



English

Original  
Instructions

# Installation, Operation and Maintenance Instructions

Series A Muncher

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# Tools

For servicing and maintenance work on the Muncher the following tools are recommended.

## **SB Muncher;**

Metric Hexagon Keys - Range 6mm-8mm (0.24" - 0.31")  
Metric Spanners - Range 10mm-36mm (0.39" - 1.42")  
Torque Wrench

## **Series A Muncher;**

Metric Hexagon Keys - Range 6mm-8mm (0.24" - 0.31")  
Metric Spanners - Range 10mm-36mm (0.39" - 1.42")  
Torque Wrench

## **Series F Muncher;**

Metric Hexagon Keys - Range 6mm-8mm (0.24" - 0.31")  
Metric Spanners - Range 10mm-36mm (0.39" - 1.42")  
Torque Wrench  
Mono Locknut Key - Item No.s MQ F06A 9750, CF F06A 9755 and MM F06A 9760

## **TR Muncher;**

Metric Hexagon Keys - Range 6mm-14mm (0.24" - 0.55")  
Metric Spanners - Range 10mm-36mm (0.39" - 1.42")  
Torque Wrench

## **Series R Muncher;**

Metric Hexagon Keys - Range 5mm-14mm (0.20" - 0.55")  
Metric Spanners - Range 10mm-36mm (0.39" - 1.42")  
Torque Wrench

All equipment should be in good working condition with no signs of excessive wear.

# ATEX Warning Statements

## GRINDERS

Due to the nature and design of grinding and macerating equipment it is possible that certain objects may enter the cutters, from the process stream, with the potential to cause sparking or jamming of the cutter assembly.

Where a grinder 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 Mono Pumps Limited before commencing with installation and commissioning.

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

To minimise the risk of sparking or temperature rises due to mechanical or electrical overload the following control and safety devices should be fitted. A control system that will shut the grinder down if the motor current or temperature exceed specified limits or a jam of the cutter stack occurs. This may include a system that reverses the machine in order to clear any such jam. 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.

It is important that the grinder rotates in the correct direction to give an efficient grinding operation. This must be checked on installation and commissioning and after any maintenance has been carried out. Failure to observe this may lead to mechanical or electrical overload.

When fitting drives, couplings, and guards to a grinder unit it is essential that these are correctly fitted, aligned and adjusted in accordance with the O&M instructions. Failure to do so may result in sparking due to unintended mechanical contact or temperature rises due to mechanical or electrical overload.

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.

# ATEX Warning Statements

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 grinder 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, seals, other wearing parts and lubrication is essential.

The grinder and its components have been designed to ensure safe operation within the guidelines covered by legislation. Accordingly Mono Pumps Limited 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 Mono Pumps Limited may affect the safe operation of the grinder 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.

# Introduction

## Series 'A' Muncher

This information and all the information contained herein, are the exclusive property of Mono Pumps Ltd, and contain information of a proprietary nature. It is provided for the sole purpose of transmitting the information contained to the designated recipient.

This information is to be used only as specified in the instrument of transmittal. It is not to be reproduced, copied in whole, or in part, nor is information it contains to be disclosed in any manner without the written consent of Mono Pumps Ltd. Its use for any other reason than the

specified shall be a violation of the agreement with the recipient concerning the legal rights of Mono Pumps Ltd.

Mono Pumps Ltd reserves the right to make changes, which may obsolete certain parts of this manual.

The manual gives a guide to the operation and maintenance of the Series 'A' Muncher given that all Health and Safety and good engineering practices are observed.

The information below is for contract No. \_\_\_\_\_ and gives the duty for which the equipment is supplied.

# Index

<b>SECTION 1</b>	<b>INSTALLATION</b>
<b>SECTION 2</b>	<b>START-UP PROCEDURE</b>
<b>SECTION 3</b>	<b>DISMANTLING AND ASSEMBLY ADVICE</b>
<b>SECTION 4</b>	<b>WIRING DIAGRAM DRAWING REF. No.'s AND TORQUE DATA CODING TABLE</b>
<b>SECTION 5</b>	<b>DISMANTLING AND ASSEMBLY DIAGRAMS</b>
<b>SECTION 6</b>	<b>EXPLODED VIEW</b>
<b>SECTION 7</b>	<b>SECTIONAL ARRANGEMENTS</b>
<b>SECTION 8</b>	<b>GENERAL ARRANGEMENTS</b>
<b>SECTION 9</b>	<b>LIFTING AND GUARDING DIAGRAMS</b>

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

The following harmonised standards are applicable: BS EN 809, BS EN ISO 12100 Parts 1 & 2

### **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 2004/108/EC  
The Low Voltage Directive 2006/95/E  
The Pressure Equipment Directive 2005/88/EC  
The Outdoor Noise Directive 2000/14/EC  
and subsequent amendments  
The Drinking Water Directive 98/83/EC

### **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 - Engineering Manager - PDS  
for Mono Pumps Limited, Martin Street, Audenshaw,  
Manchester, England, M34 5JA.**

# Installation, Operation & Maintenance Instructions

## 1.0 INSTALLATION

### 1.1 INSTALLATION & SAFETY RECOMMENDATIONS

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

#### 1.1.1 OPERATING PRINCIPLE

##### The Muncher

The Muncher is a slow speed, high torque grinder designed to operate in the water, waste and biowaste industries. All Munchers have two shafts operating at differential speeds. Each shaft is fitted with identical interleaving cutters and spacers.

## 1.2 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 Munchers 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 the Muncher components.

## 1.3 SYSTEM DESIGN AND INSTALLATION

At the system design stage, consideration must be given to the provision of filler plugs, and the installation of non-return and/or isolating valves where applicable.

Series 'F' AND 'H' Munchers are horizontal dry waste machines and must be fixed rigidly and horizontally either to the ground, or to a rigid system.

TR Pipeline models are designed for horizontal installation only.

Series 'A', SB and 'R' open channel models do not require fixing to the ground and can be supported either by the concrete channel or by steel supports bolted to the concrete channel walls.

Series 'A', SB and 'R' pipeline models can be installed at any attitude.

Pipework to and from the unit should be independently supported and not rely on the Muncher as a means of support. Wherever possible when installed in a vertical pipe system the Muncher unit should be independently supported.

## 1.4 HANDLING



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



**A weight table is included at the end of this section.**

**Lifting illustrations are contained in this document -Section 8.**

### NOTE



**DO NOT ATTEMPT TO LIFT MUNCHER USING ONLY ONE LIFTING LUG. EXTREME CAUTION SHOULD BE OBSERVED FOR PERSONNEL SAFETY WHEN LIFTING HEAVY OBJECTS.**

**BY DESIGN THE CUTTERS HAVE SHARP EDGES.**

**GREAT CARE MUST BE TAKEN WHEN HANDLING. THE USE OF PROTECTIVE GLOVES IS RECOMMENDED.**

## 1.5 STORAGE

Munchers are dispatched from our factory with the cutter chamber sprayed with a moisture repellent coating and ready for immediate installation and operation.

Should the machine be stored or left stationary for any length of time it is recommended that the cutter bank is re-sprayed with anti-rust lubricant and that the shafts are rotated monthly.

Removing the motor cowl and turning the fan by hand is the easiest way to rotate the shafts.

Failure to do this may result in a higher frequency of reversals and in extreme cases the machine to seize due to the tight running clearances of the individual cutting elements during commissioning and initial start-up.

The starter panel if supplied should be stored in a controlled dry environment to prevent moisture build-up causing corrosion of contactors and other metallic components.



# Installation, Operation & Maintenance Instructions

See manufacturer instructions for motor/gearbox/drive and panel storage procedures.

## NOTE:



The Muncher must be protected by a PLC control unit set up to the correct operating philosophy. Only PLC's supplied or approved by Mono Pumps Limited should be used. Failure to observe this requirement may cause premature machine failure and could invalidate the warranty of the machine. It is also important that the PLC be correctly wired into the panel.

Please refer to Wiring Diagram – Section 4, Page 1.

## IMMEDIATELY PRIOR TO INSTALLATION AND STARTING



Before installing the Muncher please ensure that all plugs and inspection plates are replaced.

For TR Munchers please see section 1.9.1 prior to starting for instructions on how to fit constant level oilers.

## 1.6 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.



Earthing points will be provided on electric drives (if supplied) and it is essential that these are correctly connected. The electrical installation should include appropriate isolating equipment to ensure that the unit is safe to work on.

## 1.7 GENERAL SAFETY



**GREAT CARE MUST BE TAKEN TO PROTECT ALL ELECTRICAL EQUIPMENT FROM SPLASHING WHEN HOSING DOWN. WHERE MONO PUMPS LIMITED HAVE SUPPLIED A BASIC MUNCHER 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. When commissioning the plant, all joints in the system must be checked thoroughly for leakage.

If, when starting, the Muncher does not appear to operate correctly, the plant must be shut down immediately and the cause of the malfunction established before operations are recommenced.

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

## NOTE:

**NEVER inspect or work on or near the cutter chamber without first isolating and locking the machine.**

## GUARDS



In the interests of safety, and in accordance with relevant legislation, all guards must be replaced after necessary adjustments have been made.



It is strongly recommended that a Series 'F' or 'H' horizontal dry Muncher system should incorporate: -

- A steel (or similar) feed hopper with a minimum base to top height of 1.0 metre (3.3 feet) or a minimum height of 1.5 metres (4.9 feet) from floor level.
- A steel (or similar) lower delivery chute, which is inaccessible without tools.
- A protective grid mounted over the Muncher and conveyor system, especially where overhead walkways are present.
- Emergency stop buttons positioned within easy reach of all operating staff.

The recommended extent of enclosure is illustrated in this document - Section 8.

### 1.7.1 WARNING /CONTROL DEVICE

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

### 1.7.2 NOISE LEVELS



The noise sound pressure level will not exceed 70dB at one metre distance from the Muncher. This is based on a typical installation and does not necessarily include noise from other sources or any contribution from building reverberation.

## 1.8 EXPLOSIVE PRODUCTS/ HAZARDOUS ATMOSPHERES

In certain instances the product being treated 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.

# Installation, Operation & Maintenance Instructions

## 1.9 LUBRICATION

The gearmotor(s) is supplied with the correct type and quantity of lubricant in the gearbox but should be checked before use. For further data see separate information supplied by manufacturer.

Series 'F' and 'H' bearings and rotary shaft seals are lubricated via greasing points on each bearing housing. The correct quantity of grease is reached when excess can be seen around the outer lipseal. Other models have sealed for life bearings that do not require maintenance.

Gears should be inspected periodically to see if grease replenishment is necessary, and if so, grease should be added via the grease nipple until the housing is two thirds full.

Only use recommended lubricant shown below for Muncher shaft gears, bearings and rotary seals.

BP Energrease LC2 (-30°C to 180°C) (-22°F to 356°F).

At the following intervals, bearings, gears and seal assembly inspection should take place along with lubricant replenishment;

Series 'F', 'H', 'R' - 7,500 hrs

Series 'A', SB, TR - 10,000 hrs



**PIPELINE MUNCHERS SHOULD BE ISOLATED BY CLOSING LINE VALVES PRIOR TO SERVICING.**

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

# Weights

Muncher	Type	Gear Unit / Class	M/C Size (kW)	Weight (kg)
Series A	CA202AA	IP55	1.5	241
	CA203AA			251
	CA205AA			276
	CA206AA			286
	CA210AA			351
	CA215AA			400
	CA202AB	IP55	2.2	254
	CA203AB			264
	CA205AB			284
	CA206AB			294
	CA210AB			369
	CA215AB			439
	CA202AC	IP55	4	265
	CA203AC			275
	CA205AC			295
	CA206AC			305
	CA210AC			380
	CA215AC			450

# Weights

Muncher	Type	Gear Unit / Class	M/C Size (HP)	Weight (lb)
Series A	CA202AA	IP55	2	531
	CA203AA			553
	CA205AA			608
	CA206AA			630
	CA210AA			774
	CA215AA			882
	CA202AB	IP55	3	560
	CA203AB			582
	CA205AB			626
	CA206AB			648
	CA210AB			813
	CA215AB			968
	CA202AC	IP55	5	584
	CA203AC			606
	CA205AC			650
	CA206AC			672
	CA210AC			838
	CA215AC			992

# Installation, Operation & Maintenance Instructions

## 2.0 START-UP PROCEDURE



**By the nature of the equipment and its operating environment the Muncher can be an extremely dangerous machine. It is vital that operators are conversant with these Operation and Maintenance Instructions prior to working with the machine.**

Where applicable:

- 1) Check the foundation bolts are secure once the machine is installed in its correct operating position.
- 2) Check the gearbox lubricant, remove the plug and fit the air vent to prevent gearbox pressurisation. Not applicable to submersible drive units.
- 3) Check all electrical connections for continuity and earthing and that installation is in accordance with relevant regulations and circuit diagrams.
- 4) If a feed hopper is fitted, check that it is secure and installed correctly, and that no personnel can gain access to the moving parts of the machine.
- 5) Always ensure that machine is guarded in accordance with PD5304: 2000 Safety of Machinery requirements before any attempt is made to operate.
- 6) Prior to start up ensure all CT203 & CT205 TR Munchers have constant level oilers fitted as per section 1.9.1.
- 7) On start-up check the direction of rotation of the cutters. The cutters should rotate towards the centre when viewed from the inlet side.



### NOTE:



**If it is necessary to remove any inspection cover to observe the action – EXTREME CARE should be observed when carrying out this procedure.**

- 8) Check that the Muncher stops when “STOP” button(s) are activated.
- 9) Check for reverse rotation of cutters when “REVERSE” button is activated.
- 10) Start up the machine. On initial start-up, allow machine to run for approximately 45 minutes.
- 11) Start the feed system to the machine. Care should be taken not to overburden the machine. Adjust feed to maintain only the smallest practical reservoir of material in cutter banks.

- 12) After a further 10 minutes of running, stop the machine, switch off and lock the main isolator. Check the tightness of all securing bolts. Recheck every 500 hours of operating time.
- 13) Check the tightness of all cables and connections. Re-check every 500 hours of operating time.
- 14) Observe manufacturers guidelines with regard to gearbox lubricant initial renewal and subsequent intervals.
- 15) In the event of machine overload (jam), the controller is programmed to activate the following procedure:-
  - i) Momentarily reverse rotation to clear the condition, then return to normal operation
  - ii) If overload re-occurs within 60 seconds, reverse rotation to clear the condition, then return to normal operation.
  - iii) If a third overload occurs within 60 seconds of the first, machine shutdown in reverse mode and energise alarm circuit.
- 15) After machine shutdown, isolate and lock off. Inspect machine, removing any obstruction and press the “RESET” button.
- 16) The machine can now be re-started as 9) above.



**NEVER inspect or work on or near the cutter chamber without first isolating and locking the machine.**

# Installation, Operation & Maintenance Instructions

## 3.0 DISMANTLING AND ASSEMBLY

Section 3 contains the steps to dismantle and reassemble the Muncher. All fastenings must be tightened securely and where identified the appropriate torque figures should be used.

### 3.1 USE OF ITEMS NOT APPROVED OR MANUFACTURED BY MONO PUMPS LIMITED

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

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

The use of replacement items that are not approved by or manufactured by Mono Pumps Limited may affect the safe operation of the machine 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.

### 3.2 DISMANTLING ADVICE

(Refer to specified drawings).

**CAUTION: When servicing the Muncher, be certain that the mains isolator is off and padlocked. Serious injury could result from accidental start-up.**

- 1) Disconnect wiring at motor(s) terminal box(es) and tag leads for identification.
- 2) Pipeline models - Isolate the Muncher pipeline by closing line valves before and after the machine.
- 3) If necessary, the Muncher may be completely removed from installation using the recommended lifting equipment.
- 4) Pipeline models - Replace the pull back assembly with the maintenance period screen (MPS) if required.
- 5) When dismantling cutters and spacers, take careful note of the position and orientation of each component.

