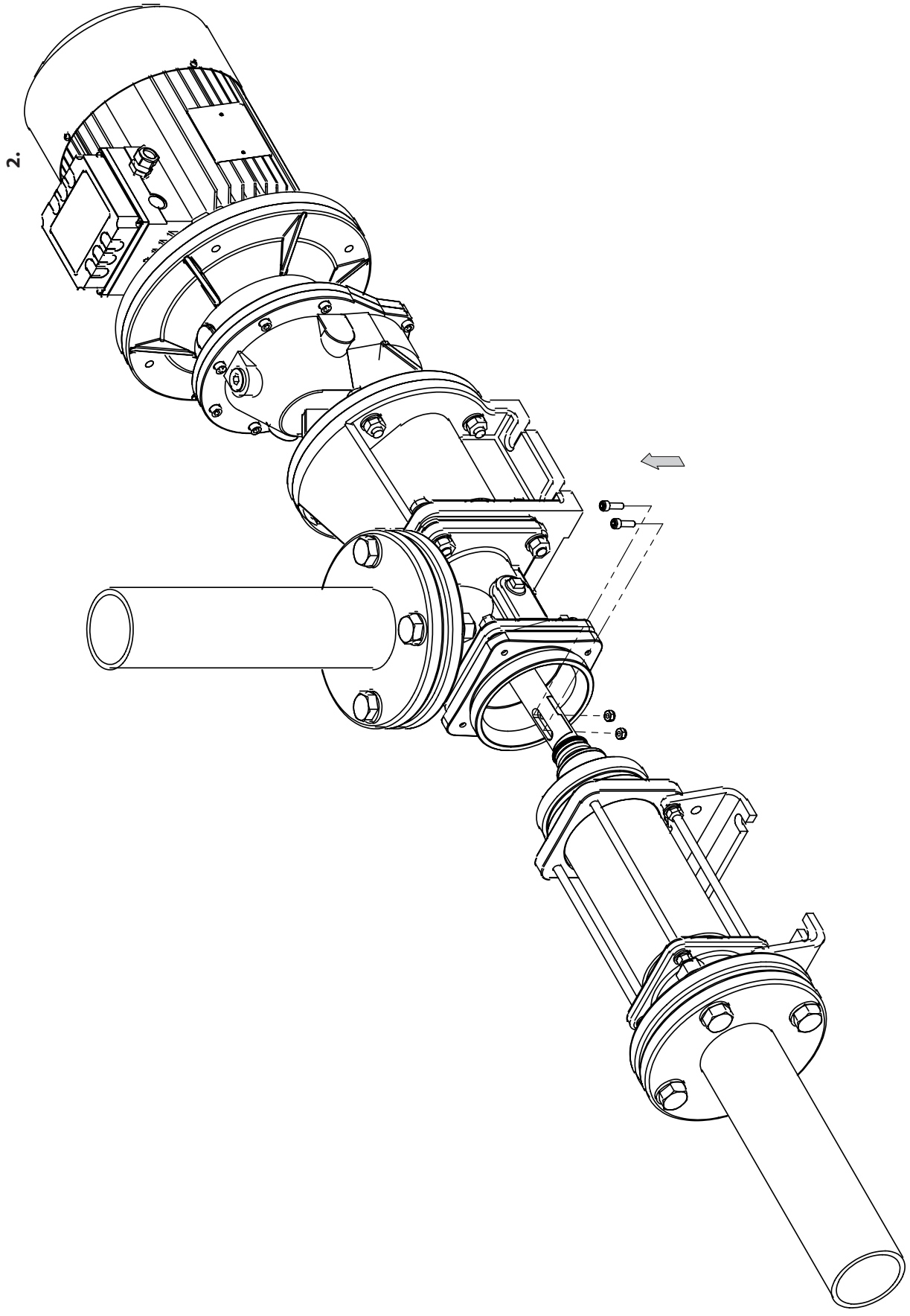

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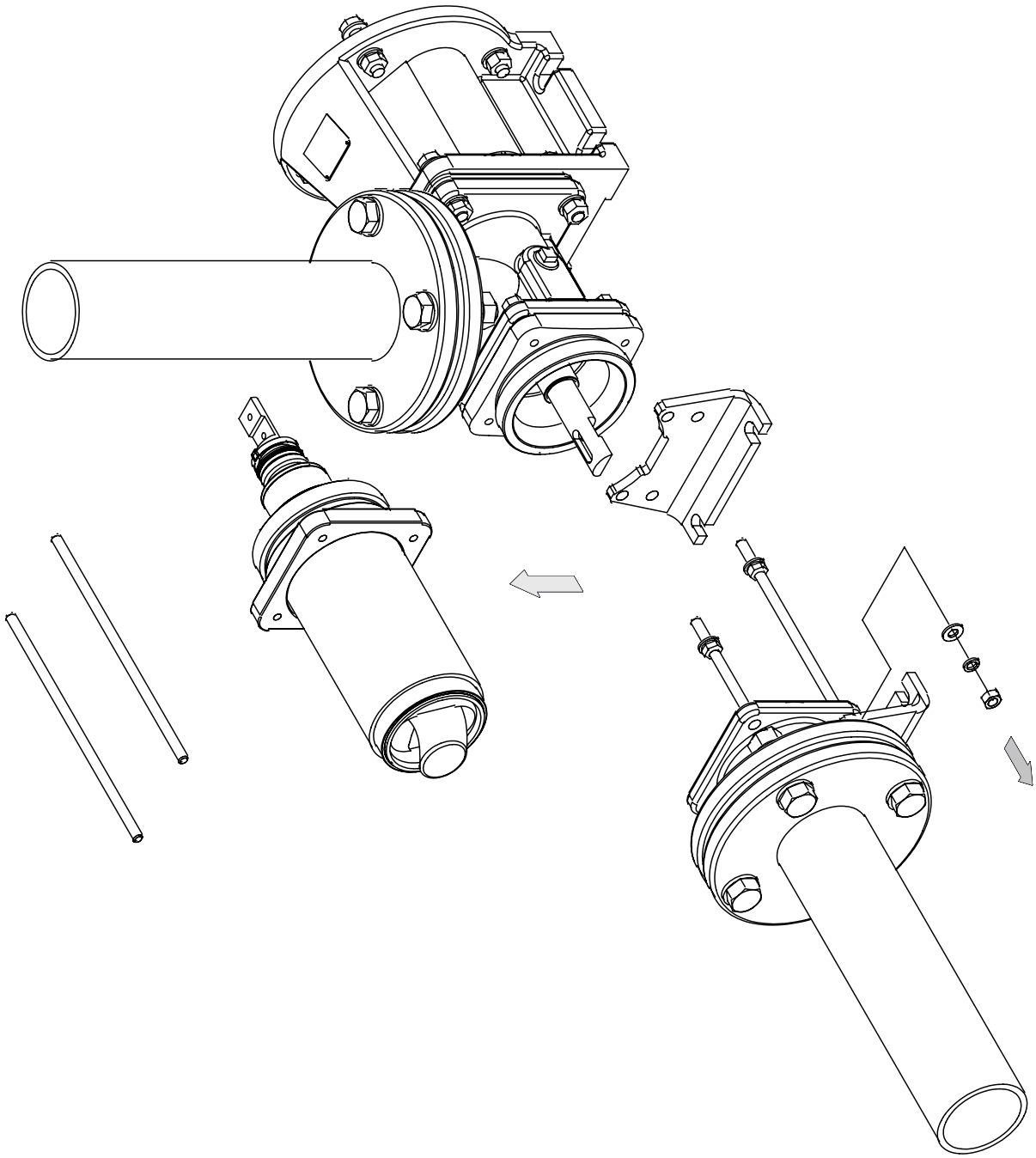

