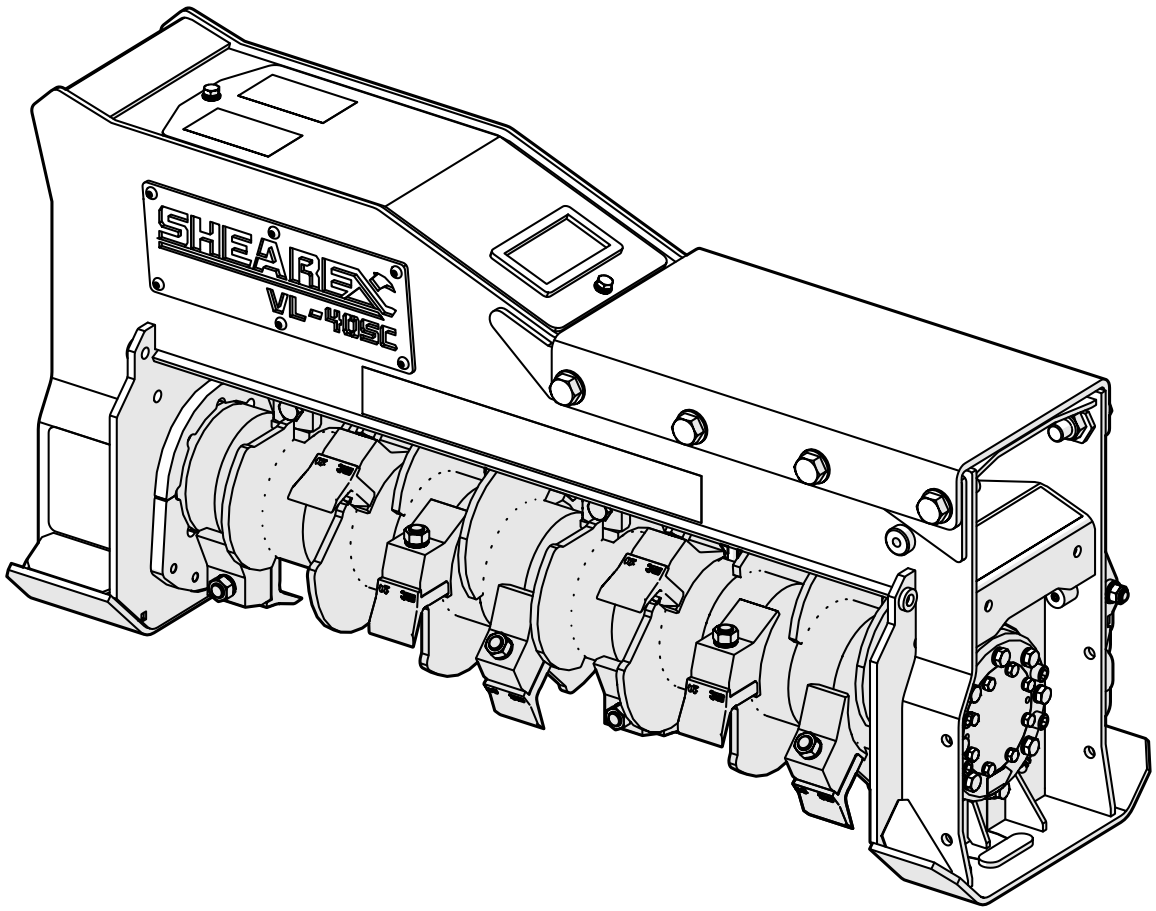
VL-40SC Mulcher
User's Manual

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1 General Information

1.1 Technical Help and Service

If you have any general questions or technical advice you need to address about your VL-40SC, please contact your dealer or, if you want an exhaustive answer, contact your SHEAREX Technical Support.

It is our priority to give you the most complete information possible when you call.

Also, always feel free to give us your suggestions or report any concern about our products. Your suggestions will be studied carefully.

Technical Support & Service
T. 1 579 213-0350
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E-Mail: service@shearex.ca
W. Shearex.ca

1.2 Manual Updates

To keep track of the revisions of the publications we produce, here is a list outlining the revision numbers, their description, and the specific pages and / or sections where the changes were made.

Revision Nb	Description	Section/page
0	First release of the document	All
1		

Although we take all necessary means to ensure the quality and accuracy of the information contained in this manual, omissions or errors are always possible.

In the eventual case (and indeed unintentional) where errors and omissions are found, please let us know and we will make sure to eliminate them in the subsequent revision.

Author :	André Blais, P.Eng./ Technical Support Manager	
Date :	October 27, 2026	

1.3 About this Manual

1.3.1 Contents

This manual is designed to help you quickly find the information you need for immediate help or, to better understand your VL-40SC mulcher principles. It describes the main components, the assemblies, the hydraulic and electrical systems, the required maintenance, and safety precautions to take when working on the mulcher or periphery devices and recommended spare parts for.

SHEAREX may also provides a digital copy of this publication and all the documents related to this mulcher by calling or addressing short E-Mail to your Technical Support and through our user's library.

The digital format .pdf copy of this manual (or all other publication), provides some useful tools from the Acrobat Reader® software for searching any information on parts and references. Links/shortcuts are included through the manual to speedup the research for necessary information.

The manual is divided in 6 sections, related to the different aspects of your mulcher as follows:

- *Section 1- General Information* describes the *technical resources* you may use, and the documentation related to and the *Environment, Health and Safety Guidelines*, you should be involved and respect to lead the on your new mulcher.
- *Section 2 - Mulcher Description*, gives an "overview" of the machine, its structure, the hydraulic and electrical (optional) systems and some detailed views of the main components.
- *Section 3 - Maintenance Instructions*, lists the tasks to perform to keep your machine in good work condition. It contains the necessary procedures for inspection and part replacement on the VL-40SC mulcher.
- *Section - 4 - Parts List*, shows exploded views of the main sub-assemblies and lists the parts and some usable components which should be kept in stock or not.
- *Section 5 - List of Figures,* lists views, drawings, schematics that were used through the manual for descriptions, explanations and instructions about operation and maintenance.
- *Section 6 - Addendum - Hydraulic Motor Operation,* is a supplementary section for exhaustive description of system or topic that remained too much detailed for the rest of the manual.

1.3.2 Convention Employed



This sign at the beginning of the text indicates instructions on safety or hazards, which if ignored, will result in danger to the user, third persons or serious injuries.



