Operation and Maintenance

Discam

Original Instructions

Table of Contents

1 Revisions

Revision No.	Date (dd/mm/yyyy)	Name	Change

2 Safety

2.1 General Notes

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

Instructions must be read prior to carrying out any work.

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

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

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

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

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

Ensure equipment is suitably guarded to PD5304:2000.

2.2 Personnel Protective Equipment (PPE)

Appropriate PPE must always be worn.

2.3 Safety and Warning

All personnel must be qualified / trained prior to carrying out any work.

All aspects of safety must be adhered to at all times.

The grinder and its components have been designed to ensure safe operation within the guidelines covered by legislation. Accordingly, your Supplier has declared the machine safe to use for the duty specified as defined by the Declaration of Incorporation or Conformity that is issued with this instruction manual.

The use of replacement parts that are not manufactured by or approved by your Supplier 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.

This manual identifies the methods for operation and maintenance including dismantling and re-assembly. These methods must be adhered to.

Do not change the application without consultation with your Supplier or appointed NOV representative.

2.4 Warnings

CAUTION
Possible danger
Minor injury or damage to machine can occur

WARNING
Possible danger
Death or serious injury can occur

DANGER
High risk of severe or fatal injury

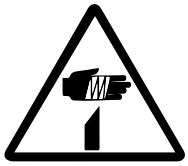
2.5 Danger Symbols

Warning

Danger of electrical voltage

Lift correctly

Guards must be used



Warning – sharp edges

Danger of entrapment

2.6 Dangers That Can Be Caused by the Machine

- If equipped with automatic level control, equipment can start without warning.
- Operating, installing, or maintaining the unit in any way that is not covered in this manual could cause death, serious personal injury such as loss of limb, or damage to the equipment. This includes any modification to the equipment or use of parts not provided by your Supplier. If there is a question regarding the intended use of the equipment, please contact your Supplier or authorised distributor.
- Movement of mechanical parts
- Risk of entanglement or entrapment if guards are not used correctly
- Electrical voltages and currents
- Risk of electrocution, shock or burns
- Risk of burns from hot surfaces
- Cutters have sharp edges and must be handled with care using the appropriate PPE at all times.

2.7 Methods of Stopping the Machine

If the equipment is still running, the following procedure should be carried out:

- Press 'stop' button or switch 'and/off/auto' selector switch to 'off' position
- Turn power off and lock off
- Hydraulically isolate at inlet inflow and discharge by closing relevant valves and lock off

2.8 Personnel

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

2.9 Safety and Protective Devices

Never operate equipment without relevant safety devices fitted.

1. All motors to be connected via overload and short circuit protection devices which must comply with local regulations.
2. All screens **must** be fitted with an emergency stop device local to the machine, in accordance with local regulations.
3. The screen employs oil lubrication to its drive train. The screen is supplied with a low-level oil sensor which must be connected to prevent malfunction of the screen.
4. The screen shaft employs a mechanical seal to protect the bottom bearing assemblies. These mechanical seals **must not** run dry for extended periods. Therefore, it is essential that a screen low level cut out is utilised.
5. For all units supplied with IP68 submersible drives, motors are fitted with thermistors. These must be connected to prevent overheating of motor windings.

2.10 Foreseeable misuse

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.

Not using machine within the specified duty.

2.11 Warranty

The seller warrants that new Equipment / Parts of its own manufacture shall conform to the material and technical specifications set forth in the agreement. Goods manufactured by others are sold “as is” except to the extent the manufacturer honours any applicable warranty made by the manufacture.

2.12 ATEX

Due to the nature and design of grinding and screening 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/disc assembly.

Where a Discam unit is to be installed in a potentially explosive atmosphere ensure that this has been specified at the time of purchase and that the equipment has been supplied accordingly and displays an ATEX nameplate or is supplied with a certificate of conformity. If there is any doubt as to the suitability of the equipment please contact your Supplier or NOV Representative 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 90ºC (194ºF) the maximum surface temperature will not exceed 90ºC (194ºF) provided the grinder is installed, operated and maintained in accordance with this manual. Where the process fluid temperature exceeds 90ºC (194ºF) the maximum surface temperature will be equal to the maximum process fluid temperature.

Cavities that could allow the accumulation of explosive gases, such as under guards, should where possible, be designed out of the system. Where this is not possible they should be fully purged before any work is carried out on the 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 Discam down if the motor current or temperature exceed specified limits or a jam of the cutter/disc stack occurs. This may include a system that reverses the machine 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.

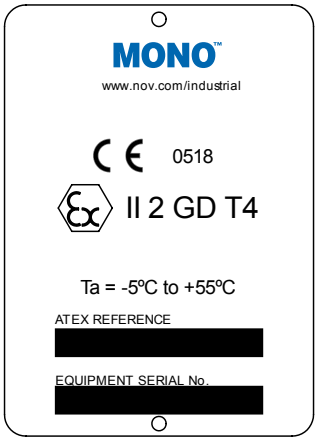
It is important that the Discam rotates in the correct direction to give an efficient grinding operation. This must be checked on installation and commissioning and after any maintenance has been carried out. Failure to observe this may lead to mechanical or electrical overload.

When fitting drives, couplings, and guards to a Discam unit it is essential that these are correctly fitted, aligned and adjusted in accordance with the Operating and Maintenance 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.

Failure to operate or maintain the Discam 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 Discam and its components have been designed to ensure safe operation within the guidelines covered by legislation. Accordingly, your Supplier has declared the machine safe to use for the duty specified as defined by the Declaration of Incorporation or Conformity that is issued with this instruction manual. The use of replacement parts that are not manufactured by or approved by your Supplier or NOV Representative 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.



3 EC Declaration

As defined by Machinery Directive 2006/42/EC.

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

EC Declaration of Incorporation

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

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

IMPORTANT

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

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

EC Declaration of Conformity

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

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

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

The EMC Directive 2014/30/EU

The Low Voltage Directive 2014/35/EU

The Pressure Equipment Directive 2014/68/EU

IMPORTANT

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

Mr A. Morris – Director of Pump Technology for NOV PFT UK Ltd.,

Greengate Way, Middleton,

Manchester, England, M24 1SA.

4 Transport, Storage and Disposal

4.1 Safety

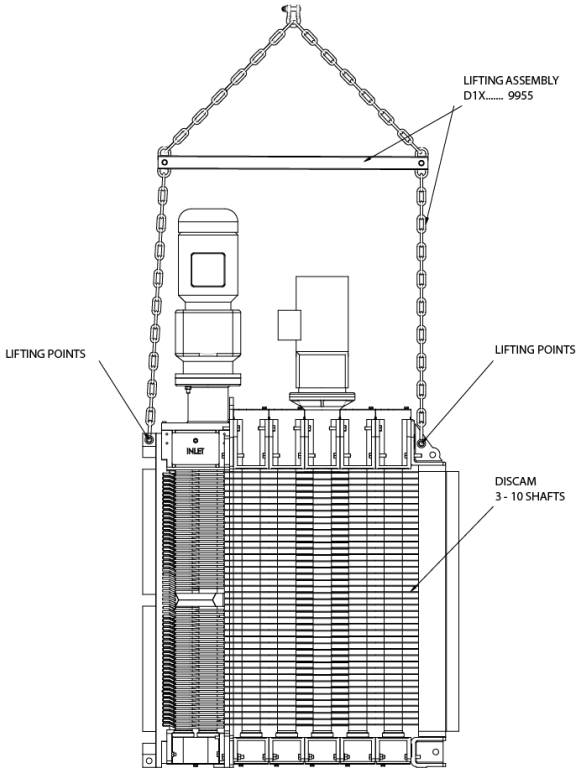
CAUTION
Personal injury or damage to transport can occur
Comply with any safety notes on packaging / paperwork. Only use suitable transport and lifting devices. Use suitable protective equipment.

4.2 Transport

For dimensions and weights see general arrangement drawing.

4.3 Safe Lifting

Unit should only be lifted with the lifting assembly supplied.



No. of Shafts	Lifting Assembly
3	D1X03 9955
4	D1X04 9955
5	D1X05 9955
6	D1X06 9955
7	D1X07 9955
8	D1X08 9955
9	D1X09 9955
10	D1X10 9955

For weights see Appendix D.

4.4 Receipt and Unpacking the Machine

Comply with any instructions on packaging and/or paperwork.

4.5 Storage

4.5.1 Short Term Storage

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

4.5.2 Long Term Storage

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.

For munchers fitted with IP55 motors, remove the motor cowl and turn the fan by hand.

When an IP68 motor is fitted the equipment will need to be connected to an electricity supply 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.

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

4.6 Disposal

	NOTICE
	Environmental
	Drain unit in accordance with regulations. Dispose correctly in accordance with regulations,

4.7 Disposal of Worn Components

- When replacing wearing parts, please ensure disposal of used parts is carried out in compliance with local environmental legislation.
- Care should be taken when disposing of lubricants, gases and liquids.
- Appropriate PPE must be worn.

CAUTION
Possible danger
Minor injury or damage to machine can occur

5 General

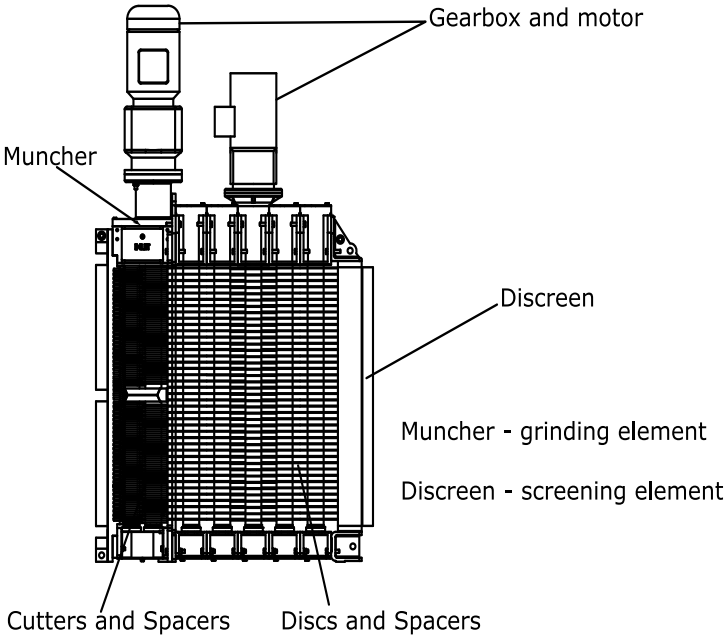
5.1 General Description

The Discam is a combined screen and grinder. Screened solids are passed directly from the screening element into the grinding unit giving improved solids handling and minimising the risk of solids hanging up between the two elements.

The external side frames incorporate guide rails to aid installation and removal for maintenance. The two elements of the machine are fitted with separate drives which enables them to be matched to the requirements of their two separate functions and minimise the overall power consumption of the unit.

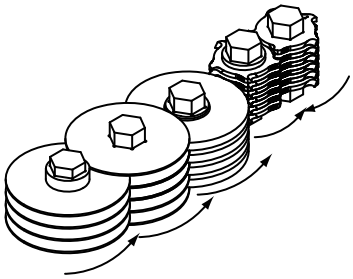
The Discam is available in throat depths of 1m, 1.5m and 2m with between 3 and 10 screen shafts as standard giving a wide range of capacities to suit different applications.

5.2 Discam Construction



5.3 Grinding Element

The grinding element is based on the Series A Muncher, having counter rotating shafts which draw solids into the cutters. The availability of different cutter sizes and stacking arrangements enable different maceration sizes to be achieved as required by the downstream process.



Path of solids being transported across the face of the screen directly into the cutters.

5.4 Screening Element

The screening element is based on the L Series Discreen. The screen is of a modular design so additional shaft stacks can be added where higher capacities are required. Each shaft rotates in the same direction as its neighbour so that solids are transferred across the face of the machine from one shaft to the next. The first and last disc stacks use thicker discs to maintain the screening gap and ensure an effective transfer of solids entering and leaving the screen.

5.5 Intended Uses of Discam

A grinder and screen package for the effective maceration of screenings.

Equipment is suitable for operating in a submerged environment for limited, intermittent, extraordinary circumstances only. Fluid levels must never exceed 3m (9 feet 10 inches) over the level of the top housing.

Downstream system operation should be configured to avoid equipment flooding under all normal and predictable circumstances.

5.6 Prohibited Uses of Discam

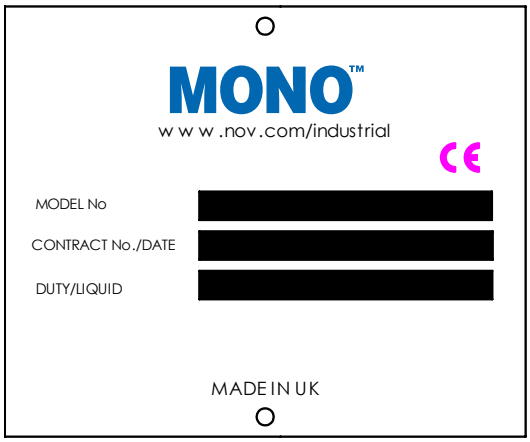
Equipment must not be allowed to run above maximum normal operating level for extended periods in a submerged condition, see Fig. 6.11.1

Using machine without fitting Programmable Logic Controller PLC to ensure machine is not subjected to overload.

Consideration must be given to any regulatory requirements on maximum permissible solids size.

Do not operate Discam outside of duty conditions.

5.7 Nameplate



5.8 Discam Coding Sheet

Features	Description	Basic Code										Variation		
		1	2	3	4	5	6	7	8	9	10	11	12	13
Product	Discam	D												
Mark Number			3											
Nominal Throat Size	1000mm (40”)			B										
	1500mm (60”)			D										
	2000mm (80”)			F										
Number of Shafts	3				0	3								
	4				0	4								
	5				0	5								
	6				0	6								
	7				0	7								
	8				0	8								
	9				0	9								
	10				1	0								
Body Material	Cast Iron Body						C							
Disc Space	9.0mm (0.3543”)							9						
Cutter Space	8.0mm (0.3150)								8					
Configuration	Left Hand Build									L				
	Right Hand Build									R				
Oblique											/			
Field												V	A	R
Typical Code		D	3	B	0	5	C	9	8	L	/	V	A	R

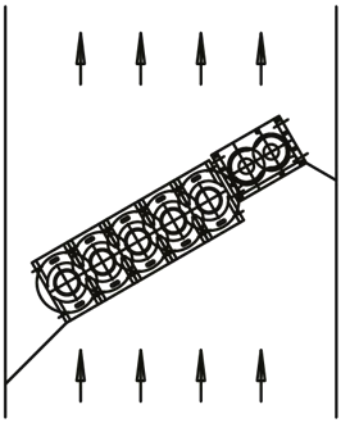
6 Assembly and Installation

6.1 System Design and Installation

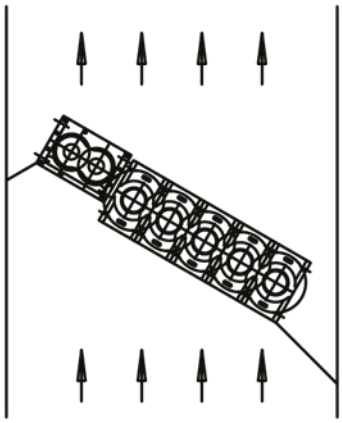
6.1.1 Machine Configuration

The Discam should be configured to suit the installation and application.

See diagrams below and coding sheet for details.

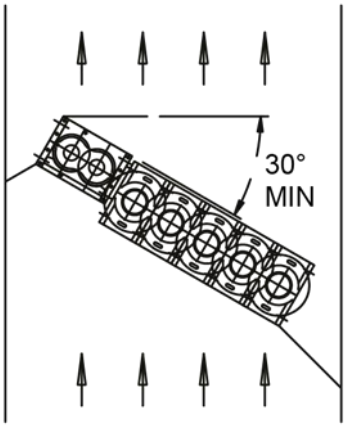


Left Hand



Right Hand Discam

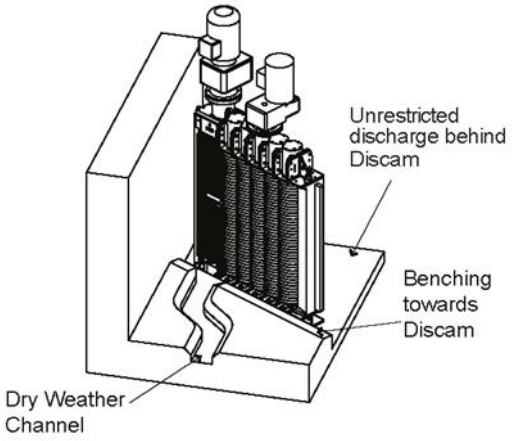
Where the Discam is installed in an inlet channel it should be at a minimum of 30° to the flow as shown below. Baffle plates should be fitted either side of the Discam to guide solids across the screen and into the grinder.



Minimum Installation Angle 30°

6.2 Channel Design Recommendations

The design of the channel should be such that it promotes flow across the face of the screen and prevents the build-up solids in 'dead areas'. A dry weather channel is recommended to maintain fluid velocities and reduce deposition of solids at times of low flow. This should direct the flow towards the grinder as shown below.



6.3 Design of Supporting Framework

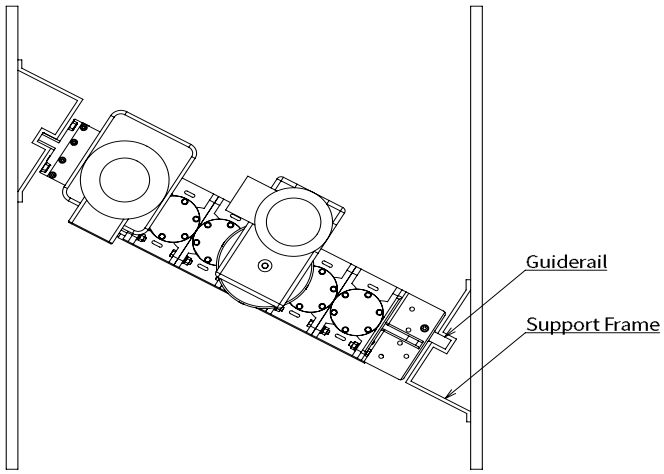
The support framework should be designed such that it promotes a clear passage of solids across the face of the screening element and into the grinder element. There should be no areas which allow solids to collect as they will quickly build up and reduce the efficiency of the Discam.

Where impact from large objects such as tree branches is likely we recommend that deflector bars are fitted in front of the machine to prevent damage to the discs or shafts.

The supporting framework should have sufficient mechanical strength to resist all mechanical and hydraulic loads it is likely to be subjected to.

The cast guides on each end of the Discam simplify the design of the framework and make installation and removal quick and easy. Baffle plates should be added to the installation to guide the flow into the Discam and prevent the build-up of solids around the support frame.

A typical support frame arrangement is shown below.



Your Supplier can supply custom made support framework / top and bottom baffle plates which are specifically designed to suit the equipment and the installation requirements. Where support framework / top and bottom baffle plates not approved by us are used we cannot be held responsible if performance of the Discam is affected by their design or method of installation.

6.4 Guide Rail Systems

Where the Discam is installed in an area where access is difficult, it is recommended that a guide rail system be used to aid removal for inspection and maintenance.

Note the safe lifting arrangement in section 4.3.

Please contact your Supplier for further information on guide rail systems.

6.5 Programmable Logic Controller (PLC)

All Discams must be installed with a special PLC in the control circuit to prevent the machine from overload and to ensure effective operation. Failure to comply with this requirement could result in premature failure of the Discam and will invalidate the warranty.

The control philosophy of the PLC is as follows:

When the absorbed power of the drive on either the grinder or screen has exceeded any of the pre-programmed set points the unit will stop for approximately 2 seconds to allow the mechanics to come fully to rest. The unit will then automatically reverse the Muncher and Discreen for 2 seconds to clear any debris, after a further 1 second delay the unit will attempt to restart in forward. If the unit tries to restart 3 times within a minute, but cannot clear the blockage, it will stop and produce an alarm indication.

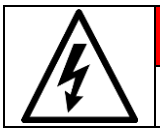
6.6 Summary of Installation Requirements

- Install Discam at a minimum angle of 30° to the flow.
- Bench the channel towards the Discam.
- Ensure unrestricted discharge behind the Discam.
- Use a dry weather channel directed towards the in-feed of the grinder.
- Support frames must be strong enough to handle the mechanical and hydraulic loads imposed.
- Use deflector bars where large objects could damage the machine.
- Use baffles to assist flow and eliminate build-up of solids.
- Ensure there are no protrusions from supporting framework which might snag solids.
- A PLC must be fitted to all Discams to prevent overloading.
- Use an IP68 drive where over-topping is a possibility.
- Ensure there is enough lighting and space to work on the Discam safely.
- Ensure unit is guarded as per section 2.1.
- For operating level control see section 6.11.

6.7 Immediately Prior to Installation and Starting

	CAUTION
	Ensure all plugs and inspection covers are replaced
	Remove any excess grease or oil

6.8 Electrical



DANGER
High risk of severe or fatal injury

Electrical connection should only be made using equipment suitable for both rating and environment. Where any doubts exist regarding the suitability of equipment, your Supplier should be consulted before proceeding.

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.

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

For cable termination information contact your NOV representative for further details.

For oil level sensor, see separate manual OMMP/074/01.

6.9 Reduction of Noise and Vibration

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

6.10 Space Required for Operation and Maintenance

Refer to general arrangement drawing or contact your NOV representative for further details.

6.11 Fluid Level Operation

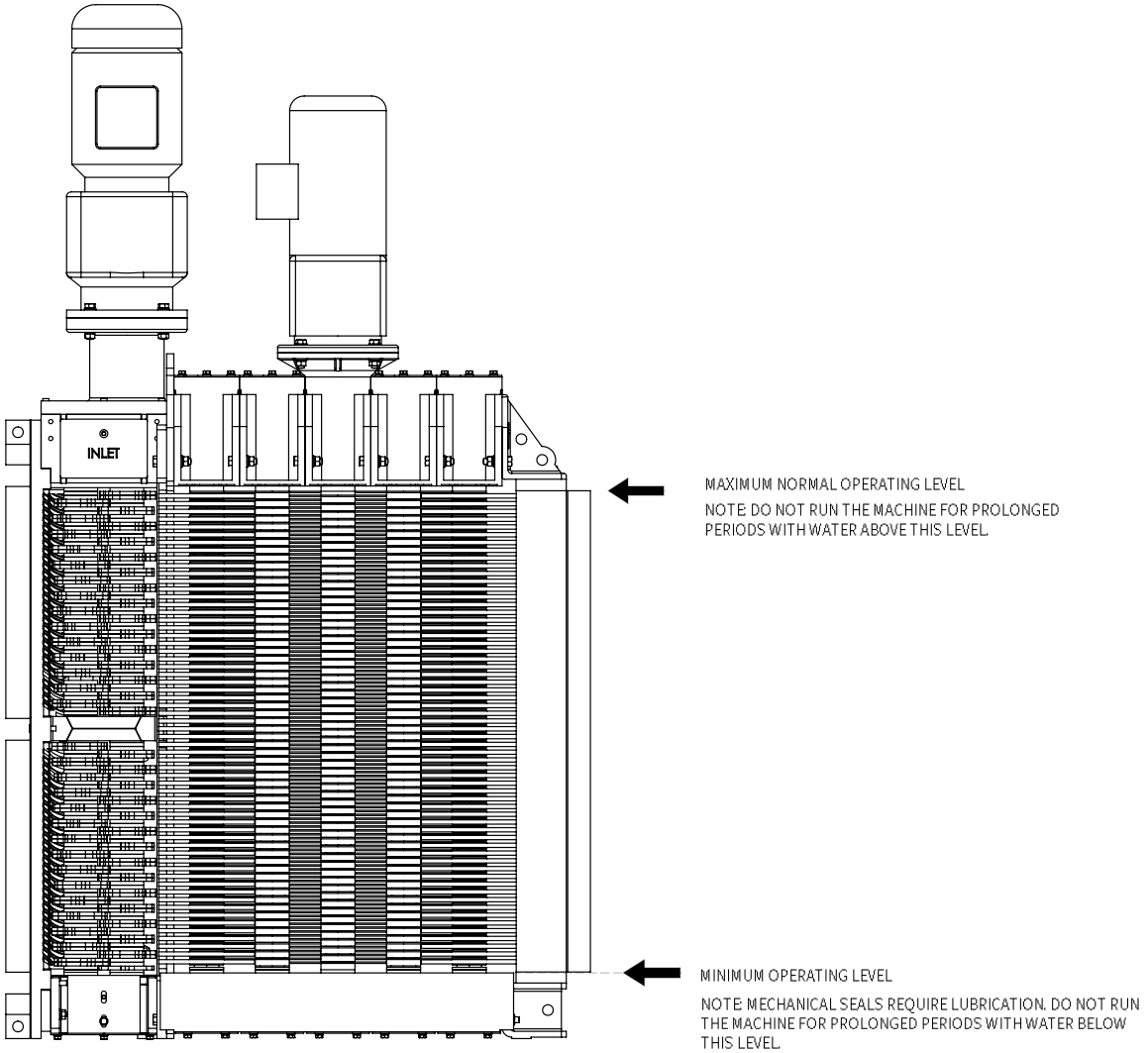
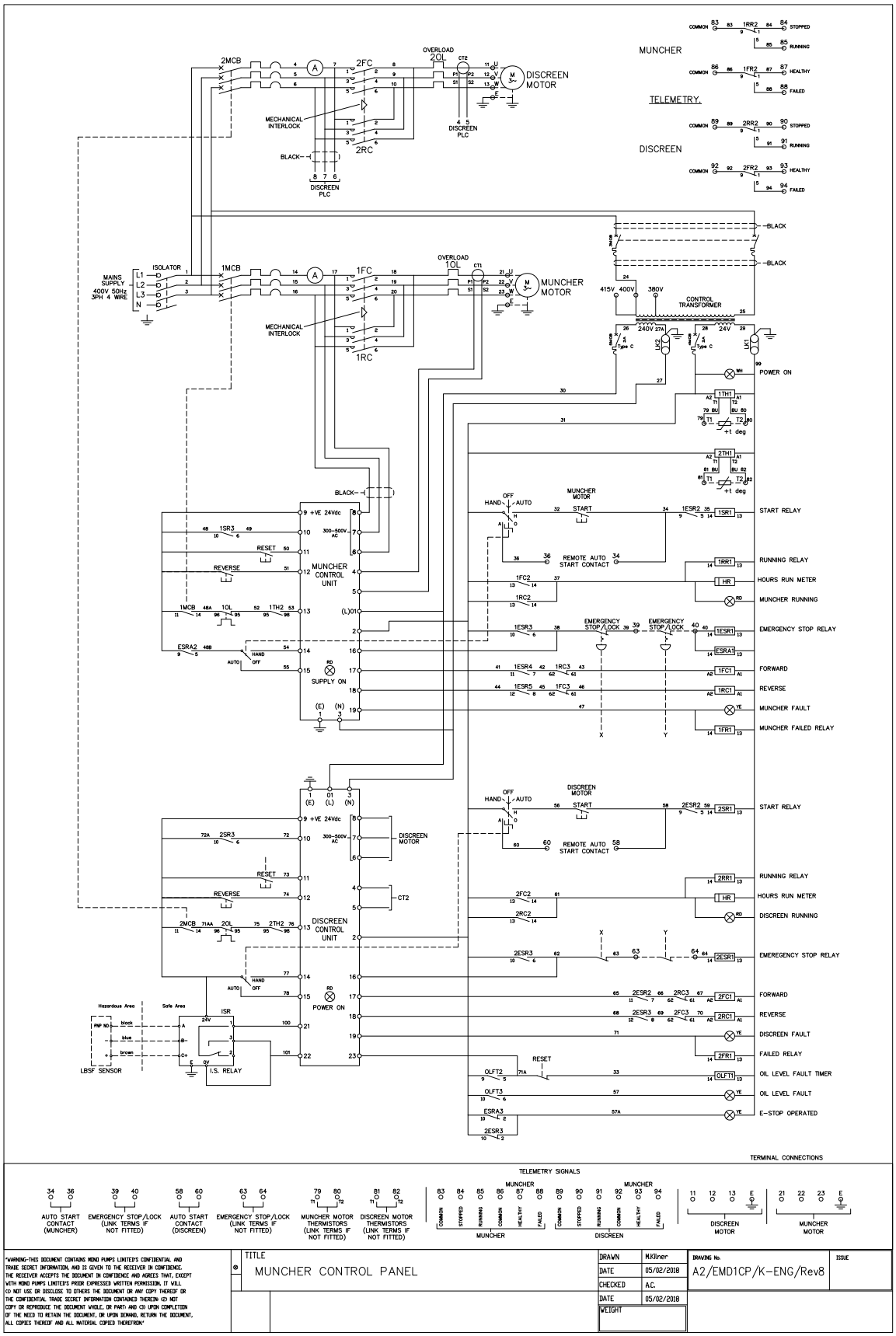
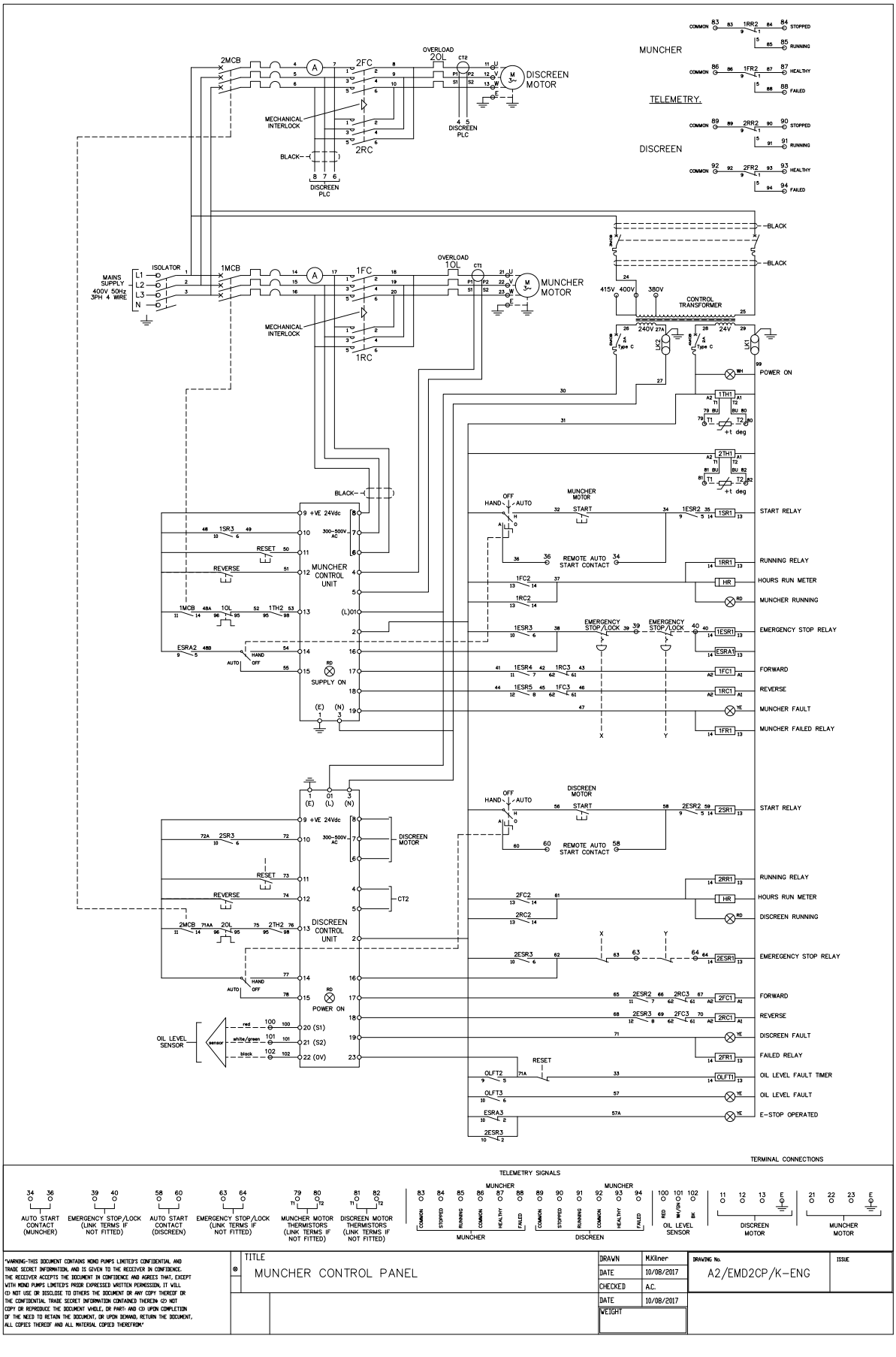


Fig. 6.11.1

6.12 MK 2 Oil Level Sensor Baumer UK, Europe etc Use (All Countries Except China)

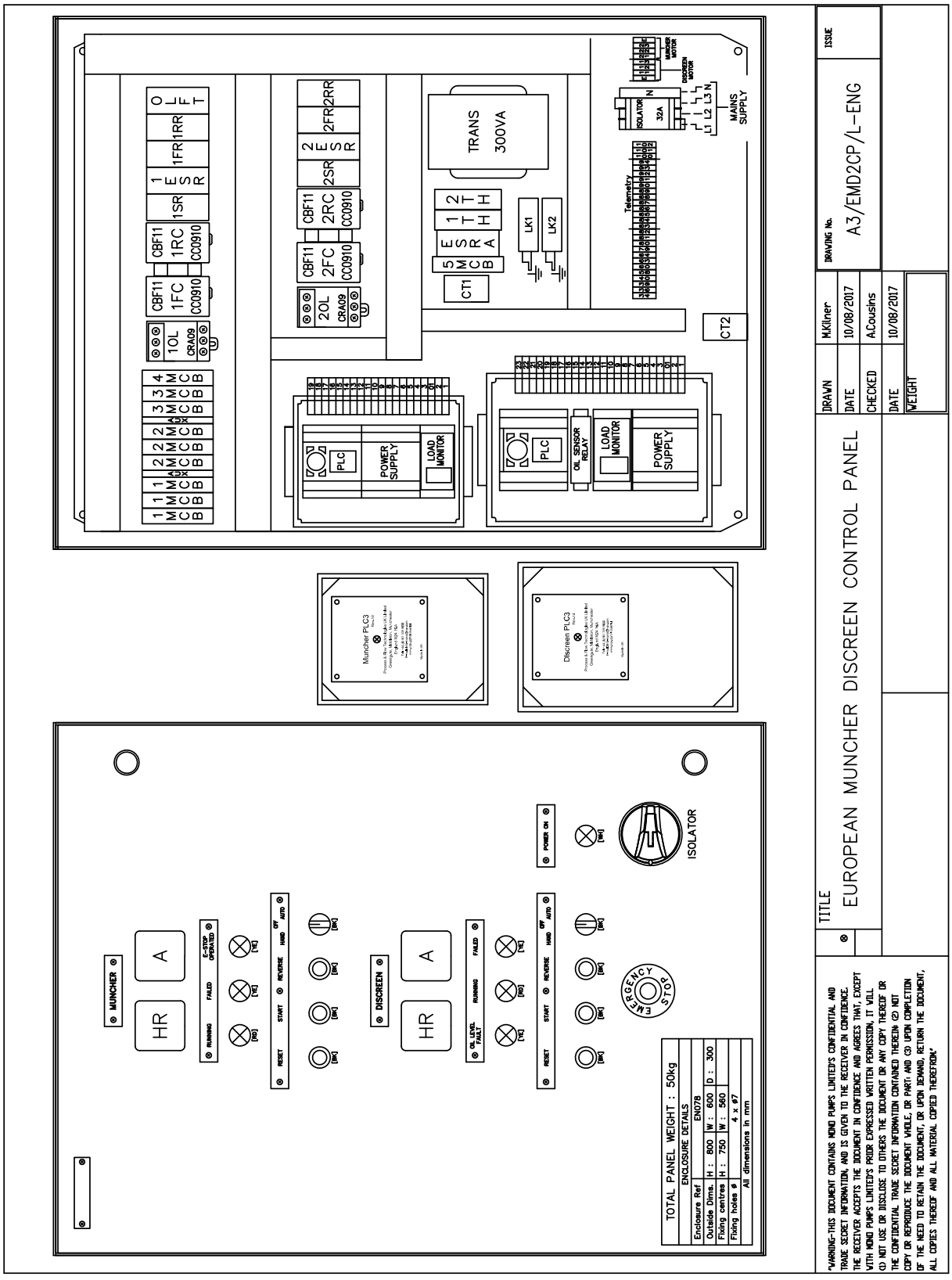


6.13 MK1 Oil Level Sensor – China Only

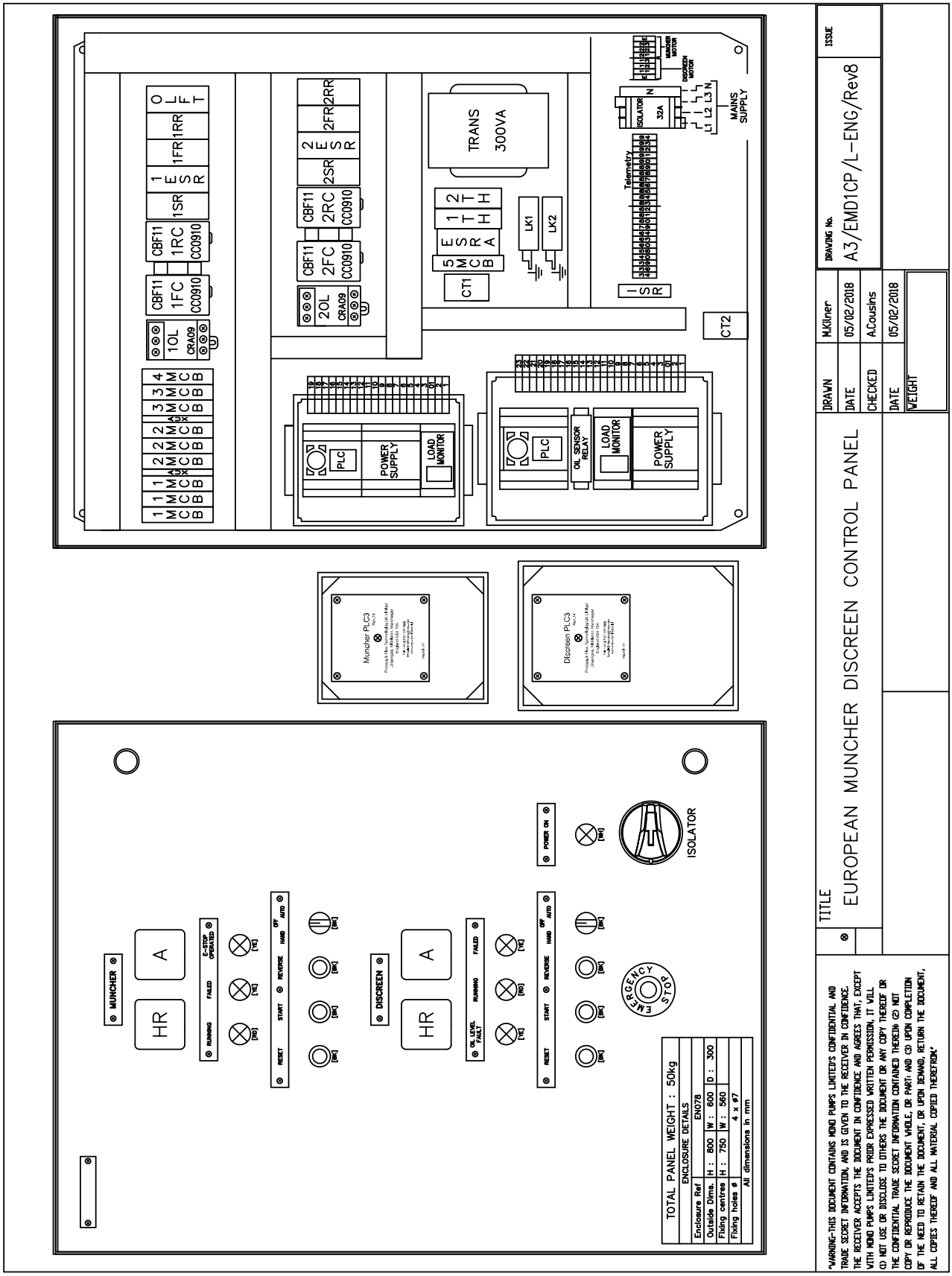


TITLE	MUNCHER CONTROL PANEL
DRAWN	M.Kilner
DATE	10/08/2017
CHECKED	A.C.
DATE	10/08/2017
WEIGHT	
DRAWING No.	A2/EMD2CP/K-ENG
ISSUE	

6.14 European Muncher Discreen Control Panel



6.15 Muncher Discreen Control Panel



7 Maintenance and Servicing

All maintenance and servicing must be carried out by competent / trained personnel.

DANGER
High risk of severe or fatal injury
NEVER inspect or work on near the cutter chamber without first isolating and locking the machine.

7.1 Cleaning Procedure

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

7.2 Discam Maintenance Schedule

Notes: All safety information in this manual should be adhered to. Ensure machine is isolated during checks, except for noise level checks.

If excessive reversals/trips are being experienced, this could indicate that cutters are worn.

Refer to relevant gearbox manual for maintenance instructions.

For any irregular findings, please contact your NOV representative.

