

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  
Metric Spanners - Range 10mm-36mm  
Torque Wrench

**Series A Muncher:**

Metric Hexagon Keys - Range 6mm-8mm  
Metric Spanners - Range 10mm-36mm  
Torque Wrench

**Series F Muncher:**

Metric Hexagon Keys - Range 6mm-8mm  
Metric Spanners - Range 10mm-36mm  
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  
Metric Spanners - Range 10mm-36mm  
Torque Wrench

**Series R Muncher:**

Metric Hexagon Keys - Range 5mm-14mm  
Metric Spanners - Range 10mm-36mm  
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 the maximum surface temperature will not exceed 90°C provided the grinder is installed, operated and maintained in accordance with this manual. Where the process fluid temperature exceeds 90°C 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. \_\_\_\_\_  
supplied.

and gives the duty for which the equipment is

 <b>The Muncher®</b>	<b>WARNING</b>
MODEL No. <input type="text"/>	<b>ENSURE THIS MACHINE IS</b>
CONTRACT No. / Date <input type="text"/>	<b>ELECTRICALLY ISOLATED AND</b>
DUTY / LIQUID <input type="text"/>	<b>CANNOT BE STARTED PRIOR TO</b>
<b>Martin Street, Audenshaw, Manchester M34 5DQ</b>	<b>REMOVING ANY FITMENT, GUARD OR</b>
<b>Tel : 0161 339 9000 Fax : 0161 344 0727</b>	<b>INSPECTION COVER AND THAT ALL</b>
<b>www.mono-pumps.com</b>	<b>ITEMS SO REMOVED ARE REPLACED</b>
<b>MADE IN ENGLAND</b>	<b>PRIOR TO RESTARTING.</b>

# 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</b>
	<b>DRAWING REF. No.'s and TORQUE DATA</b>
	<b>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 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 97/23/EC  
The Outdoor Noise Directive 2005/88/EC  
The Drinking Water Directive 99/83/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 C. Q. Griffiths - Engineering Services Manager.  
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 bio-waste 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 despatched 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.**

## 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 or a minimum height of 1.5 metres 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).

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	4.0	265
	CA203AC			275
	CA205AC			295
	CA206AC			305
	CA210AC			380
	CA215AC			450
Series F	CF306RJS7B2	Nord IP55	11	780
	CF310RMS7B2		7.5 & 11	1180
Series H	CH06	Nord IP55	11 & 15 /15 & 22	1800
	CH09			2300
	CH12			2800
SB	Pipeline CB201	IP55	1.1	205
			1.5	207
			2.2	244
		IP55	1.1	208
			1.5	244
			2.2	248
	Channel CB201A	IP55	1.1	155
			1.5	190
			2.2	195
		IP67 & 68	1.1	200
1.5	225			
2.2	260			
TR	CT203C	IP55	1.5	290
			2.2/4.0	340
	CT203D	IP55	1.5	290
			2.2/4.0	340
	CT203E	IP55	1.5	290
			2.2/4.0	340
CT205F	IP55	1.5	345	
		2.2/4.0	390	
CT205G	IP55	1.5	345	
		2.2/4.0	390	
R	CR145A	IP55	7.5	800

# 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) 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.**

- 7) Check that the Muncher stops when "STOP" button(s) are activated.
- 8) Check for reverse rotation of cutters when "REVERSE" button is activated.
- 9) Start up the machine. On initial start-up, allow machine to run for approximately 45 minutes.



### NOTE:



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

- 10) 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.
- 11) After a further 10 minutes of running, stop the machine, switch off and lock the main isolator. Check the tightness of all securing bolts. Re-check every 500 hours of operating time.
- 12) Check the tightness of all cables and connections. Re-check every 500 hours of operating time.
- 13) Observe manufacturers guidelines with regard to gearbox lubricant initial renewal and subsequent intervals.
- 14) 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.

# Installation, Operation & Maintenance Instructions

## 3.0 DISMANTLING AND ASSEMBLY

Section 3 contains the steps to dismantle and re-assemble 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.

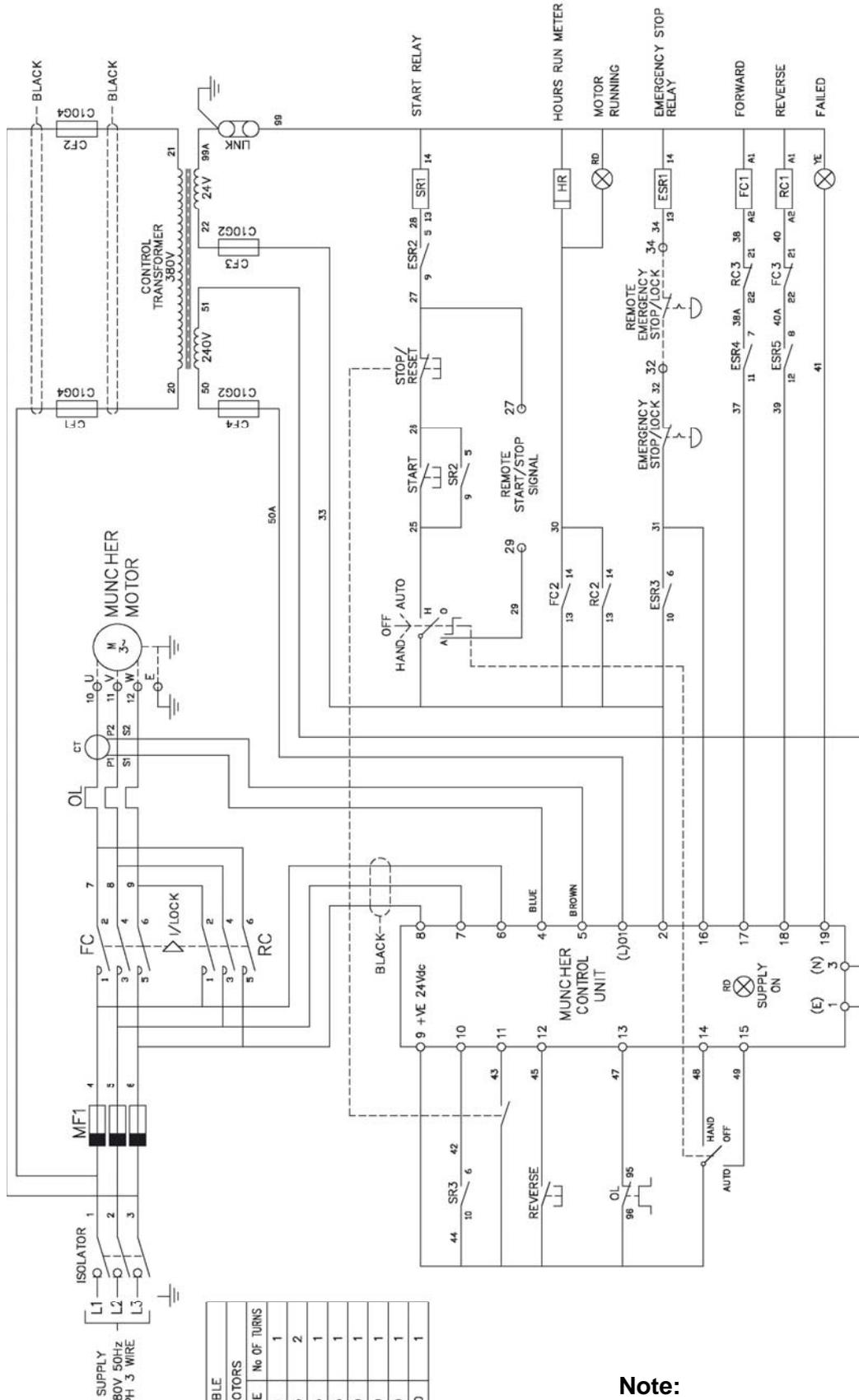
## 3.3 CLEANING / INSPECTION

- 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 re-assembly.
- 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



CT TABLE	
4 POLE MOTORS	
KW	No OF TURNS
1.1	CTM10 1
1.5	CTM25 2
2.2	CTM25 1
3.0	CTM25 1
4.0	CTM50 1
5.5	CTM50 1
7.5	CTM50 1
11.0	CTM100 1

**Note:**  
Other language versions may be available on request. Please contact Mono Pumps.

DRAWING No:  
A3/EMCP/K/ENG

# Drawing Reference Numbers

<u>DRG.REF.</u>	<u>DESCRIPTION</u>	<u>DRG.REF.</u>	<u>DESCRIPTION</u>
0100	MAIN BEARING HOUSING	P101	DOWEL PIN
*0175	MID BEARING HOUSING	P102	LIPSEAL
0600	MUNCHER NAMEPLATE	P103	SPLIT PIN
0650	WARNING NAMEPLATE	P104	SPRING WASHER
1100	BOTTOM COVER PLATE	P105	SPRING WASHER
1150	TOP COVER PLATE	P106	SLOTTED HEX NUT
1700	ADAPTOR STOOL	P107	SOCKET CAP SCREW
2000	COVER PLATE GASKET	P108	SOCKET CAP SCREW
2010	SIDERAIL GASKET	P109	HEX HEAD SCREW
*2020	MID HOUSING GASKET	P111	EXTERNAL CIRCLIP
2100	SIDERAIL	P112	EXTERNAL CIRCLIP
2500	CUTTER	*P113	SPRING WASHER
2600	MUNCHER HALF COUPLING	*P114	SOCKET CAP SCREW
3200	DRIVE SHAFT	P115	DRIVESCREW
3250	DRIVEN SHAFT	P116	HEX CSK PLUG
3500	CUTTER SPACER	P207	HEX HEAD SCREW
3505	SHIM SPACER	P208	SPRING WASHER
4700	BACK UP WASHER	P301	RECT PAR KEY
4701	LOCK WASHER	P302	RECT PAR KEY
4702	WASHER	*P303	SUPPORT BUSH
7800	DRIVE GEAR	P304	MECH SEAL
7850	DRIVEN GEAR		

\* CA210 & CA215 models ONLY

<b>Pipeline Models Only</b>		<b>Gearbox Models Only</b>	
2020	FLANGE GASKET	BOE	GEARMOTOR & KEY
2030	COVER GASKET	2620	GEARMOTOR HALF COUPLING
2400	MOUNTING FLANGE	9700	LIFTING LUG
5900	INSPECTION COVER	P201	HEX HEAD BOLT
P400	HEX HEAD SCREW	P202	HEX HEAD BOLT
P401	HEX HEAD BOLT	P203	SPRING WASHER
P402	HEX NUT	P204	HEX NUT
P403	HEX NUT	P205	PLAIN WASHER
P404	STUD	P206	M8 HEX SOCKET SET SCREW
P405	SPRING WASHER		
P406	PLAIN WASHER		
P407	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.

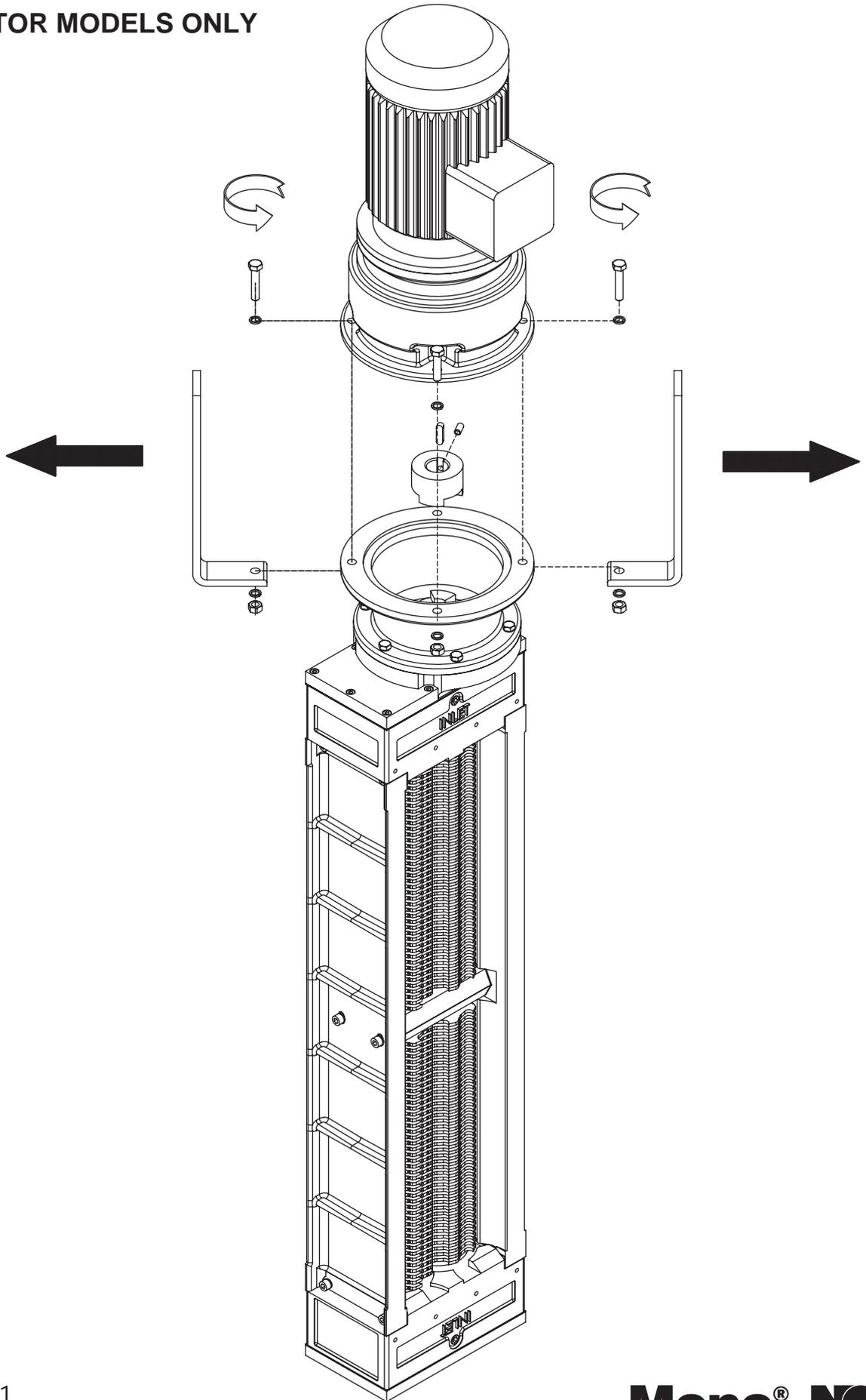
# Torque Tightening Table for Fasteners

DESCRIPTION	THREAD SIZE	PART No.(s)	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

