INSTALLATION, OPERATION, SPARE PARTS, AND MAINTENANCE MANUAL

MMD 625 SERIES (625MM CENTRES) TWIN SHAFT SIZER™

S625-0085, Standard Height & Length, Low Type Blind End Case, 4T x 8R

CUSTOMER
ANGLO COAL GOEDEHOOP COLLIERY SOUTH AFRICA

Machine Serial Number :		**S625-0085***
Date Of Manufacture :		**November 2000**
Case Designation :	Height:	**Std Height Low Blind End**
	Length:	**Standard Length**
Shafts Designation :		**4 Tooth x 8 Ring**
Gearbox Assembly :		**MMD R200, 30:1**
Fluid Coupling Type :		**Voith 487 TVG**
Wheel Carriage Assembly :		**Corner Type Units**
Centralised Greasing :		**Customer Supply**
Underspeed Sensing :		**Carlo Gavazzi, 110V A.C**

* Please quote in all correspondence. This number can be found on the identification plate, and welded onto the machine side plate

THE MMD GROUP OF COMPANIES

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MMD 625 SERIES, 625MM BREAKER SHAFT CENTRES TWIN-SHAFT SIZER™

CUSTOMER

ANGLO COAL
GOEDEHOOP COLLIERY
SOUTH AFRICA

MMD JOB NUMBER	**15464**
MACHINE SERIAL NUMBER	**S625-0085**
GEARBOX SERIAL NUMBERS	**S7070435-019** **S7070435-020**
G.A. DRAWING NUMBER	**6250424**

PREPARED BY :- K.HUDDART

POSITION :- CAD DEPARTMENT.

DATE COMPLETED :- 14 - 12 - 00

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MMD MINING MACHINERY DEVELOPMENTS LIMITED

MMD 625 SERIES, 625mm CENTRES TWIN SHAFT SIZER™

General Arrangement Drawing No. - 6250424

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1.0	FIRST ISSUE	14-12-00

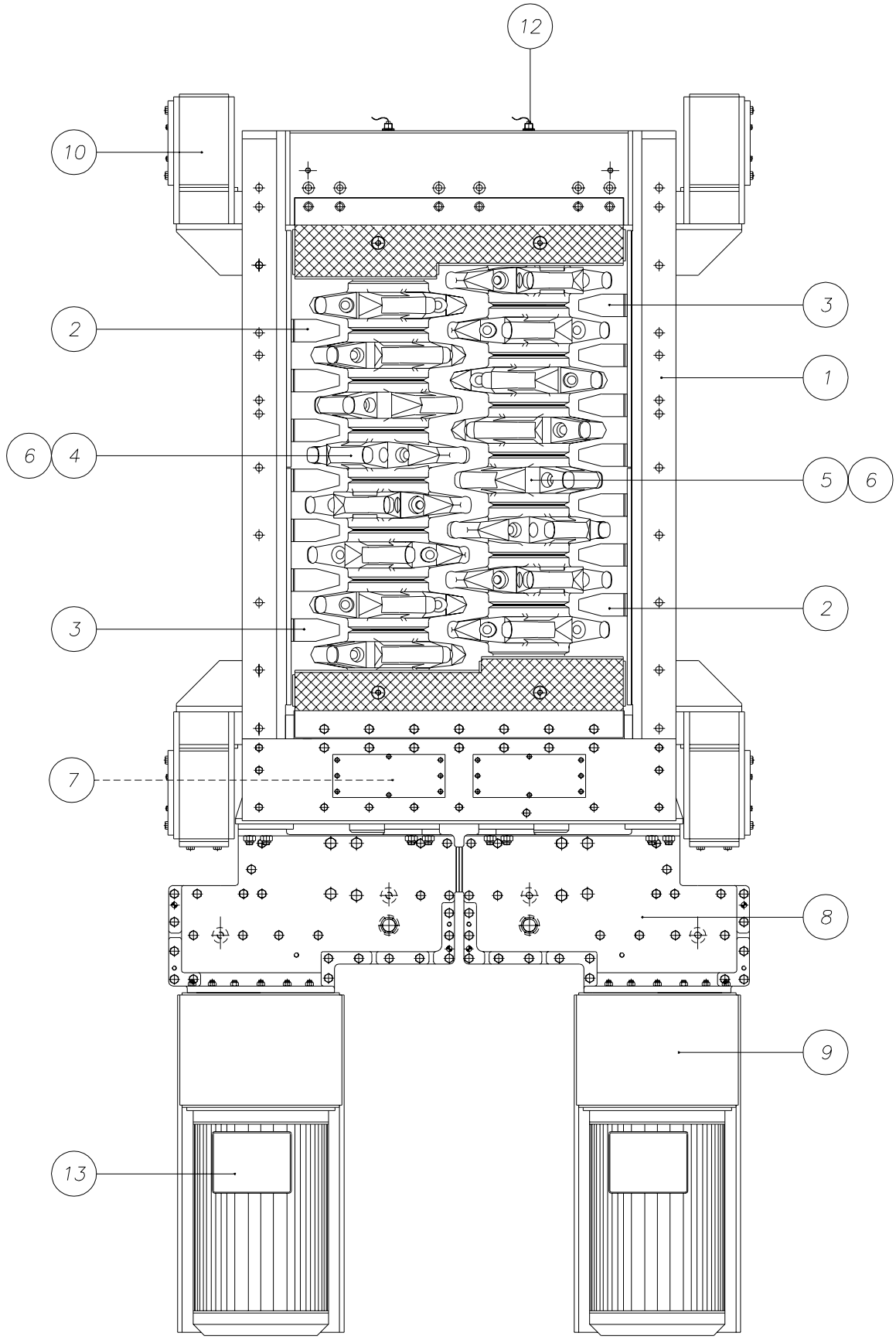
MMD MINING MACHINERY DEVELOPMENTS LIMITED

SIZER™ ASSEMBLY

SERIAL NUMBER - S625-0085

REVISION	MODIFICATION	DATE
1.0	FIRST ISSUE	14-12-00

MMD MINING MACHINERY DEVELOPMENTS LIMITED
SIZER™ Assembly - Serial Number : S625-0085



MMD MINING MACHINERY DEVELOPMENTS LIMITED
SIZER™ Assembly - Serial Number : S625-0085

ITEM	PART NUMBER	DESCRIPTION	UNIT MASS	QTY
1	346250424	Standard Length, Low Profile Case Assembly	5,320	1
2	146251942	Side Wear Plate Assembly	170.5	2
3	146251943	Side Wear Plate Assembly	191	2
4	246251956	Left Hand Heavy Duty Shaft Assembly (4 Tooth x 8 Ring)	2,538	1
5	246251957	Right Hand Heavy Duty Shaft Assembly (4 Tooth x 8 Ring)	2,538	1
6	145060084	Heavy Duty Tooth Cap & Fixings Assembly	23.6	64
7	111701004	Gear Coupling Assembly	109	2
8	247070435	MMD R200 30:1 Ratio Gearbox Assembly	1,758	2
9	146251966	Voith 487 TV Fluid Coupling Assembly	581	2
10	145040240	Wheel Carriage Assembly	1,757	1
11	146251983	Centralised Greasing Assembly	22.6	1
12	143210000	Carlo Gavazzi 110 Volt Underspeed Sensing Assembly	0.6	2
13	–	Electric Motor (Customer Supply)	–	2
		The Total Mass Below Excludes Item 13.		

	TOTAL MASS:-	**14,628 kg**

MMD MINING MACHINERY DEVELOPMENTS LIMITED

MMD 625 SERIES TWIN SHAFT MINERAL SIZER

PRINCIPLES OF OPERATION & MAINTENANCE SCHEDULE

REVISION	MODIFICATION	DATE
1.0	FIRST ISSUE	14-12-00

MMD 625 SERIES TWIN SHAFT MINERAL SIZER™

Principles Of Operation

The MMD Mineral SIZER™ accepts the product in through the top of the SIZER™, delivery being from any angle. The two rotating shafts have attached the appropriate sizing teeth which pass the total product, undersize and oversize, down through the SIZER™.

The undersized product is passed through the rotating teeth without further degradation, whilst the oversized product is presented to the teeth in such a manner that the weakness of the material in tension is exploited to the advantage. The size of the broken product can be controlled in all three planes, giving an accurately sized product, which is then passed to the underside of the SIZER™.

The SIZER™ is made of extremely robust construction and of adequate strength to withstand continuous heavy duty operation.

The machined sideframes are of ribbed construction fabricated from structural steel with easily replaceable steel wearplates covering all the inside area of the sizing chamber. Suitable drillings readily accept the fitting of hopper and chute work.

The main shafts are machined from high strength alloy steel bar which are supported by self aligning double row spherical roller bearings which are situated in heavy duty housings. The bearings are lubricated by grease at both ends of the SIZER™ and are protected by heavy duty lip seals which are further protected by a grease filled double labyrinth to prevent the ingress of water, dirt, etc.

The actual sizing elements are manufactured to MMD's own specification, various specialist materials have been developed to suit particular requirements.

Important Note On Operation

Running machines without load for extended periods is known to have serious detrimental effects. This can cause damage to the bearings. It must therefore be part of the operating procedure that when the machine is not being fed material for an extended period it must be shut down.

Safe Operating Procedure

BEFORE ANY WORK IS CARRIED OUT ON THE SIZER™ OR ANY OF ITS ANCILLIARIES, ISOLATE THE POWER SUPPLY FOR THE DRIVE ELECTRIC MOTOR. UNLESS THE ABOVE OPERATION IS CARRIED OUT, NO PERSON OR PERSONS SHALL STAND ON THE MACHINE.

- Installation of safety guards and hand rails shall be the responsibility of the customer at the time of commissioning.
- During operation of the machine, no person or persons should violate the safety guards and hand rails in its vicinity.
- Unless otherwise stated, MMD will not be responsible for the safe siting of the machine, and/or any requirements appertaining to operating codes of practice.
- MMD will not be responsible for the use or operation of the machine for any purpose other that the specified / accepted operation requirement in the official order.
- It is understood any maintenance carried out in accordance with this manual shall be by a person or persons qualified to carry out such practice in compliance with the safety requirements of the operating company.

NOTE: FAILURE TO COMPLY WITH ANY OF THE ABOVE PROCEDURES IS DONE SO AT THE OPERATOR'S OWN RISK.

Commissioning Procedure

If the SIZER™ is removed from the working position for major overhauls or modifications, it will also be necessary to re-commission it prior to re-starting.

- Carry out a full check of all items against manual parts list and drawings to ensure that everything is installed correctly. This is a visual check only.
- Carry out a stall test to adjust the level in the fluid coupling, refer to the *SIZER™ Stall Test* section.
- For the recommended lubricant specifications/quantities, see the *Maintenance Schedule.*
- Run the machine under zero-load conditions for four (4) hours. Check for excessive noise, vibration, and temperature. The normal operating temperature of the gearbox ranges between 55^{o}C and 80^{o}C. If any adverse effects are evident, refer to the *Trouble Shooting* guide. Rectify as necessary.
- Run the machine under full-load conditions for eight (8) hours. Again check for any excessive noise, vibration and temperature as before.

Pre-Start Check List

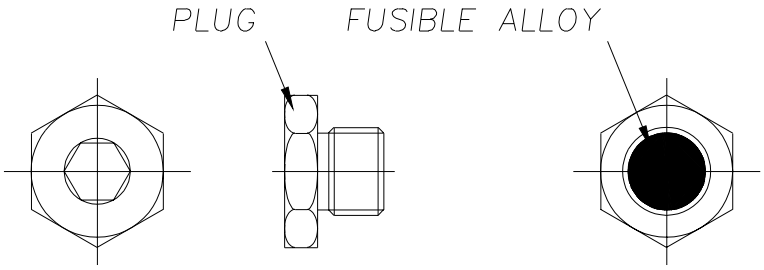
- Ensure visually that the machine is fully engaged in the working position.
- Check thoroughly to ensure that no person or persons can be injured when the machine starts.
- Check drive components for signs of obvious damage, leaks, etc.
- Check all oil levels, (gearbox & spur gears if fitted), check that the bearings are charged with grease.
- Check autolube system is set to run (if fitted).

SIZER™ Start-Up Procedure

- Carry out the specified pre-start checks.
- The machine can now start. If the motor starts, but the shafts do not rotate, then the machine is either stalled, or a fusible plug has melted in one or both of the fluid couplings.
- Refer to the *Stall Procedure*.

Overload Safety Systems (Mechanical)

- Mechanical overload protection is given by use of a fluid coupling, mounted on the input shaft of the gearbox and the drive shaft motor.
- The fluid coupling is protected against excessively high operating temperatures by built-in fusible plugs, which melt on thermal overloading, and allow the fluid to discharge, thereby interrupting the transmission of torque and preventing damage.
- After a fusible plug failure, the fault must be corrected. The peripheral bolts must be re-torqued, (see fluid couplng section), new fusible plugs fitted, and the fluid coupling refilled with clean fluid in accordance with the fluid coupling manual.
- 160/140/180°c. For normal use the 160°c type fusible plug should be used.



Overload Safety Systems (Electrical)

- Where specified, fitted at the non drive end of the SIZER™, is an underspeed sensing device. The purpose of the underspeed sensing device is to isolate power to the main SIZER™ motor(s) and upstream supply systems. When the rotors have lost speed. This is achieved by a pulse stud on the breaker shaft(s) passing through the magnetic field of a close proximity sensor, therefore inducing an electrical impulse to the monitoring system. Should the breaker shafts stop rotating, the monitoring systems should be connected to ensure they trip the electric motor(s) after seven seconds. **The Power supply to the electric motor(s) must be isolated**, and a manual inspection can be carried out to identify the fault.

Replacing The Underspeed Sensor

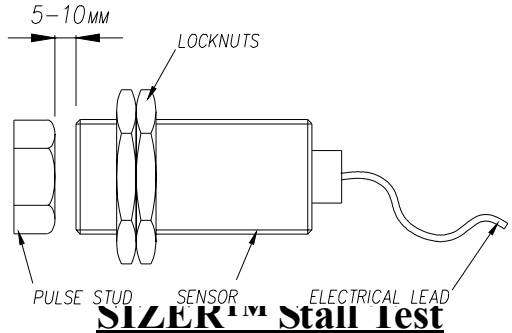
Should the underspeed sensor become inoperative, it will be necessary to replace it. To do this the machine must be isolated electrically together with any upstream supply systems, so that they cannot be started accidentally whilst work is being carried out.

i Isolate power supply.

i Disconnect electric leads.

ii Loosen the locknuts, and unscrew the detector head.

iv Refitting is the reverse of the above procedure. However, care must be taken to ensure that the sensor head is within 5 to 10mm of the stud in the end of the breaker shaft, which provides a pulse every revolution.



SIZER™ Stall Test

After every operating stall, and after any major overhaul, the fluid coupling must be reset to give optimum performance. This is achieved by carrying out the following;

- **Isolate the machine, by removing the cable from the electric motor. Use lockout procedures.**
- Physically block the breaker shafts, so that they cannot rotate.
- Re-connect the power cable to the electric motor.
- The next operation requires and a tachometer, and is carried out as follows.

  i Select the start position on the control switch, and run the motor until a steady speed reading is obtained on the tachometer. It is imperitive that running time is kept to a minimum to avoid a build of thermal energy in the coupling.

  ii Stop the motor.

  iii The objective is to obtain a steady reading of approximately 94% of synchronous motor speed.
  i.e,
  50Hz = 1410 RPM
  60Hz= 1700 RPM

  iv Add or remove a small amount of fluid as required

  v Allow sufficient time for the coupling to cool before repeating the test.

- If the tachometer reading is below the desired speed, release fluid from the fluid coupling. If synchronous speed is reached add fluid to the coupling. Repeat this process until a steady reading is achieved for the motor of 94% synchronous speed.
- Remove the obstruction from between the SIZER™ shafts.

Trouble Shooting Guide

It is recommended that a daily check be made for any excessive noise, vibration, lubricant leaks, or obvious damage. The following hints should help in determining the source of any unusual feature;

NOISE – When an unusual noise is heard, it is important to determine quickly what is causing the noise, so that action can be taken. There are basically two noises to consider.

- **i** High speed end (Electric Motor)
- **ii** Low speed ends (Breaker Shafts)

The first step is to determine the frequency of the noise. It will be a regular noise in either the machine aperture or the drive train. If it is a slow rhythmic noise, it is likely to come from the shafts. This could indicate that there is a broken or loose bolt. Fully check the machine, the machine aperture, (with no material passing through), to determine the cause.

If the noise is high frequency, it is possibly coming from the drive train. Starting from the motor, work along the transmission to determine the cause of the noise. The obvious causes would be; faulty bearings in the motor, fluid coupling, or gearbox; lack of lubricant or ingress of dust into rotating parts.

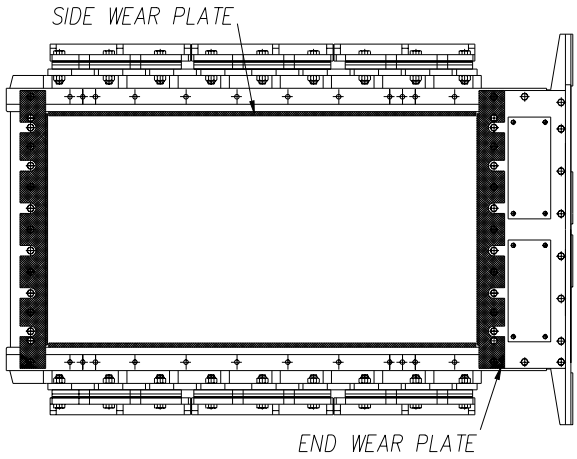
VIBRATION – A similar check list is used as when tracking down an unusual noise, however, most excessive vibration is caused either by faulty main shaft bearings or faulty gearbox bearings. These items should be checked first by checking the temperature on the frame of the machine adjacent to the shaft bearings and on the casing of the gearbox.