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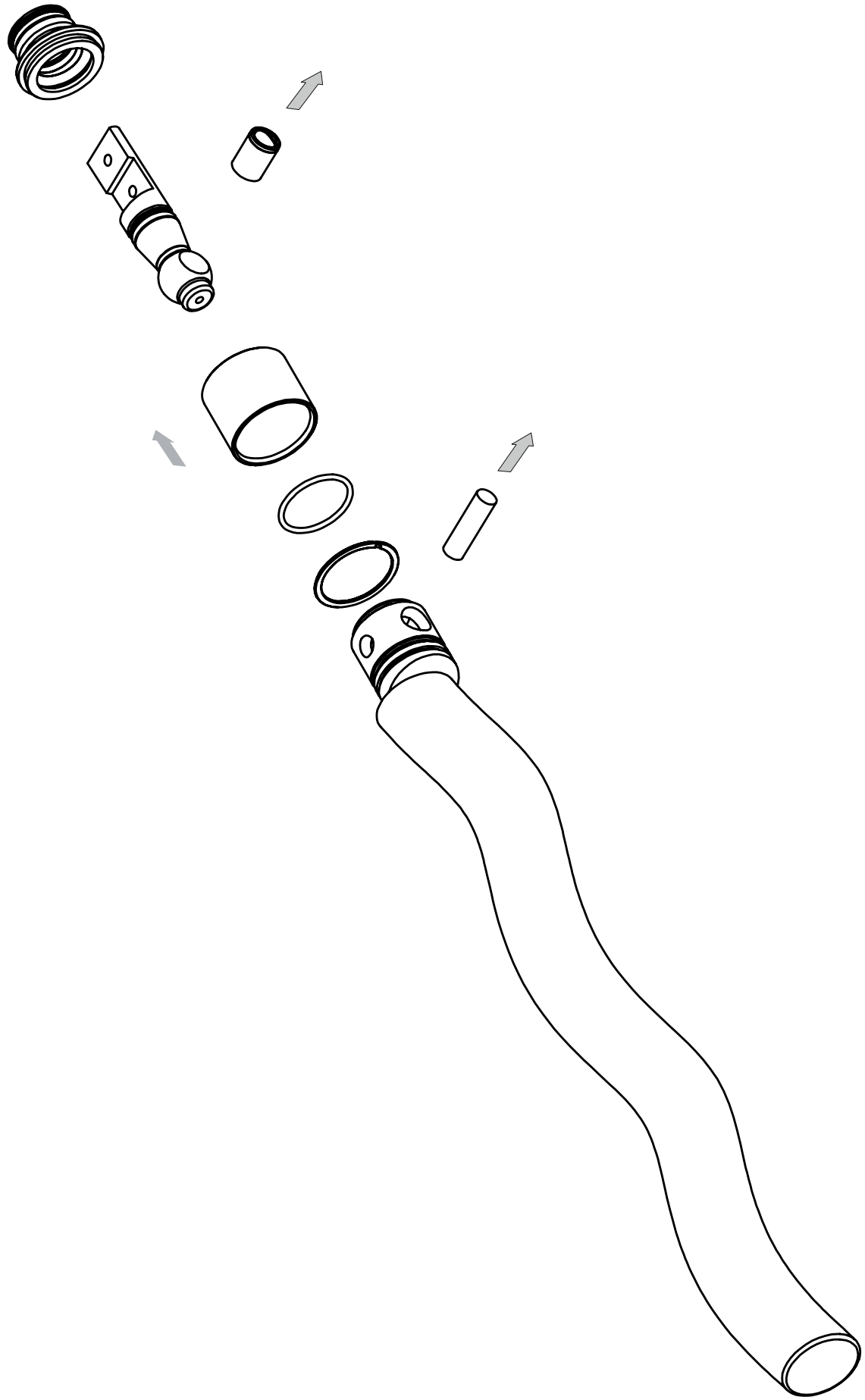
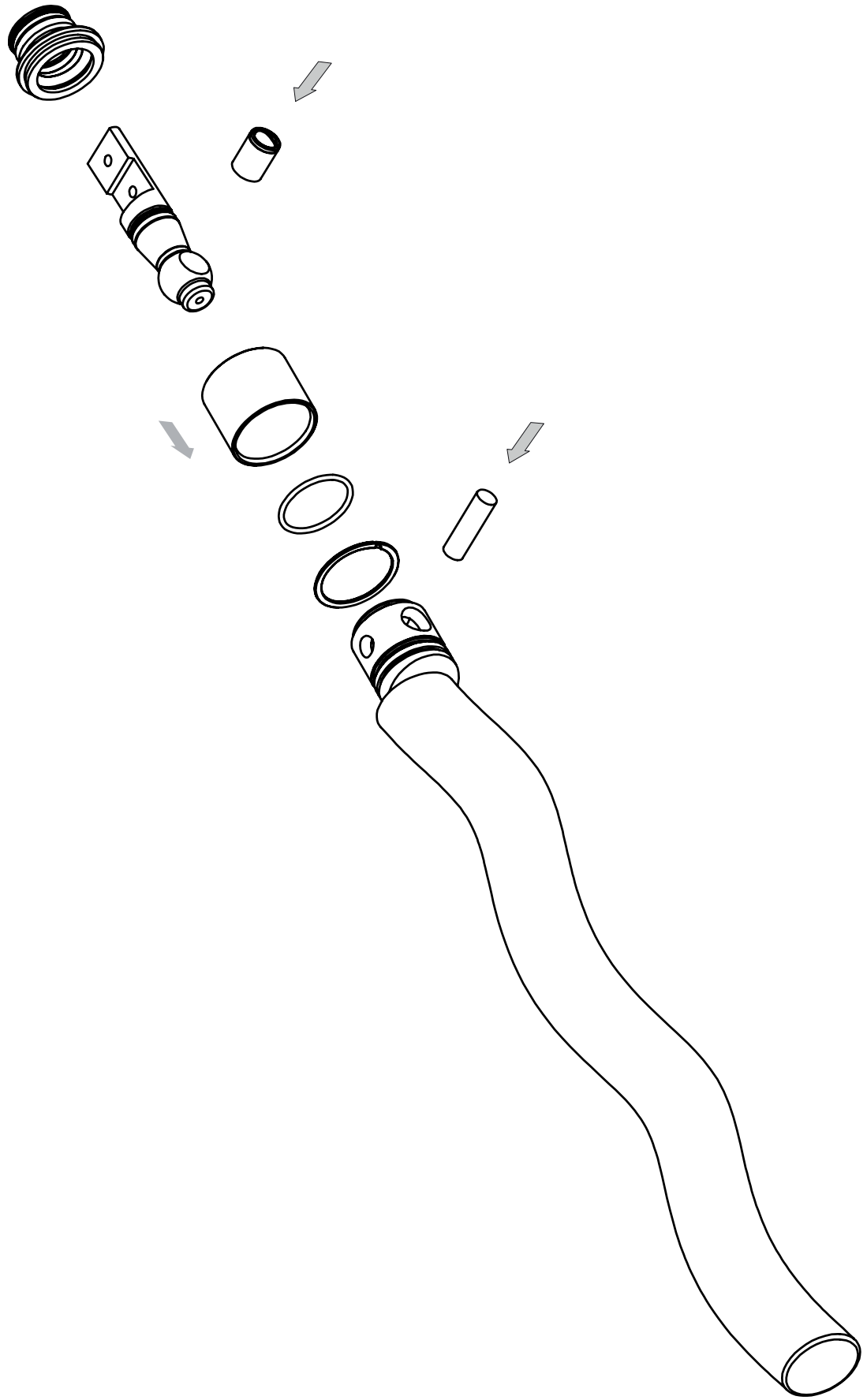


Assembly - Rotor and Stator Change for Mechanically Bonded Stators

Z3*D & PUMPS WITH MECHANICALLY BONDED STATORS

1.



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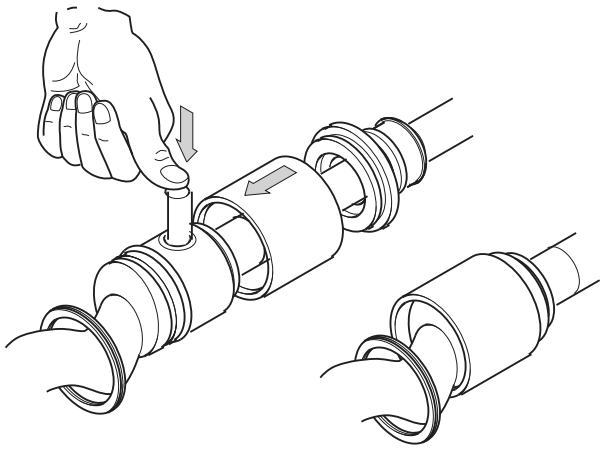

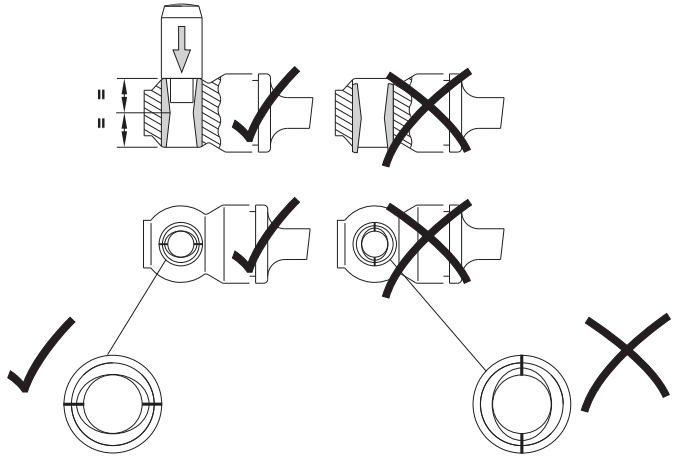

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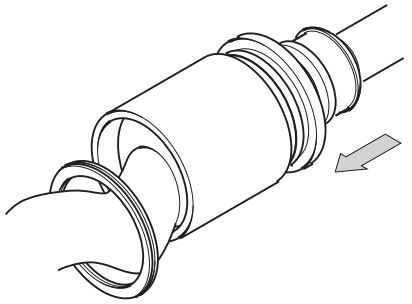

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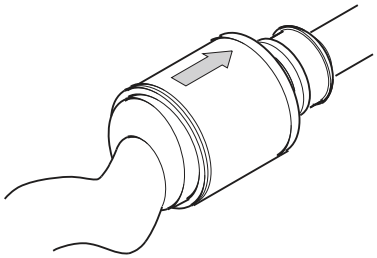

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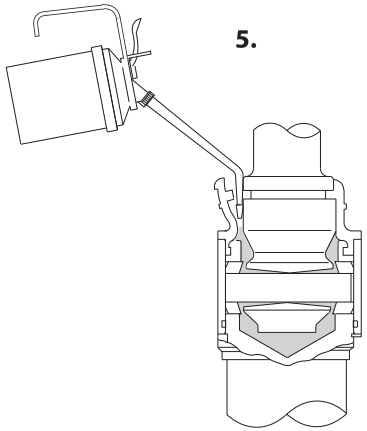