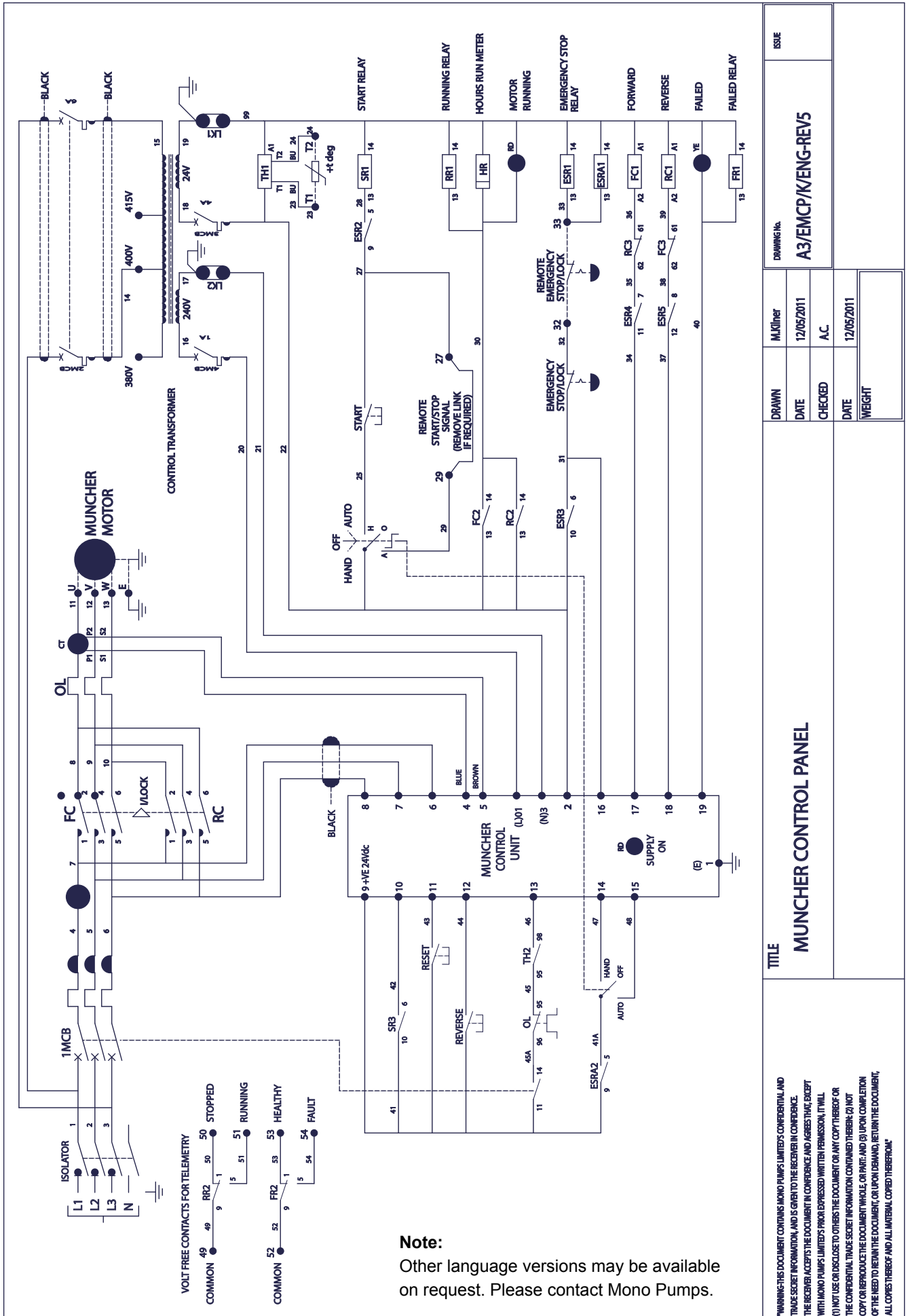
## 3.3 CLEANING / INSPECTION

- 1) Steam clean and disinfect all parts of the Muncher excluding motor, seal assemblies, gear drive unit and bearings.
- 2) Remove any gasket material from joint faces.
- 3) Housings should be cleaned thoroughly.
- 4) Inspect all parts for excessive wear and replace if necessary.
- 5) Sealed bearings cannot be re-greased, replace if necessary.
- 6) Check and if necessary replace the internal 'O'rings, lipseals and mechanical seals.
- 7) Inspect gears for wear and damage and replace if necessary.
- 8) All cutters and spacers must be clean and free from cracks or excessive wear.
- 9) Shafts should be clean and any burrs filed off for easier stacking. Inspect shafts for excessive wear of hexagonal portion. Replace if necessary.

## 3.4 REASSEMBLY ADVICE

- 1) Lubricate all bores, shafts and seals on reassembly.
- 2) Lubricate gears on re-assembly with the specified lubricant.
- 3) Reconnect wiring at motor(s) terminal box(es) using tag leads for identification.
- 4) Re-open system isolation valves.
- 5) On completion of assembly, run through the 'initial start-up' procedure in section 2.

# Wiring Diagram



DRAWING No.		ISSUE	
A3/EMCP/K/ENG-REVS			
DRAWN	MJ/ther	DATE	12/05/2011
CHECKED	A.C.	DATE	12/05/2011
WEIGHT			
<b>TITLE</b>			
<b>MUNCHER CONTROL PANEL</b>			
<small>                     *WARNING: THIS DOCUMENT CONTAINS MONO PUMPS' CONFIDENTIAL AND TRADE SECRET INFORMATION, AND IS GIVEN TO THE RECIPIENT IN CONFIDENCE. THE RECIPIENT ACCEPTS THE DOCUMENT IN CONFIDENCE AND AGREES THAT, EXCEPT WITH MONO PUMPS' LIMITED PRIOR EXPRESSED WRITTEN PERMISSION, IT WILL (1) NOT USE OR DISCLOSE TO OTHERS THE DOCUMENT OR ANY COPY THEREOF OR THE CONFIDENTIAL TRADE SECRET INFORMATION CONTAINED THEREIN; (2) NOT COPY OR REPRODUCE THE DOCUMENT WHOLE OR IN PART; AND (3) UPON COMPLETION OF THE NEED TO RETURN THE DOCUMENT, OR UPON DEMAND, RETURN THE DOCUMENT, ALL COPIES THEREOF AND ALL MATERIAL DERIVED THEREFROM.                 </small>			

# Drawing Reference Numbers

DRG.REF.	DESCRIPTION	DRG.REF.	DESCRIPTION
01A	MAIN BEARING HOUSING	P101	DOWEL PIN
*01B	MID BEARING HOUSING	P102	LIPSEAL
06A	MUNCHER NAMEPLATE	P103	SPLIT PIN
06B	WARNING NAMEPLATE	P104	SPRING WASHER
11A	BOTTOM COVER PLATE	P105	SPRING WASHER
11B	TOP COVER PLATE	P106	SLOTTED HEX NUT
17A	ADAPTER STOOL	P107	SOCKET CAP SCREW
20A	COVER PLATE GASKET	P108	SOCKET CAP SCREW
20B	SIDERAIL GASKET	P109	HEX HEAD SCREW
*20C	MID HOUSING GASKET	*P113	SPRING WASHER
21A	SIDERAIL	*P114	SOCKET CAP SCREW
25A	CUTTER	P115	DRIVESCREW
26A	MUNCHER HALF COUPLING	P116	HEX CSK PLUG
32A	DRIVE SHAFT	P117	ABUTMENT RING
32B	DRIVEN SHAFT	P118	LOCK NUT
35A	CUTTER SPACER	P119	LOCK WASHER
35B	SHIM SPACER	P207	HEX HEAD SCREW
47A	BACK UP WASHER	P208	SPRING WASHER
47B	LOCK WASHER	P301	RECT PAR KEY
47C	WASHER	*P303	SUPPORT BUSH
78A	DRIVE GEAR	P305	MECH SEAL
78B	DRIVEN GEAR	P306	RECT PAR KEY
<b>Gearbox Models Only</b>			
BOE	GEARMOTOR & KEY	P204	HEX NUT
97A	LIFTING LUG	P205	PLAIN WASHER
P201	HEX HEAD BOLT	P206	HEX SOCKET SET SCREW
P202	HEX HEAD BOLT	P209	PINFLEX COUPLING
P203	SPRING WASHER		

**IMPORTANT NOTE:** - THE DRAWING REFERENCES SHOWN GIVE THE DESCRIPTION OF ALL THE PARTS DETAILED ON THE SECTIONAL DRAWINGS IN THIS SECTION OF THE BOOK. THEREFORE SOME OF THE REFERENCES MAY NOT BE SHOWN ON ANY ONE.

## Torque Tightening Table for Fasteners

DESCRIPTION	THREAD SIZE	PART NO.	MAX. TIGHTENING TORQUE	
			Nm	Lbf.ft.
SLOTTED HEX NUT	M24 x 3	P106	230	170
SOCKET CAP SCREW	M10 x 1.5	P107	56	41
SOCKET CAP SCREW	M8 x 1.25	P108	29	22
HEX HEAD SCREW	M8 x 1.25	P109	29	22
SOCKET CAP SCREW	M10 x 1.5	P114	56	41
HEX HEAD BOLT	M12 x 1.75	P201	101	76
HEX HEAD BOLT	M12 x 1.75	P202	101	76
HEX HEAD SCREW	M10 x 1.5	P207	56	41
HEX HEAD SCREW	M8 x 1.25	P400	29	22
HEX HEAD BOLT	M8 x 1.25	P401	29	22

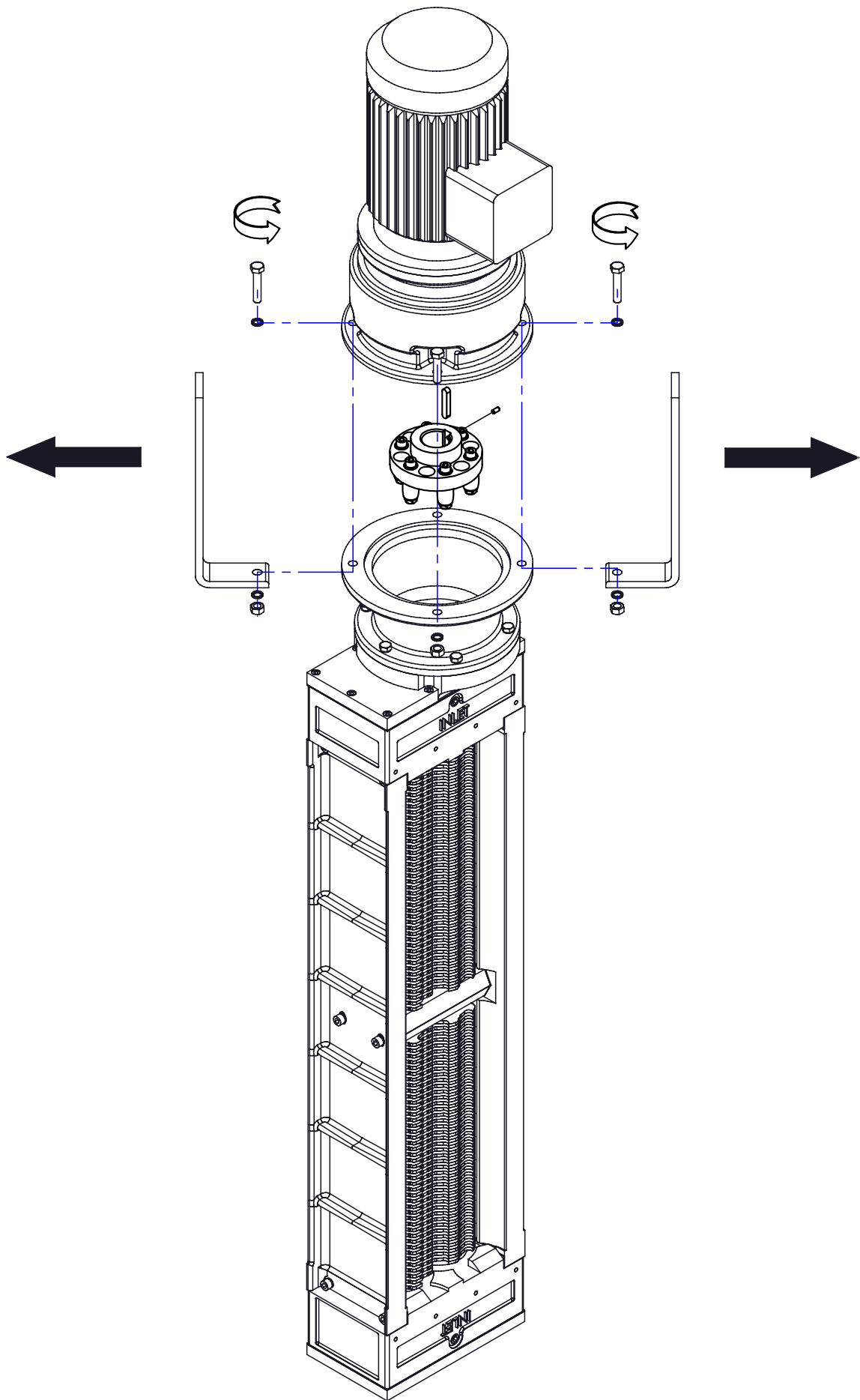
Torque tolerances are +/- 5% of stated values.



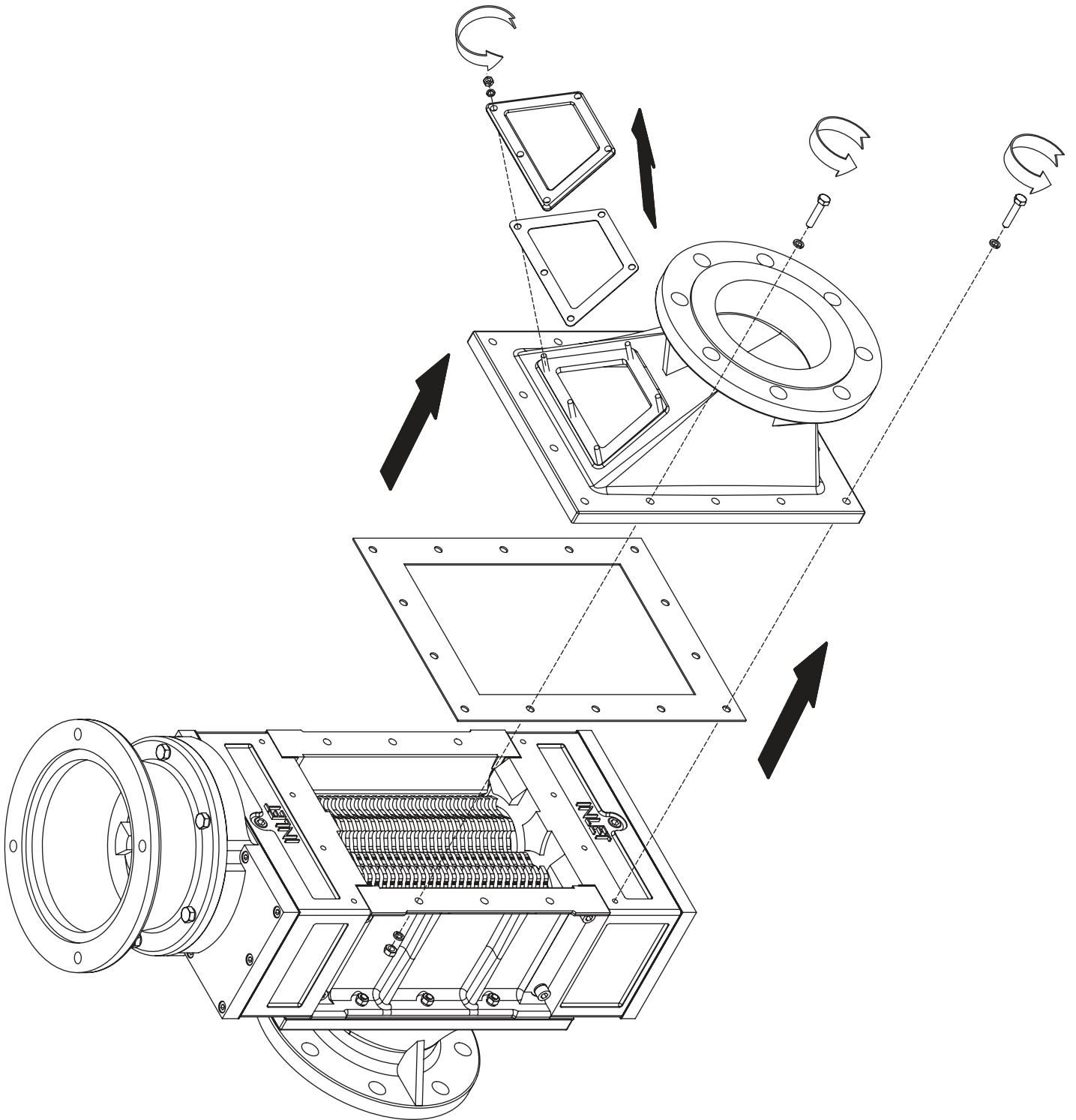
# Drawing Reference Numbers

Part	Mono Seq	DRG. REF	Part	Mono Seq	DRG. REF	
Bearing Housing	100	01A	Cutter	2511	25A	
	101			2513		
	112			2515		
	113			2516		
Mid Housing	175	01B	Drive Shaft	3200	32A	
	176			3201		
	177			3205		
Nameplate	600	06A		3206		
	630			3251		
Warning Nameplate	650	06B	Driven Shaft	3250	32B	
Bottom Cover Plate	1100	11A		3255		
Top Cover Plate	1150	11B		3256		3500
	1152			Spacer		3501
	1701		3502			
	1708		3506			
	1720		Shim Spacer	3551	35B	
1721	3503					
Adapter Stool	1722	17A	3504	35C		
	1723		Spacer (Mid Bearing)		3556	
	1724		Sleeve (Mid Bearing)		3557	
	1725		Retaining Washer		4702	
	1726		Lock Washer		4701	
	Cover Plate Gasket		2000		20A	Drive Gear
Side Rail Gasket	2010	20B	Driven Gear	7850		
Mid Bearing Housing Gasket	2020	20C	Lifting Lug	9700		
Mounting Flange Gasket	2021	20D				
Side Rail	2100	21A	<b>Coupling Variations</b>			
	2101		Pinflex Coupling	PF1BB09/35-35	P209	
	2105			PF2BB09/35-35		
	2106			PF2BB09/35-40		
	2110			PF2BB12/35-40		
	2111			PF1BB12/35-45		
	2120			PF2BB12/35-50		
	2121					
	2122					
	2123					