LUBRICANT LEAKS – It is essential that all lubricants are corrected and replenished in accordance with the service manual recommendations. If any leak is found, action must be taken immediately to correct it, i.e find the source of the leak, determine the cause of the leak by reference to the spare parts manual, and identify the parts required to rectify the leak. When this has been done, the machine must be stopped at the first opportunity so that the work carried out.

OBVIOUS DAMAGE – 99% of the obvious damage occurring on MMD machines inside the machine aperture is caused by tramp iron. Broken or cracked caps/segments and bolts are the most common form of obvious damage. A visual inspection will determine the cause.

Wear Plates - Replacing

The MMD SIZER™ has wear plates on the inside of the machine aperture to protect the side plates and bearing housings. These wear plates must be replaced when excessive wear has been detected. Clearance of rotating teeth on the side wear plates should be a minimum of 10mm. This clearance should be checked when side wear plates have been replaced before starting the machine.



To remove wearplates, the following procedures must be followed;

Side Wear Plates:

- Where the machine has pyramids/side combs which are bolted through the side wear plate, it will be necessary to remove them prior to attempting to remove the wear plate.
- Weld two temporary lifting lugs to each wear plate, (on smaller machines this procedure may not be necessary).
- Remove the bolts retaining the side wear plates and pyramids to the side plates, and discard them.
- Attach lifting equipment to the lifting lugs.
- Remove the bolts retaining the side wear plates and discard them.
- Remove the wear plate.
- Thoroughly clean the inside of the machine where the new wear plate is to be fitted to ensure correct seating of the new wear plate.
- Weld temporary lifting lugs to the new side wear plate.
- Lift the new wear plate into position, and line up with fixing holes.
- Bolt the new wear plate into position, using new bolts. MMD do not recommend the re-use of wearplate bolts due to the wearing of the bolt tops.
- Tighten the bolts to the torque specified on MMD procedure T056.
- Remove the temporary lifting lugs and discard them.
- Check the clearance between tooth caps/segments and wear plates. Clearance should be a minimum of 10mm.

End Wear Plates:

- Thoroughly clean the top of the machine to expose the holes for the lifting eye bolts.
- Remove the fixings from the end wear plates, which attach the wear plate to the bearing housing. These fixings are fitted into drilled and tapped holes.
- Fit lifting eye bolts into the top of the wear plates, and lift out.
- Thoroughly clean all faces to which the new wear plates fit, to ensure correct seating of the new wear plate. Protect tapped fixing holes before cleaning.
- Attach lifting eye bolts to the new wear plate, and lift it into position.
- Bolt the wear plate into position using the existing set screws.
- Remove the lifting eyes.
- Tighten the bolts to the torque rating specified in MMD procedure T056. (Included at the back of this manual).

Main Shaft Bearings

(Flange Type)

To replace a worn or damaged bearing, the following procedure must be followed:

- Follow the procedure for removing the shafts, see shaft removal.
- Using a bearing puller or similar device, plus a hydraulic jack, the complete bearing assembly must be pulled from the end of the shaft, after first removing the end cap.
- This will leave the old labyrinth still attached to the shaft. It must be checked visually for excess wear. See *Things To Check*.
- The damaged bearing assembly may now be dismantled as follows:

  i Remove the retaining plate, complete with the two outer seals.

  ii Remove the damaged bearing from the capsule.

Things to Check

- LABYRINTH - Check for wear grooves on the seal surface. Also, check for any significant wear on the labyrinth shoulders. If there is any grooving on the seal surface, then the labyrinth must be replaced.
- SEALS - Check the condition of all lip seals. If there is any sign of damage, the seals must be replaced. As company policy MMD recommend that all seals be replaced if they are removed for any reason.
- SEAL SPACER - If there is any grooving on the outside diameter of this spacer, it must be replaced.
- BEARING CAPSULE - If there is any obvious damage or any sign that the bearing has been turning in the capsule, then it should be replaced.

Main Shaft Bearings

Re-Assembly (Flange Type)

Should every item need replacing, the following procedure should be followed;

- Remove old labyrinth from the breaker shaft using oxy-acetylene cutting equipment to heat the labyrinth to assist removal. Care must be taken to ensure that no damage is done to the shaft.
- Assemble the parts in the following order:-

  i Labyrinth
  ii Capsule
  iii Seals
  iv Bearing
  v Seal Plate
  vi Spacer
  vii 'O' Rings

- Warm the labyrinth in an oil bath or similar to 110^{o}C. Remove from the oil bath and push onto the shaft immediately. The labyrinth will stop at the raised shoulder.
- Fit the inner seals into the bearing capsule. Ensure the seals are seated correctly, (see the drawing in the appropriate section).
- Coat the inside of the capsule sparingly with a light oil.

- Warm the bearing and capsule in an oil bath or similar to 110°C. Remove from the oil bath and immediately push onto the shaft. Care must be taken as the seals engage the labyrinth spacer and the assembly must be 'eased' into position. The assembly will seat fully home once engaged onto the seal surface of the labyrinth spacer as the furthest extremity of the labyrinth locates against the inner race of the bearing.

- Warm the spacer in an oil bath and heat to 110°C. When up to temperature remove and immediately push onto the shaft.

- Re-assemble the machine in reverse sequence.

Main Shaft Bearings

(Dowel Located Type)

To replace a worn or damaged bearing, the following procedure should be followed;

- Follow the procedure for removing the shafts until the shafts are fully exposed, see shaft removal.

- Using a bearing puller or similar, plus a hydraulic jack, the complete bearing assembly must be pulled from the end of the shaft, after first removing the end plate.

- This will leave the old labyrinth still attached to the shaft. It must be checked visually for excess wear.

- The damaged bearing assembly may now be dismantled as follows:

  i Remove the retaining plate. This automatically removes the two outer seals, and the seal spacer.

  ii Support the bearing capsule around the periphery, 200mm off floor level.

  iii Apply heat to the outside of the bearing capsule.

  iv The damaged bearing should fall out of the capsule.

Things to Check

- LABYRINTH - Check for wear grooves on the seal surface. Also, check for any significant wear on the labyrinth shoulders. If there is any wear on the seal surface, then the labyrinth must be replaced.

- SEALS - Check the condition of all lip seals. If there is any sign of damage, the seals must be replaced. As company policy MMD recommend that all seals be replaced if they are removed for any reason.

- SEAL SPACER - If there is any wear grooves on the outside diameter of this spacer, it must be replaced.

- BEARING CAPSULE - If there is any obvious damage or any sign that the bearing has been turning in the capsule, then it should be replaced.

- Dowel - Check for any signs of damage on the sides of the dowel. If the capsule has been trying to turn, there will be indentations approximately half way up its length. If theseare evident, then the dowel must be replaced.

- Assemble all the parts required in the following order:-

  i Labyrinth
  ii Capsule
  iii Seals
  iv Bearing
  v Dowel & Seal
  vi Seal Retaining Plate
  vii Spacer

Main Shaft Bearings

Re-Assembly (Dowel Located Type)

Should every item need replacing, the following procedure should be followed;

- Remove the old labyrinth from the breaker shaft using oxy-acetylene equipment to apply heat to the labyrinth to assist removal. Care must be taken to ensure that no damage is done to the shaft.

- Warm the labyrinth in an oil bath to 110^{o}C. Remove from the oil bath and push onto the shaft immediately. Place up to the abutment.

- Fit the inner seals into the bearing capsule. Ensure they are seated correctly, (see the drawing in the appropriate section).

- Coat the inside of the capsule sparingly with a light oil.

- Fit the bearing into the capsule. This is a toleranced fit and a soft drift should be used.

- Warm the bearing and capsule in an oil bath or similar to 110^{o}C. Remove from the oil bath and immediately push onto the shaft. Care must be taken as the seals engage the labyrinth spacer and the assembly must be 'eased' into position. The assembly will seat fully home once engaged onto the seal surface of the labyrinth spacer as the furthest extremity of the labyrinth locates against the inner race of the bearing.

- Fit one of the bonded seals into the dowel location hole on the capsule and hold in with thick grease, ensuring the remaining bonded seal is in the dowel location hole on the bottom bearing housing. Then place the dowel to the bottom bearing housing.

- Warm the spacer in an oil bath and heat to 110^{o}C. When up to temperature remove and immediately push onto the shaft.

- Fit the two outer seals into the seal retaining plate ensuring that the seals are seated correctly as shown in the appropriate section.

- Push the seal retaining plate into the capsule. Fit the retaining bolts and torque to the required amount as specified as T056.

- Re-assemble the machine in reverse sequence.

Breaker Shafts

- Move the SIZER™ into the maintenance position, if fitted onto wheels.
- Thoroughly clean the SIZER™ of all extraneous material, grease, oil, etc.
- Remove the end wearplates, and side combs (where fitted) from the machine. (See Heading 'Wear Plates - Replacing').
- Remove the top cover plate from the machine. This is bolted to the machine side plates, the top bearing housing and the gearbox mounting plate.
- Remove the clamping rings from the gear couplings and slide back the sleeve towards the gearbox. This action disconnects the drive train from the breaker shafts. Care should be taken so as not to damage any 'O' Ring seals.
- Remove the shaft end cap, along with its fixings, and slide the remaining coupling hub off the shaft. Where fitted, the spur gear can now be slid along the shaft, until it no longer meshes with the spur gear on the driven shaft, taking care to support its mass at all times.
- Where the bearings are flange mounted, remove the bolts securing the bearing capsule to the bearing housing.
- Remove the bolts from the top bearing housing on each end of the machine.
- Using two appropriately sized eye bolts, lift out the top bearing housings. The shaft assemblies are now exposed.
- The damaged shaft can now be lifted out by means of nylon webs slung at either end.
- Once the shaft is removed, the bearing assemblies, and labyrinth seals, can be removed, (refer to the bearing removal sections).
- Replacement is a reversal of the above procedure.

Shaft Re-Timing Procedure

Where the machine is fitted with spur gears, the timing of the shafts can be altered as follows;

Spur Gears At Non-Drive End:

- **Isolate the machine electrically by removing the cable from the SIZER™ drive electric motor.**
- Undo the bolts securing the top cover plate to the side plates, end cover and the top bearing housing.
- If desired drain the gear oil.
- Remove the top cover plate. (There is no need to drain the oil).
- Remove the end cap from the driven (non-drive) shaft by unscrewing the fixings which secure it.
- Slide the spur gear along the breaker shaft splines until it is clear of the spur gear on the drive shaft (until it no longer meshes), taking care to support its mass.
- Rotate the driven shaft to the desired position.
- Move the spur gear back along the splines, and into position, so that it meshes with the other spur gear.
- Replace the shaft end cap, and replace the fixings, using a threadlock.
- Refit the top cover plate after applying sealant and refit the bolts which secure it.

Spur Gears At Drive End:

- **Isolate the machine electrically by removing the cable from the SIZER™ drive electric motor.**
- Undo the bolts securing the top cover plate to the side plates, gearbox mounting plate, and top bearing housing.
- Remove the top cover plate, along with the end wear plate,if still attached to the cover plate. (There is no need to drain the oil).
- Remove the end cap from the driven (non-drive) shaft by unscrewing the fixings which secure it.
- Remove the shaft spacers.
- Slide the spur gear along the breaker shaft splines until it is clear of the spur gear on the drive shaft (until it no longer meshes), taking care to support its mass.
- Rotate the driven shaft to the desired position.
- Move the spur gear back along the splines, and into position, so that it meshes with the other spur gear.
- Replace the spacers and end cap then replace the fixings using a threadlock.
- Refit the top cover plate and where applicable, the end wear plate, and refit the bolts which secure it to the case.

Breaker Bar Adjustment

Adjustment of the breaker bar should be carried out as follows;

- Remove the bolts securing the breaker bar to the machine.
- Using the jacking screws, raise the breaker bar to the desired height.
- Adjust the breaker bar by removal/insertion of packers as required.
- When the height is satisfactory, refit the bolts, and tighten in accordance with MMD procedure T056.

Breaker Bar Cap Replacement

Breaker bar caps can only be replaced from the underside of the machine. They must be replaced when showing signs of excessive wear. Replace the breaker bar caps immediately, or damage to the breaker bar will result.

Removal:

- Clean the area around the cap which is to be replaced.
- Remove the bolts securing the cap to the breaker bar.
- Remove the cap from the breaker bar.

Replacement:

- Clean the top surface of the breaker bar.
- Position the cap onto the breaker bar. Ensure that the cap is fitted in the correct orientation, as shown on the drawing.
- Bolt the cap to the breaker bar using new bolts. All bolts must be tightened in accordance with MMD procedure T056.

Cleaning Comb Adjustment

Standard Type:

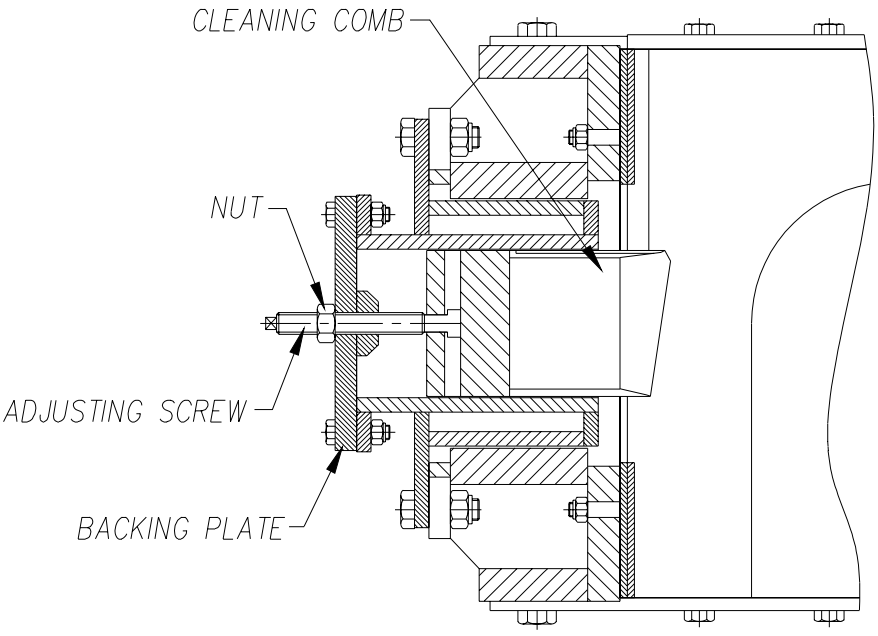
Where specified, on larger machines, adjustable cleaning combs may be fitted to minimise build-up of material between the tooth rings, and to prevent recirculation of any product attached to the shafts. These cleaning combs will need periodic adjustment to compensate for wear. This is achieved by removing packers as follows;

- Check the actual cleaning comb clearance.
- Remove the cleaning combs. Each cleaning comb is secured to the side plate by two bolts. Remove these bolts and withdraw the cleaning comb from the side plate.
- Remove necessary packers to give specified cleaning comb clearance. Thickness of packers to be removed is the difference between actual cleaning comb clearance and the specified cleaning comb clearance.
- Refit the cleaning combs into the side plates and move the packers from the 'inside' of the pyramid to the 'outside' and bolt into position using existing bolts. These bolts must then be re-torqued.

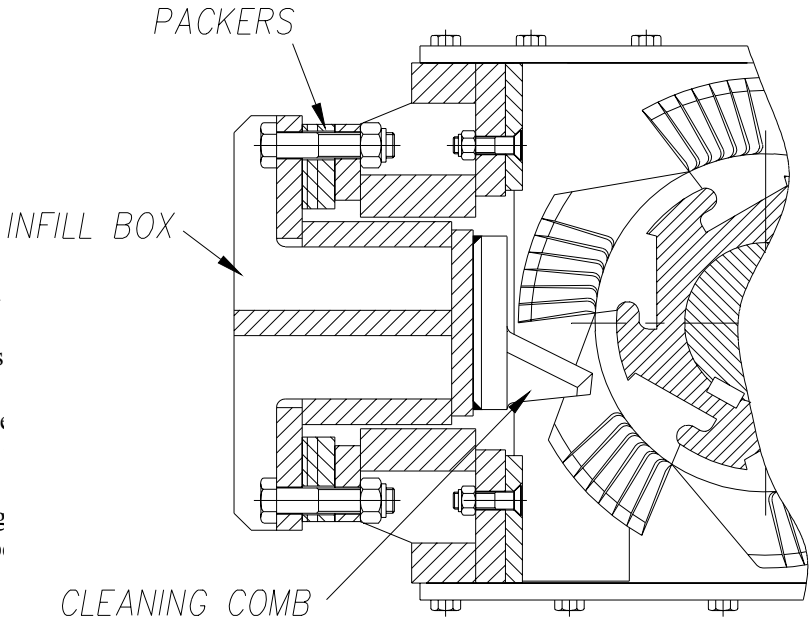
Screw Adjustable Type:

On smaller segment machines, adjustable cleaning combs &/or clay cleaners may be fitted.
Adjustment is carried out as follows;

- Check the actual cleaning comb clearance.
- Loosen the nut securing the adjusting screw to the backing plate.
- Using the adjusting screw, move the cleaning comb into the desired position.
- Re-tighten the nut, in accordance with MMD procedure T056.



Where Infill bo r removing the packers.



Adjustment is achieved

- Remove the bolts
- Add or remove n eds to be moved out-
  wards in order to aid in this operation.
- Refit the existing the side plate. These
  bolts must then b

Motor Installation

(Foot & Flange Mounted Type):

The electric motor cradle is designed such that foot mounting can be utilised, but still allowing the motor to oscillate with the machine. Thus the problem which would be encountered with mounting to a separate base would be avoided. The flange spigot is used to assist in gaining accurate concentricity and squareness.

- The motor should initially be sat on jacking screws, in the tapped holes through the cradle foot packs.
- Adjust until the motor spigot is engaged in the cradle spigot and then fit flange bolts and tighten.
- The packer height required under each foot must be measured individually. Packer sets must then be made up or machined.
- Fit the packers under the correct feet. Reference mark packs to their position.
- The foot bolts should then be added, and all bolts tightened to the amount specified in MMD procedure T056.

Motor Removal

(Foot & Flange Mounted Type):

The motor can sometimes be removed on the cradle to allow fluid coupling removal. This prevents disturbance of the motor alignment.