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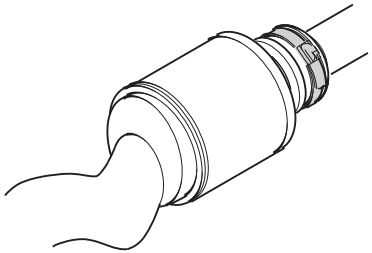
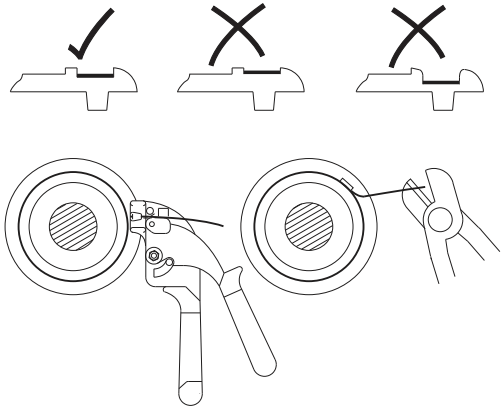


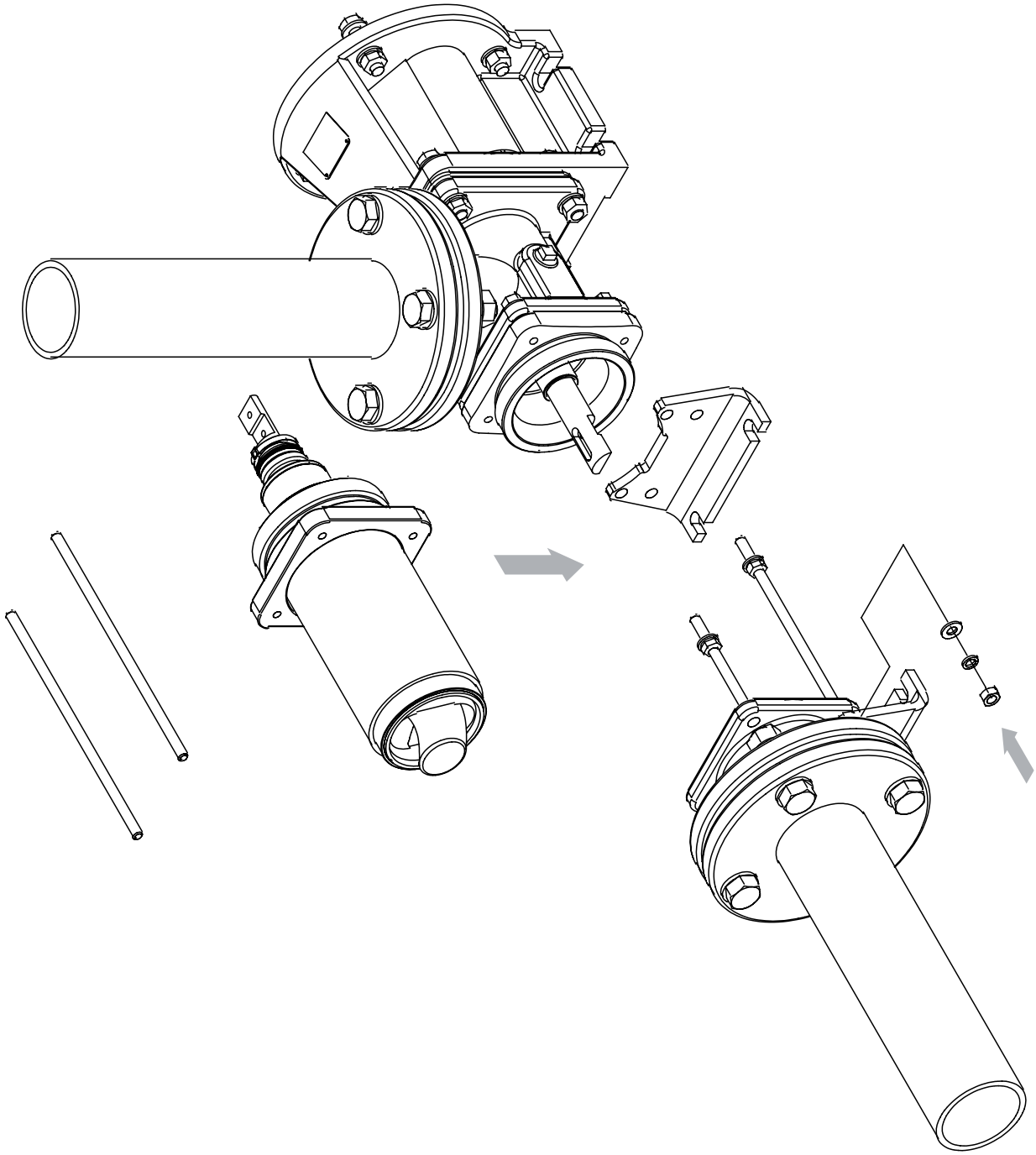


MUST BE FILLED WITH OIL IN THE VERTICAL POSITION

Correct tool available from your Supplier
Part Number: 80D1331

7.

8.



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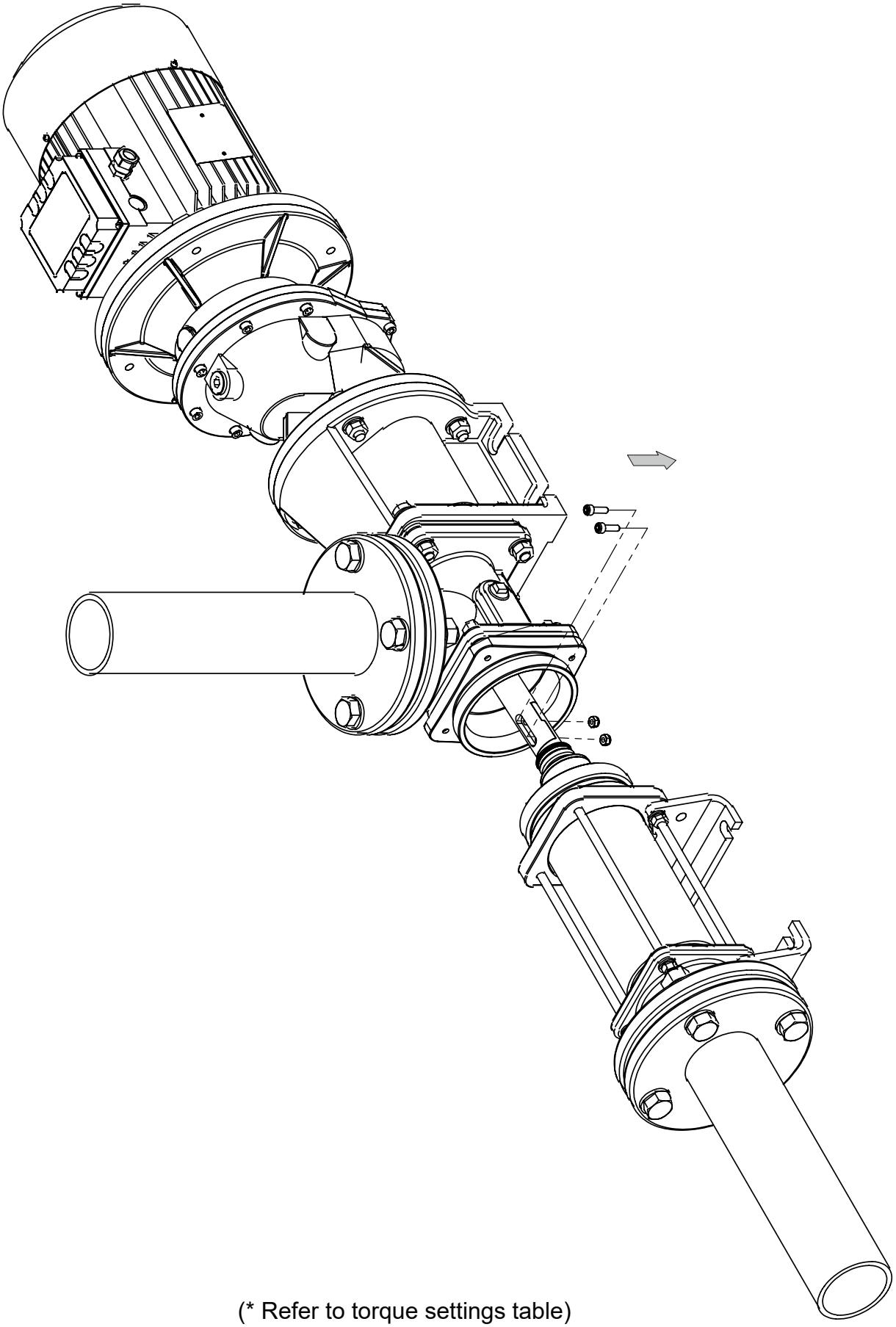
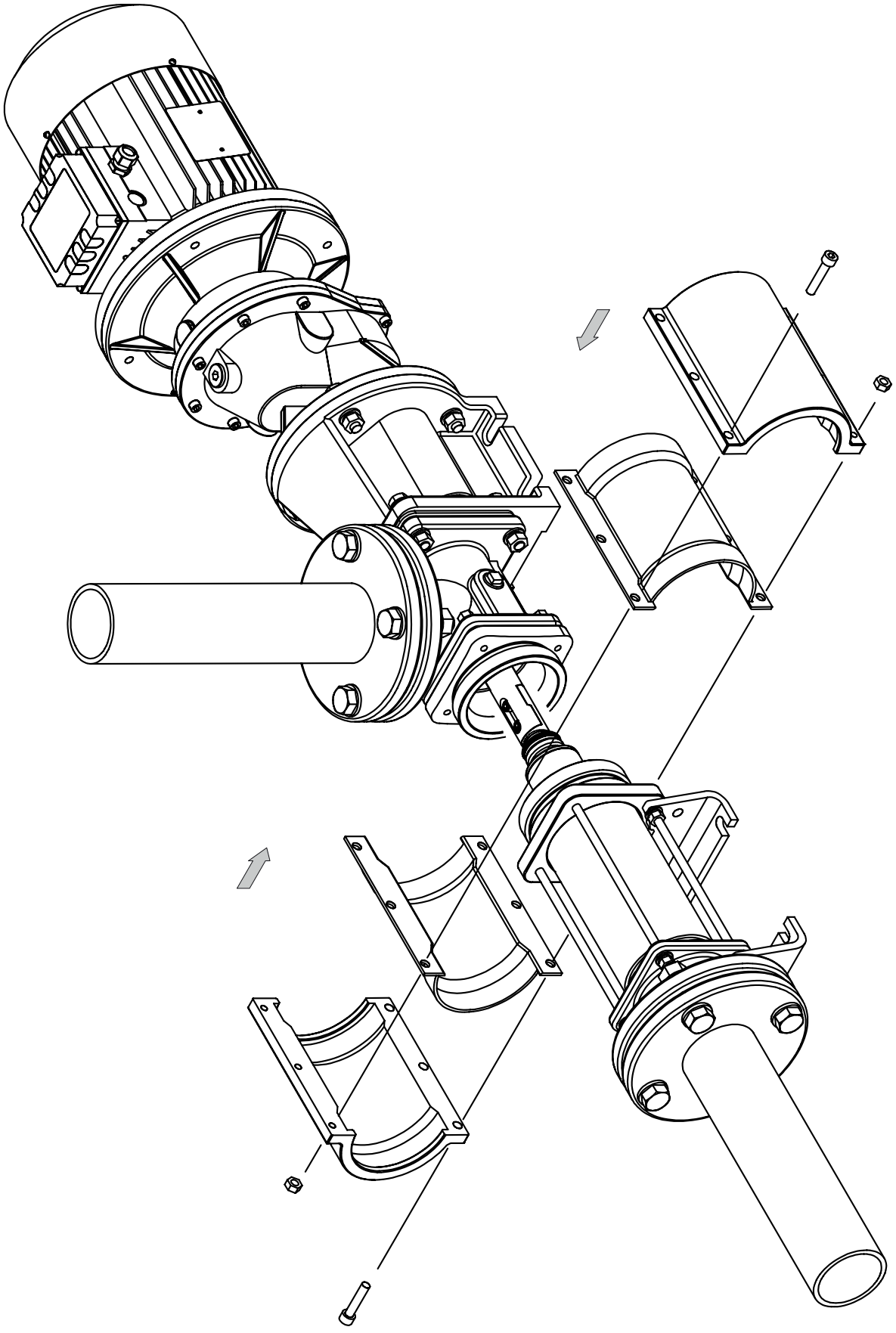