This sign at the beginning of the text indicates important instructions prior/during operation or service, which if ignored, could result in damage to the machine or to other property.



This sign indicates information, tip, advice for the correct and economical operation and service of the equipment.



This symbol indicates that the intended operation must be carried out by specialized and "qualified" personnel so as not to compromise the safety or integrity of the equipment.

1.4 Health, Safety and Environment

1.4.1 Responsibilities vs Authorities

Each Country, Forest Research and Shared Services has a Health and Safety Policy and a Health and Safety Committee. Managers within these areas are responsible for ensuring health, safety and environment policies are put into practice day-to-day.

A. The relevant Executive Boards and Management Boards are responsible for ensuring:
   - health and safety policy and procedures are readily available to all staff.
   - risks to health and safety are identified, assessed, and appropriately managed.
   - effective communication and consultation with employees and other relevant stakeholders on health and safety matters
   - appropriate training and other resources are available.
   - periodic audits are carried out.

B. The operator is responsible of following common-sense rules and regulations stated by the local and government authorities[1] by:
   - taking reasonable care of their own health and safety and that of others
   - understanding how the health and safety policies and procedures apply to them and their areas of work.
   - following all local and general instructions regarding environmental regulations, work safety rules for prevention of accidents.
   - report any accidents or near misses.

C. The owner must ensure that the maintenance manual of the VL-40SC mulcher is supplemented by company-internal instructions with respect to supervision, reporting, work organization, staff qualification etc.

D. All personnel engaged to work with this machine must have read and understood this SHEAREX Maintenance Manual and will be aware of the warnings for safety and hazards contained in the separate documents for periphery devices.

[1] Crown Copyright, courtesy Forestry Commission (Sept. 3, 2018), licensed under the Open Government Licence

1.4.2 Safety Gear

1.4.2.1 Personal Protective Equipment (PPE)

A. Working clothes should be manufactured from materials which keep the workers' body dry and at a comfortable temperature. For work in hot and dry climates, appropriate clothing should be used to avoid excessive thermal insulation and allow respiration. Adequate protective clothing should be provided where there is a risk of UV radiation or biological hazards, such as poisonous plants, animals, and infections.

B. Clothing should be of a colour that contrasts with the forest environment, to ensure that workers are clearly visible.

C. The use of personal protective equipment should be regarded as a last resort when risk reduction by technical or organizational means is not feasible. Only in these circumstances should suitable personal protective equipment having regard to the specific risks be used.

D. Personal protective equipment for forestry work should include the relevant items listed in table 1, which identifies personal protective equipment required for specific tasks.

E. When tasks are performed using hazardous chemicals, personal protective equipment should be provided in accordance with Safety in the use of chemicals at work: An ILO code of practice (Geneva, 1993).

F. Personal protective equipment should comply with international or national standards.

G. There should be a sufficient supply of necessary personal protective equipment readily available to ensure that operatives are consistently aware that safety and health is of paramount importance.

1.4.2.2 PPE vs Type of Operation

Each employer should evaluate the need for personal protective equipment in the prevailing conditions.

The table[2] below shows the generally accepted practices in the use of this equipment. Workers should be provided with personal protective equipment as specified in table 1, except where the employer can demonstrate that no or other protective equipment affords the same or a higher level of protection. Here is below a list of the general tasks to perform and the safety gear that the operator must be provided with.

This list remains only a start that can be used as a "check list" to remind whom it may concerned to avoid injuries at the work site.

Parts of the body to protected	**Feet**	**Legs**	**Trunk, Arms, legs**	**Hands**	**Head**	**Eyes**	**Eyes/face**	**Hearing**
PPE Normally Appropriate	Safety boots/shoes	Safety trousers	Close fit. clothing	Gloves	Safety helmet	Goggles	Visor (mesh)	Earmuffs
Rotating knife/flail	✓		✓	✓				✓
Felling								
Hand tools	✓		✓	✓	✓			
Chain-saw	✓	✓	✓	✓	✓		✓	✓
Mechanized	✓		✓		✓			✓
Stacking/ loading	✓		✓	✓	✓			✓
Chipping	✓	✓	✓	✓	✓	✓	✓	✓

Fig. 1-1 Personal protective equipment (PPE) appropriate for forestry operations

[2] Source: *Safety and health in forestry work, Geneva, ILO 1998*

1.4.3 Maintenance Hazards

1.4.3.1 Electrical Hazards

Only skilled and fully trained personnel who are familiar with the inherent dangers are permitted to work on the electrical system. In cases where the machine has to be working under power, an additional skilled person should be called in who can take the necessary steps in emergency situations.

Prior for maintenance or repairs on the electrical system:

1. Stop the machine and place the breaker in "OFF" position. Attach a lockout device, lock and tag.
2. Disconnect the machine (e.g. battery, breaker) and periphery devices from the mains and ensure that the power cannot be reconnected.

1.4.3.2 Hydraulic Hazards

1. Before carrying out any work on the hydraulic system, switch off the machine and the hydraulic power unit and ensure that the power cannot be inadvertently switched back on again.
2. Afterwards ensure that the hydraulic system is no longer under pressure. Let the pressure drop slowly to "0" on all pressure gauges.
3. Make sure that all mechanisms are stable so nothing will unexpectedly drop or move due to a lack of pressure.

1.4.3.3 Periphery Hazards

Without request and permission obtained from SHEAREX, it is not permitted to carry out modifications or extensions to the VL-40SC mulcher or periphery devices.

For replacements of any parts of the machine, use exclusively original accessories and spare parts provided by the SHEAREX.

Observe the instructions in the documents for periphery devices and all local safety regulations.



Work on the electrical, pneumatic, hydraulic and on periphery systems is only to be carried out by skilled personnel.

1.4.4 Labelling

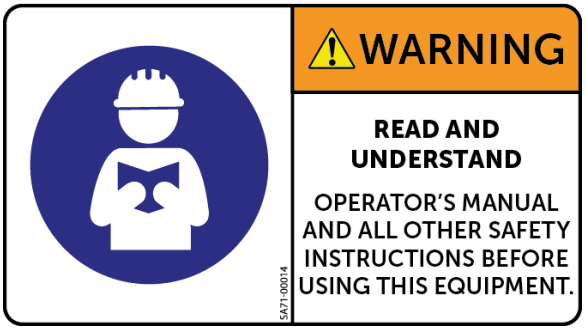
The labels used for this mulcher operation purposes have been developed to quickly warn the user on the important topics and actions to take (immediate or not) for the safety and the good operation of the equipment.