Should just the motor need removing, the following procedure should be followed;

- Disconnect all electrical connections from the motor.
- Remove the cover plate(s) from the motor mounting frame.
- Remove the bolts connecting the motor flange and bolts connecting the motor feet to the mounting bracket.
- The motor can now be removed. Carefully slide the motor out of the motor mounting bracket, until the drive boss on the motor shaft is clear of the motor mounting bracket. The motor can now be safely lifted out of position.
- Remove the coupling half and spacer (where fitted) from the motor shaft.
- Remove the shims from the foot mountings, after identification to position.

Motor Installation

(Flange Mounted Type):

In this arrangement alignment is achieved automatically.

- Fit the motor spacer (if applicable).
- Fit the coupling and engage the drive boss.
- Lift the motor into position, fit the flange bolts and tighten to the amount specified in MMD procedure T056.

Motor Removal

(Flange Mounted Type):

Should the fluid coupling need removing or replacing, the motor must be removed, the procedure for this is as follows;

- Disconnect all electrical connections from the motor.
- Attaching lifting equipment to the motor.
- Remove the bolts connecting the motor flange.
- The motor can now be removed. Carefully slide the motor out of position, until the motor shaft is clear of the

coupling housing. The motor can now be safely lifted out of position.

Gearbox Replacement

Removal:

- Remove the motor (See Heading ‘Motor Removal’)
- Remove the fluid coupling. (See Heading ‘Fluid Coupling Replacement’).
- Note, that if fitted Oil cooler modules must have their pipes disconnected.
- Note, that when fitted the Gearbox Temperature Monitoring System must be removed from the gearbox
- Remove the motor mounting bracket or coupling housing from the gearbox.
- Remove the top cover plate to expose the gear coupling.
- Split the two clamping rings from the gear coupling, taking care not to damage the ‘O’ ring.
- Slide the coupling sleeve towards the gearbox.
- Attach lifting equipment to the gearbox lifting eyes.
- Remove the studs/bolts connecting the gearbox to the gearbox mounting plate.
- Slide the gearbox away from the mounting plate, until the gear coupling is clear of the mounting plate. The gearbox can now be lifted out of position.

Gearbox Fitting Procedure:

- Clean the output shaft of the gearbox and the gear coupling.
- Slide the coupling half onto the output shaft.
- Fit the end cap onto the output shaft. Threadlock should be applied to the bolts prior to fitting.
- Lift the gearbox into position, ensuring that the spigot on the gearbox mates with the recess on the gearbox mounting plate. Fit the studs/bolts connecting the gearbox to the gearbox mounting plate, and torque to the amount specified in MMD procedure T056.
- Align the teeth on the coupling half, with the teeth on the coupling sleeve, and slide the coupling sleeve into position.
- Ensure 'O' rings are correctly seated on the coupling sleeve, and fit the two split clamping rings around the coupling. Tighten bolts in accordance with MMD procedure T056.
- Fill the gearbox with the correct lubricant to the designated level. (See Maintenance Schedule for Specification).
- Fill the gear coupling with grease. (See Maintenance Schedule for Specification).

Fluid Coupling Replacement
(Voith Turbo Fluid Coupling)

Preparation:

- Remove the motor (see heading 'Motor Removal')
- Where fitted, disconnect power supply to Voith MTS temperature monitoring device.
- Where fitted, remove the Voith MTS sensor bracket, complete with sensor.

Removal:

- The Voith fluid coupling may now be removed. See Voith installation and operating manual before removing the coupling.

Installation:

- Clean gearbox input shaft and fit key.
- Fit Voith coupling, in accordance with Voith's installation and operating manual using the proper tools.
- Where fitted, re-fit the Voith sensor bracket and sensor to the motor mounting bracket.
- Where fitted, connect power supply to Voith MTS temperature monitoring device.
- Refit the motor (See heading 'Motor Installation')

Fluid Coupling Replacement
(Fluidrive Fluid Coupling)

Preparation:

- Remove the motor (See heading 'Motor Installation')

Removal:

- The Fluidrive fluid coupling may now be removed. See fluidrive installation and operating instructions before removing the coupling

Installation:

- Clean the gearbox input shaft.
- Fit the Fluidrive coupling, in accordance with fluidrive's installation and operating instructions.

MMD Equipment Storage Instructions

All MMD equipment is delivered in a stored condition, and is suitable to be stored inside or outside, in normal temperatures for a period of approximately 12 months.

The cases supplied have a waterproof lining. On departure from MMD, the gearboxes are filled with lubricant (for the lubricant specification, see the gearbox maintenance schedule). The input and output shafts of the gearbox are wrapped in protective 'Denso' tape.

The containers supplied are covered in a Tarpaulin sheet with a slight apex incorporated to aid drainage, and roped down accordingly around the base of the container. This must be checked periodically for rips or tears.

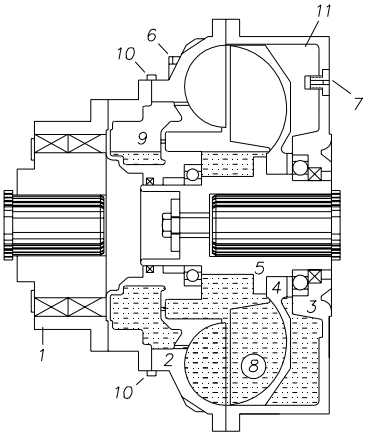
All exposed machined faces, such as the gearbox mounting plate are coated in 'Tectil' corrosion inhibitor.

THE SUPPLIED CONTAINERS, CASES, ETC. MUST NOT BE OPENED UNTIL MMD ARE NOTIFIED.

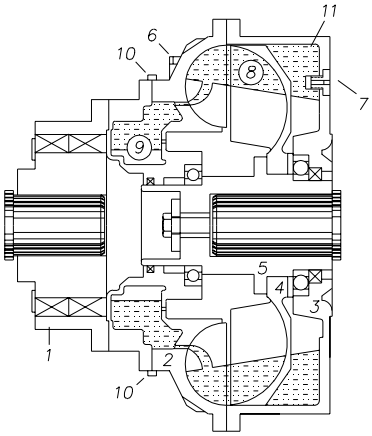
Fluidrive Fluid Coupling

Voith Fluid Coupling Design Type: TVSC

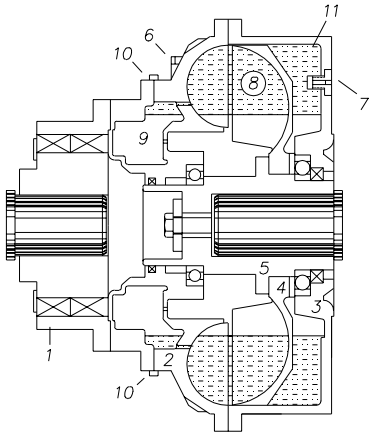
Coupling At **Stand-Still**



Coupling At **Start-Up**



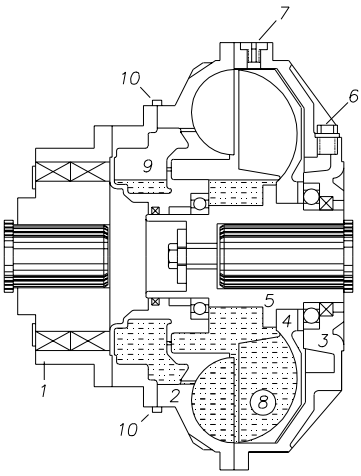
Coupling **Running**



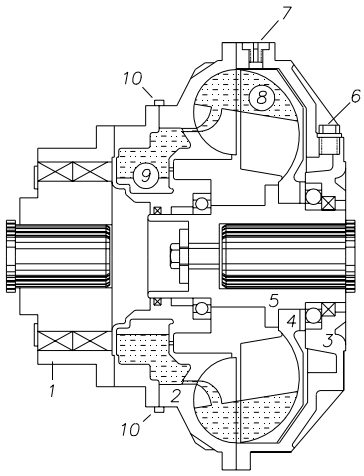
VOITH DESIGN TYPE: TVSC		6	Filler Plug
1	Flexible Connecting Cpl'g	7	Fusible Plug
2	Outer Wheel	8	Operating Fluid
3	Coupling Shell	9	Delayed Filling Chamber
4	Inner Wheel	10	Delay Chamber
5	Coupling Hub	11	'SC' Chamber

Voith Fluid Coupling Design Type: TV

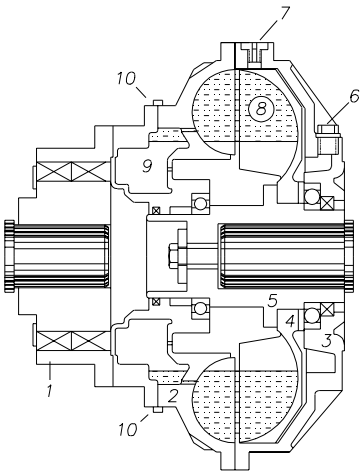
Coupling At **Stand-Still**



Coupling At **Start-Up**



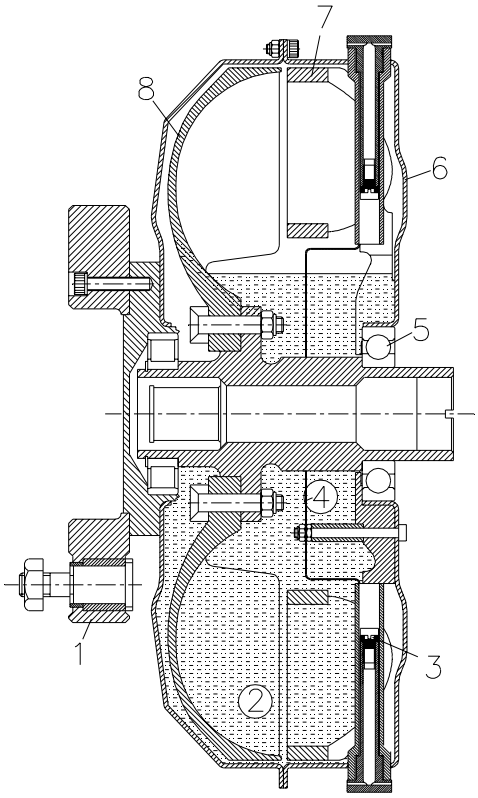
Coupling **Running**



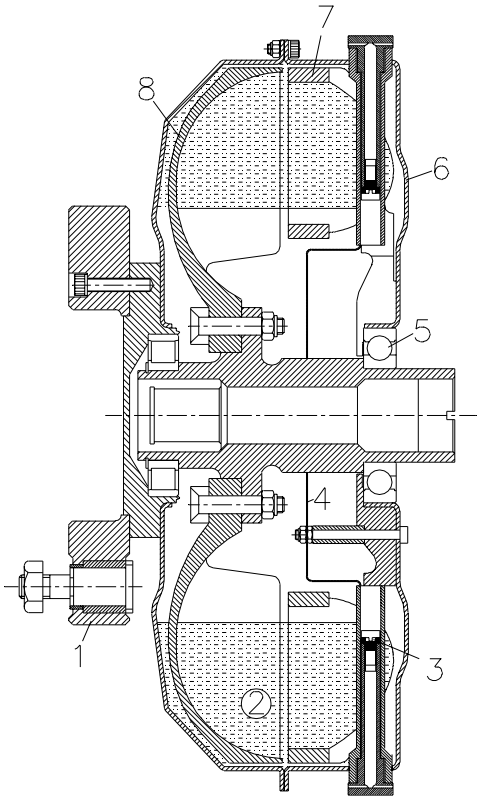
VOITH DESIGN TYPE: TV			
1	Flexible Connecting Cpl'g	6	Filler Plug
2	Outer Wheel	7	Fusible Plug
3	Coupling Shell	8	Operating Fluid
4	Inner Wheel	9	Delayed Filling Chamber
5	Coupling Hub	10	Delay Nozzle

Operation Design Type: STC

Coupling At **Stand-Still**



Coupling **Running**



FLUIDRIVE DESIGN TYPE: STC			
1	Adaptor	**5**	Ball-Bearing
2	Operating Fluid	**6**	Impeller Casing
3	Fusible Plug	**7**	Impeller
4	Ante-Chamber	**8**	Runner

Maintenance Schedule

Maintenance of the SIZER™ and its ancillaries is most important, and must be carried out in accordance with this manual. Failure to do so could result in a reduction of operational efficiency, or even a machine breakdown. Warranty maybe affected by improper maintenance.

Where the machine is fitted with breaker segments, after the first 24 hours of operation, check the segment fixing bolts, and re-torque to the amount specified in MMD Procedure T056. then after 7 days operation, check the segment fixing bolts again, and re-torque to the amount stated.

NOTE: Before any work is carried out on this machine, isolate the power supply, and remove the cable from the electric motor.

Grease Lubrication;

Some MMD machines are fitted with autolube greasing to the labyrinth seals to prevent contamination, the greasing rate is specified in T0132. The bearing lubrication points are not always served by the automatic lubrication pump and in this case must be greased using a grease gun or similar. The quantity of grease for the bearings is specified in MMD procedure T0132 to each bearing each week. To check that the labyrinth seals are clear, and that the greasing system is functioning normally, grease will be visible at the labyrinths.If the bearing is fed by the autolube the quantity of grease fed to each bearing is specified as per T0132.

NOTE: WHERE FITTED, THE AUTOMATIC CENTRALISED GREASING SYSTEM MUST BE RUN AT ALL TIMES, WHILST THE MACHINE IS RUNNING. IT IS ALSO STRONGLY RECOMMENDED TO RUN THE GREASE FEED FOR 2 HOURS AFTER EACH RUNNING PERIOD.

Spur Gear Oil;

MMD recommend that the spur gear oil should be renewed at approximately every 4000 hours. Drainage is achieved by removing the drain plug which is fitted to the bottom cover plate. Once this plug has been removed the oil can then be drained into the suitable catch tray or other suitable containers. To replace the spur gear oil remove the inspection cover(s) and fill to the required quantity through the top cover plate. Re-seal the top cover plate on refitting. Fill to the level stick notch. The oil specification grade is listed in MMD procedure T0138a.

Light Load Running;

When it is expected that the SIZER™ will not have any feed of material for a period in excess of 15 minutes, the SIZER™ motors should be shut down. The reason for this, is that the transmissions are designed to carry high loads, and when loads are removed, the possibility of roller slip in the bearings exists, which could result in long term damage.

Daily Maintenance;

Visual and audible examination for excessive vibration or noise.

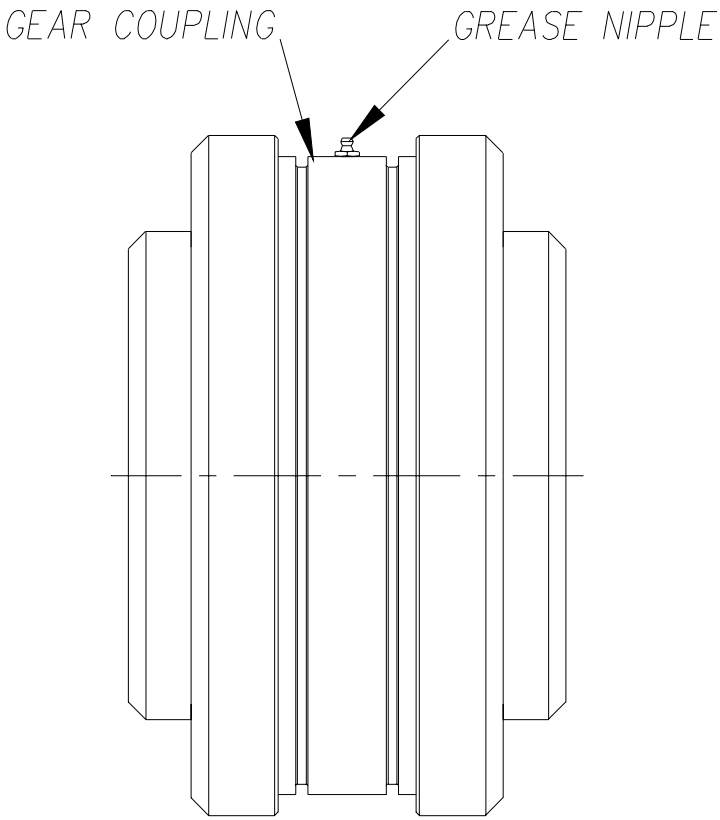
Ensure (where fitted) the Autolube is functioning correctly.

Where fitted, check the centralised greasing unit reservoir grease level, and top-up if required with the recommended lubricant. Visually check for leaks.

Check the spur gear oil level, and top up as required, with the correct specification lubricant. Refer to MMD procedure T0138a.

Three Monthly Maintenance;

Grease the gear coupling at the ¼" BSPT grease nipple. Specification as per breaker shaft bearings. Where fitted, check that the shut-down alarms are effective.



Annual Maintenance;

All bolts must be checked for tightness, and re-torqued to the amount specified in the procedure overleaf (MMD Procedure T056) if necessary.

Where fitted, grease the wheel carriage units at their respective grease points.