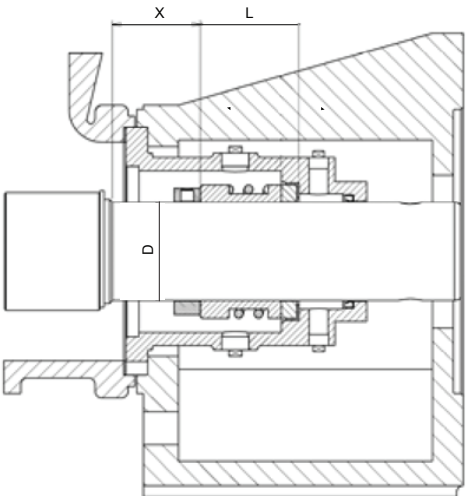
(* Refer to torque settings table)

10.



(* Refer to torque settings table)

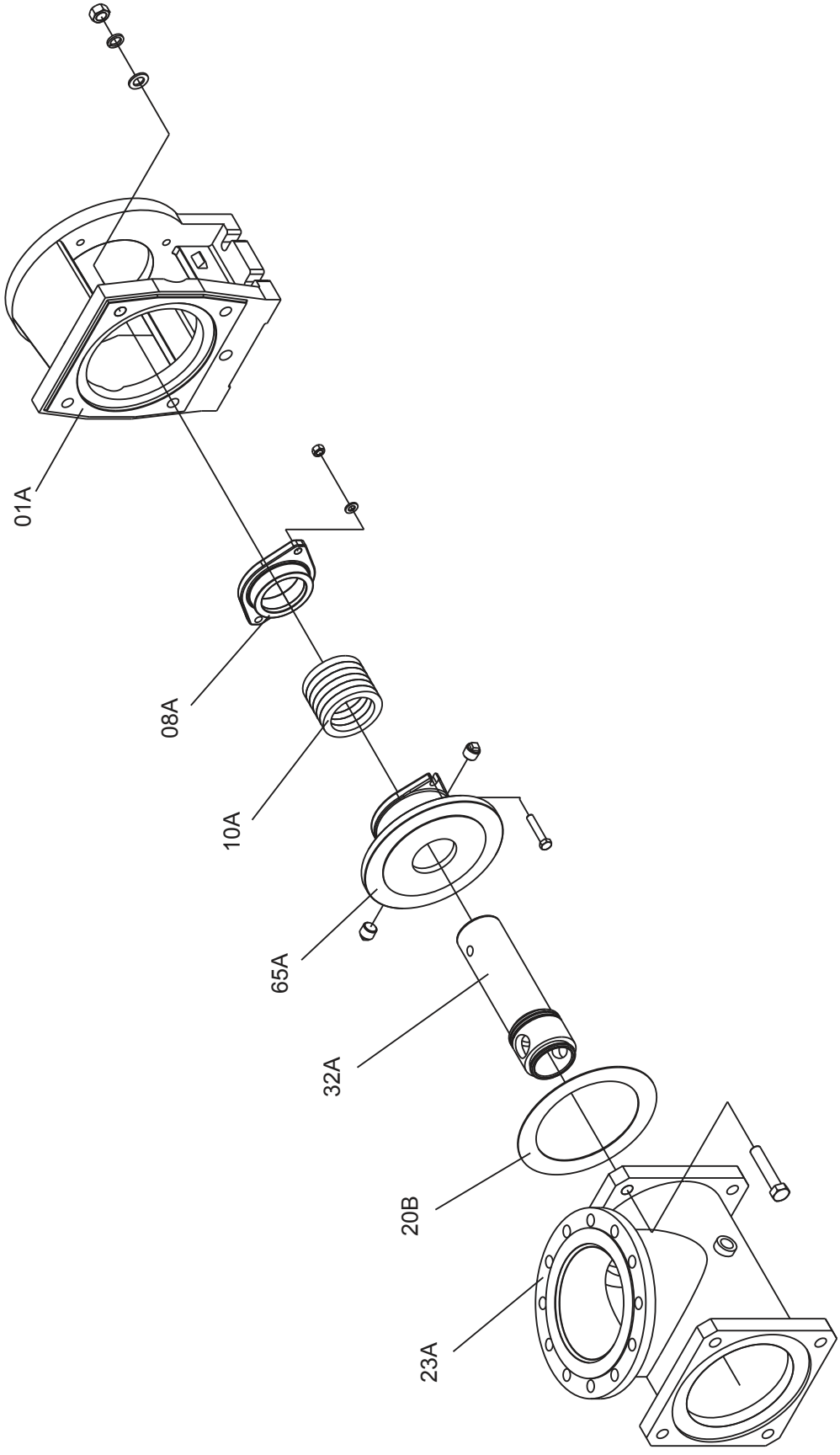
Mechanical Seal Setting Length

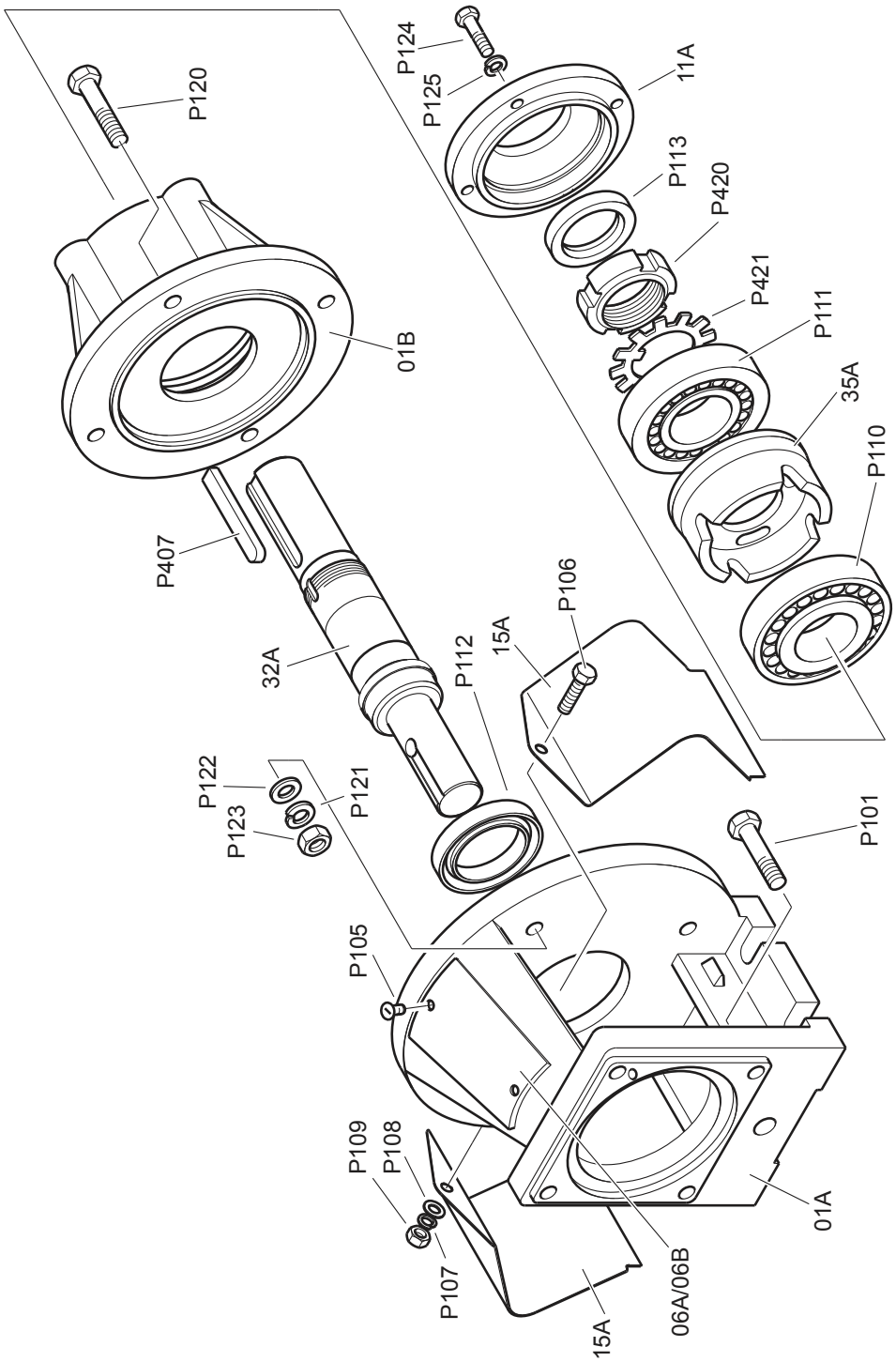


Pump Size	Drive Type	Shaft Diameter mm (inches)	Seal Part No.	Seal Working Length L mm (inches)	Setting Distance 'X' mm (inches)
Z34A	Pin Joint	45 (1.77)	M045139G	45.0 (1.77)	41.0 (1.6)
Z34B					
Z34K					
Z35A					
Z35K					
Z34D	Pin Joint	55 (2.16)	M055139G	47.5 (1.87)	34.5 (1.35)
Z35B					
Z36A					
Z36K					
Z35D	Pin Joint	65 (2.56)	M065139G	52.5 (2.07)	33.5 (1.32)
Z36B					