We develop and currently use "common sense" icons, stickers apposed on the mulcher frame as reminders for the maintenance and operation. Foreign language labels may be supplied under special request.

Pay attention to the labels apposed on the mulcher frame, they can same you time, avoid severe injuries and even save life!

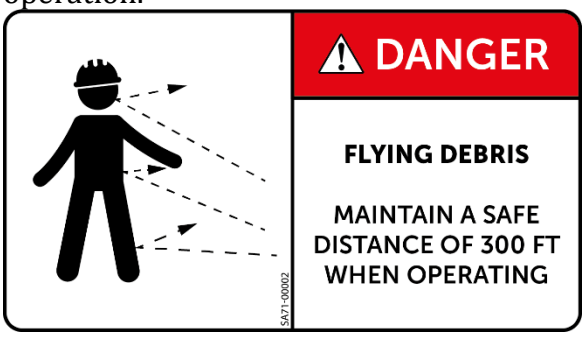
READ AND UNDERSTAND the Operator's (User's) Manual and all other safety instructions before using this equipment.

1.4.4.1 Read and Understand!



1.4.4.2 Flying Debris

Since the rotor turns at 3500 rpm at the ground level, chips and debris may be projected on long distances. They can cause severe injuries for those who stand too close to the equipment during operation.



1.4.4.3 DANGER – Stand Clear 300'

This label remains particularly important for people around who are not involved with the operating equipment. Standing in front or rear of an operating equipment always remain hazardous.



1.4.4.4 Cut Hazard

The mulcher rotor is provided with 21 sharpened blades which, running or not, may easily cut hand and body skin.

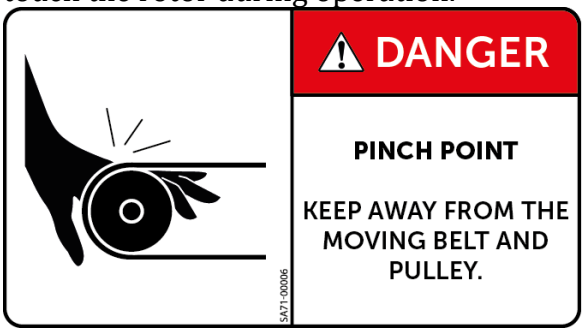
During storage, maintenance, and operation, always use the right tools and methods to avoid such injuries.



1.4.4.5 Pinch Point

Except some conditions where speed reading or adjustment procedure is on-going, NEVER stand close or let any laces, cordons, shirt, or scarf close to the rotating part of the equipment.

Part/clothes can easily be trapped, or body be killed by the rotor if someone touch the rotor during operation.



1.4.4.6 Crush or Cut Hazard (hands)

Since the mulcher is a quite heavy machine and the rotor has high rotation inertia, always get your hands, feet, and part of your body out of its way.



1.4.4.7 Crush or Cut Hazard (feet)

Since the mulcher is quite a heavy piece of equipment and the rotor has high rotation inertia, it takes a long time to stop.
Always get your feet, and any part of your body out of its way.



1.4.4.8 Beware of Slippery Surface

During maintenance works around the mulcher or getting out of the carrier cabin after operation session, oil may be spilled on the surfaces that remain slippery.



1.4.4.9 High Pressure Oil

Oil leaks may appear just as drops under hydraulic lines and could also appear as a thin jet almost invisible but that can get through your skin. Don't inspect oil leak with your bare hands.



1.4.4.10 Hot Surface Inside

Temperature for bearing and hydraulic oil may get higher than 100°C. Use a thermal gun instead of your own hands prior to check for overheating problem.

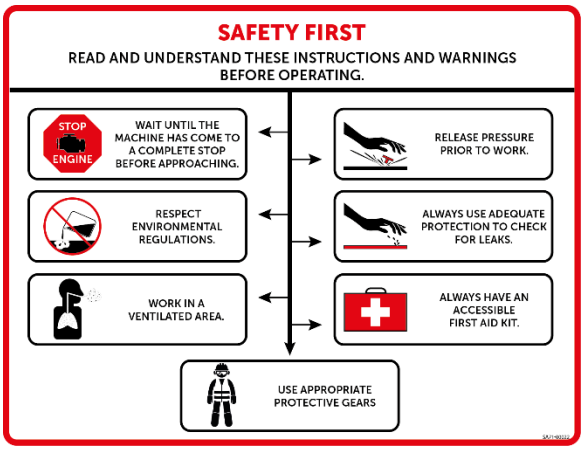


1.4.4.11 Maximum Return Pressure

On the Hydro-Leduc hydraulic motor, the max permissible pressure at the return outlet is 360 PSI. Failure to follow this recommendation may result in significant motor damage



1.4.4.12 Safety First



2 Mulcher Description

2.1 Model Identification

SHEAREX inc produces many model mulchers but your new mulcher has a unique model number that describes some of its characteristics.

The productivity is largely depending on the vehicle, tractor or carrier to be used. This VL-40SC mulcher rotor performances depend on the flow and pressure that the vehicle can supply and the capacity of the motor itself.

Since the motor speed and torque are directly proportional to the flow supplied, the operator must keep the rotor in the specifications recommended.

Since the information and/or parts you may need are specifically related to the model mulcher currently used, refer to this number for further information requests.