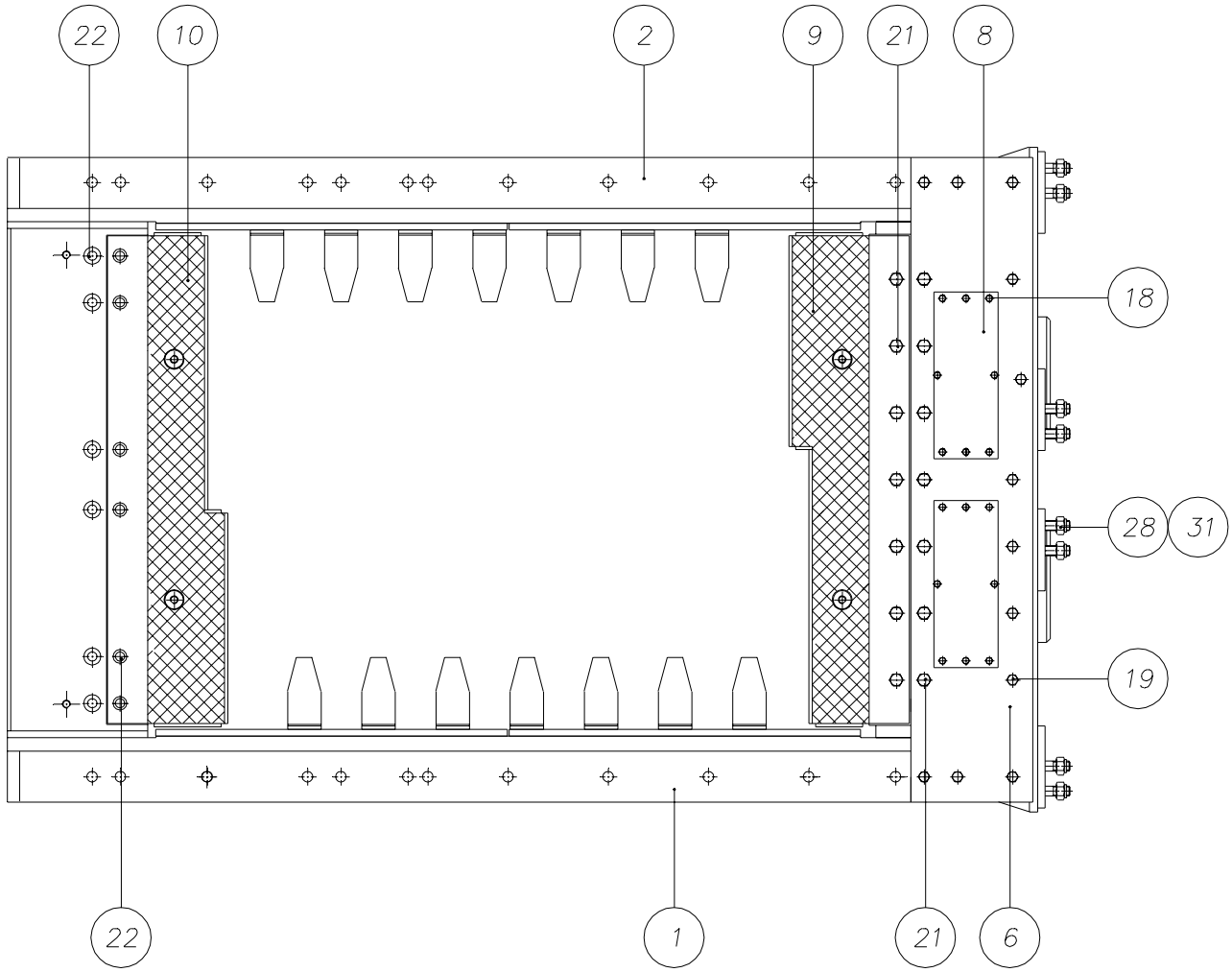
MMD MINING MACHINERY DEVELOPMENTS LIMITED

CASE ASSEMBLY

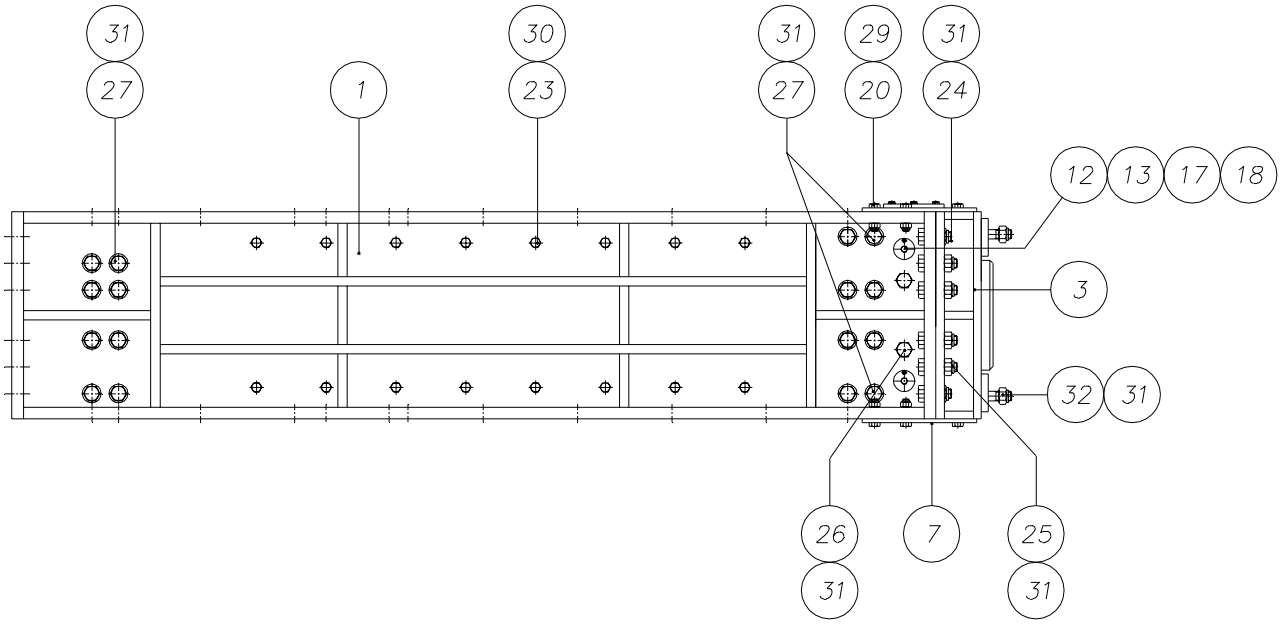
PART NUMBER - 346250424

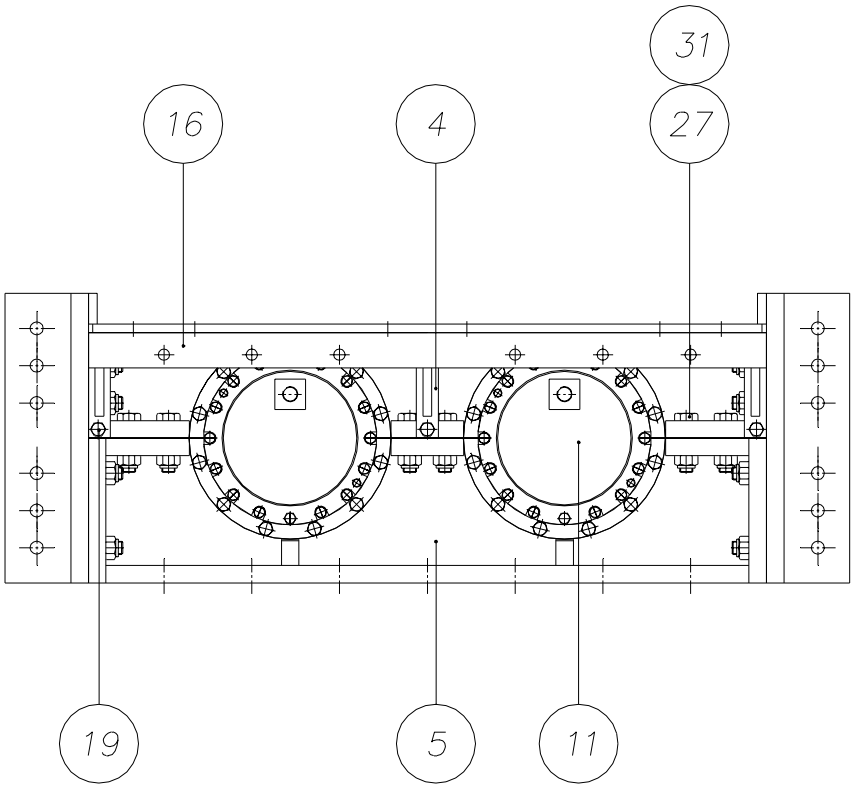
REVISION	MODIFICATION	DATE
1.0	FIRST ISSUE	14-12-00

MMD MINING MACHINERY DEVELOPMENTS LIMITED
Case Assembly - Part Number : 346250424



MMD MINING MACHINERY DEVELOPMENTS LIMITED
Case Assembly - Part Number : 346250424




31
16
4
27
19
5
11

MMD MINING MACHINERY DEVELOPMENTS LIMITED
Case Assembly - Part Number : 346250424

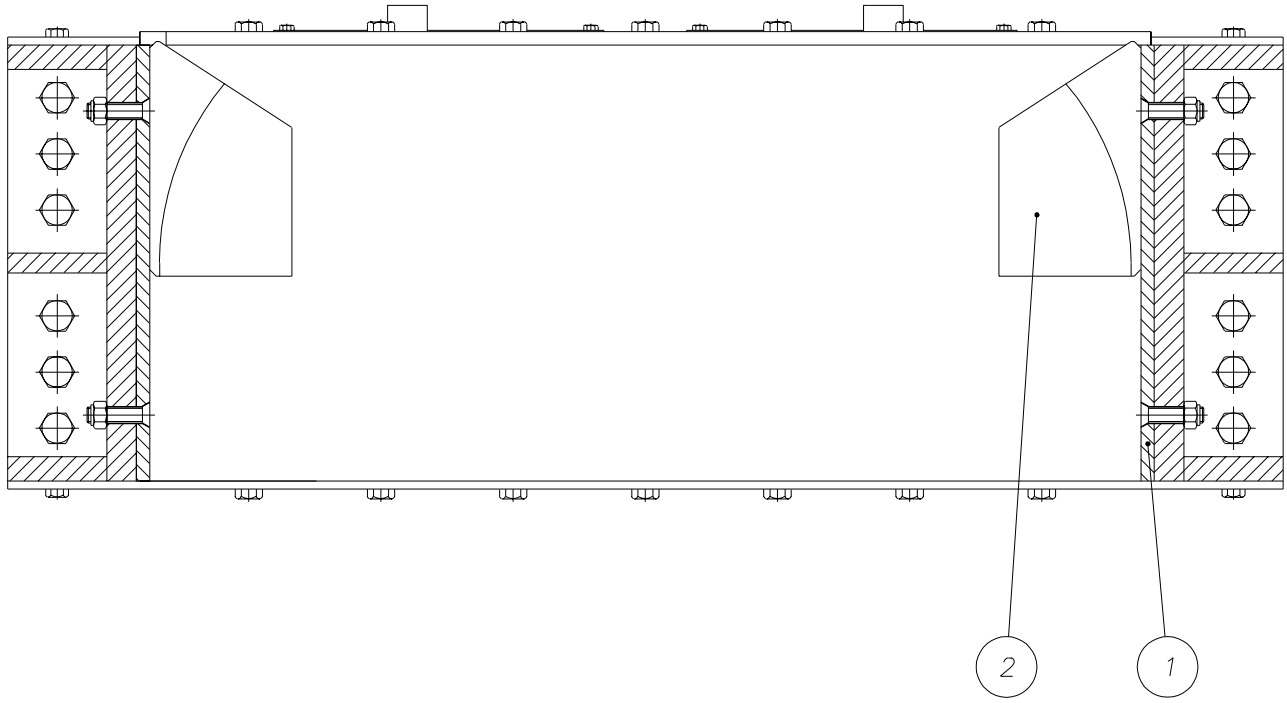
ITEM	PART NUMBER	DESCRIPTION	UNIT MASS	QTY
1	6251960-85	Side Plate	1,170	1
2	6251961-85	Side Plate	1,170	1
3	6251244-85	Gearbox Mounting Plate	532	1
4	6251958-06	Standard Bearing Housing	310	3
5	6251959-06	Narrow Bearing Housing	240	1
6	6250208-85	Top Cover Plate	92	1
7	6250209-85	Bottom Cover Plate	102	1
8	6250232-84	Inspection Cover Plate	8	2
9	6251947-84	End Wear Plate	370	1
10	6251962-84	End Wear Plate	308	1
11	6251963-01	Shaft End Cover Plate	40	2
12	6250193-01	Dowel - Gearbox Mounting Plate To Side Plate	0.5	4
13	6250194-01	Dowel Retaining Plate	0.25	4
14	6250213-85	Lifting Lug (Not Shown)	16	2
15	6250214-85	Lifting Lug (Not Shown)	16	2
16	6251964-84	Chute Plate	115	1
17	030508016	M8 x 16 Socket Cap Screw	0.01	4
18	031312020	M12 x 20 Hex Set Screw	0.03	20
19	031320040	M20 x 40 Hex Set Screw	0.14	15
20	030320070	M20 x 70 Hex Bolt	0.22	8
21	031324050	M24 x 50 Hex Set Screw	0.27	21
22	031824050	M24 x 50 Countersunk Socket Screw	0.22	12
23	031824100	M24 x 100 Countersunk Socket Screw	0.34	32
24	030330080	M30 x 80 Hex Bolt	0.62	4
25	030330100	M30 x 100 Hex Bolt	0.7	8
26	030330110	M30 x 110 Hex Bolt	0.7	4
27	030330120	M30 x 120 Hex Bolt	0.85	56
28	030330130	M30 x 130 Hex Bolt	0.9	8
29	031420000	M20 Nyloc Nut	0.06	8
30	031424000	M24 Nyloc Nut	0.11	32
31	031430000	M30 Nyloc Nut	0.21	92
32	6251981-01	M30 Stud	0.8	8
		TOTAL MASS:-	**5,320 kg**	

SIDE WEAR PLATE ASSEMBLY

PART NUMBER - 146251942

REVISION	MODIFICATION	DATE
1.0	FIRST ISSUE	14-12-00

MMD MINING MACHINERY DEVELOPMENTS LIMITED
Side Wear Plate Assembly - Part Number : 146251942



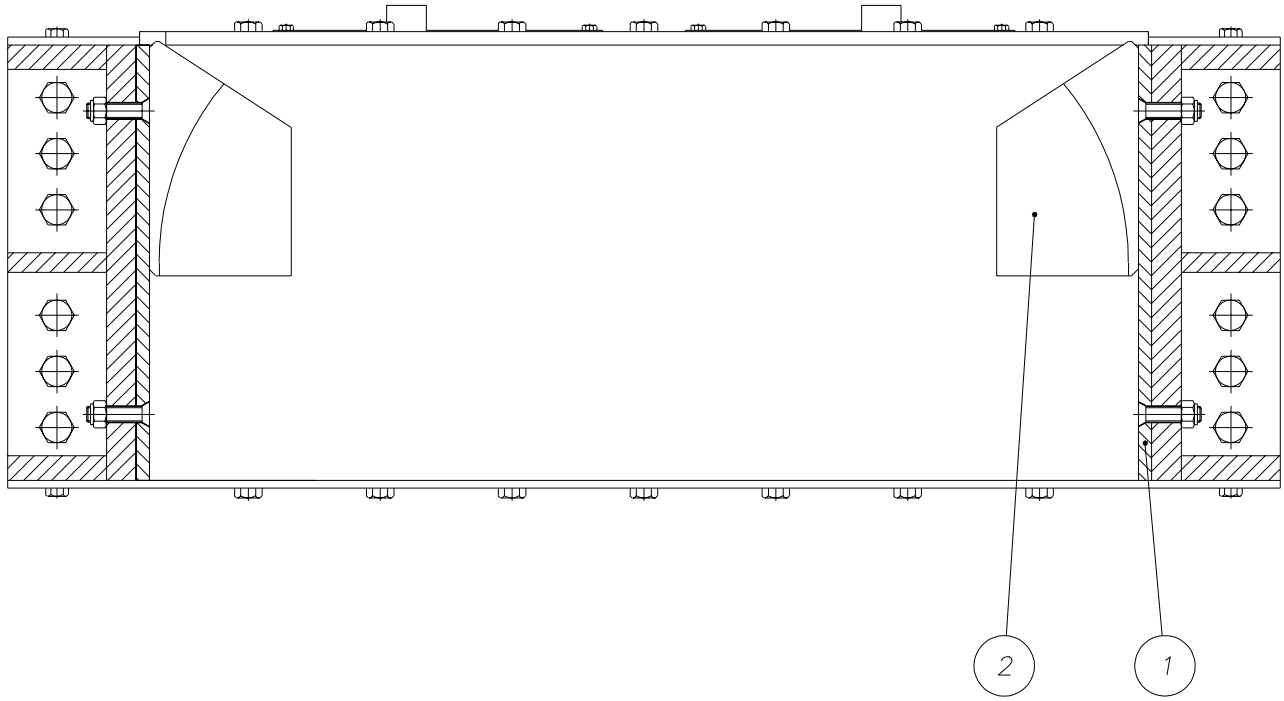
ITEM	PART NUMBER	DESCRIPTION	UNIT WGT	QTY
1	6251942-84	Side Wear Plate	109	1
2	6251070-01	Pyramid (Material - MMD 101)	20.5	3
		TOTAL MASS:-	**170.5 kg**	

SIDE WEAR PLATE ASSEMBLY

PART NUMBER - 146251943

REVISION	MODIFICATION	DATE
1.0	FIRST ISSUE	14-12-00

MMD MINING MACHINERY DEVELOPMENTS LIMITED
Side Wear Plate Assembly - Part Number : 146251943