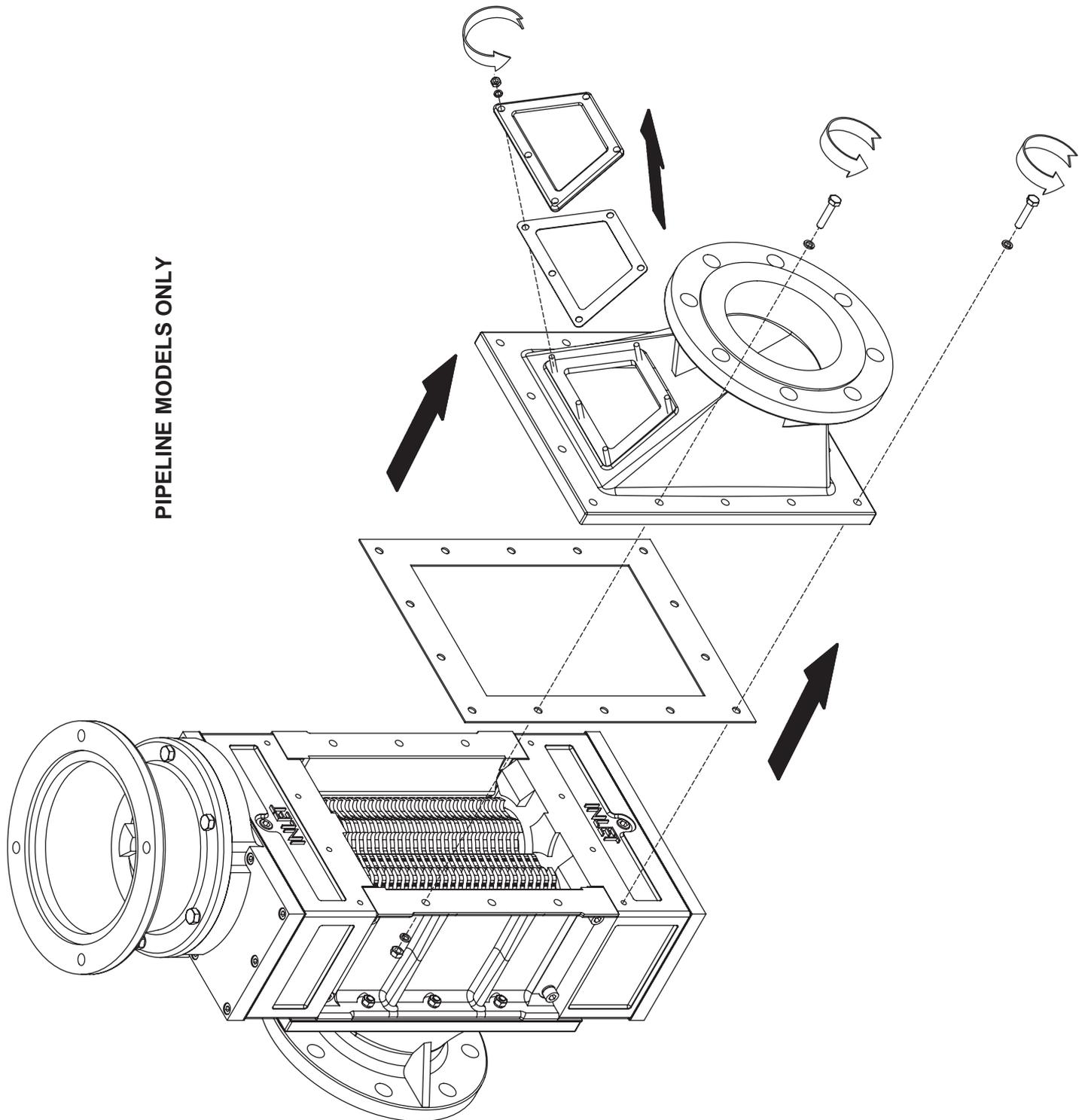
Torque tolerances are +/- 5% of stated values.