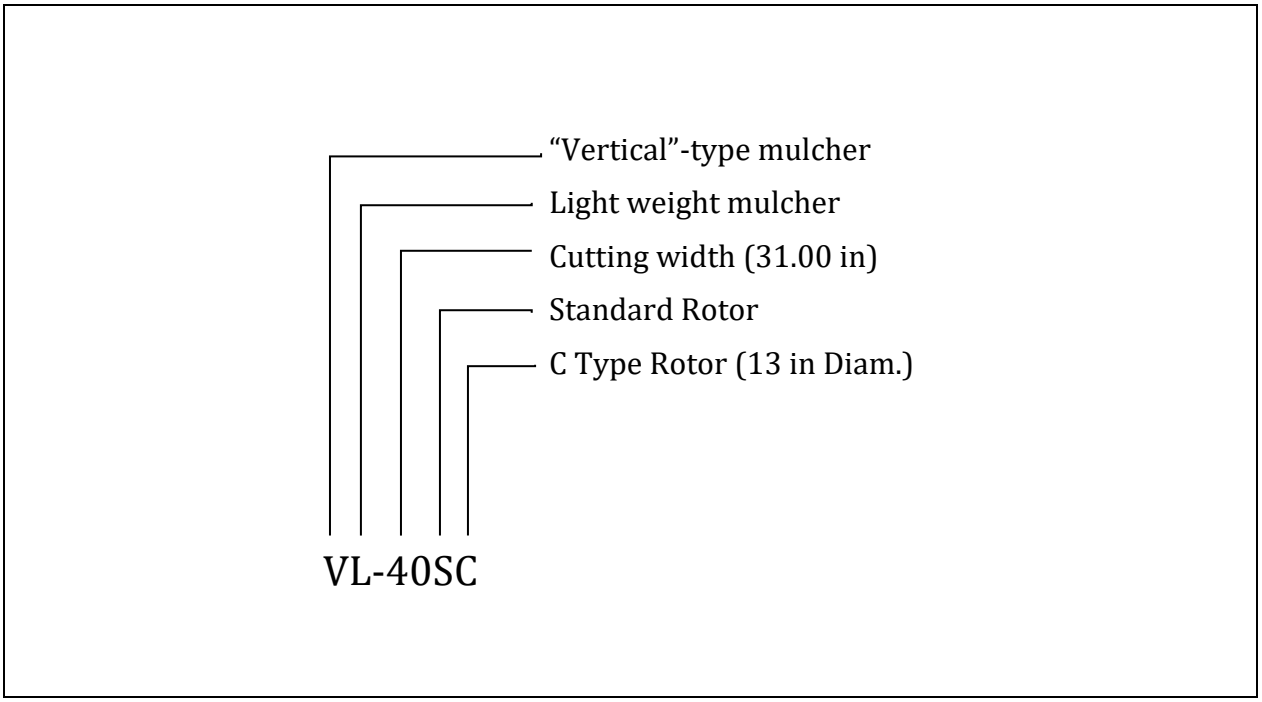


Fig. 2-1 Model Number Identification

2.2 Specifications

The VL-40SC is a ground-use type mulcher which has been built to deliver maximum performance for heavy duty operations on a large range of wood species.

It is the new generation of machine specifically designed for landscaping services, forestry work or just to refresh and enhance vegetation coverage.

The table below shows the main specifications of the VL-40SC mulcher.

Parameter	VL-40SC	
Cutting Width, cm (in)	101 (40)	
Rotor Diameter, cm (in)	33 (13)	
Exterior length, cm (in)	129 (51)	
Exterior height, cm (in)	58 (23)	
Exterior width, cm (in)	45 (18)	
Target material, cm (in)	12 (5)	
Required Hydraulic Flow, l/min (GPM)	Min = 83 (22)	Max = 129 (34)
Max. operating pressure, bar (psi)	400 (5800)	
Rotor Speed MAX	3500	
Typical Weight, kg (lbs)	334 (735)	
Number of Blades	16	

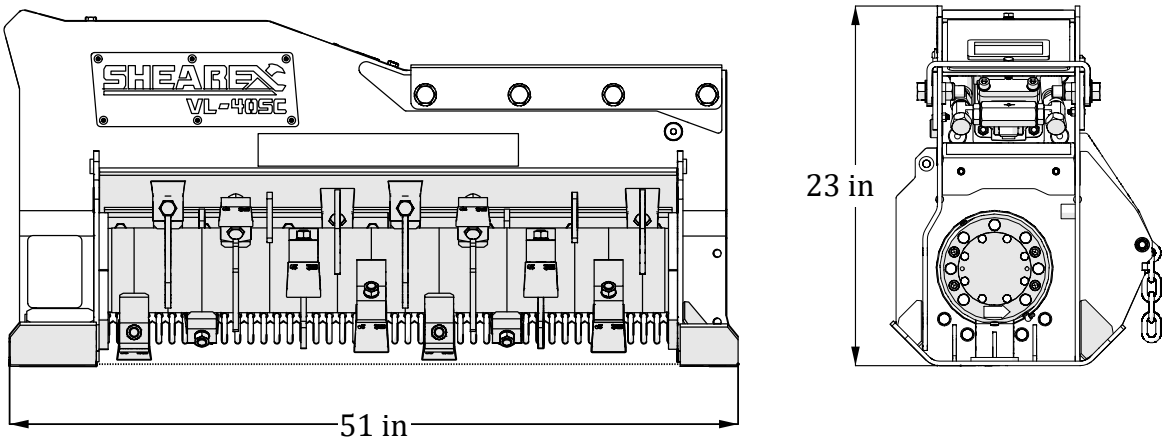


Fig. 2-2 VL-40SC Mulcher Dimensions

2.3 Structure Description

2.3.1 Frame

The frame is the main structural element which support the rotor and its bearing ass'y, the hydraulic motor, the two pulleys and the cogs belt. The attachment bracket does not make part of the frame since it must be adapted to the excavator size and model.

It is designed in a single piece with a reduced number of metal plates, fairing and fasteners to limit the occurrence of parts loosening and time for checkup.

To protect the frame from the chips and debris generated by the rotor, an internal circumferential liner remains welded inside the rotor enclosure.

2.3.2 Rotor

The rotor is the toughest part of the mulcher since it must "convert" 40-50% of the hydraulic power of the vehicle for cutting/mulching the material at a very high speed (2500 – 3500 rpm).

The type of material to be mulched still varies from soft pine wood, spruce tree, or fir to the hardiest type of wood as cedar tree, palm tree and citrus tree in the southern regions where fruit trees cultures renewable is requested.

As tough the material may be, as sharpened the blade/cutter must be, so they are. The blades are made of specially hardened steel (forged, tempered, and machined) to resist the day-to-day work and last longer (approx. 150-200 hrs) according to the operating methods and the type of soil encountered.

To solidly keep the blades against the rotor while transmitting the rotor power to the blades and to endure continuous shocks without distortion, the blade holders are made of specific type of steel that withstands heavy duty work. The blade holders are welded around the rotor arbor as well as the mulch control rings that help to limit the penetration of the rotor in the material.

2.3.3 Hydraulic Motor

The hydraulic motor is a robust piece of cast iron and steel pistons inside that convert the hydraulic flow power (i.e. Q x P = power) to the kinematic power (i.e. rotor machine).