HOURS RUN	MECHANICAL INSPECTION	ELECTRICAL INSPECTION	NOTES
Every 5000	Discam General Condition: Steam clean unit to clear debris from machine and to give a clear view of components. Noise Levels: Listen for high or irregular noise levels when running. Discreen Element Oil Level: Check gear train oil level sensor and top up oil level if required.	Discam Check for any loose wiring connections in panels Discreen Element Interrogate PLC data logger and note readings. Check running currents and voltages Muncher Element Interrogate PLC data logger and note readings. Check running currents and voltages	Ensure correct oil grades are used. Check lubrication section of this manual and gearbox manual for details.
Every 10000	Discam General Condition: Steam clean unit to clear debris from machine and to give a clear view of components. Noise Levels: Listen for high or irregular noise levels when running. Discreen Element Oil Level: Check gear train oil level sensor and top up oil level if required. Disc Stack: Check condition of disc stack, particularly at the bottom of the unit. Check the tightness of the stack. Muncher Element Cutter Stack: Check condition of cutters and remove any debris wedged in-between. Check the tightness of the stack. Mechanical Seal: Lift out unit and remove bottom cover plate to check for ingress of water. Replace mechanical seal if water is present.	Repeat 5,000 hours checks.	If any water ingress detected, check condition of gears, bearings and seals and replace if required. Ensure correct oil and grease grades are used. Check lubrication section of this manual for details.

HOURS RUN	MECHANICAL INSPECTION	ELECTRICAL INSPECTION	NOTES
Every 20000	Repeat 10000 hours checks plus: Discreen Element Gear train assembly: Remove the drive, adaptor stool and top housing covers. Check for any water ingress and condition of gears. Drain and replace oil. Muncher Element Gear train assembly: Remove the drive and adaptor stool. Check for any water ingress and condition of gears.	Repeat 5,000 hours checks.	If any water ingress detected, check condition of gears, bearings and seals and replace if required.

Follow schedule until 90,000 hours. Then consider service exchange unit.

7.3 Lubrication

7.3.1 Grinder Element

The drive gear chamber should be approximately two thirds full. If replenishment is necessary use BP Energrease LC2.

7.3.2 Screen Element

The drive train of the screen element is fitted with an oil level sensor and sight glass. If replenishment is necessary use Klubersynth GH6-460 oil.

7.3.3 Lipseals

All lipseals should be liberally lubricated with Food Lube Universal 2 or equivalent.

7.3.4 Gearmotor

The gear motor is supplied with the correct type and quantity of lubricant in the gearbox but should be checked before use. For further information see separate information supplied by the manufacturer.

Ensure gearbox is filled to the correct level. See gearbox manufacturers manual for details.

7.4 Oil Capacity Chart – Screening Element

Number of Screen Shafts	3	4	5	6	7	8	9	10
Total Oil Capacity (cc)	2110	2740	3370	4000	4630	5260	5890	6520

Note:

Oil capacities are approximate.

Ensure the sight glass is completely full.

7.5 Wearing Parts

These parts must be checked for wear:

- Cutters
- Spacers
- Shafts
- Bearings
- Seals
- Gears

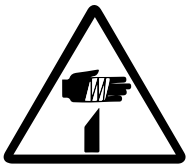
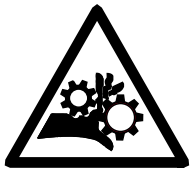
7.6 Recommended Spares List

Muncher Element		
Reference	**Description**	**Quantity**
P101	Lipseal	2
P102	Lipseal	2
P103	Lipseal	2
P104	Lipseal	1
P106	O-Ring	2
P108	Mechanical Seal	1
P114	Circlip	1
2506	Cutters	1/3 of total
3501	Spacers	1/3 of total
3240	Drive Shaft	1
3245	Driven Shaft	1
Discreen Element		
Reference	**Description**	**Quantity**
P108	Mechanical Seal	2
P200	Snap Ring	1 per shaft
P201	Lipseal	1
P206	Circlip	1 per shaft
P207	O-Ring	2 per shaft
P208	Lipseal	1 per shaft
P209	Lipseal	1 per shaft
P210	Lipseal	1 per shaft
2500	Discs	1/3 of total
3500	Spacers	1/3 of total
3240	Drive Shaft	1
3245	Driven Shaft	1

8 Accident or Breakdown

8.1 Unblocking Procedure



- If machine has tripped - reset.
- Select hand mode on control panel (where applicable) and run in reverse for 5 - 10 seconds.
- Re-start in forward.
- If machine doesn't start due to excessive blockage, manual intervention is required.
- Ensure equipment is electrically and hydraulically isolated and locked off.
- If possible, remove machine from installation to ensure adequate space to work.
- If this is not possible, you must follow correct method statements for working in confined spaces.
- The correct PPE must be worn, and gas detection / escape equipment must be used.
- Relieve internal pressure.
- Where applicable, allow machine to cool down below temperature of 40°C.
- In a controlled manner, relieve residual pressure in suction and discharge pipework.
- Visually look at what's causing the blockage.
- Ensure correct hand and facial PPE is worn before attempting to remove blockage by levering and cutting.
- Once blockage has been removed, re-insert machine back to location.
- Remove electrical isolation.
- Place panel into hand mode and test run in forwards and reverse.

8.2 Emission or Leakage of Explosive / Hazardous Substances

	WARNING
	Possible danger
	Death or serious injury can occur

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.

9 Maintenance Tools

To maintain and service the Discam the following tools are recommended:

- Metric hexagon Allen keys from 5mm to 14mm
- Metric spanners from 13mm to 45mm
- Torque wrench (rated from 10Nm to 200Nm)
- Circlip pliers
- Lock nut key - MB D000 9750 (Discreen drive shaft)
- C spanner (Muncher shafts)
- Sockets from 13mm to 55mm

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

10 Discreen Dismantling

For drawing reference descriptions, please see the sectional drawings in Appendix A.

Discam Back

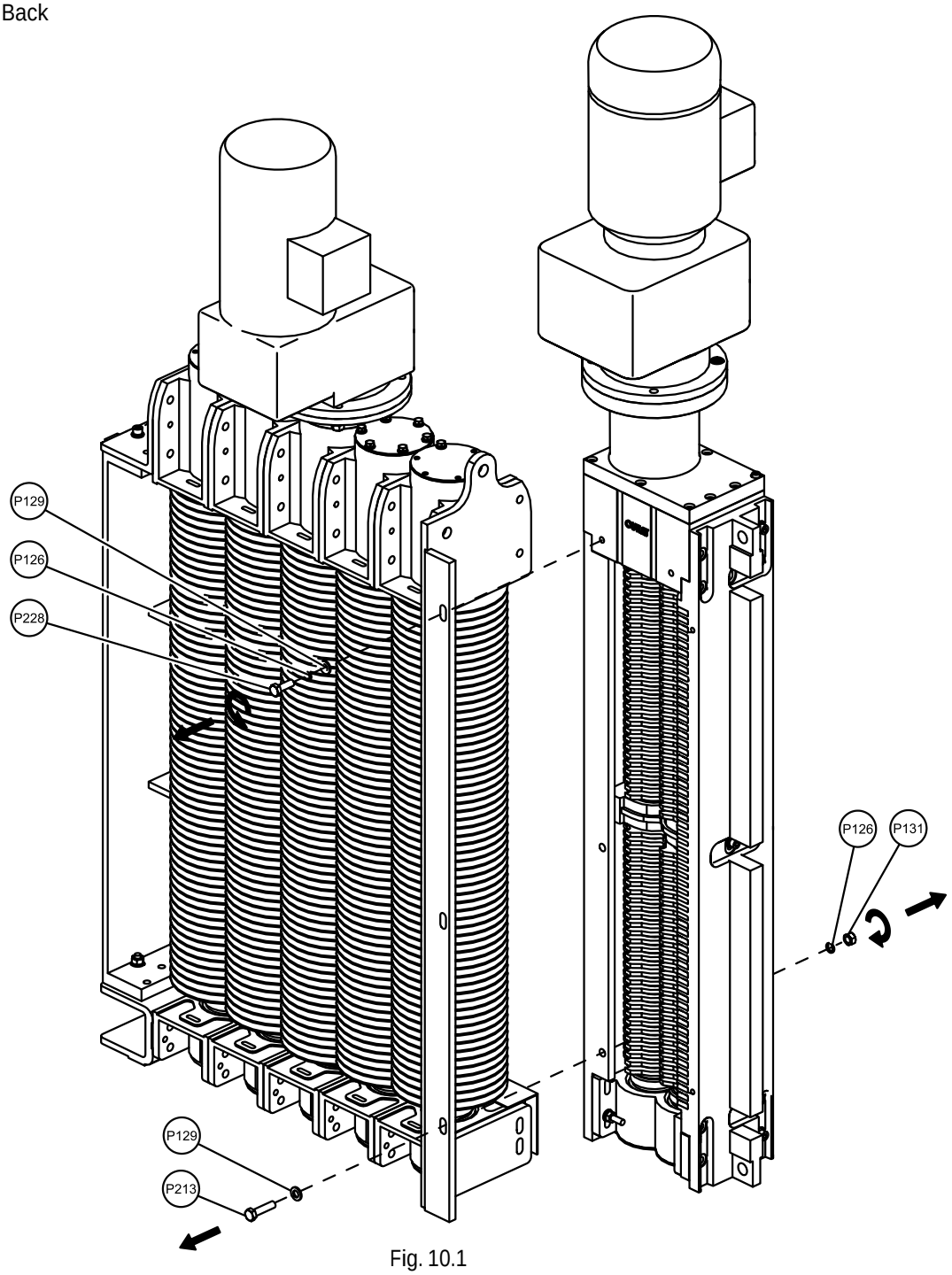


Fig. 10.1

NOTES:

- Drain oil from top housings using drain ports

STEPS:

- Separate top and bottom housings by unscrewing hexagon nuts (P131) and removing spring washer (P126), plain washer (P129) & hexagon head bolt (P213)

Discam Front

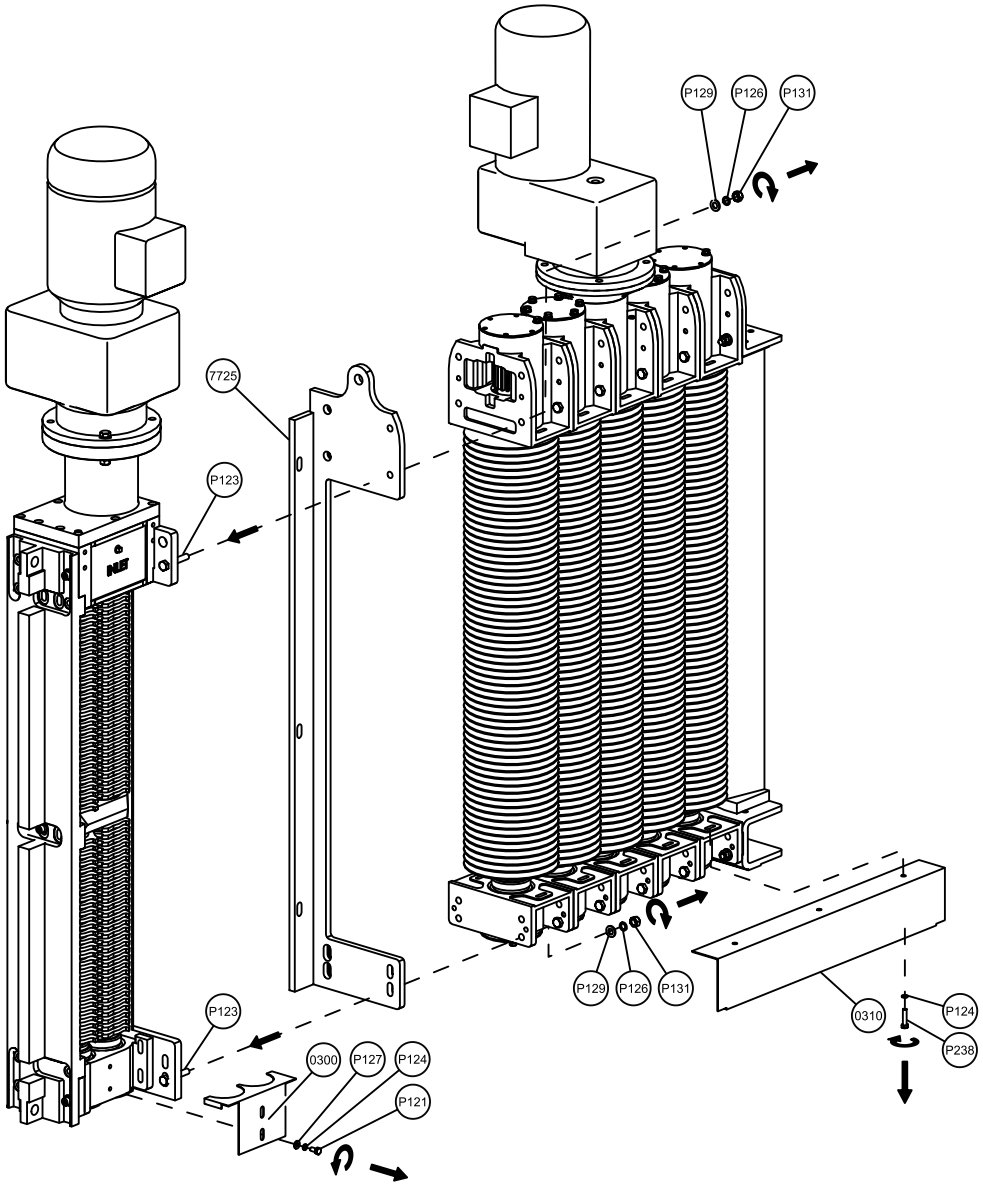


Fig. 10.2

NOTES:

- Any remaining oil that has not been drained will spill out during this dismantling stage.

STEPS:

- Unscrew hexagon head bolts (P131) and remove spring washers (P126), plain washers (P129) and hexagon nuts (P123)
- Remove the bottom baffle plate (0310) from the Discreen bottom housings by unscrewing hexagon head bolts (P238) and removing spring washers (P124)
- Remove the bottom baffle plate (0300) from the bottom housing of the Muncher by unscrewing hexagon head bolts (P121) and removing spring washers (P124) and plain washers (P127)

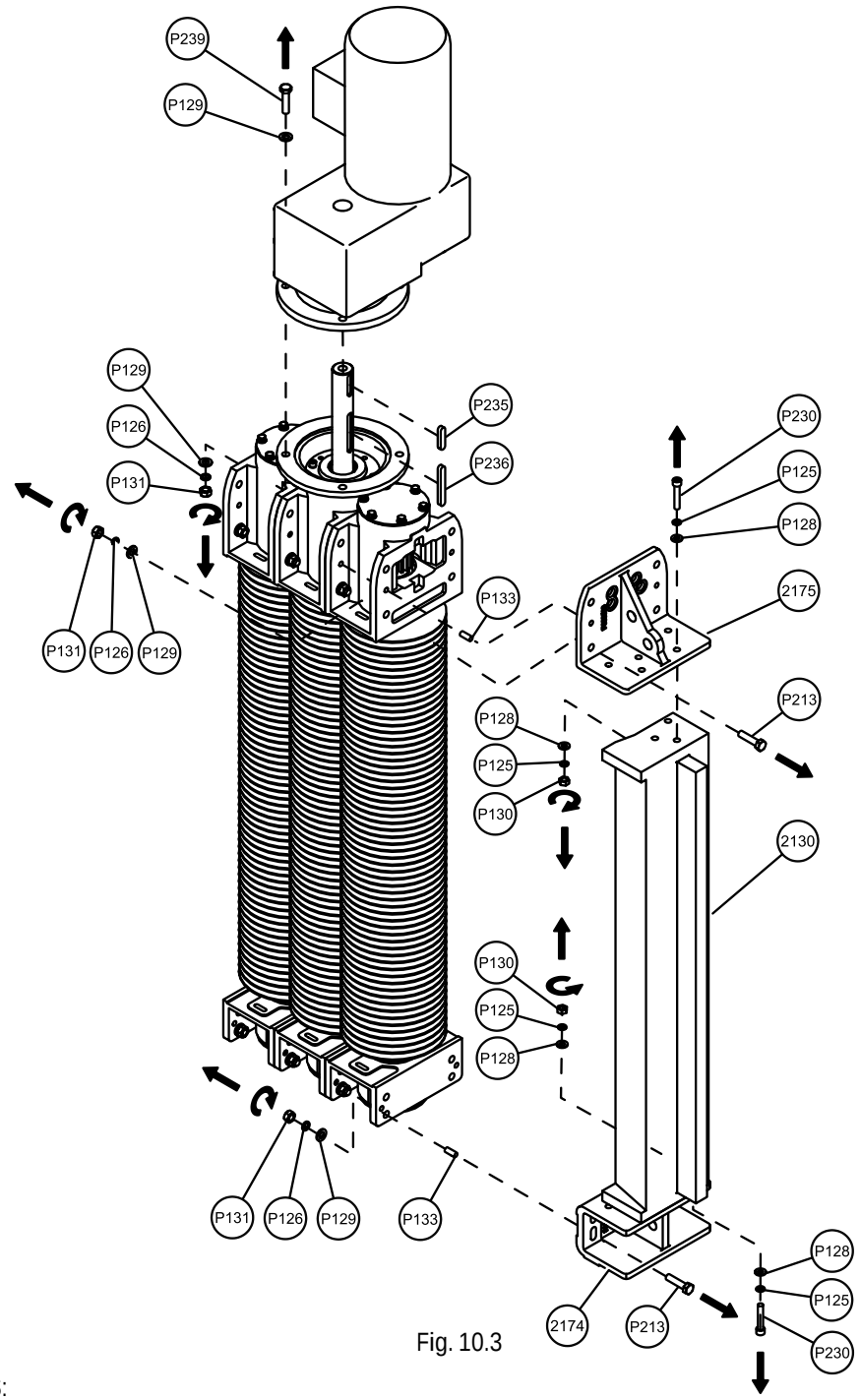


Fig. 10.3

STEPS:

- Remove the drive by unscrewing nut (P131) and removing plain washers (P129), spring washers (P126) and bolt (P239)
- Remove keys (P235) and (P236) from keyways in drive shaft
- Remove the mounting brackets (2174) & (2175) from the bearing housings by unscrewing hexagon nuts (P131) and removing spring washers (P126), plain washers (P129) and hexagon head bolts (P213). Remove dowel pins (P133).
- Remove the side rail (2130) from the top (2175) and bottom (2174) mounting brackets by unscrewing hexagon nuts (P130) and removing spring washers (P125), plain washers (P128) and bolts (P230)

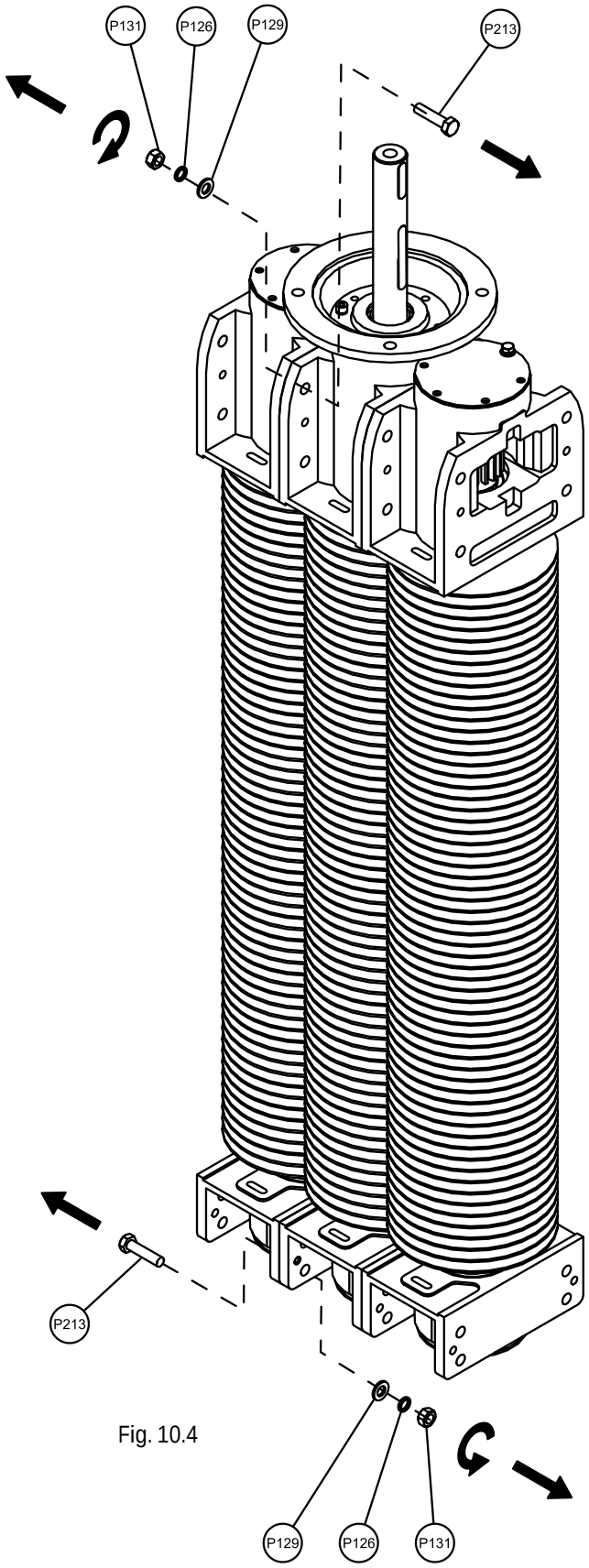


Fig. 10.4

STEPS:

- Separate top and bottom housings by unscrewing hexagon nuts (P131) and removing spring washer (P126), plain washer (P129) & hexagon head bolt (P213)

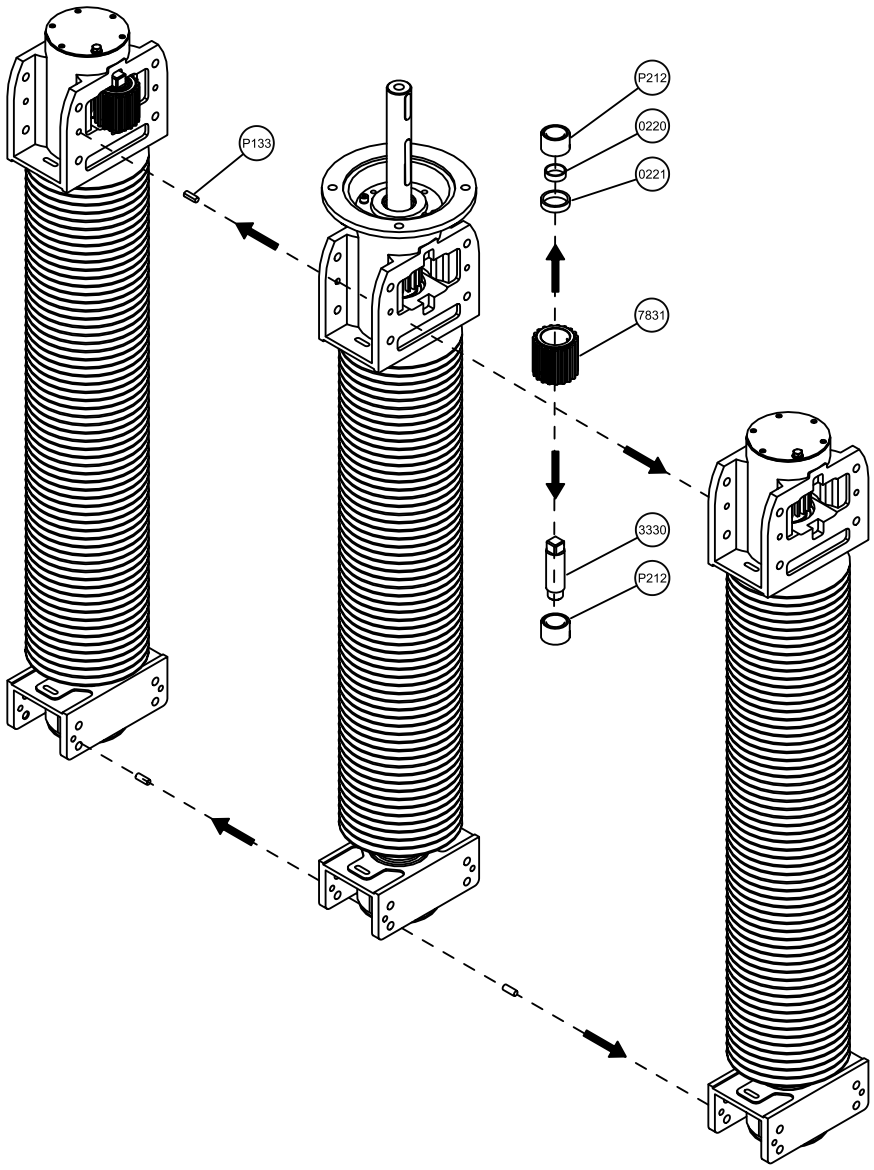


Fig. 10.5

STEPS:

- Separate shaft assemblies
- Remove idler gear parts: roller bearings (P212), bearing spacers (0220) & (0221), idler gear (7831) and idler shaft (3330)
- Remove dowel pins (P133)

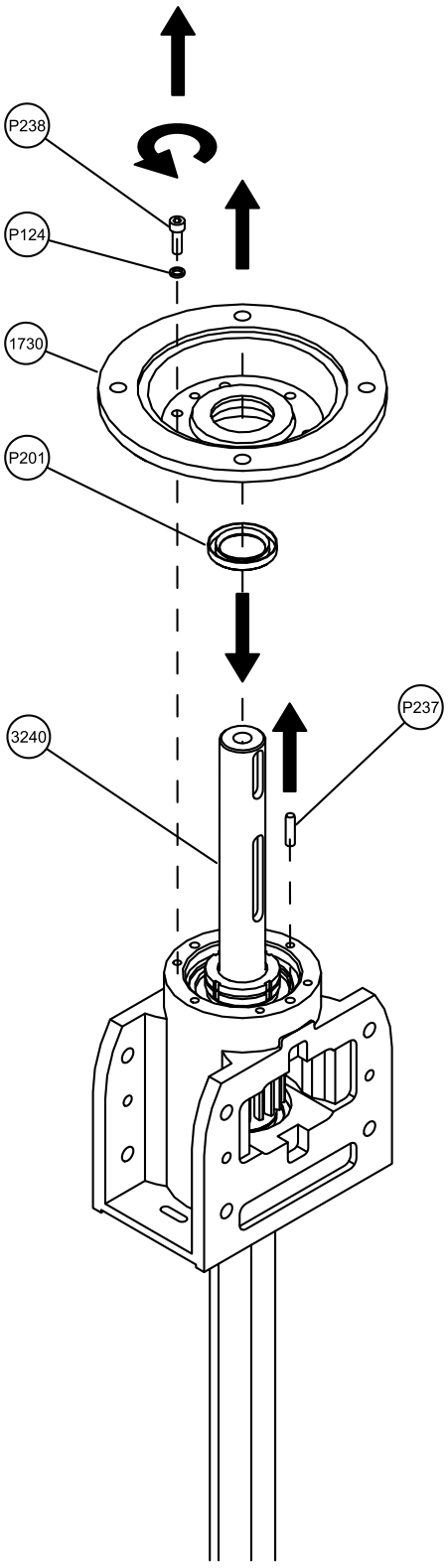
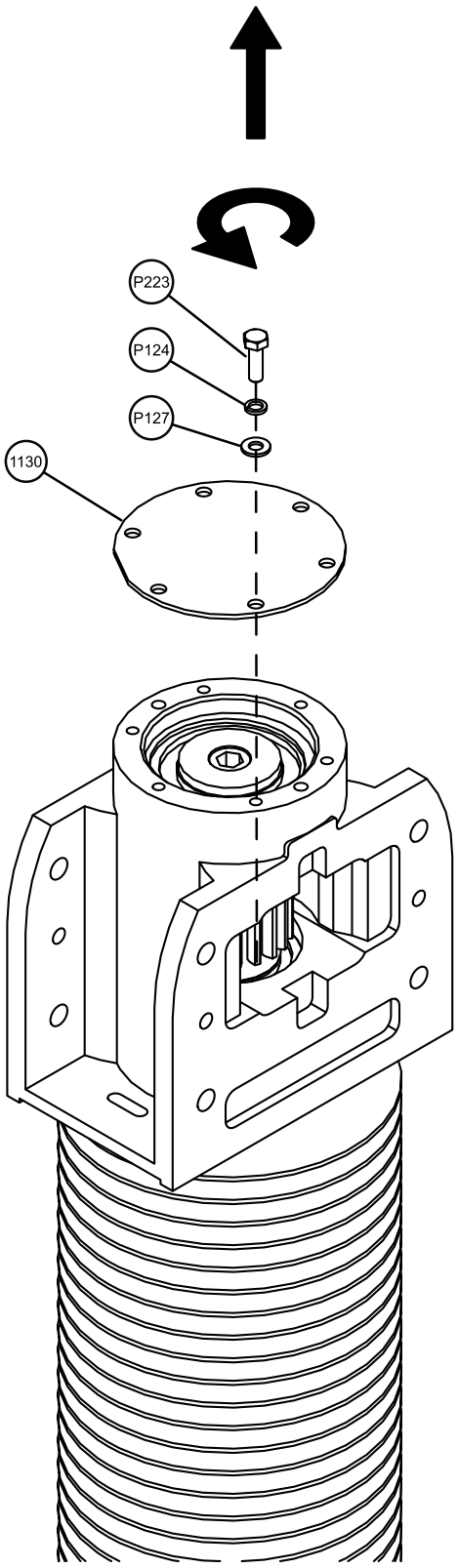


Fig. 10.6

STEPS:

- Remove adaptor stool (1730) from top housing by unscrewing socket cap screw (P238) and removing spring washer (P124)
- Remove lipseal (P201) from adaptor stool (1730)
- Remove dowel pins (P237) from top housing

Driven Shaft



STEPS:

- Remove top cover plate (1130) from the top housing by unscrewing hexagon head bolt (P223) and removing spring washer (P124) and plain washer (P127)

Fig. 10.7

Drive and Driven Shaft

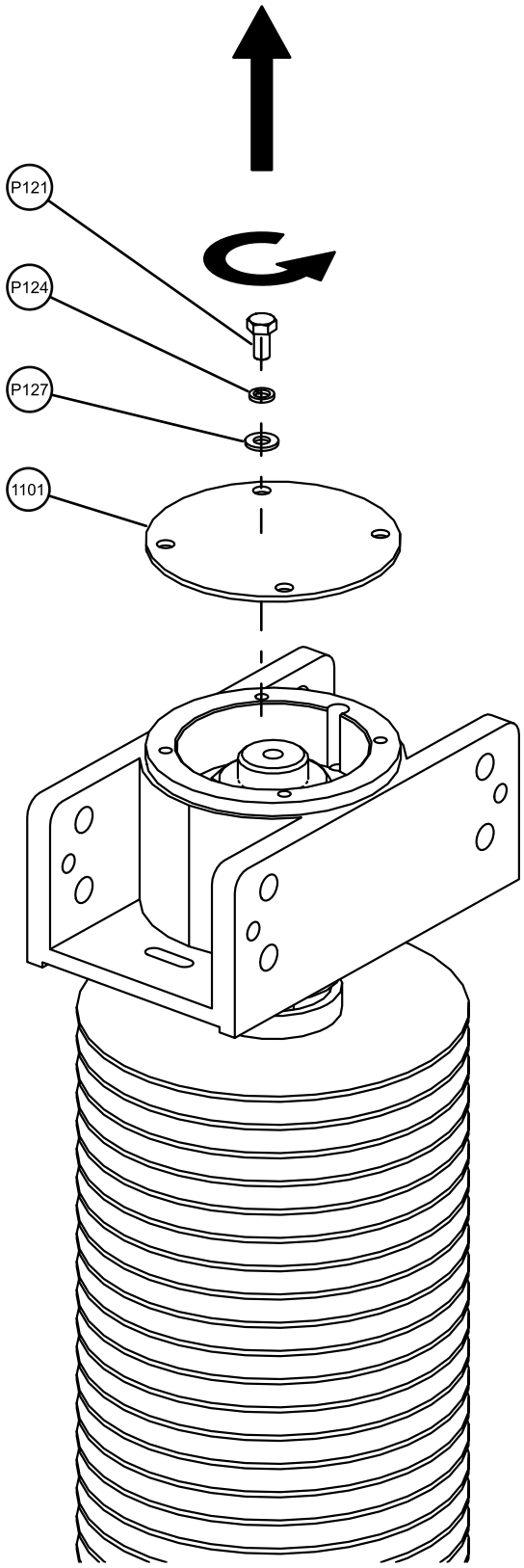
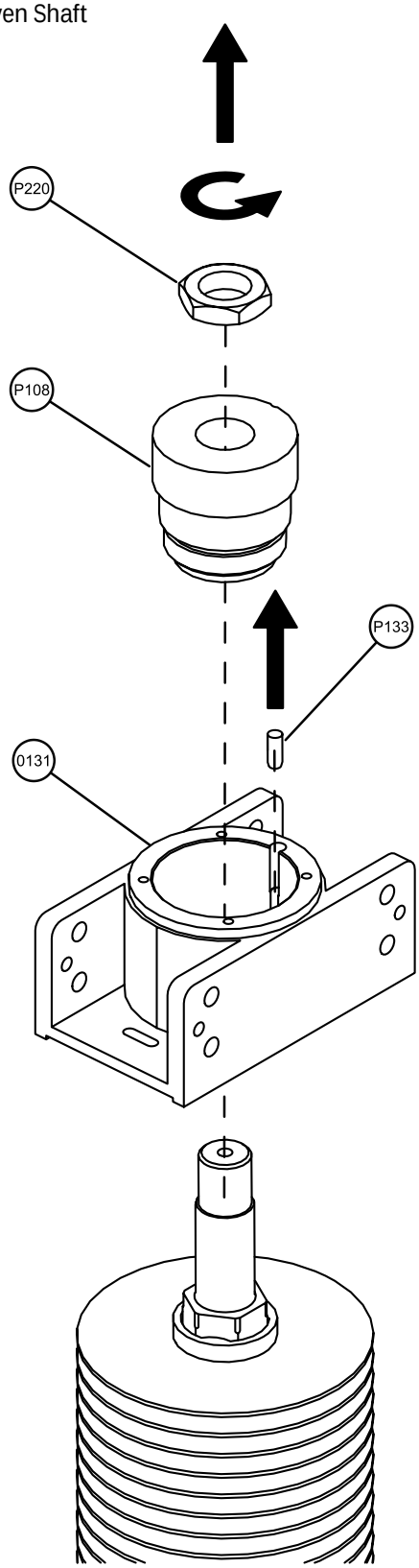


Fig. 10.8

STEPS:

- Remove bottom cover plate (1101) from the bottom housing by unscrewing hexagon head bolt (P121) and removing spring washer (P124) and plain washer (P127)

Drive and Driven Shaft

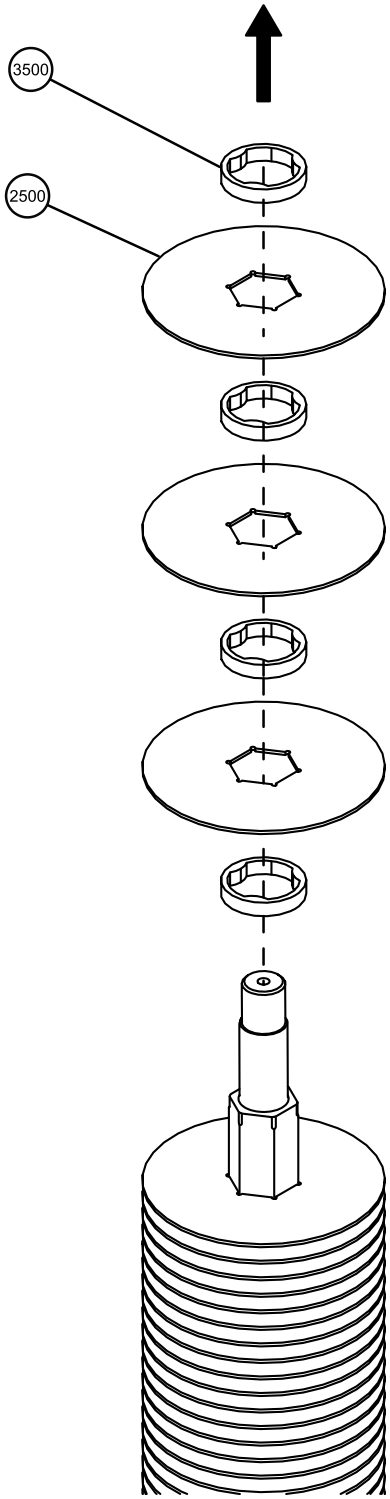


STEPS:

- Unscrew the nut (P220) from the shaft
- Remove bottom housing (0131) with mechanical seal (P108) and pin (P133) from the shaft
- Remove mechanical seal (P108) and pin (P133) from housing (0131)

Fig. 10.9

Drive and Driven Shaft



STEPS:

- Remove all discs (2500) and spacers (3500) from the drive and driven shafts

Fig. 10.10

Drive Shaft

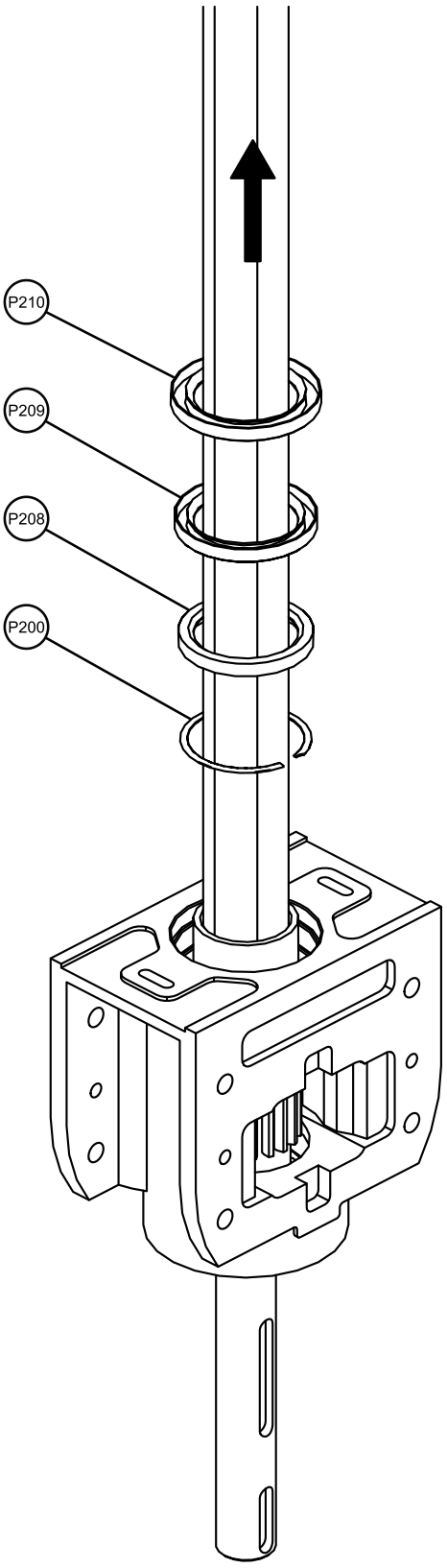


Fig. 10.11

STEPS:

- Remove lipseals (P208). (P209) & (P210) from the bores in the top housing
- Remove the snap ring (P200) from the internal groove in the top housing