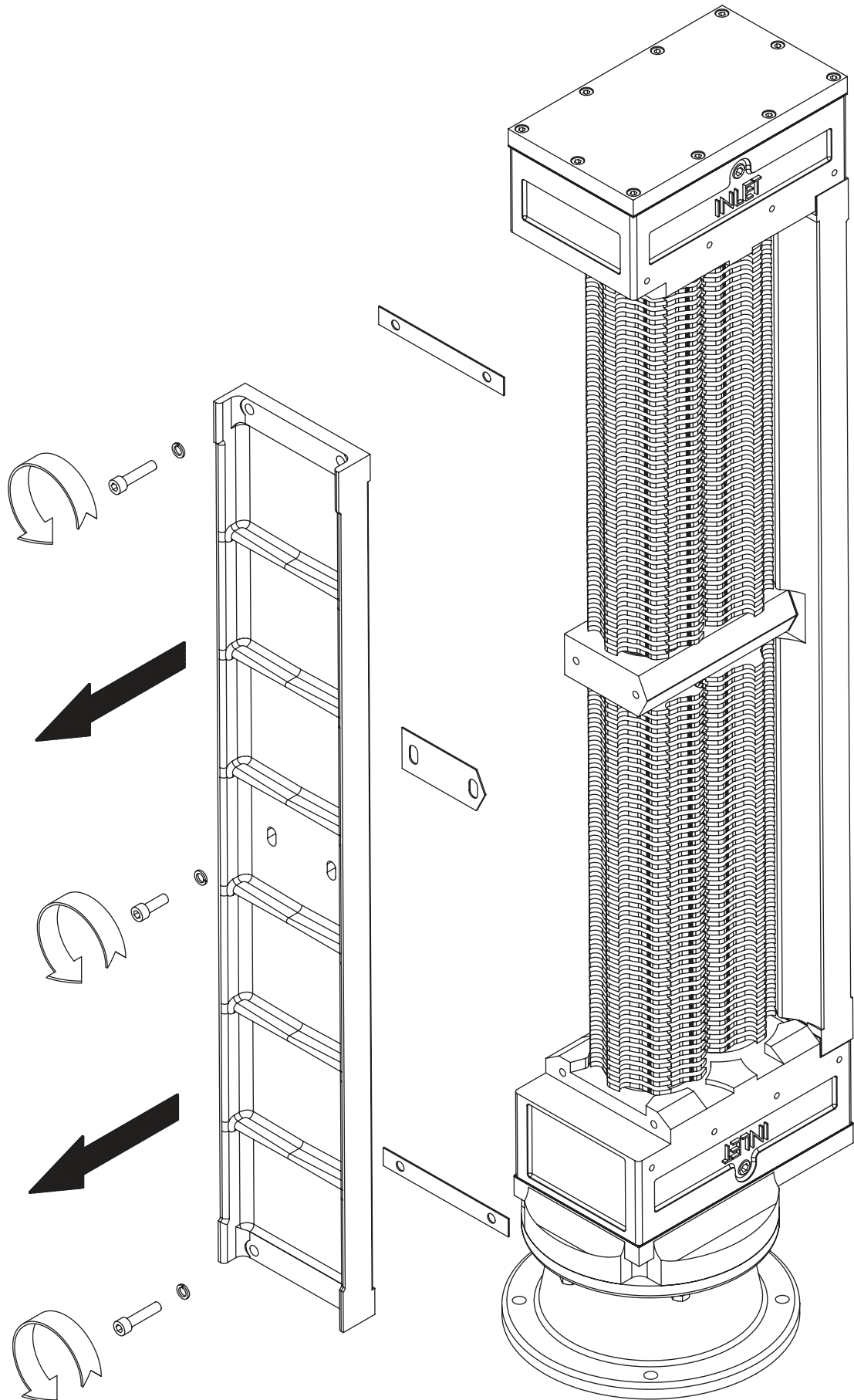
# Dismantling & Assembly Diagrams



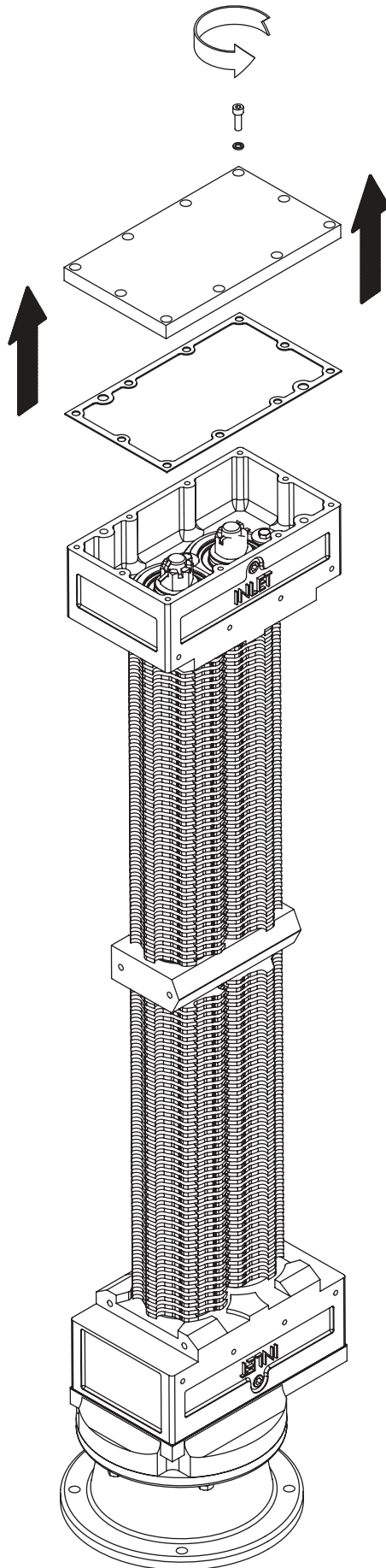
# Dismantling & Assembly Diagrams



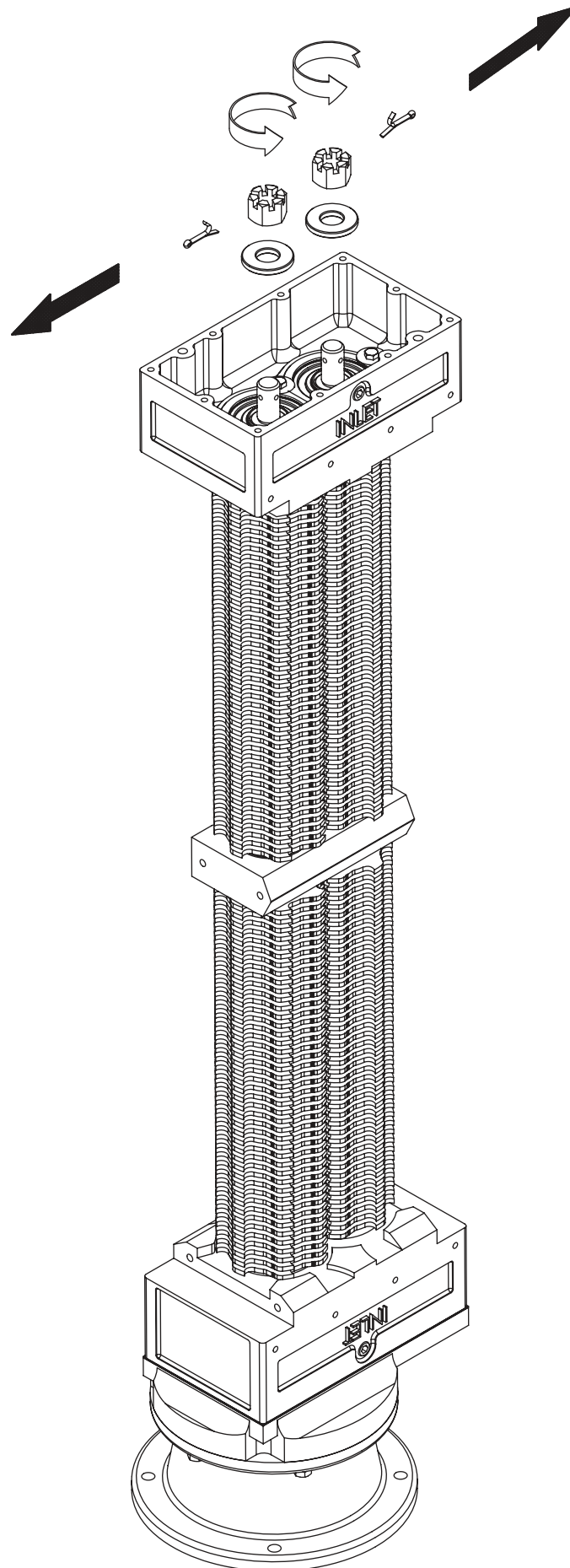
# Dismantling & Assembly Diagrams



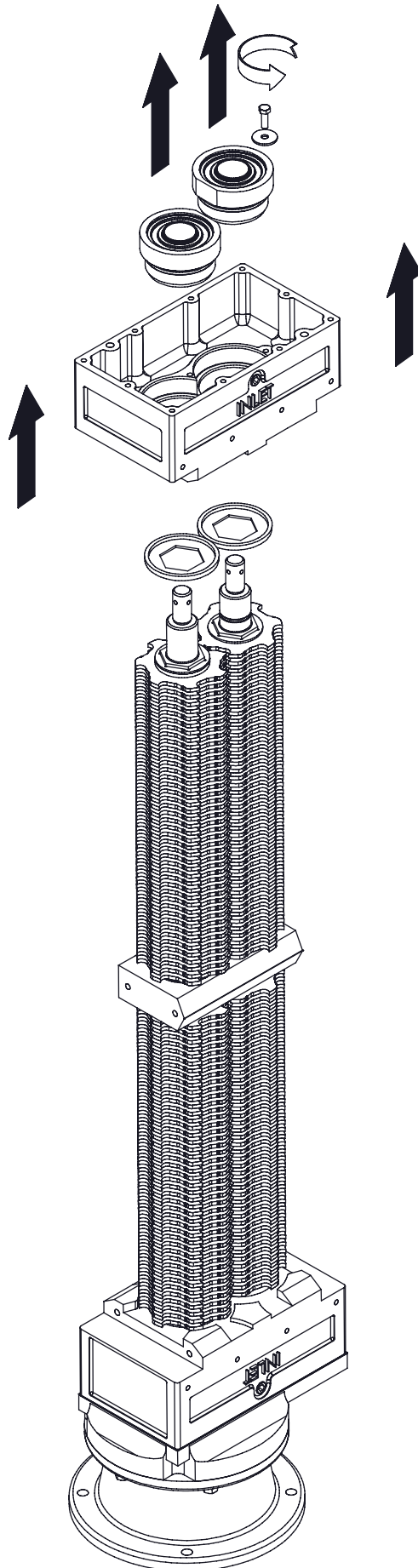
# Dismantling & Assembly Diagrams



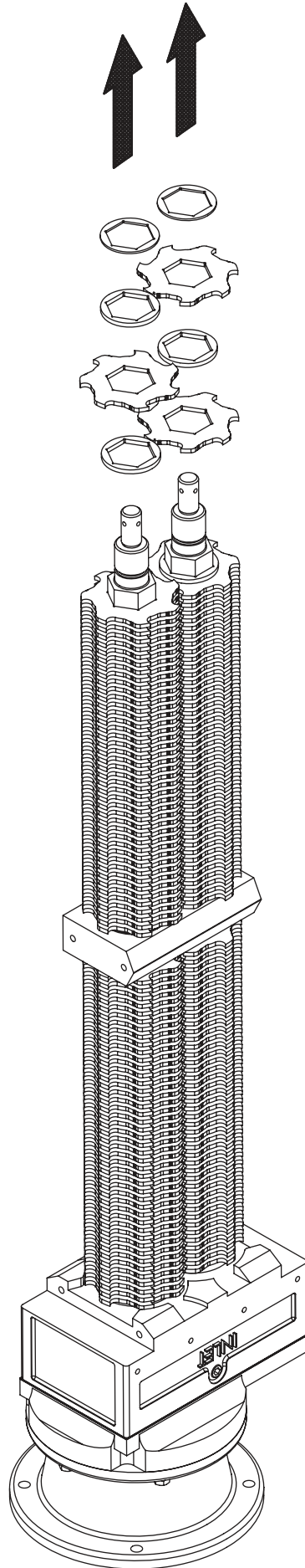
# Dismantling & Assembly Diagrams



# Dismantling & Assembly Diagrams

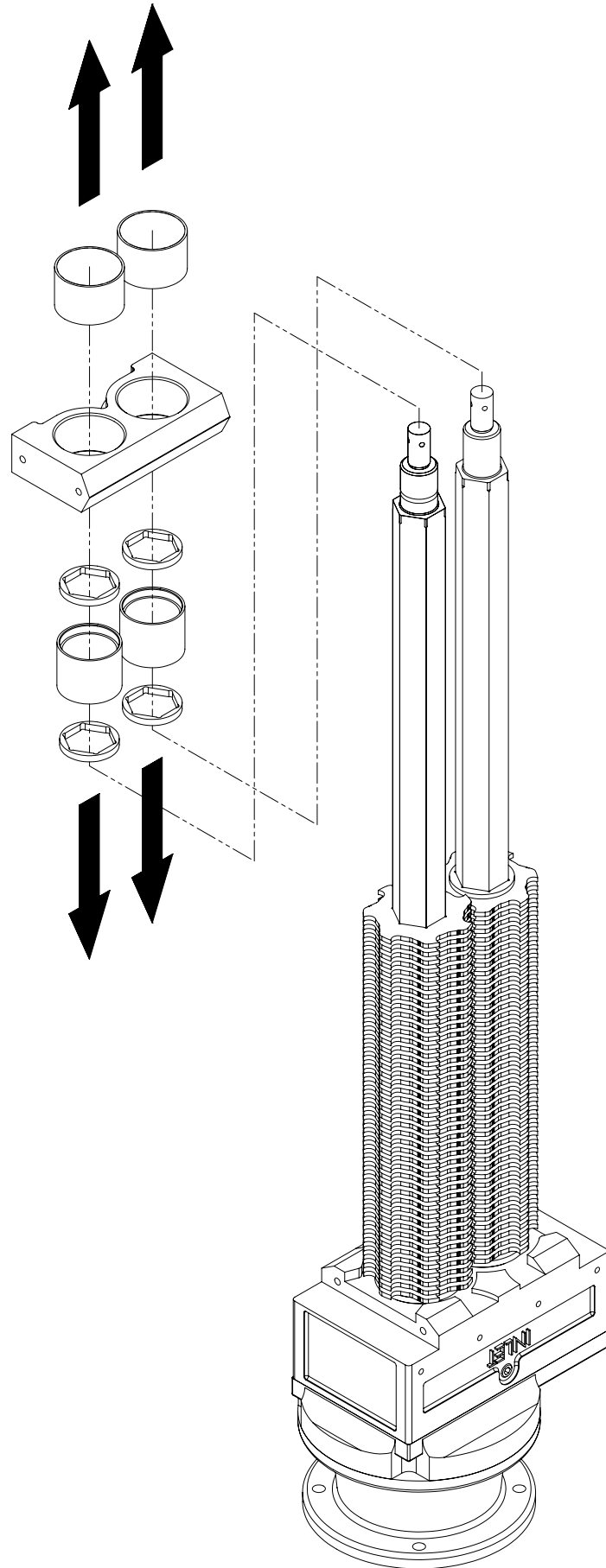


# Dismantling & Assembly Diagrams

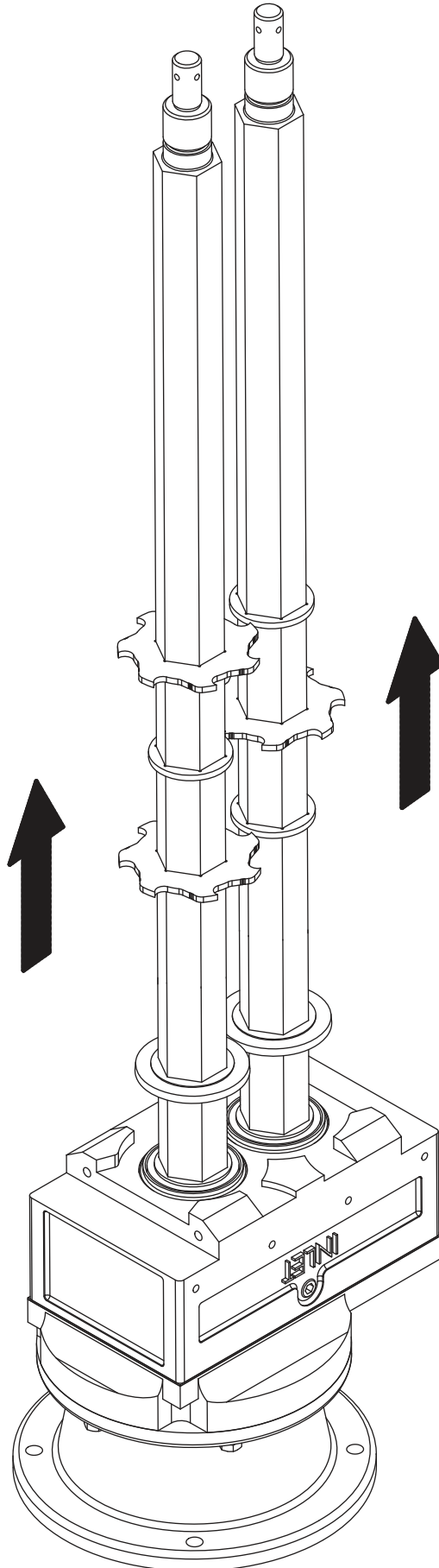




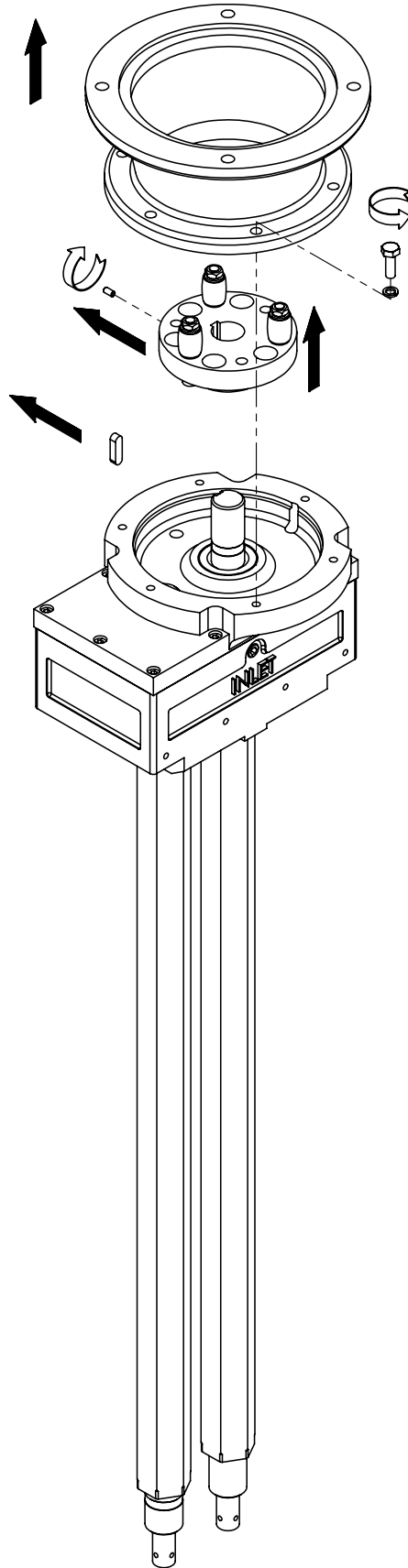