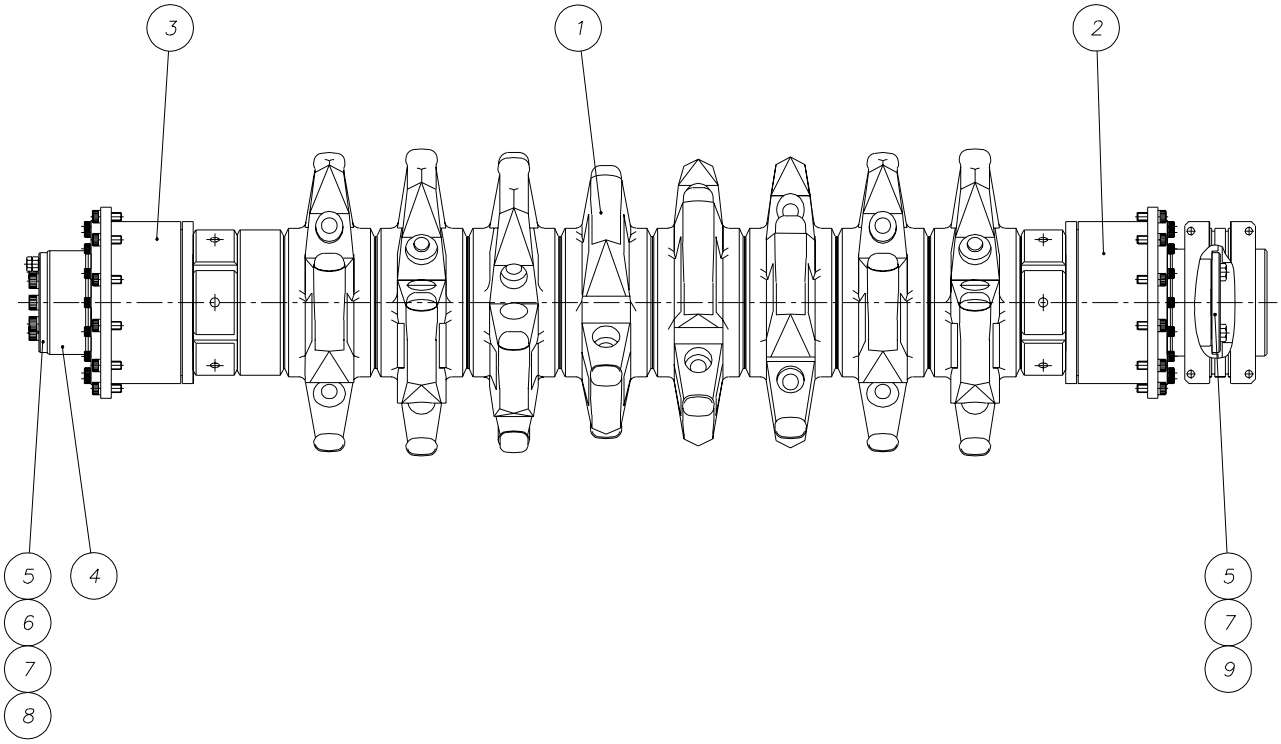
ITEM	PART NUMBER	DESCRIPTION	UNIT MASS	QTY
1	6251943-84	Side Wear Plate	109	1
2	6251070-01	Pyramid (Material - MMD 101)	20.5	4
		TOTAL MASS:-	**191 kg**	

LEFT HAND 4 TOOTH x 8 RING BREAKER SHAFT ASSEMBLY

PART NUMBER - 246251956

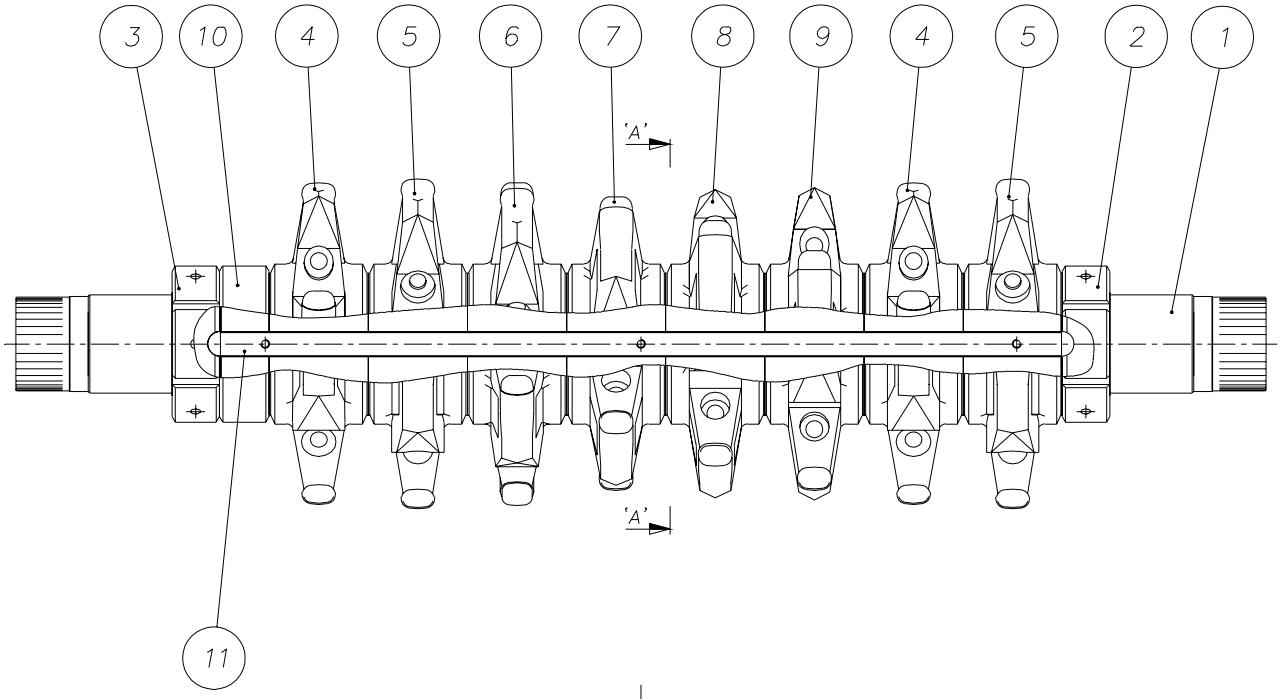
REVISION	MODIFICATION	DATE
1.0	FIRST ISSUE	14-12-00

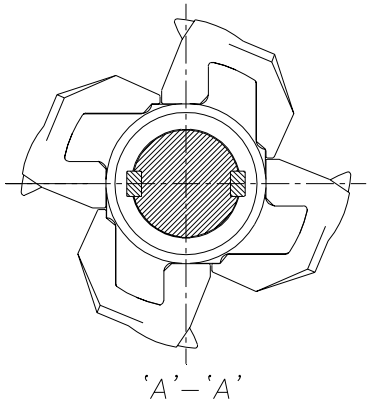
MMD MINING MACHINERY DEVELOPMENTS LIMITED
Left Hand Breaker Shaft Assembly - Part Number : 246251956



ITEM	PART NUMBER	DESCRIPTION	UNIT MASS	QTY
1	146251370	4 Tooth x 8 Ring Heavy Duty Shaft Assembly	2,232	1
2	146251952	Fixed Bearing Assembly	139	1
3	146251953	Floating Bearing Assembly	137	1
4	6251321-01	Spacer (Non-Drive End)	10	1
5	6251359-01	End Cap	7	2
6	031320050	M20 x 50 Hex Set Screw	0.17	1
7	030524070	M24 x 70 Socket Cap Screw (Grade 12.9)	0.36	16
8	030420000	M20 Hex Nut	0.06	1
9	111701033	Gear Coupling Assembly (See Page 25)	–	1
		TOTAL MASS:-	**2,538 kg**	

MMD MINING MACHINERY DEVELOPMENTS LIMITED
Left Hand Breaker Shaft Assembly - Part Number : 146251370



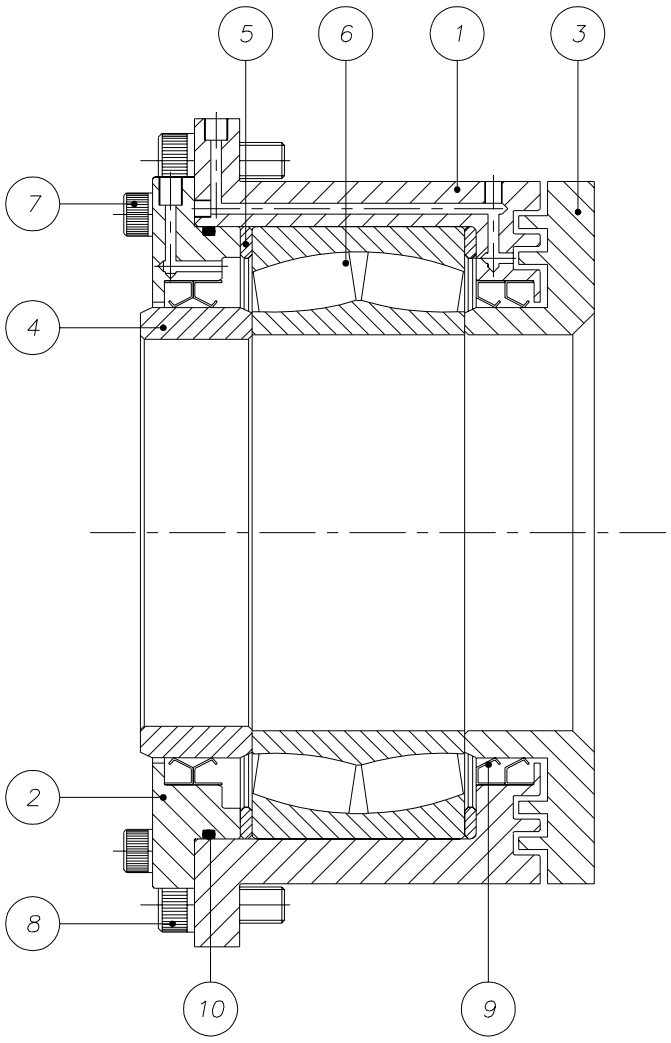


MMD MINING MACHINERY DEVELOPMENTS LIMITED
Left Hand Breaker Shaft Assembly - Part Number : 146251370

ITEM	PART NUMBER	DESCRIPTION	UNIT MASS	QTY
1	5010151-06	Breaker Shaft	810	1
2	6250204-01	Left Hand Screwed Collar	40	1
3	6250205-01	Right Hand Screwed Collar	40	1
4	5050132-06	4 Tooth Ring - Heavy Duty (0 Degrees)	156	2
5	5050133-06	4 Tooth Ring - Heavy Duty (15 Degrees)	156	2
6	5050134-06	4 Tooth Ring - Heavy Duty (30 Degrees)	156	1
7	5050135-06	4 Tooth Ring - Heavy Duty (45 Degrees)	156	1
8	5050136-06	4 Tooth Ring - Heavy Duty (60 Degrees)	156	1
9	5050137-06	4 Tooth Ring - Heavy Duty (75 Degrees)	156	1
10	6250206-01	Half Spacer	42	1
11	5090021-01	Key (56 x 32 x 1890)	26	2

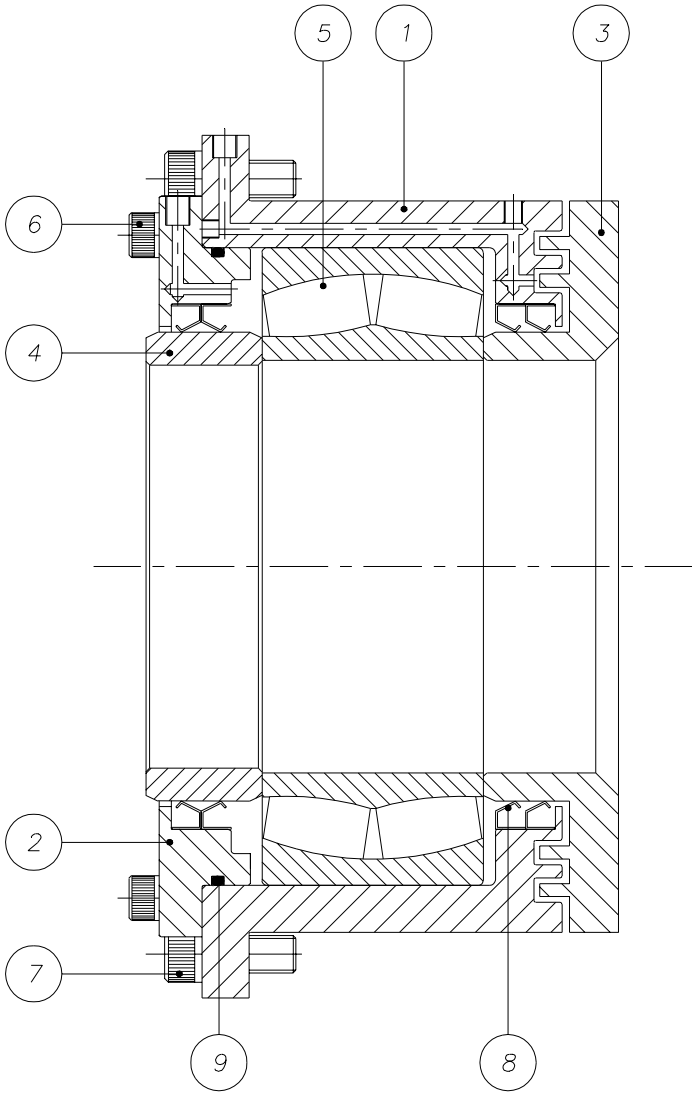
TOTAL MASS:-	**2,232 kg**

MMD MINING MACHINERY DEVELOPMENTS LIMITED
Fixed Bearing Assembly - Part Number : 146251952



ITEM	PART NUMBER	DESCRIPTION	UNIT MASS	QTY
1	6251954-06	Bearing Capsule	57	1
2	6251955-01	Retaining Plate	15	1
3	6251428-01	Labyrinth Spacer	22	1
4	6251358-01	Spacer	7	1
5	6251850-01	Spacer	0.8	2
6	035000057	Spherical Roller Bearing (24044 CC C3 W33)	30.5	1
7	030516050	M16 x 50 Socket Cap Screw (Grade 12.9)	0.11	16
8	030520050	M20 x 50 Socket Cap Screw (Grade 12.9)	0.18	12
9	032000220	Weston Oil Seal (250 x 280 x 16 R4)	0.4	4
10	032000604	'O' Ring RM3193-57	0.1	1
		TOTAL MASS:-	**139 kg**	

MMD MINING MACHINERY DEVELOPMENTS LIMITED
Floating Bearing Assembly - Part Number : 146251953



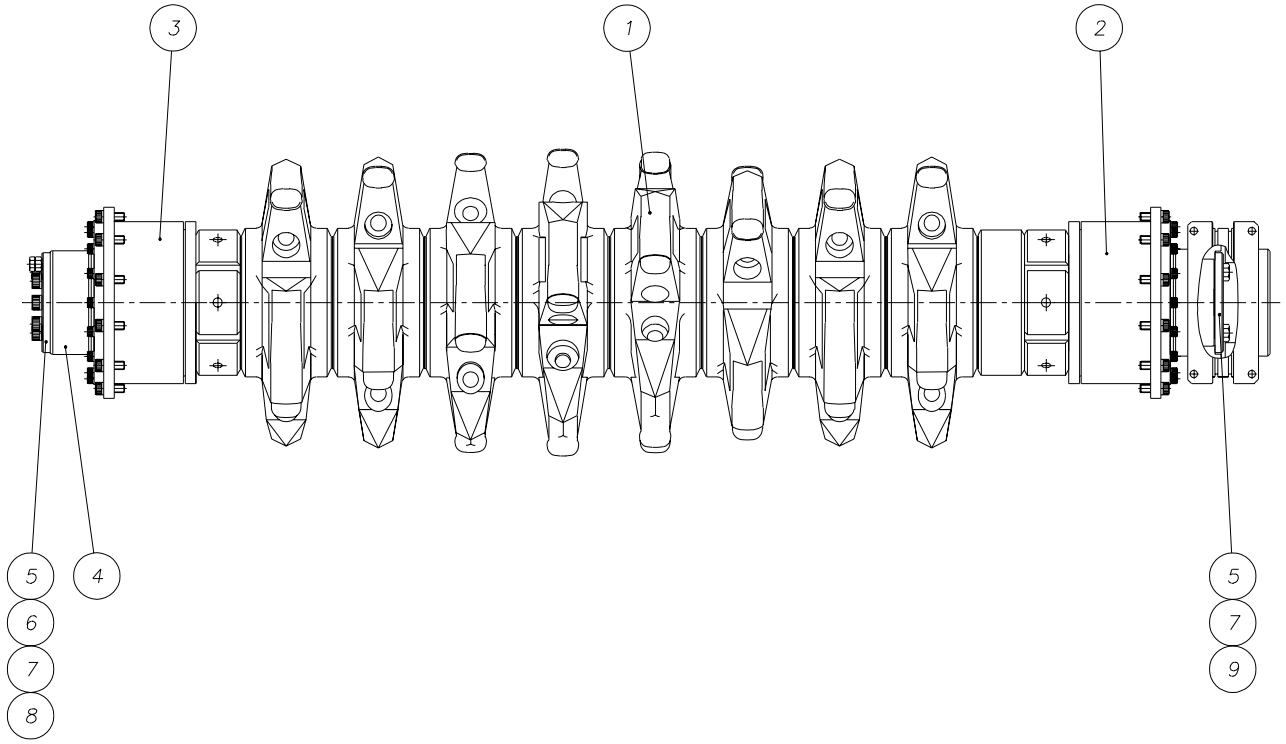
ITEM	PART NUMBER	DESCRIPTION	UNIT MASS	QTY
1	6251954-06	Bearing Capsule	57	1
2	6251955-01	Retaining Plate	15	1
3	6251428-01	Labyrinth Spacer	22	1
4	6251358-01	Spacer	7	1
5	035000057	Spherical Roller Bearing (24044 CC C3 W33)	30.5	1
6	030516050	M16 x 50 Socket Cap Screw (Grade 12.9)	0.11	16
7	030520050	M20 x 50 Socket Cap Screw (Grade 12.9)	0.18	12
8	032000220	Weston Oil Seal (250 x 280 x 16 R4)	0.4	4
9	032000604	'O' Ring RM3193-57	0.1	1
		TOTAL MASS:-	**137 kg**	