It does not need adjustment since it takes the flow from the carrier as is but it must remain in some permissible range.

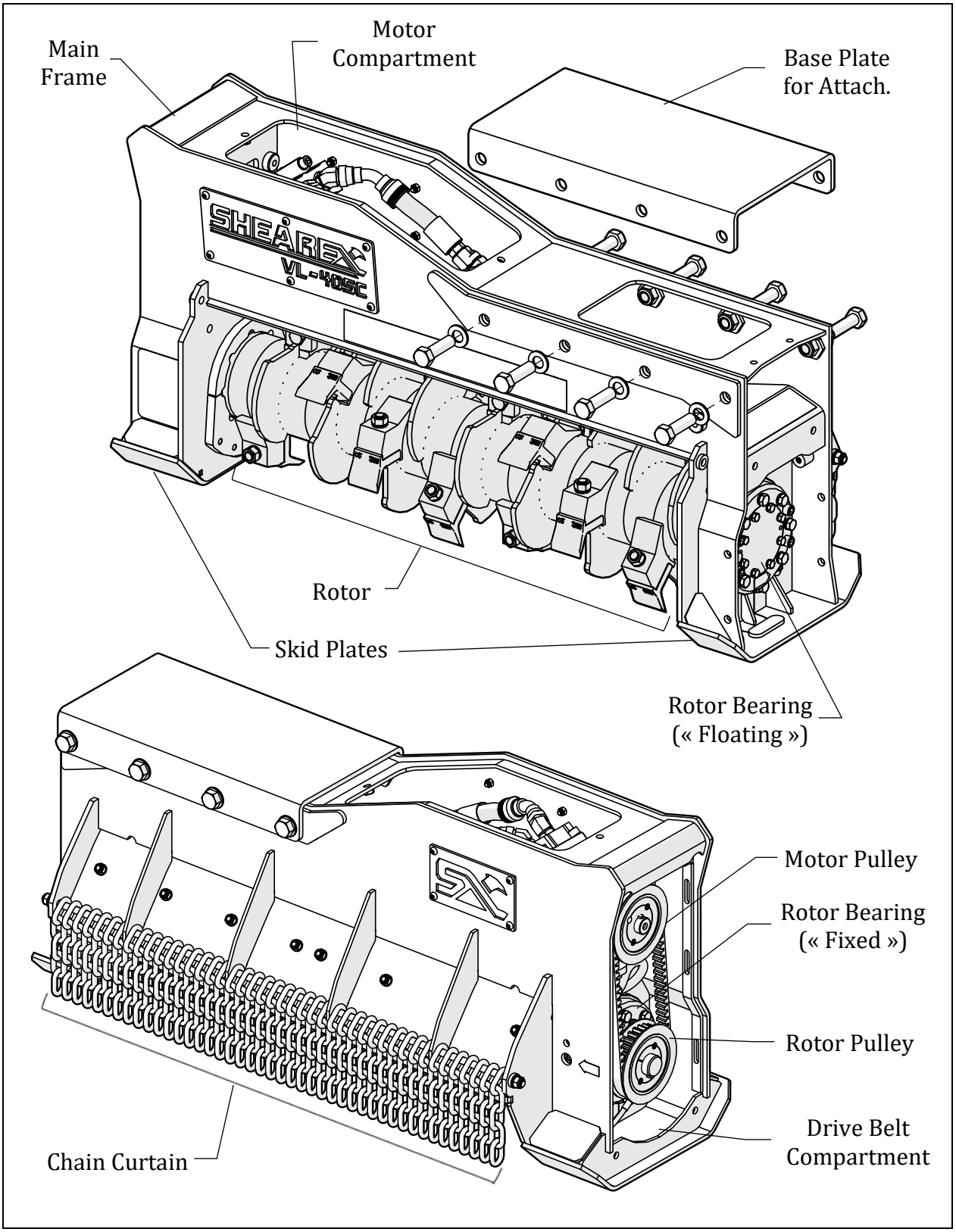


Fig. 2-3 Structure Description

2.4 Drive System

2.4.1 Transmission

The VL-40SC mulcher drive system use a hydraulic motor coupled to an upper pulley that transfer the power by a cog transmission belt to a lower pulley mounted on the main rotor shaft.

The motor is mounted to an adjustable mounting plate bolted to the frame, but the height remains adjustable for belt tension purposes. To transfer the power from the motor to the upper pulley, a taper lock bushing is tightened to the motor shaft. In the same way, the lower pulley is mounted to the rotor shaft with a 1½" I.D taper lock bushing.

Nbr	Description	PN
1	Hydraulic Motor (32cc)	SA21-00025
2	Taper Lock (TL) Bushing for the motor shaft	SA33-00016
3	Motor Pulley (30 teeth)	SA31-00009
4	Drive Belt	SA32-00008
5	Taper Lock Bushing for the rotor shaft	SA33-00014
6	Rotor Pulley (30 teeth)	SA31-00009