# Dismantling & Assembly Diagrams



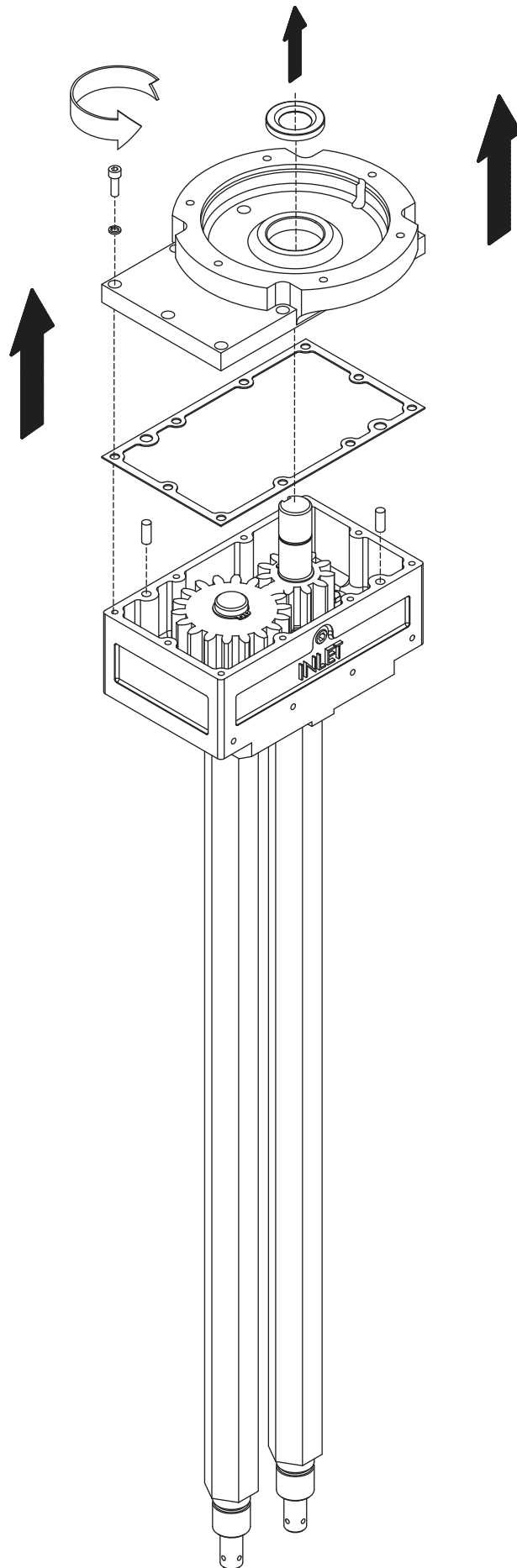
# Dismantling & Assembly Diagrams



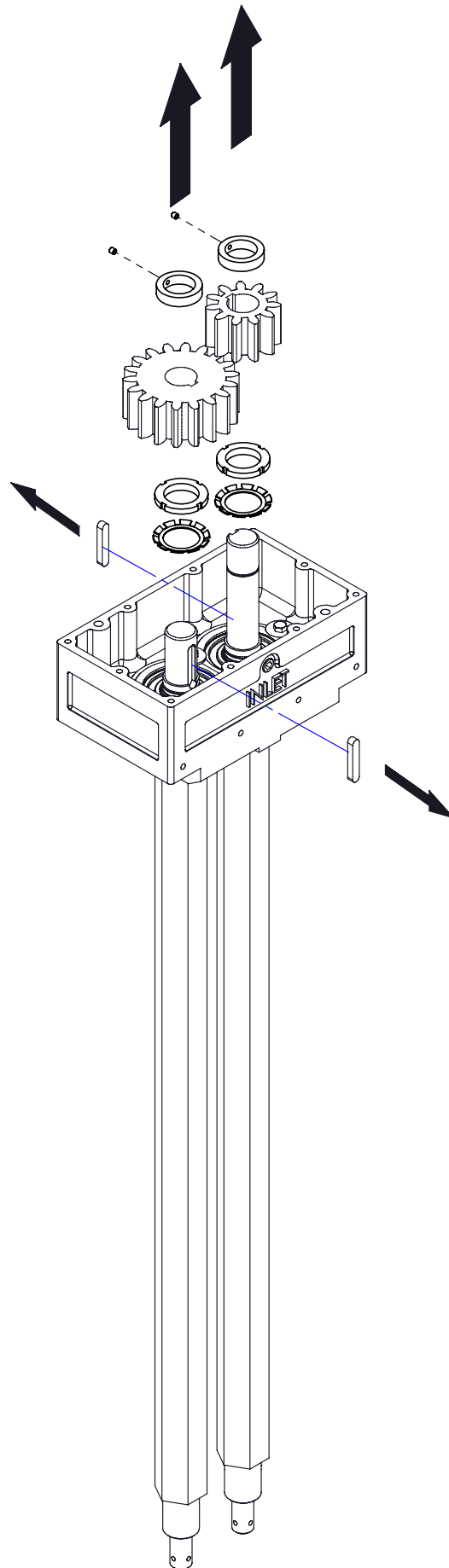
# Dismantling & Assembly Diagrams



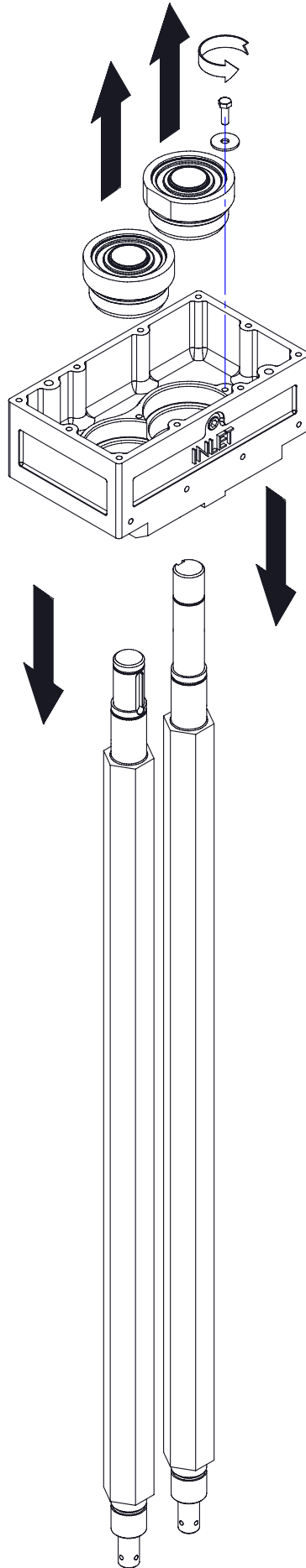
# Dismantling & Assembly Diagrams



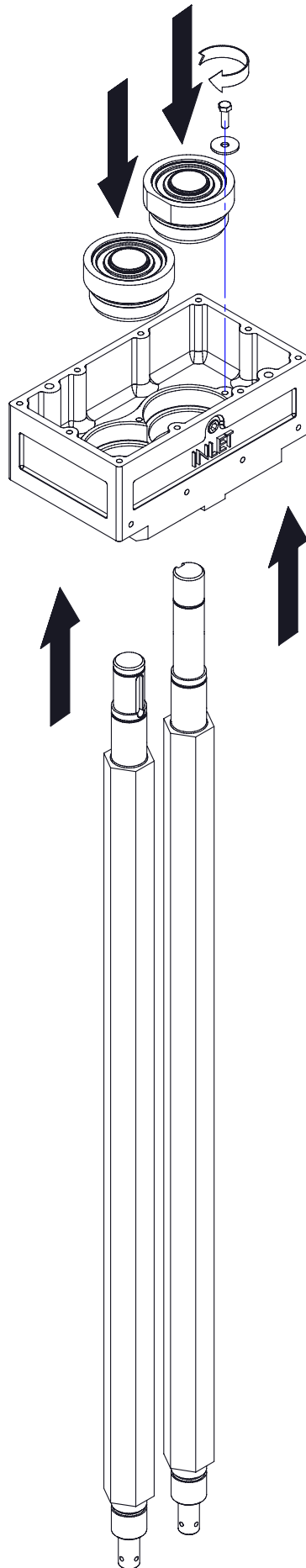
# Dismantling & Assembly Diagrams



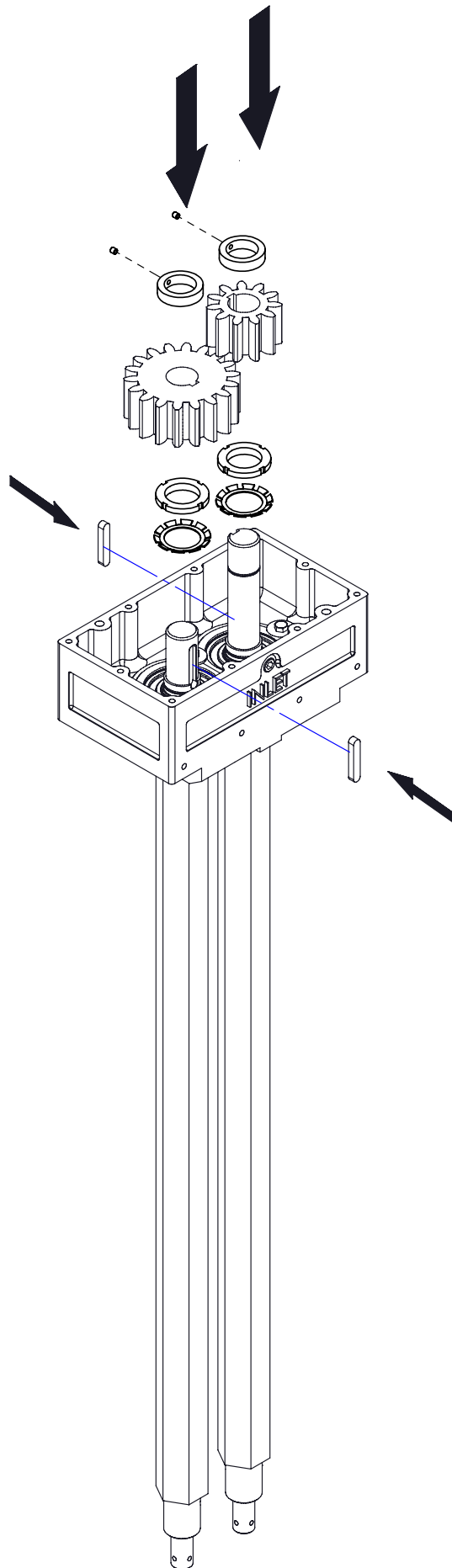
# Dismantling & Assembly Diagrams



# Dismantling & Assembly Diagrams

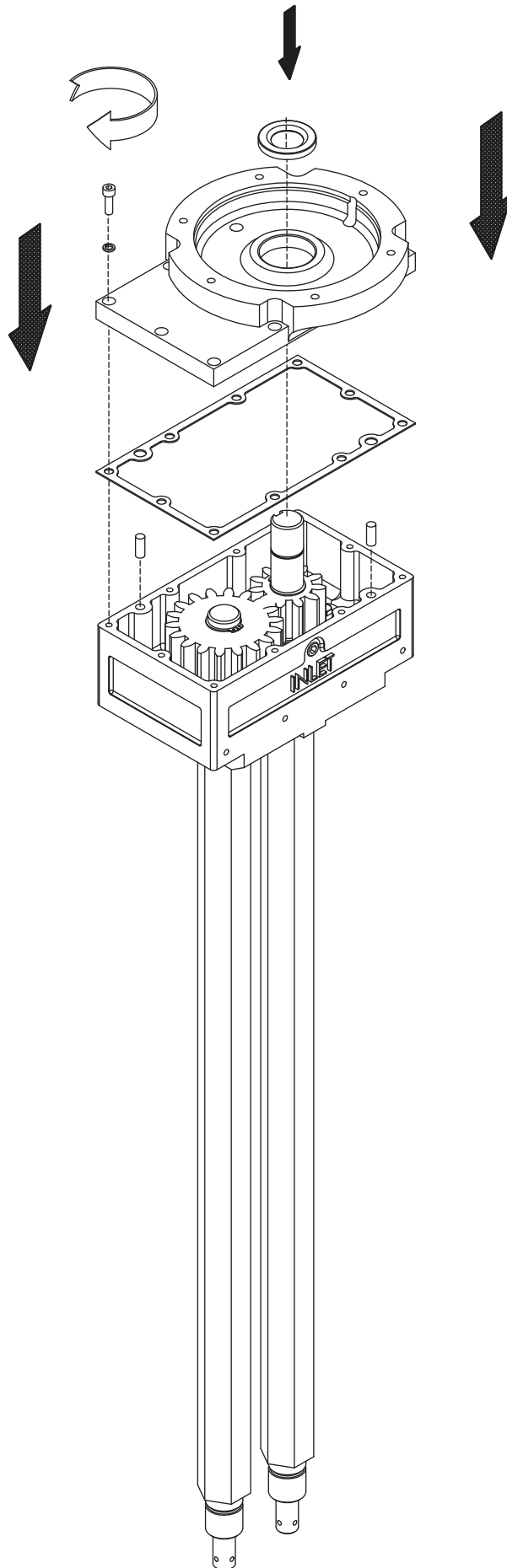


# Dismantling & Assembly Diagrams

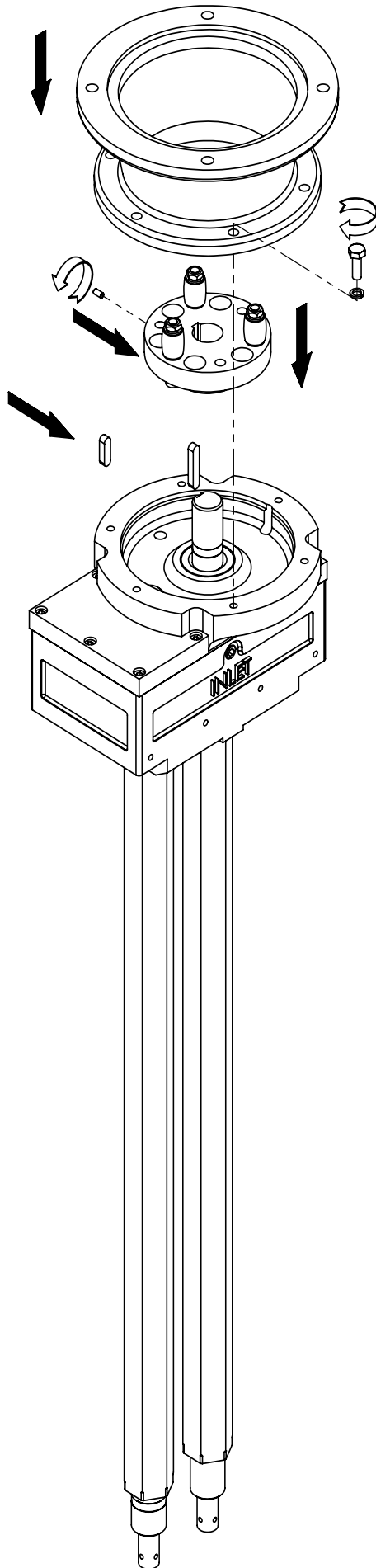




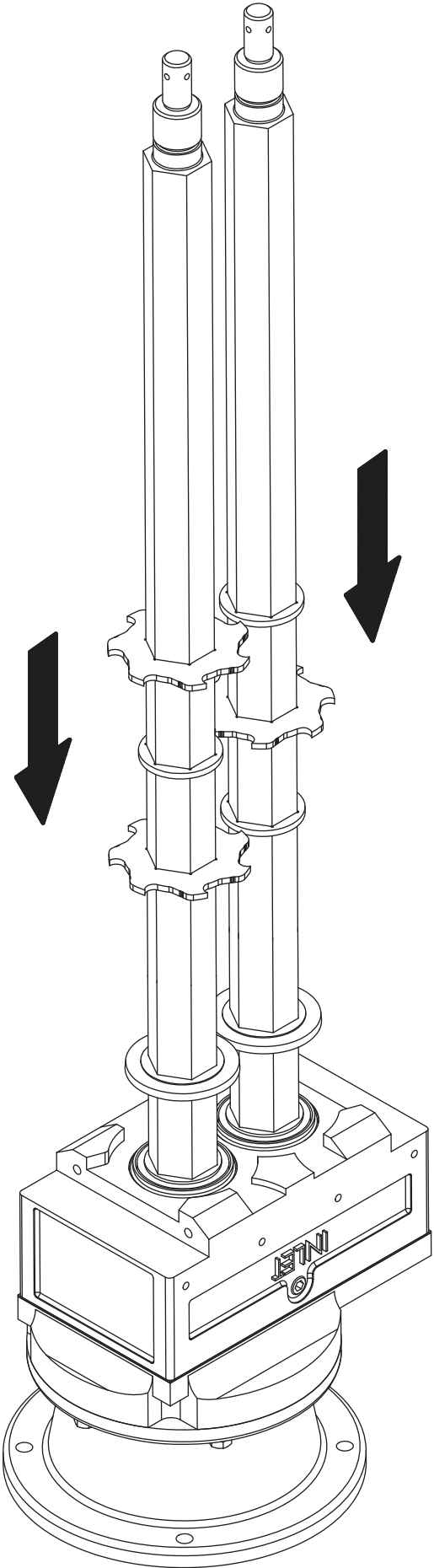