RIGHT HAND 4 TOOTH x 8 RING BREAKER SHAFT ASSEMBLY

PART NUMBER - 246251957

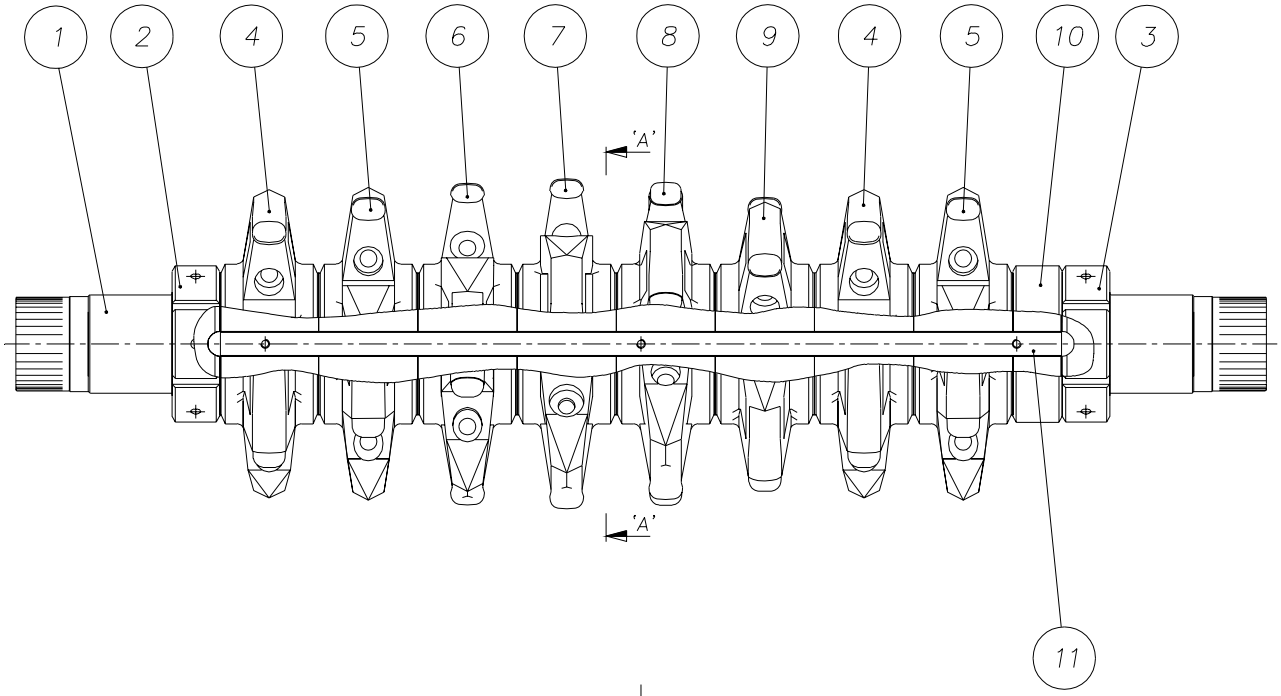
REVISION	MODIFICATION	DATE
1.0	FIRST ISSUE	14-12-00

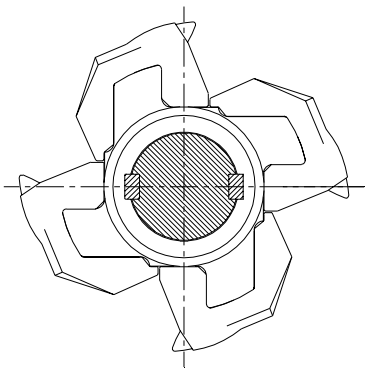
MMD MINING MACHINERY DEVELOPMENTS LIMITED
Right Hand Breaker Shaft Assembly - Part Number : 246251957



ITEM	PART NUMBER	DESCRIPTION	UNIT MASS	QTY
1	146251371	4 Tooth x 8 Ring Heavy Duty Shaft Assembly	2,232	1
2	146251952	Fixed Bearing Assembly	139	1
3	146251953	Floating Bearing Assembly	137	1
4	6251321-01	Spacer (Non-Drive End)	10	1
5	6251359-01	End Cap	7	2
6	031320050	M20 x 50 Hex Set Screw	0.17	1
7	030524070	M24 x 70 Socket Cap Screw (Grade 12.9)	0.36	16
8	030420000	M20 Hex Nut	0.06	1
9	111701004	Gear Coupling Assembly (See Page 25)	–	1
		TOTAL MASS:-	**2,538 kg**	

MMD MINING MACHINERY DEVELOPMENTS LIMITED
Right Hand Breaker Shaft Assembly - Part Number : 146251371





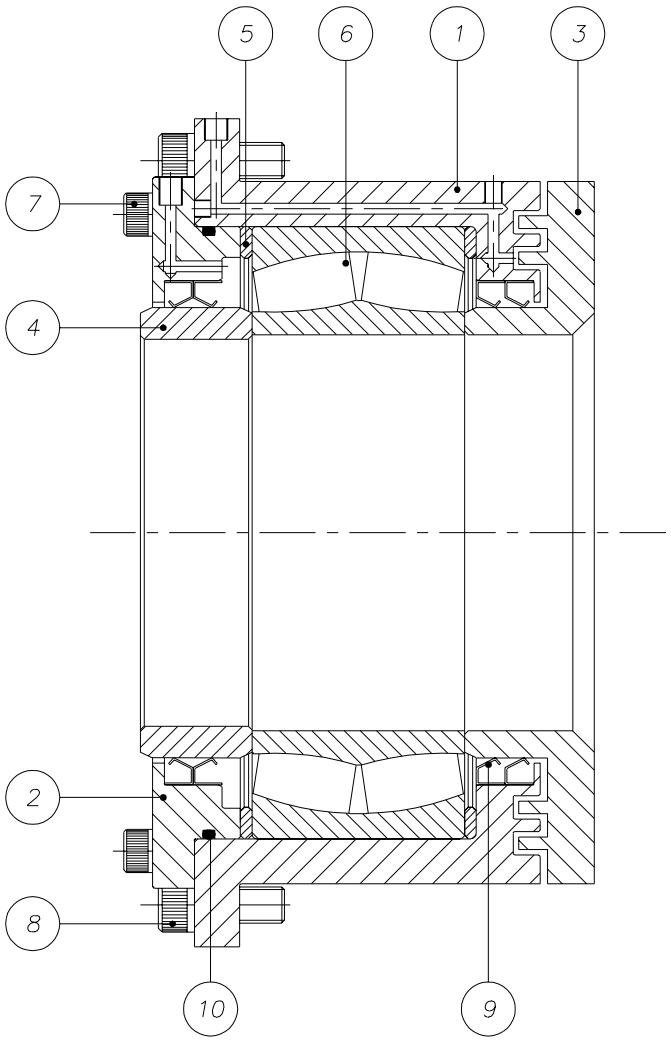
'A' – 'A'

MMD MINING MACHINERY DEVELOPMENTS LIMITED
Right Hand Breaker Shaft Assembly - Part Number : 146251371

ITEM	PART NUMBER	DESCRIPTION	UNIT MASS	QTY
1	5010151-06	Breaker Shaft	810	1
2	6250204-01	Left Hand Screwed Collar	40	1
3	6250205-01	Right Hand Screwed Collar	40	1
4	5050132-06	4 Tooth Ring - Heavy Duty (0 Degrees)	156	2
5	5050133-06	4 Tooth Ring - Heavy Duty (15 Degrees)	156	2
6	5050134-06	4 Tooth Ring - Heavy Duty (30 Degrees)	156	1
7	5050135-06	4 Tooth Ring - Heavy Duty (45 Degrees)	156	1
8	5050136-06	4 Tooth Ring - Heavy Duty (60 Degrees)	156	1
9	5050137-06	4 Tooth Ring - Heavy Duty (75 Degrees)	156	1
10	6250206-01	Half Spacer	42	1
11	5090021-01	Key (56 x 32 x 1890)	26	2

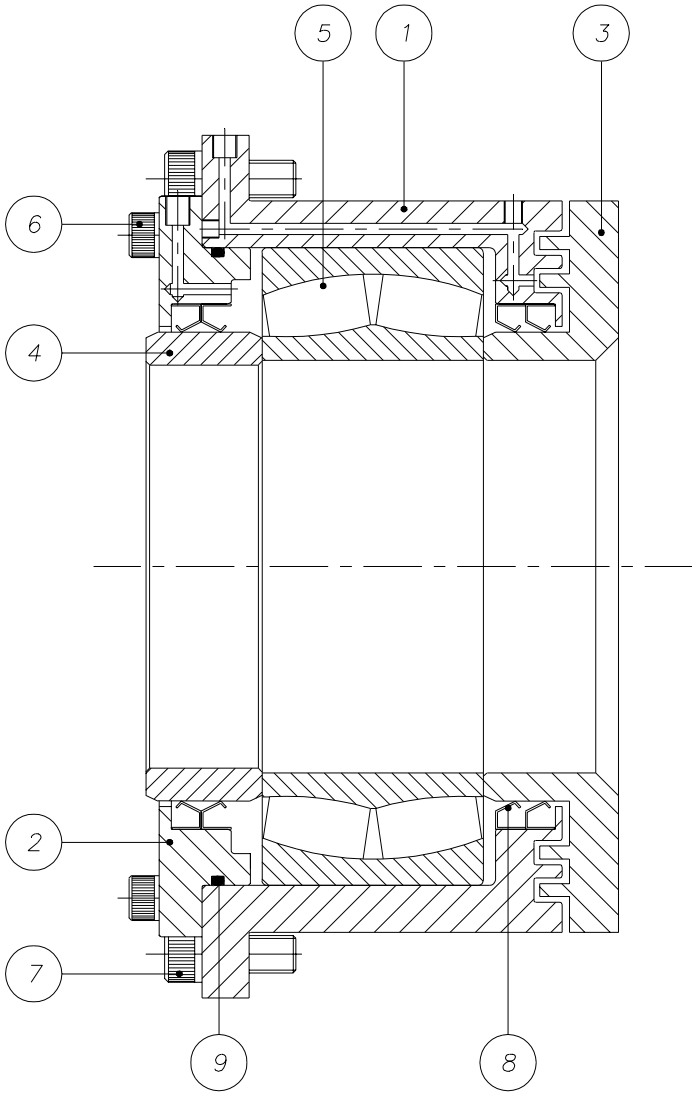
TOTAL MASS:-	**2,232 kg**

MMD MINING MACHINERY DEVELOPMENTS LIMITED
Fixed Bearing Assembly - Part Number : 146251952



ITEM	PART NUMBER	DESCRIPTION	UNIT MASS	QTY
1	6251954-06	Bearing Capsule	57	1
2	6251955-01	Retaining Plate	15	1
3	6251428-01	Labyrinth Spacer	22	1
4	6251358-01	Spacer	7	1
5	6251850-01	Spacer	0.8	2
6	035000057	Spherical Roller Bearing (24044 CC C3 W33)	30.5	1
7	030516050	M16 x 50 Socket Cap Screw (Grade 12.9)	0.11	16
8	030520050	M20 x 50 Socket Cap Screw (Grade 12.9)	0.18	12
9	032000220	Weston Oil Seal (250 x 280 x 16 R4)	0.4	4
10	032000604	'O' Ring RM3193-57	0.1	1
		TOTAL MASS:-	**139 kg**	

MMD MINING MACHINERY DEVELOPMENTS LIMITED
Floating Bearing Assembly - Part Number : 146251953



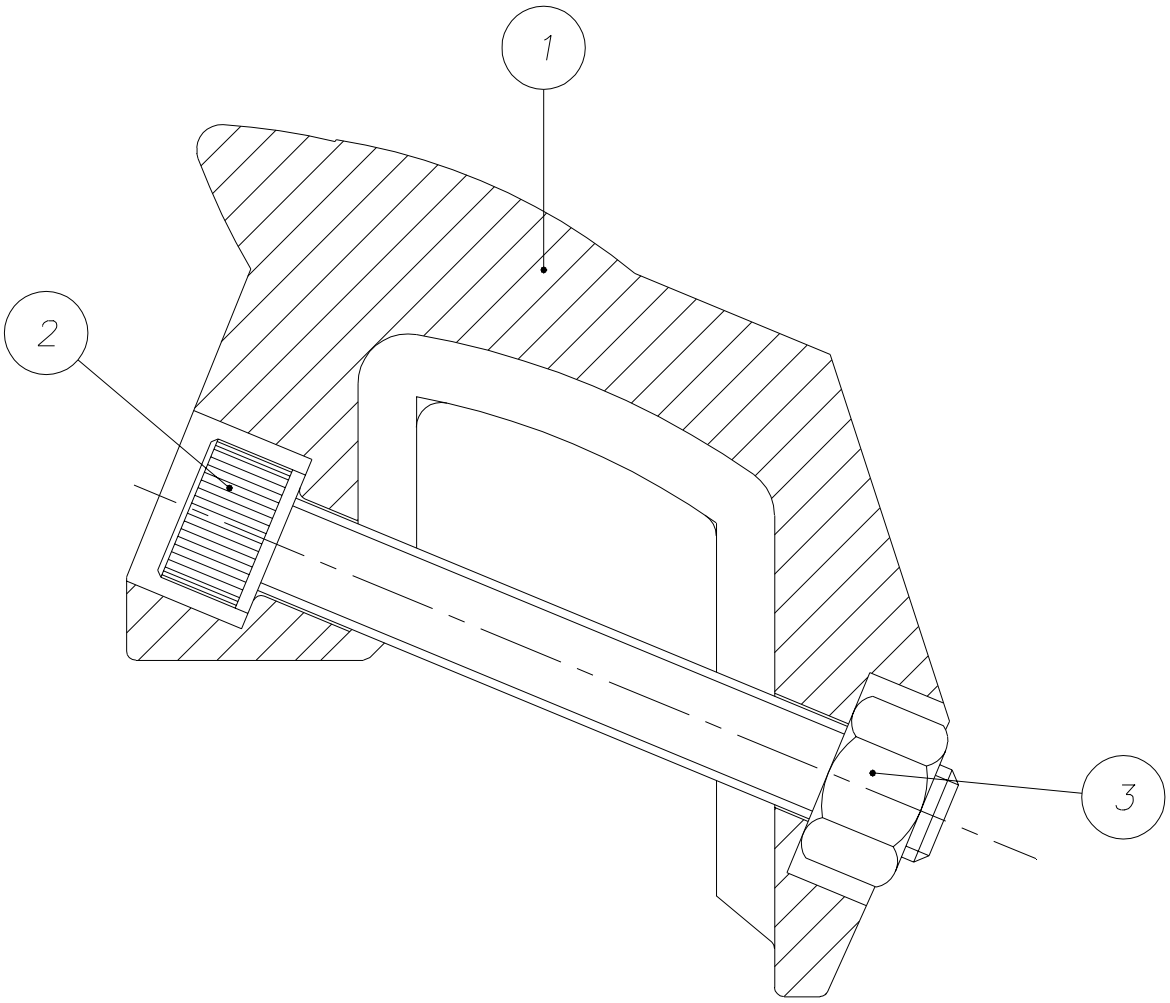
ITEM	PART NUMBER	DESCRIPTION	UNIT MASS	QTY
1	6251954-06	Bearing Capsule	57	1
2	6251955-01	Retaining Plate	15	1
3	6251428-01	Labyrinth Spacer	22	1
4	6251358-01	Spacer	7	1
5	035000057	Spherical Roller Bearing (24044 CC C3 W33)	30.5	1
6	030516050	M16 x 50 Socket Cap Screw (Grade 12.9)	0.11	16
7	030520050	M20 x 50 Socket Cap Screw (Grade 12.9)	0.18	12
8	032000220	Weston Oil Seal (250 x 280 x 16 R4)	0.4	4
9	032000604	'O' Ring RM3193-57	0.1	1
		TOTAL MASS:-	**137 kg**	

HEAVY DUTY TOOTH CAP & FIXINGS ASSEMBLY

PART NUMBER - 145060084

REVISION	MODIFICATION	DATE
1.0	FIRST ISSUE	14-12-00

MMD MINING MACHINERY DEVELOPMENTS LIMITED
Tooth Cap & Fixings Assembly - Part Number : 145060084



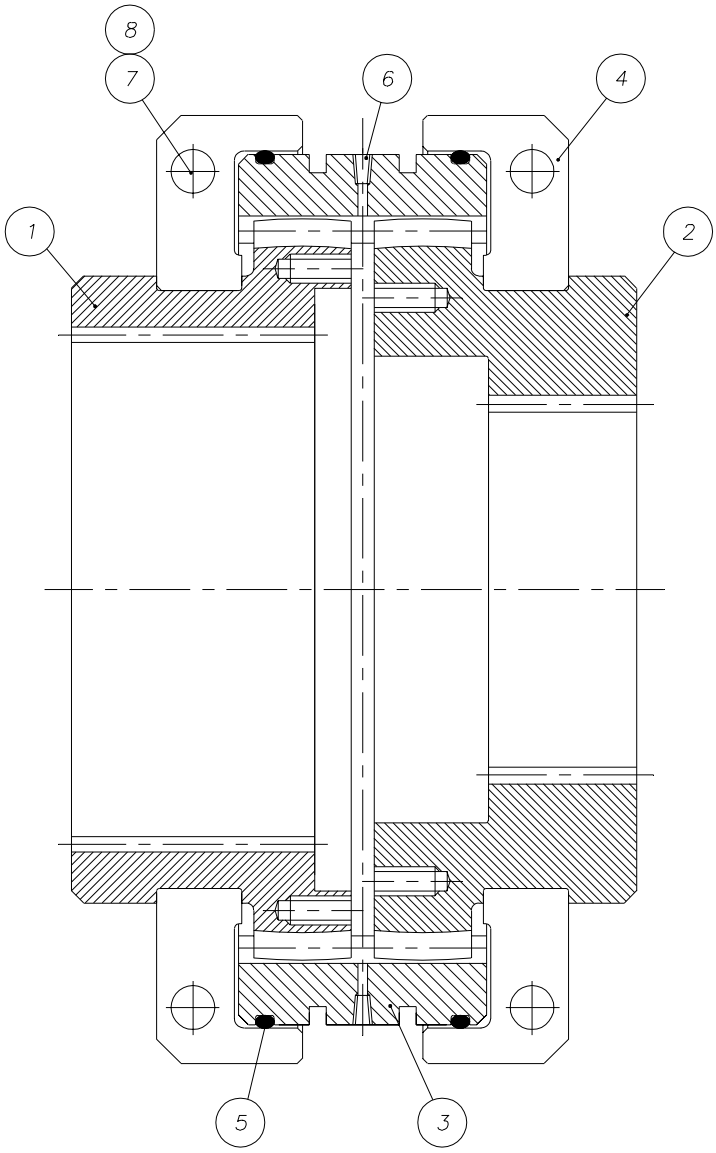
ITEM	PART NUMBER	DESCRIPTION	UNIT MASS	QTY
1	5060084-84	Tooth Cap (Material MMD 501)	21	1
2	030536260	M36 x 260 Socket Capscrew	2.2	1
3	032736012	M36 Hex Nut 1xD Thick	0.4	1
		TOTAL MASS:-	**23.6 kg**	