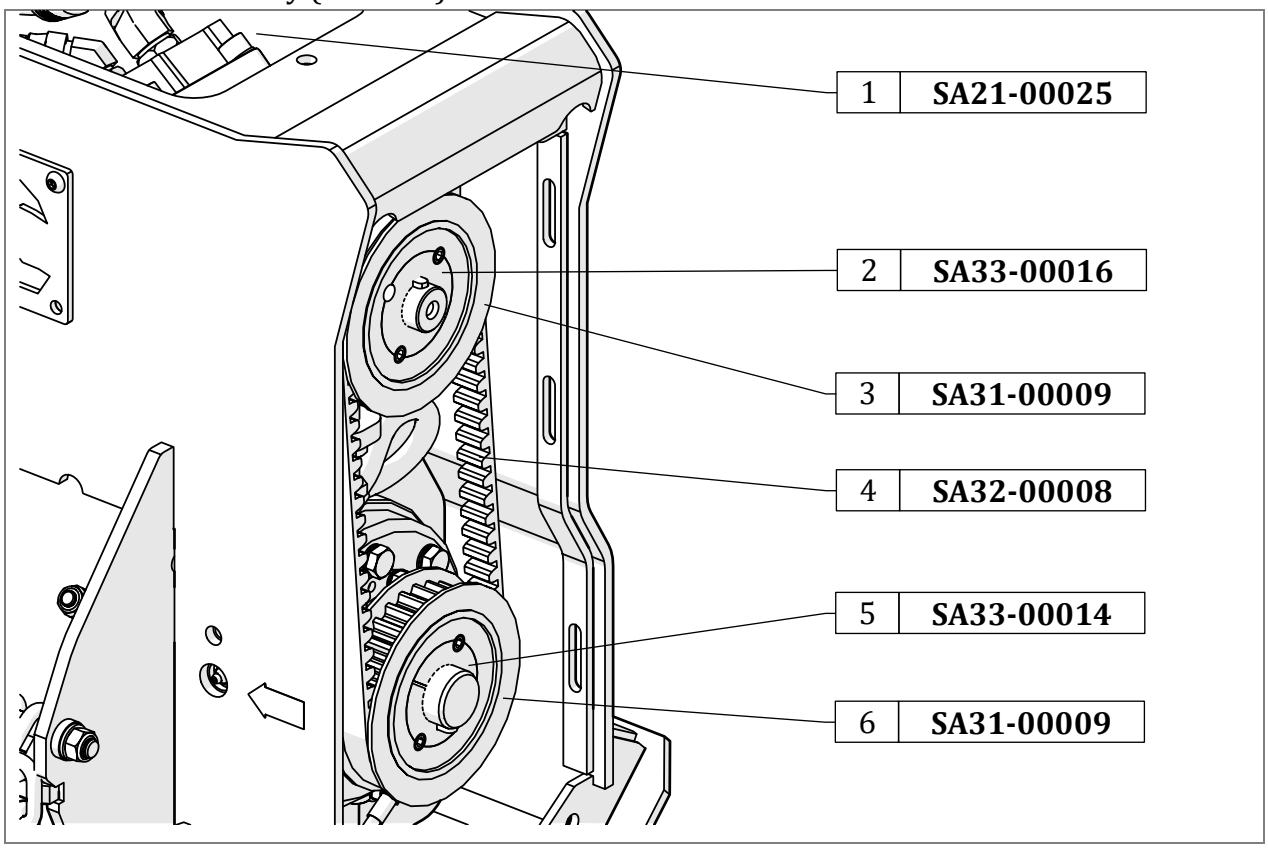


Fig. 2-4 Mulcher Drive System

2.4.2 Hydraulic Motor

The VL-40SC mulcher drive system is provided with a piston motor featured with fixed displacement/ bent axis design which allow the control of the speed by the hydraulic supply from the carrier. The 32 cc motor is the standard.

The motor ass'y is featured with a check valve and a "freewheeling" (close loop) lines which let the rotor a period to stop while the flow circulates into the motor in a close loop direction.

Model type: Hydro Leduc-	Motor Specs
Max. displacement (V_{gmax}) [cc]	32
Max speed [rpm]	6300[3]*
Max. flow @ 8000 rpm [L/min (gal/min)]	202 (53.4)
Max. torque @ 400 bars [N·m (lbf·ft)]	204 (150)
Max. working pressure [bar (psi)][4]	400 (6000)
Max power @ 400 bars [Kw (Hp)]	134,8 (180)
Weight [kg (lbs)]	11,5 (25)

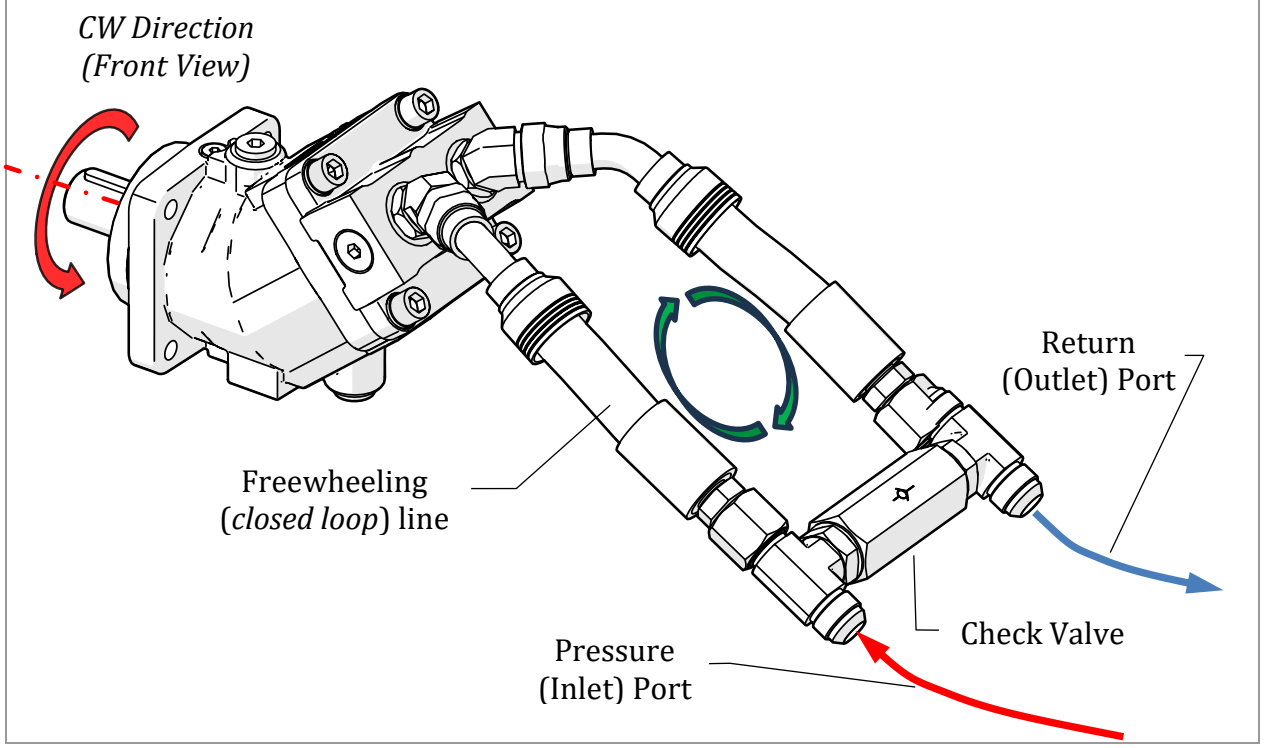


Fig. 2-5 Hydro-Leduc 32 cc- Hydraulic Description

[3] VL-40SC mulcher rotor limit speed should not exceed 3500 rpm, adjust flow from carrier accordingly.
[4] When replacing the check valve, pay attention to the direction of the CV

2.4.3 Rotor Ass'y

The rotor is provided with a "fixed config." bearing on the drive/front side and a "floating config." bearing on the rear side which means that one bearing will not constrain the other.