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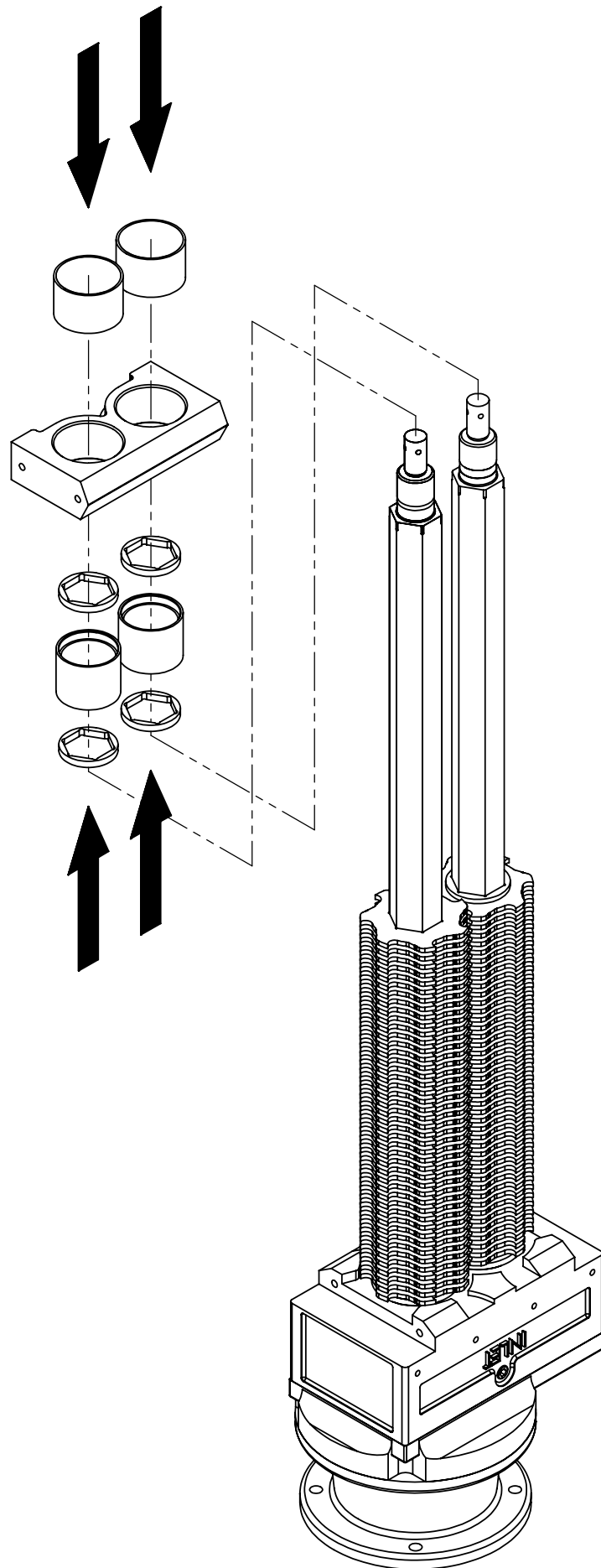
# Dismantling & Assembly Diagrams



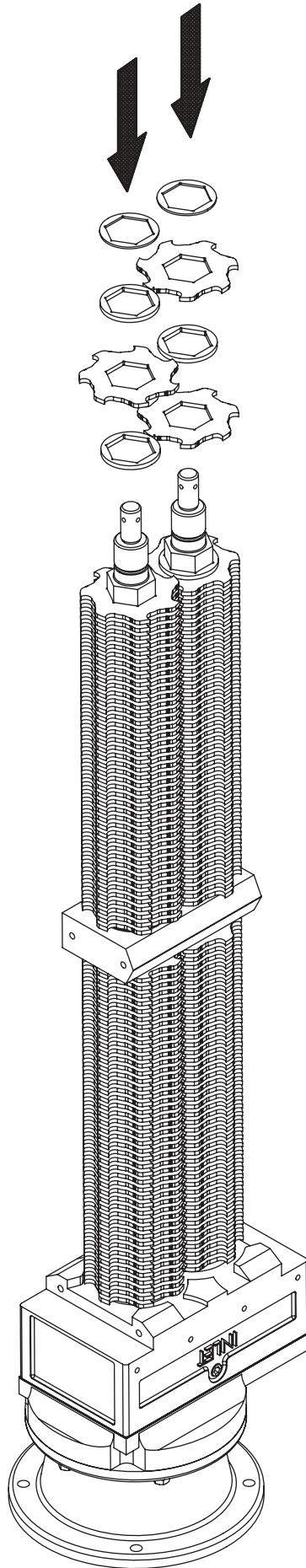
# Dismantling & Assembly Diagrams



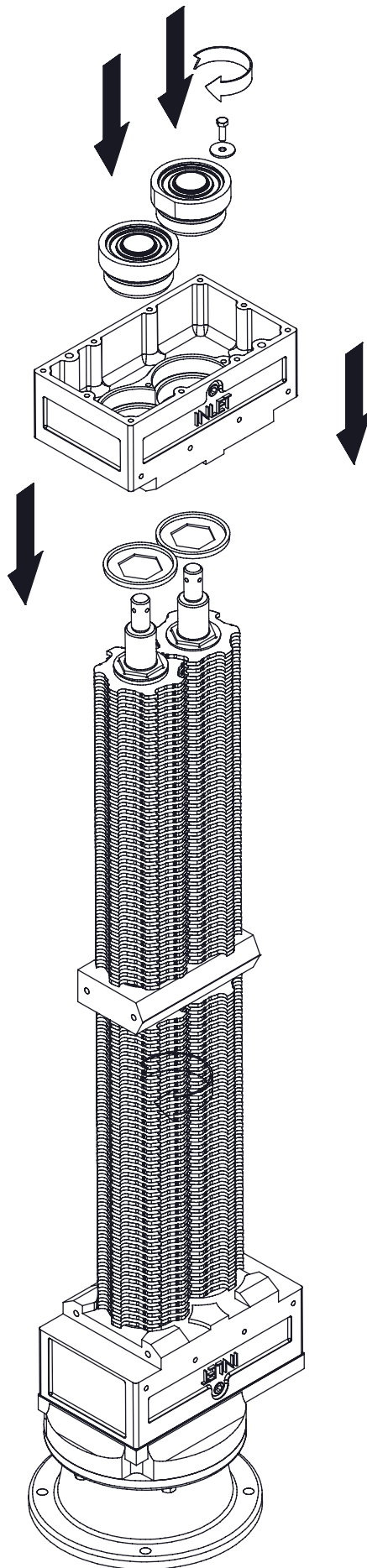
# Dismantling & Assembly Diagrams



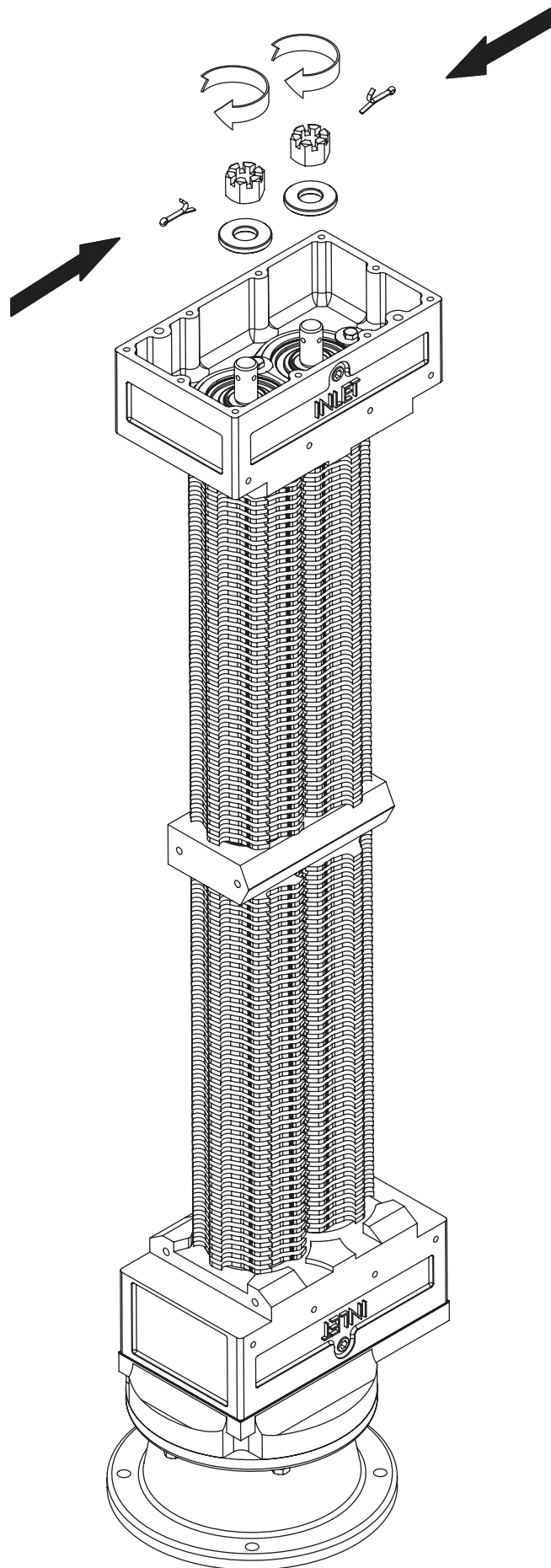
# Dismantling & Assembly Diagrams



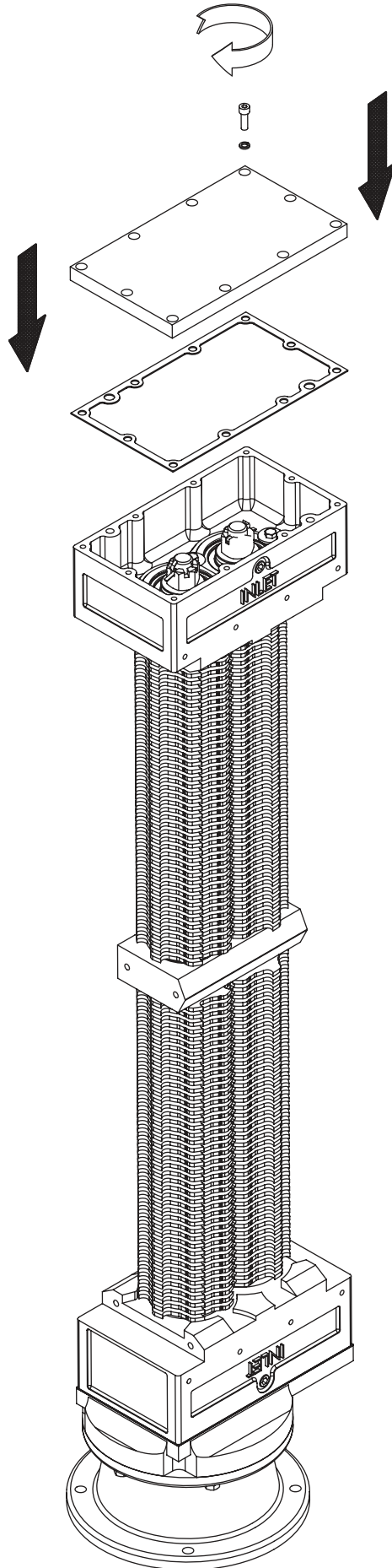
# Dismantling & Assembly Diagrams



# Dismantling & Assembly Diagrams

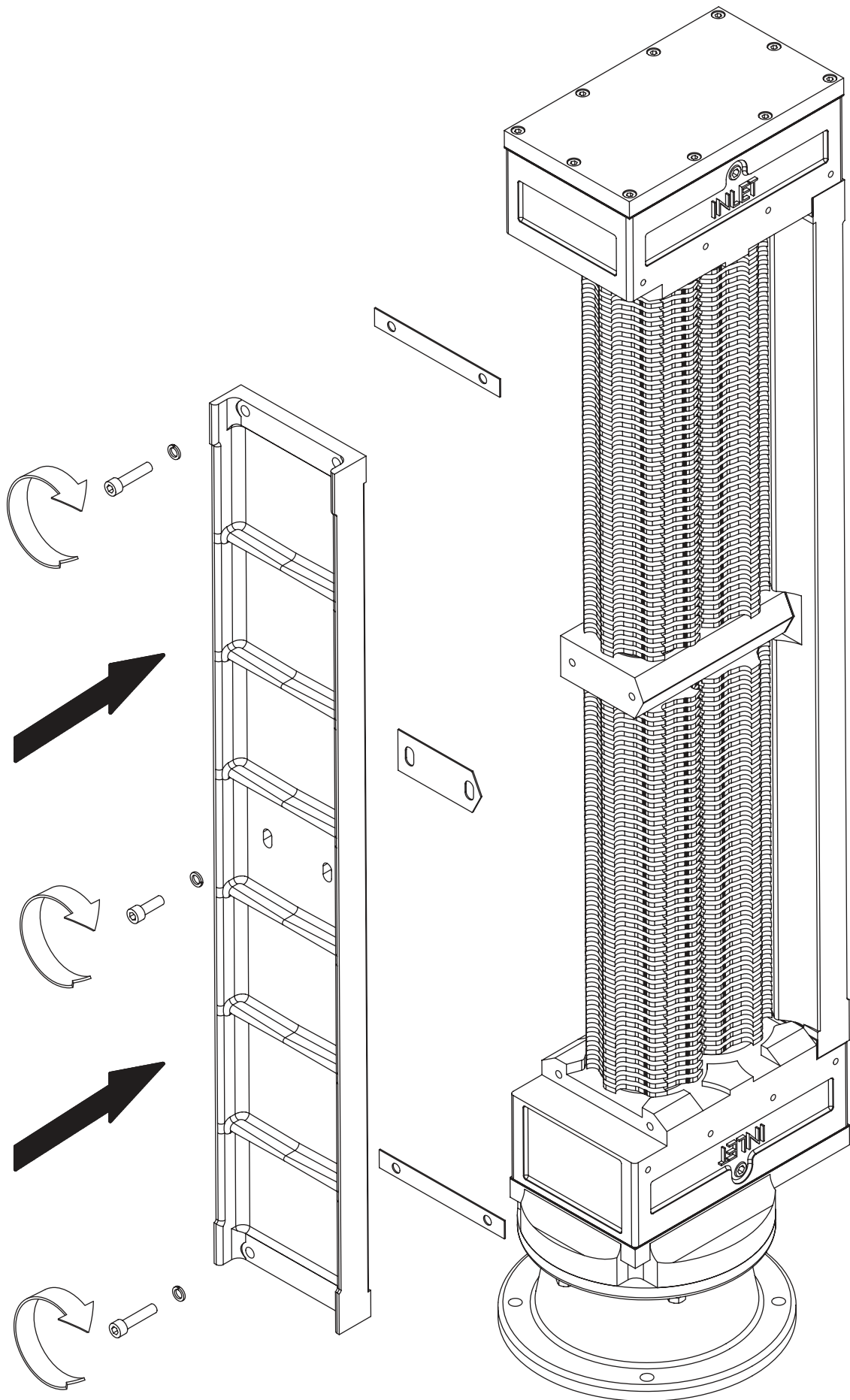


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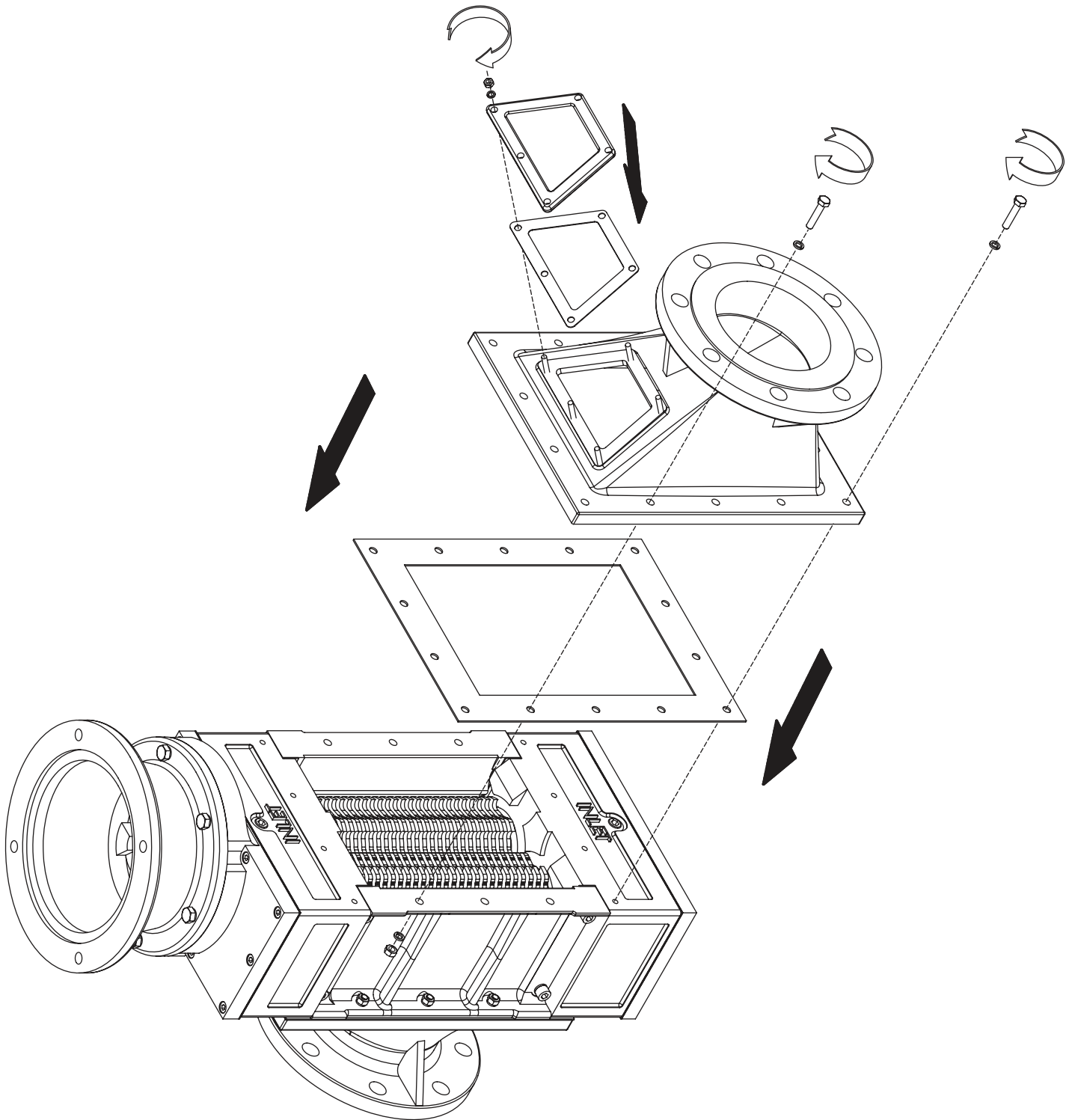