# Dismantling & Assembly Diagrams

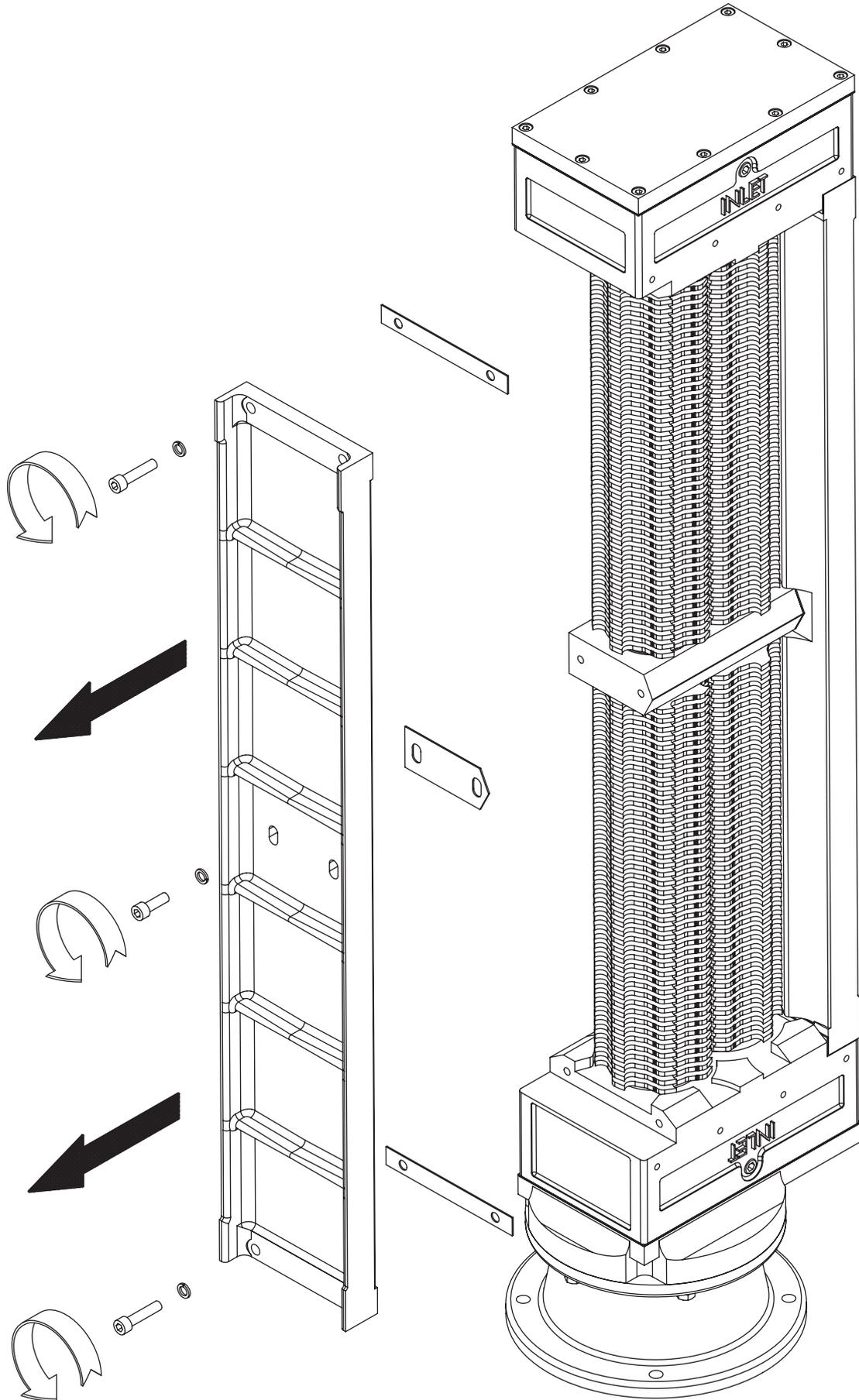
**GEARMOTOR MODELS ONLY**



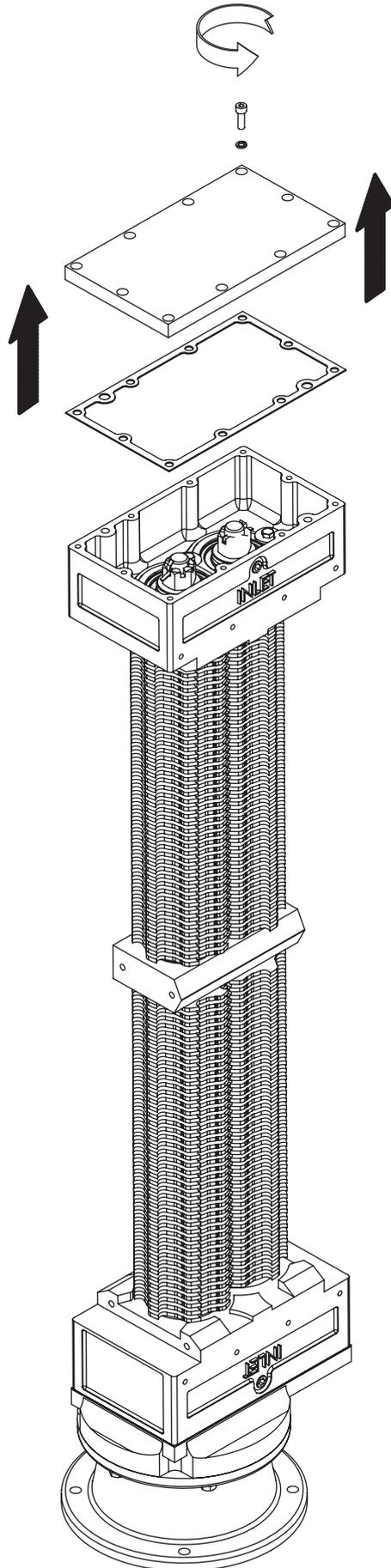
# Dismantling & Assembly Diagrams



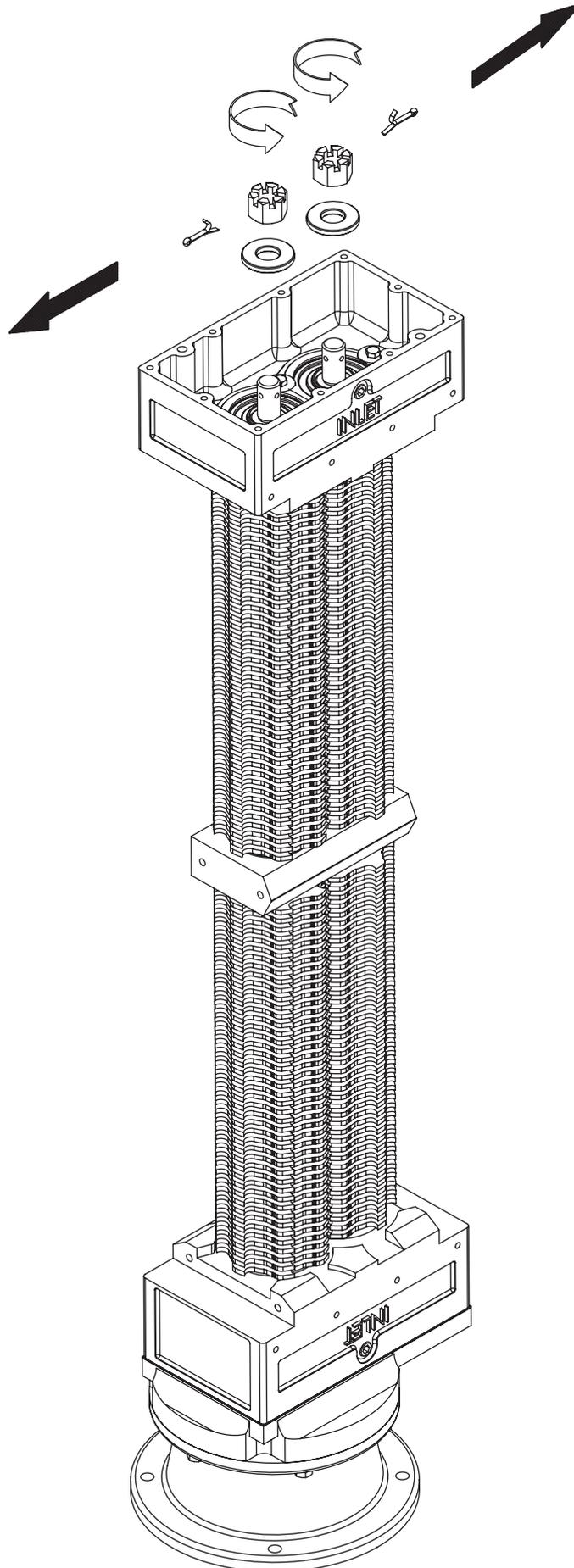
# Dismantling & Assembly Diagrams



# Dismantling & Assembly Diagrams

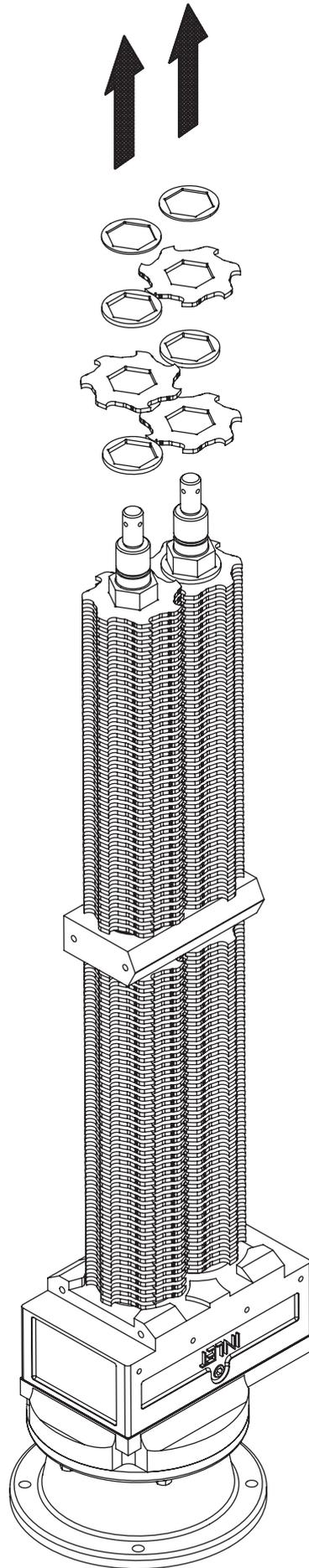


# Dismantling & Assembly Diagrams



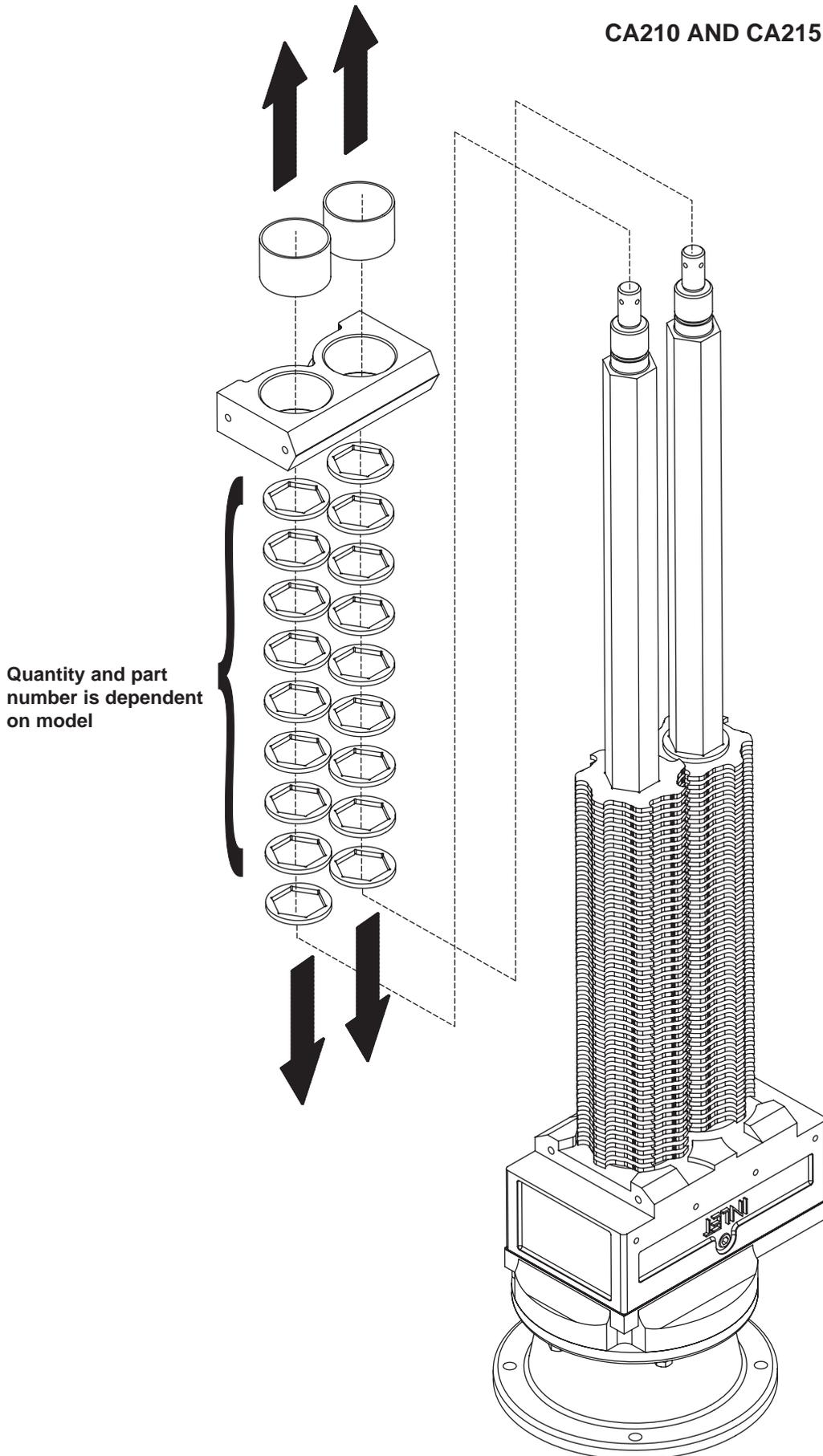


# Dismantling & Assembly Diagrams

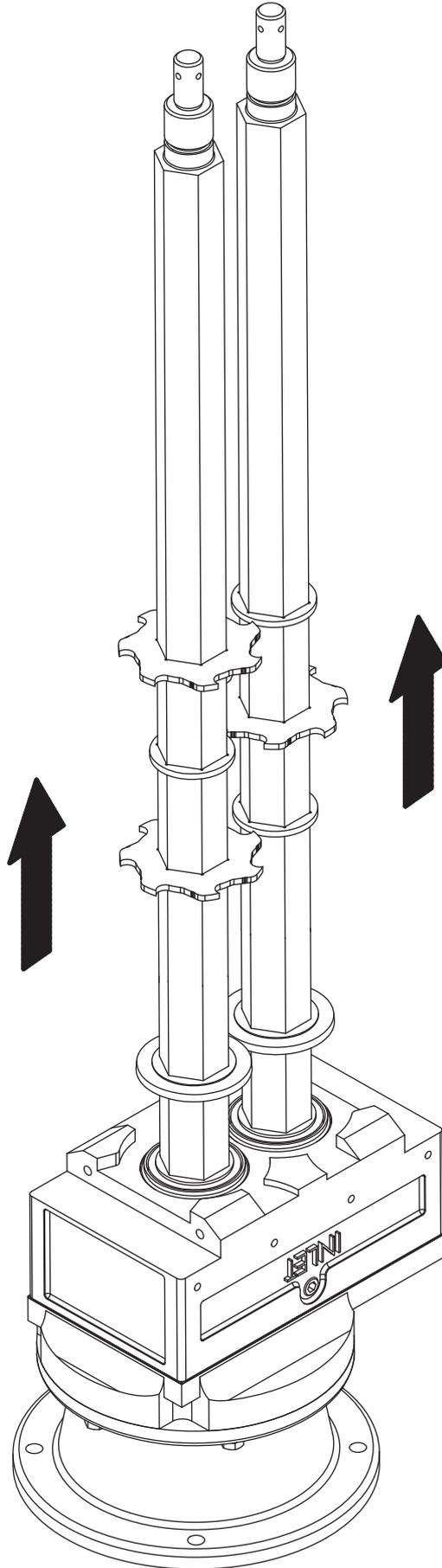


# Dismantling & Assembly Diagrams

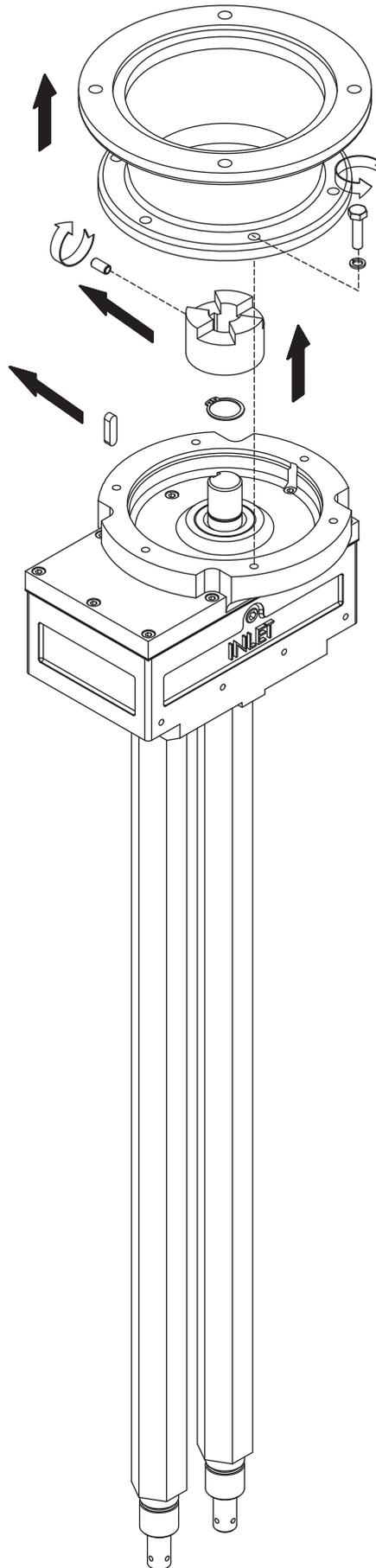
CA210 AND CA215 MODELS ONLY



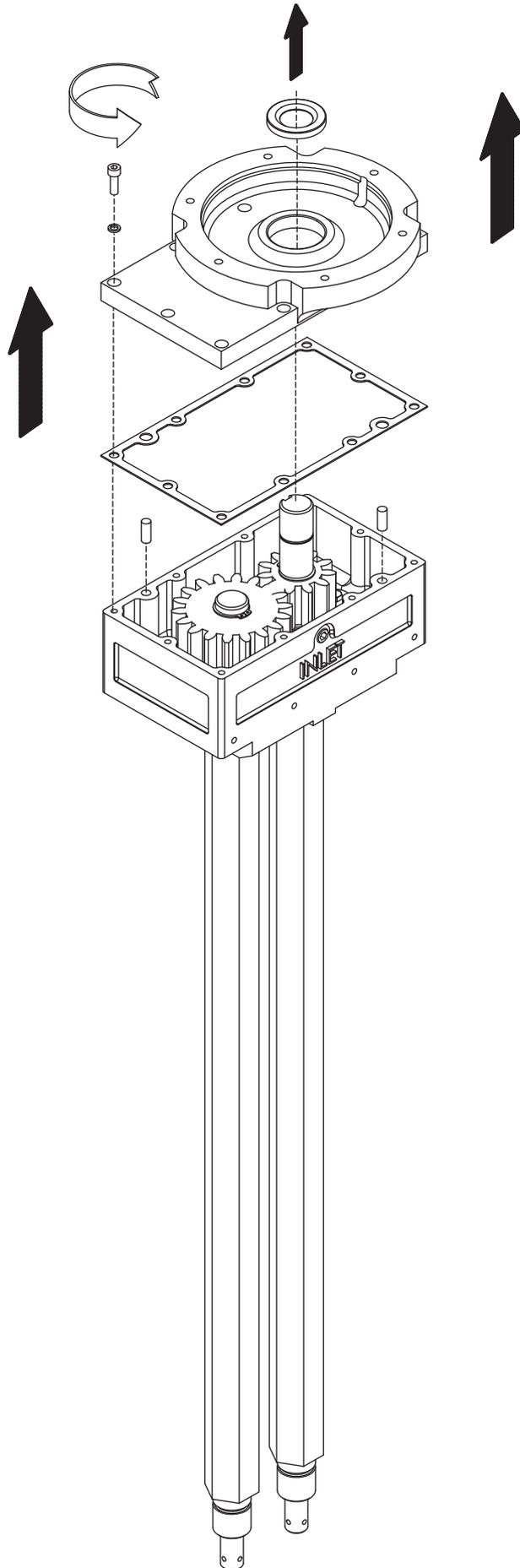