The drive side roller bearing is mounted in a housing where the rotation is free but side move is not allowed, so it has one degree of freedom.

The rear side roller bearing is mounted in a housing where the rotation is free and the side move is allowed, so it has two degrees of freedom.

No	Description	PN
1	Rotor Ass'y (Steel tube, rings, blade holders)	SFM0027-5000
2	Blade – x16	SFL04-20
3	Front/Fixed Bearing Housing Ass'y	SFM0006-5000
4	Rear/Floating Bearing Housing Ass'y	SFM0006-5001

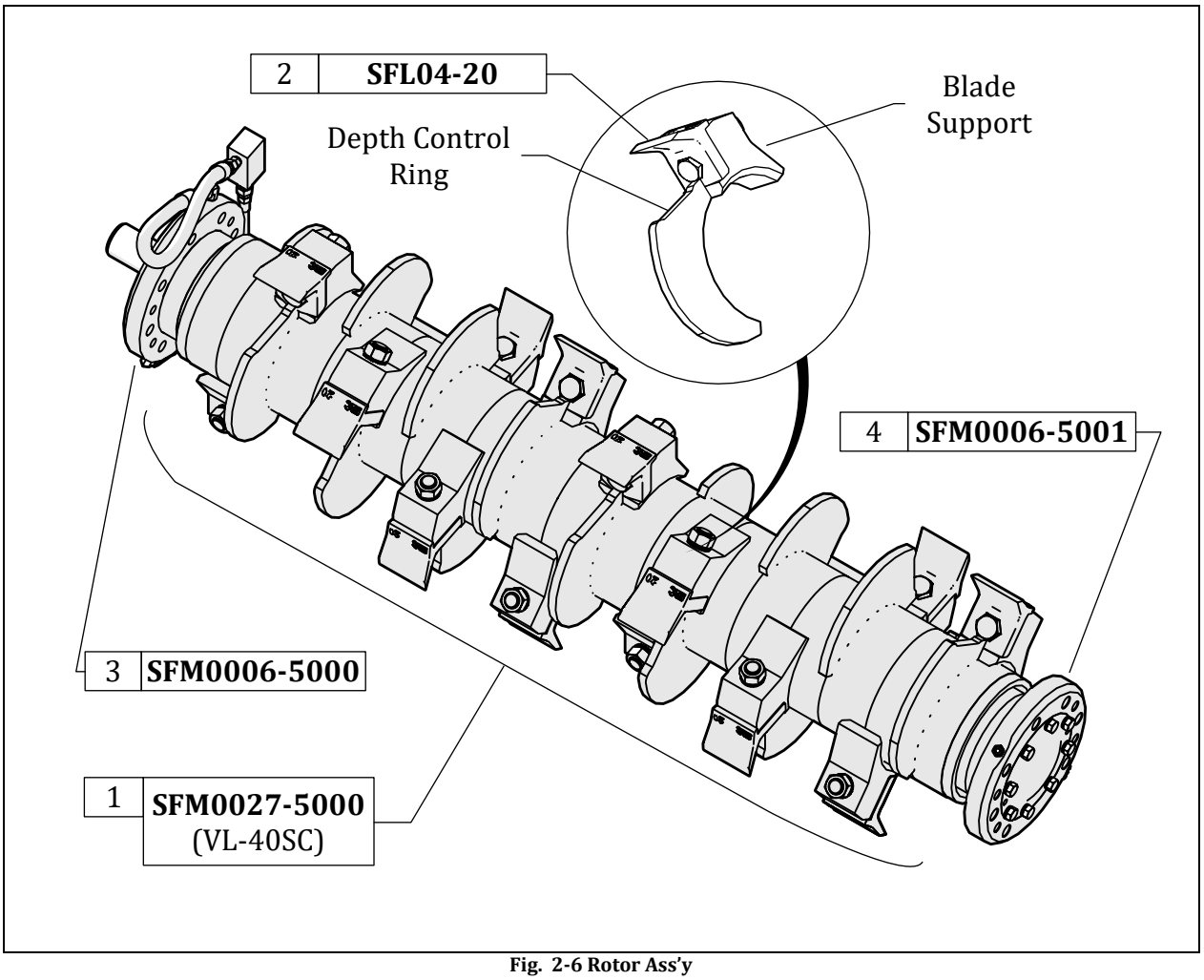


Fig. 2-6 Rotor Ass'y

2.5 Hydraulic System

2.5.1 Lines and Quick Disconnects

The mulcher does not include the set of 2 main hydraulic hoses necessary to supply the hydraulic motor and which must come from the carrier/vehicle, but the minimum dimensions of adapters and recommended hose diameters are described below.

Nbr	Purpose	Min. Dimensions
1x	Pressure (P) Line/ -JICM12 fitting	#12 (0.75″ ID)
1x	Return (R) Line/ -JICM12 fitting	#12 (0.75″ ID)
-	Freewheeling	N/A