GEAR COUPLING ASSEMBLY

PART NUMBER - 1117010084

REVISION	MODIFICATION	DATE
1.0	FIRST ISSUE	14-12-00

MMD MINING MACHINERY DEVELOPMENTS LIMITED
Gear Coupling Assembly - Part Number 111701004



ITEM	PART NUMBER	DESCRIPTION	UNIT MASS	QTY
1	1701005-01	Coupling Hub	28	1
2	1701006-01	Coupling Hub	17.6	1
3	1701007-01	Coupling Sleeve	22	1
4	1701008-91	Split Clamp	20	2
5	032000784	'O' Ring - RM3493-57	0.01	2
6	036000002	¼" BSPT Pressure Plug	0.01	2
7	030516090	M16 x 90 Socket Cap Screw	0.2	4
8	031416000	M16 Nyloc Nut	0.03	4
		TOTAL MASS:-	**109 kg**	

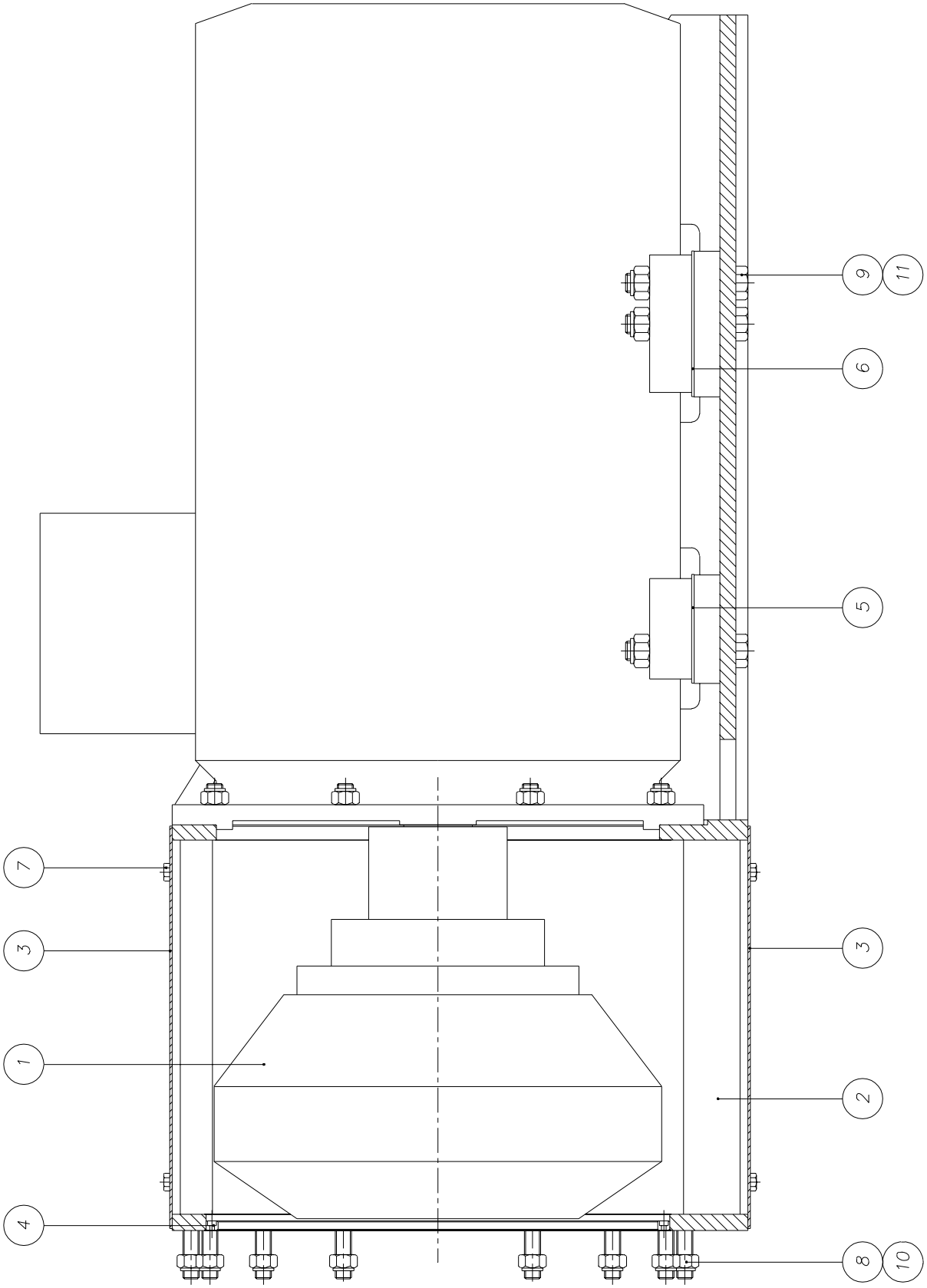
MMD MINING MACHINERY DEVELOPMENTS LIMITED

VOITH 487TVG FLUID COUPLING ASSEMBLY

PART NUMBER - 146251966

REVISION	MODIFICATION	DATE
1.0	FIRST ISSUE	14-12-00

MMD MINING MACHINERY DEVELOPMENTS LIMITED
Fluid Coupling Assembly - Part Number : 1416251966



ITEM	PART NUMBER	DESCRIPTION	UNIT MASS	QTY
1	023300349	Voith 487 TVG (Anodised) c/w EEKE Boss (Osborn Supply)	105	1
2	6251967-85	Motor Mounting Frame	445	1
3	6251968-84	Cover Plate	8.25	2
4	1561828-01	Spigot Ring	3	1
5	6251969-01	Motor Shim Pack	0.6	2
6	6251970-01	Motor Shim Pack	0.7	2
7	031312020	M12 x 20 Hex Set Screw	0.04	8
8	030520080	M20 x 80 Socket Cap Screw (Grade 12.9)	0.25	22
9	030524140	M24 x 140 Socket Cap Screw (Grade 12.9)	0.2	6
10	031420000	M20 Nyloc Nut	0.06	22
11	031424000	M24 Nyloc Nut	0.11	6

TOTAL MASS:-	**581 kg**

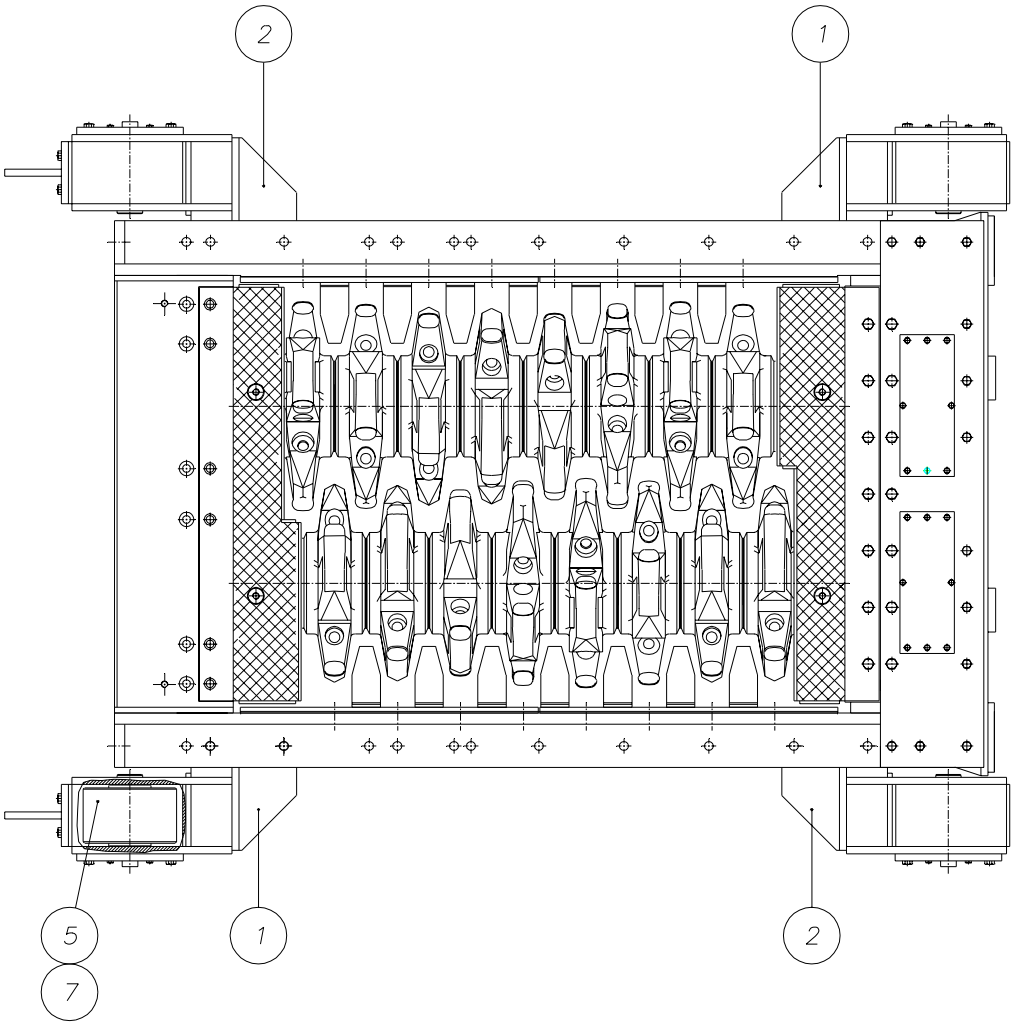
MMD MINING MACHINERY DEVELOPMENTS LIMITED

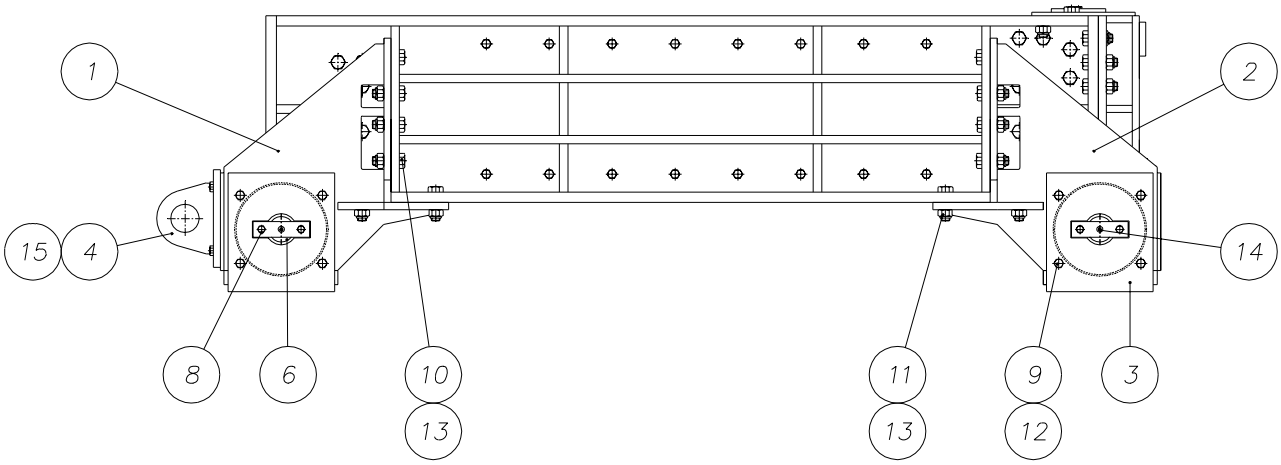
WHEEL CARRIAGE ASSEMBLY

PART NUMBER - 145040240

REVISION	MODIFICATION	DATE
1.0	FIRST ISSUE	14-12-00

MMD MINING MACHINERY DEVELOPMENTS LIMITED
Wheel Carriage Assembly - Part Number : 145040240





MMD MINING MACHINERY DEVELOPMENTS LIMITED
Wheel Carriage Assembly - Part Number : 145040240

ITEM	PART NUMBER	DESCRIPTION	UNIT MASS	QTY
1	5040236-85	90 Degree Corner Carriage	245	2
2	5040237-85	90 Degree Corner Carriage	245	2
3	5040238-84	Trapping Bracket	30	4
4	5040239-85	Towing Eye	25	2
5	5040224-01	Wheel	120	4
6	5020060-01	Pin	15.4	4
7	5040068-01	Bronze Bush	1.3	8
8	031312040	M12 x 40 Hex Set Screw	0.05	8
9	030320320	M20 x 320 Hex Bolt	2.5	16
10	030324090	M24 x 90 Hex Bolt	0.41	16
11	030324100	M24 x 100 Hex Bolt	0.44	8
12	031420000	M20 Nyloc Nut	0.06	16
13	031424000	M24 Nyloc Nut	0.11	24
14	036000604	1/4” BSP Grease Nipple	0.01	4
15	031320050	M20 x 50 Hex Set Screw	0.17	8
		TOTAL MASS:-	**1,757 kg**	

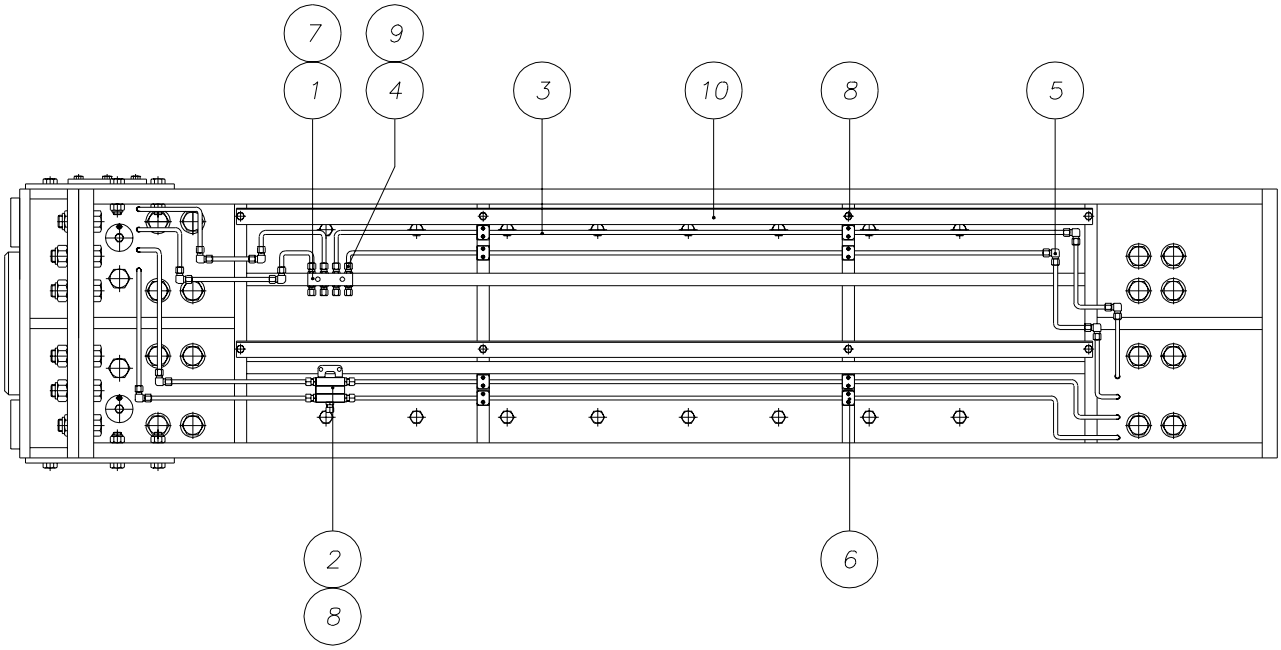
MMD MINING MACHINERY DEVELOPMENTS LIMITED

CENTRALISED GREASING ASSEMBLY

PART NUMBER - 146251983

REVISION	MODIFICATION	DATE
1.0	FIRST ISSUE	14-12-00

MMD MINING MACHINERY DEVELOPMENTS LIMITED
Wheel Carriage Assembly - Part Number : 146251983