# Dismantling & Assembly Diagrams



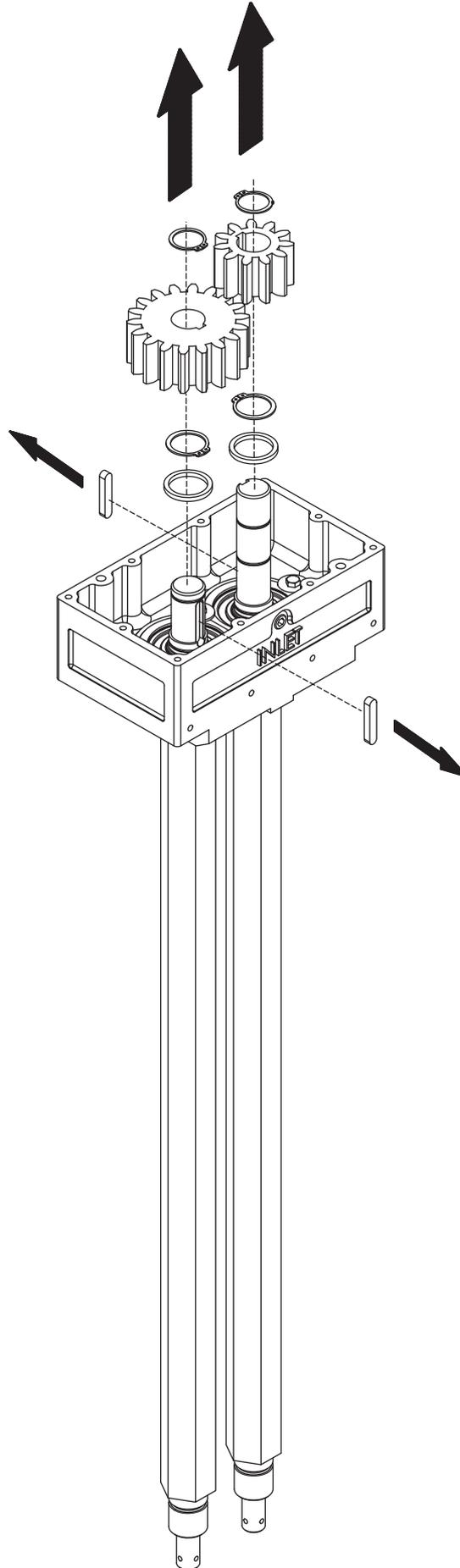
# Dismantling & Assembly Diagrams



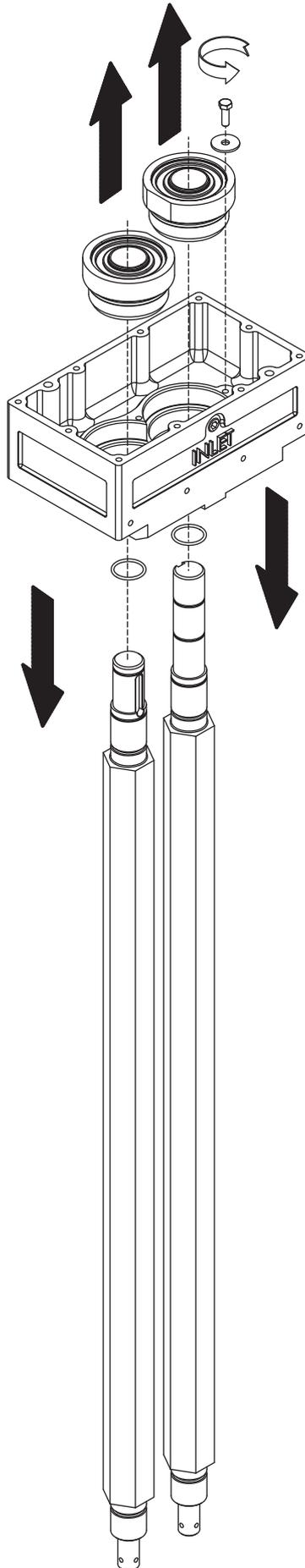
# Dismantling & Assembly Diagrams



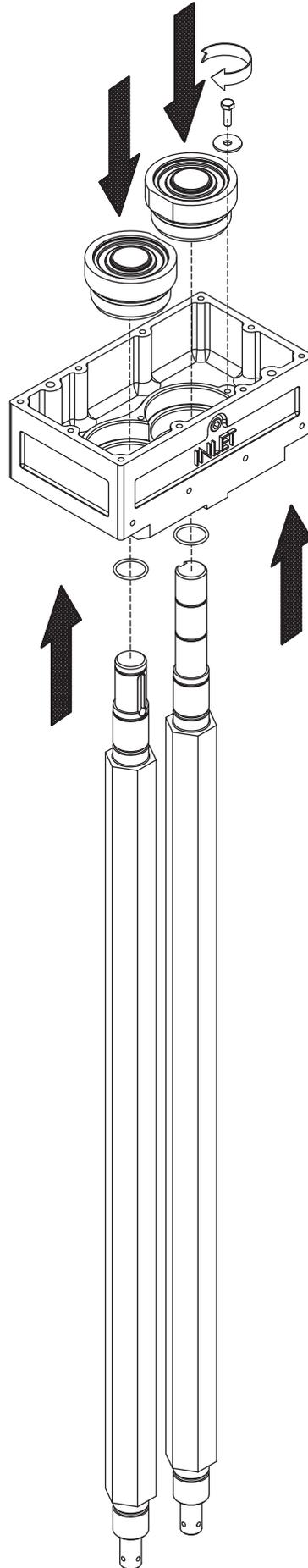
# Dismantling & Assembly Diagrams



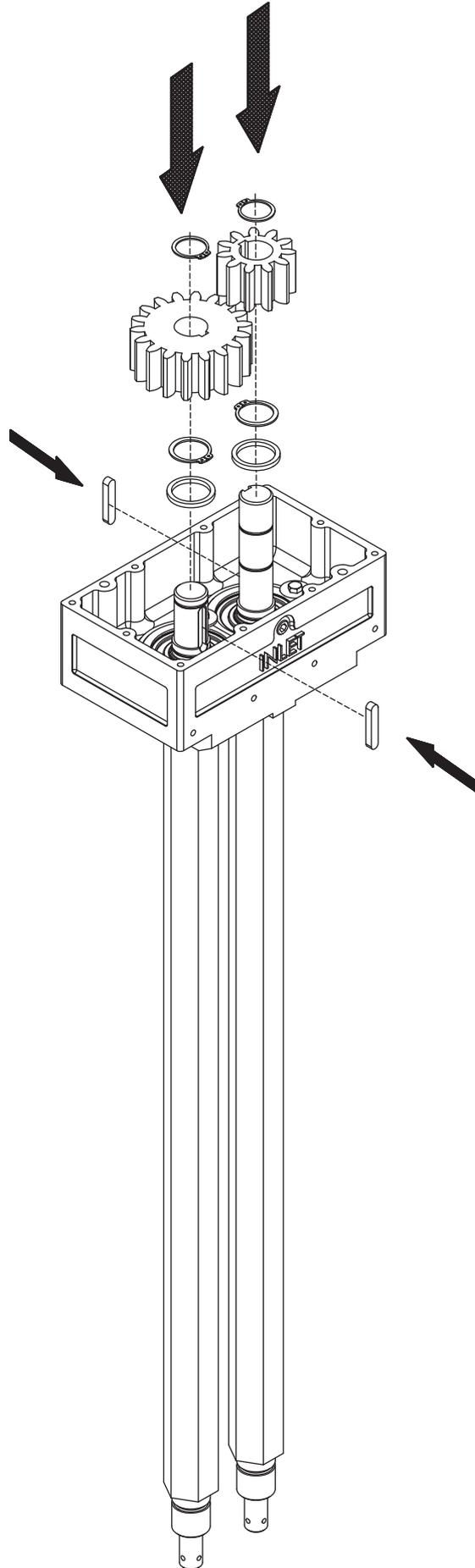
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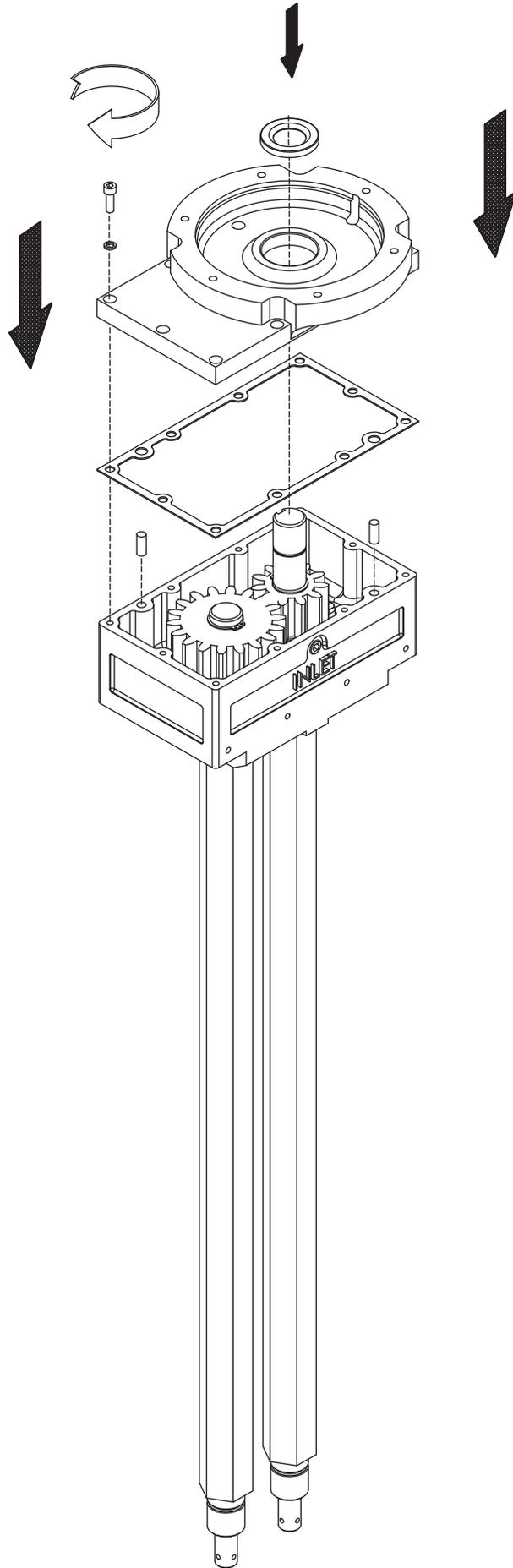
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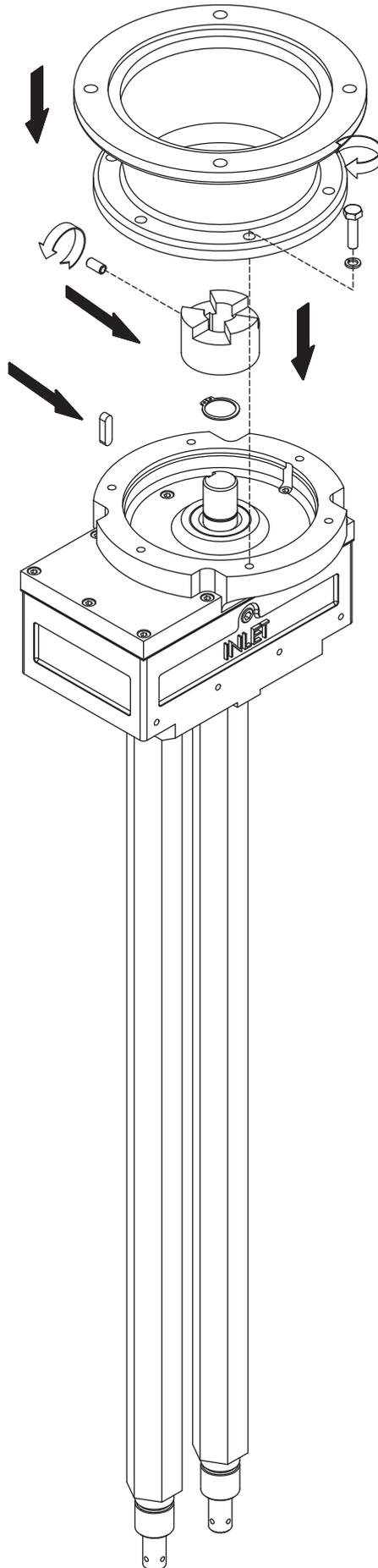
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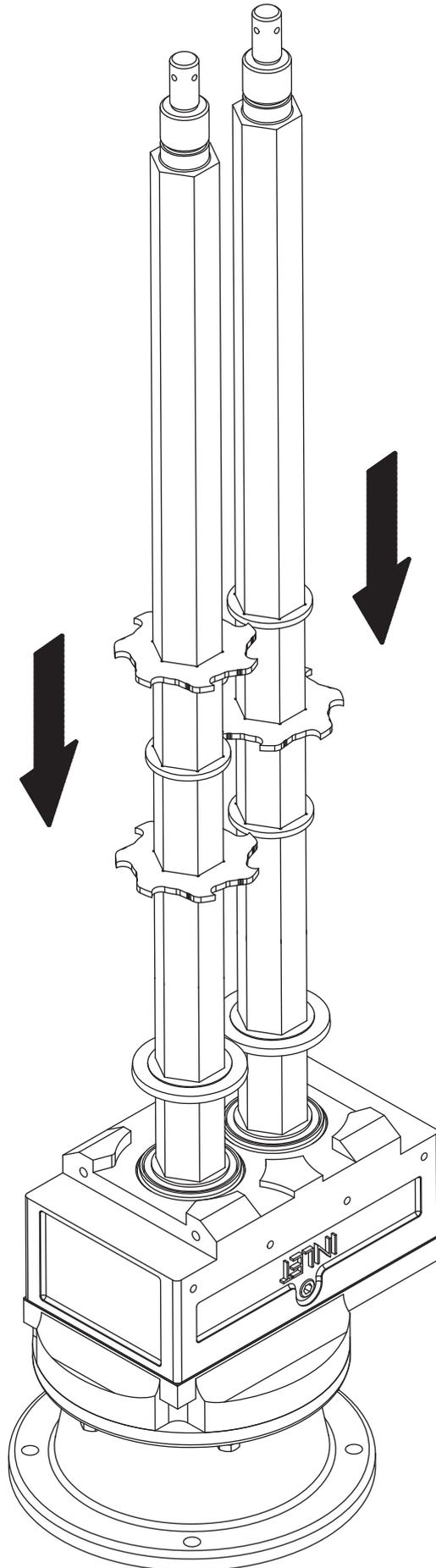
# Dismantling & Assembly Diagrams