Driven Shaft

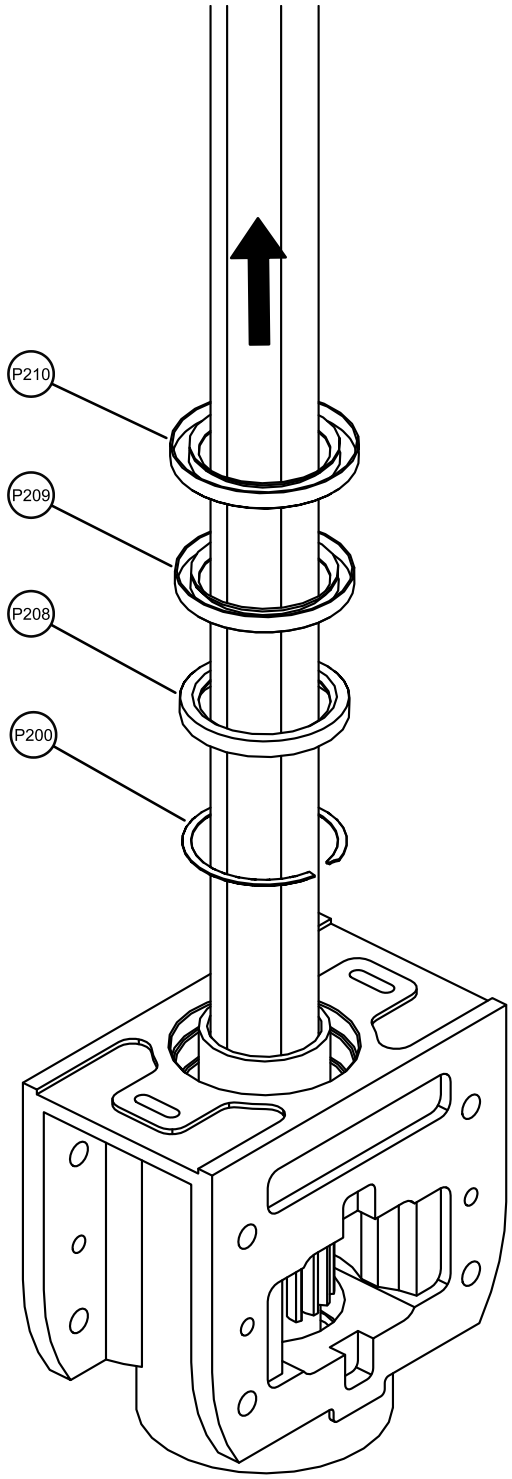
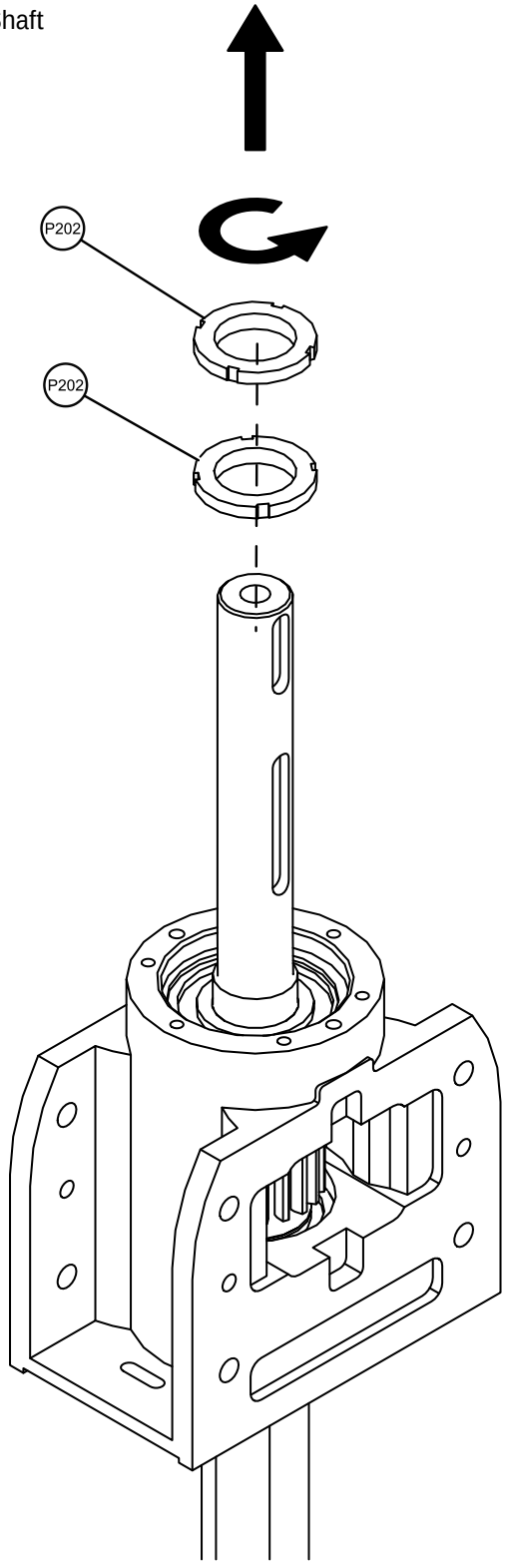


Fig. 10.12

STEPS:

- Remove lipseals (P208). (P209) & (P210) from the bores in the top housing
- Remove the snap ring (P200) from the internal groove in the top housing

Drive Shaft



NOTE:

- Tool D000 9750 can be used to remove nuts

STEPS:

- Unscrew locknuts (P202) and remove from the shaft

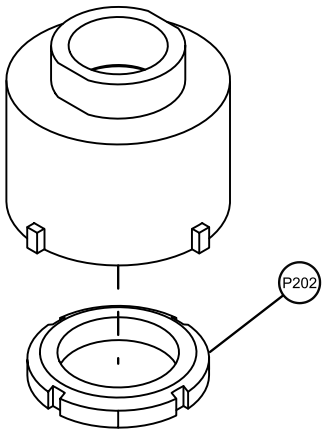


Fig. 10.13

Fig. 10.14

Driven Shaft

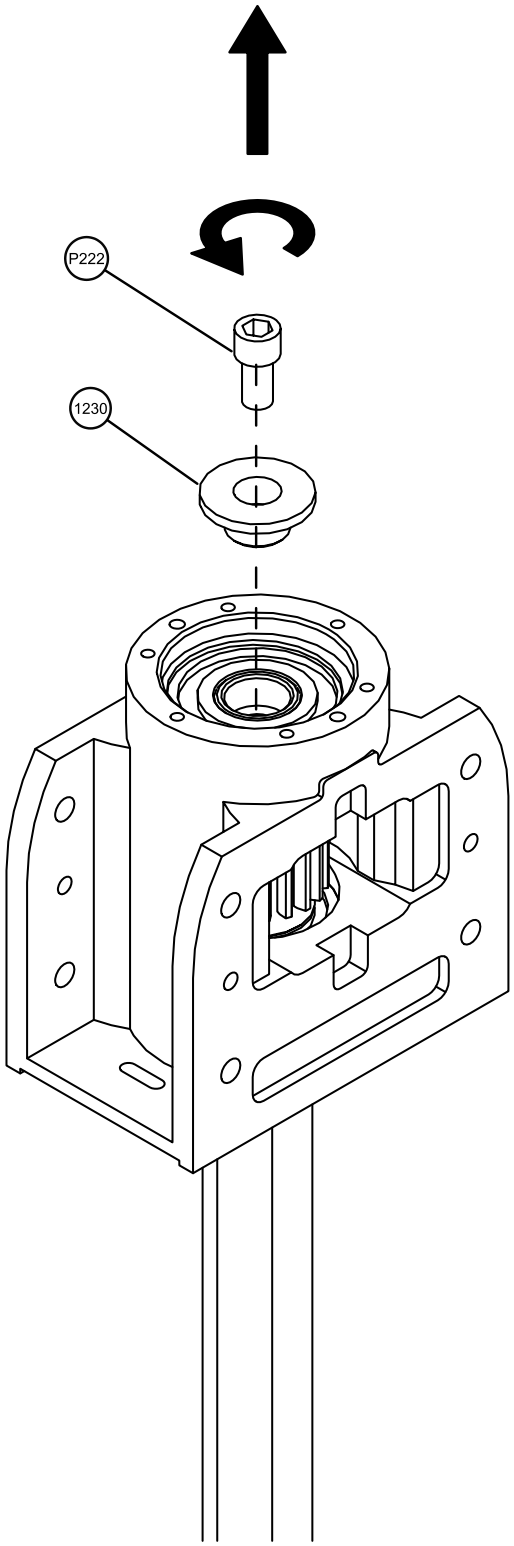


Fig. 10.15

STEPS:

- Unscrew socket cap screw (P222) and remove along with shaft end cap (1230)

Drive Shaft

STEPS:

- Remove the drive shaft assembly from the housing assembly

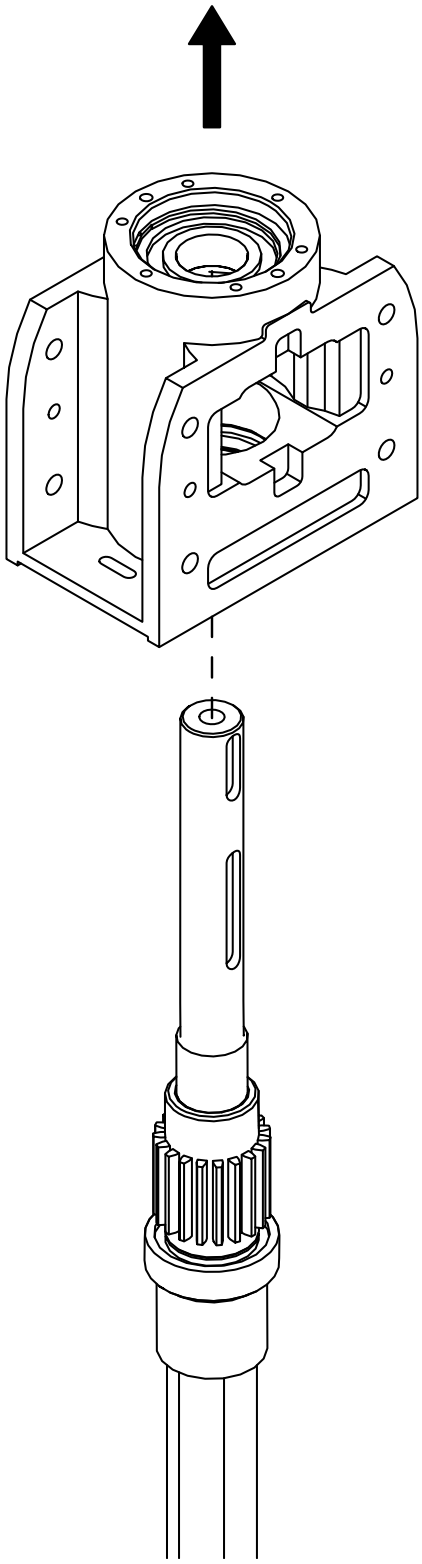


Fig. 10.16

Driven Shaft

STEPS:

- Remove the driven shaft assembly from the housing assembly

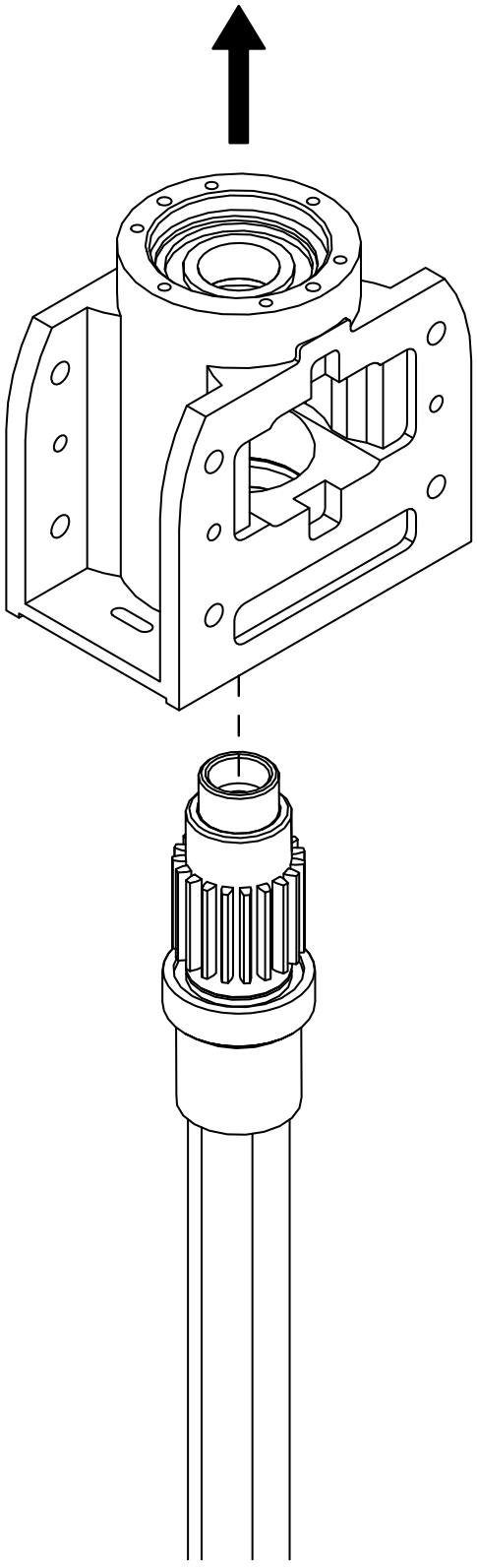


Fig. 10.17

Drive Shaft

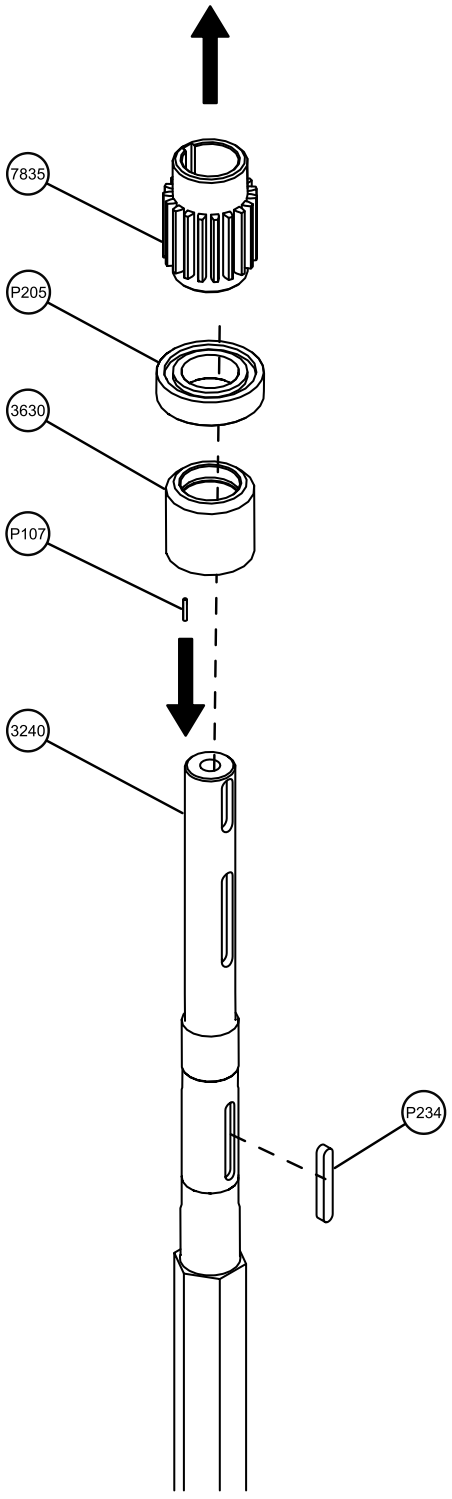


Fig. 10.18

STEPS:

- Remove the gear (7835) from the shaft (3240)
- Remove the key (P234) from the keyway on the shaft
- Remove the bearing (P205) from the shaft
- Remove the top stack collar (3630) from the shaft and remove the pin (P107) from the hole in the bottom of the collar

Driven Shaft

STEPS:

- Remove the gear (7835) from the shaft (3245)
- Remove the key (P234) from the keyway on the shaft
- Remove the bearing (P205) from the shaft
- Remove the top stack collar (3630) from the shaft and remove the pin (P107) from the hole in the bottom of the collar
- Fig. 10.20 Remove the O-rings (P207) from the top stack collar (3630)

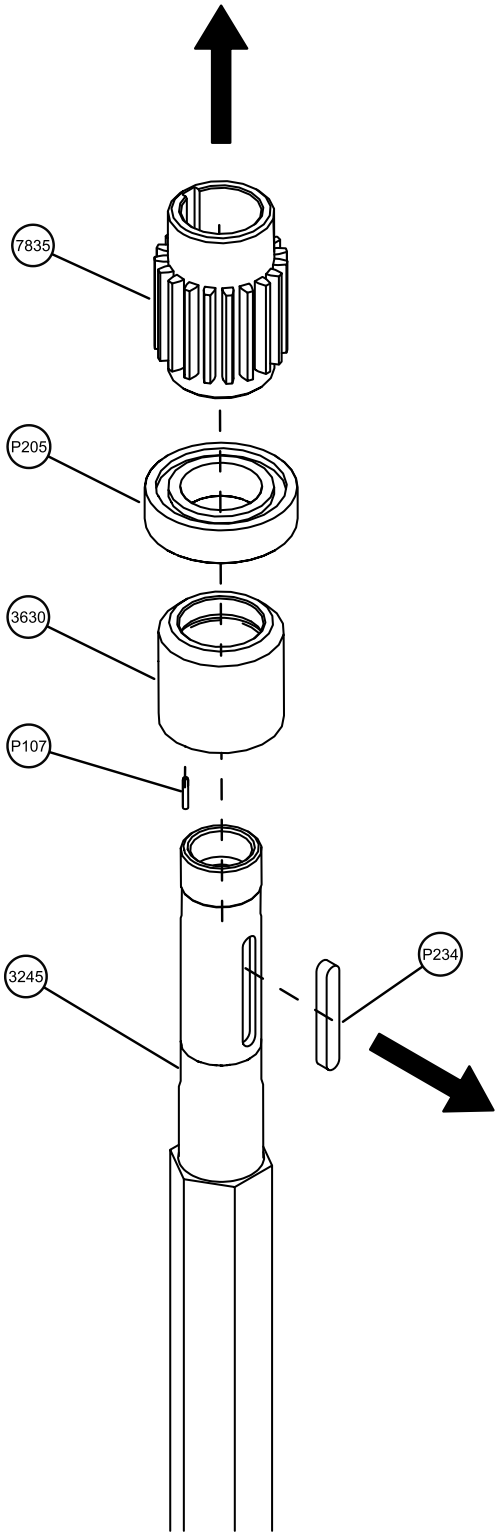


Fig. 10.19

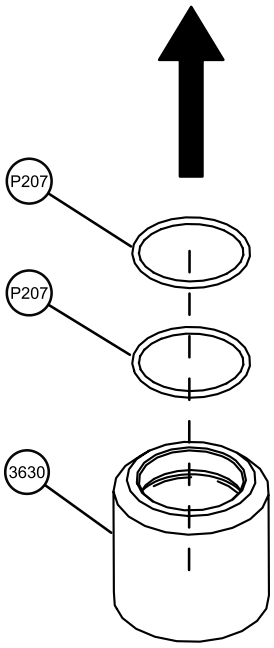


Fig. 10.20

STEPS:

- Remove the circlip (P206) from the top housing and remove the bearing (P204).

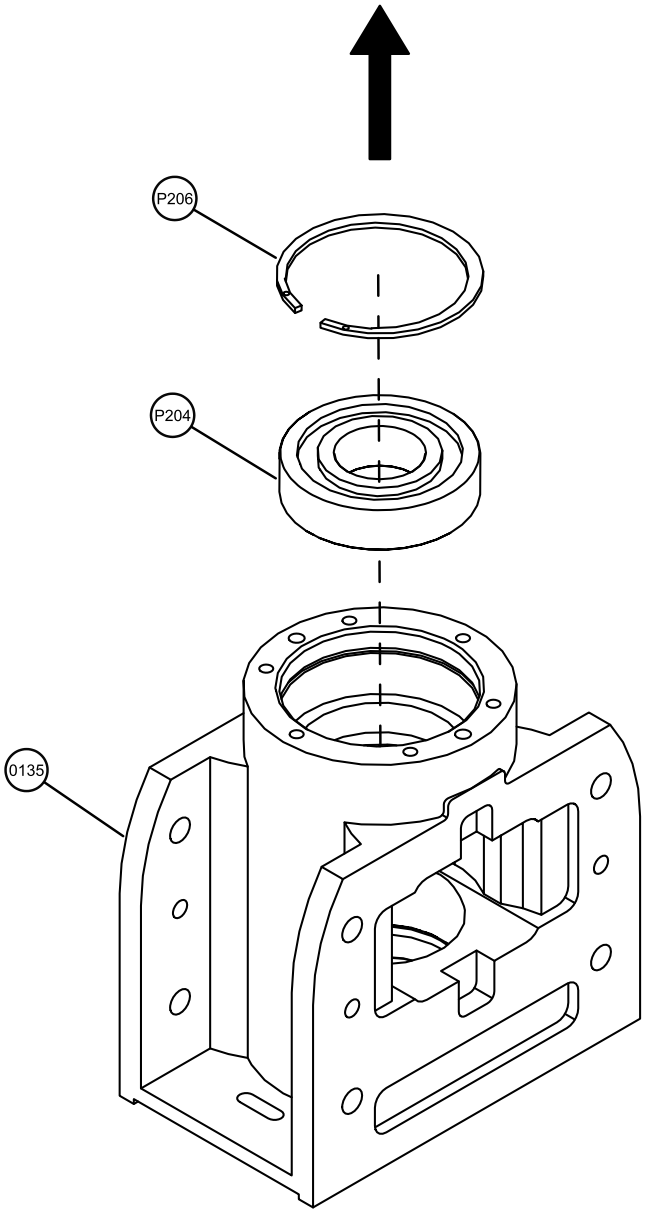


Fig. 10.21

11 Muncher Dismantling

For drawing reference descriptions, please see the sectional drawings in Appendix A.

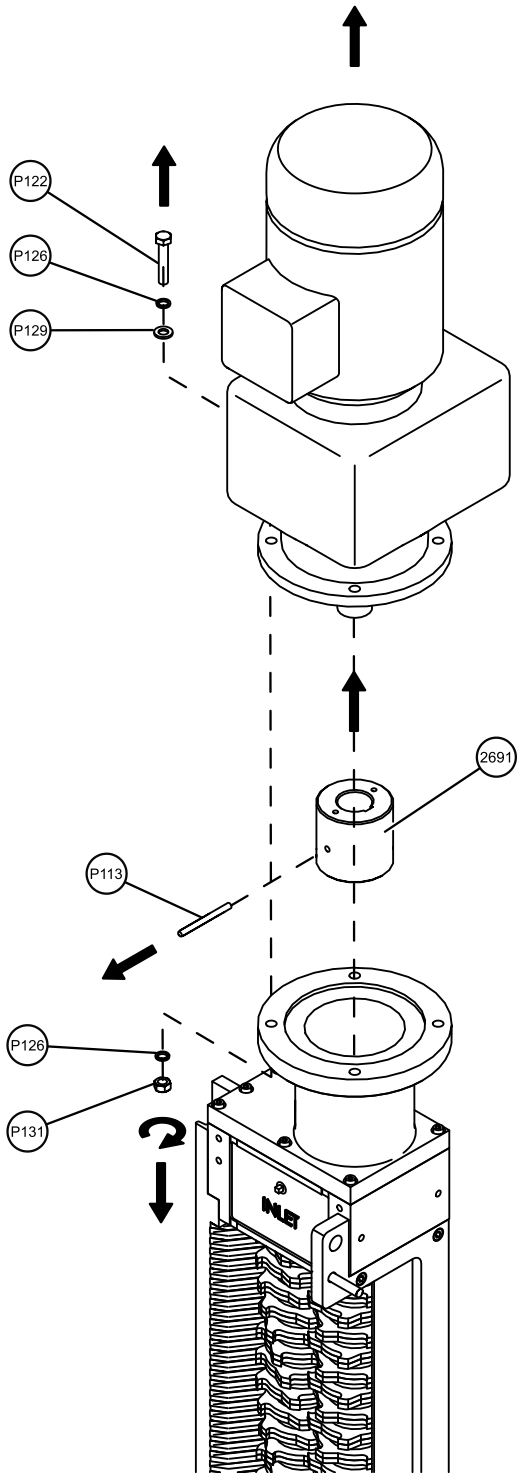


Fig. 11.1

STEPS:

- Unscrew hexagon nuts (P131) and remove spring washers (P126), plain washers (P129) and hexagon head bolt (P122)
- Remove the drive from the adaptor stool
- Remove the coupling (2691) and roll pin (P113)

1m and 1.5m Only

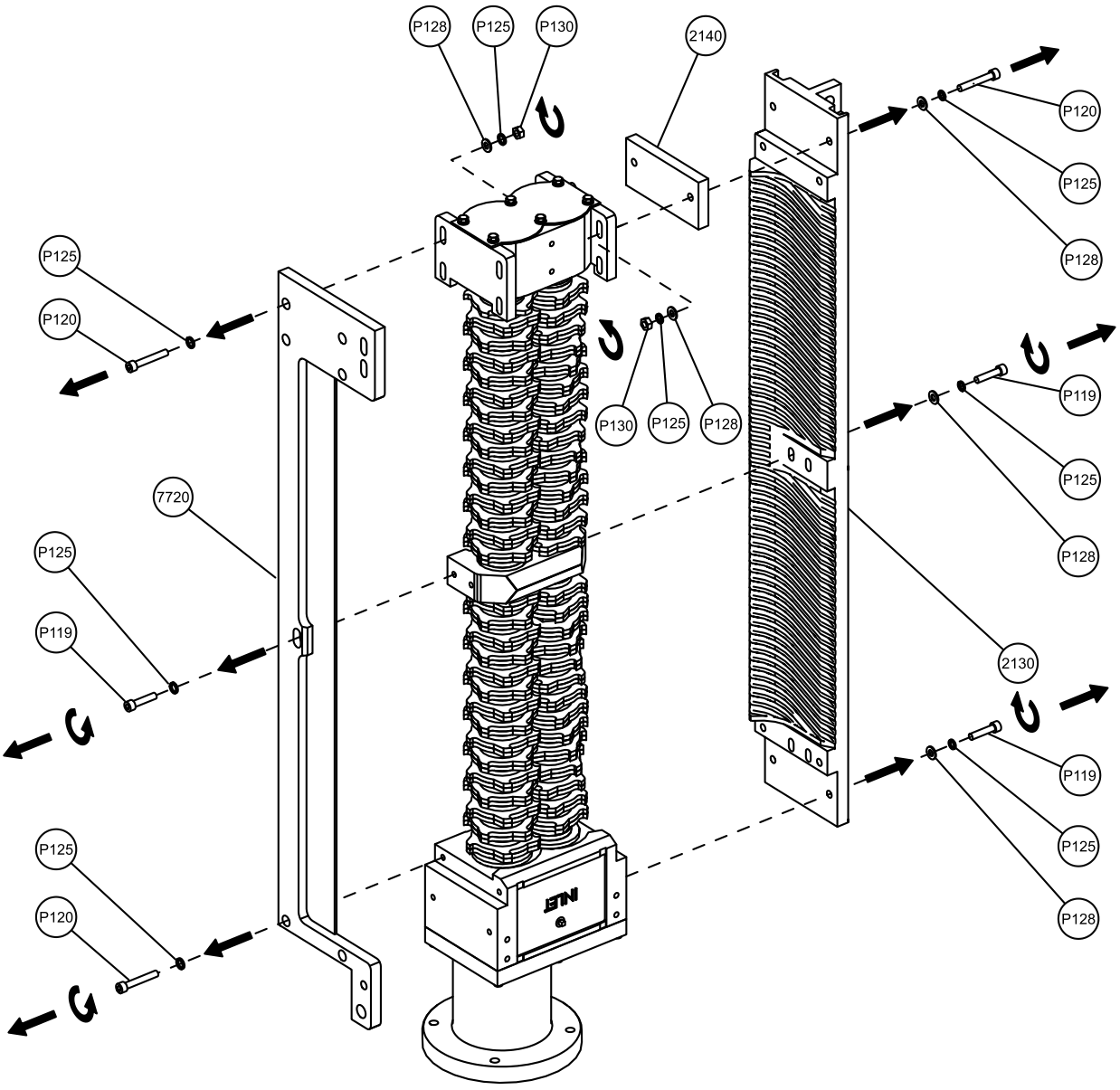


Fig. 11.2

STEPS:

- Unscrew all cap head bolts (P119) & (P120) and nuts (P130) and remove along with all spring washers (P125) and plain washers (P128)
- Remove side rails (7720) & (2130)
- Remove packer plate (2140)

2m Only

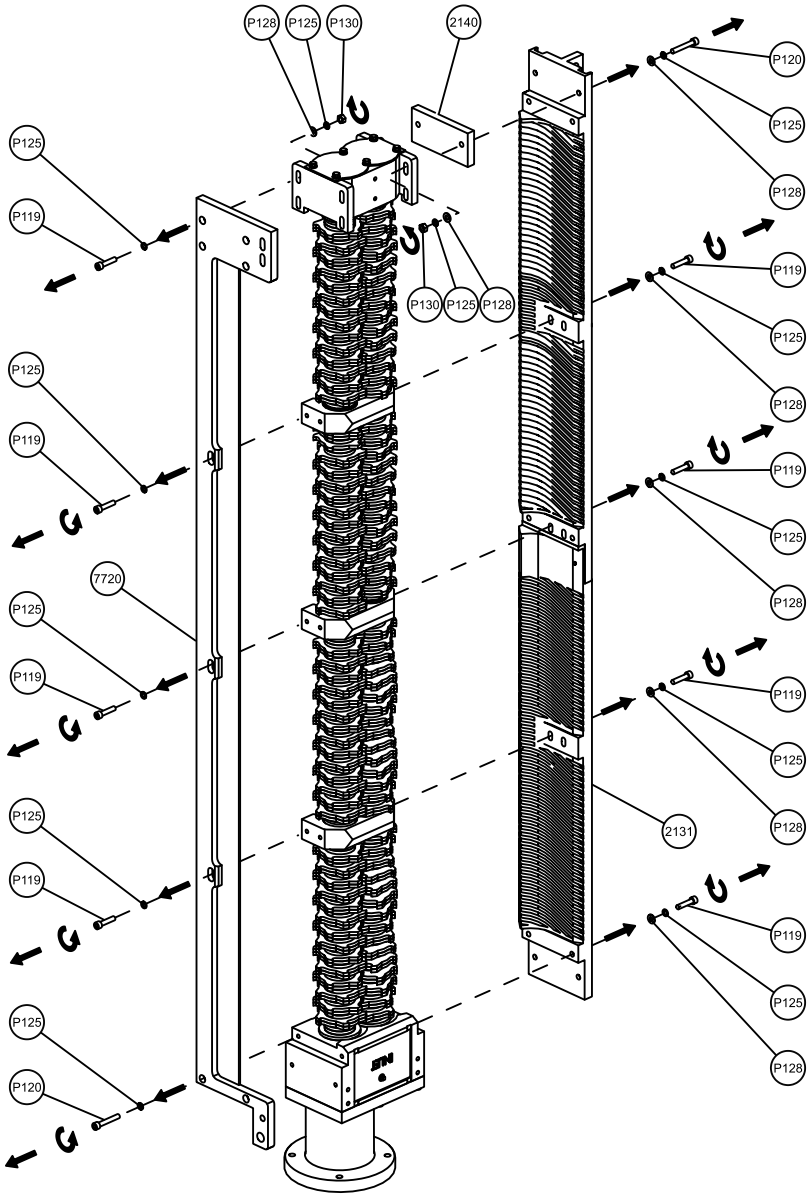


Fig. 11.3

STEPS:

- Unscrew all cap head bolts (P119) & (P120) and nuts (P130) and remove along with all spring washers (P125) and plain washers (P128)
- Remove side rails (7720), (2130) & (2131)
- Remove packer plate (2140)

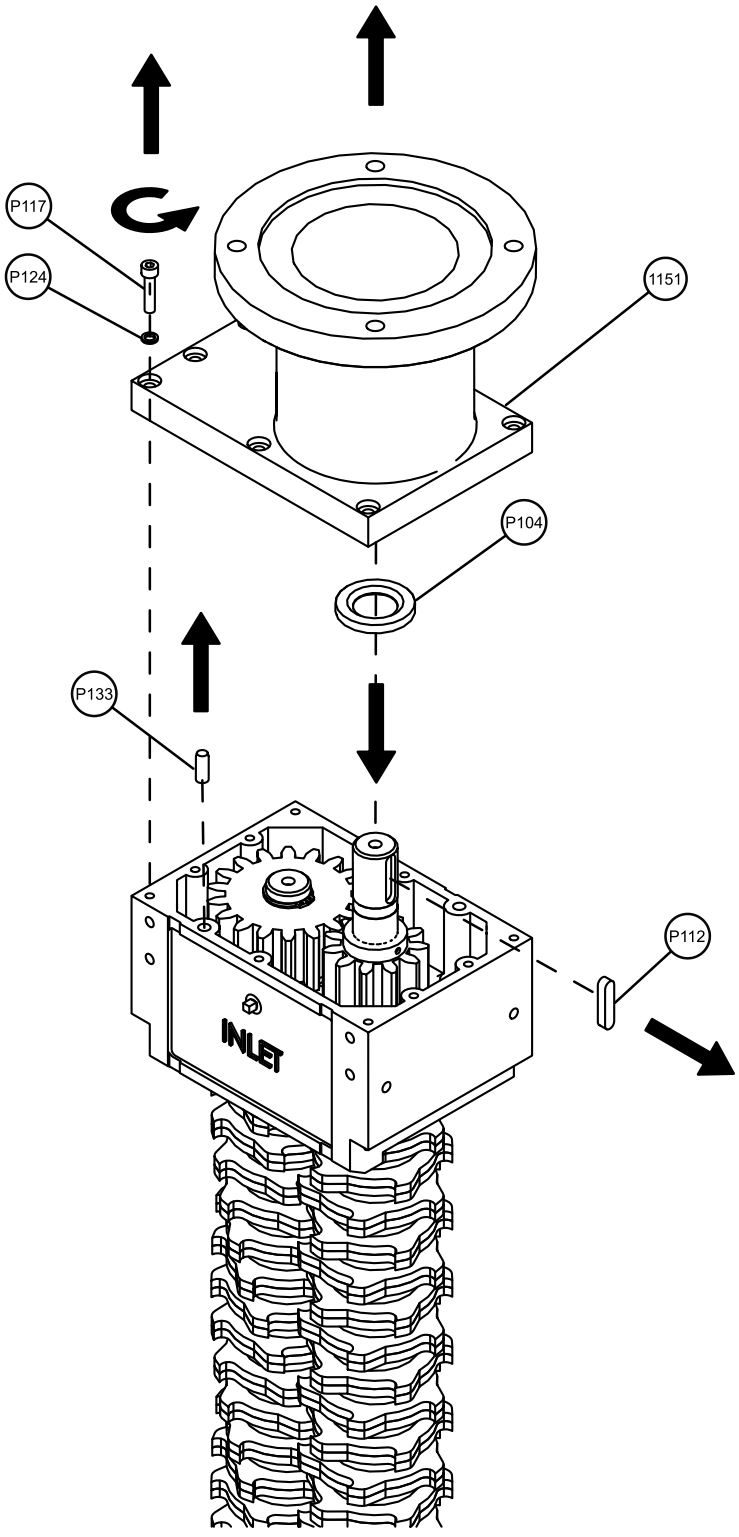


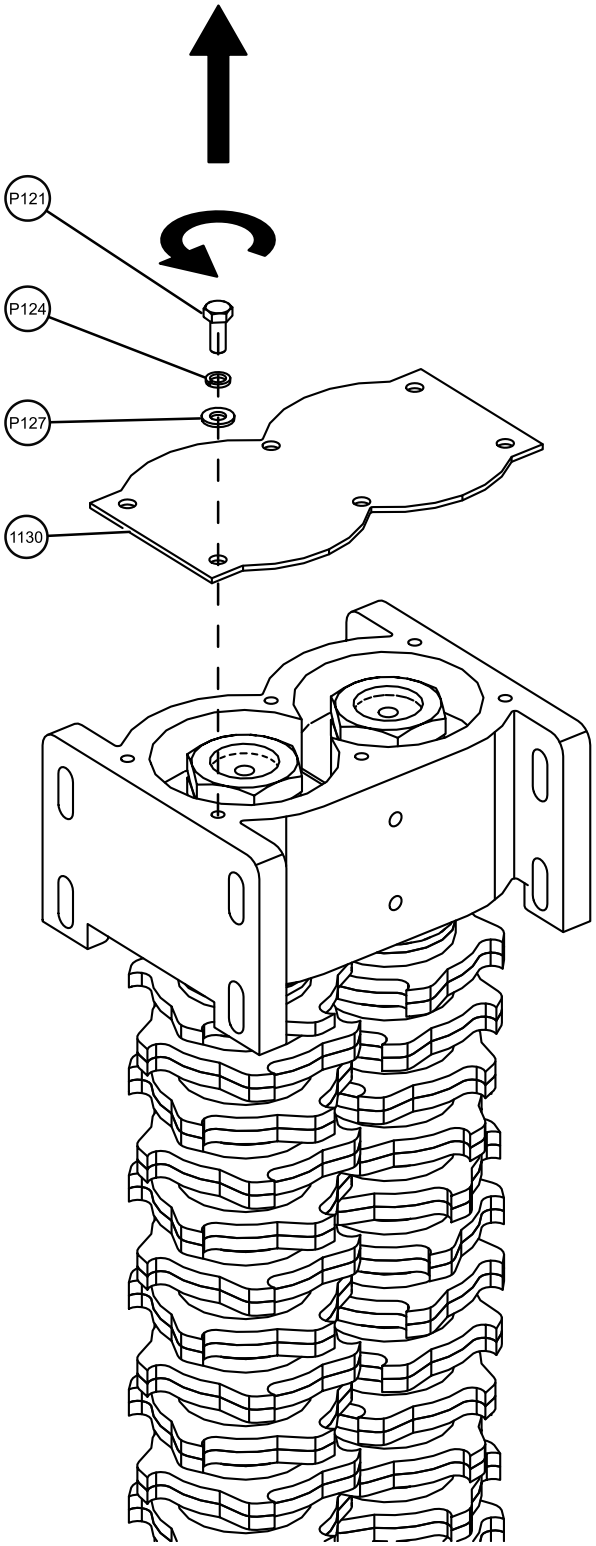
Fig. 11.4

NOTES:

- Cavity will be filled with grease

STEPS:

- Unscrew cap head bolts (P117) and remove with spring washers (P124).
- Remove adaptor stool (1151).
- Remove lipseal (P104) from adaptor stool.
- Extract dowel pin (P133) from top housing and remove key (P112) from keyway in shaft.



NOTE:

- Cavity will be filled with grease

STEPS:

- Unscrew hexagon head bolt (P121) and remove spring washers (P124) and plain washers (P127).
- Remove bottom cover plate (1130).

Fig. 11.5

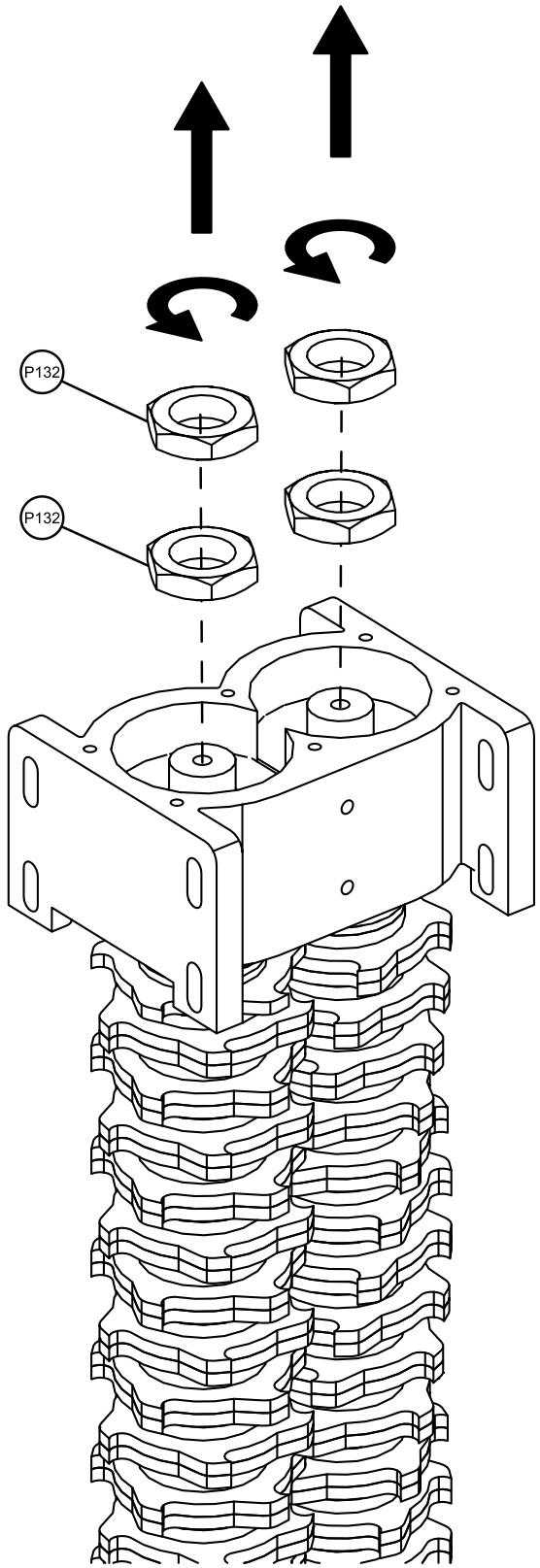


Fig. 11.6

NOTES:

- Use a wedge between gears to prevent shafts turning while unscrewing nuts

STEPS:

- Unscrew and remove hexagon nuts (P132)

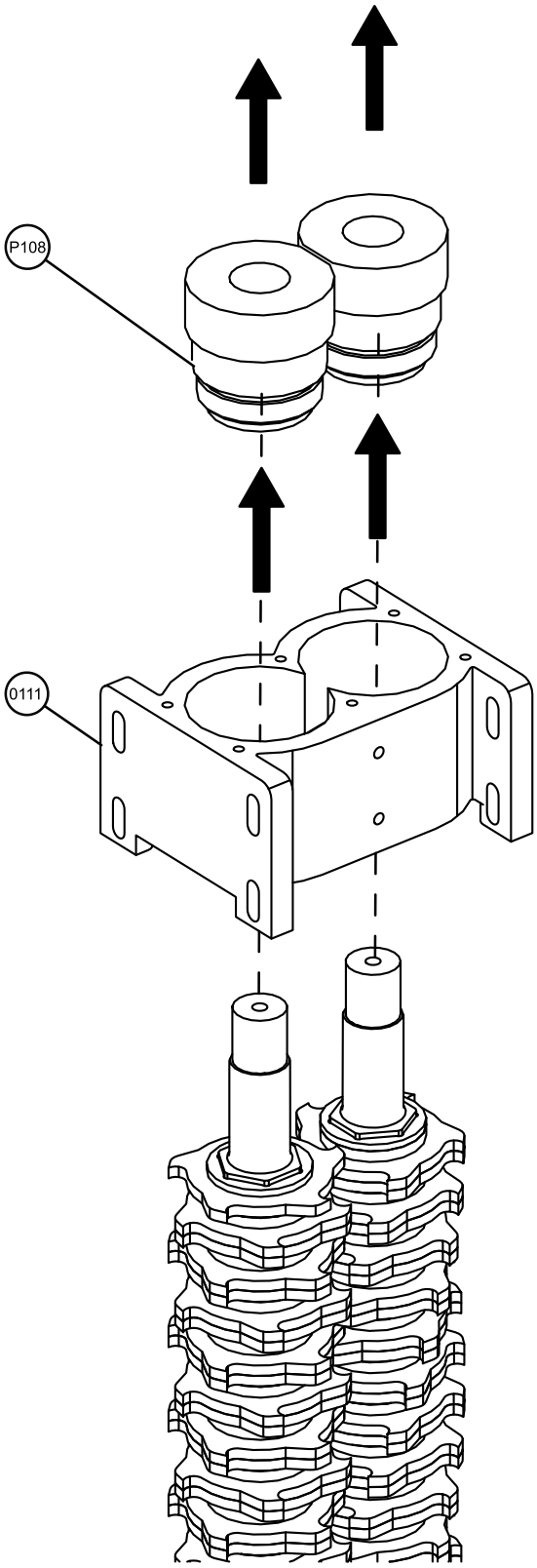


Fig. 11.7

STEPS:

- Remove the bottom bearing housing (0111) with the mechanical seals (P108).
- Remove the mechanical seals from the bearing housing.