# Dismantling & Assembly Diagrams

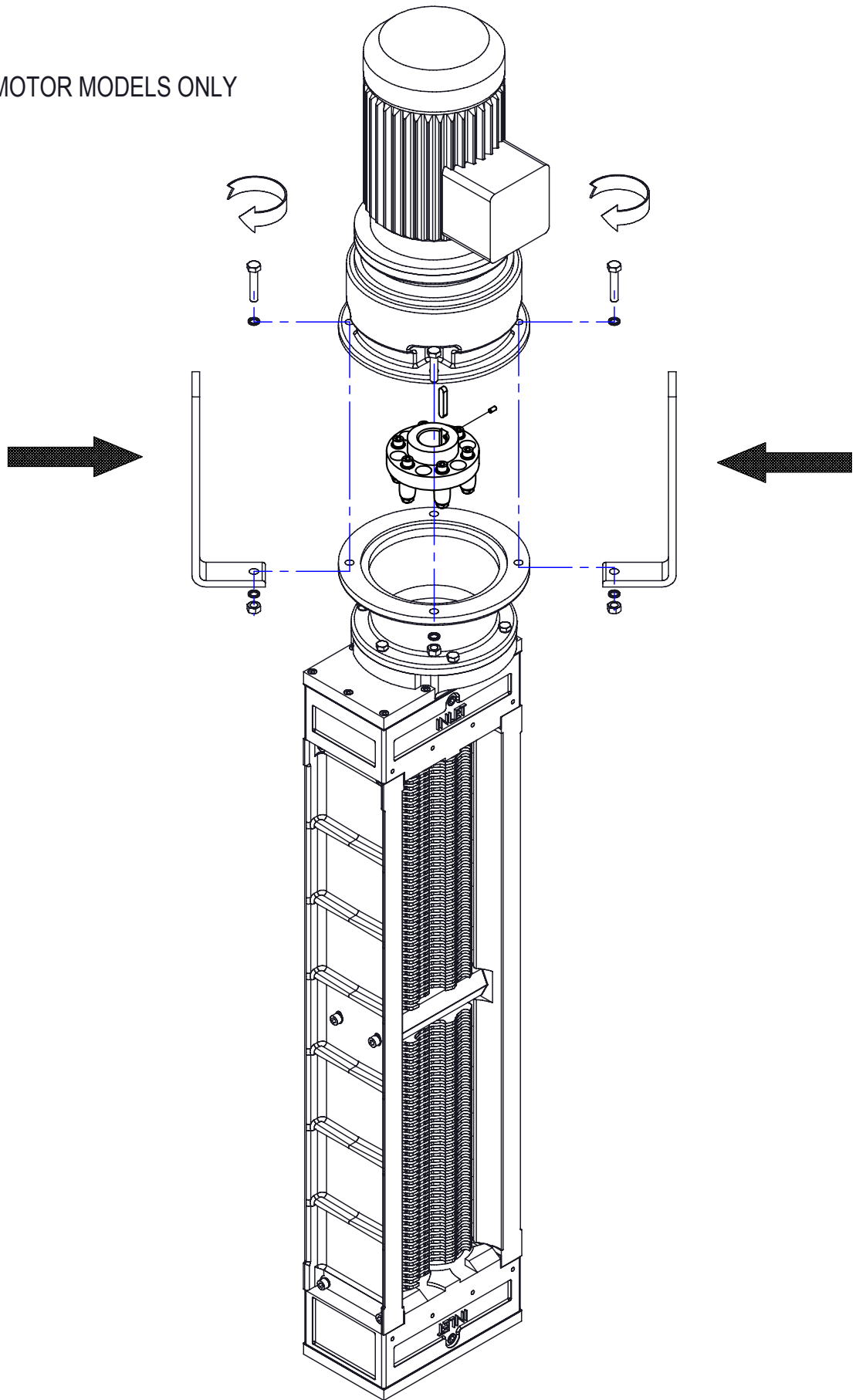


# Dismantling & Assembly Diagrams

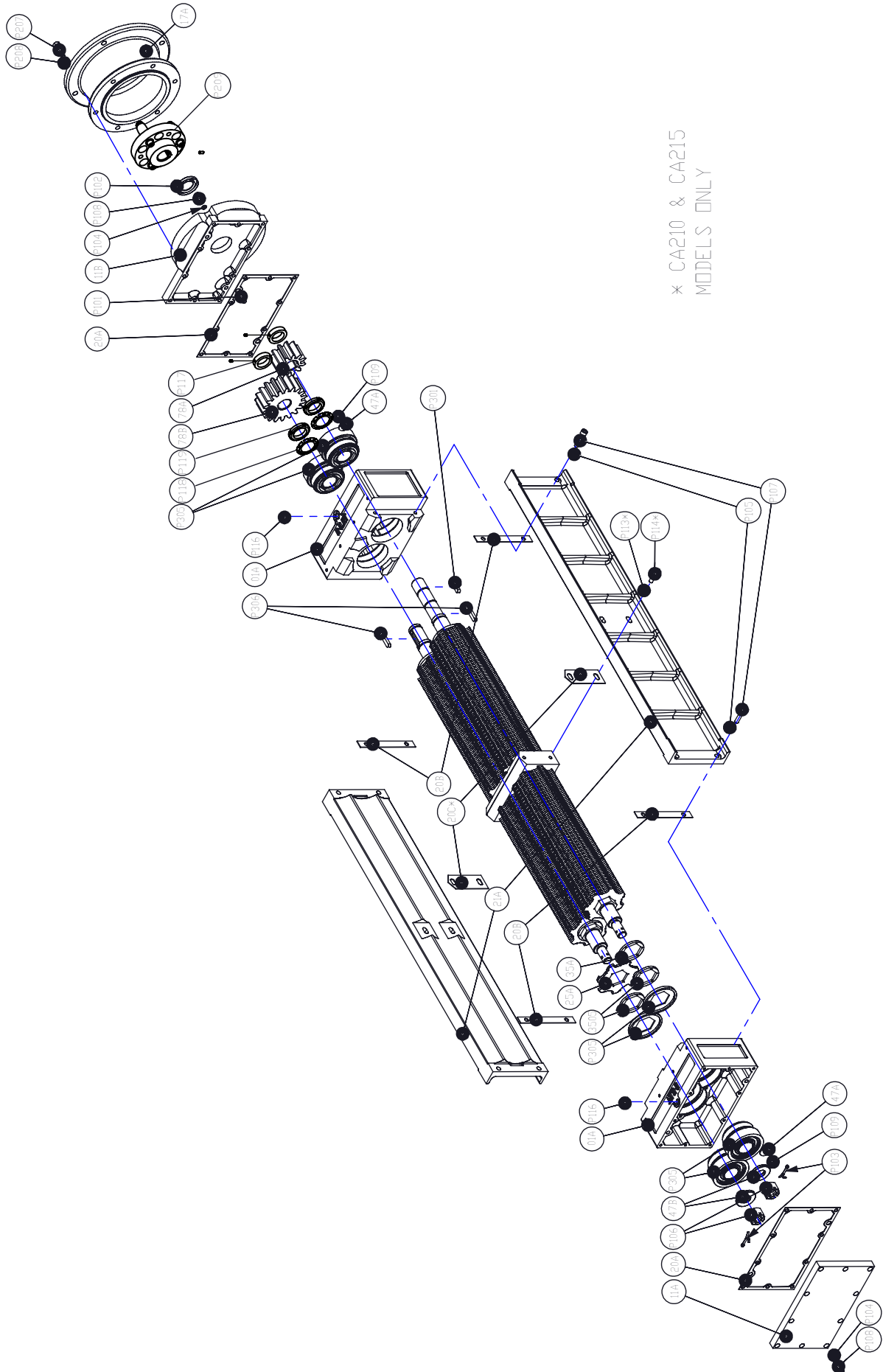


# Dismantling & Assembly Diagrams

GEARMOTOR MODELS ONLY

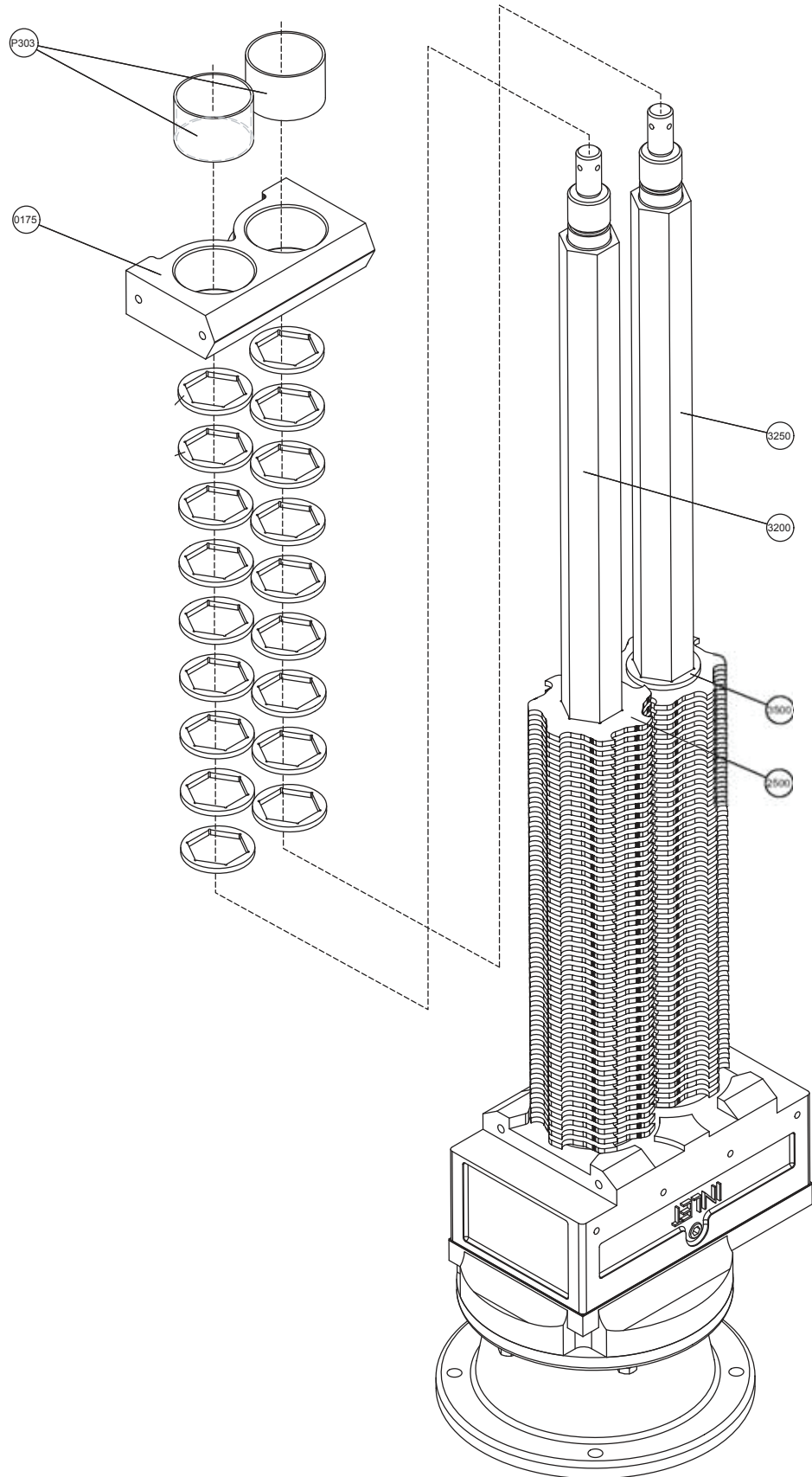


# Exploded Views

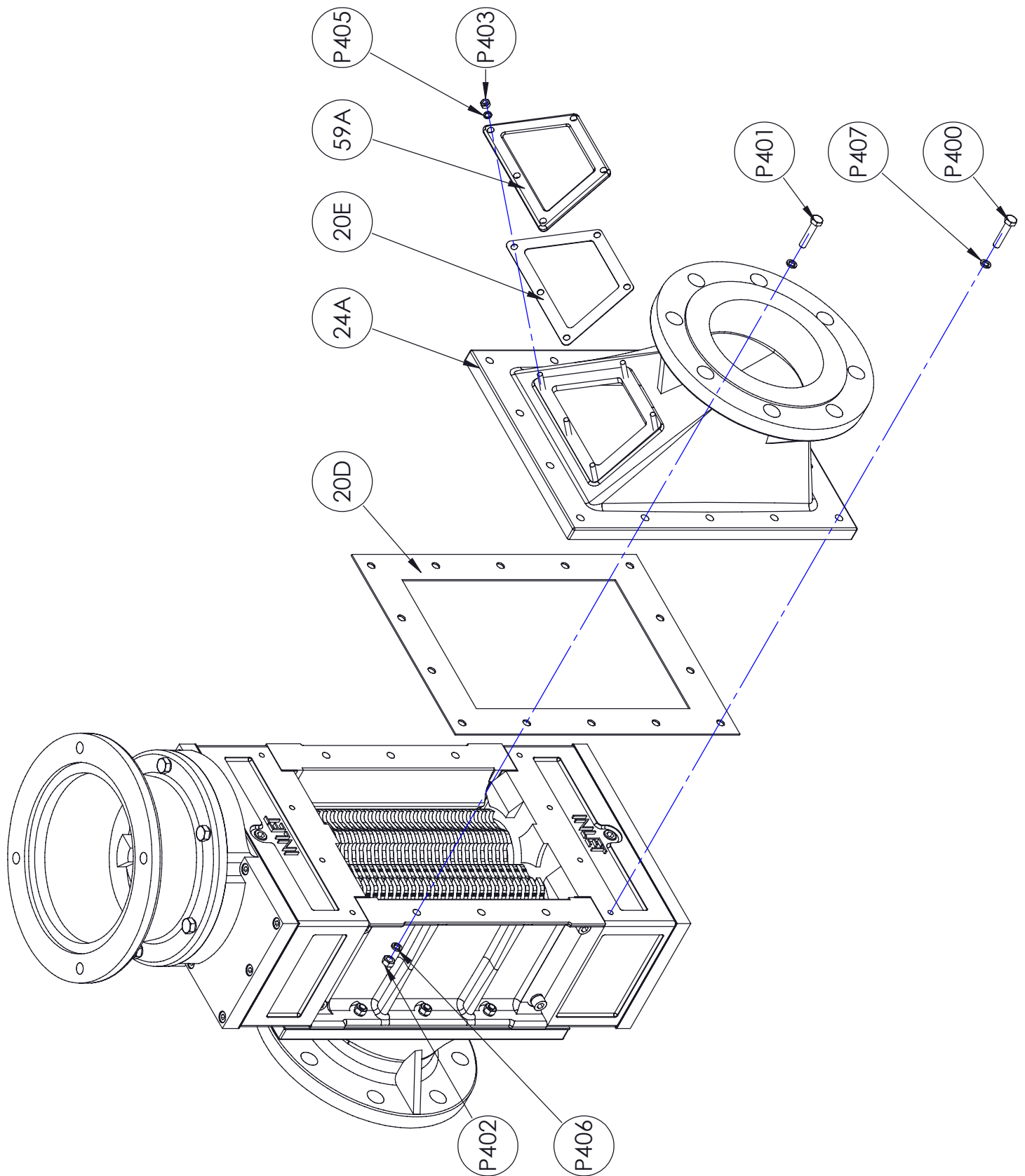


× CA210 & CA215  
MODELS ONLY

# Exploded Views

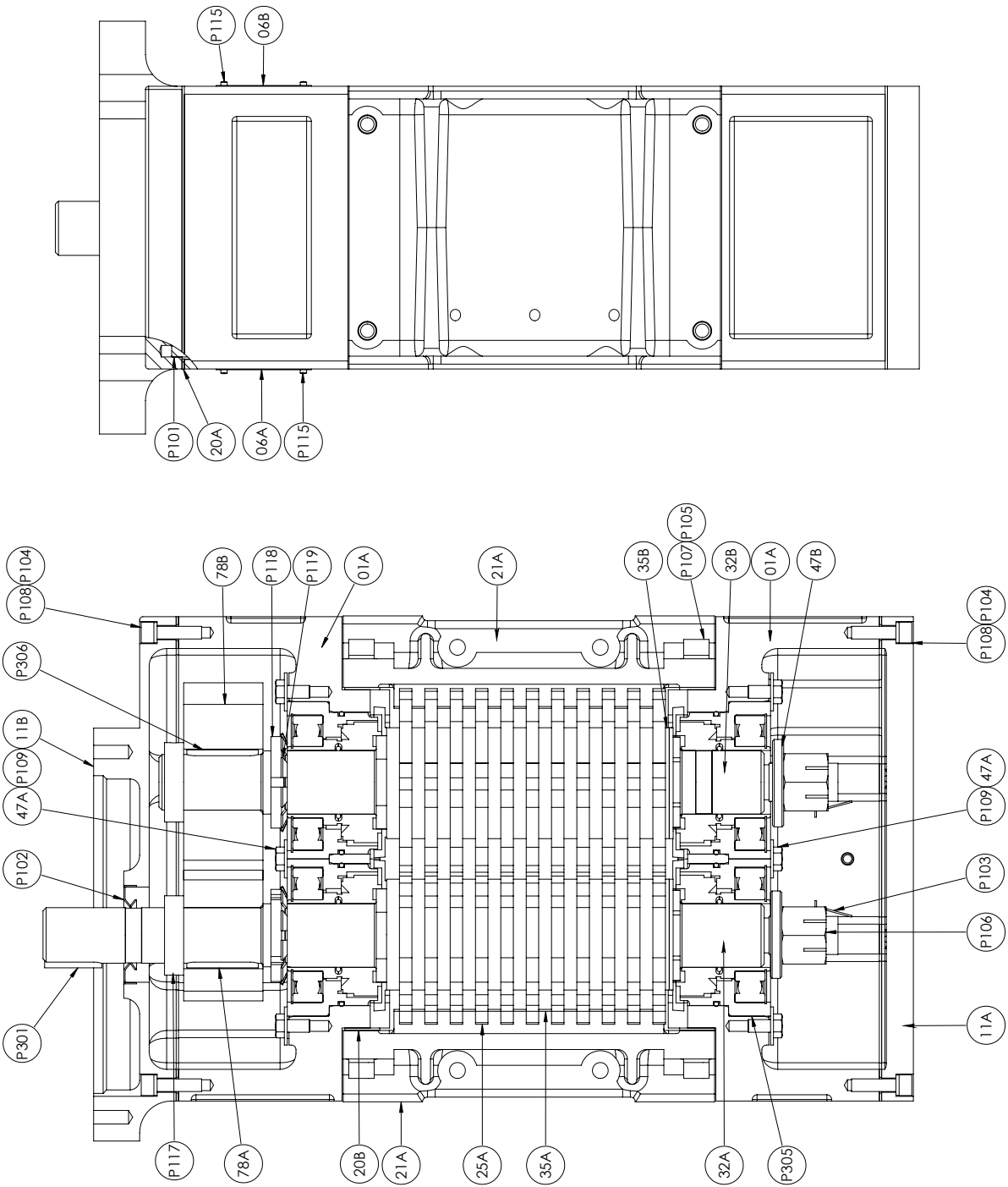


# Exploded Views

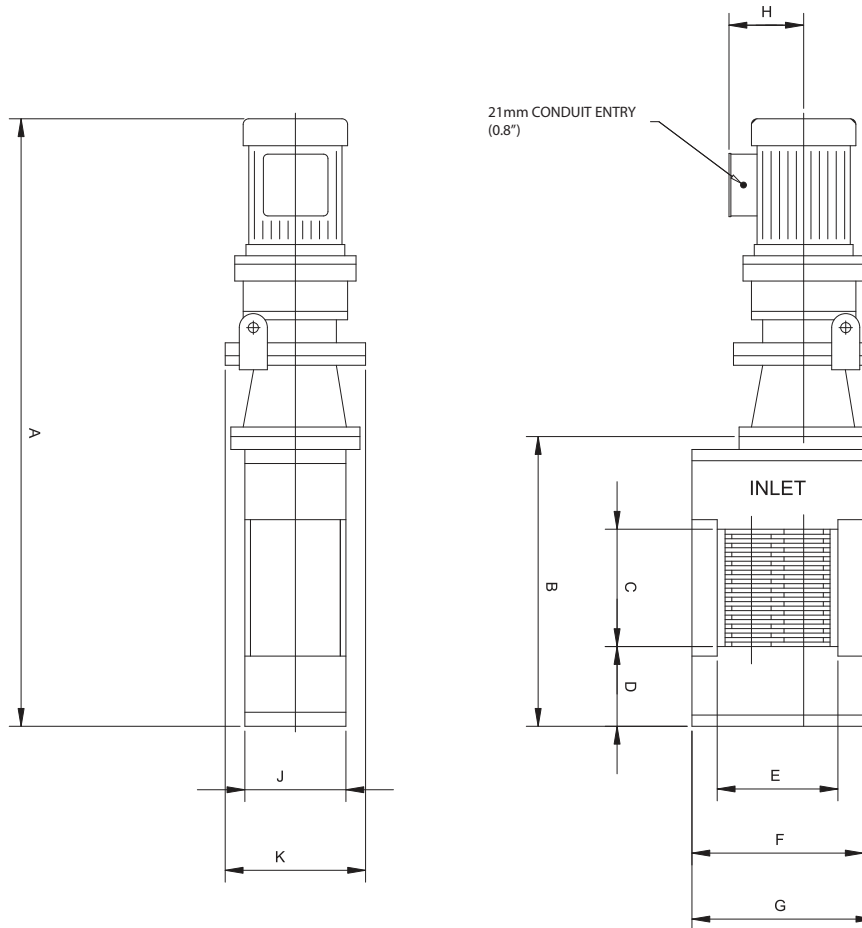


# Sectional Arrangement

BODY PARTS		QTY
ITEM	DESCRIPTION	
01A	BEARING HOUSING	2
06A	NAMEPLATE (MUNCHER)	1
06B	NAMEPLATE (WARNING)	1
P305	MECHANICAL SEAL (INCL O-RINGS)	4
11A	COVER PLATE (BOTTOM)	1
11B	COVER PLATE (TOP)	1
20A	COVER PLATE GASKET	2
20B	SIDERAIL GASKET	4
47A	WASHER	8
47B	LOCK WASHER	2
78A	DRIVE GEAR	1
78B	DRIVEN GEAR	1
P101	DOWEL PIN	2
P102	ROTARY SHAFT LIPSEAL	1
P103	SPLIT COTTER PIN	2
P104	SGL COIL SPR WASHER	20
P105	ST STL SPR WASHER	8
P106	SLOTTED HEX NUT	2
P107	ST STL HEX SOC CAPSCREW	8
P108	ST STL HEX SOC CAPSCREW	20
P109	HEX HD SCREW	8
P113	ST STL SPR WASHER	4
P114	ST STL HEX SOC CAPSCREW	4
P115	DRIVESCREW	8
P116	HEX CSK PLUG	2
P117	ABUTMENT RING	2
P118	LOCK NUT	2
P119	LOCK WASHER	2
P301	RECT PAR KEY	1
P306	RECT PAR KEY	2
ROTATING PARTS		
21A	SIDERAIL	2
25A	CUTTER	*
32A	DRIVE SHAFT	1
32B	DRIVEN SHAFT	1
35A	CUTTER SPACER	*
35B	SHIM SPACER	*



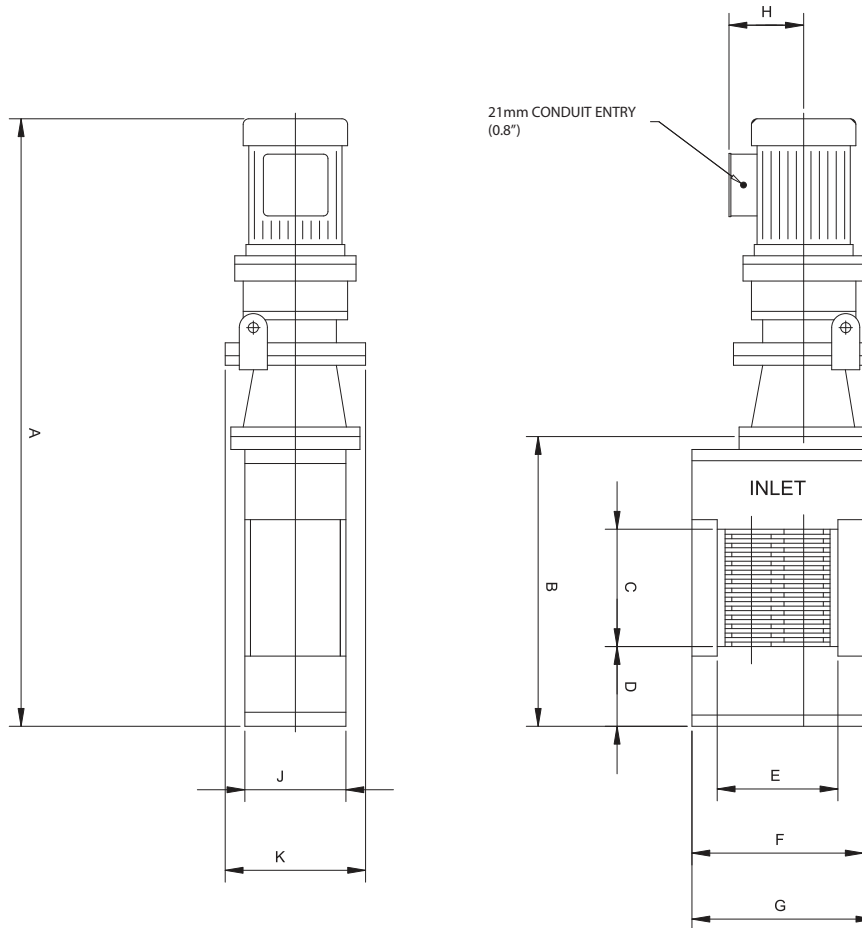
# General Arrangement



MODEL	kW	DIM A mm	DIM B mm	DIM C mm	DIM D mm	DIM E mm	DIM F mm	DIM G mm (MAX)	DIM H mm (MAX)	DIM J mm	DIM K mm	MASS kg (MAX)
CA202AA	1.5	1059	515	175	155	215	305	350	145	178	260	159
CA203AA	1.5	1173	629	290	155	215	305	350	145	178	260	169
CA205AA	1.5	1323	779	440	155	215	305	350	145	178	260	189
CA206AA	1.5	1468	924	585	155	215	305	350	145	178	260	199
CA210AA	1.5	1883	1339	1000	155	215	305	350	145	178	260	274