# Dismantling & Assembly Diagrams



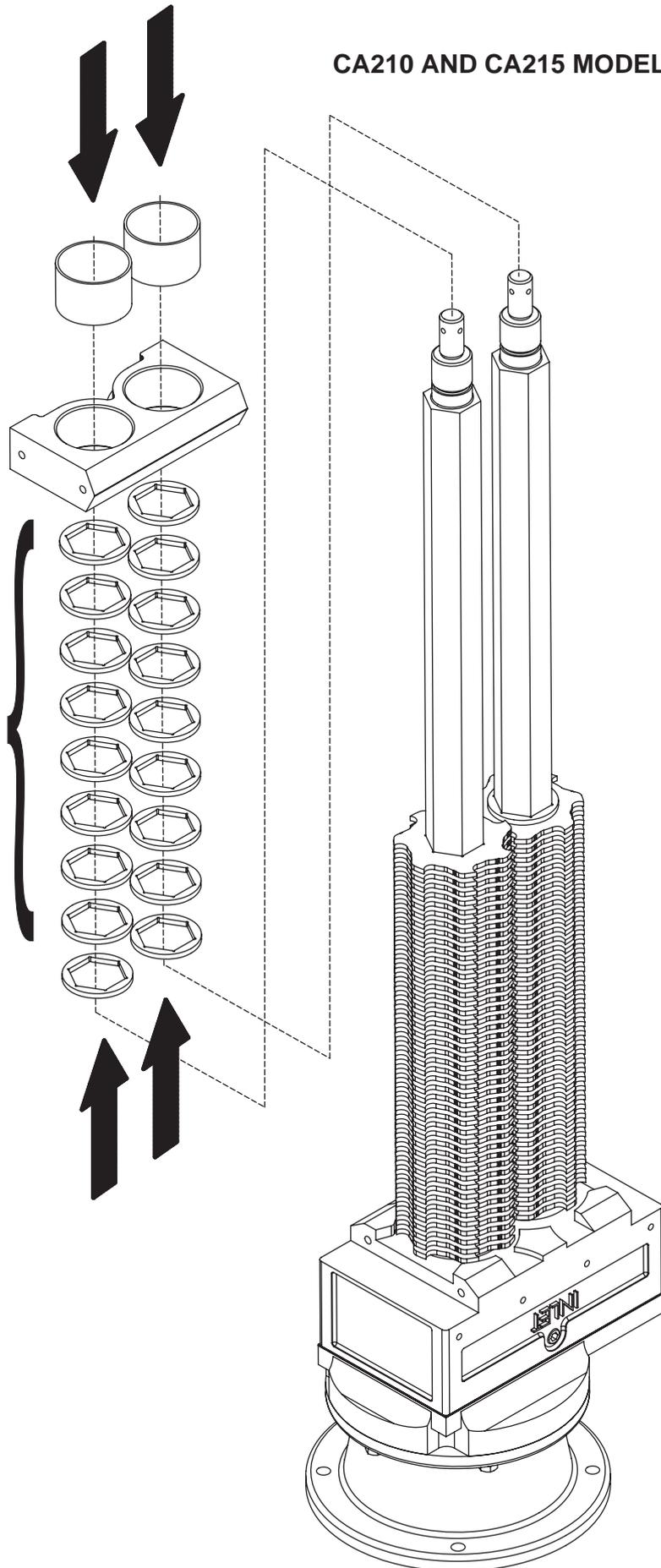
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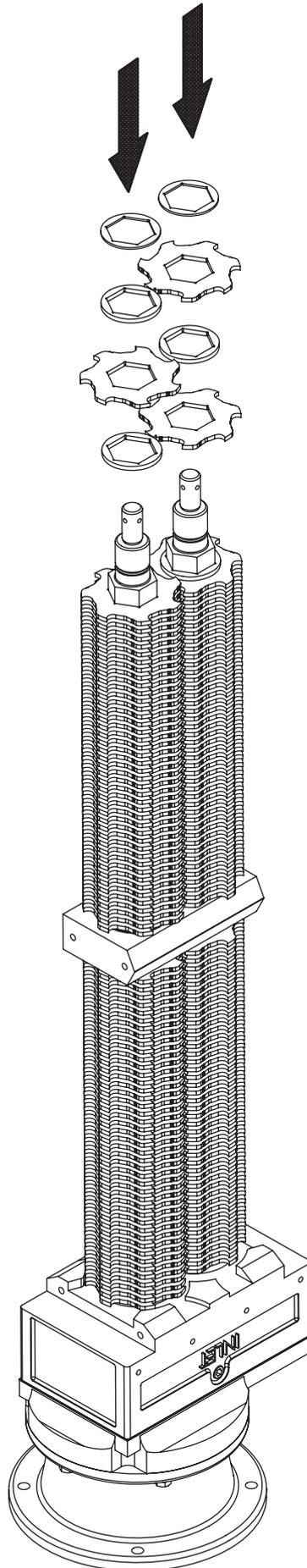
# Dismantling & Assembly Diagrams

CA210 AND CA215 MODELS ONLY

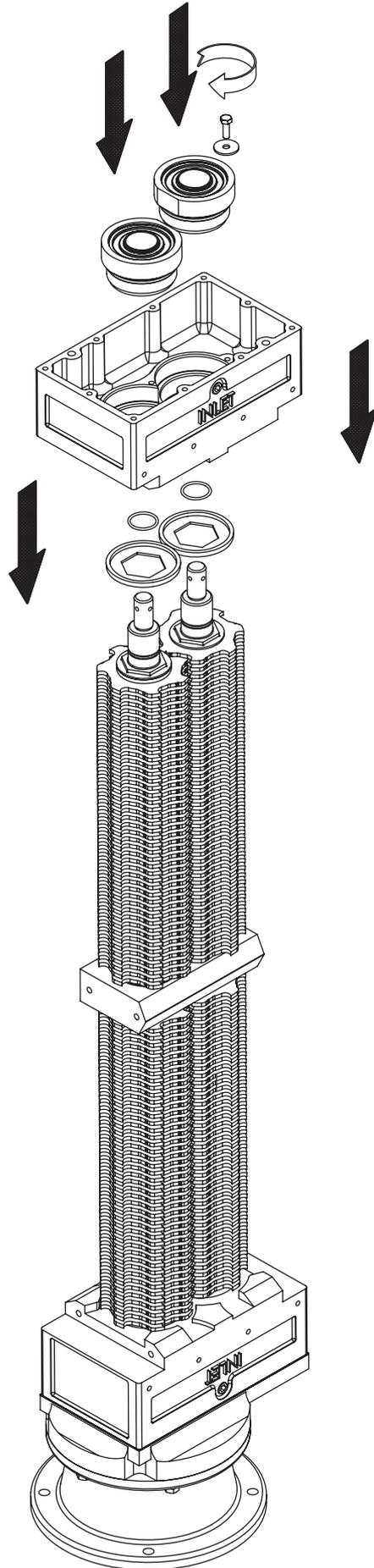
Quantity and part number is dependent on model