Z37A					
Z37B					
Z37K					
Z38A					
Z38K					
Z36D	Pin Joint	85 (3.35)	M085139G	60.0 (2.40)	33.0 (1.30)
Z38B					
Z39A					
Z39B					
Z39K					
Z3AA					
Z3AK					
Z37D	Pin Joint	85 (3.35)	M085139G	60.0 (2.40)	58.0 (2.28)
Z38D					
Z3AB					
Z3BA					
Z3BK					

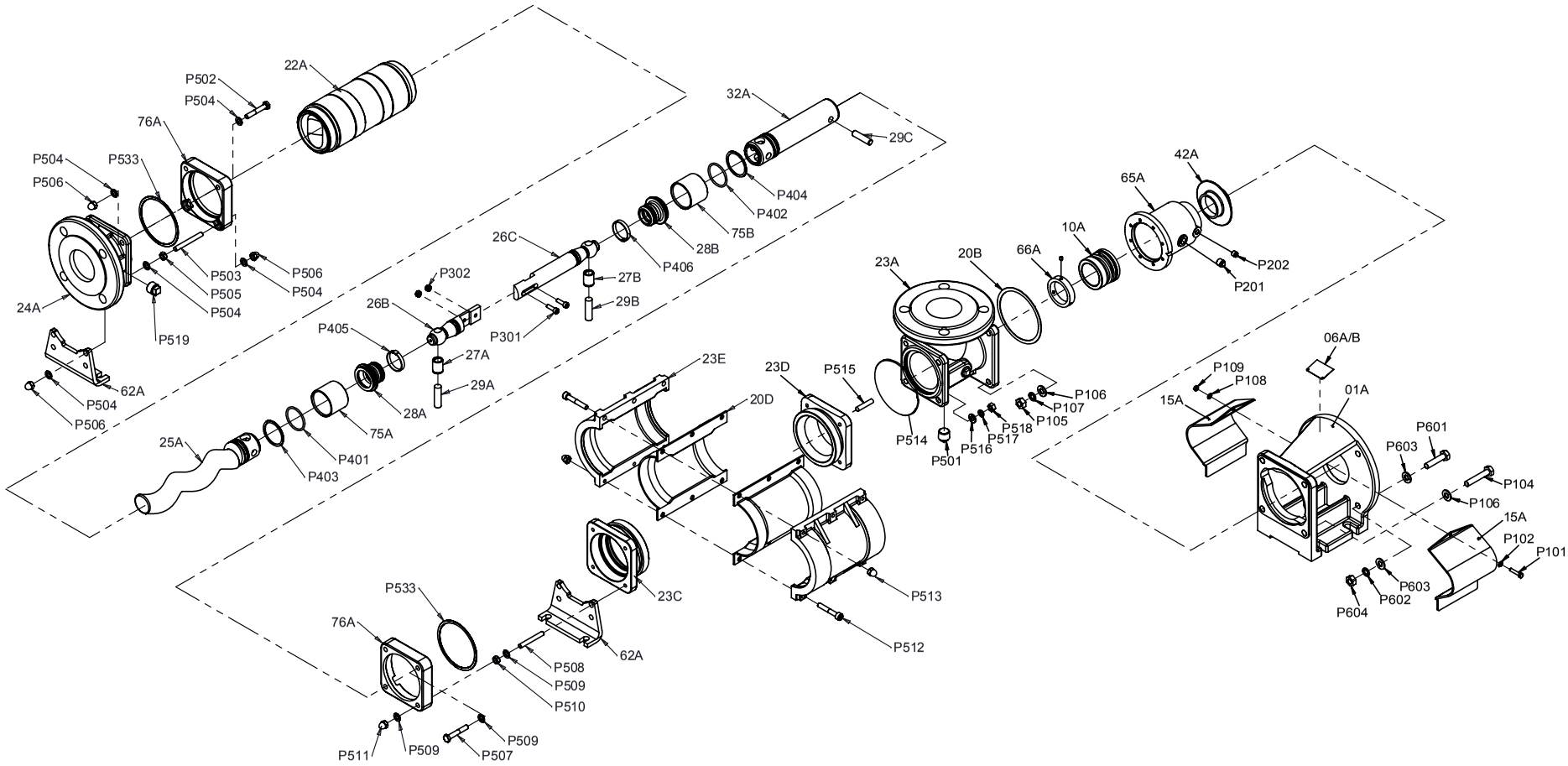
NOTE: All seal working lengths are to DIN L1K dimensions.
This table is not to be used for standard or DIN L1N working length seals.
All seals use 'M' type seat except for 85mm (3.35) which uses 'BS' type or 'M' type.
This table is not necessarily compatible with any other seal type - check with Your Supplier