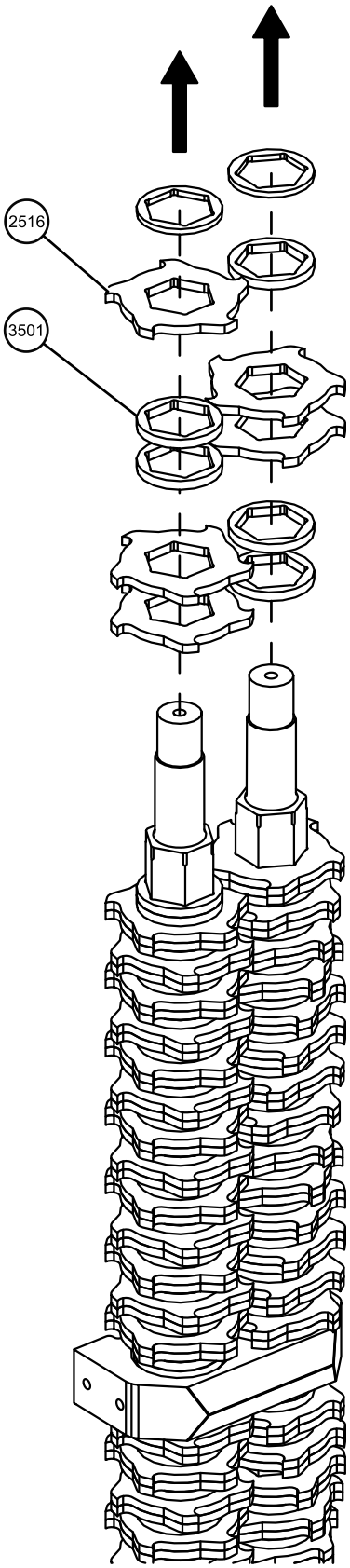
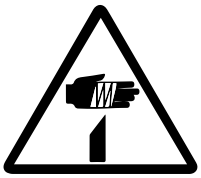


Fig. 11.8

CAUTION:



NOTES:

If 16mm cutters are fitted, only one cutter will be stacked between spacers.

STEPS:

- Remove the cutters (2516) and spacers (3501) from the shafts.

1m and 1.5m Only

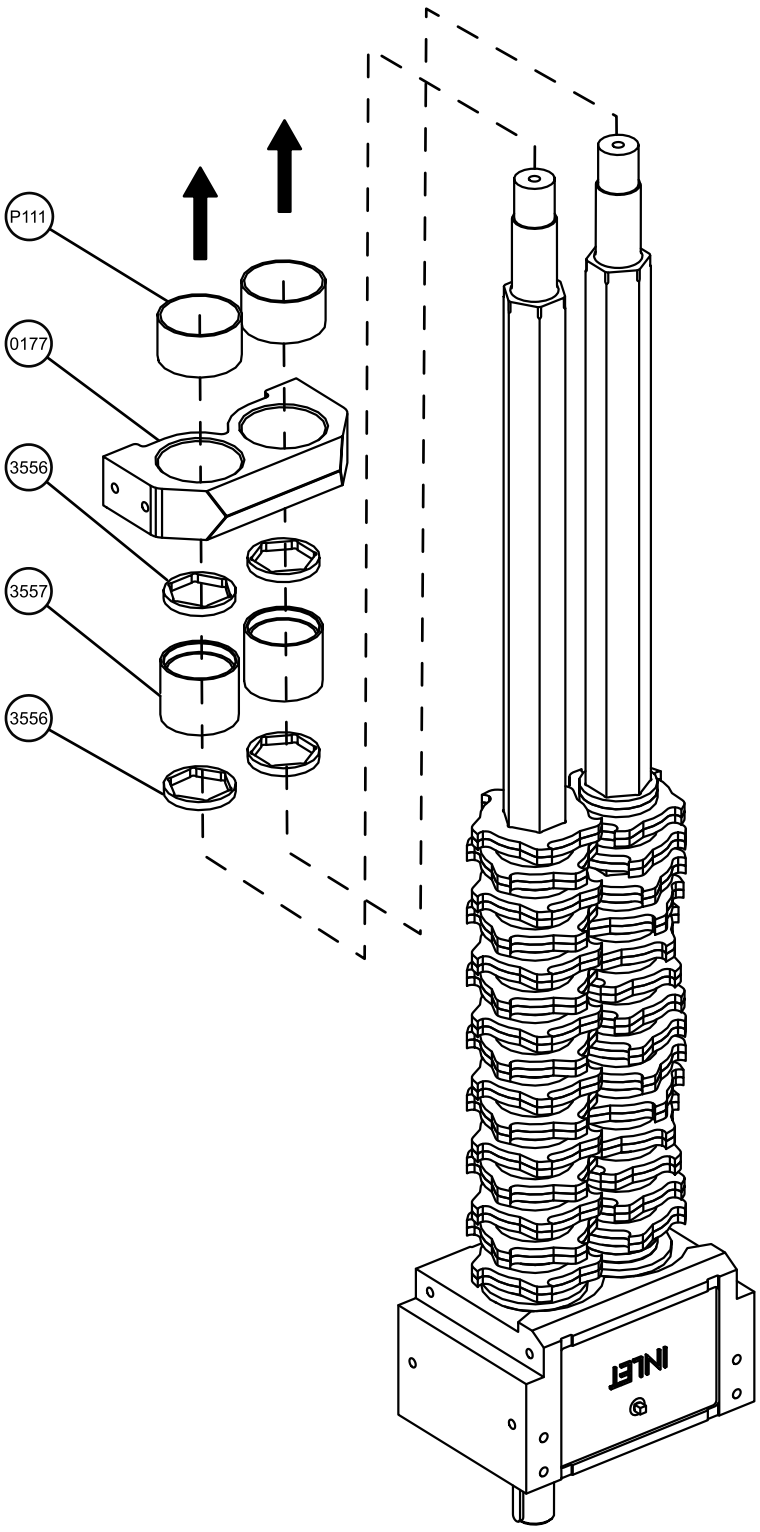


Fig. 11.9

STEPS:

- Remove the mid bearing housing (0177) from the shafts.
- Remove the support bushes (P111) and bearing sleeves (3557), then remove the mid bearing spacers (3556) from each end of the bearing sleeve.

1m and 1.5m Only

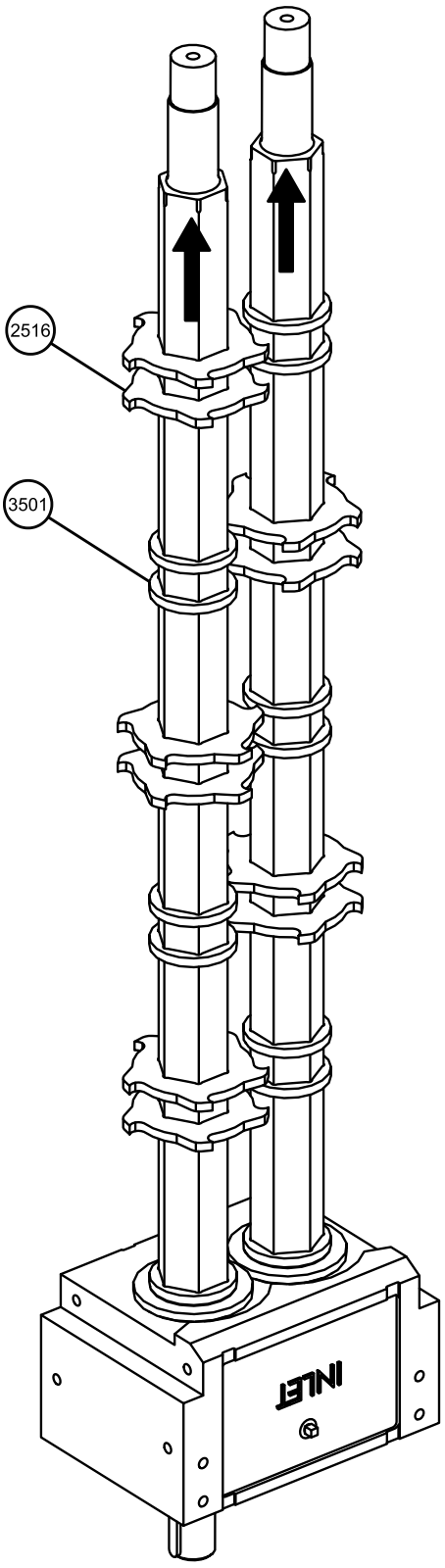
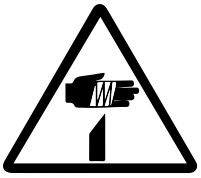


Fig. 11.10

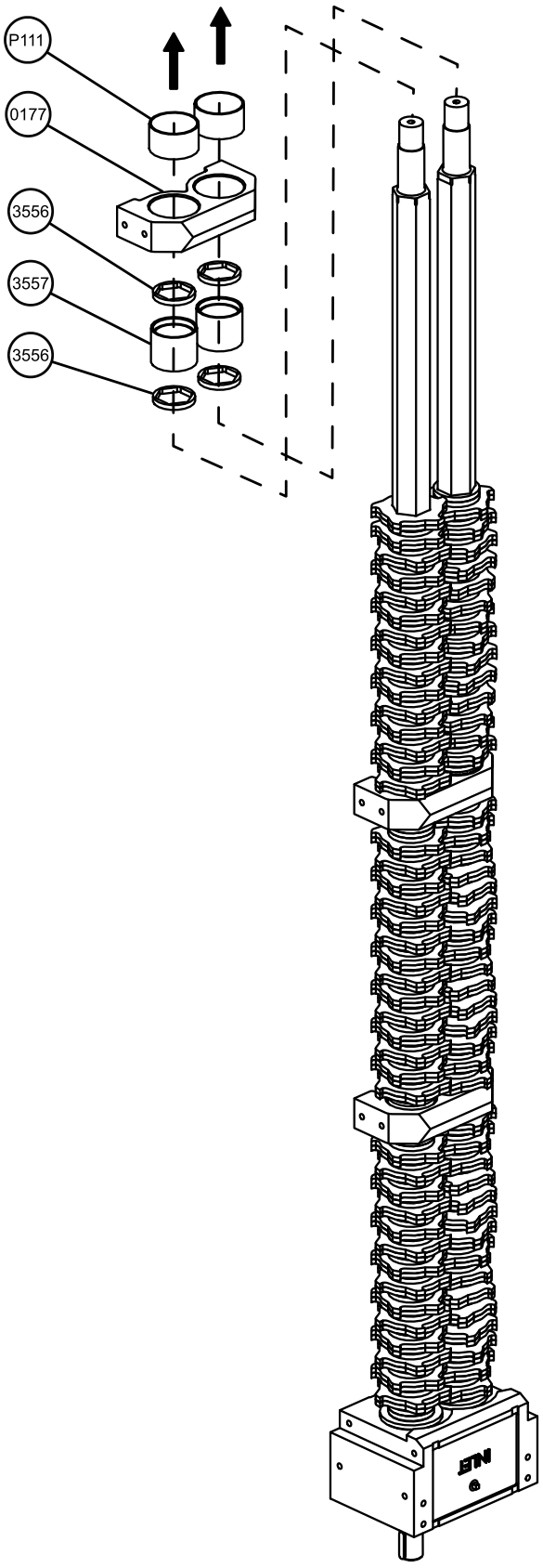
CAUTION:



STEPS:

- Remove the remaining cutters (2516) and spacers (3501) from the shafts.

2m Only

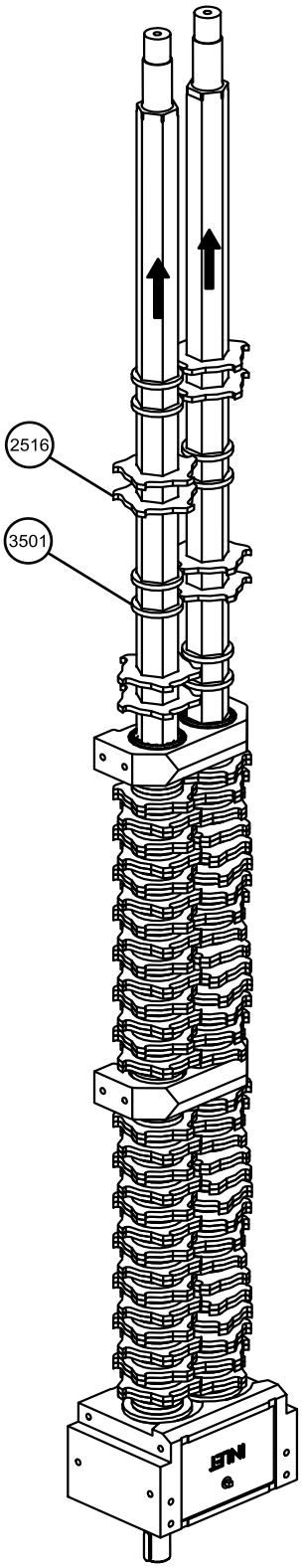


STEPS:

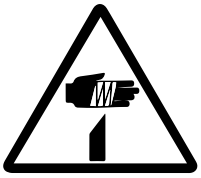
- Remove the first mid bearing housing (0177) from the shafts.
- Remove the support bushes (P111) and bearing sleeve (3557) then remove the mid bearing spacers (3556) from each end of the bearing sleeve.

Fig. 11.11

2m Only



NOTE:

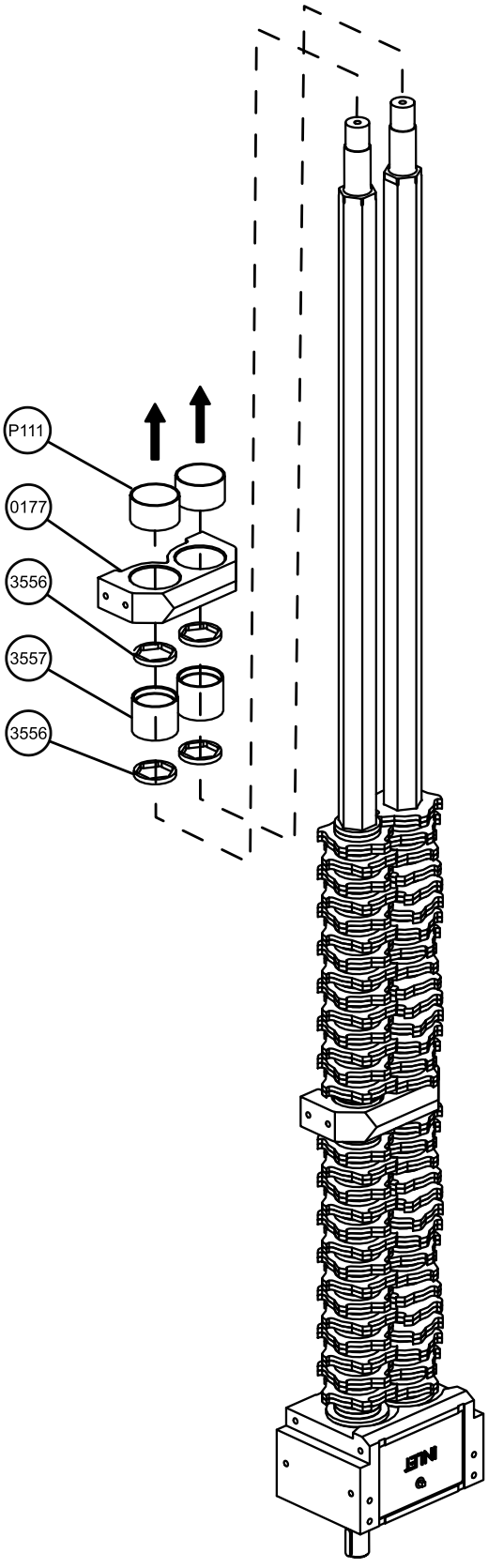


STEPS:

- Remove the next stack of cutters (2516) and spacers (3501) from the shafts.

Fig. 11.12

2m Only



STEPS:

- Remove the next mid bearing housing (0177) from the shafts.
- Remove the support bushes (P111) and bearing sleeve (3557) then remove the mid bearing spacers (3556) from each end of the bearing sleeve.

Fig. 11.13

2m Only

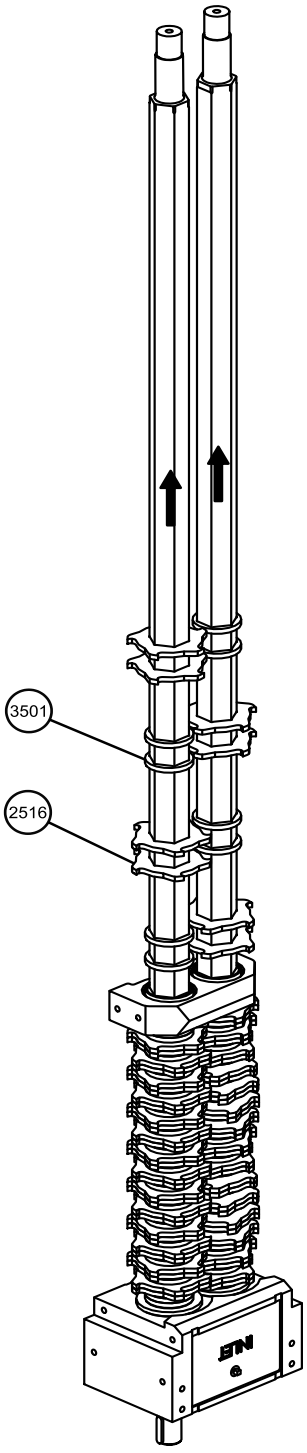
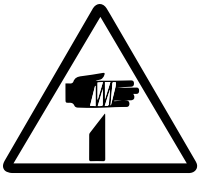


Fig. 11.14

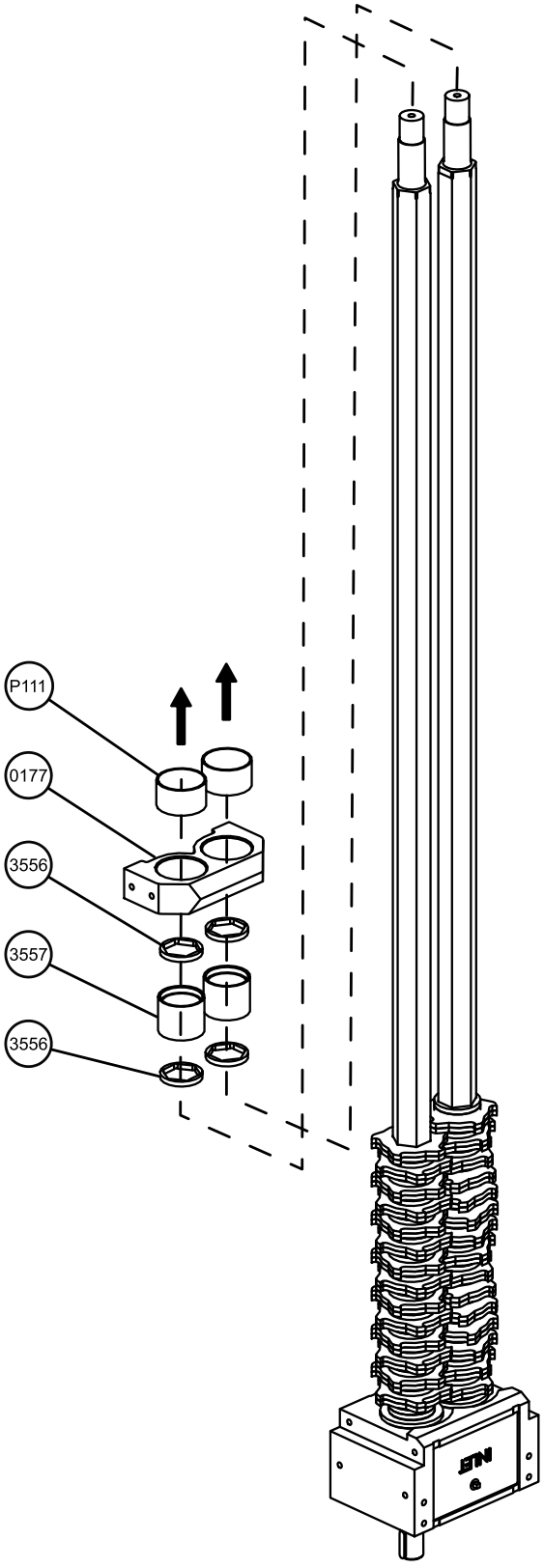
CAUTION:



STEPS:

- Remove the next stack of cutters (2516) and spacers (3501) from the shafts.

2m Only



STEPS:

- Remove the next mid bearing housing (0177) from the shafts.
- Remove the support bushes (P111) and bearing sleeve (3557) then remove the mid bearing spacers (3556) from each end of the bearing sleeve.

Fig. 11.15

2m Only

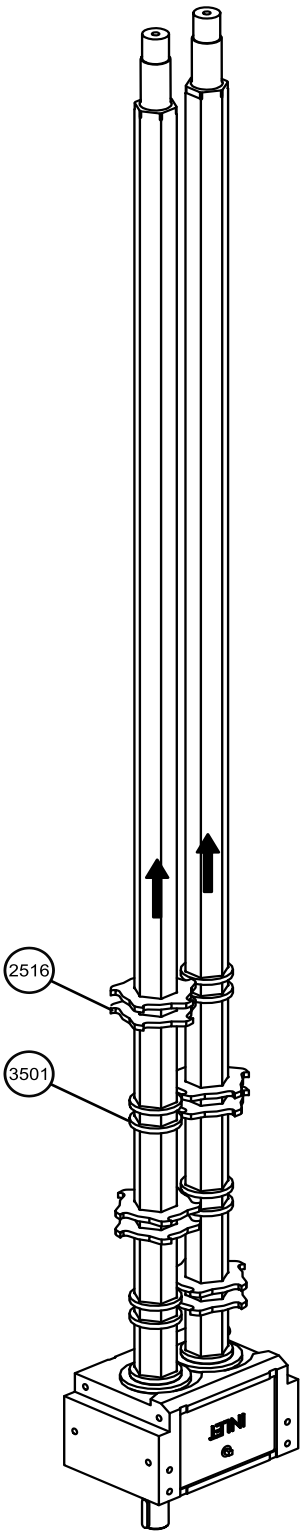
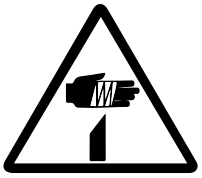


Fig. 11.16

NOTE:



STEPS:

- Remove the remaining cutters (2516) and spacers (3501) from the shafts.

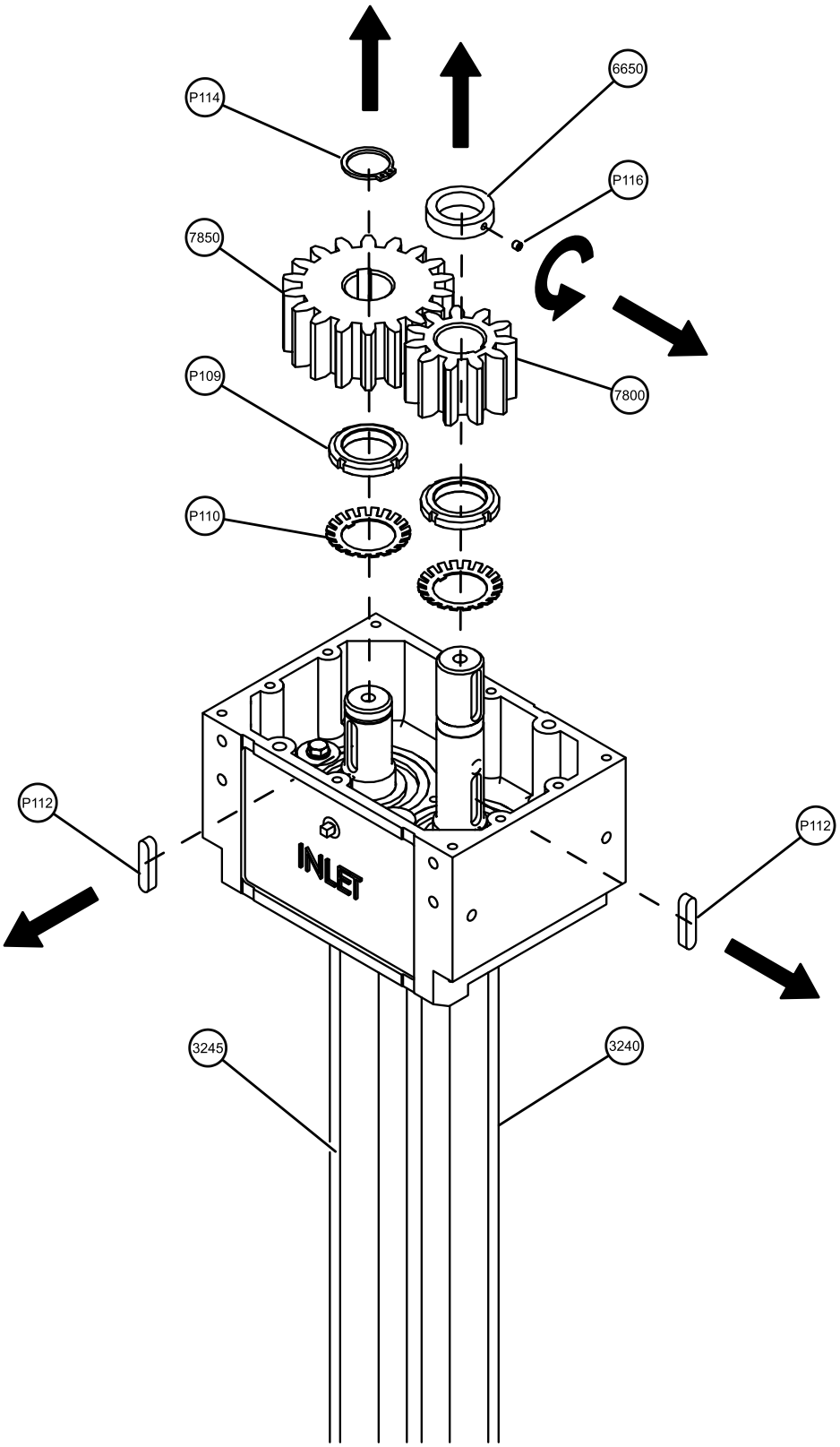


Fig. 11.17

STEPS:

- Cavity will be filled with grease

STEPS:

- Unscrew setscrew (P116) from tapped hole in abutment ring (6650) and remove abutment ring from drive shaft (3240)
- Remove circlip (P114) from driven shaft (3245)
- Slide gears (7800) & (7850) off the shafts
- Remove keys (P112) from keyways in shafts
- Unfold the external tabs of the lock washers (P110) from the grooves in the locknuts (P109) to enable them to be unscrewed
- Unscrew locknuts (P109) and remove lock washers (P110)

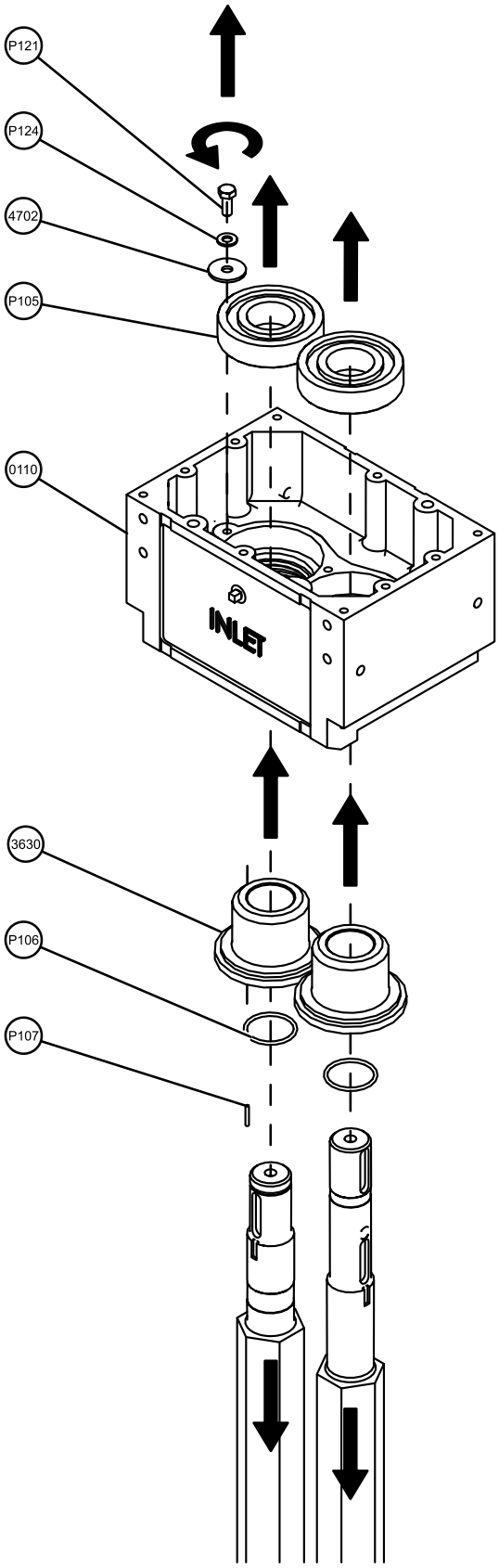


Fig. 11.18

STEPS:

- Unscrew hexagon head bolt (P121) and remove spring washer (P124) and bearing retaining washer (4702)
- Remove shafts and top stack collars (3630) from the top bearing housing (0110)
- Remove top stack collars (3630) from shafts and remove O-rings (P106) from internal grooves and pin (P107) from hole in bottom of top stack collar
- Press bearings (P105) out of bearing housing (0110)

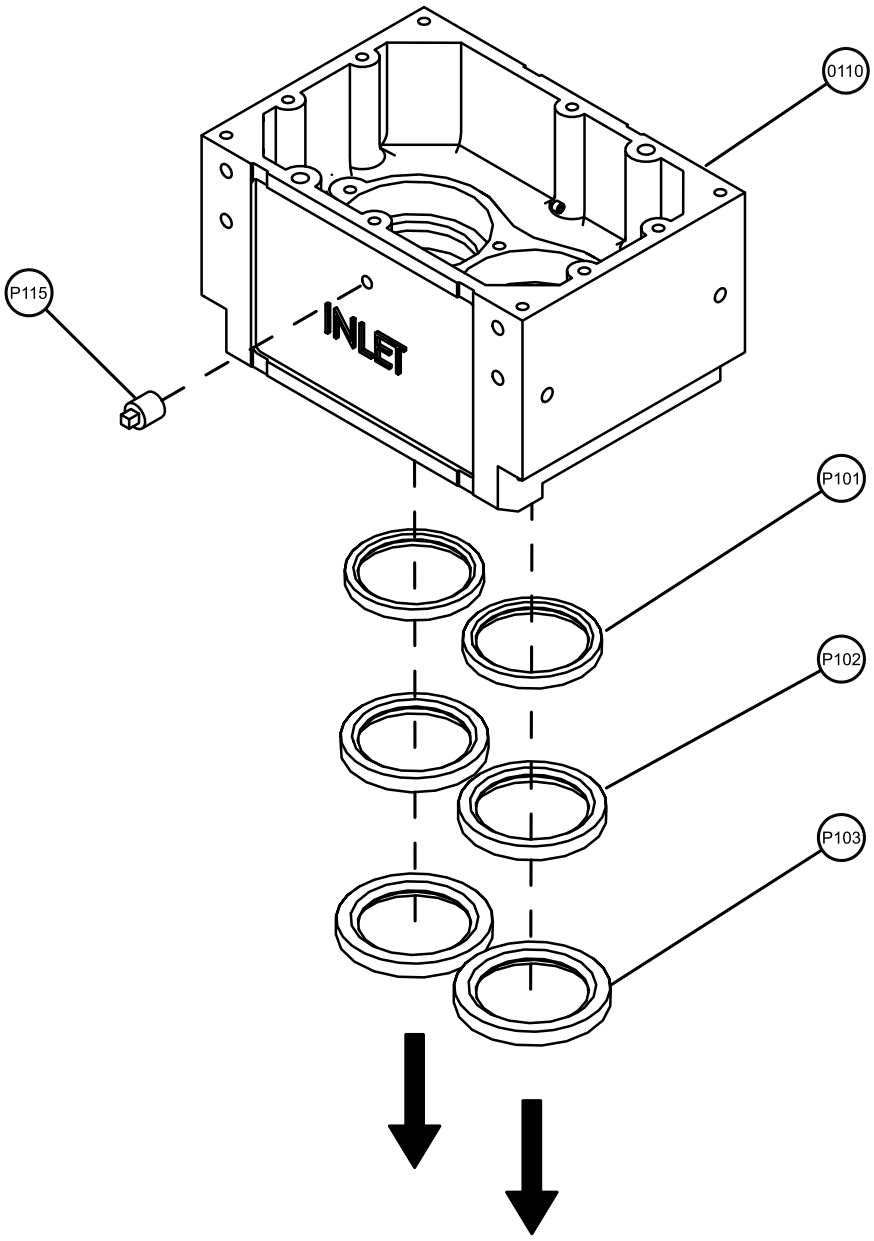


Fig. 11.19

STEPS:

- Remove lipseals (P101), (P102) and (P103) from bearing housing
- Unscrew plug (P115) from housing

12 Muncher Assembly

For drawing reference descriptions, please see the sectional drawings in Appendix A.

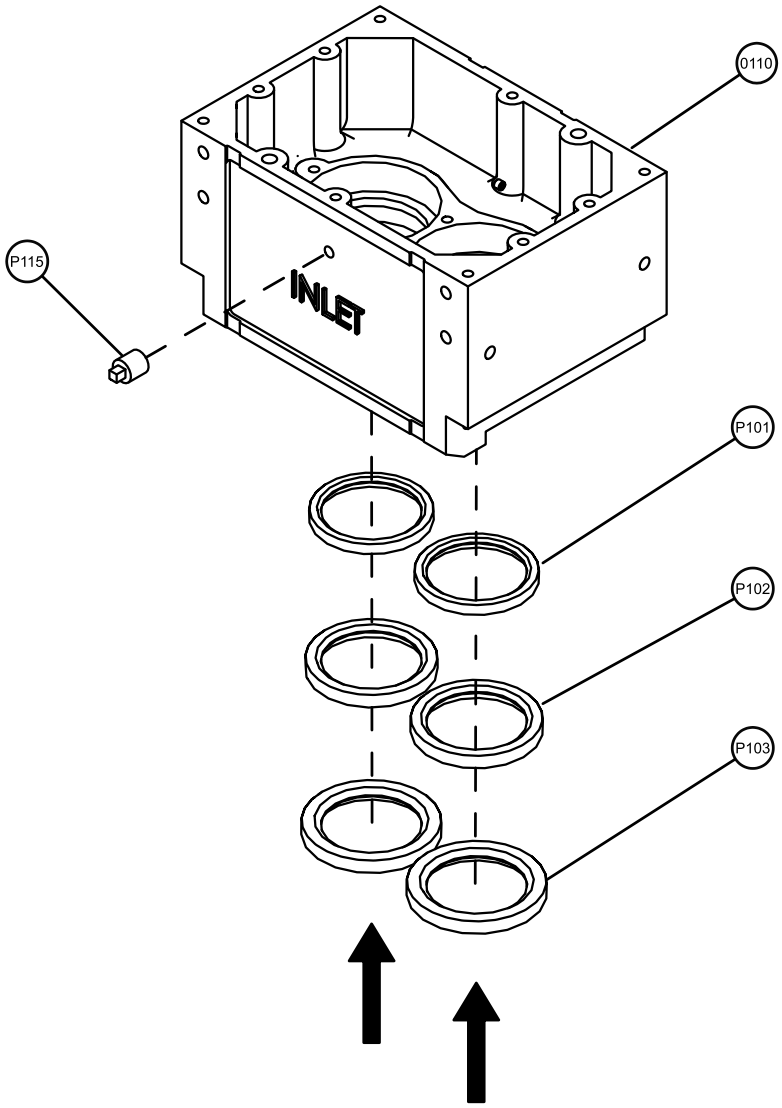


Fig. 12.1

NOTES:

- All surfaces should be clean and grease free before assembling
- Pack/fill all cavities of lipseals with grease. See Fig. 12.2
- Plastic discs can be used to help ensure lip seals are pressed in concentrically
- Grease: Lithium Grease

STEPS:

- Turn the bearing housing (0110) upside down and press the lip seals (P101), (P102) & (P103) into the cavities
- Pack with grease in between each lip seal
- Screw the plug (P115) into the bearing housing (0110)

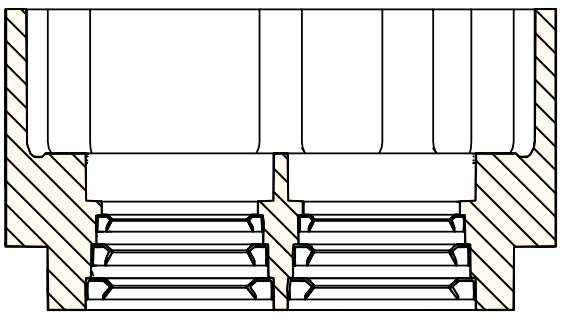


Fig. 12.2

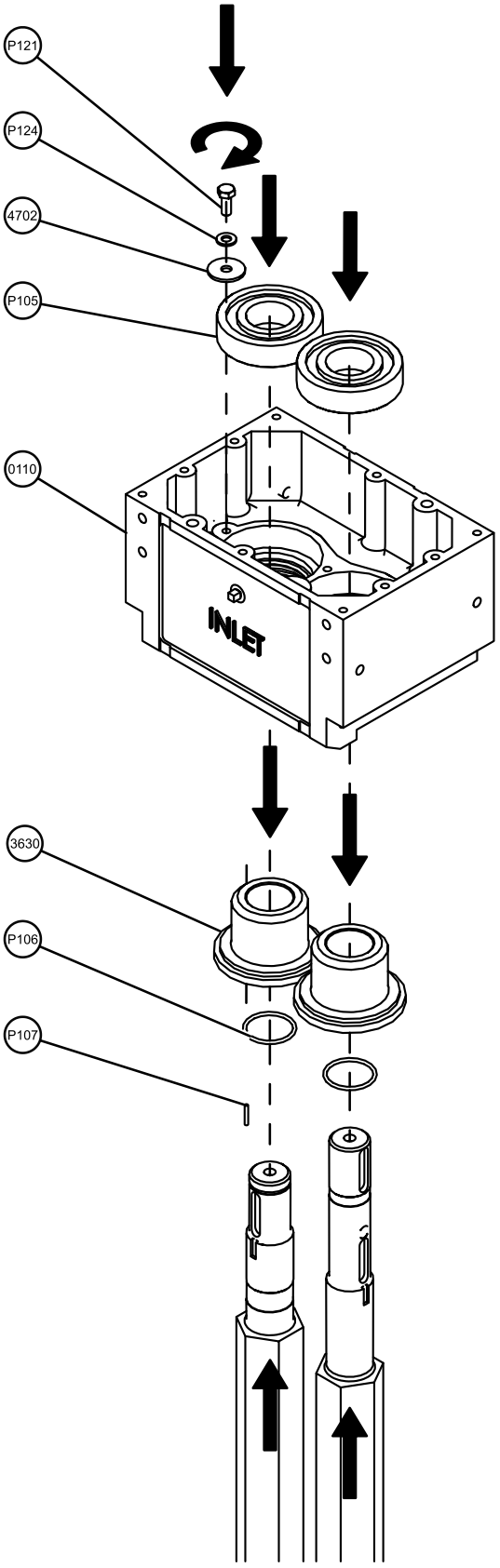


Fig. 12.3

NOTES:

- For right-hand Discam assemblies (where the Muncher is on the left-hand side when looking at the inlet side), the drive shaft (3240) should be fitted on the right
- For left-hand Discam assemblies (where the Muncher is on the right-hand side when looking at the inlet side), the drive shaft (3240) should be fitted on the left
- Ensure the thread on the shafts are wrapped in masking tape before the O-rings (P106) are pushed over
- Use Loctite 641 medium strength retainer on outer diameter of bearings
- Apply Loctite 243 to bolt (P121)

STEPS:

- Press bearings into housing (0110) and secure with bearing retaining washer (4702), spring washer (P124) and Hexagon Head bolt (P121)
- Fit O-rings (P106) into internal groove in top stack collar (3630) and insert pin (P107) into hole on underside of top stack collar (3630)
- Carefully fit the top stack collar and O-ring assembly onto the shafts (see note above) ensuring the pin locates against a flat face on the hexagon shaft
- Remove the masking tape from the thread
- Insert the shaft, stack collar and O-ring assembly into the bearing housing

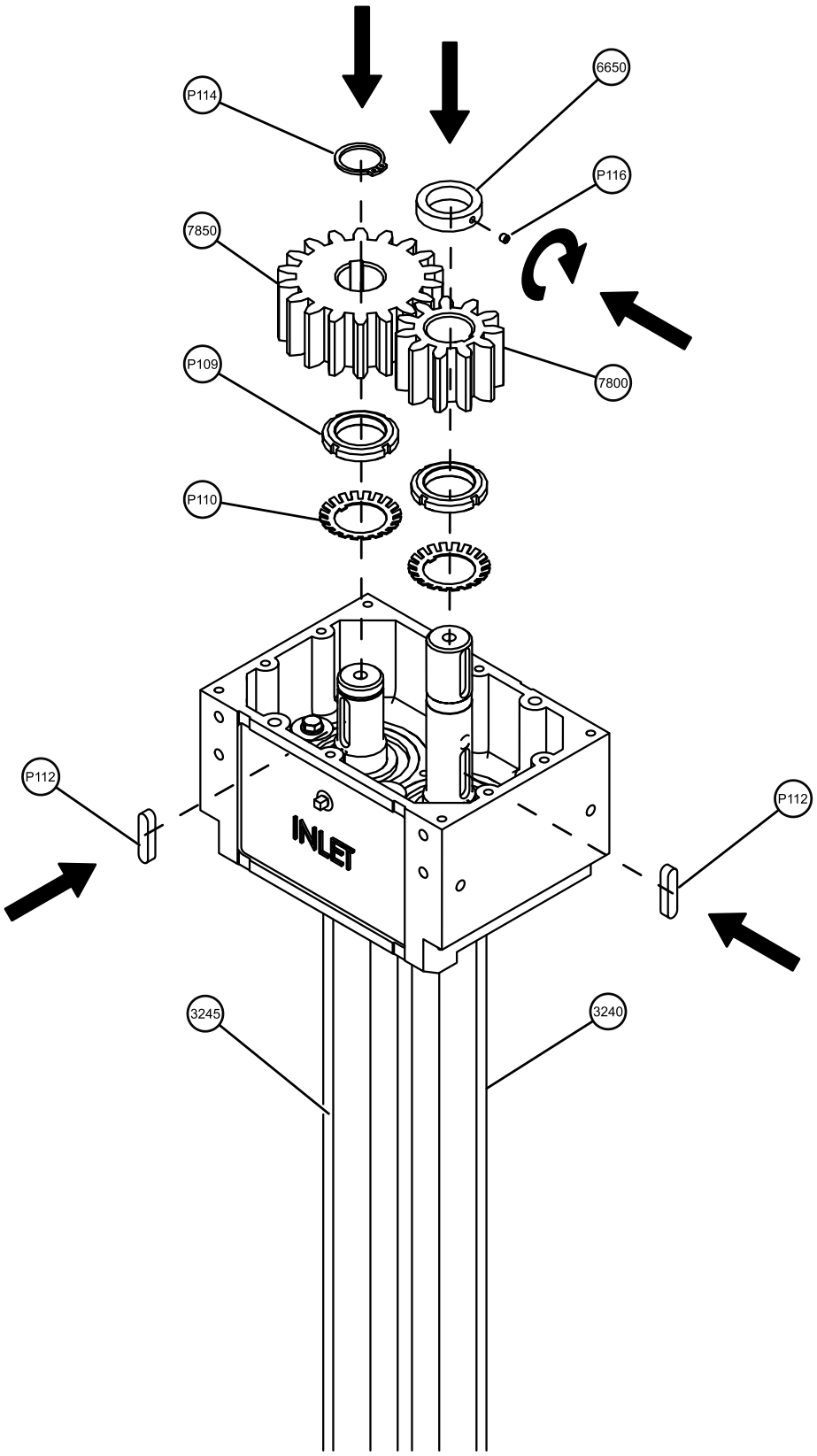


Fig. 12.4

NOTES

- Apply Loctite 243 to screw (P116)

Tightening Torques			
Item	Code	Nm	Ft lb
Setscrew	P116	10	7

STEPS:

- Slide the lock washers (P110) onto the shafts
- Screw the locknuts (P109) onto the shafts.
- Fold over the external tabs of the lock washer into the grooves in the lock nut to prevent it unscrewing
- Fit the keys (P112) into the keyways on the shafts
- Slide the gears onto the shafts lining up the key slots onto the keys. The smaller (7800) gear should be fitted onto the drive shaft and the larger gear (7850) onto the driven shaft
- Slide the abutment ring (6650) onto the drive shaft (3240) and screw the socket setscrew (P116) into the tapped hole in the abutment ring ensuring it locates into the spot face on the shaft (3240). See note.
- Fit the circlip (P114) into the groove on the driven shaft (3245)

1m and 1.5m Only

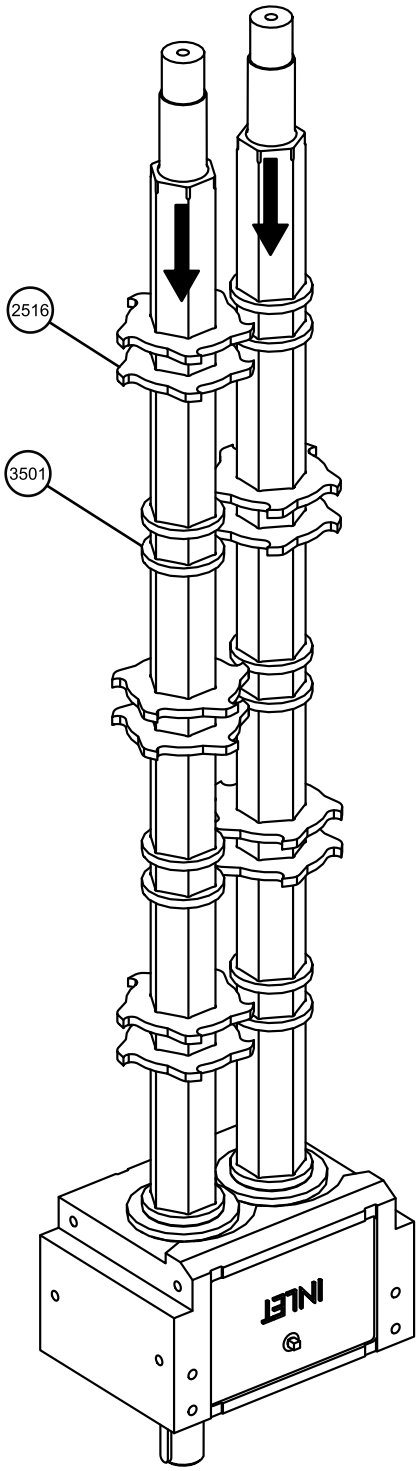
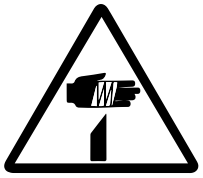


Fig. 12.5

CAUTION:



NOTES:

- The stack should be staggered so that cutters (2516) are adjacent to spacers (3501) on each shaft.
- The quantity and part number of the cutter (2516) and spacer (3501) stack is dependent upon model. See Appendix E for details.
- If 16mm cutters are fitted, only one cutter will be stacked between spacers.

STEPS:

- Stack the cutters (2516) and spacers (3501) onto the shafts with the cutters 'offset' stacked on the driveshaft and 'spiral' stacked on the driven shaft. See Appendix C for details. The first cutter should be placed on the drive shaft.

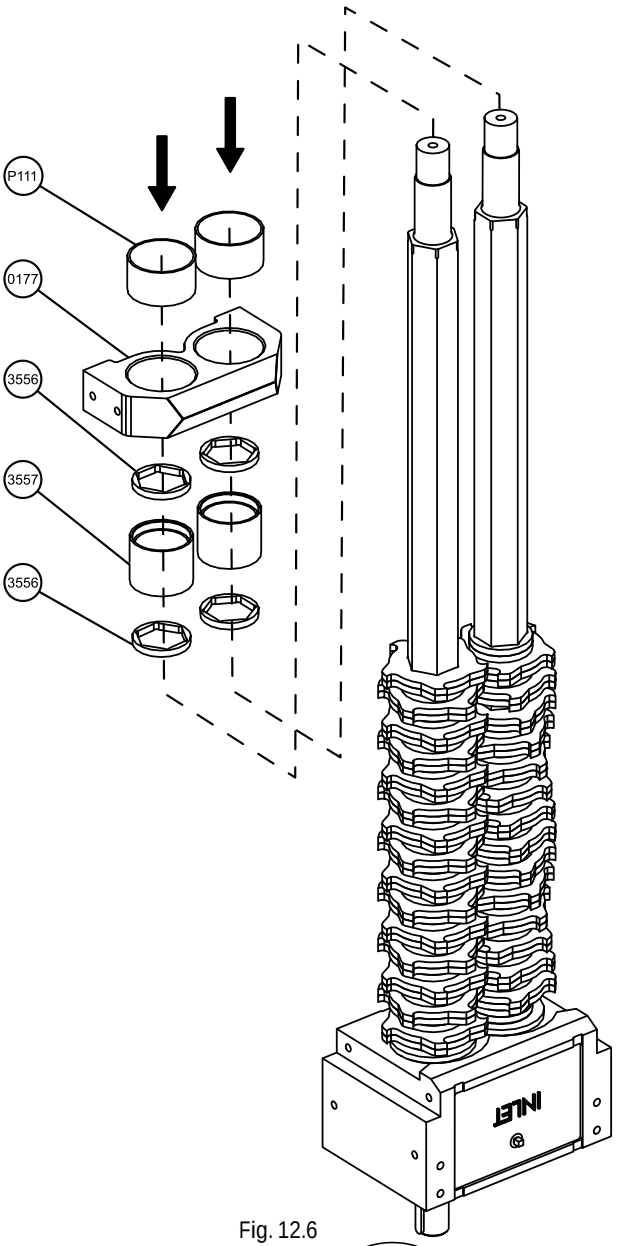
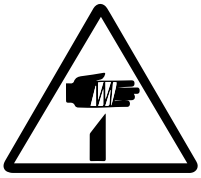


Fig. 12.6

CAUTION:



NOTES:

- Fig. 12.6 Cutters and spacers can be added or removed to correct the position

STEPS:

- Fig. 12.7 Press the first mid-bearing spacer (3556) into the top and bottom of the mid-bearing sleeve (3557)
- Fig. 12.8 Slide the spacer assembly onto a piece of hexagon bar, spacer side down
- Fig. 12.9 Slide the second spacer (3556) onto the hexagon bar to align the spacer profiles
- Fig. 12.10 Press the second spacer (3556) into the sleeve, using a larger spacer as a buffer
- Press the spacer assembly into the mid-bearing housing (0177)
- Slide the mid-bearing assembly onto the shafts in the orientation shown
- Check the position of the mid-housing by checking that the holes in the side rails (7720) & (2130) line up. See note.

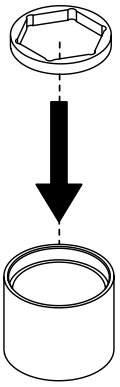


Fig. 12.7

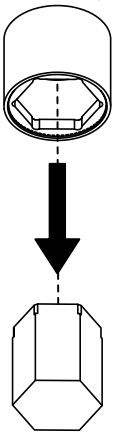


Fig. 12.8

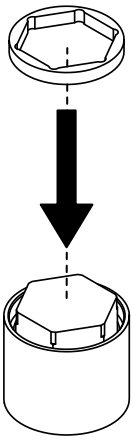


Fig. 12.9

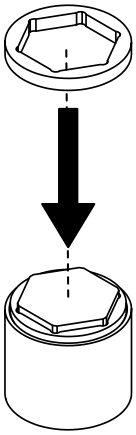
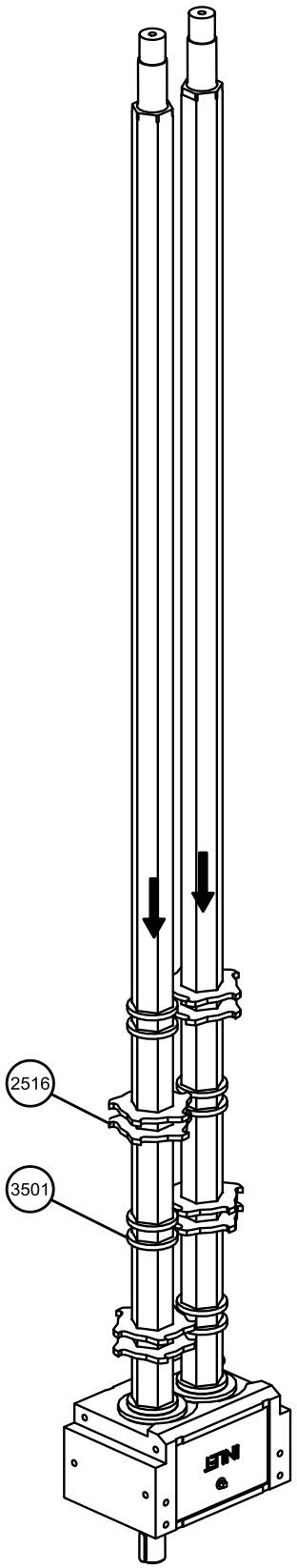


Fig. 12.10

2m Only



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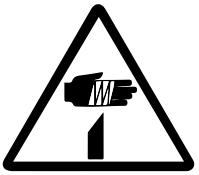


NOTES:

- The stack should be staggered so that cutters (2516) are adjacent to spacers (3501) on each shaft.
- The cutters should be 'offset' stacked on the driven shaft and 'spiral' stacked on the driven shaft. See Appendix B for details.
- The quantity and part number of the cutter (2516) and spacer (3501) stack is dependent on model. See Appendix E.
- If 16mm cutters are fitted, only one cutter will be stacked between spacers.

STEPS:

- Stack the cutters (2516) and spacers (3501) onto the shafts. The first cutter should be placed on the drive shaft.
- Keep stacking until a quarter of the cutters and spacers have been fitted.

Fig. 12.11

2m Only

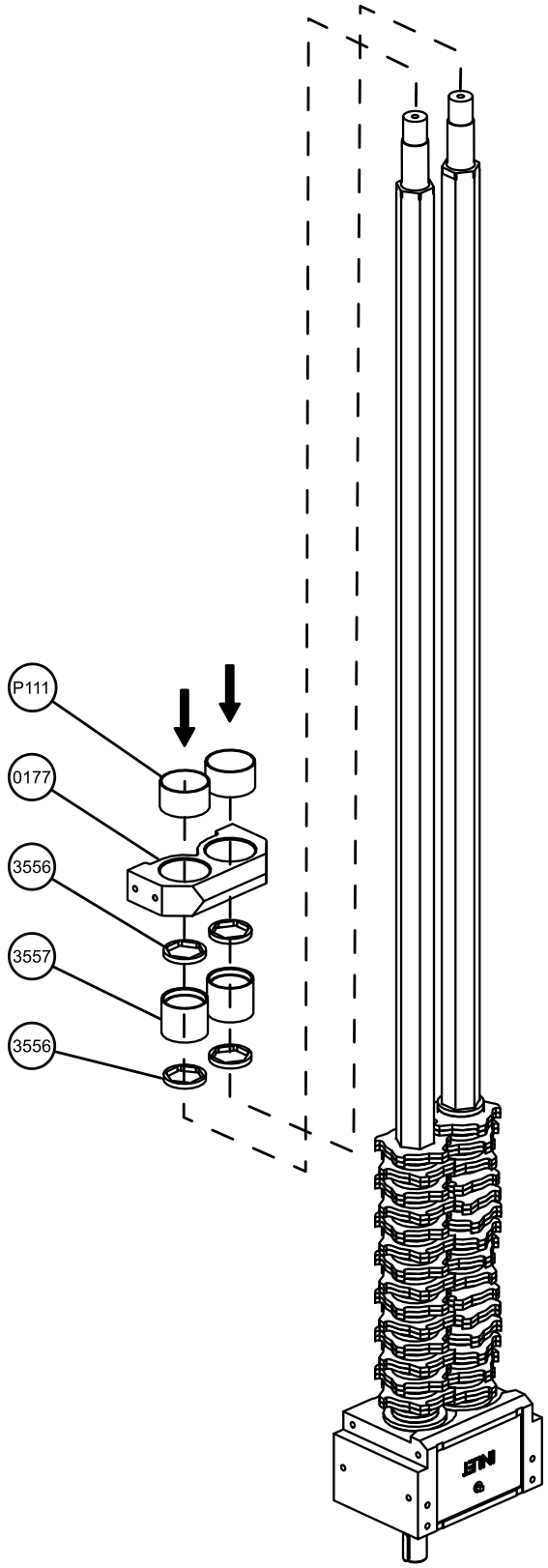
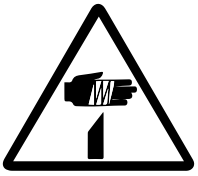


Fig. 12.12

CAUTION:



NOTES:

- Cutters and spacers can be added or removed to correct the position.

STEPS:

- Fig. 12.7 Press the first mid-bearing spacer (3556) into the top and bottom of the mid-bearing sleeve (3557).
- Fig. 12.8 Slide the spacer assembly onto a piece of hexagon bar, spacer side down.
- Fig. 12.9 Slide the second spacer (3556) onto the hexagon bar to align the spacer profiles
- Fig. 12.10 Press the second spacer (3556) into the sleeve, using a larger spacer as a buffer.
- Press the spacer assembly into the mid-bearing housing (0177)
- Slide the mid-bearing assembly onto the shafts in the orientation shown
- Check the position of the mid-housing by checking that the holes in the side rails (7720) & (2130) line up. See note.

2m Only

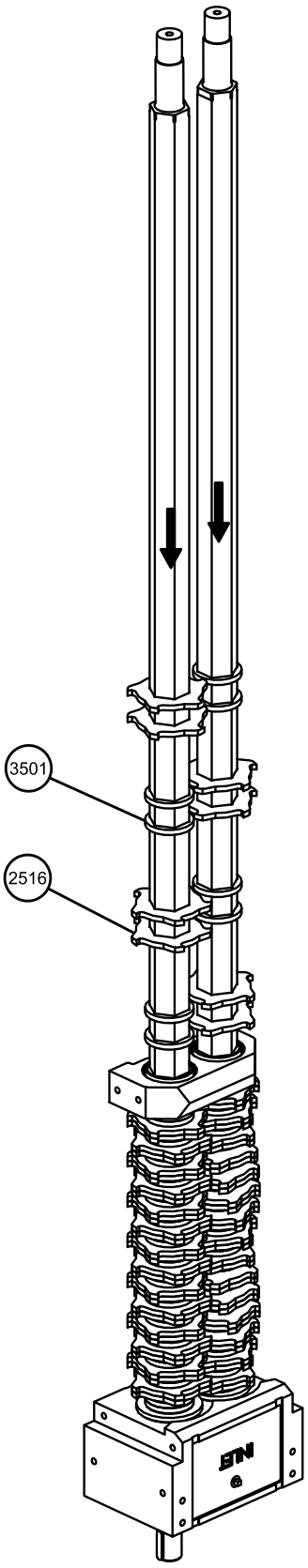
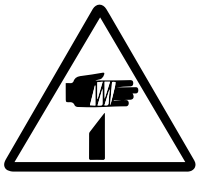


Fig. 12.13

CAUTION:



NOTES:

- The stack should be staggered so that cutters (2516) are adjacent to spacers (3501) on each shaft.
- The quantity and part number of the cutter (2516) and spacer (3501) stack is dependent upon model. See Appendix E for details.

STEPS:

- Stack the cutters (2516) and spacers (3501) onto the shafts with the cutters 'offset' stacked on the driveshaft and 'spiral' stacked on the driven shaft. See Appendix C for details. The first cutter should be placed on the drive shaft.

2m Only

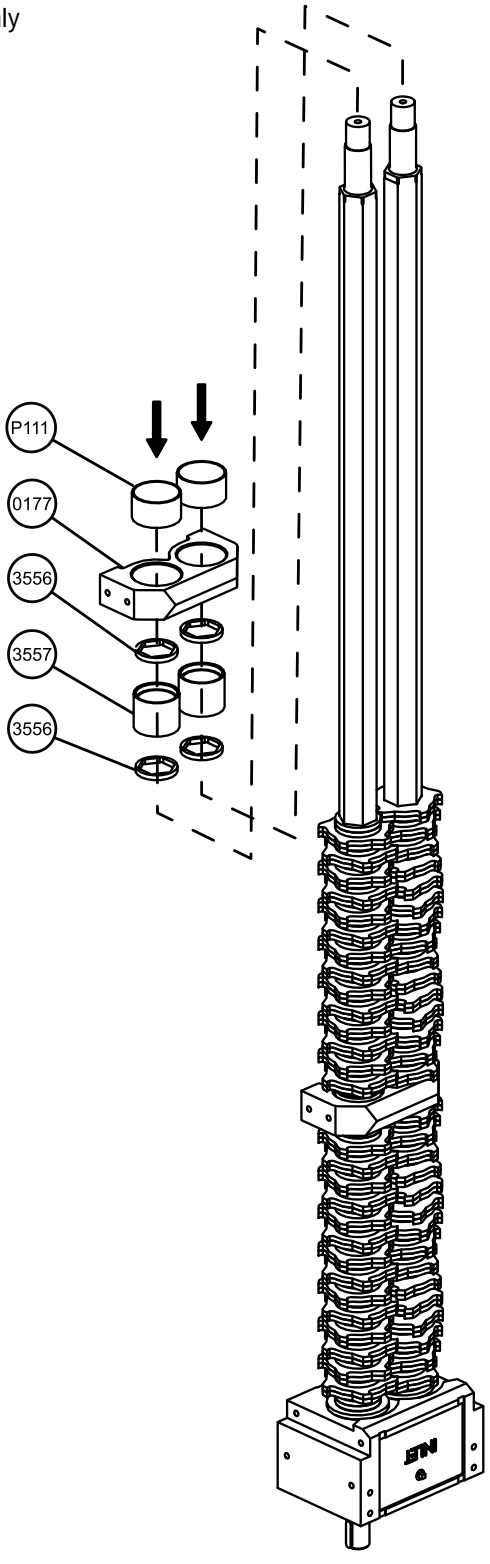
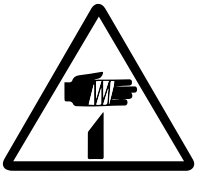


Fig. 12.14

CAUTION:



NOTES:

- Cutters and spacers can be added or removed to correct the position.

STEPS:

- Fig. 12.7 Press the first mid-bearing spacer (3556) into the top and bottom of the mid-bearing sleeve (3557).
- Fig. 12.8 Slide the spacer assembly onto a piece of hexagon bar, spacer side down.
- Fig. 12.9 Slide the second spacer (3556) onto the hexagon bar to align the spacer profiles
- Fig. 12.10 Press the second spacer (3556) into the sleeve, using a larger spacer as a buffer.
- Press the spacer assembly into the mid-bearing housing (0177)
- Slide the mid-bearing assembly onto the shafts in the orientation shown
- Check the position of the mid-housing by checking that the holes in the side rails (7720) & (2130) line up. See note.

2m Only

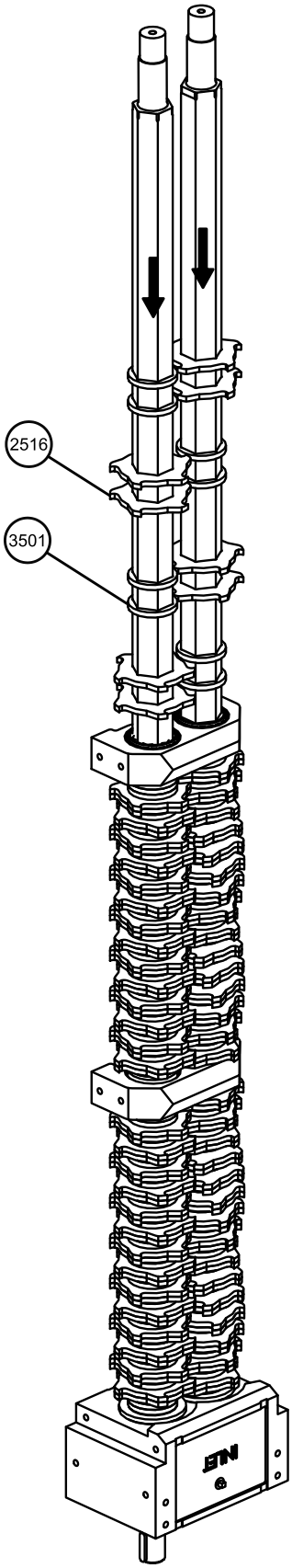
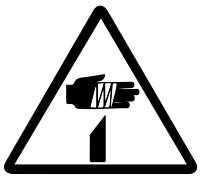


Fig. 12.15

CAUTION:



NOTES:

- The stack should be staggered so that cutters (2516) are adjacent to spacers (3501) on each shaft.
- The cutters should be 'offset' stacked on the driveshaft and 'spiral' stacked on the driven shaft. See Appendix C for details.
- The quantity and part number of the cutter (2516) and spacer (3501) stack is dependent upon model. See Appendix E.

STEPS:

- Continue stacking the cutters (2516) and the spacers (3501). Start the next section of the stack with a spacer where you finished the first half with a cutter and vice versa.

2m Only

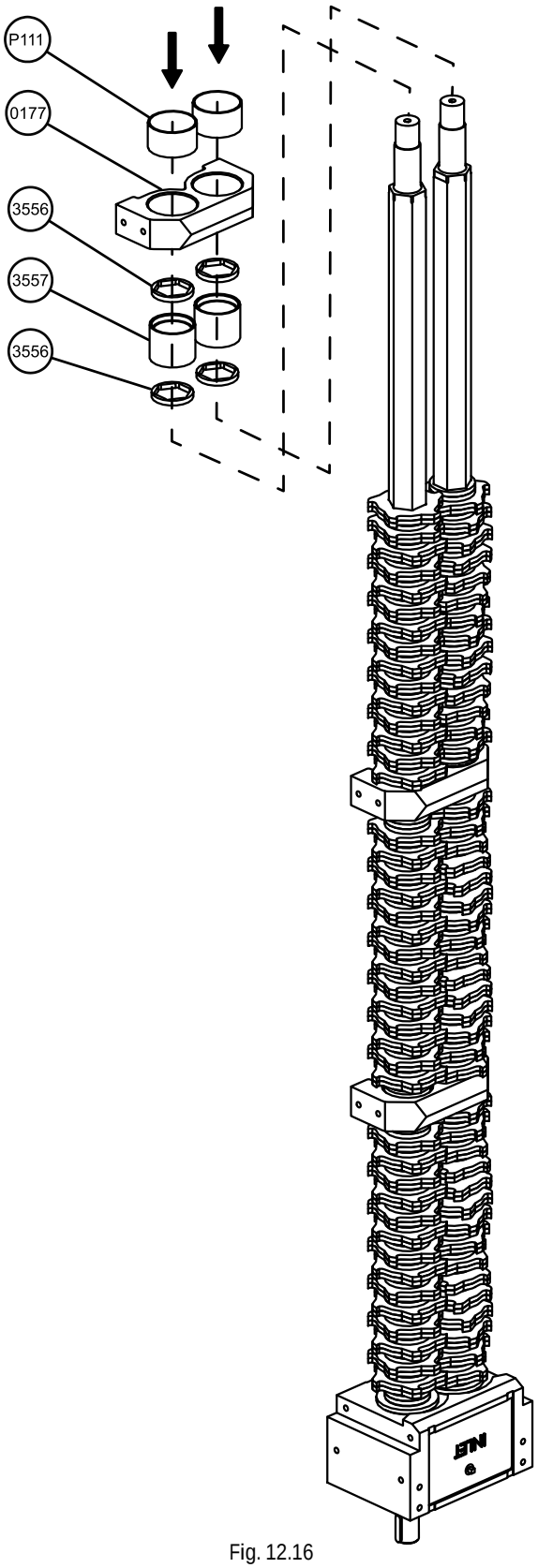
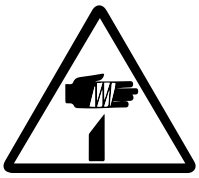


Fig. 12.16

CAUTION:



NOTES:

- Cutters and spacers can be added or removed to correct the position.

STEPS:

- Fig. 12.7 Press the first mid-bearing spacer (3556) into the top and bottom of the mid-bearing sleeve (3557)
- Fig. 12.8 Slide the spacer assembly onto a piece of hexagon bar, spacer side down
- Fig. 12.9 Slide the second spacer (3556) onto the hexagon bar to align the spacer profiles
- Fig. 12.10 Press the second spacer (3556) into the sleeve, using a larger spacer as a buffer
- Press the spacer assembly into the mid-bearing housing (0177)
- Slide the mid-bearing assembly onto the shafts in the orientation shown
- Check the position of the mid-housing by checking that the holes in the side rails (7720) & (2130) line up. See note.

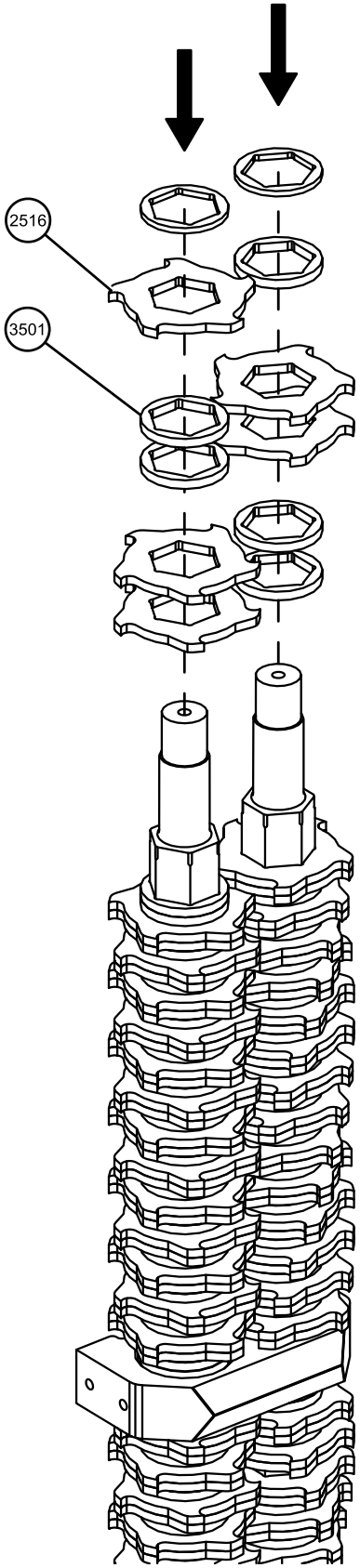
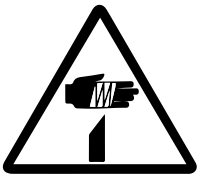


Fig. 12.17

CAUTION:



NOTES:

- The stack should be staggered so that cutters (2516) are adjacent to spacers (3501) on each shaft.
- The cutters should be 'offset' stacked on the driveshaft and 'spiral' stacked on the driven shaft. See Appendix B for details.
- The quantity and part number of the cutter (2516) and spacer (3501) stack is dependent upon model. See Appendix E for details.

STEPS:

- Continue stacking the cutters (2516) and the spacers (3501) over the shafts. Start the second half of the stack with a spacer where you finished the first half with a cutter and vice versa.
- Leave 7-8mm clear between the top cutter/spacer and the end of the shaft. Shims can be used to fill gaps which are larger than 10mm and smaller than a cutter/spacer.

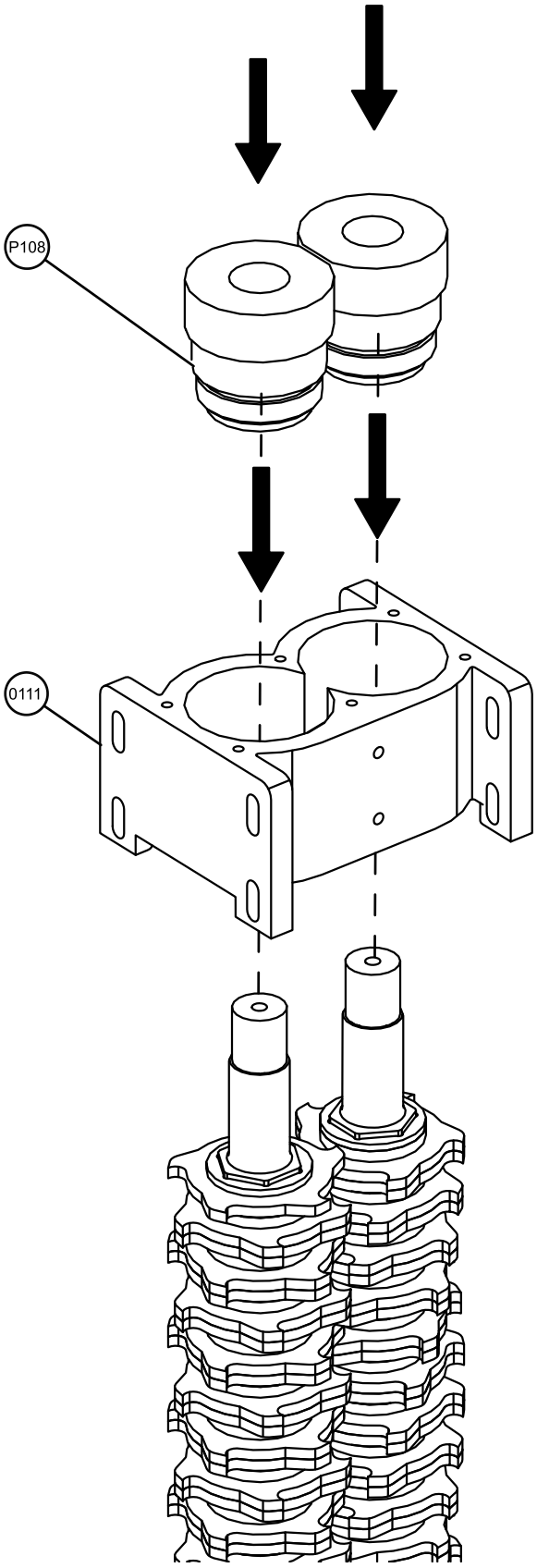


Fig. 12.18

STEPS:

- Install the bottom bearing housing (0111) and assemble the mechanical seals (P108) in the cavities ensuring the milled flat on each seal is towards the centre as shown in Fig. 12.19

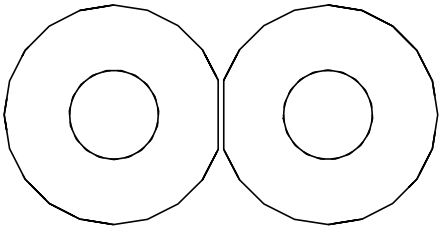


Fig. 12.19

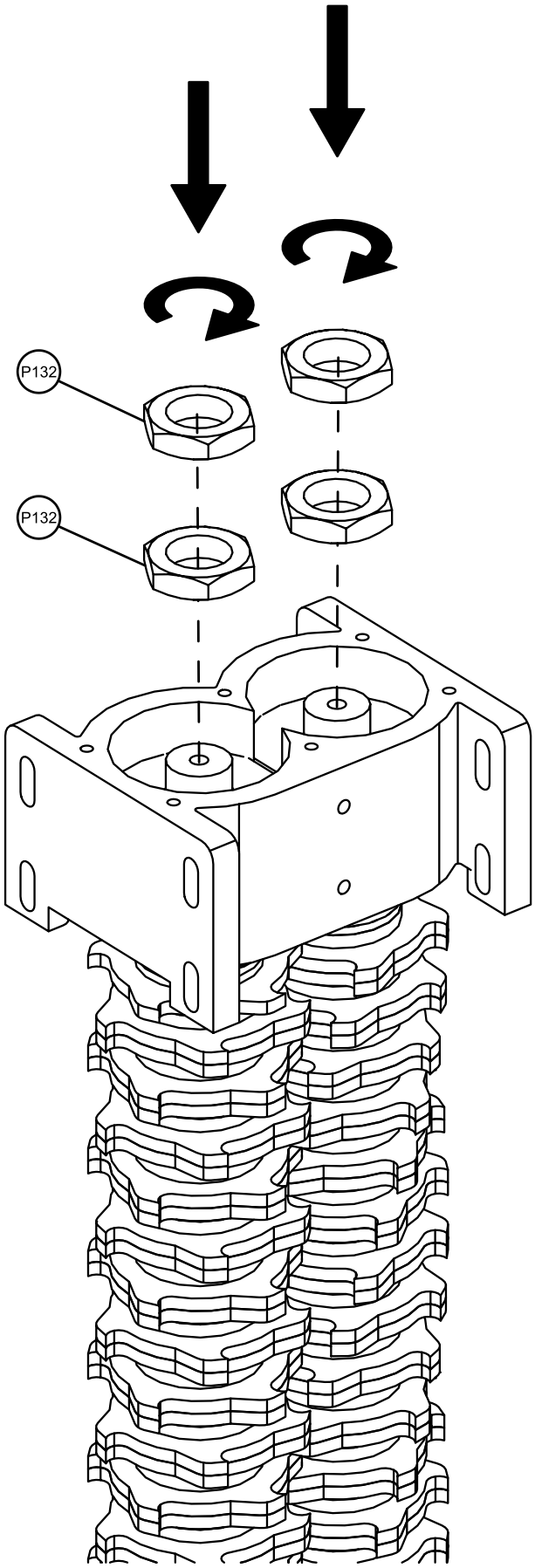


Fig. 12.20

NOTES:

- Apply Loctite 243 to hexagon nuts (P132).