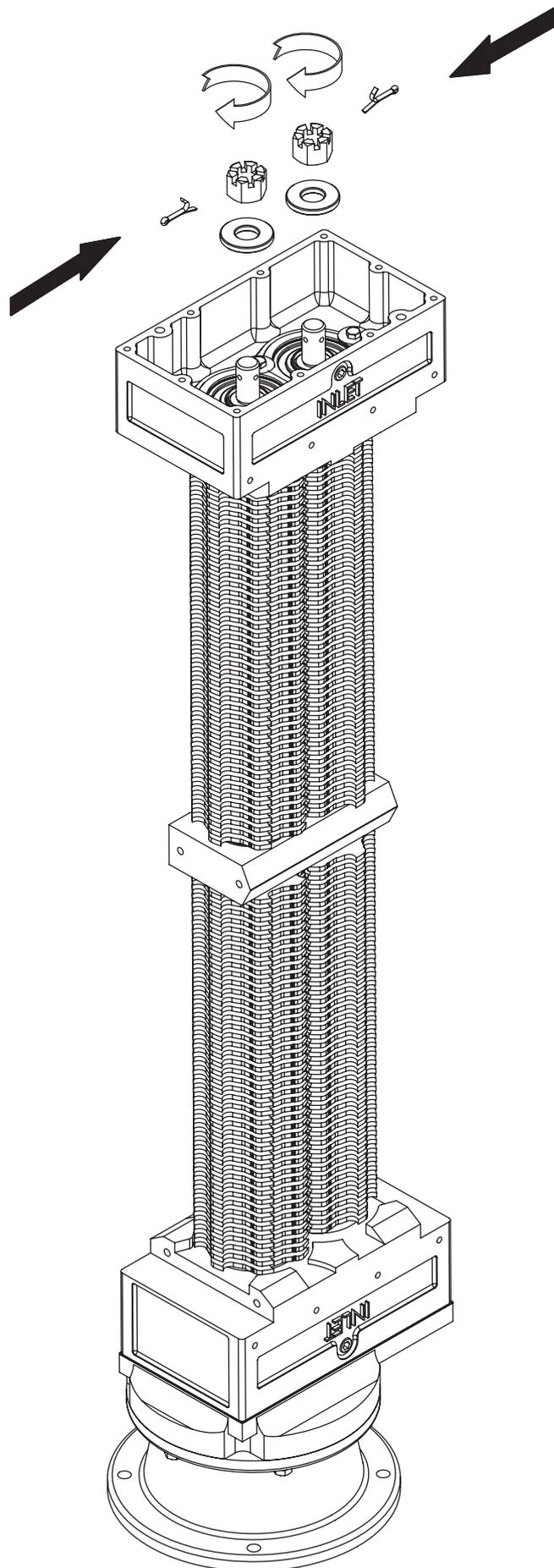
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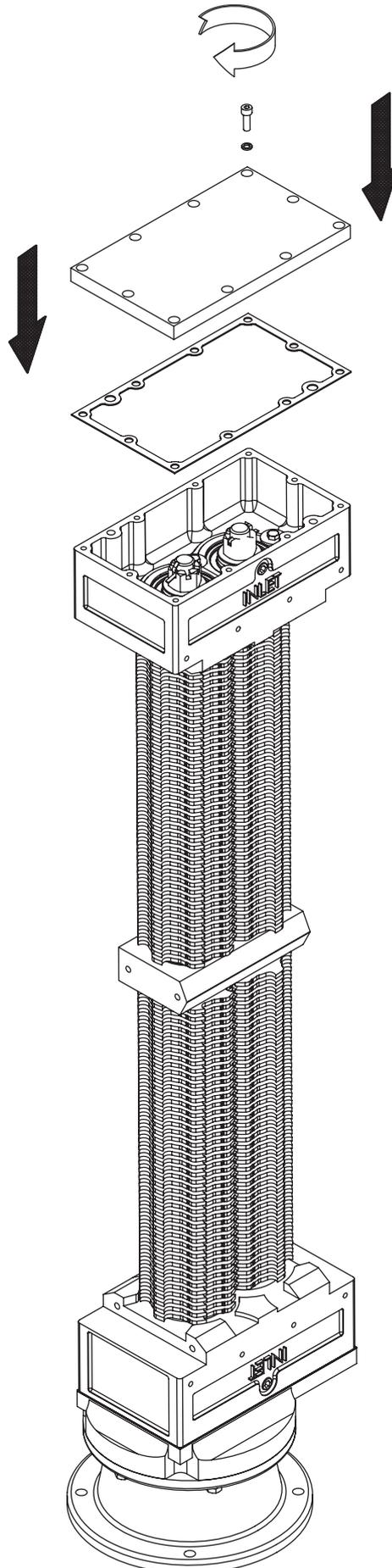
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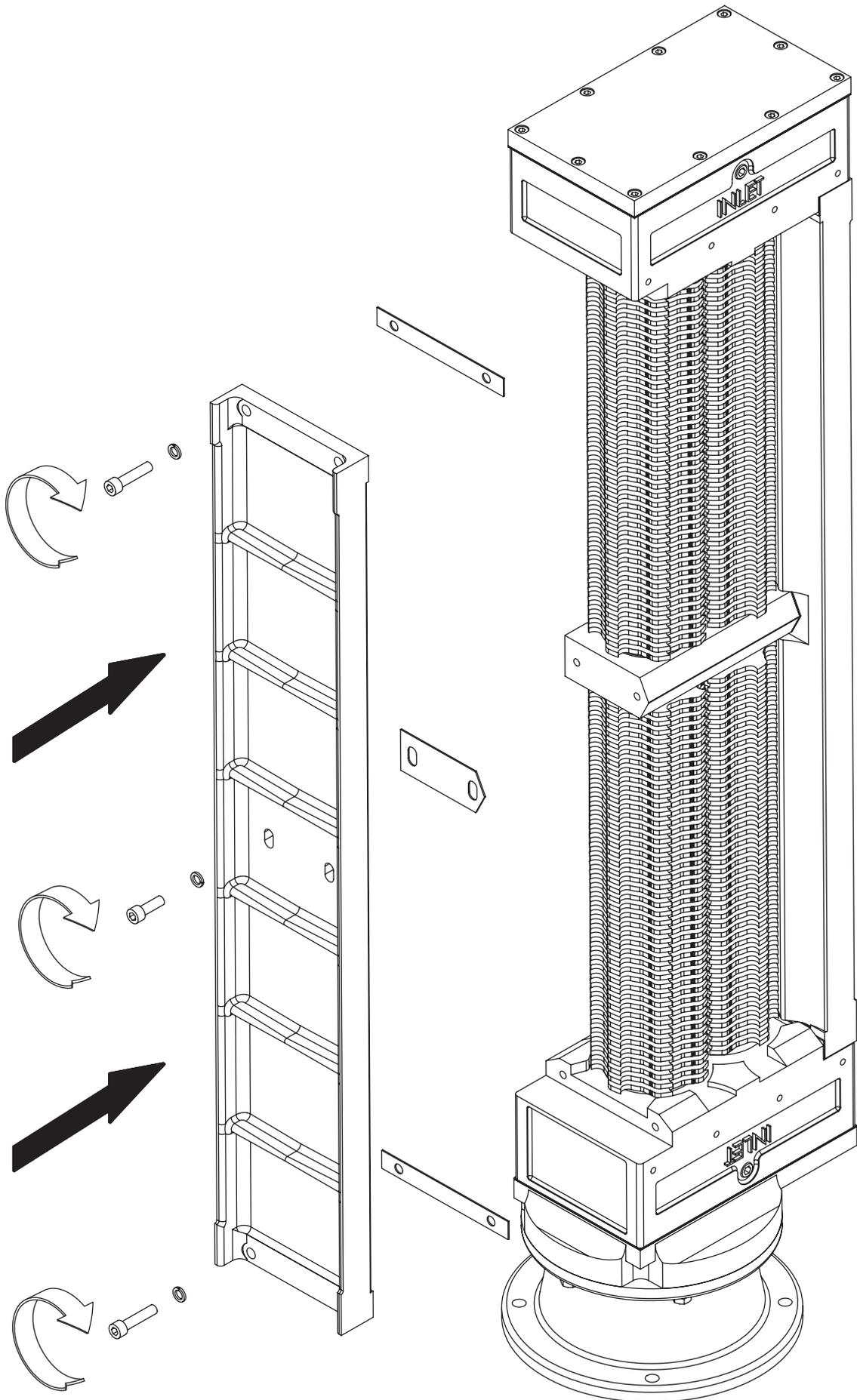
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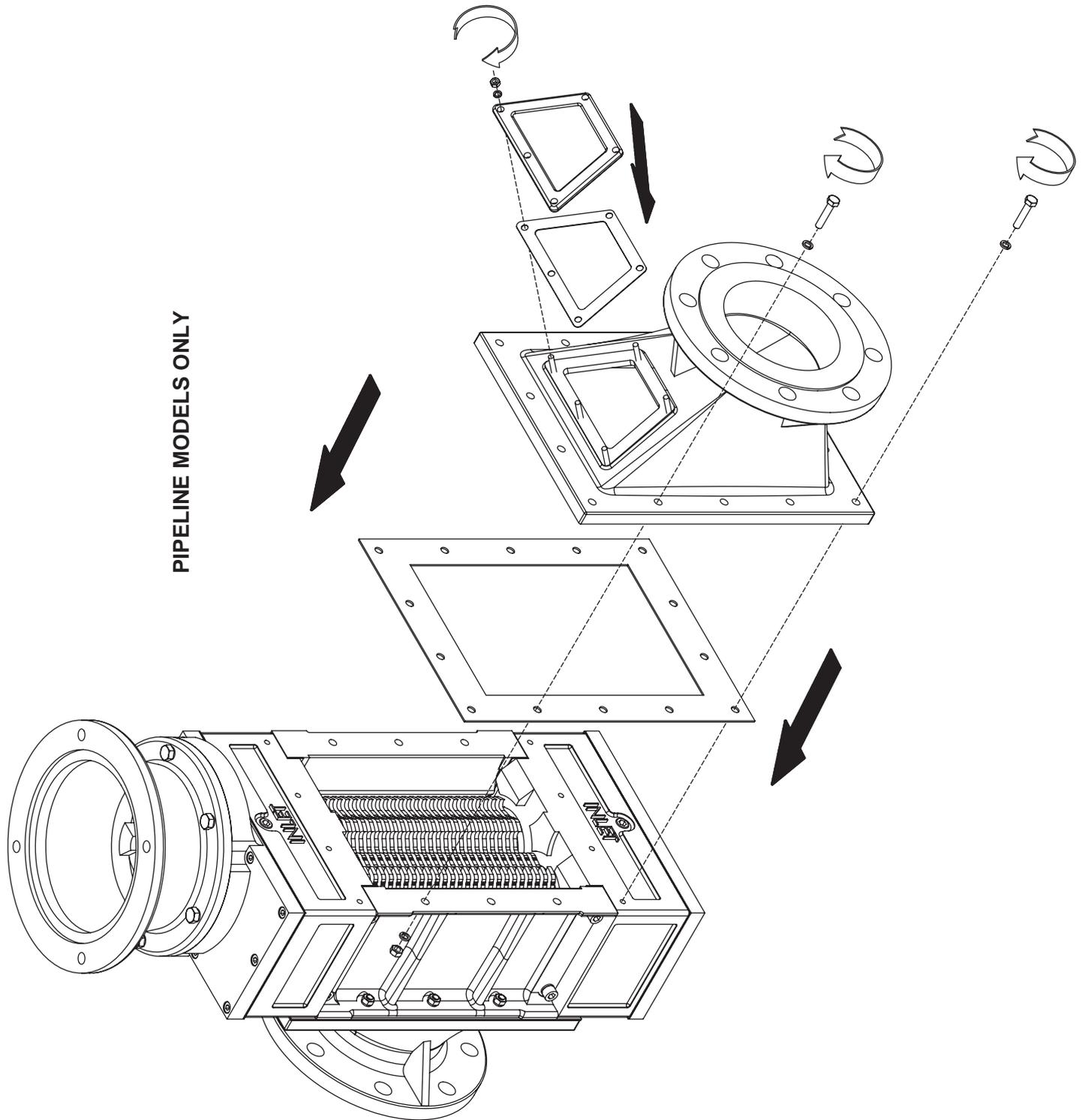
# Dismantling & Assembly Diagrams