Exploded Views

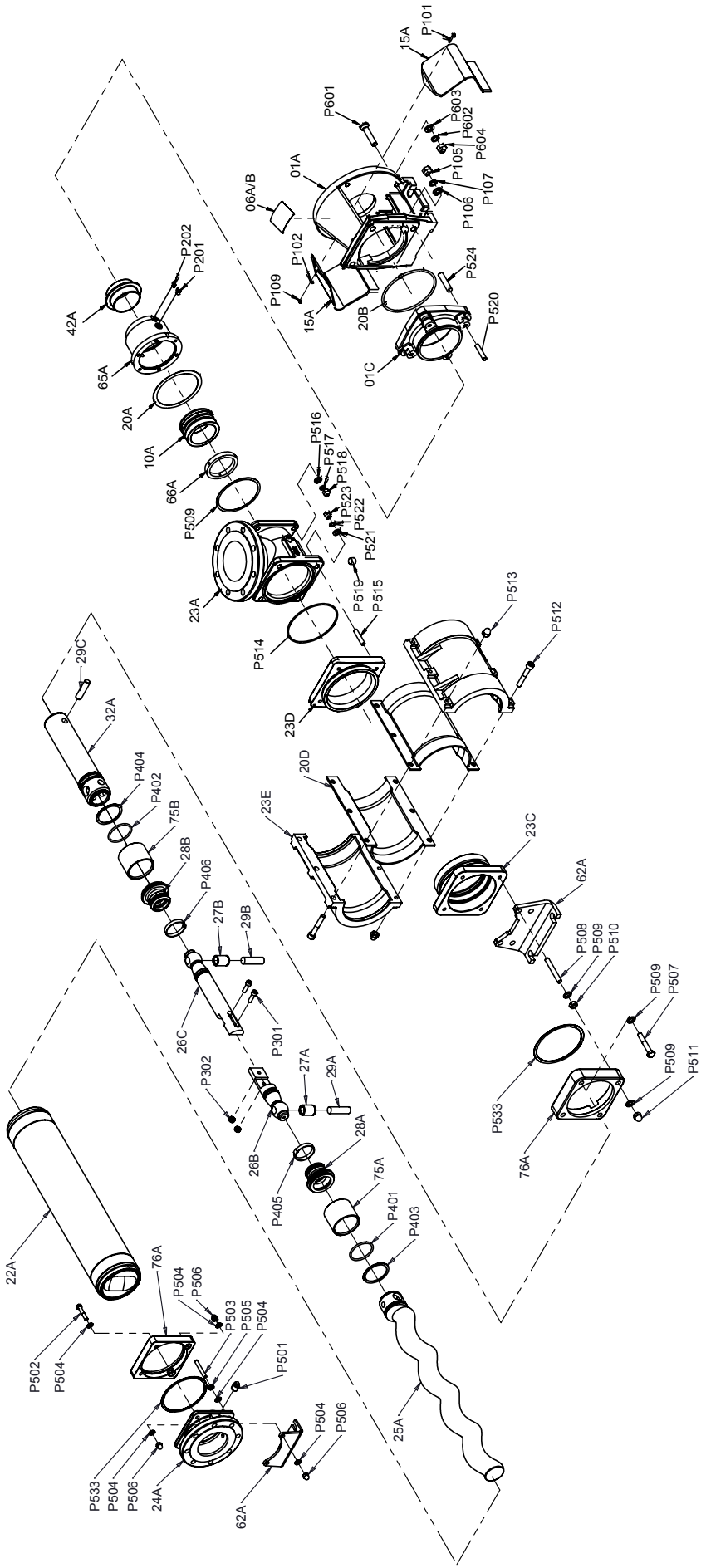



P124
P125
11A
P120
P113
P420
P421
P111
35A
P110
01B
P407
32A
P112
15A
P106
P122
P123
P121
P101
P105
P109
P108
P107
15A
06A/06B
01A

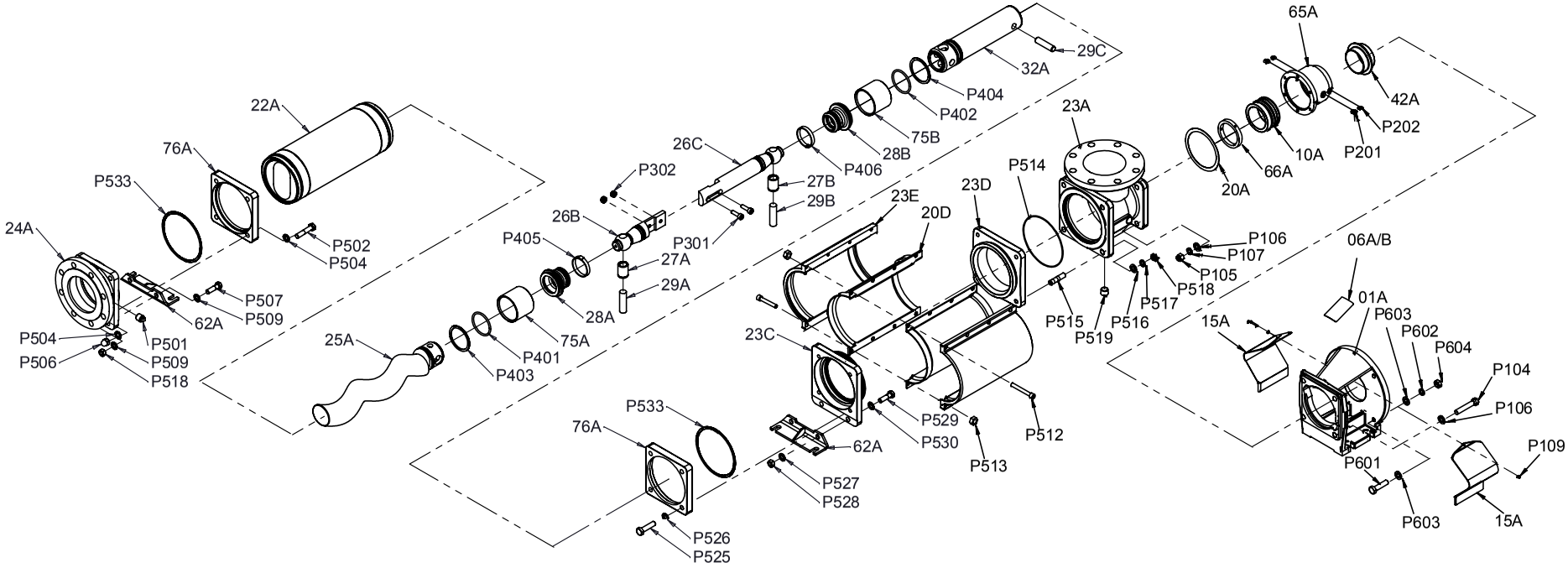
Z34A - Z38K


22A
P502
P504
76A
P504
P506
P533
24A
P519
P503
P505
P504
P506
P504
62A
P504
P506
25A
P403
P401
75A
28A
P405
26B
P302
27A
29A
P301
26C
P406
28B
27B
29B
32A
29C
P404
P402
75B
42A
65A
10A
66A
20B
23A
P202
P201
P106
P107
P105
P518
P517
P516
P501
P514
P515
23D
23E
20D
P513
P512
23C
62A
P533
76A
P508
P509
P510
P511
P509
P509
P507
06A/B
P109
P108
01A
15A
P601
P603
P104
P106
15A
P102
P101
P603
P602
P604

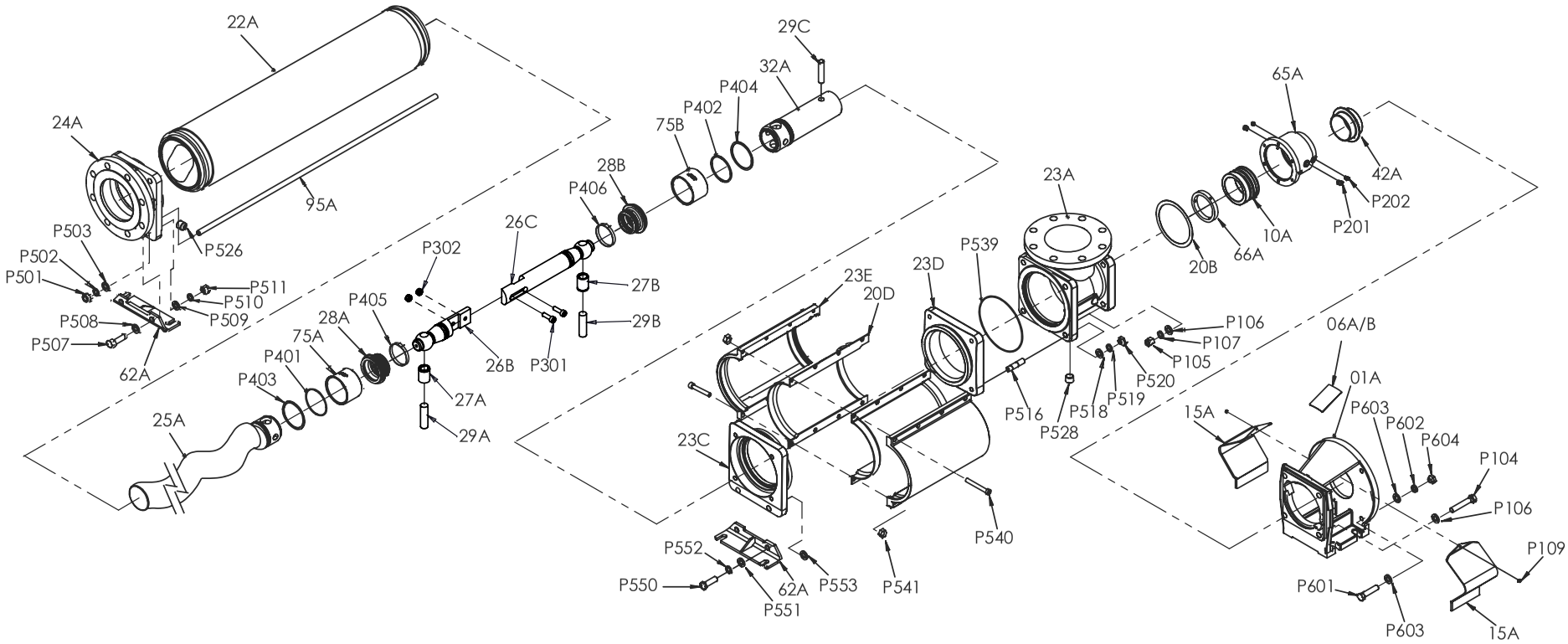
Z38B ONLY


15A
P101
P601
P603
P602
P604
P105
P107
P106
06A/B
01A
P102
P109
15A
20B
P524
P520
01C
42A
P202
P201
65A
20A
10A
66A
P509
P516
P517
P518
P523
P522
P521
P519
P515
23A
P514
23D
P513
P512
20D
23E
23C
62A
P508
P509
P510
P509
P507
P509
P511
P533
76A
29C
32A
P404
P402
75B
28B
P406
27B
29B
26C
P301
P302
27A
29A
26B
28A
P405
75A
P401
P403
22A
76A
P504
P506
P503
P505
P504
P501
P502
P504
P533
P504
P506
24A
62A
P504
P506
25A