Tightening Torques			
Item	Code	Nm	Ft lb
Hex Nut	P132	200	150

STEPS:

- Screw one locknut (P132) onto each shaft and tighten to the specified torque (see note)
- Tighten the second locknut (P132) to the specified torque to prevent unscrewing

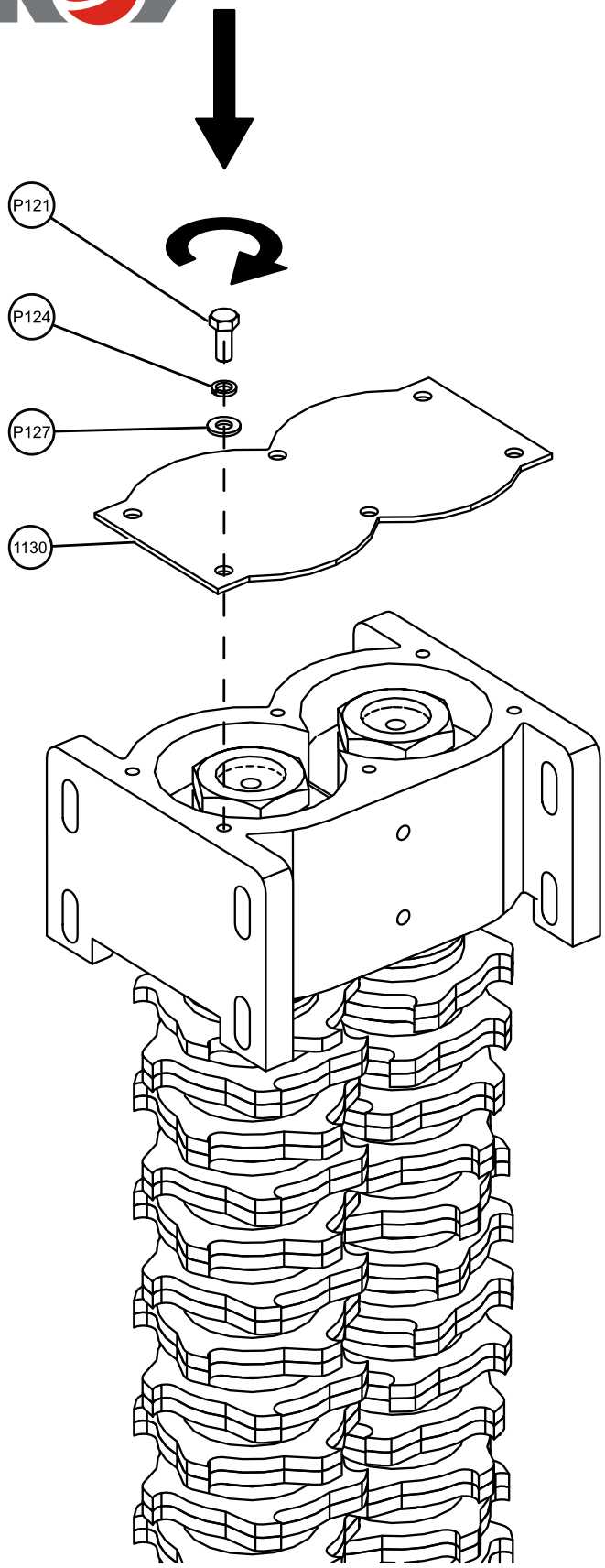


Fig. 12.21

NOTES:

- Bottom cover plate should be sealed with Loctite 5910. See Fig. 12.22
- Hexagon head screws (P121) should have Loctite 243 applied

STEPS:

- Add the bottom cover plate (1130) and apply Loctite (See note).
- Secure with plain washers (P127), spring washers (P124) and hexagon head screws (P121). (See note)

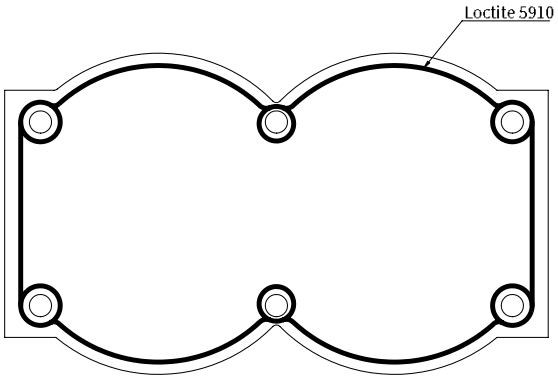


Fig. 12.22

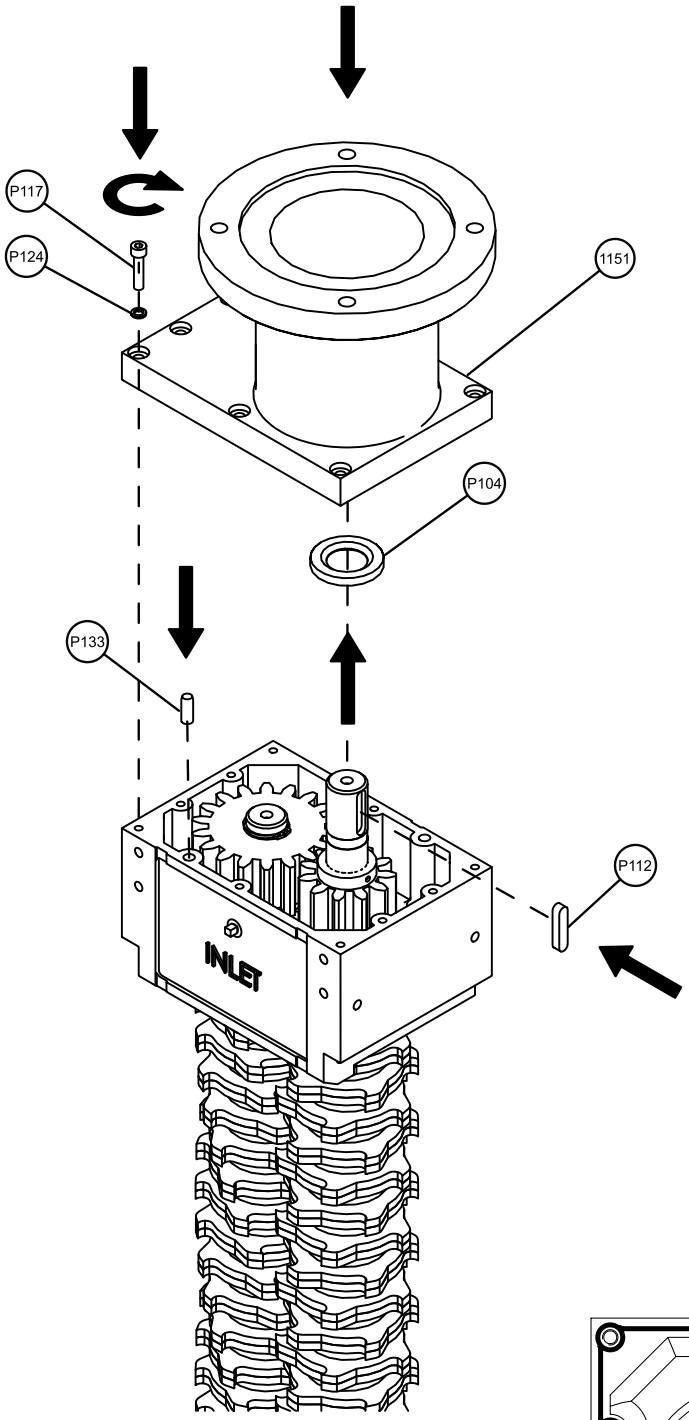


Fig. 12.23

NOTES:

- Grease: Lithium Grease
- Use Loctite 5910 to seal the adaptor stool onto the bearing housing see Fig. 12.25
- Apply Loctite 243 to socket head cap screw (P117).

Tightening Torques			
Item	Code	Nm	Ft lb
Cap Head Bolt	P117	20	15

STEPS:

- Fill the cavity with grease.
- Fit the dowel pins (P133) into the holes on the bearing housing.
- Fit the lip seal (P104) into the adaptor stool in the orientation shown in Fig. 12.24
- Seal the faces of the top bearing housing and adaptor stool. See note
- Fit the adaptor stool (1151) onto the bearing housing by lining up the dowel pins, then screw into place using spring washers (P124) and cap head screws (P117). Ensure faces are sealed (see note)
- Fit the key (P112) into the slot at the top of the drive shaft

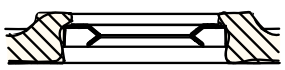


Fig. 12.24

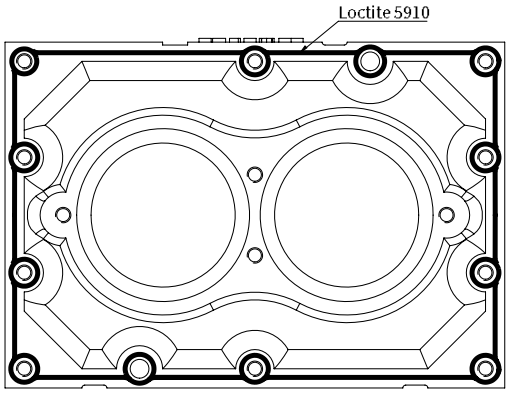


Fig. 12.25

1m and 1.5m Only

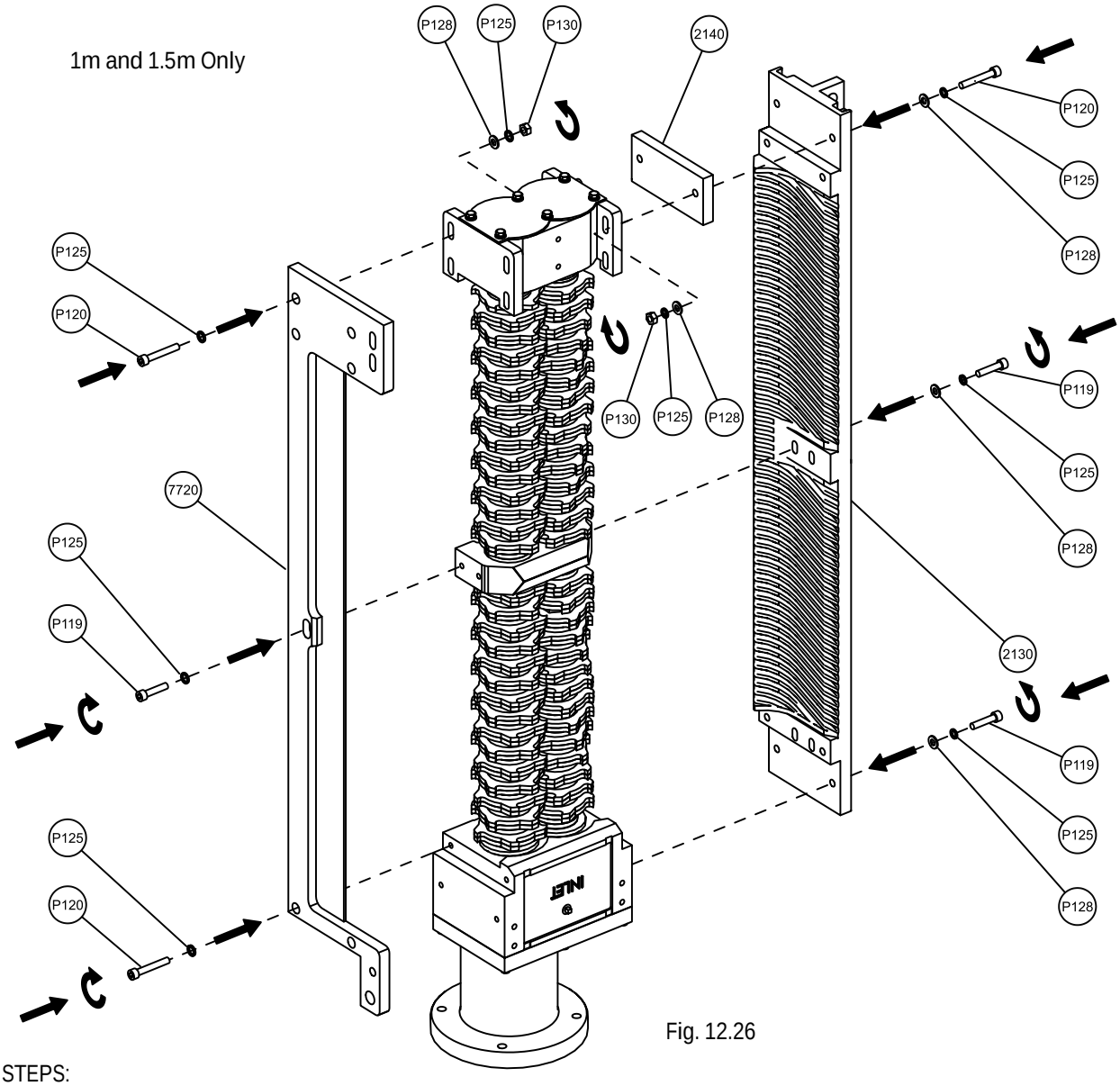


Fig. 12.26

STEPS:

- Bolt side rail (7720) onto the bottom bearing housing and top bearing housing using cap head bolts (P120) and spring washers (P125).
- Secure side rail (2130) onto the bottom bearing housing with the side rail packer plate (2140) using cap head bolts (P120), spring washers (P125) and plain washers (P128) and secure using hexagon nuts (P130).
- Secure side rail (2130) onto the top bearing housing by tightening cap head bolt (P119), spring washer (P125) and plain washer (P128).
- Tighten cap head bolt (P119), spring washer (P125) and plain washers (P128) to bolt side rail (2130) onto mid bearing housing.
- Tighten cap head bolt (P119) and spring washer (P125) to bolt side rail (7720) onto mid bearing housing.

Tightening Torques			
Item	Code	Nm	Ft lb
Cap Head Bolt	P119	30	20
Cap Head Bolt	P120	20	15

2m Only

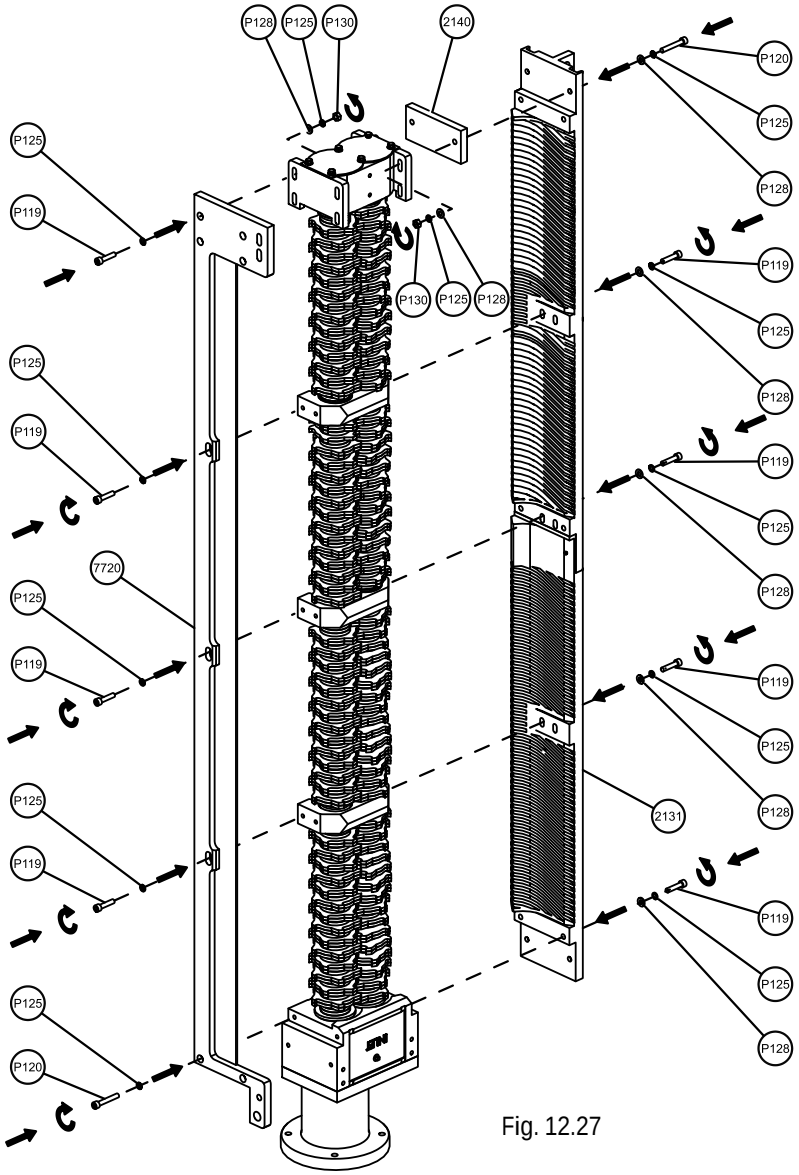


Fig. 12.27

STEPS:

- Bolt side rail (7720) onto the bottom bearing housing and top bearing housing using cap head bolts (P119) & (P120) and spring washers (P125).
- Secure side rail (2130) onto the bottom bearing housing with the side rail packer plate (2140) using cap head bolts (P120), spring washers (P125) and plain washers (P128) and secure using hexagon nuts (P130).
- Secure side rail (2131) onto the top bearing housings by tightening cap head bolts (P119), spring washers (P125) and plain washers (P128).
- Tighten cap head bolts (P119), spring washer (P125) and plain washers (P128) to bolt side rails (2130) & (2131) onto mid bearing housings.
- Tighten cap head bolts (P119) and spring washer (P125) to bolt side rail (7720) onto mid bearing housings.

Tightening Torques			
Item	Code	Nm	Ft lb
Cap Head Bolt	P119	30	20
Cap Head Bolt	P120	20	15

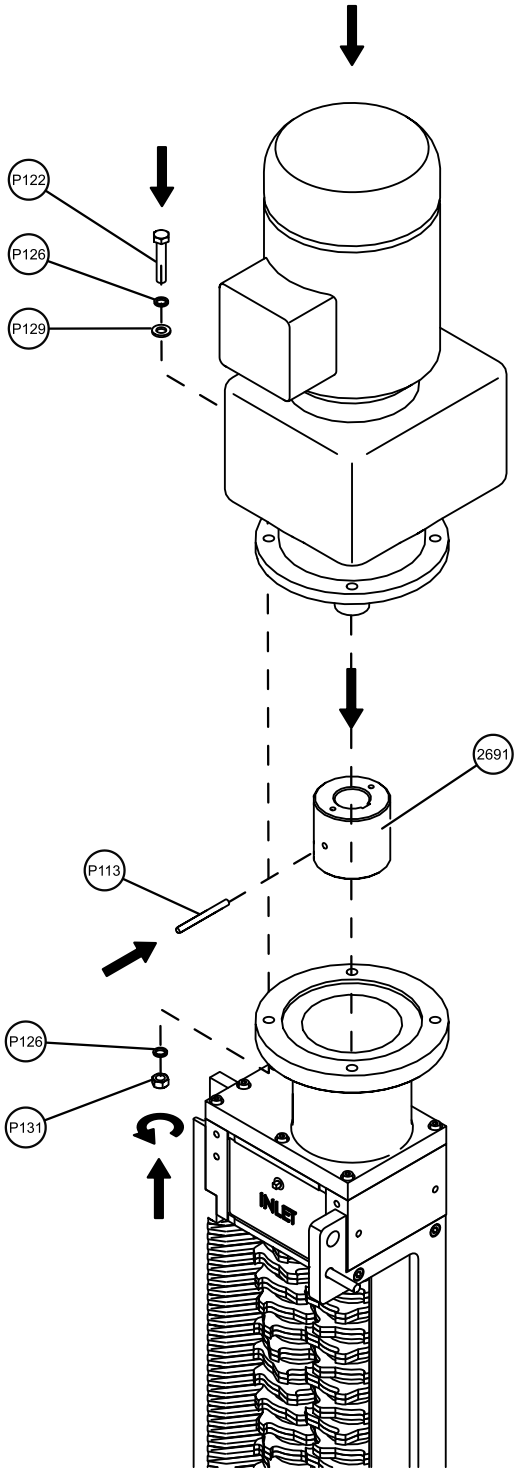


Fig. 12.28

NOTES:

- Assemble in vertical position
- Seal drive onto adaptor stool using Loctite 5910

STEPS:

- Insert dowel pin (P113) into the hole in the centre of the coupling (2691)
- Line up the keyway on the coupling (2691) with the key on the drive shaft and slide the coupling onto the drive shaft.
- Line up the key on the gearbox shaft with the keyway in the coupling.
- Assemble the motor onto the coupling and secure using hexagon bolts (P122), spring washers (P126), plain washers (P129) and hexagon nuts (P131)

Tightening Torques			
Item	Code	Nm	Ft lb
Hex Head Bolt	P122	40	30

13 Discreen Assembly

For drawing reference descriptions, please see the sectional drawings in Appendix A.

Drive and Driven Shaft

NOTES:

- All surfaces should be clean and grease free before assembling
- Assemble vertically as shown.
- Secure outer diameter of bearing using Loctite 641.

STEPS:

- Fig. 13.1. Press bearing (P204) into the top housing (0135) and secure with circlip (P206). See note.
- Fig. 13.2 Fit O-rings (P207) into the internal grooves in the top stack collar (3630)

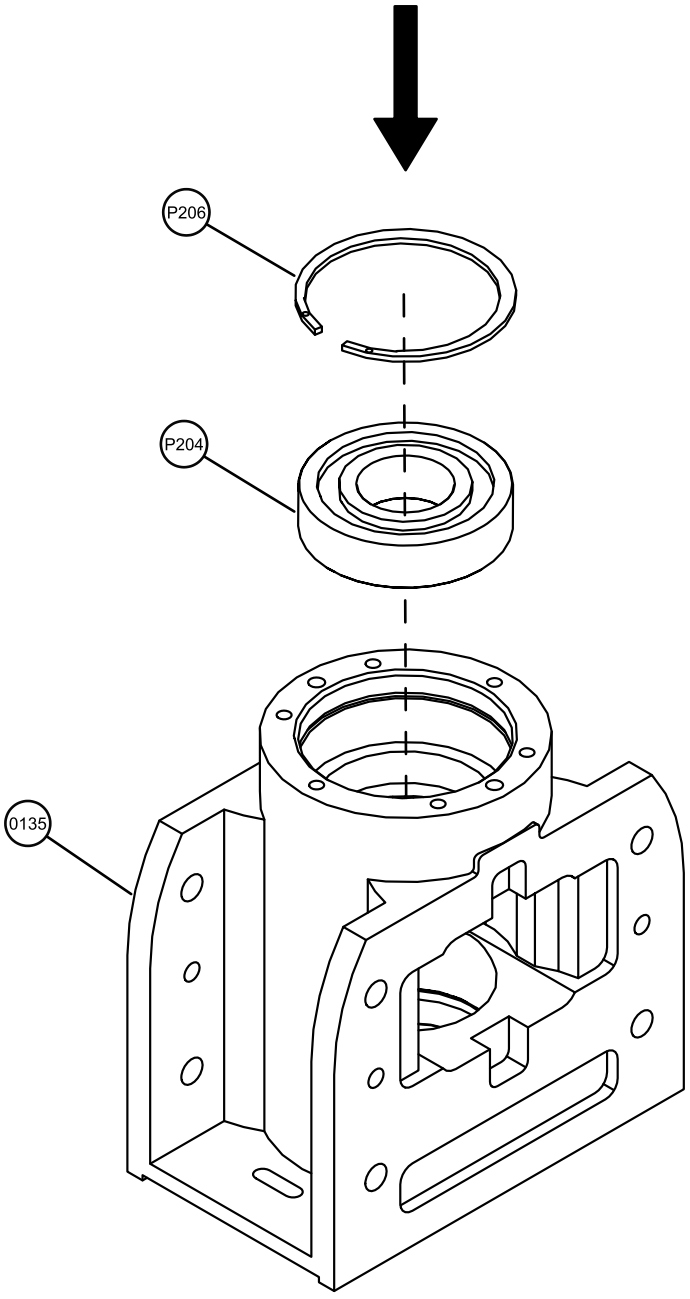


Fig. 13.1

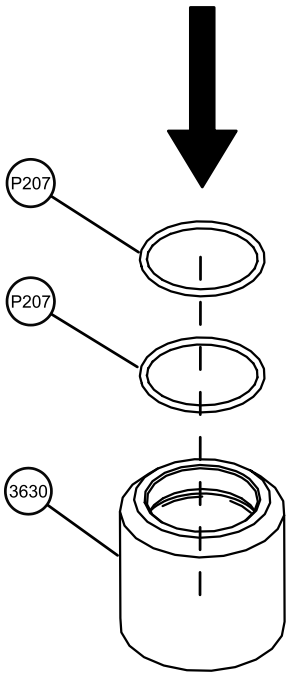
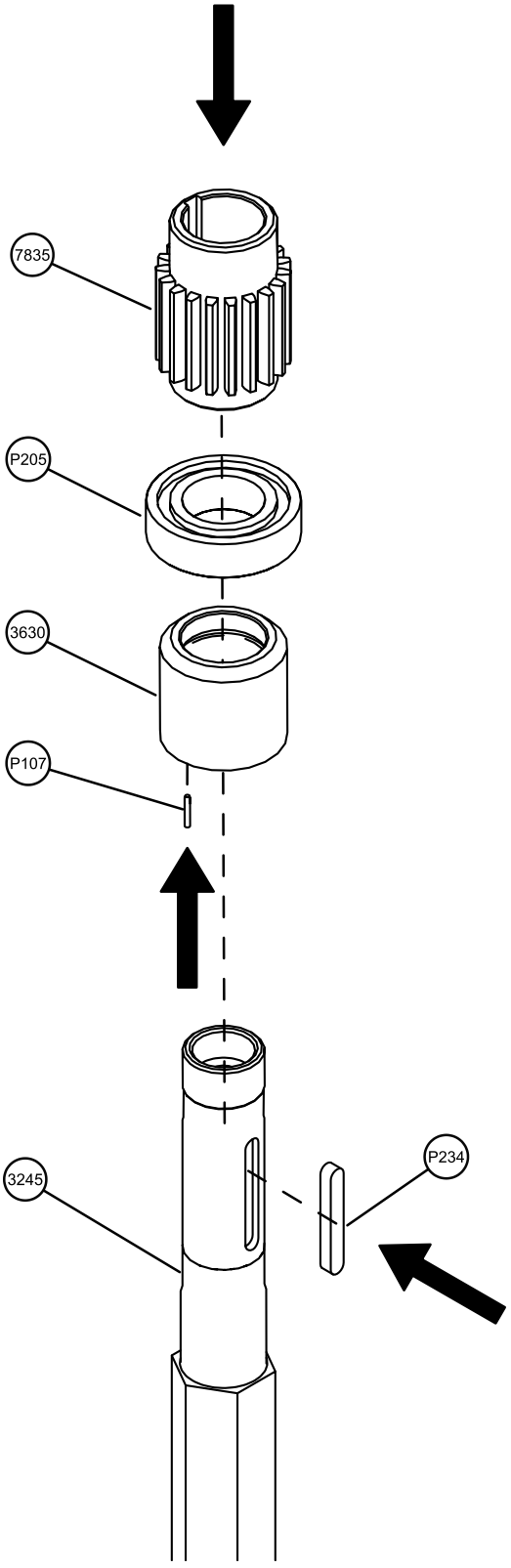


Fig. 13.2

Driven Shaft



STEPS:

- Insert the pin (P107) into the hole at the bottom of the top stack collar (3630) and slide the collar onto the driven shaft (3245), ensuring the pin locates against a flat face of the hexagon shaft.
- Press the bearing (P205) onto the shaft (3245).
- Insert the key (P234) into the keyway on the shaft.
- Slide the gear (7835) onto the shaft, ensuring that the internal keyway lines up with the key (P234) on the shaft.

Fig. 13.3

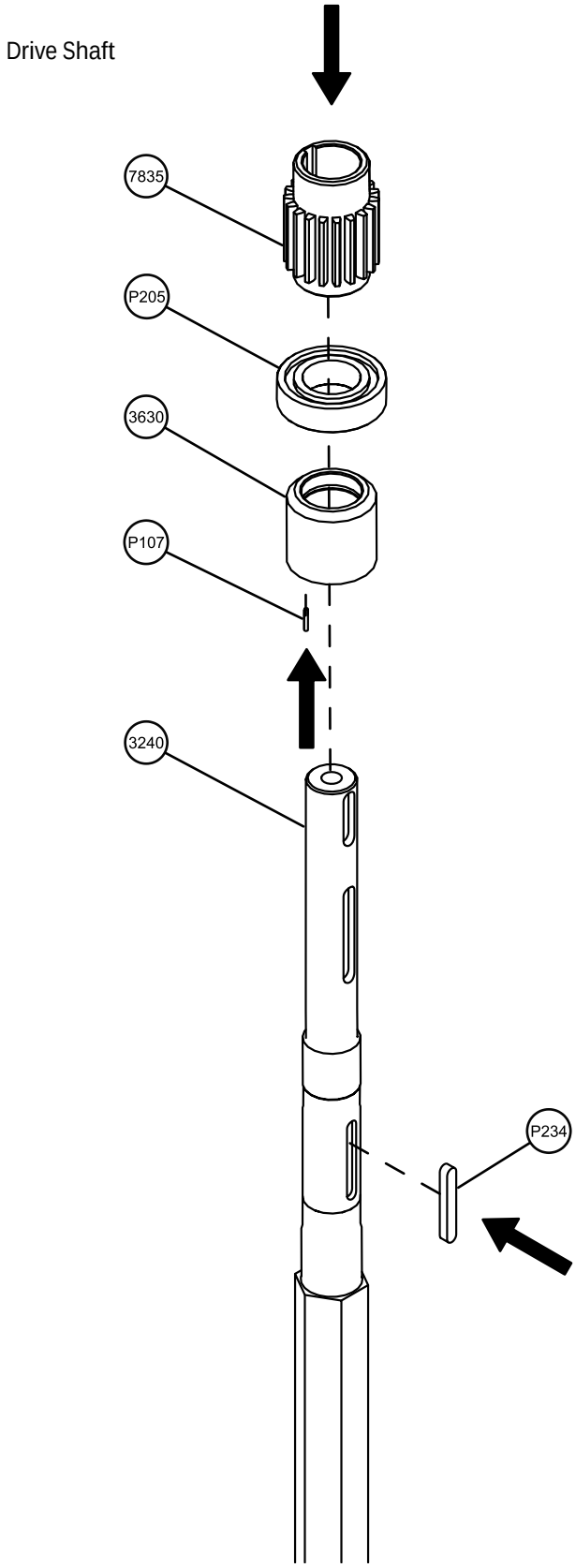
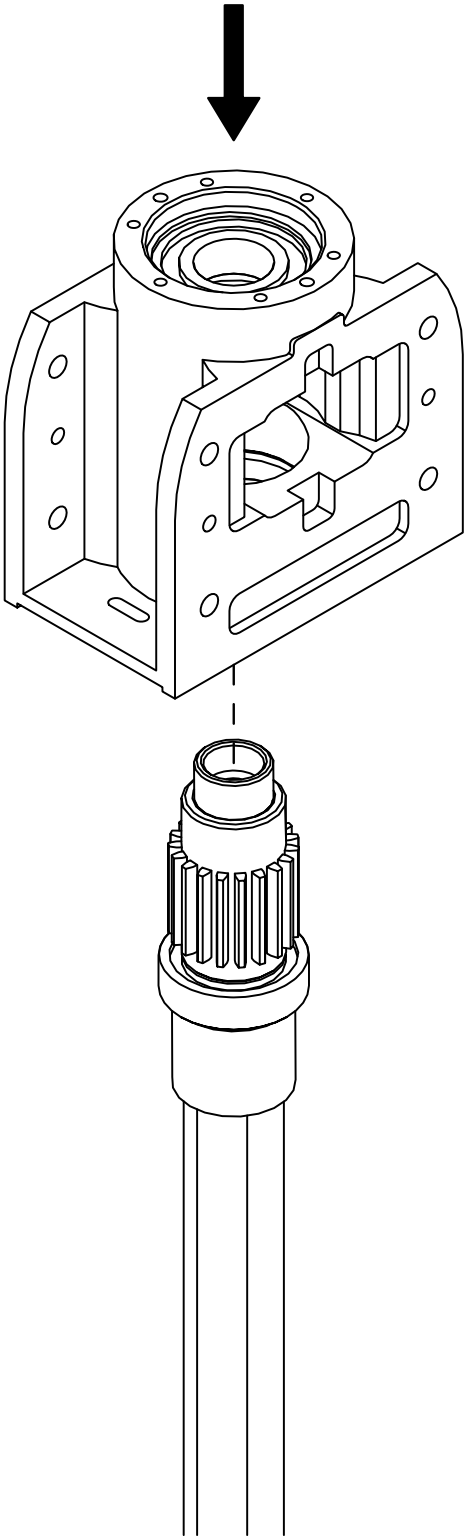


Fig. 13.4

STEPS:

- Insert the pin (P107) into the hole at the bottom of the top stack collar (3630) and slide the collar onto the driven shaft (3240), ensuring the pin locates against a flat face of the hexagon shaft.
- Press the bearing (P205) onto the shaft (3240).
- Insert the key (P234) into the keyway on the shaft.
- Slide the gear (7835) onto the shaft, ensuring that the internal keyway lines up with the key.

Driven Shaft

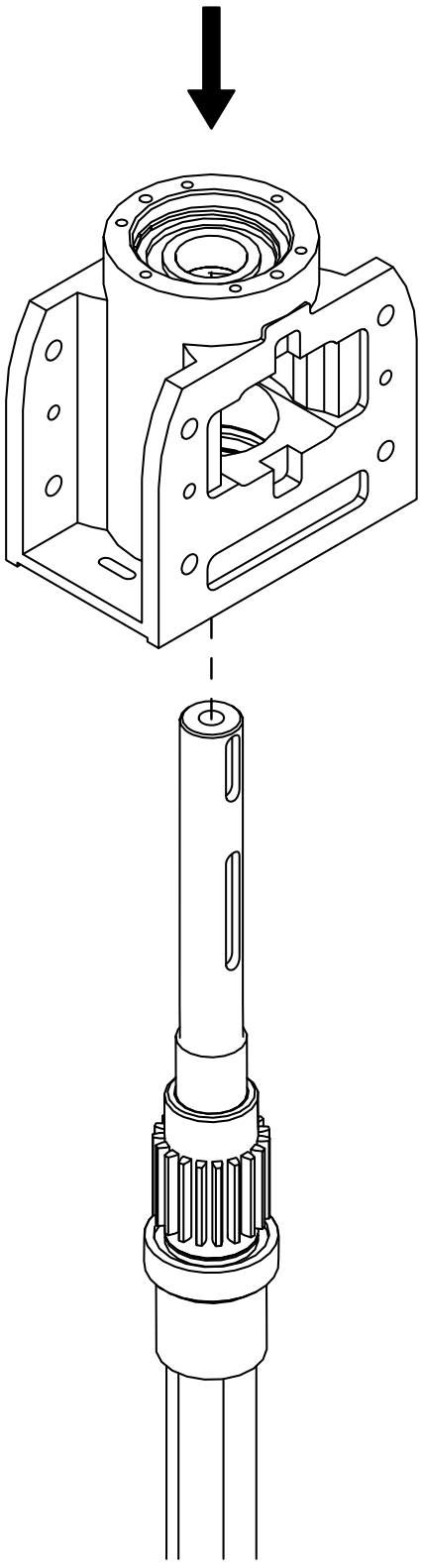


STEPS:

- Press the bearing housing assembly onto the driven shaft assembly.

Fig. 13.5

Drive Shaft



STEPS:

- Press the bearing housing assembly onto the drive shaft assembly.

Fig. 13.6

Driven Shaft

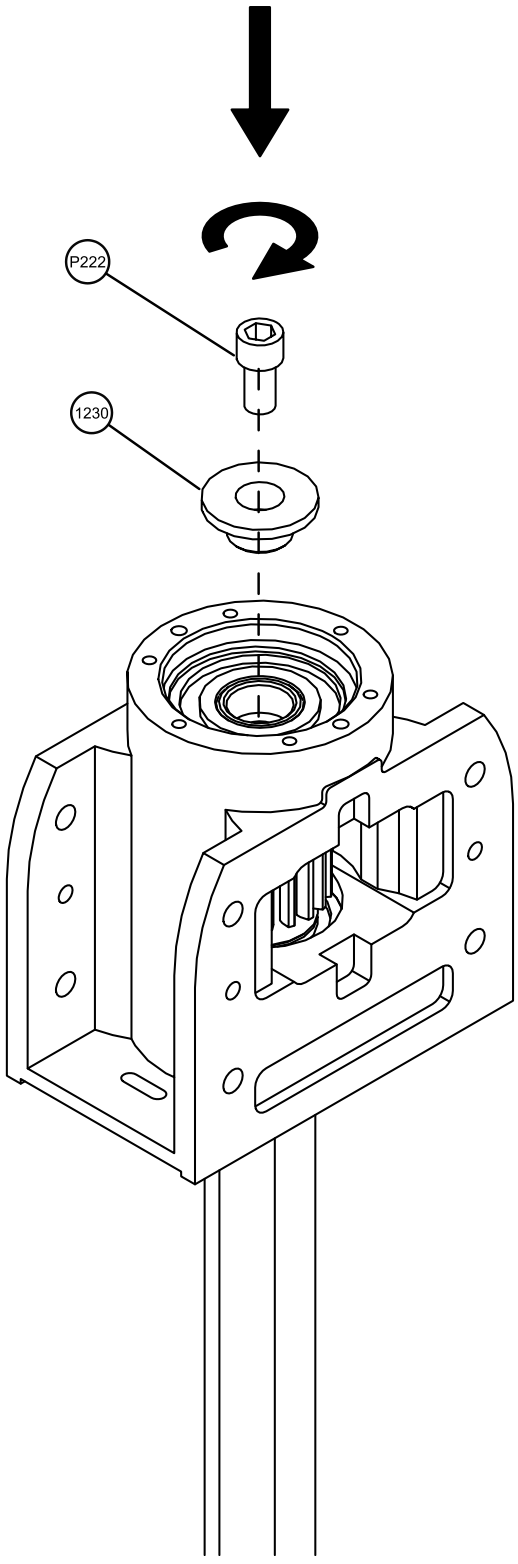


Fig. 13.7

NOTES:

Tightening Torques			
Item	Code	Nm	Ft lb
Cap screw	P222	140	100

- Apply Loctite 243 to socket cap screw (P222).

STEPS:

- Secure with the shaft end cap (1230) and socket cap screw (P222). See notes.

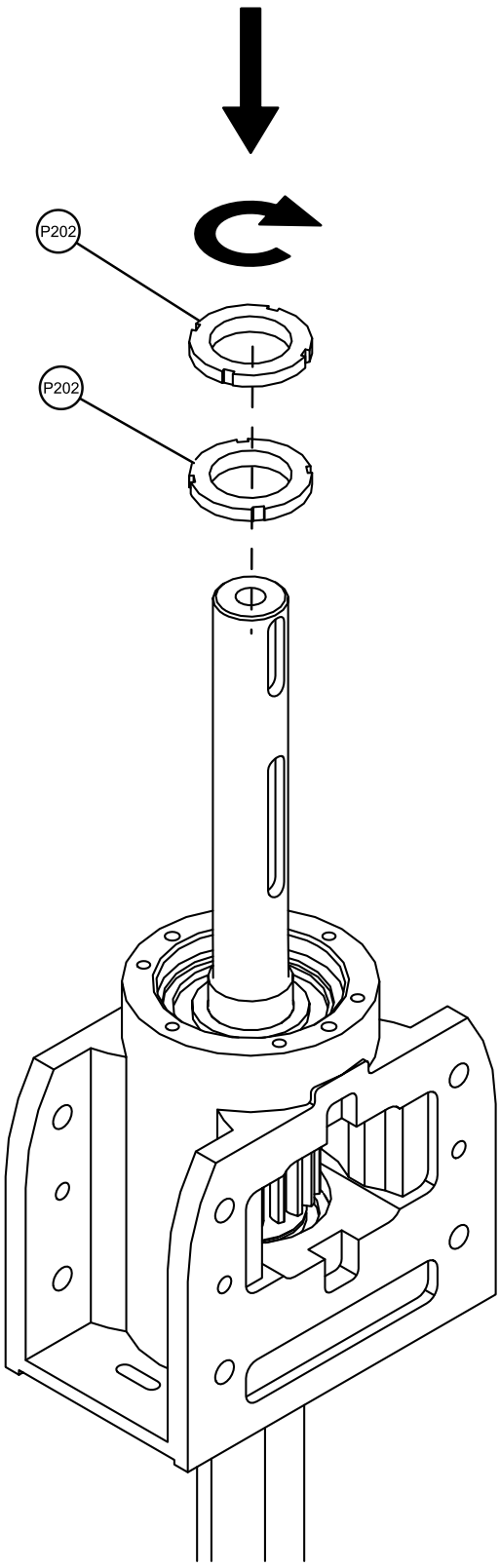


Fig. 13.8

NOTES:

- Assemble the locknuts as soon as possible after Loctite is applied to the bearings
- Apply Loctite 243 to locknuts (P202)
- Tool D000 9750 can be used to tighten locknuts see Fig. 13.9

STEPS:

- Screw first locknut (P202) onto the shaft and tighten against the bearing. Secure with second locknut. (P202)

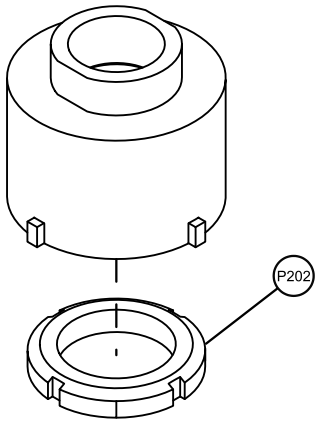


Fig. 13.9

Driven Shaft

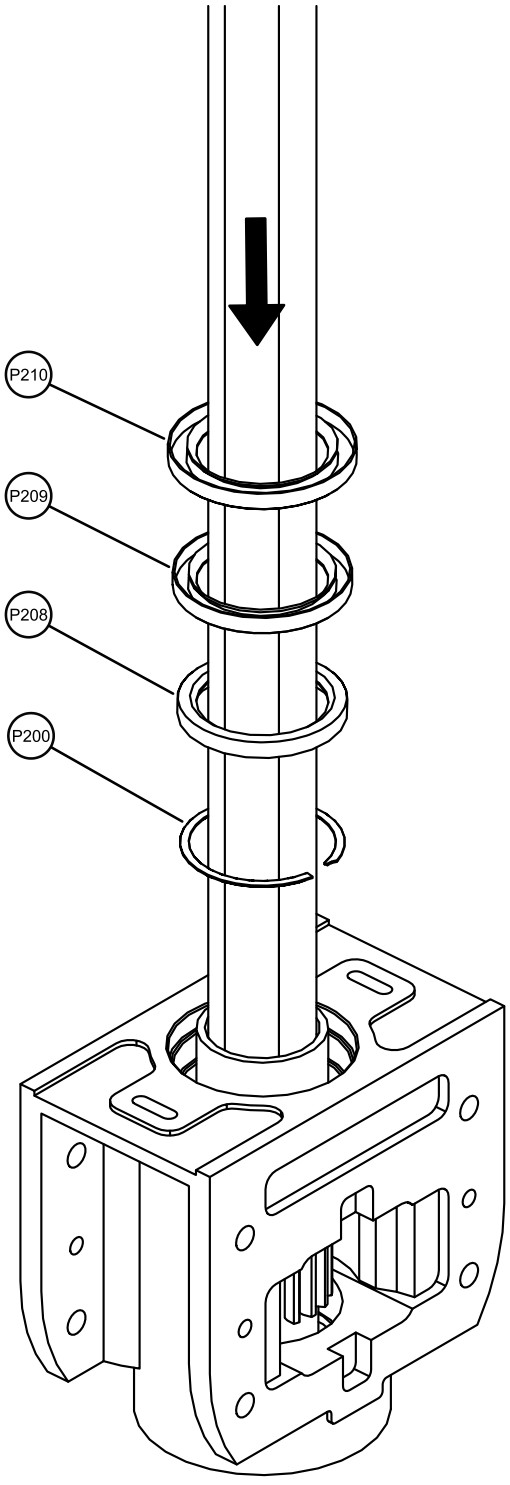


Fig. 13.10

NOTES:

- Assemble vertically in orientation shown
- Grease: Rocol food lube NLGI 2
- Pack/fill all cavities of lipseals with grease

STEPS:

- Insert the snap ring (P200) into the internal groove in the top housing.
- Install lipseals (P208), (P209) & (P210) into the bores in the top housing in the orientation shown in Fig. 13.11.