# Dismantling & Assembly Diagrams

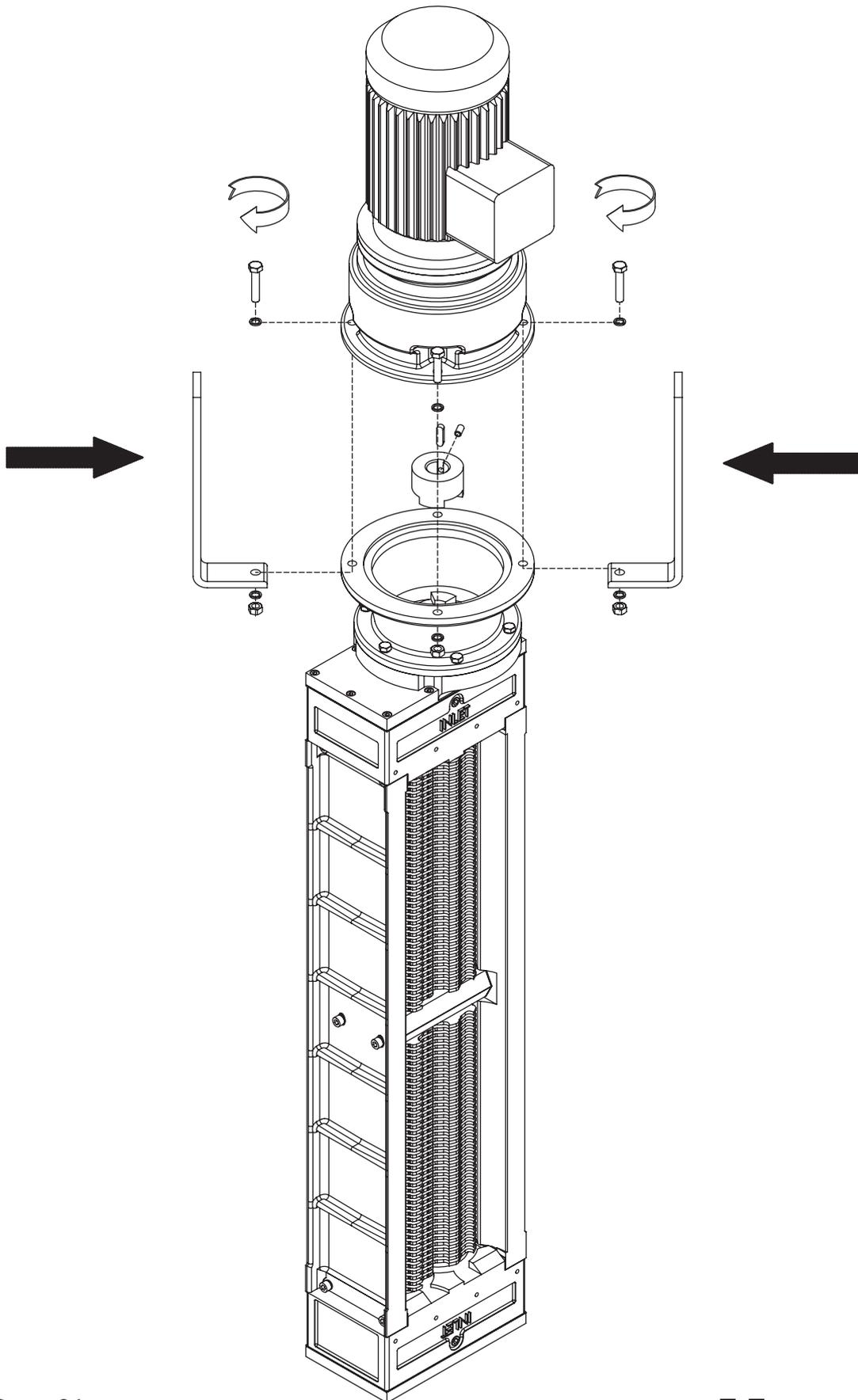


# Dismantling & Assembly Diagrams



# Dismantling & Assembly Diagrams

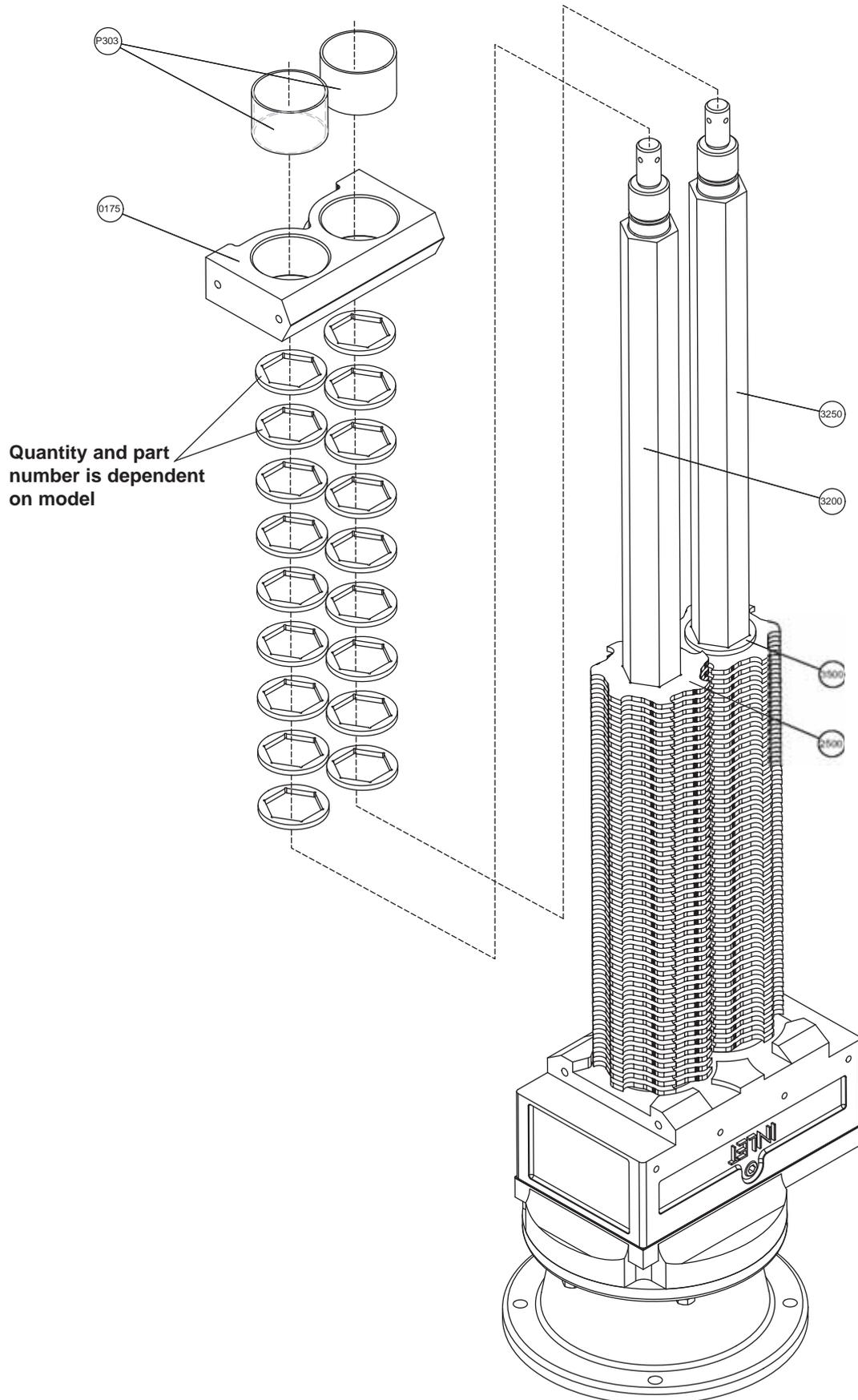
GEARMOTOR MODELS ONLY



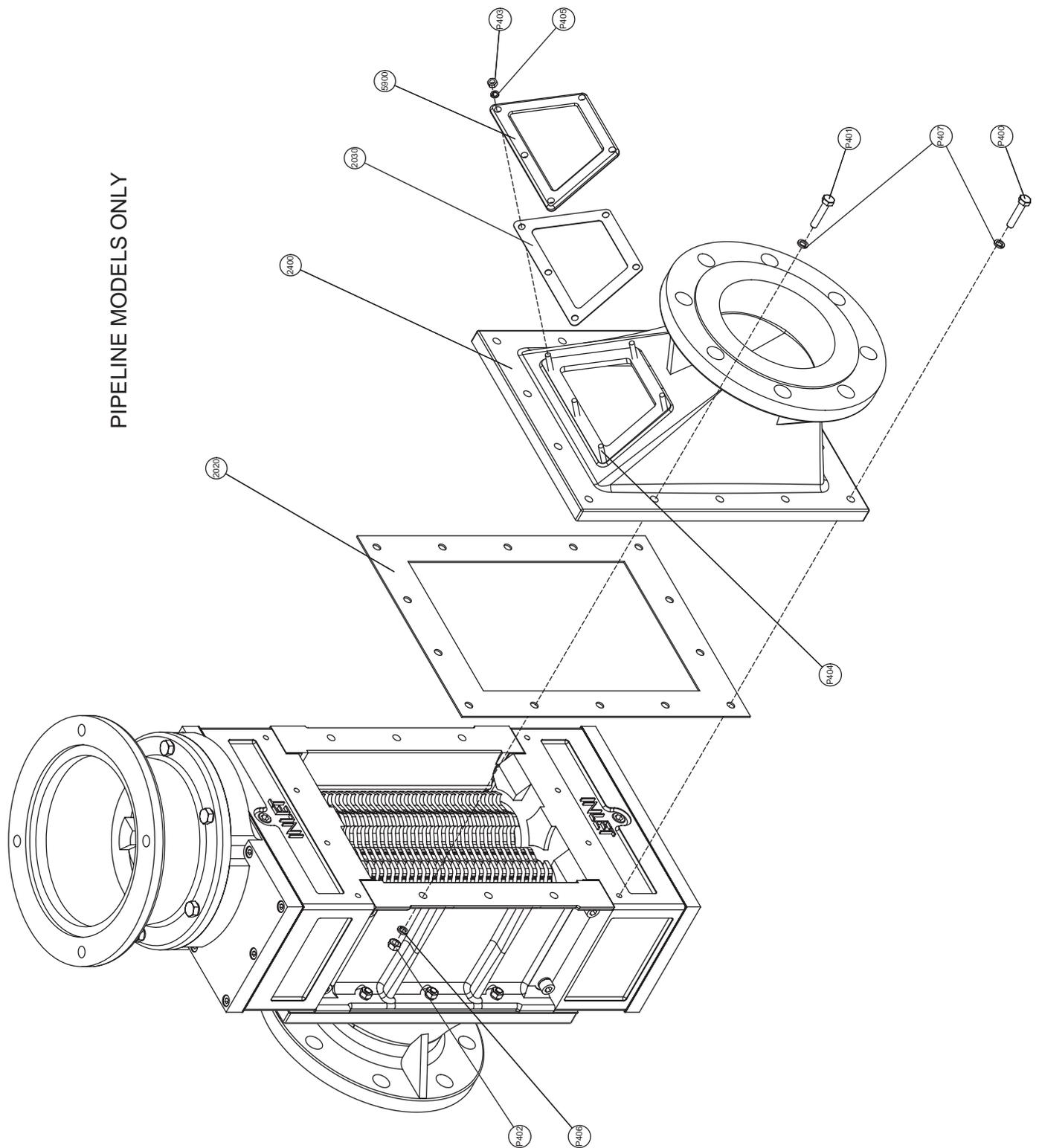


# Exploded Views

## CA210 AND CA215 MODELS ONLY

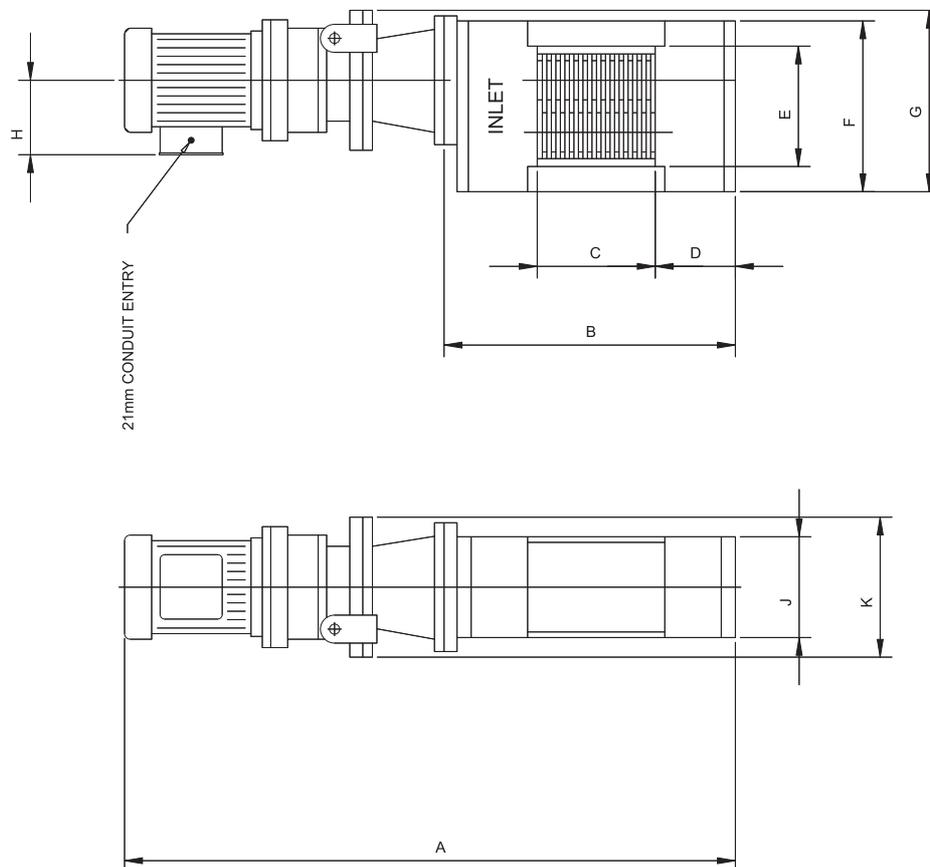


# Exploded Views





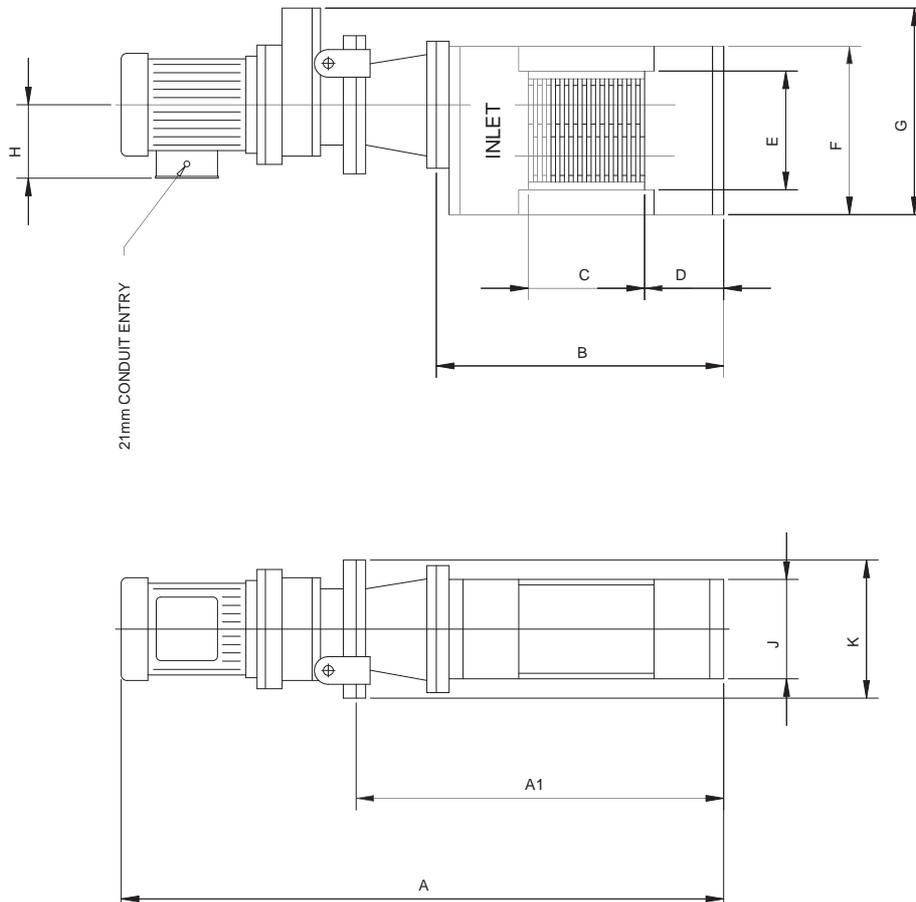
# General Arrangement



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

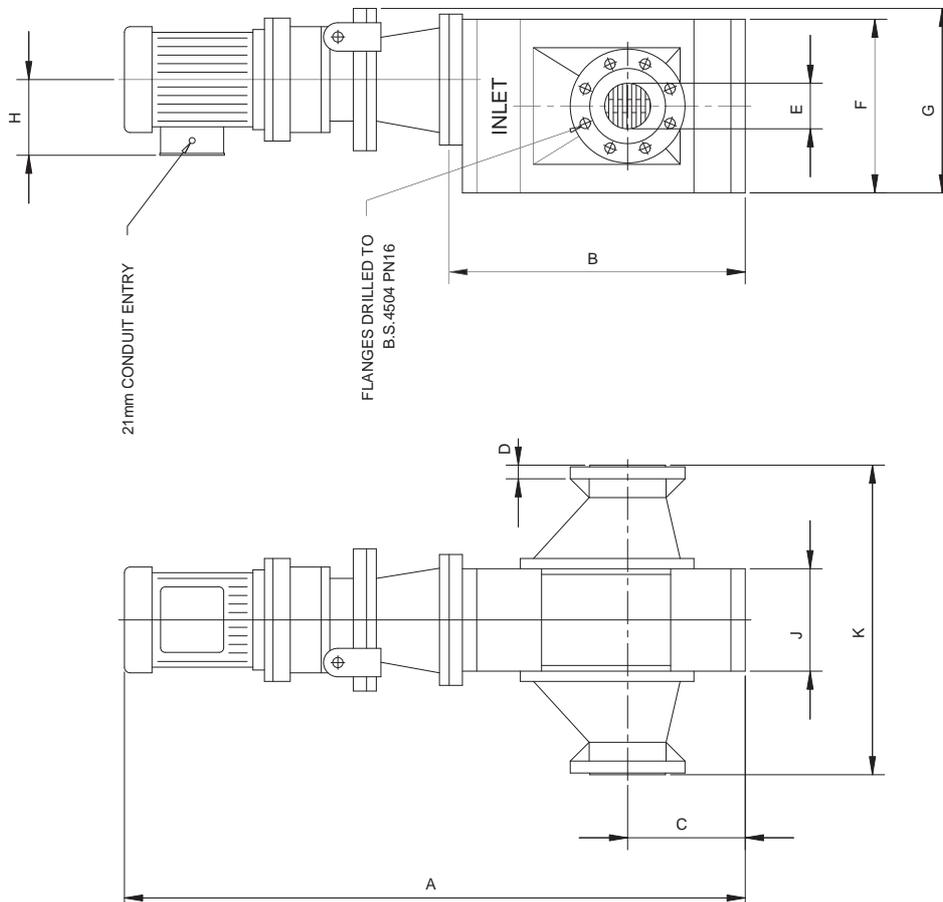
# General Arrangement

MODEL	MOTOR	DIM A	DIM B	DIM C	DIM D	DIM E	DIM F	DIM G (MAX)	DIM H (MAX)	DIM J	DIM K	MASS (DRIVE UNIT NOT INCLUDEDLED) (MAX)
CA202AA	1.5KW	634	515	175	155	215	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	260	121Kg
CA203AA	1.5KW	746	629	290	155	215	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	260	131Kg
CA205AA	1.5KW	898	779	440	155	215	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	260	151Kg
CA206AA	1.5KW	1043	924	585	155	215	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	260	161Kg
CA210AA	1.5KW	1458	1339	1000	155	215	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	260	236Kg
CA202AB	2.2KW	643	515	175	155	215	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	260	121Kg
CA203AB	2.2KW	757	629	290	155	215	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	260	131Kg
CA205AB	2.2KW	907	779	440	155	215	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	260	151Kg
CA206AB	2.2KW	1052	924	585	155	215	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	260	161Kg
CA210AB	2.2KW	1467	1339	1000	155	215	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	260	236Kg
CA215AB	2.2KW	1977	1849	1510	155	215	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	260	306Kg
CA202AC	4.0KW	654	515	175	155	215	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	300	122Kg
CA203AC	4.0KW	768	629	290	155	215	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	300	132Kg
CA205AC	4.0KW	918	779	440	155	215	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	300	152Kg
CA206AC	4.0KW	1063	924	585	155	215	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	300	162Kg
CA210AC	4.0KW	1478	1339	1000	155	215	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	300	237Kg



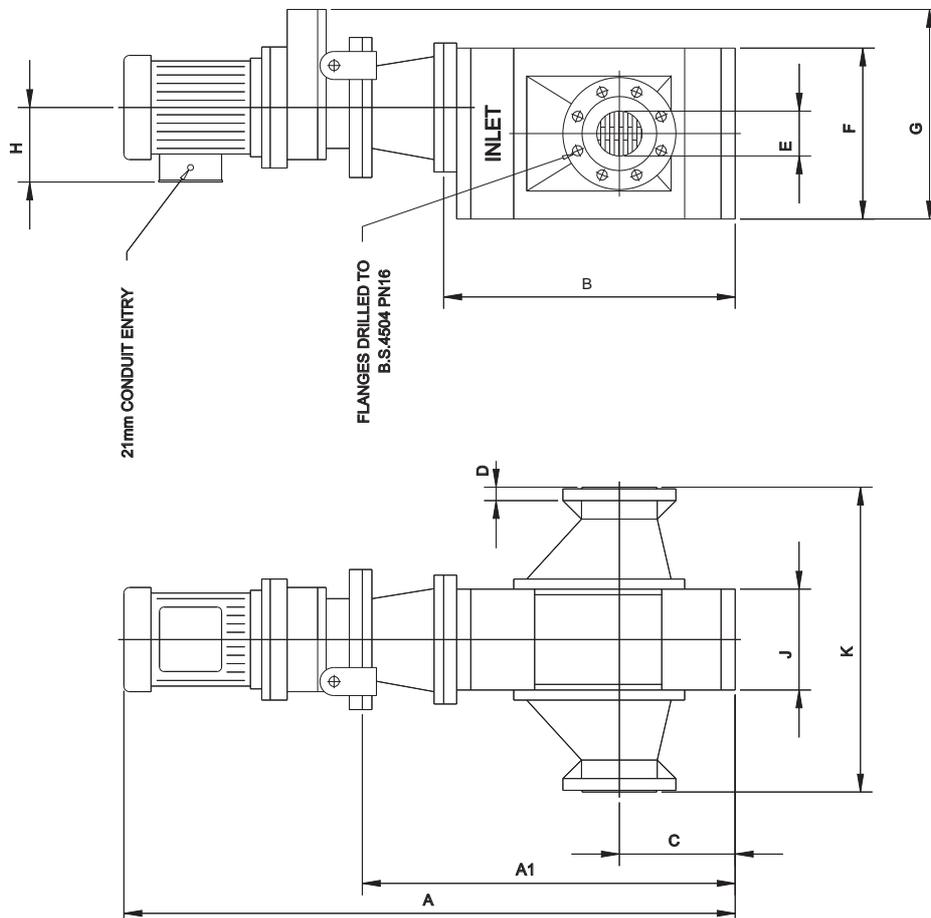
# General Arrangement

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

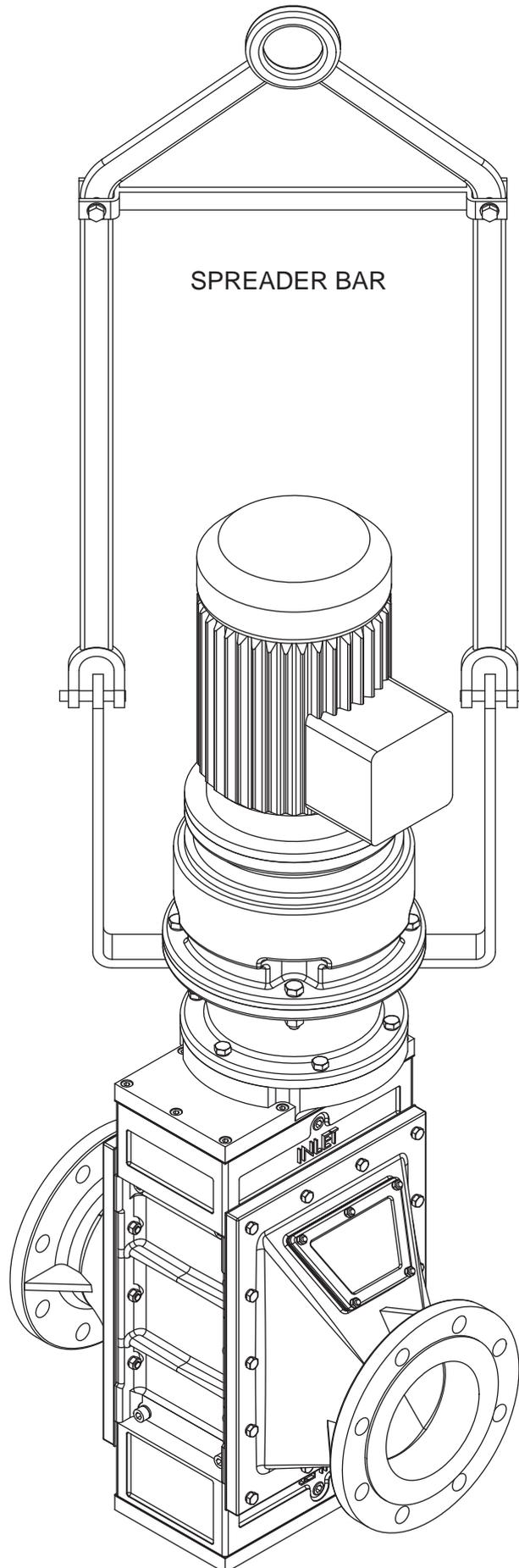


# General Arrangement

MODEL	MOTOR	DIM A	DIM A1	DIM B	DIM C	DIM D	DIM E	DIM F	DIM G (MAX)	DIM H (MAX)	DIM J	DIM K	MASS (DRIVE UNIT NOT INCLUDED) (MAX)