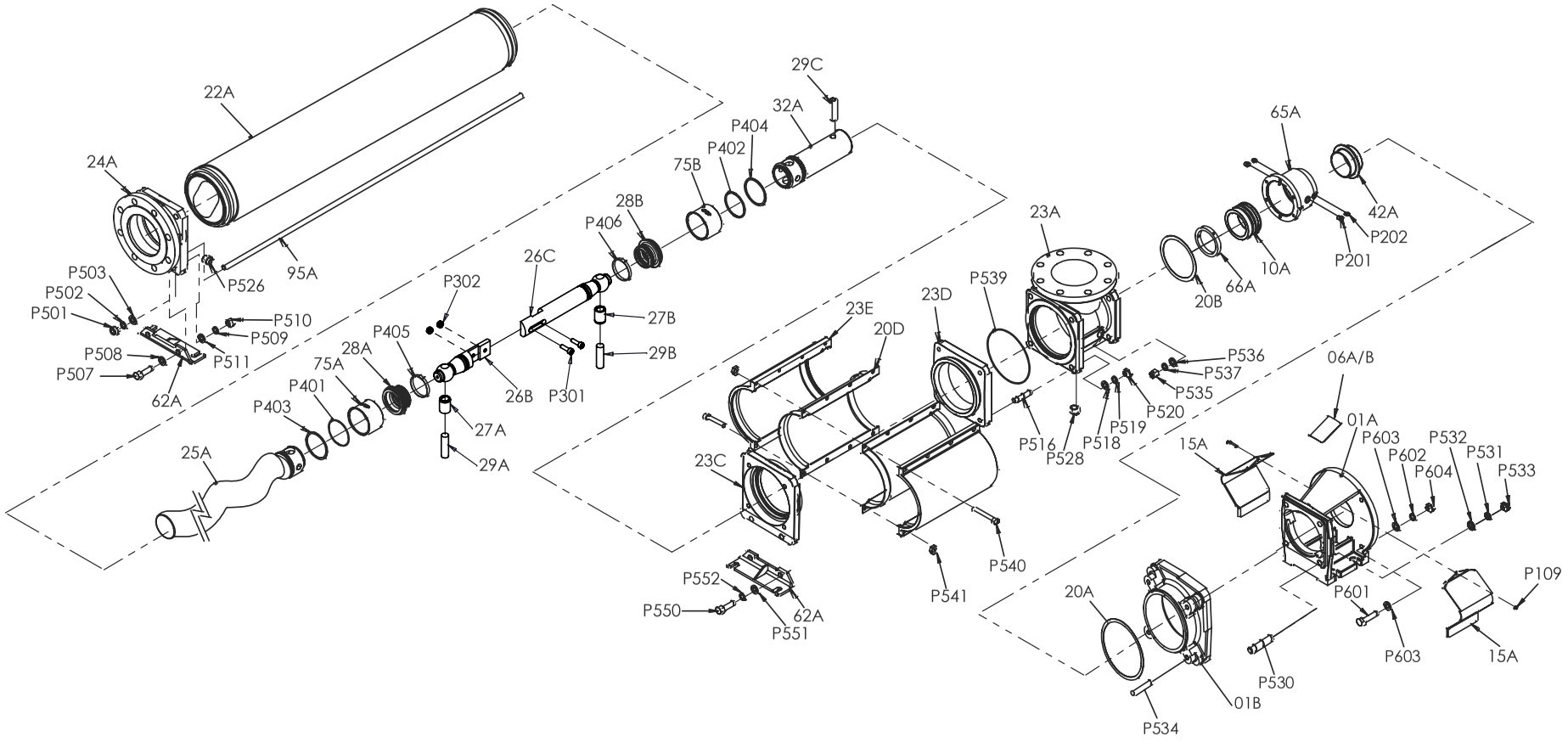
Z39A AND ABOVE



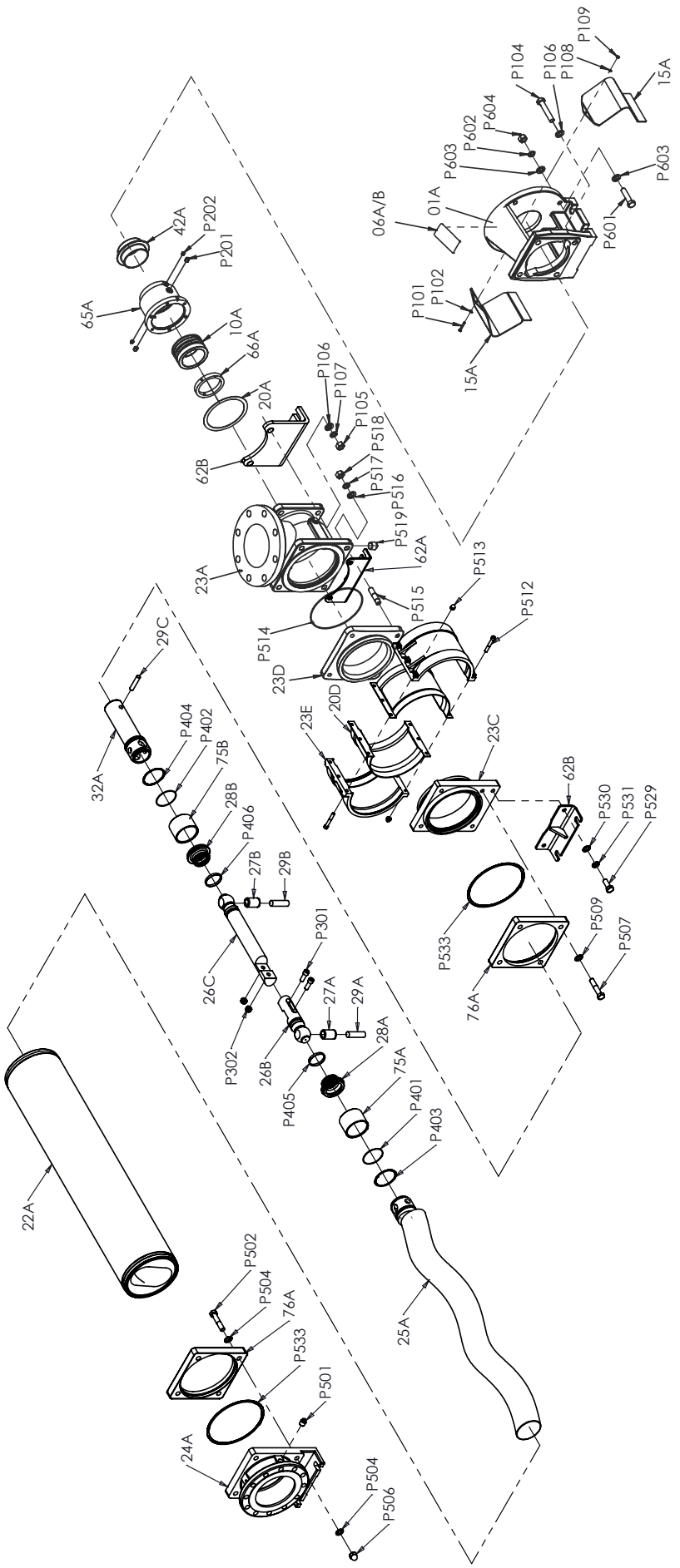
Z34D AND Z35D & PUMPS WITH MECHANICALLY BONDED STATORS



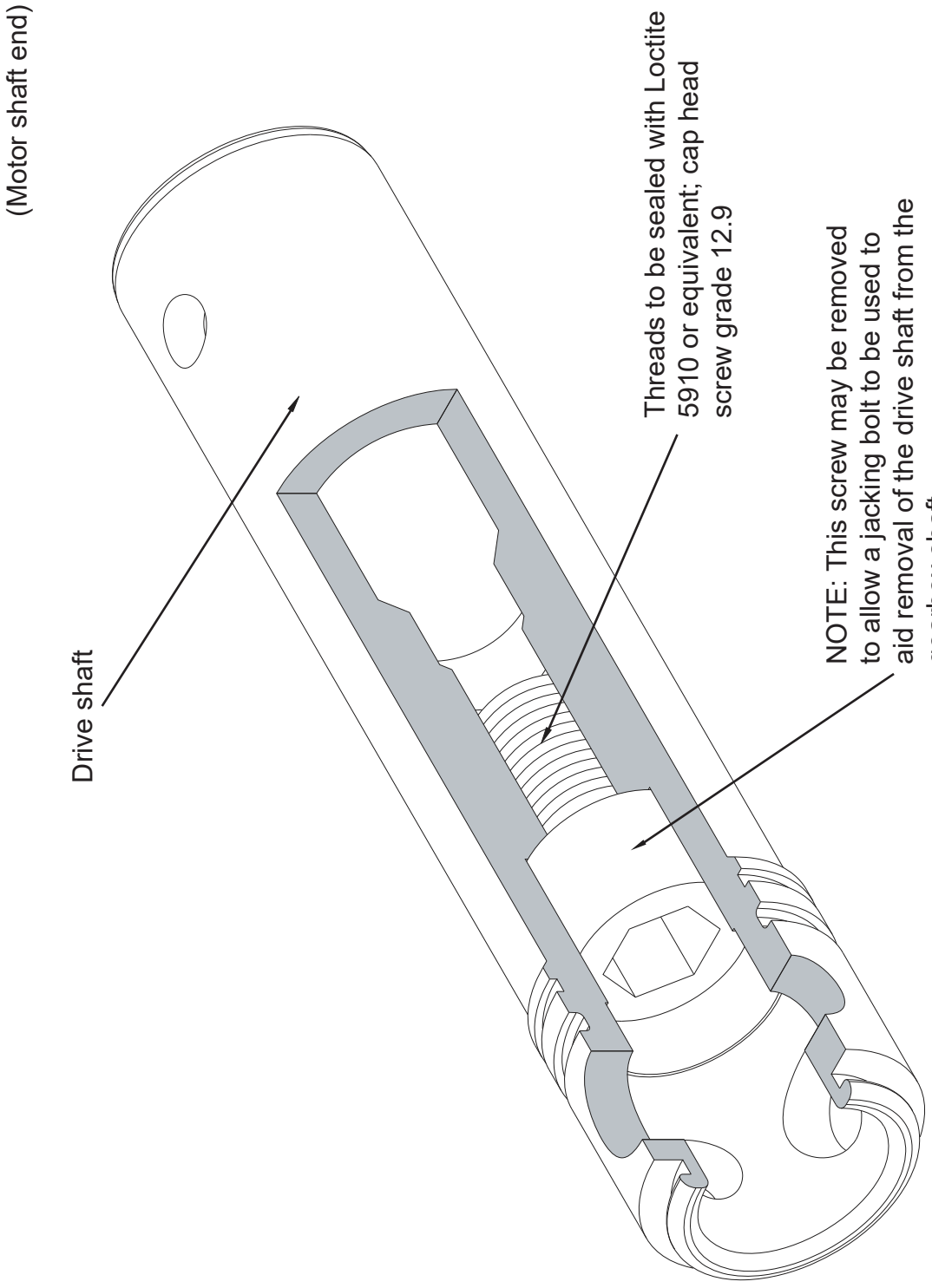
Z36D / Z37D / Z38D



Z3BA AND Z3BK



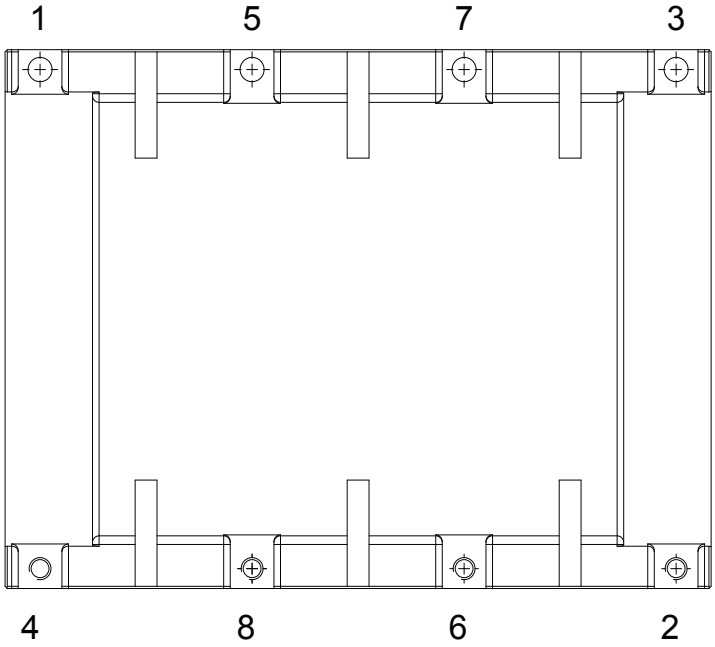
Drive Shaft Assembly with Plug



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

Torque Tightening

MK3 EZstrip
Torque Tightening Sequence



Tighten in sequence as shown in 3 steps:

- Step 1 - 35% of specified torque
- Step 2 - 70% of specified torque
- Step 3 - 100% of specified torque

* **Do not** fit lock nut P541 until the screws (P540) are tightened to the specified torque.

Torque Figures

Pump Size	Body/Suct Chamber			Stator Clamp	Stator Tie Bars	Split Coupling Rod	Split Suction Chamber Halves
	Nm			Nm		Nm	Nm *
	P526	P105	P530	P506 P511	P105 P501	P301	P540
Z34A	11			3	-	4	25
Z34K	11			3	-	7	25
Z34B	11			4	-	8	25
Z34D	11			-	11	16	25
Z35A	11			4	-	8	35
Z35K	21			4	-	10	35
Z35B	21			7	-	16	35
Z35D	21			-	11	34	35
Z36A	21			8	-	13	35
Z36K	21			7	-	16	35
Z36B	36			13	-	23	35
Z36D	36			-	24	57	35
Z37A	36			10	-	23	45
Z37K	36			11	-	41	45
Z37B	36			16	-	45	45
Z37D	36			-	24	103	45
Z38A	36			14	-	31	55
Z38K	36			12	-	38	55
Z38B	50	-	36	23	-	60	55
Z38D	50	-	36	-	40	139	55
Z39A	90			23	-	42	70
Z39K	90			25	-	76	70
Z39B	90			38	-	83	70
Z3AA	90			30	-	62	70
Z3AK	90			26	-	76	70
Z3AB	90			50	-	145	70
Z3BA	176			60	-	124	70
Z3BK	176			50	-	154	70

Pumps with Mech Bond Stators ONLY - Additional details

Pump Size	Body/Suct Chamber			Stator Clamp	Stator Tie Bars	Split Coupling Rod	Split Suction Chamber Halves
	Nm			Nm		Nm	Nm *
	P526	P105	P530	P506 P511	P105 P501	P301	P540
Z37B	36			-	24	45	45
Z39A	90			-	75	42	70
Z39B	90			-	75	83	70

* see page 88 for note

Torque Figures