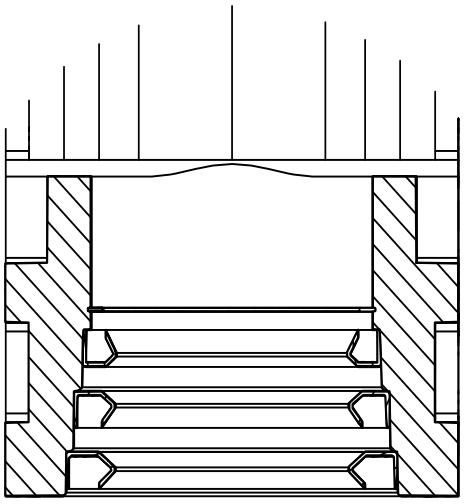


Fig. 13.11

Drive Shaft

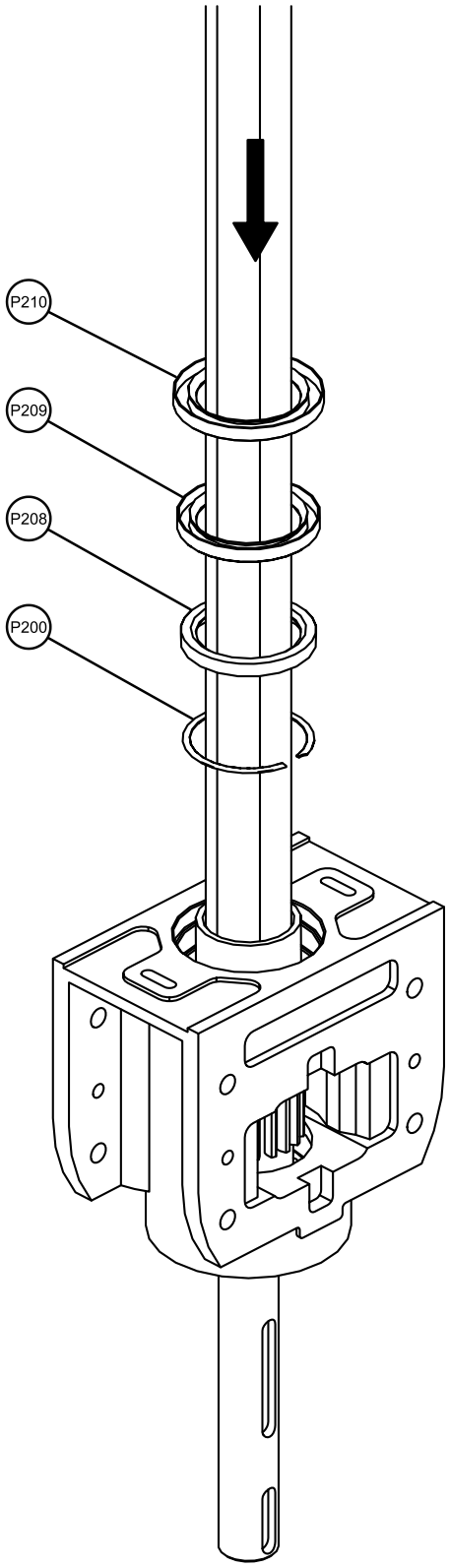


Fig. 13.12

NOTES:

- Assemble vertically in orientation shown
- Grease: Rocol food lube NLGI 2

STEPS:

- Insert the snap ring (P200) into the internal groove in the top housing
- Install lipseals (P208), (P209) & (P210) into the bores in the top housing in the orientation shown in Fig. 13.13. Pack with grease (see note)

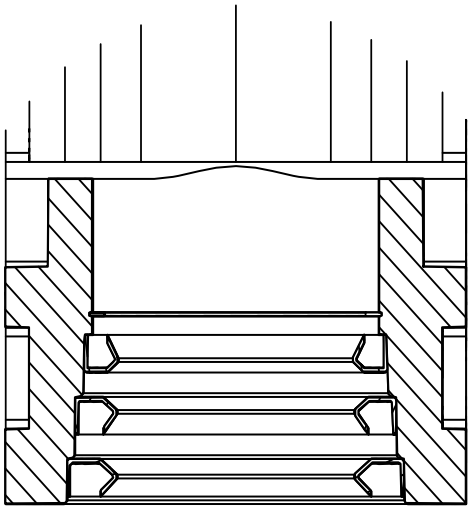


Fig. 13.13

Drive and Driven Shaft

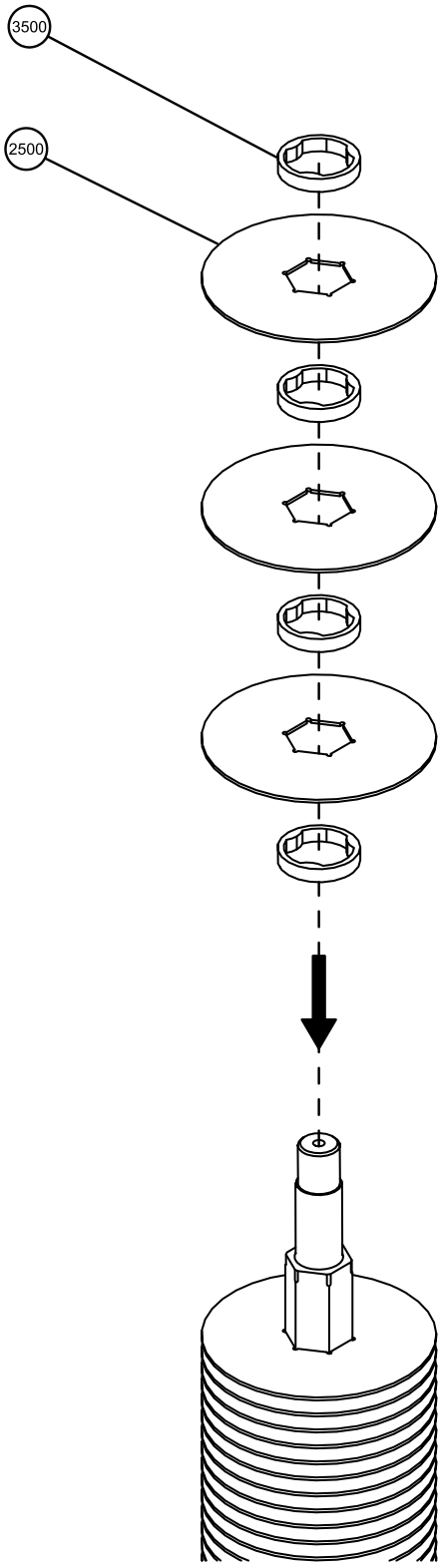


Fig. 13.14

NOTES:

- Disc configurations will vary depending upon shaft configuration. See Appendix B for details

STEPS:

- Slide alternate discs (2500) and spacers (3500) onto the shafts leaving approximately 7-8mm of hexagon shaft protruding

Drive and Driven Shaft

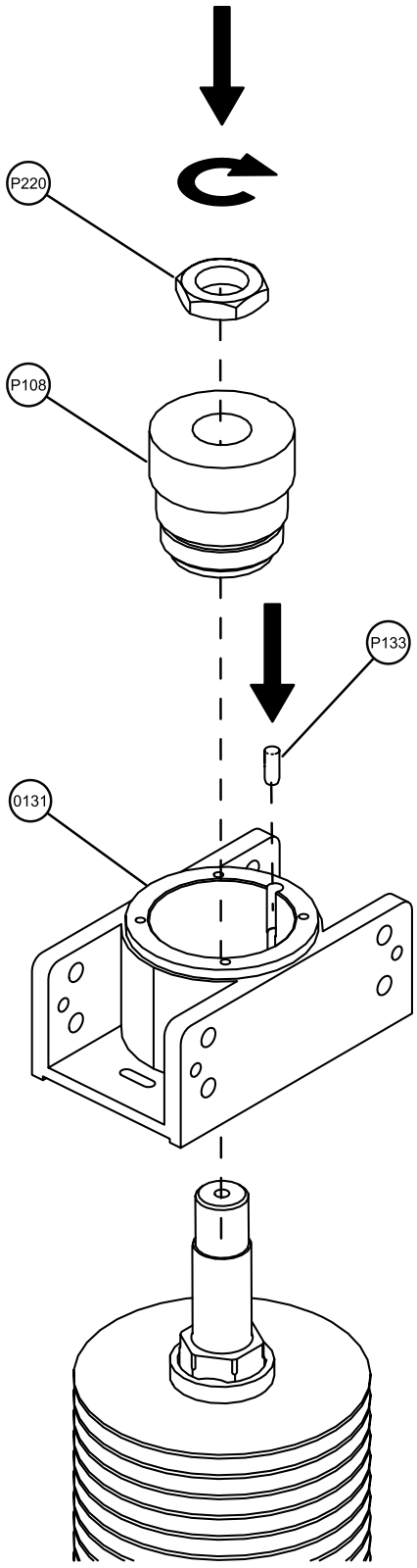


Fig. 13.15

NOTES:

- Apply Loctite 243 to nut (P220)

Tightening Torques			
Item	Code	Nm	Ft lb
Cap screw	P220	90	66

STEPS:

- Install the pin (P133) into the groove on the bottom housing.
- Insert the mechanical seal (P108) into the housing, ensuring it is aligned with the pin.
- Install the bottom housing (0131), pin (P133) and mechanical seal (P108) onto the shaft.
- Tighten the nut (P220) onto the shaft. See notes.

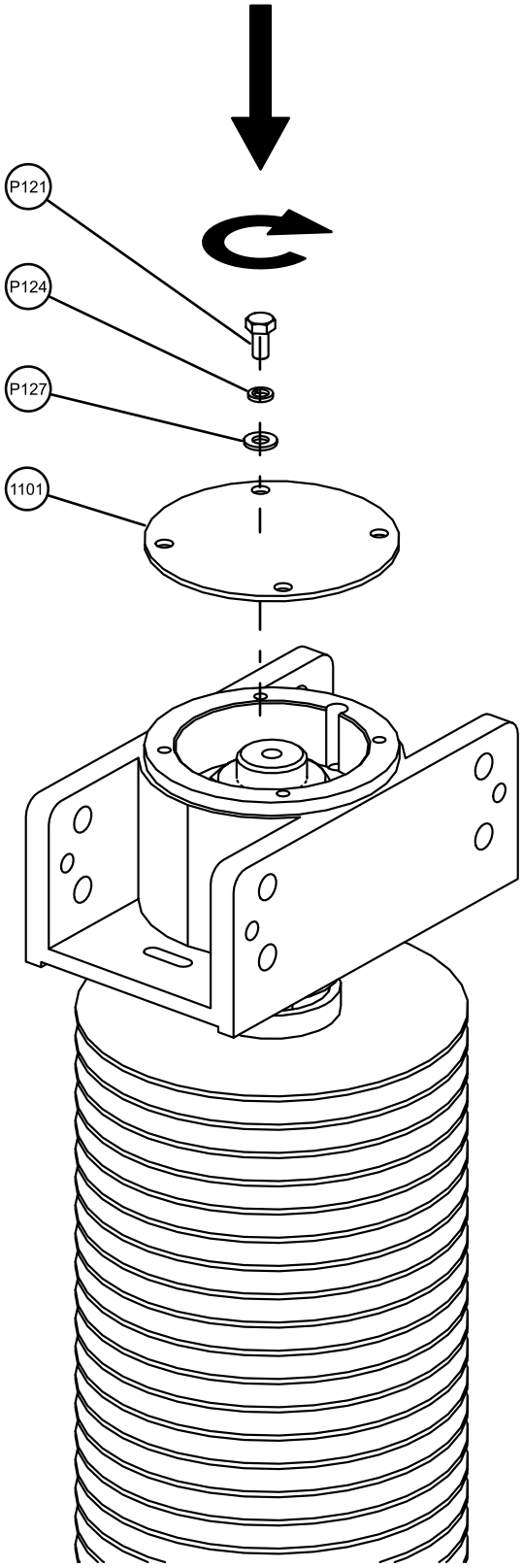


Fig. 13.16

NOTES:

- Seal bottom cover plate (1101) onto bottom housing with Loctite 5910 see Fig. 13.17
- Apply Loctite 243 to bolts (P121)

STEPS:

- Position bottom cover plate (1101) onto the bottom housing and secure in place with spring washer (P124), plain washer (P127) and hexagon head bolt (P121)

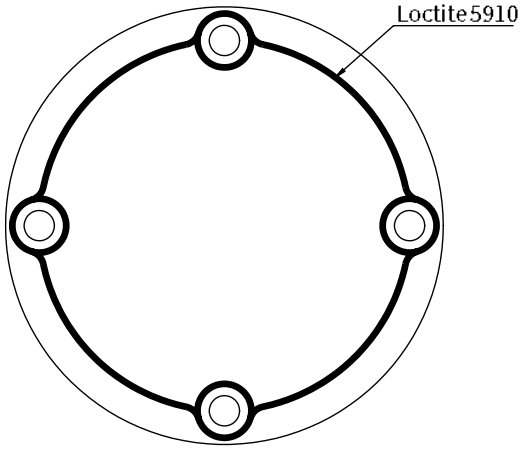


Fig. 13.17

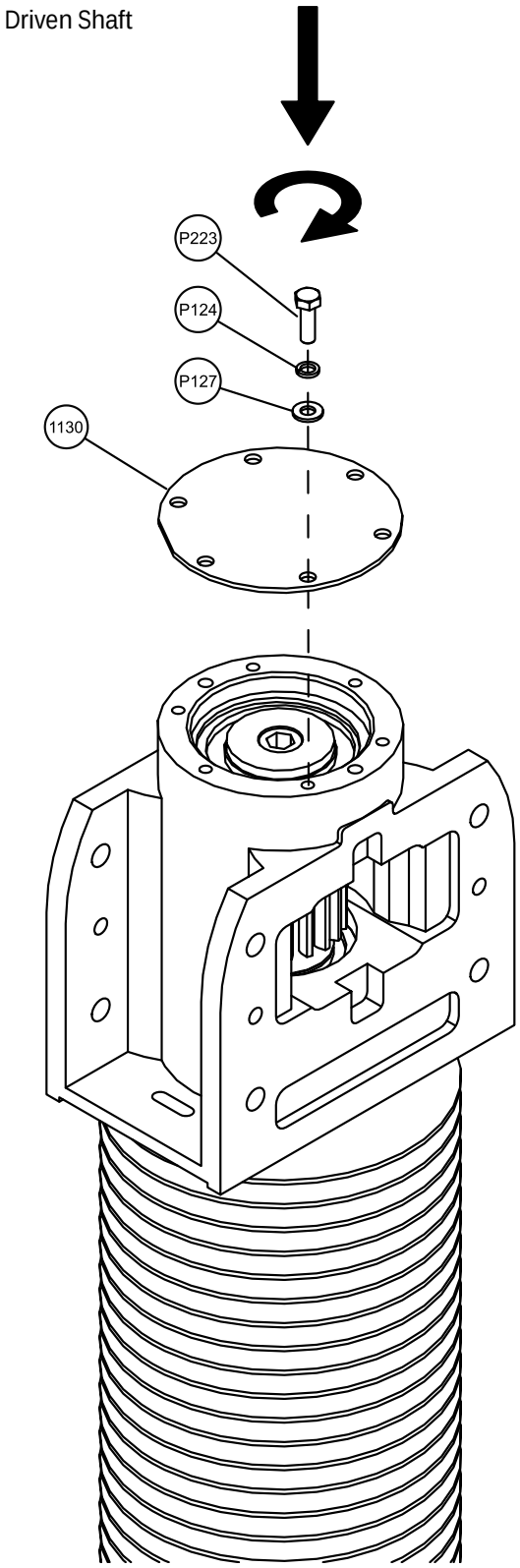


Fig. 13.18

NOTES:

- Seal top cover plate (1130) onto top housing with Loctite 5910 see Fig. 13.19
- Apply Loctite 243 to bolts (P223)

STEPS:

- Position top cover plate (1130) onto the top housing and secure in place with plain washer (P127), spring washer (P124) and hexagon head bolt (P223). See note.

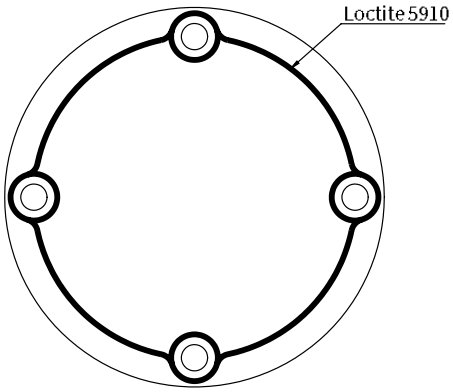


Fig. 13.19

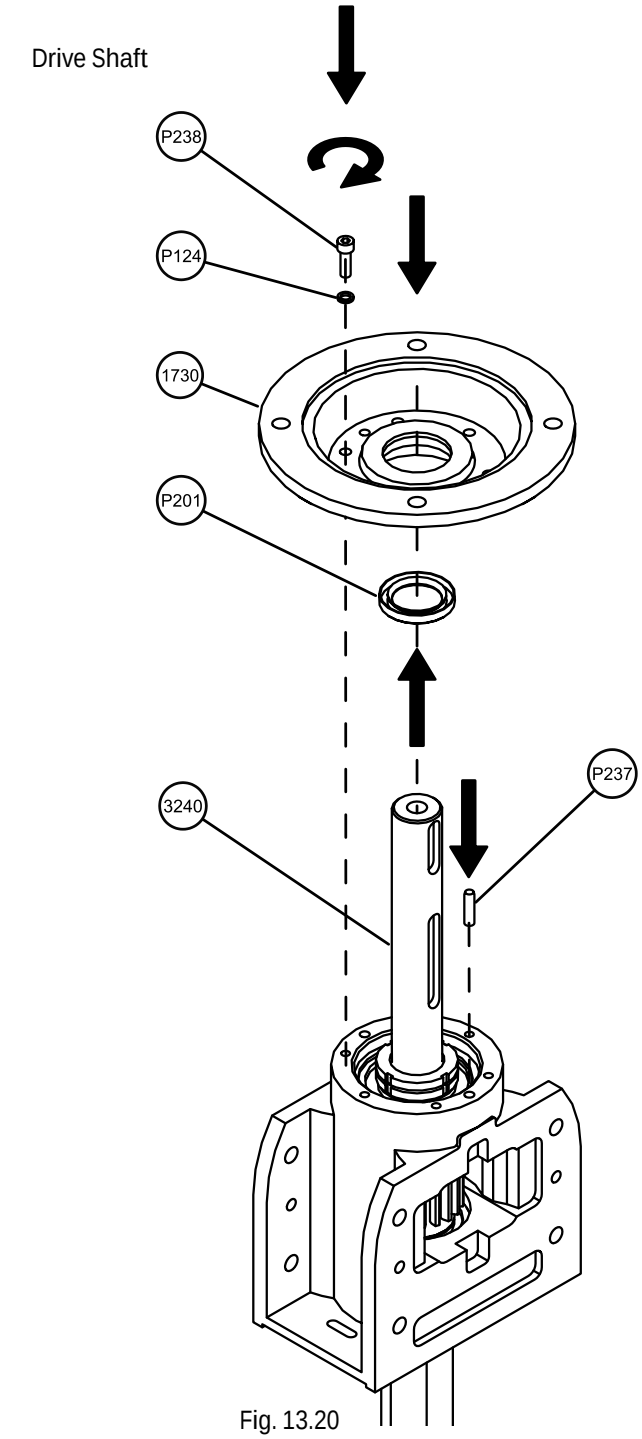


Fig. 13.20

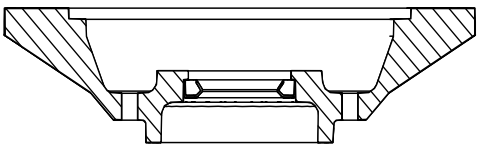


Fig. 13.21

NOTES:

- Seal adaptor stool (1730) onto top housing with Loctite 5910 see Fig. 13.22
- Apply Loctite 243 to bolts (P238)

Tightening Torques			
Item	Code	Nm	Ft lb
Cap screw	P238	30	22

- Grease: Rocol food lube NLGI 2

STEPS:

- Insert lipseal (P201) into adaptor stool (1730) in orientation shown in Fig. 13.21 and pack with grease
- Insert dowel pins (P237) into top housing and position adaptor stool by locating in pin hole
- Bolt adaptor stool (1730) onto top housing using spring washer (P124) and socket cap screw (P238)

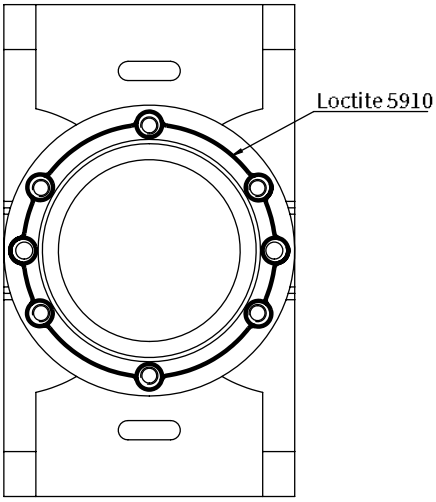


Fig. 13.22

Shaft Assembly

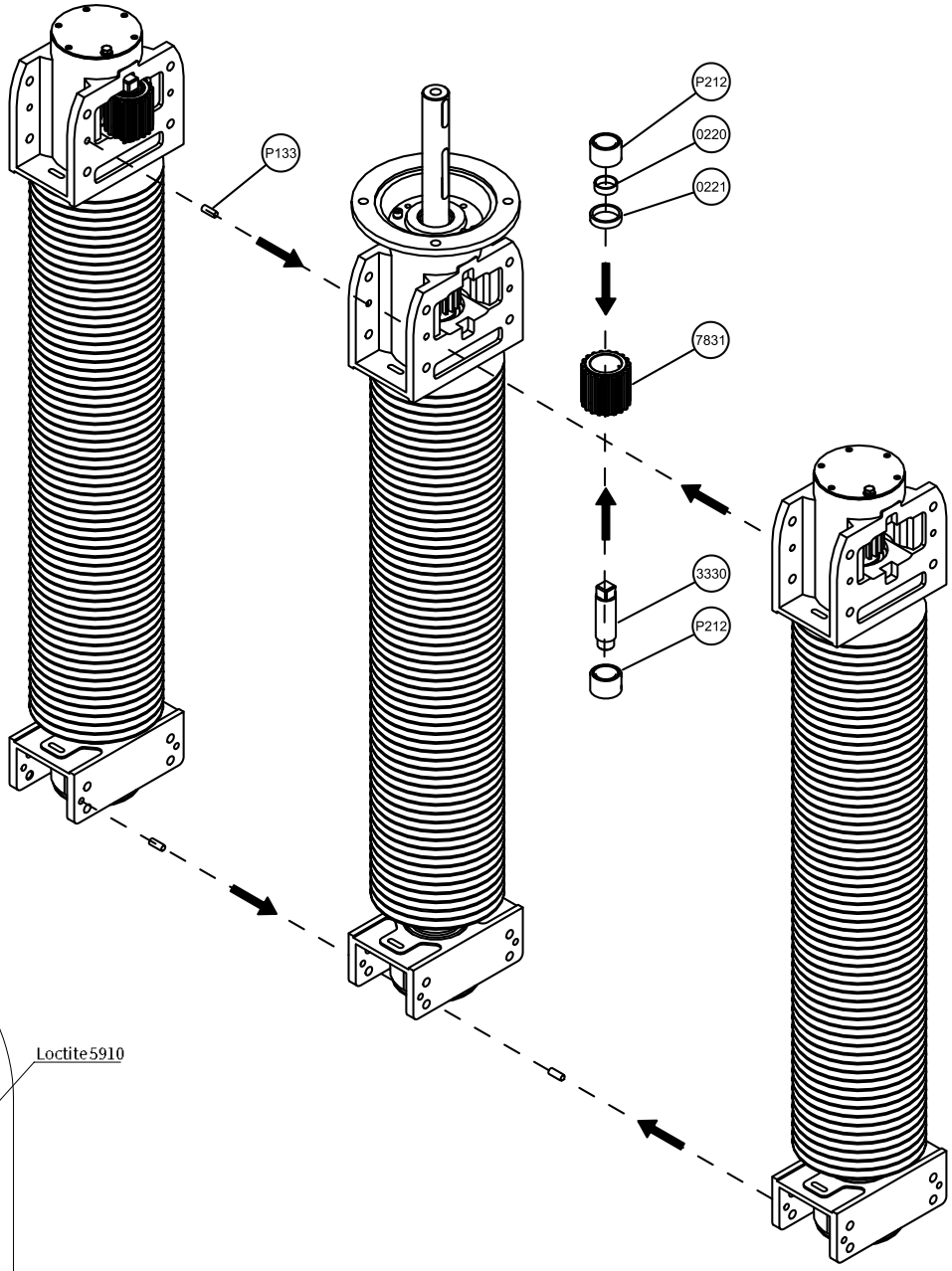


Fig. 13.23

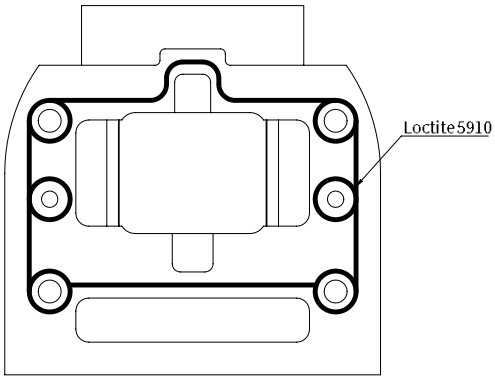


Fig. 13.24

STEPS:

- Assemble components of idler gear roller bearings (P212), bearing spacers (0220) & (0221), idler gear (7831) and idler shaft (3330)
- Insert in grooves in top housing
- Insert dowel pins (P133) into the top and bottom housings.
- Apply Loctite 5910 to face of housing see Fig. 13.24 and bring assemblies together

Shaft Assembly

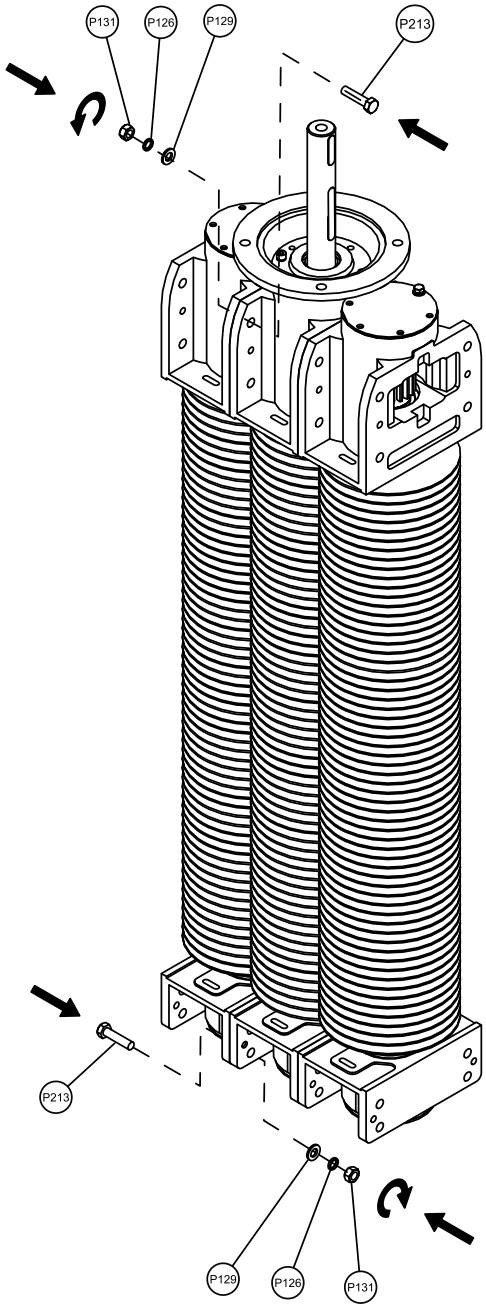


Fig. 13.25

NOTES:

- Apply Loctite 243 to bolts (P213)

Tightening Torques			
Item	Code	Nm	Ft lb
Hex Bolt	P213	40	30

STEPS:

- Bolt top and bottom housings together using bolts (P213), spring washer (P126), plain washer (P129) & hexagon nut (P131)

Discreen Shaft Assembly

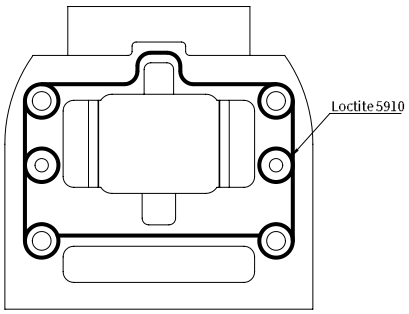


Fig. 13.26

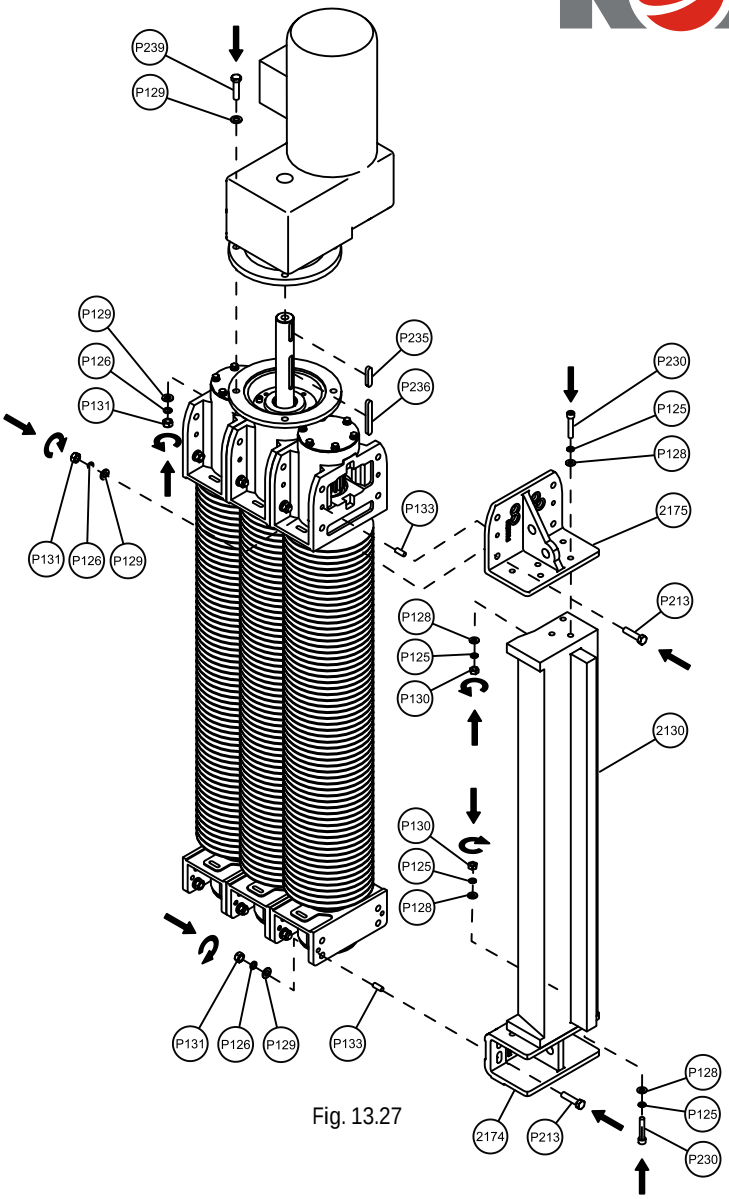


Fig. 13.27

NOTES:

- Seal the faces between the top housing and top mounting bracket (2175) using Loctite 5910 see Fig. 13.26

STEPS:

- Bolt the side rail (2130) to the top (2175) and bottom (2174) mounting brackets using cap head bolts (P230), spring washers (P125), plain washers (P128) and hexagon nuts (P130)
- Bolt the mounting brackets (2174) & (2175) to the bearing housings using hexagon head bolts (P213), spring washers (P126), plain washers (P129) and hexagon nuts (P131)
- Insert keys (P235) & (P236) into keyways in drive shaft.
- Assemble drive by lining up the keys in the bore of the gearbox and secure using bolts (P239), spring washers (P126), plain washers (P129) and nuts (P131).

Tightening Torques			
Item	Code	Nm	Ft lb
Hex Bolt	P213	40	30
Hex Bolt	P230	30	20

Discam Front

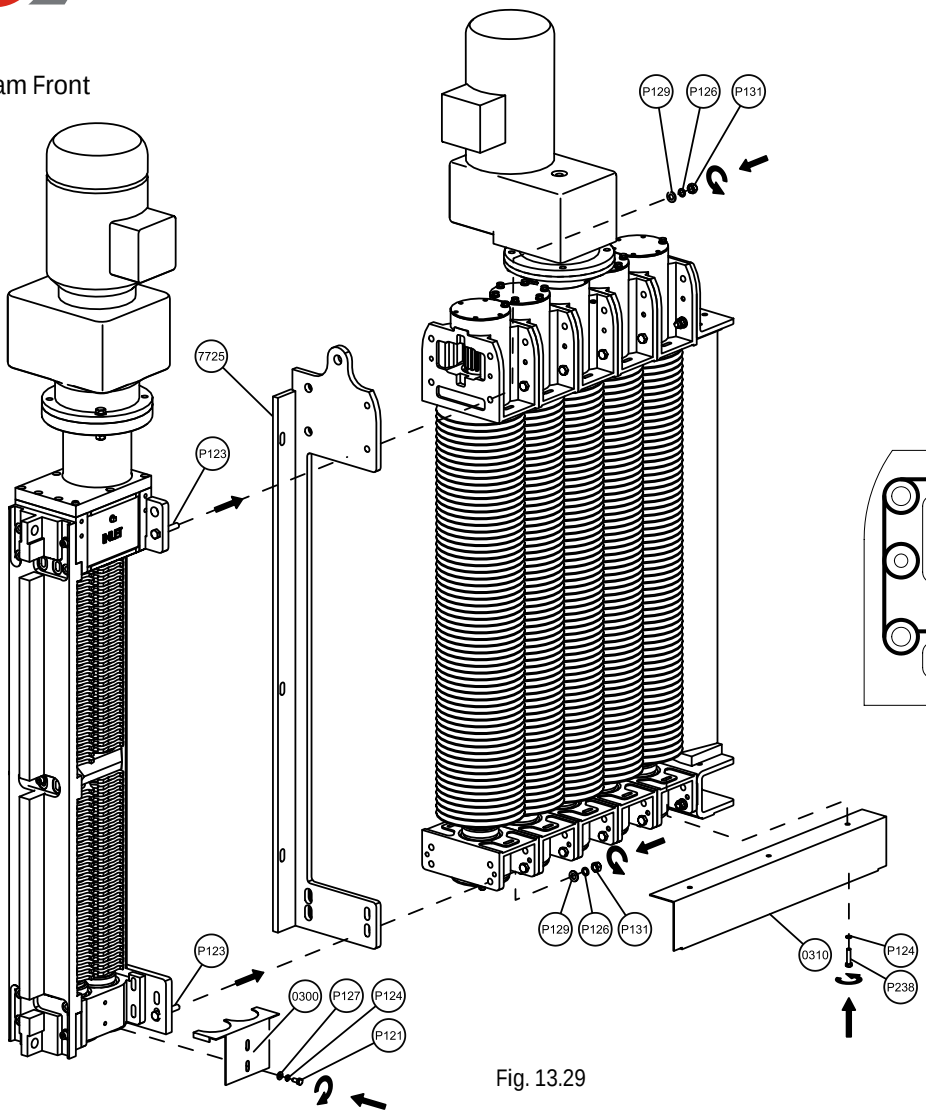


Fig. 13.29

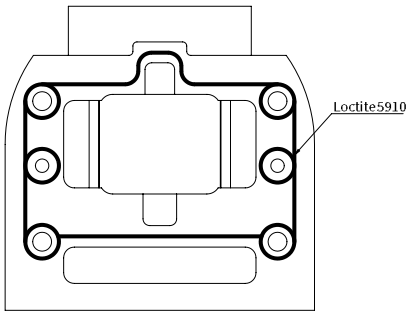


Fig. 13.28

NOTES:

- Fig. 13.29 shows a right-hand machine
- A left-hand machine would have the muncher on the right-hand side when looking towards the inlet
- Seal the faces between the top housing and side rail (7720) with Loctite 5910 see Fig. 13.28
- Apply Loctite 243 to bolts (P121) and (P238)

STEPS:

- Bolt the Muncher to the Discreen using hexagon head bolts (P123), spring washers (P126), plain washers (P129) and hexagon nuts (P131).
- Bolt the bottom baffle plate (0310) onto the Discreen bottom housings using hexagon head bolts (P238) and spring washers (P124)
- Bolt the bottom baffle plate (0300) onto the bottom housing of the Muncher using hexagon head bolts (P121), spring washers (P124) and plain washers (P127)

Tightening Torques			
Item	Code	Nm	Ft lb
Hex Bolt	P123	40	30

Discam Back

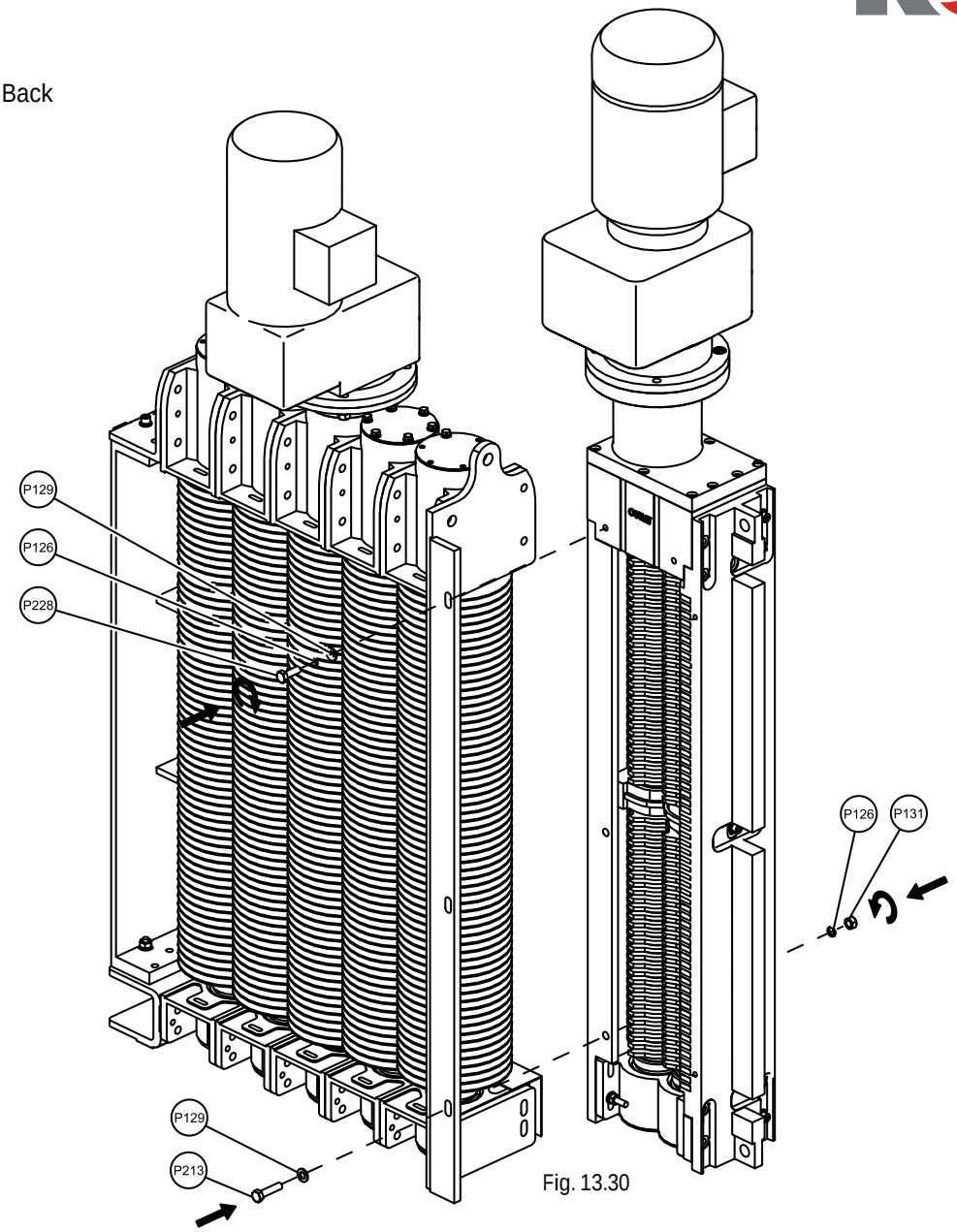


Fig. 13.30

NOTES:

- Fig. 13.30 shows a right-hand machine
- A left-hand machine would have the muncher on the right-hand side when looking towards the inlet