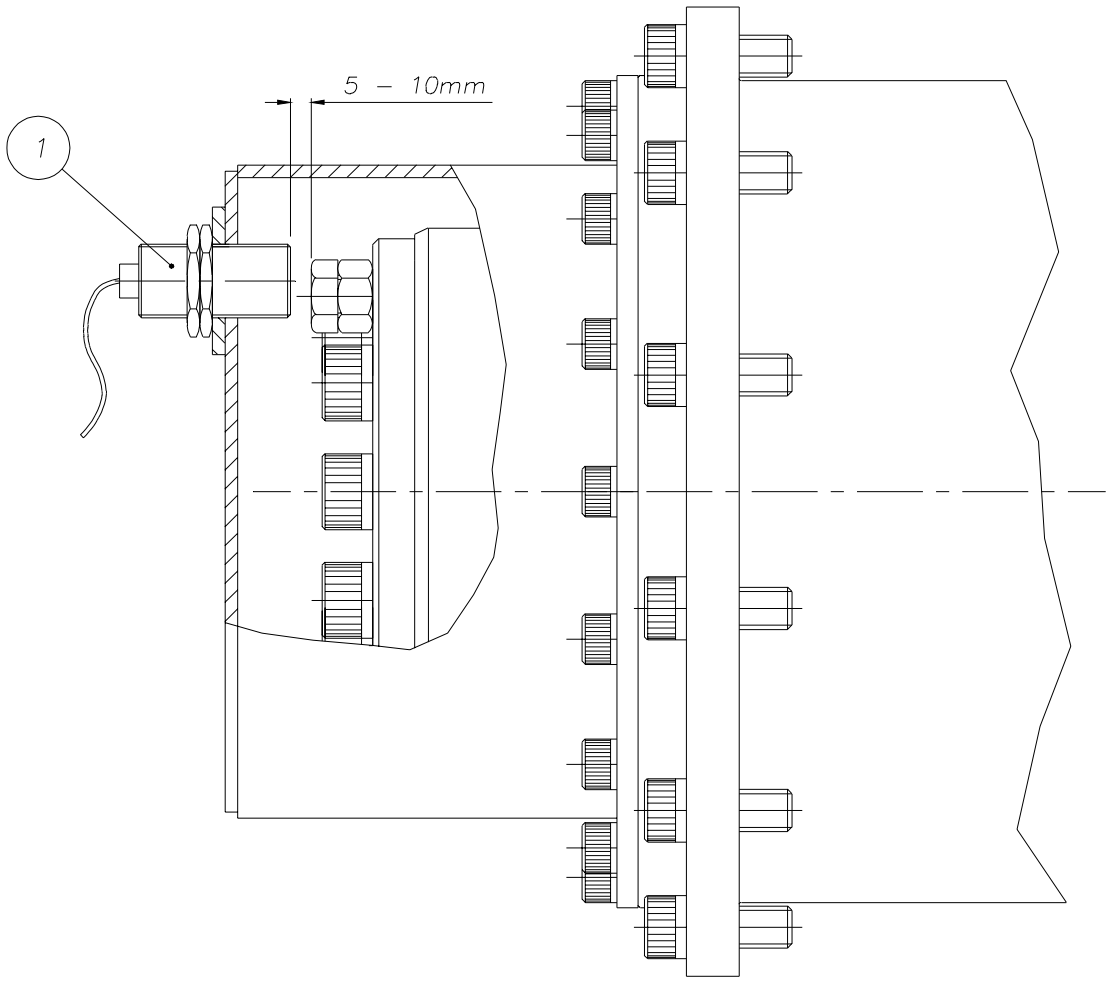
ITEM	PART NUMBER	DESCRIPTION	UNIT MASS	QTY
1	0063654-01	Grease Pipe Joint Bracket	0.6	1
2	023060210	4 Way Distribution Block (ZP-A)	0.5	1
3	023307507	10mm O/D x 1.5mm Wall x 6MT Long Pipe	1.3	3
4	023307509	1/4” BSP Male - 10mm Pipe	0.1	32
5	023307510	10mm x 10mm Elbow	0.1	12
6	023307511	Pipe Clamps	0.1	8
7	030512030	M12 x 30 Socket Cap Screw	0.04	2
8	031310020	M10 x 20 Hex Set Screw	0.2	10
9	032000451	1/4” BSP Bonded Seal	0.01	32
10	3991616-84	Grease Pipe Protector	5	2
		TOTAL MASS:-	**22.6 kg**	

CARLO GAVAZZI 110 VOLT UNDERSPEED SENSING ASSEMBLY

PART NUMBER - 143210000

REVISION	MODIFICATION	DATE
1.0	FIRST ISSUE	14-12-00

MMD MINING MACHINERY DEVELOPMENTS LIMITED
Underspeed Sensing Assembly - Part Number : 143210000



ITEM	PART NUMBER	DESCRIPTION	UNIT MASS	QTY
1	**143210000**	**Carlo Gavazzi Underspeed Sensing Assembly, 110 Volt, D.C,** ***Comprising of:-***	–	–
	023210001	Sensor - Ref. DJ10G	0.35	1
	023210002	Relay - Ref. S114156115 -100 RPM	0.2	1
	023210004	Base - Ref. S411	0.06	1
		TOTAL MASS:-	**0.6 kg**	

CARLO GAVAZZI
SPEED SWITCH OPERATION &
INSTALLATION INSTRUCTIONS

The speed switch provided is a Carlo Gavazzi pulse continuity relay, part number S114 156 115. This multiple function control relay operates as a motor speed monitor. The relay receives a pulse from a Carlo Gavazzi proximity sensor, part number DJ10G to monitor motor speed. The control operation of this relay includes two selectable modes of operation, and four selectable time ranges.

SECTION 1 - BASIC OPERATION

This section covers basics connections and settings of DIP switches for the modes of operation and time delay settings.

SECTION II - MOMENTARY START CIRCUIT OPERATION

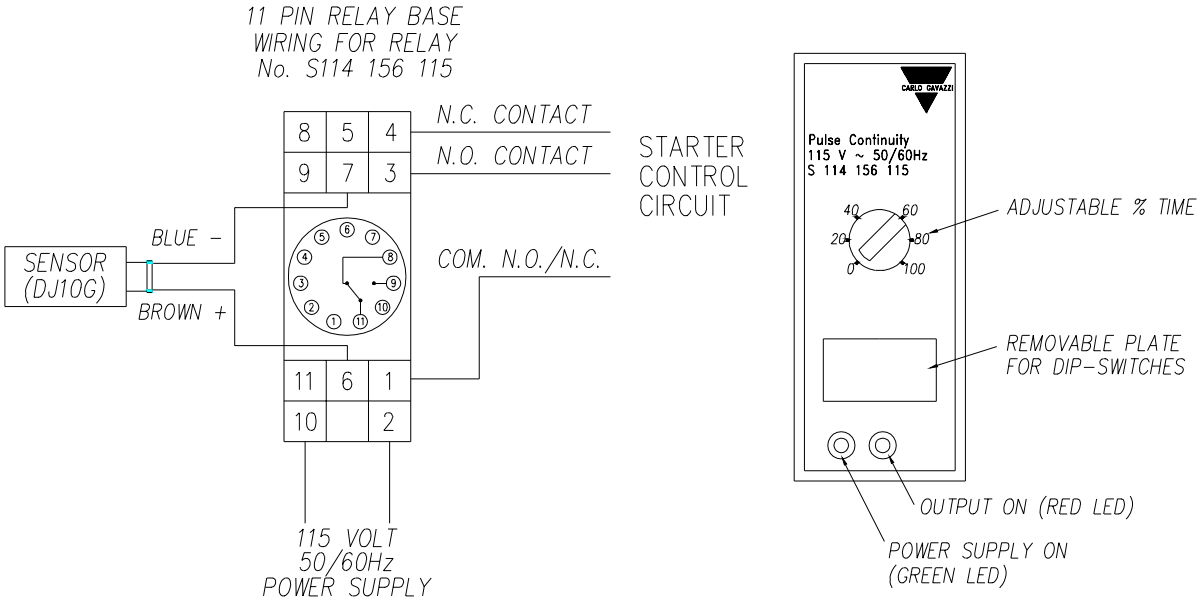
This section covers the electric operation of the relay for a momentary start circuit, and the required DIP switch setting for this operation.

SECTION III - MAINTAINED RUN CIRCUIT OPERATION

This section covers the electric operation of the relay for a maintained start circuit and the required DIP switch setting for this operation.

I. BASIC OPERATION

This relay required 115 volts 50/60Hz control power connected to terminals 2 and 10. To connect the proximity sensor connect the brown (+) positive wire to terminal 6 and the blue (-) negative wire to terminal 7.



Modes Of Operation:

DIP-SWITCH #1 ON; The relay operates and the time period starts when control power is applied. If an input pulse is received before the end of the set time period, the relay continues operating for a full new time period starting at the leading edge of the input pulse. If the set time period expires before a new input pulse is received, the relay releases.

DIP-SWITCH #1 OFF; The relay operates and the time period starts at the leading edge of the first input pulse. If a new input pulse is received before the end of the set time period, the relay continues operating for a full new time period starting at the leading edge of the new input pulse. If the set time expires before a new input pulse is received, the relay releases.

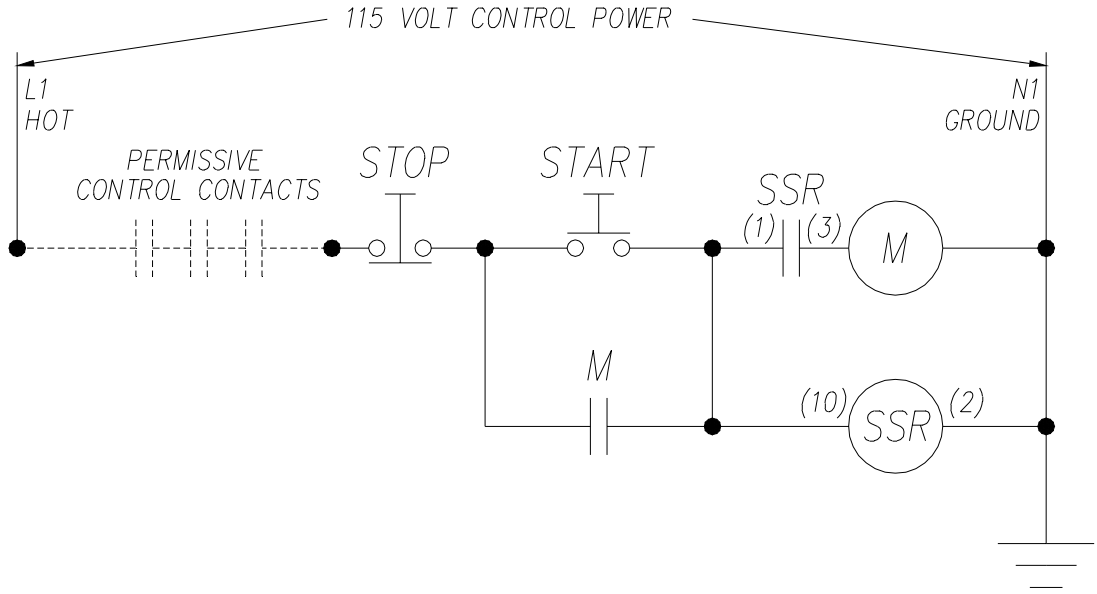
Time Settings:

Four (4) selectable time ranges 0.15 seconds to 800 seconds, with an adjustable scale in percent of the maximum time setting.

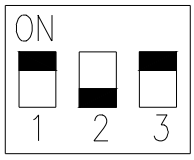
DIP-SWITCH #2 ON	#3 OFF	time setting 0.15 sec to 3 sec.
DIP-SWITCH #2 OFF	#3 ON	time setting 0.6 sec to 12 sec.
DIP-SWITCH #2 ON	#3 ON	time setting 5 sec to 100 sec.
DIP-SWITCH #2 OFF	#3 OFF	time setting 40 sec to 800 sec.

II. MOMENTARY START CIRCUIT OPERATION

The speed switch relay contact (SSR) closes and the time period starts when the start push button is pressed, applying 115 volt control power to the relay (SSR). When an input pulse from the proximity sensor is received the relay continues operating for a full new time period starting at the next impulse. When the set time period expires before the next input pulse is received, the relay opens contact (SSR) and stops the motor.



This operation requires the speed switch relay to be set for a time delay setting of 6 seconds. This allows for motor start up and provides a time delay for the motor to recover from a potential stall condition. See figure below for required DIP switch settings.

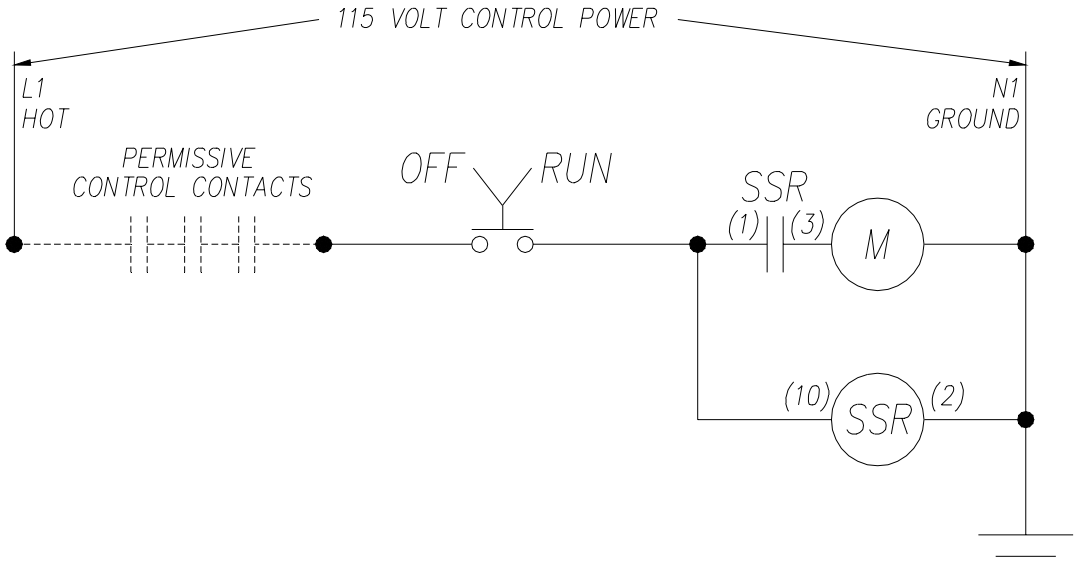


DIP switches for selecting function and time are placed behind a small removable plate on the front of the relay.

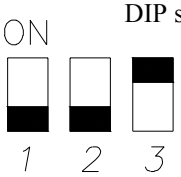
With the DIP switches set to provide a time range of 0.6 to 12 seconds, set the % time adjustment to 50 percent for a time delay of 6 seconds.

III. MAINTAINED RUN CIRCUIT OPERATION

The speed switch relay contact (SSR) closes and the time period starts when the control switch is in the run position, applying 115 volt control power to the relay (SSR). When and input pulse from the proximity sensor is received the relay continues operating for a full new time period starting at the next input pulse. When the set time period expires before the next input pulse is received, the relay opens contact (SSR) and stops the motor.



This operation requires the speed switch relay to be set for a time delay setting of 6 seconds. This allows for motor start up and provides a time delay for the motor to recover from a potential stall condition. See figure below for required DIP switch settings.

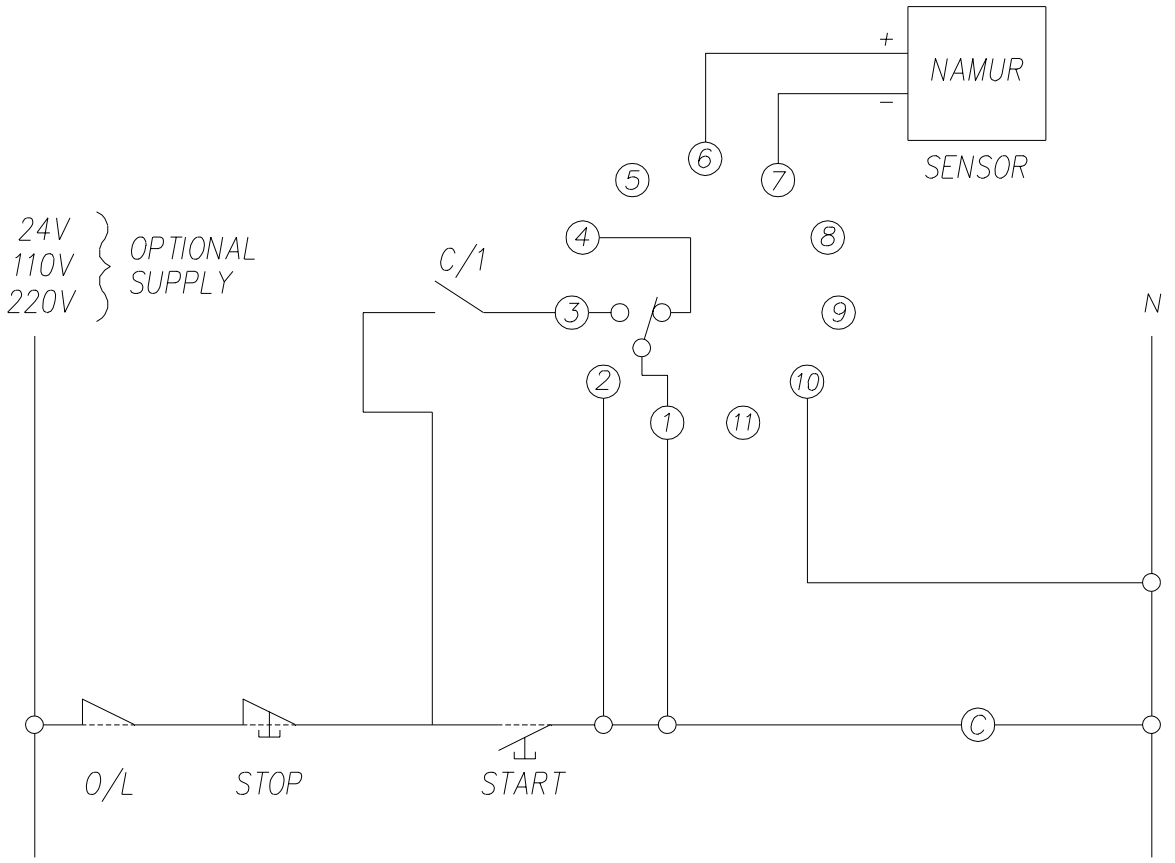


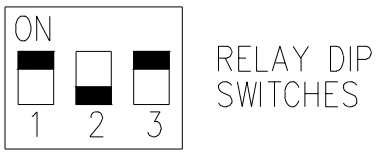
DIP switches for selecting function and time are placed behind a small removable plate on the front of the relay.

With the DIP switches set to provide a time range of 0.6 to 12 seconds, set the % time adjustment to 50 percent for a time delay of 6 seconds.

BASIC SPEED SENSOR CIRCUIT

The speed switch provided is a Carlo Gavazzi pulse continuity relay, part number **S114 166 724** (24 V), **S114 156 115** (110 V), or **S114 156 230** (220 V). This multiple function control relay operates as a motor speed monitor. The relay receives a pulse from a Carlo Gavazzi proximity sensor, part number **DJ10G** to monitor motor speed.





DIP SWITCH SETTINGS

SW 1	ON	AUTO START WITH RELAY ON
SW 2	OFF	0.6 – 12s TIME DELAY
SW 3	ON	ADJUSTABLE BY KNOB ON RELAY

Operation:

On pressing start, the push button contactor pulls in, C/1 closes. Power is applied to the timer and closes contacts 1 and 3. When the sensor detects a pulse, the timer is reset and waits for the next pulse. If there is no pulse, the relay drops out, stopping the motor.