Pump Size	Body/Suct Chamber			Stator Clamp	Stator Tie Bars	Split Coupling Rod	Split Suction Chamber Halves
	ft lb			ft lb		ft lb	ft lb *
	P526	P105	P530	P506 P511	P105 P501	P301	P540
Z34A	8			2	-	3	18
Z34K	8			2	-	5	18
Z34B	8			3	-	6	18
Z34D	8			-	8	12	18
Z35A	8			3	-	6	26
Z35K	15			3	-	7	26
Z35B	15			5	-	12	26
Z35D	15			-	8	25	26
Z36A	15			6	-	10	26
Z36K	15			5	-	12	26
Z36B	27			10	-	17	26
Z36D	27			-	18	42	26
Z37A	27			7	-	17	33
Z37K	27			8	-	31	33
Z37B	27			12	-	33	33
Z37D	27			-	18	76	33
Z38A	27			10	-	23	41
Z38K	27			9	-	28	41
Z38B	37	-	27	17	-	44	41
Z38D	37	-	27	-	30	102	41
Z39A	66			17	-	31	52
Z39K	66			18	-	56	52
Z39B	66			28	-	62	52
Z3AA	66			22	-	46	52
Z3AK	66			19	-	56	52
Z3AB	66			37	-	107	52
Z3BA	130			44	-	92	52
Z3BK	130			37	-	113	52

Pumps with Mech Bond Stators ONLY - Additional details

Pump Size	Body/Suct Chamber			Stator Clamp	Stator Tie Bars	Split Coupling Rod	Split Suction Chamber Halves
	ft lb			ft lb		ft lb	ft lb *
	P526	P105	P530	P506 P511	P105 P501	P301	P540
Z37B	27			-	18	33	33
Z39A	66			-	55	31	52
Z39B	66			-	55	62	52

* see page 88 for note

Pin Joint Lubrication

PUMP MODEL	JOINT LUBRICATION CAPACITY (APPROX.) PER JOINT ml* (fl/oz)	NON-FOOD APPLICATIONS ONLY		FOOD APPLICATIONS
		RECOMMENDED	SUITABLE ALTERNATIVE	
Z34A Z34B Z34K Z35A	22 (0.7)	KLUBERSYNTH GH6-460 OIL	MOBILITH SHC 007 SEMI-FLUID GREASE; SHELL RETINAX CSZ; MOBIL GEAR OIL SHC 320	KLUBEROIL UHI 6-460
Z34D Z35B Z36A Z36K	45 (1.5)			
Z35D Z36B Z37A Z37B Z37K Z38A Z38K	55 (1.9)			
Z36D Z38B Z39A Z39B Z39K Z3AA Z3AK	95 (3.2)			
Z37D Z38D Z3AB Z3BA Z3BK	175 (5.9)			

COMPONENTS	ALL APPLICATION EXCEPT FOOD	FOOD APPLICATIONS ONLY	SERVICE COMMENTS
PUMP DRIVE JOINTS	SEE ABOVE TABLE		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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