CA202AB	2.2	1119	515	175	155	215	305	350	154	178	260	170
CA203AB	2.2	1233	629	290	155	215	305	350	154	178	260	180
CA205AB	2.2	1383	779	440	155	215	305	350	154	178	260	200
CA206AB	2.2	1528	924	585	155	215	305	350	154	178	260	210
CA210AB	2.2	1943	1339	1000	155	215	305	350	154	178	260	285
CA215AB	2.2	2453	1849	1510	155	215	305	350	154	178	260	355
CA202AC	4.0	1244	515	175	155	215	305	350	179	178	260	196
CA203AC	4.0	1358	629	290	155	215	305	350	179	178	260	206
CA205AC	4.0	1508	779	440	155	215	305	350	179	178	260	226
CA206AC	4.0	1653	924	585	155	215	305	350	179	178	260	236
CA210AC	4.0	2068	1339	1000	155	215	305	350	179	178	260	311

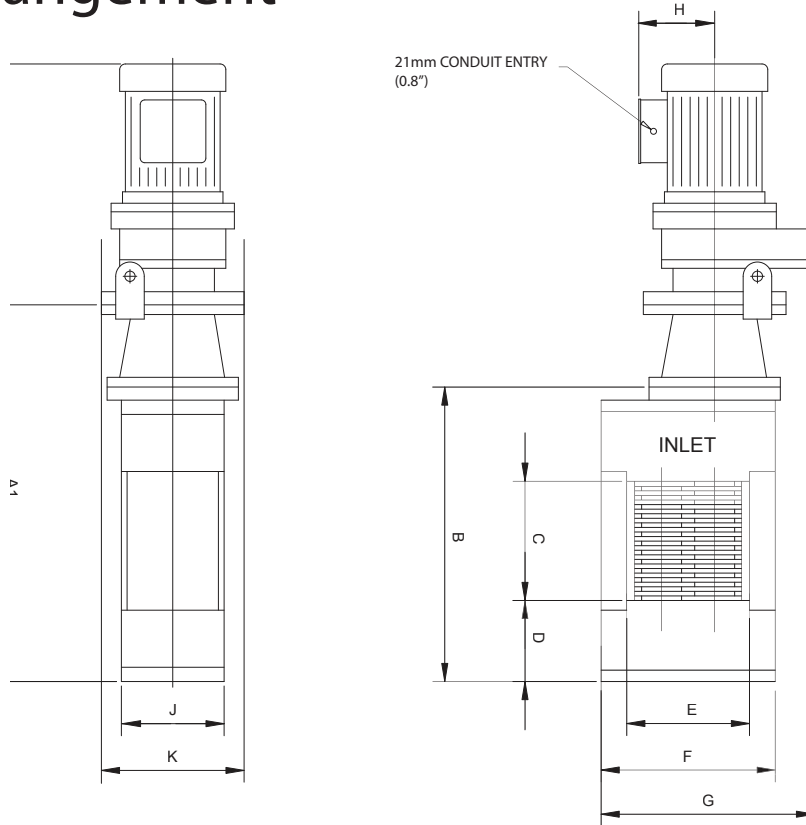


# General Arrangement



MODEL	MOTOR HP	DIM A inches	DIM B inches	DIM C inches	DIM D inches	DIM E inches	DIM F inches	DIM G inches (MAX)	DIM H inches (MAX)	DIM J inches	DIM K inches	MASS lb (MAX)
CA202AA	2.0	41.7	20.3	6.9	6.1	8.5	12.0	13.8	5.7	7.0	10.2	351
CA203AA	2.0	46.2	24.8	11.4	6.1	8.5	12.0	13.8	5.7	7.0	10.2	373
CA205AA	2.0	52.1	30.7	17.3	6.1	8.5	12.0	13.8	5.7	7.0	10.2	417
CA206AA	2.0	57.8	36.4	23.0	6.1	8.5	12.0	13.8	5.7	7.0	10.2	439
CA210AA	2.0	74.1	52.7	39.4	6.1	8.5	12.0	13.8	5.7	7.0	10.2	605
CA202AB	3.0	44.1	20.3	6.9	6.1	8.5	12.0	13.8	6.1	7.0	10.2	375
CA203AB	3.0	48.5	24.8	11.4	6.1	8.5	12.0	13.8	6.1	7.0	10.2	397
CA205AB	3.0	54.4	30.7	17.3	6.1	8.5	12.0	13.8	6.1	7.0	10.2	441
CA206AB	3.0	60.2	36.4	23.0	6.1	8.5	12.0	13.8	6.1	7.0	10.2	463
CA210AB	3.0	76.5	52.7	39.4	6.1	8.5	12.0	13.8	6.1	7.0	10.2	629
CA215AB	3.0	96.6	72.8	59.4	6.1	8.5	12.0	13.8	6.1	7.0	10.2	783
CA202AC	5.4	49.0	20.3	6.9	6.1	8.5	12.0	13.8	7.0	7.0	10.2	432
CA203AC	5.4	53.5	24.8	11.4	6.1	8.5	12.0	13.8	7.0	7.0	10.2	455
CA205AC	5.4	59.4	30.7	17.3	6.1	8.5	12.0	13.8	7.0	7.0	10.2	499
CA206AC	5.4	65.1	36.4	23.0	6.1	8.5	12.0	13.8	7.0	7.0	10.2	521
CA210AC	5.4	81.4	52.7	39.4	6.1	8.5	12.0	13.8	7.0	7.0	10.2	686