CA202BA	1.5KW	SEE DRIVE UNIT SPEC	634	515	205	24	80	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	544	149Kg
CA202CA	1.5KW	SEE DRIVE UNIT SPEC	634	515	205	24	100	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	544	150Kg
CA202DA	1.5KW	SEE DRIVE UNIT SPEC	634	515	205	24	150	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	544	152Kg
CA203DA	1.5KW	SEE DRIVE UNIT SPEC	748	629	230	24	150	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	544	167Kg
CA208EA	1.5KW	SEE DRIVE UNIT SPEC	748	629	255	24	200	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	584	179Kg
CA209FA	1.5KW	SEE DRIVE UNIT SPEC	888	779	280	24	250	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	684	224Kg
CA206GA	1.5KW	SEE DRIVE UNIT SPEC	1043	924	305	24	300	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	784	268Kg
CA202BB	2.2KW	SEE DRIVE UNIT SPEC	643	515	205	24	80	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	544	149Kg
CA202CB	2.2KW	SEE DRIVE UNIT SPEC	643	515	205	24	100	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	544	150Kg
CA202DB	2.2KW	SEE DRIVE UNIT SPEC	643	515	205	24	150	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	544	152Kg
CA203DB	2.2KW	SEE DRIVE UNIT SPEC	757	629	230	24	150	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	544	167Kg
CA203EB	2.2KW	SEE DRIVE UNIT SPEC	757	629	255	24	200	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	584	179Kg
CA206FB	2.2KW	SEE DRIVE UNIT SPEC	907	779	280	24	250	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	684	224Kg
CA206GB	2.2KW	SEE DRIVE UNIT SPEC	1052	924	305	24	300	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	784	268Kg
CA202BC	4.0KW	SEE DRIVE UNIT SPEC	654	515	205	24	80	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	544	150Kg
CA202CC	4.0KW	SEE DRIVE UNIT SPEC	654	515	205	24	100	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	544	151Kg
CA202DC	4.0KW	SEE DRIVE UNIT SPEC	654	515	205	24	150	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	544	153Kg
CA203DC	4.0KW	SEE DRIVE UNIT SPEC	768	629	230	24	150	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	544	168Kg
CA203EC	4.0KW	SEE DRIVE UNIT SPEC	768	629	255	24	200	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	584	180Kg
CA206FC	4.0KW	SEE DRIVE UNIT SPEC	918	779	280	24	250	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	684	225Kg
CA206GC	4.0KW	SEE DRIVE UNIT SPEC	1063	924	305	24	300	305	SEE DRIVE UNIT SPEC	SEE DRIVE UNIT SPEC	178	784	269Kg



# Lifting & Guarding Diagrams



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