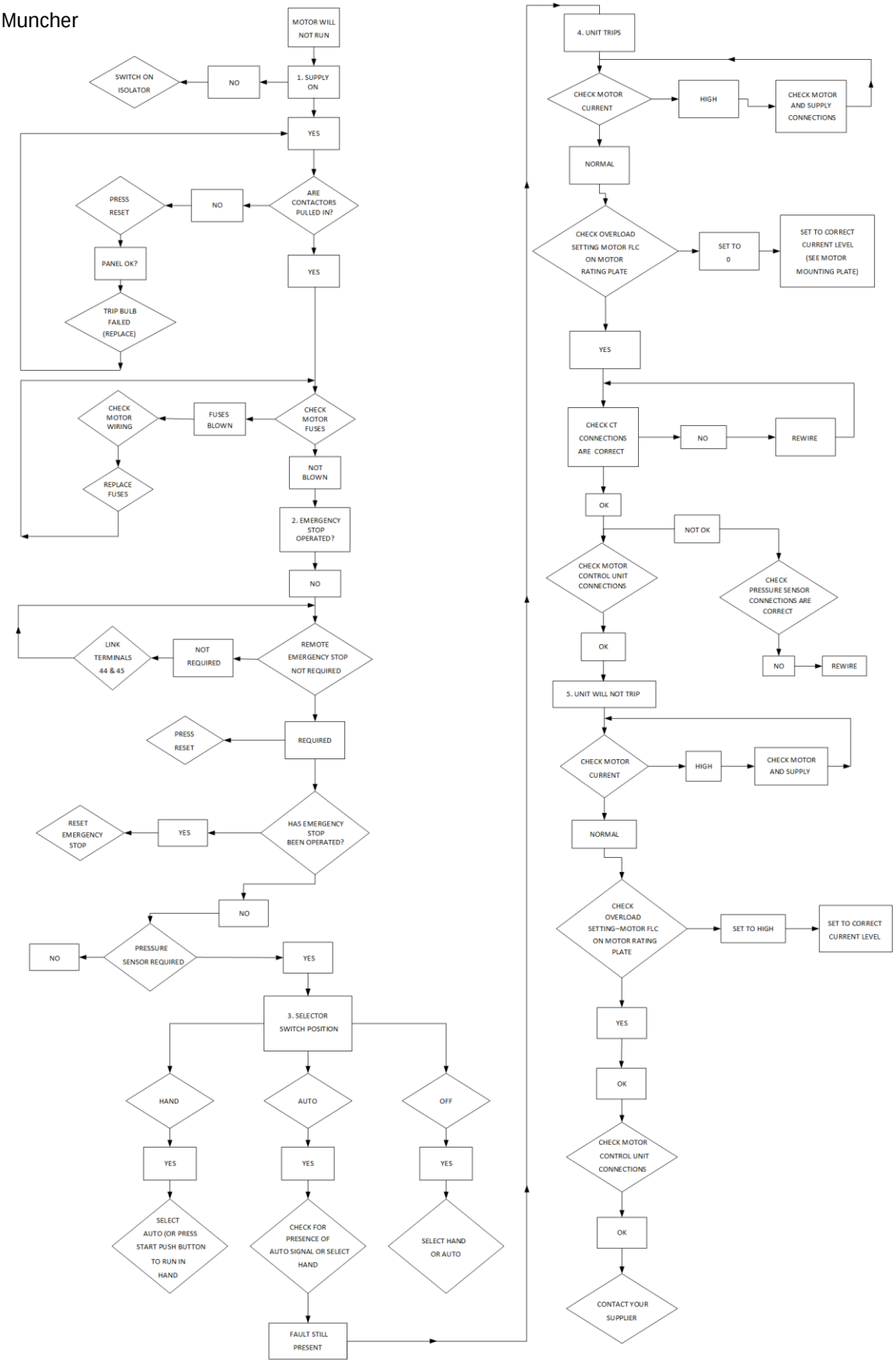
STEPS:

- Secure the Muncher and Discreen together using hexagon head bolts (P228) & (P213), spring washers (P126) and plain washers (P129) and hexagon nuts (P131)
- Top housings to be filled with oil via plug (See appendix F)

Tightening Torques			
Item	Code	Nm	Ft lb
Hex Bolt	P213	40	30
Hex Bolt	P228	40	30

14 Fault Finding

14.1 Muncher



15 Spares and Service Contacts

UK

Spares	+44 (0)161 214 2380 (direct line 8.15 am – 5.00 pm)
E-mail	ManchesterSpares@nov.com
Service	+44 (0)161 214 2390 (direct line 8.15 am – 5.00 pm)
E-mail	Customer.Services@nov.com
Service	+44 (0)161 339 9000 (24 hrs)

France

Spares & Service	+33 (0)3 29 94 26 88
E-mail	monofrance@nov.com

Australia

Melbourne	(03) 9773 7777
Sydney	(02) 8536 0900
Brisbane	(07) 3350 4582
Adelaide	(08) 8132 6800
Perth	(08) 9320 5800
Darwin	(08) 8931 3300
E-mail	ozsales@nov.com

New Zealand

Spares & Service	+64 (0)9 829 0333
E-mail	info@mono-pumps.co.nz

USA

Houston Spares & Service	+1 281 854 0300
Ohio Spares & Service	+1 877 486 6966
E-mail	moyno@nov.com

China

Beijing	+86 (0) 10 5707 0900
Shanghai	+86 (0) 21 3990 4558

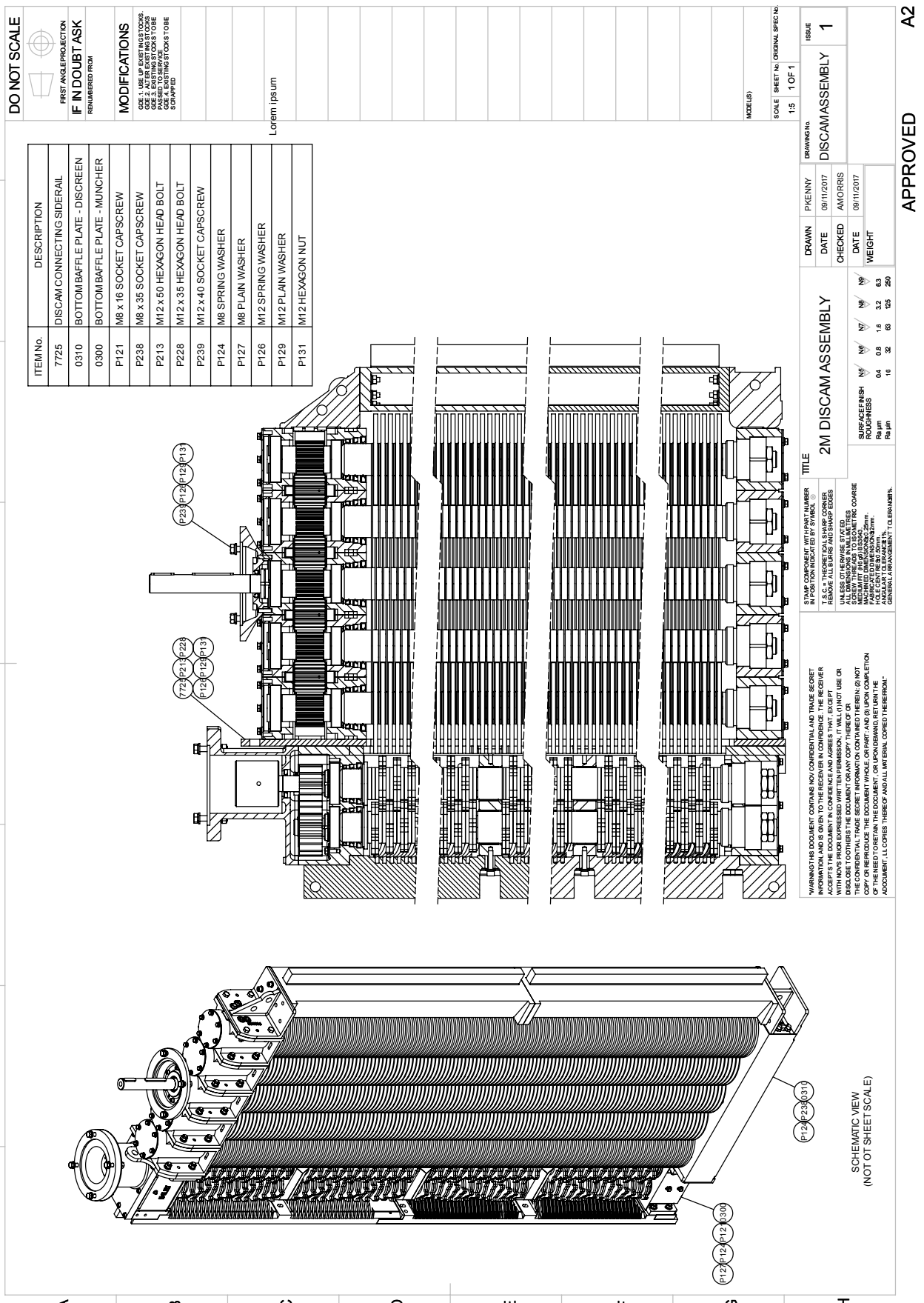
16 Distributors

For local distribution, please refer to our website:

www.mono-pumps.com/en-uk/sales_network

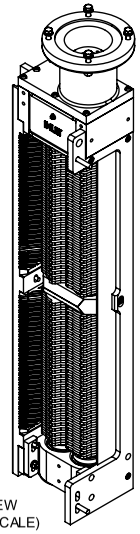
17 Appendices

17.1 Appendix A



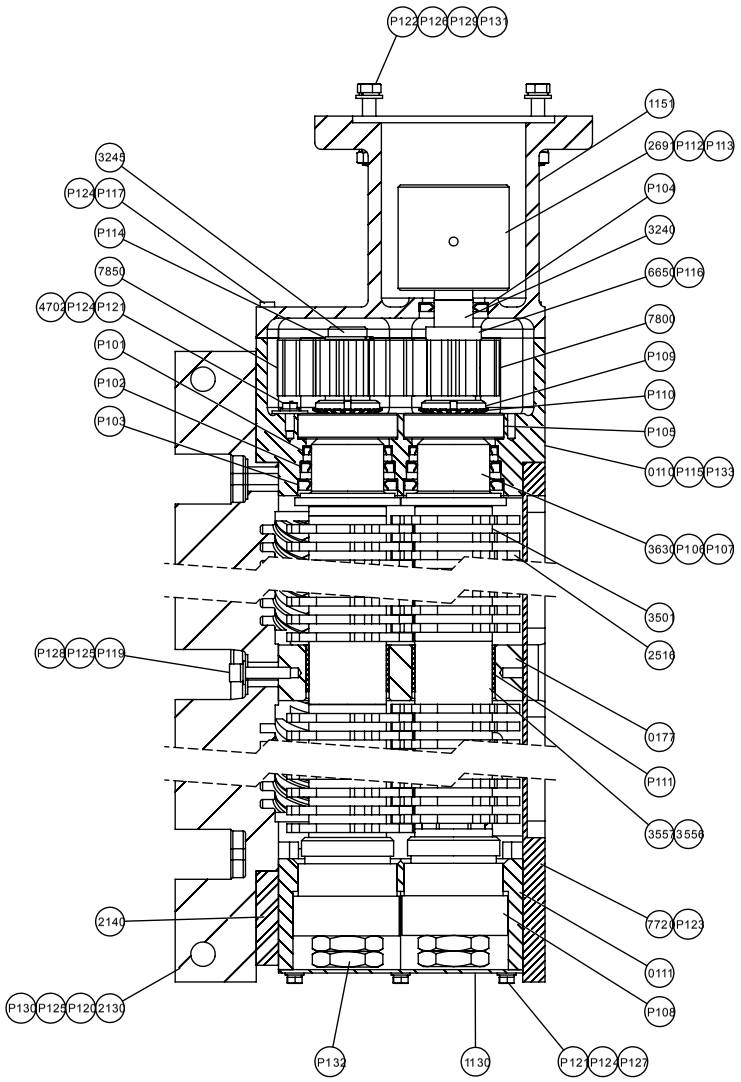
OMMP/051/01 – REV 2

ITEM No.	DESCRIPTION
0110	TOP BEARING HOUSING
0111	BOTTOM BEARING HOUSING
0177	MID HOUSING
1130	BOTTOM COVER PLATE
1151	ADAPTOR STOOL
2130	SIDERAIL
2140	SIDERAIL PACKER PLATE
7720	INBOARD SIDERAIL
3245	DRIVEN SHAFT
3240	DRIVE SHAFT
3630	TOP STACK COLLAR
7800	DRIVE GEAR
7850	DRIVEN GEAR
4702	BEARING RETAINING WASHER
6650	ABUTMENT RING
2516	MUNCHER CUTTER
3501	MUNCHER SPACER
2691	MOTOR COUPLING
3556	MID BEARING SPACER
3557	MID BEARING SLEEVE



SCHEMATIC VIEW
(NOT TO SHEET SCALE)

ITEM No.	DESCRIPTION
P101	ROTARY SHAFT LIPSEAL 65 x 80 x 8
P102	ROTARY SHAFT LIPSEAL 65 x 85 x 10
P103	ROTARY SHAFT LIPSEAL 65 x 90 x 10
P104	ROTARY SHAFT LIPSEAL 35 x 62 x 7
P105	BALL BEARING 40 x 90 x 23
P106	TOROIDAL SEAL RING 39.5 x 3
P107	DOWEL PIN Ø3 x 20
P108	MECHANICAL SEAL
P109	LOCKNUT M40 x 1.5
P110	LOCK WASHER M40
P111	PERMAGLIDE BUSH
P112	RECTANGULAR PARALLEL KEY 10 x 8 x 45
P113	DOWEL PIN Ø8 x 90
P114	CIRCLIP
P115	3/8" BSP PLUG
P116	HEXAGON SOCKET SCREW M6 x 6
P117	SOCKET CAPSCREW M8 x 35
P119	SOCKET CAPSCREW M10 x 45
P120	SOCKET CAPSCREW M10 x 65
P121	HEXAGON HEAD BOLT M8 x 16
P122	HEXAGON HEAD BOLT M12 x 65
P123	HEXAGON HEAD BOLT M12 x 70
P124	M8 SPRING WASHER
P125	M10 SPRING WASHER
P126	M12 SPRING WASHER
P127	M8 PLAIN WASHER
P128	M10 PLAIN WASHER
P129	M12 PLAIN WASHER
P130	M10 HEXAGON NUT
P131	M12 HEXAGON NUT
P132	HEXAGON NUT M36 x 2
P133	DOWEL PIN Ø10 x 25



DO NOT SCALE

FIRST ANGLE PROJECTION

IF IN DOUBT ASK

RENUMBERED FROM

MODIFICATIONS

GDE.1. USE UP EXISTING STOCKS.
GDE.2. ALTER EXISTING STOCKS
GDE.3. EXISTING STOCKS TO BE PASSED TO SERVICE
GDE.4. EXISTING STOCKS TO BE SCRAPPED

Mono™

MODEL(S)

SCALE	SHEET No.	ORIGINAL SPEC No.
1:3	1 OF 1	

STAMP COMPONENT WITH PART NUMBER IN POSITION INDICATED BY SYMBOL

T.S.C. = THEORETICAL SHARP CORNER
REMOVE ALL BURRS AND SHARP EDGES

UNLESS OTHERWISE STATED
ALL DIMENSIONS IN MILLIMETRES
SCREW THREADS TO ISO METRIC COARSE MEDIUM FIT (H6 g6) BS3643.
MACHINED DIMENSIONS ±0.25mm.
FABRICATED DIMENSIONS ±2mm.
HOLE CENTRES ±0.50mm.
ANGULAR TOLERANCE ±1%.
GENERAL ARRANGEMENT TOLERANCE ±1%.

TITLE

DISCAM MUNCHER ASSEMBLY

DRAWN	PKENNY
DATE	09/11/2017
CHECKED	AMORRIS
DATE	09/11/2017
WEIGHT	

SURFACE FINISH ROUGHNESS	N5	N6	N7	N8	N9
Ra µm	0.4	0.8	1.6	3.2	6.3
Ra µin	16	32	63	125	250

DRAWING No.: DISCAM MUNCHER

ISSUE: 1

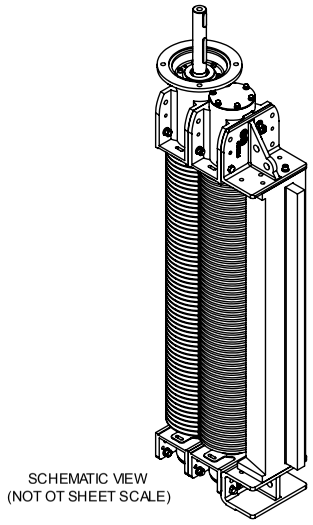
APPROVED

A2

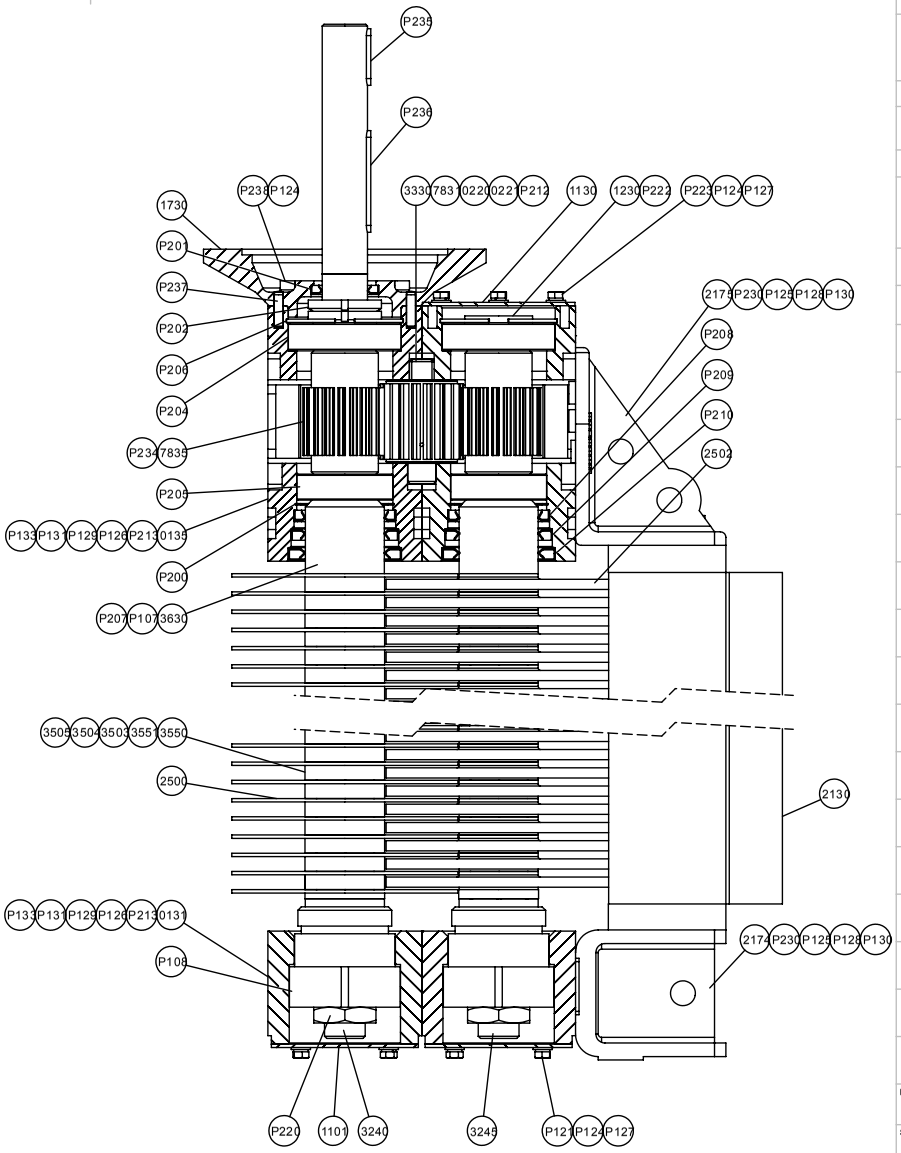
111

ITEM No.	DESCRIPTION
0131	BOTTOM HOUSING
0135	TOP BEARING HOUSING
0220	IDLER GEAR BEARING SPACER
0221	IDLER GEAR BEARING SPACER
1101	BOTTOM COVER PLATE
1130	TOP COVER PLATE
1230	DRIVEN SHAFT END CAP
1730	ADAPTOR STOOL
2130	SIDERAIL
2174	BOTTOM MOUNTING BRACKET
2175	SIDERAIL MOUNTING BRACKET
2500	DISCREEN DISC
2502	DYNAMIC DISC
3240	DRIVE SHAFT
3245	DRIVEN SHAFT
3330	IDLER SHAFT
3503	DISC SPACER
3504	DISC SPACER
3505	DISC SPACER
3550	DISC SPACER
3551	DISC SPACER
3630	TOP STACK COLLAR
7831	IDLER GEAR
7835	DRIVE GEAR

ITEM No.	DESCRIPTION
P107	DOWEL PIN Ø3 x 20
P108	MECHANICAL SEAL
P121	M8 x 16 HEXAGON HEAD BOLT
P124	M8 SPRING WASHER
P125	M10 SPRING WASHER
P126	M12 SPRING WASHER
P127	M8 PLAIN WASHER
P128	M10 PLAIN WASHER
P129	M12 PLAIN WASHER
P130	M10 HEXAGON NUT
P131	M12 HEXAGON NUT
P133	DOWEL PIN Ø10 x 25
P200	SNAP RING
P201	ROTARY SHAFT LIPSEAL 40 x 60 x 8
P202	M45 x 1.5 LOCKNUT
P204	SINGLE ROW BALL BEARING 45 x 100 x 25
P205	ROLLER BEARING 45 x 85 x 23
P206	INTERNAL CIRCLIP
P207	TOROIDAL SEAL RING
P208	ROTARY SHAFT LIPSEAL 90 x 70 x 10
P209	ROTARY SHAFT LIPSEAL 70 x 95 x 10
P210	ROTARY SHAFT LIPSEAL 70 x 100 x 10
P212	IDLER GEAR ROLLER BEARING
P213	M12 x 50 HEXAGON HEAD BOLT
P220	M36 HEXAGON THIN NUT
P222	M16 x 30 SOCKET CAPSCREW
P223	M8 x 25 HEXAGON HEAD BOLT
P230	M10 x 55 SOCKET CAPSCREW
P234	RECTANGULAR PARALLEL KEY 10 x 8 x 70
P235	RECTANGULAR PARALLEL KEY 12 x 8 x 50
P236	RECTANGULAR PARALLEL KEY 12 x 8 x 90
P237	DOWEL PIN Ø8 x 30
P238	M8 x 35 SOCKET CAPSCREW



SCHEMATIC VIEW
(NOT OT SHEET SCALE)



DO NOT SCALE

FIRST ANGLE PROJECTION

IF IN DOUBT ASK

RENUMBERED FROM

MODIFICATIONS

GDE.1. USE UP EXISTING STOCKS.
GDE.2. ALTER EXISTING STOCKS
GDE.3. EXISTING STOCKS TO BE PASSED TO SERVICE
GDE.4. EXISTING STOCKS TO BE SCRAPPED

Mono™

MODEL(S)

SCALE	SHEET No.	ORIGINAL SPEC No.
1:3	1 OF 1	

STAMP COMPONENT WITH PART NUMBER IN POSITION INDICATED BY SYMBOL ◎

T.S.C. = THEORETICAL SHARP CORNER
REMOVE ALL BURRS AND SHARP EDGES

UNLESS OTHERWISE STATED
ALL DIMENSIONS IN MILLIMETRES
SCREW THREADS TO ISO METRIC COARSE MEDIUMFIT (6H/6g) BS3643.
MACHINED DIMENSIONS ± 0.25mm.
FABRICATED DIMENSIONS ± 2mm.
HOLE CENTRES ± 0.50mm.
ANGULAR TOLERANCE ± 1°.
GENERAL ARRANGEMENT TOLERANCE ± 1%.

TITLE

DISCAM DISCREEN ASSEMBLY

SURFACE FINISH ROUGHNESS	N5	N6	N7	N8	N9
Ra µm	0.4	0.8	1.6	3.2	6.3
Ra µin	16	32	63	125	250

DRAWN	PKENNY
DATE	09/11/2017
CHECKED	AMORRIS
DATE	09/11/2017
WEIGHT	

DRAWING No. DISCAM DISCREEN

ISSUE 1

APPROVED

A2

OMMP/051/01 – REV 2

17.2 Appendix B

Discam 9mm Spacing

Shaft Configurations

NB. Configuration order is left to right when looking at the inlet side of the Discreen.

1m (40") Throat

A		B		C		D	
Part No.	Qty	Part No.	Qty	Part No.	Qty	Part No.	Qty
SO D000 2502	41	SO D000 2500	41	SO D000 3551	1	SO D000 3551	1
		SO D000 3550	41	SR A02A 3504	1	SO D000 2500	1
		SO D000 3551	41	SO D000 2500	41	SO D000 2502	40
				SO D000 3550	40	SO D000 3551	1
				SO D000 3551	40	SO D000 2500	1
				SR D000 3504	1		

No. of Shafts	Configuration (Bold character is position of Drive Shaft)	
	Left Hand	Right Hand
3	A ,**B**, A	A ,**B**, A
4	D, C, **B**, A	D, **C**, B, A
5	A, B, **C**, B, A	A, B, **C**, B, A
6	D, C, B, **C**, B, A	D, C, **B**, C, B, A
7	A, B, C, **B**, C, B, A	A, B, C, **B**, C, B, A
8	D, C, B, C, **B**, C, B, A	D, C, B, **C**, B, C, B, A
9	A, B, C, B, **C**, B, C, B, A	A, B, C, B, **C**, B, C, B, A
10	D, C, B, C, B, **C**, B, C, B, A	D, C, B, C, **B**, C, B, C, B, A

1.5m (60") Throat

A		B		C		D	
Part No.	Qty	Part No.	Qty	Part No.	Qty	Part No.	Qty
SO D000 2502	62	SO D000 2500	62	SO D000 3551	1	SO D000 3551	1
SR A02A 3505	1	SO D000 3550	62	SR A02A 3504	1	SO D000 2500	1
		SO D000 3551	62	SO D000 2500	61	SO D000 2502	61
		SR A02A 3503	1	SO D000 3550	61	SO D000 2500	1
				SO D000 3551	61	SR A02A 3502	1
				SO D000 2500	1		
				SR A02A 3503	1		
				SR D000 3504	1		

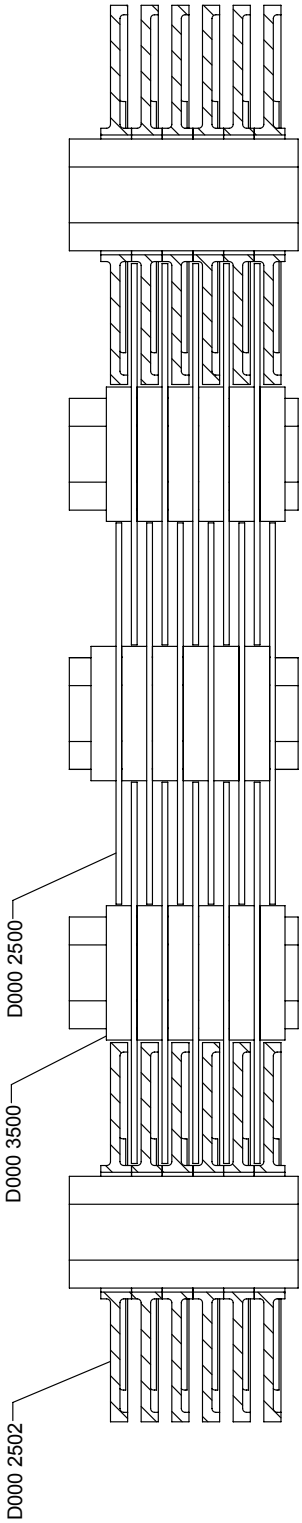
No. of Shafts	Configuration (Bold character is position of Drive Shaft)	
	Left Hand	Right Hand
3	A ,**B**, A	A ,**B**, A
4	D, C, **B**, A	D, **C**, B, A
5	A, B, **C**, B, A	A, B, **C**, B, A
6	D, C, B, **C**, B, A	D, C, **B**, C, B, A
7	A, B, C, **B**, C, B, A	A, B, C, **B**, C, B, A
8	D, C, B, C, **B**, C, B, A	D, C, B, **C**, B, C, B, A
9	A, B, C, B, **C**, B, C, B, A	A, B, C, B, **C**, B, C, B, A
10	D, C, B, C, B, **C**, B, C, B, A	D, C, B, C, **B**, C, B, C, B, A

2m (80") Throat

A		B		C		D	
Part No.	Qty	Part No.	Qty	Part No.	Qty	Part No.	Qty
SO D000 2502	84	SO D000 2500	84	SO D000 3551	1	SO D000 3551	1
SR D000 3504	1	SO D000 3550	84	SR A02A 3504	1	SO D000 2500	1
		SO D000 3551	84	SO D000 2500	83	SO D000 2502	84
		SO D000 2500	1	SO D000 3550	83		
		SR A02A 3500	1	SO D000 3551	83		
		SR A02A 3505	1	SO D000 2500	1		
				SR D000 3504	1		
				SR L000 3501	1		

No. of Shafts	Configuration (Bold character is position of Drive Shaft)	
	Left Hand	Right Hand
3	A ,**B**, A	A ,**B**, A
4	D, C, **B**, A	D, **C**, B, A
5	A, B, **C**, B, A	A, B, **C**, B, A
6	D, C, B, **C**, B, A	D, C, **B**, C, B, A
7	A, B, C, **B**, C, B, A	A, B, C, **B**, C, B, A
8	D, C, B, C, **B**, C, B, A	D, C, B, **C**, B, C, B, A
9	A, B, C, B, **C**, B, C, B, A	A, B, C, B, **C**, B, C, B, A
10	D, C, B, C, B, **C**, B, C, B, A	D, C, B, C, **B**, C, B, C, B, A

9mm (0.35") DISCREEN DISC AND SPACER BUILD
5 SHAFT CONFIGURATION EXAMPLE



D000 2502 DISCS ARE ASSEMBLED ON THE OUTER SHAFTS OF ALL ASSEMBLY CONFIGURATIONS TO MAINTAIN REQUIRED SCREEN APERTURE.
NB. D000 2502 DISCS ARE SECTIONED FOR CLARITY.

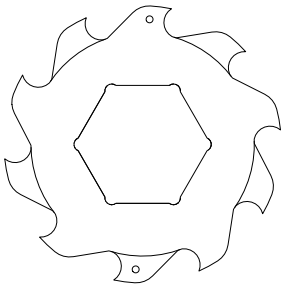
17.3 Appendix C

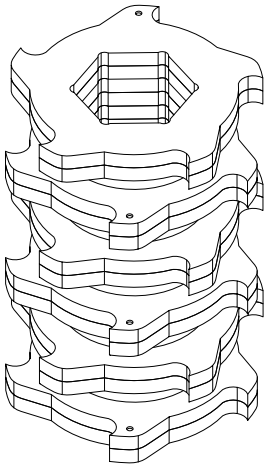
Cutter Stack on Drive Shaft – Offset

Two cutters and two spacers are stacked together. Each set of two cutters are fitted at 180°.

If 16mm cutters are fitted, only one cutter will be stacked between spacers.

Pop mark on cutter blade should be used to ensure cutters are stacked correctly.





Cutter Stack on Driven Shaft – Spiral

2 cutters and 2 spacers are stacked together. Each set of two cutters are fitted at 60°

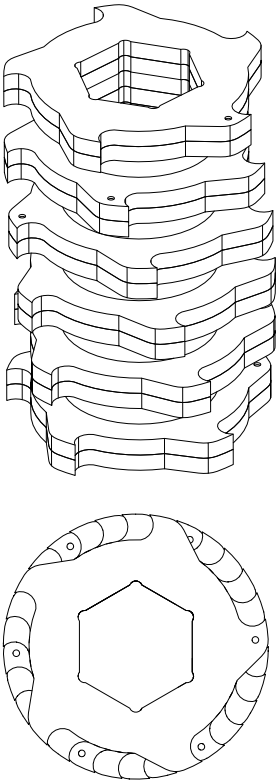


Fig. 17.1 Downward Spiral

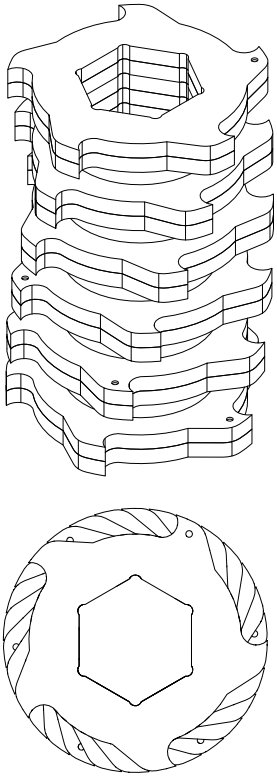


Fig. 17.2 Upward Spiral

Cutter Stacking

Fig. 17.3 shows the offset stacking of the cutters on the drive shaft and spiral stacking on the driven shaft. The spiral stacking should direct the solids to the centre of the machine as shown.

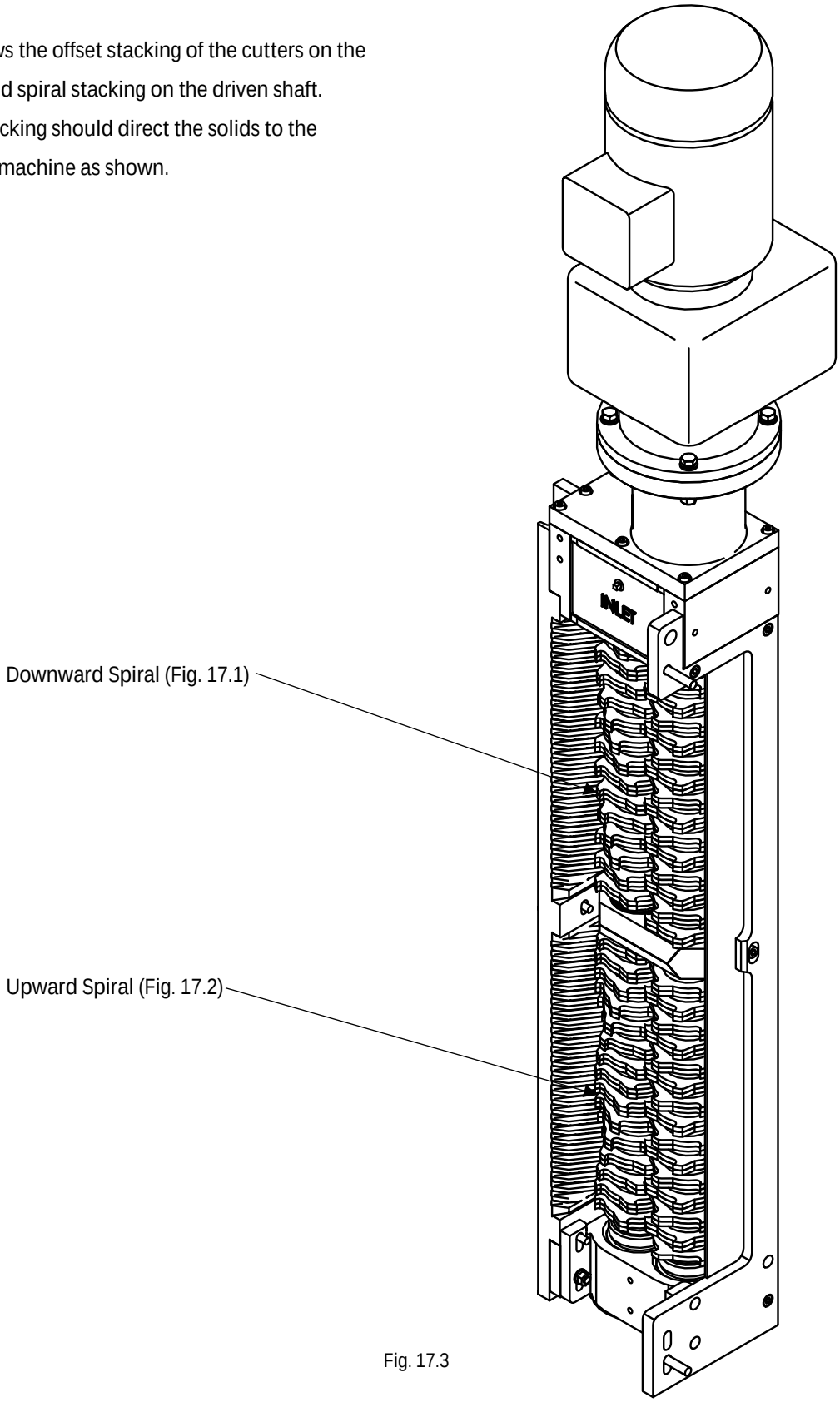


Fig. 17.3

17.4 Appendix D

Discam Mass

Machine Size	Muncher Mass (Kg)	Discreen: No of Shafts	Discreen Mass (Kg)	Total Discam Mass (Kg)
1m	415	3	548	963
		4	657	1072
		5	766	1181
		6	875	1290
		7	984	1399
		8	1093	1508
		9	1202	1617
		10	1311	1726
1.5m	472	3	710	1182
		4	854	1326
		5	998	1470
		6	1142	1614
		7	1286	1758
		8	1430	1902
		9	1574	2046
		10	1718	2190
2m	560	3	890	1450
		4	1072	1632
		5	1254	1814
		6	1436	1996
		7	1618	2178
		8	1800	2360
		9	1982	2542
		10	2164	2724

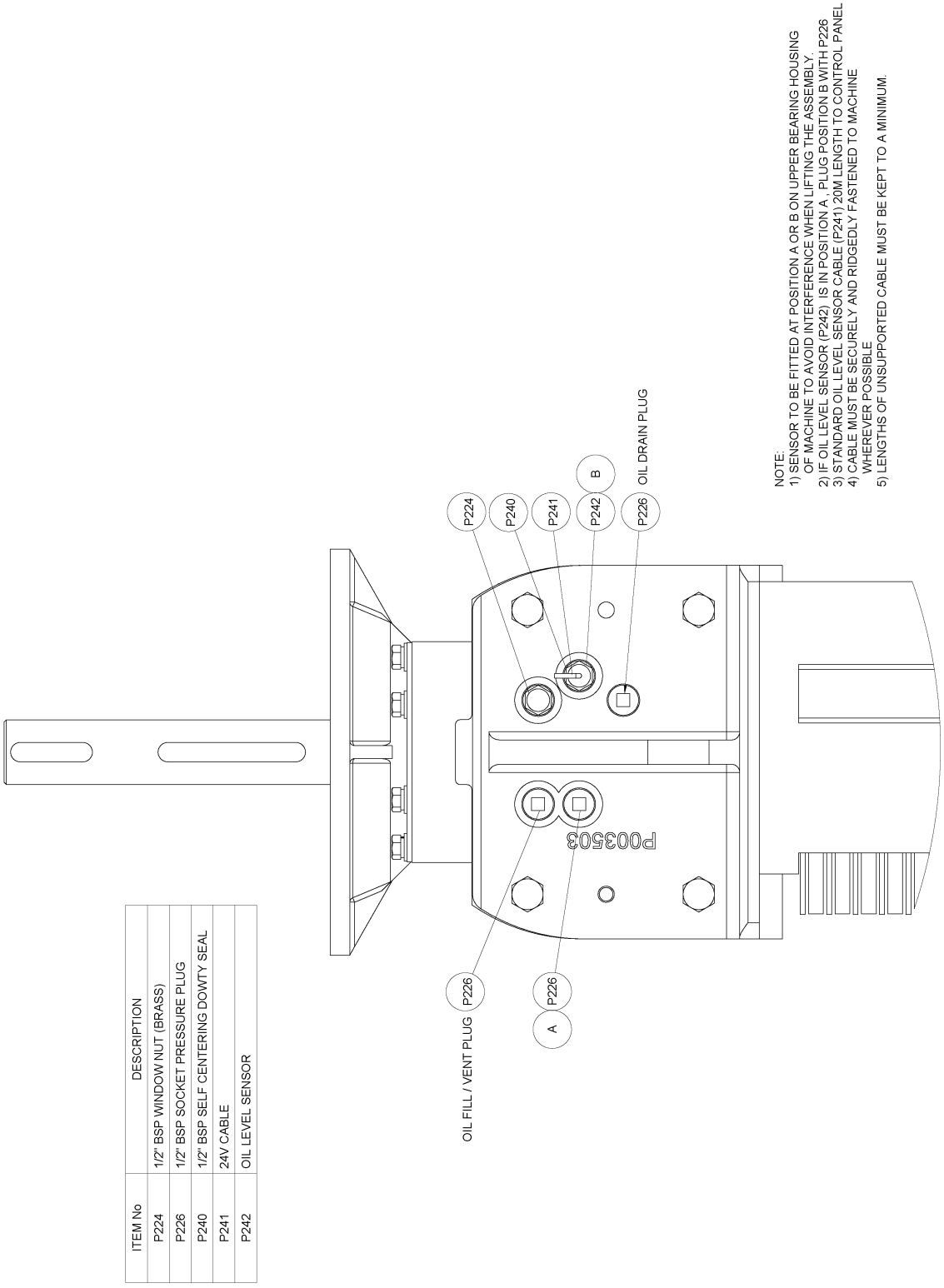
17.6 Appendix E

Muncher - Number of Cutters & Spacers

Machine Size	Cutters/ Spacers	From Top of Shaft to Mid Bearing Housing		From Mid Bearing Housing to Bottom of Shaft	
		Drive Shaft	Driven Shaft	Drive Shaft	Driven Shaft
1m	Cutters	30	28	29	30
	Spacers	29	31	29	30
1.5m	Cutters	46	45	45	46
	Spacers	45	47	46	45

Machine Size	Cutters/ Spacers	Number of Cutters							
		From Top of Shaft To 1st Mid Bearing Housing		From 1st To 2nd Mid Bearing Housing		From 2nd To 3rd Mid Bearing Housing		From 3rd Mid Bearing Housing to Bottom of Shaft	
		Drive Shaft	Driven Shaft	Drive Shaft	Driven Shaft	Drive Shaft	Driven Shaft	Drive Shaft	Driven Shaft
2m	Cutters	28	30	29	30	30	28	28	30
	Spacers	31	29	30	29	28	30	30	28

17.7 Appendix F



ITEM No	DESCRIPTION
P224	1/2" BSP WINDOW NUT (BRASS)
P226	1/2" BSP SOCKET PRESSURE PLUG
P240	1/2" BSP SELF CENTERING DOWTY SEAL
P241	24V CABLE
P242	OIL LEVEL SENSOR