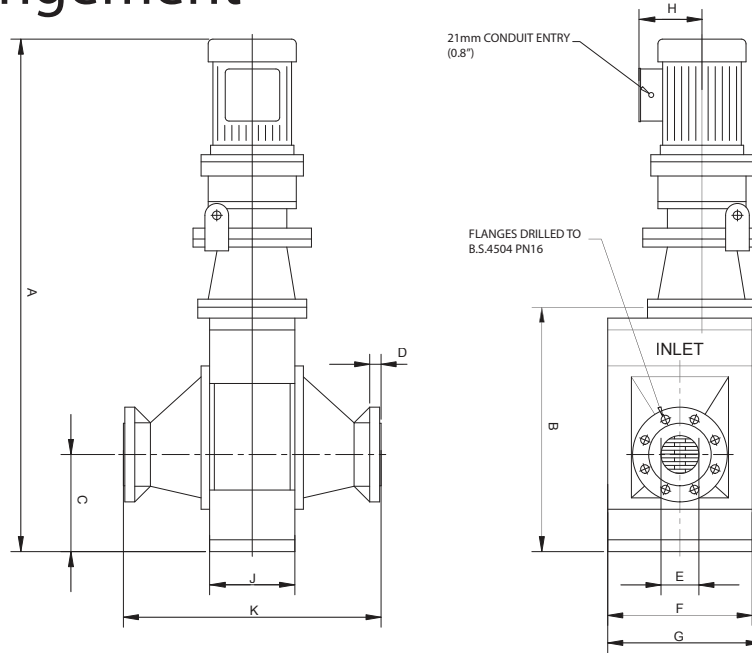
# General Arrangement



MODEL	MOTOR kW	DIM A mm	DIM A1 mm	DIM B mm	DIM C mm	DIM D mm	DIM E mm	DIM F mm	DIM G mm (MAX)	DIM H mm (MAX)	DIM J mm	DIM K mm	MASS kg (MAX)
CA202AA	1.5	SEE DRIVE UNIT SPEC	634	515	175	155	215	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	260	121
CA203AA	1.5		748	629	290	155	215	305			178	260	131
CA205AA	1.5		898	779	440	155	215	305			178	260	151
CA206AA	1.5		1043	924	585	155	215	305			178	260	161
CA210AA	1.5		1458	1339	1000	155	215	305			178	260	236
CA202AB	2.2	SEE DRIVE UNIT SPEC	643	515	175	155	215	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	260	121
CA203AB	2.2		757	629	290	155	215	305			178	260	131
CA205AB	2.2		907	779	440	155	215	305			178	260	151
CA206AB	2.2		1052	924	585	155	215	305			178	260	161
CA210AB	2.2		1467	1339	1000	155	215	305			178	260	236
CA215AB	2.2	1977	1849	1510	155	215	305	178	260	306			
CA202AC	4.0	SEE DRIVE UNIT SPEC	654	515	175	155	215	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	300	122
CA203AC	4.0		769	629	290	155	215	305			178	300	132
CA205AC	4.0		918	779	440	155	215	305			178	300	152
CA206AC	4.0		1063	924	585	155	215	305			178	300	162
CA210AC	4.0		1478	1339	1000	155	215	305			178	300	237

MODEL	MOTOR HP	DIM A in	DIM A1 in	DIM B in	DIM C in	DIM D in	DIM E in	DIM F in	DIM G in (MAX)	DIM H in (MAX)	DIM J in	DIM K in	MASS lb (MAX)
CA202AA	2.0	SEE DRIVE UNIT SPEC	25.0	20.3	6.9	6.1	8.5	12.0	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	7.0	10.2	267
CA203AA	2.0		29.4	24.8	11.4	6.1	8.5	12.0			7.0	10.2	289
CA205AA	2.0		35.4	30.7	17.3	6.1	8.5	12.0			7.0	10.2	333
CA206AA	2.0		41.1	36.4	23.0	6.1	8.5	12.0			7.0	10.2	355
CA210AA	2.0		57.4	52.7	39.4	6.1	8.5	12.0			7.0	10.2	521
CA202AB	3.0	SEE DRIVE UNIT SPEC	25.3	20.3	6.9	6.1	8.5	12.0	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	7.0	10.2	267
CA203AB	3.0		29.8	24.8	11.4	6.1	8.5	12.0			7.0	10.2	289
CA205AB	3.0		35.7	30.7	17.3	6.1	8.5	12.0			7.0	10.2	333
CA206AB	3.0		41.4	36.4	23.0	6.1	8.5	12.0			7.0	10.2	355
CA210AB	3.0		57.8	52.7	39.4	6.1	8.5	12.0			7.0	10.2	521
CA215AB	3.0	77.8	72.8	59.4	6.1	8.5	12.0	7.0	10.2	675			
CA202AC	5.4	SEE DRIVE UNIT SPEC	25.7	20.3	6.9	6.1	8.5	12.0	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	7.0	11.8	269
CA203AC	5.4		30.3	24.8	11.4	6.1	8.5	12.0			7.0	11.8	291
CA205AC	5.4		36.1	30.7	17.3	6.1	8.5	12.0			7.0	11.8	335
CA206AC	5.4		41.9	36.4	23.0	6.1	8.5	12.0			7.0	11.8	357
CA210AC	5.4		58.2	52.7	39.4	6.1	8.5	12.0			7.0	11.8	523

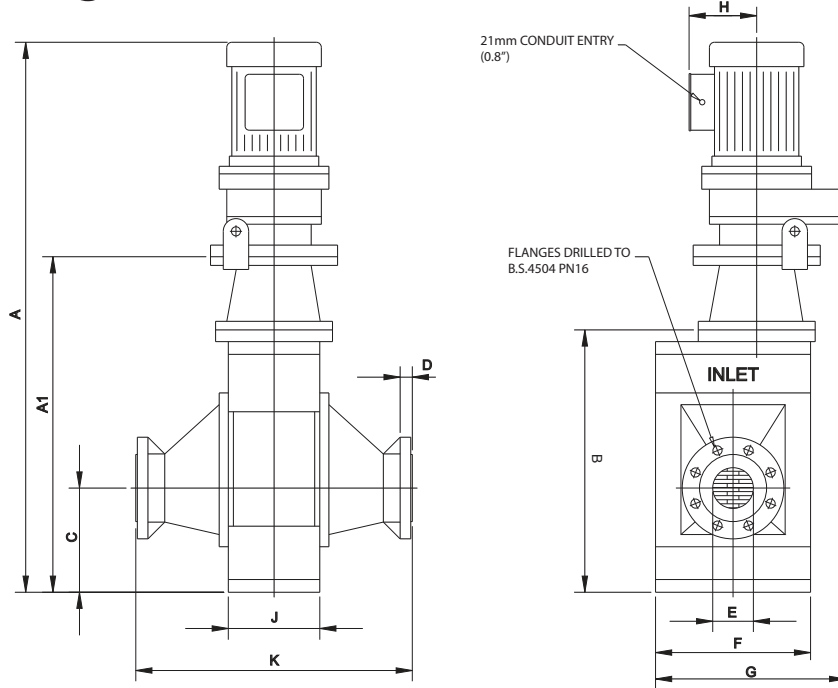
# General Arrangement



MODEL	MOTOR kW	DIM A mm	DIM B mm	DIM C mm	DIM D mm	DIM E mm	DIM F mm	DIM G mm (MAX)	DIM H mm (MAX)	DIM J mm	DIM K mm	MASS kg (MAX)
CA202BA	1.5	1059	515	205	24	80	305	350	145	178	544	187
CA202CA	1.5	1059	515	205	24	100	305	350	145	178	544	188
CA202DA	1.5	1059	515	205	24	150	305	350	145	178	544	190
CA203DA	1.5	1173	629	230	24	150	305	350	145	178	544	205
CA203EA	1.5	1173	629	255	24	200	305	350	145	178	584	217
CA205FA	1.5	1323	779	280	24	250	305	350	145	178	684	262
CA206GA	1.5	1468	924	305	24	300	305	350	145	178	784	306
CA202BB	2.2	1119	515	205	24	80	305	350	154	178	544	198
CA202CB	2.2	1119	515	205	24	100	305	350	154	178	544	199
CA202DB	2.2	1119	515	205	24	150	305	350	154	178	544	201
CA203DB	2.2	1233	629	230	24	150	305	350	154	178	544	216
CA203EB	2.2	1233	629	255	24	200	305	350	154	178	584	228
CA205FB	2.2	1383	779	280	24	250	305	350	154	178	684	273
CA206GB	2.2	1528	924	305	24	300	305	350	154	178	784	317
CA202BC	4.0	1244	515	205	24	80	305	350	179	178	544	224
CA202CC	4.0	1244	515	205	24	100	305	350	179	178	544	225
CA202DC	4.0	1244	515	205	24	150	305	350	179	178	544	227
CA203DC	4.0	1358	629	230	24	150	305	350	179	178	544	242
CA203EC	4.0	1358	629	255	24	200	305	350	179	178	584	254
CA205FC	4.0	1508	779	280	24	250	305	350	179	178	684	299
CA206GC	4.0	1653	924	305	24	300	305	350	179	178	784	343

MODEL	MOTOR HP	DIM A in	DIM B in	DIM C in	DIM D in	DIM E in	DIM F in	DIM G in (MAX)	DIM H in (MAX)	DIM J in	DIM K in	MASS lb (MAX)
CA202BA	2.0	41.7	20.3	8.1	0.9	3.1	12.0	13.8	5.7	7.0	21.4	413
CA202CA	2.0	41.7	20.3	8.1	0.9	3.9	12.0	13.8	5.7	7.0	21.4	415
CA202DA	2.0	41.7	20.3	8.1	0.9	5.9	12.0	13.8	5.7	7.0	21.4	419
CA203DA	2.0	46.2	24.8	9.1	0.9	5.9	12.0	13.8	5.7	7.0	21.4	452
CA203EA	2.0	46.2	24.8	10.0	0.9	7.9	12.0	13.8	5.7	7.0	23.0	479
CA205FA	2.0	52.1	30.7	11.0	0.9	9.8	12.0	13.8	5.7	7.0	26.9	578
CA206GA	2.0	57.8	36.4	12.0	0.9	11.8	12.0	13.8	5.7	7.0	30.9	675
CA202BB	3.0	44.1	20.3	8.1	0.9	3.1	12.0	13.8	6.1	7.0	21.4	437
CA202CB	3.0	44.1	20.3	8.1	0.9	3.9	12.0	13.8	6.1	7.0	21.4	439
CA202DB	3.0	44.1	20.3	8.1	0.9	5.9	12.0	13.8	6.1	7.0	21.4	443
CA203DB	3.0	48.5	24.8	9.1	0.9	5.9	12.0	13.8	6.1	7.0	21.4	477
CA203EB	3.0	48.5	24.8	10.0	0.9	7.9	12.0	13.8	6.1	7.0	23.0	503
CA205FB	3.0	54.4	30.7	11.0	0.9	9.8	12.0	13.8	6.1	7.0	26.9	602
CA206GB	3.0	60.2	36.4	12.0	0.9	11.8	12.0	13.8	6.1	7.0	30.9	699
CA202BC	5.4	49.0	20.3	8.1	0.9	3.1	12.0	13.8	7.0	7.0	21.4	494
CA202CC	5.4	49.0	20.3	8.1	0.9	3.9	12.0	13.8	7.0	7.0	21.4	496
CA202DC	5.4	49.0	20.3	8.1	0.9	5.9	12.0	13.8	7.0	7.0	21.4	501
CA203DC	5.4	53.5	24.8	9.1	0.9	5.9	12.0	13.8	7.0	7.0	21.4	534
CA203EC	5.4	53.5	24.8	10.0	0.9	7.9	12.0	13.8	7.0	7.0	23.0	560
CA205FC	5.4	59.4	30.7	11.0	0.9	9.8	12.0	13.8	7.0	7.0	26.9	660
CA206GC	5.4	65.1	36.4	12.0	0.9	11.8	12.0	13.8	7.0	7.0	30.9	757

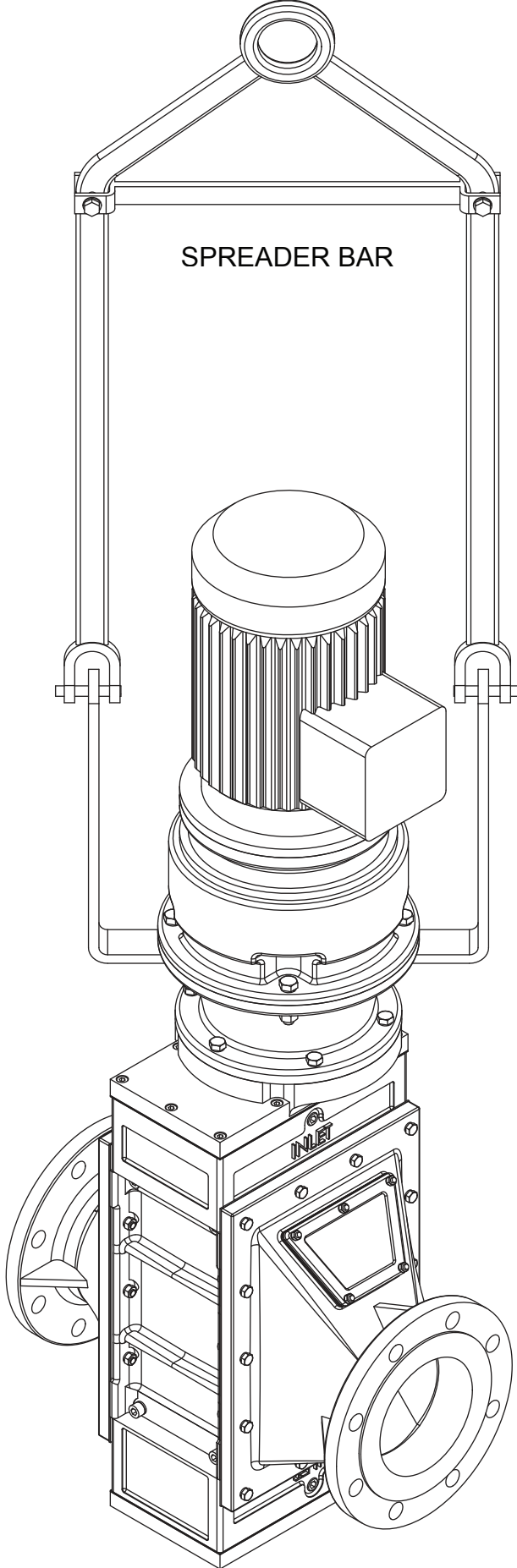
# General Arrangement



MODEL	MOTOR kW	DIM A mm	DIM A1 mm	DIM B mm	DIM C mm	DIM D mm	DIM E mm	DIM F mm	DIM G mm (MAX)	DIM H mm (MAX)	DIM J mm	DIM K mm	MASS kg (MAX)
CA202BA	1.5	SEE DRIVE UNIT SPEC	634	515	205	24	80	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	544	149
CA202CA	1.5		634	515	205	24	100	305			178	544	150
CA202DA	1.5		634	515	205	24	150	305			178	544	152
CA203DA	1.5		748	629	230	24	150	305			178	544	167
CA203EA	1.5		748	629	255	24	200	305			178	584	179
CA205FA	1.5		898	779	280	24	250	305			178	684	224
CA206GA	1.5	1043	924	305	24	300	305	178	784	268			
CA202BB	2.2	SEE DRIVE UNIT SPEC	643	515	205	24	80	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	544	149
CA202CB	2.2		643	515	205	24	100	305			178	544	150
CA202DB	2.2		643	515	205	24	150	305			178	544	152
CA203DB	2.2		757	629	230	24	150	305			178	544	167
CA203EB	2.2		757	629	255	24	200	305			178	584	179
CA205FB	2.2		907	779	280	24	250	305			178	684	224
CA206GB	2.2	1052	924	305	24	300	305	178	784	268			
CA202BC	4.0	SEE DRIVE UNIT SPEC	654	515	205	24	80	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	544	150
CA202CC	4.0		654	515	205	24	100	305			178	544	151
CA202DC	4.0		654	515	205	24	150	305			178	544	153
CA203DC	4.0		768	629	230	24	150	305			178	544	168
CA203EC	4.0		768	629	255	24	200	305			178	584	180
CA205FC	4.0		918	779	280	24	250	305			178	684	225
CA206GC	4.0	1063	924	305	24	300	305	178	784	269			

MODEL	MOTOR HP	DIM A inches	DIM A1 inches	DIM B inches	DIM C inches	DIM D inches	DIM E inches	DIM F inches	DIM G inches (MAX)	DIM H inches (MAX)	DIM J inches	DIM K inches	MASS lb (MAX)
CA202BA	2.0	SEE DRIVE UNIT SPEC	25.0	20.3	8.1	0.9	3.1	12.0	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	7.0	21.4	329
CA202CA	2.0		25.0	20.3	8.1	0.9	3.9	12.0			7.0	21.4	331
CA202DA	2.0		25.0	20.3	8.1	0.9	5.9	12.0			7.0	21.4	335
CA203DA	2.0		29.4	24.8	9.1	0.9	5.9	12.0			7.0	21.4	368
CA203EA	2.0		29.4	24.8	10.0	0.9	7.9	12.0			7.0	23.0	395
CA205FA	2.0		35.4	30.7	11.0	0.9	9.8	12.0			7.0	26.9	494
CA206GA	2.0	41.1	36.4	12.0	0.9	11.8	12.0	7.0	30.9	591			
CA202BB	3.0	SEE DRIVE UNIT SPEC	25.3	20.3	8.1	0.9	3.1	12.0	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	7.0	21.4	329
CA202CB	3.0		25.3	20.3	8.1	0.9	3.9	12.0			7.0	21.4	331
CA202DB	3.0		25.3	20.3	8.1	0.9	5.9	12.0			7.0	21.4	335
CA203DB	3.0		29.8	24.8	9.1	0.9	5.9	12.0			7.0	21.4	368
CA203EB	3.0		29.8	24.8	10.0	0.9	7.9	12.0			7.0	23.0	395
CA205FB	3.0		35.7	30.7	11.0	0.9	9.8	12.0			7.0	26.9	494
CA206GB	3.0	41.4	36.4	12.0	0.9	11.8	12.0	7.0	30.9	591			
CA202BC	5.4	SEE DRIVE UNIT SPEC	25.7	20.3	8.1	0.9	3.1	12.0	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	7.0	21.4	331
CA202CC	5.4		25.7	20.3	8.1	0.9	3.9	12.0			7.0	21.4	333
CA202DC	5.4		25.7	20.3	8.1	0.9	5.9	12.0			7.0	21.4	338
CA203DC	5.4		30.2	24.8	9.1	0.9	5.9	12.0			7.0	21.4	371
CA203EC	5.4		30.2	24.8	10.0	0.9	7.9	12.0			7.0	23.0	397
CA205FC	5.4		36.1	30.7	11.0	0.9	9.8	12.0			7.0	26.9	496
CA206GC	5.4	41.9	36.4	12.0	0.9	11.8	12.0	7.0	30.9	594			

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