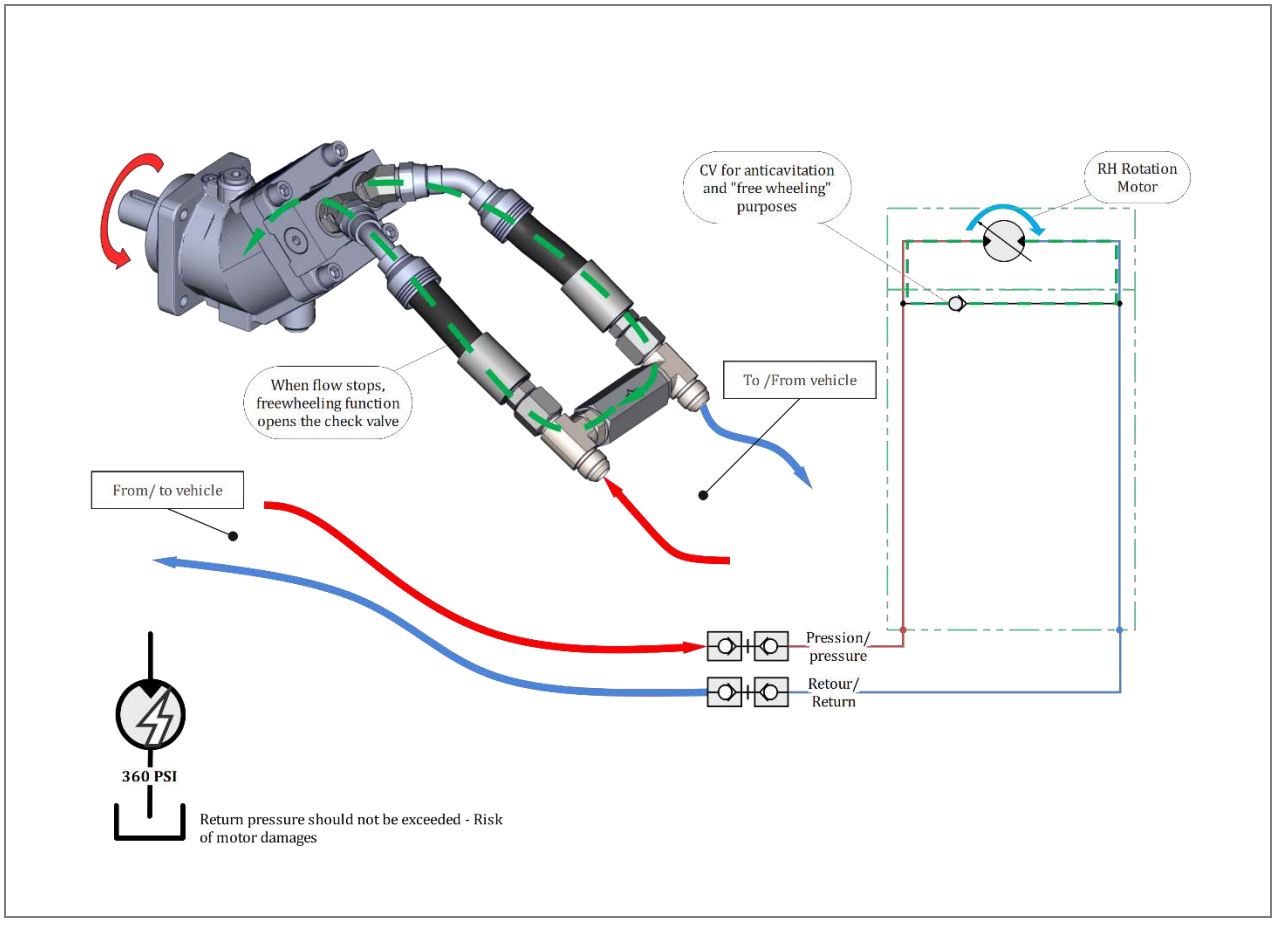


Fig. 2-7 Hoses & Fittings Identification

2.5.2 Recommendations

2.5.2.1 System Requirements

A. Under normal operating conditions, 360 PSI return pressure should not be exceeded, otherwise, motor damages may occur.

B. Since loop flushing is typically not used in OC-applications it is essential to provide enough cooling capacity. When needed, this can be done by motor case cross flushing. The flow rate needs to be adjusted to the cooling demand.

C. Also, we recommend keeping the mulcher turning at low speed for five minutes allowing the oil to reach the motor and fill all the hoses and piping.

D. The highest case drain outlet port must always be used for the return flow to the cooler or tank.

E. The plumbing must not allow the oil to drain down nor be replaced with air in the control or rotating group.

F. For good operation of the motor, the minimum pressure in the inlet port and the outlet port, measured at gage ports MA and MB, must be equal or higher as 15 bar (220 psi).

G. The oil must remain at this level; the motor case, the control system and the working lines connected to Port A and B must always be kept full of oil, whether in a dynamic or static condition otherwise the motor can suffer permanent damages.

2.5.2.2 Fluid Specifications

Properties		**Range**	
Viscosity	Minimum, maximum	7 to 1600 [49 to 7416]	mm^2/s [SUS]
	Recommended	12 to 80 [66 to 366]	
Temperature	Minimum, maximum*	-40 to 115 [-40 to 240]	° C [°F]
	Recommended	104 [220]	
Cleanliness[5]	Required per ISO 4406	22/18/13	
	Efficiency (return line)	$\beta_{35\text{-}45} = 75$ ($\beta_{10} \geq 2$)	
	Rec.'d inlet screen mesh	100 to 125 µm	

*Cold Start: t ⩽ 3 min., P ⩽ 50 bar (725 psi), n ⩽ 1000 rpm

[5] Filter βx-ratio is a measure of filter efficiency defined by ISO 4572. It is defined as the ratio of the number of particles greater than a given diameter ("x" in microns) upstream of the filter to the number of these particles downstream of the filter.

3 Maintenance Instructions

3.1 Pre-work Check List

To help you remind the steps to pay attention prior and during Maintenance, we prepared the following checklist.

A.	Wait for Machine to Stop	☑
B.	Release Pressure Prior to Work	☑
C.	First Aid Kit	☑
D.	Individual Protection Equipment	☑
E.	Respect Environmental Regulations	☑
F.	Handle Gas and Oil with Care	☑
G.	Work in a Ventilated Area	☑
H.	Walk Around Inspection	☑

Only persons sufficiently qualified for the work involved and who have the necessary knowledge of the VL-40SC mulcher are permitted to install, operate, service and if necessary, repair the machine.

3.2 Work to be Scheduled

In this section, we recommend the usual timeframe for preventive maintenance to be made for a good and long-lasting operation of the mulcher.

You can considerer this as a start since it may be part of a more extended schedule that would include all your tools and machinery.

Check lists are commonly available to make sure that all the items in this chart will be covered and fulfill our recommendations.

We conveniently use some icons and symbols to remind the user that some specific work must be achieved to maintain the equipment in good state of order.

	Task to perform	10	50	500	1000
1.	✓ Clean dust and debris ✓ Check for leaks, lose or damaged parts, odor of fuel, odor of burned devices ✓ Listen for any unusual system noise(s) that can indicate that service is required ✓ Notice all fire risks and make necessary repairs immediately				
2.	✓ Sharpen the blade using the Go-no-go Shape Gauge (GSG) provided ✓ Check the blade tightness (Torque = 400 lbf·ft) using the socket provided with your Maintenance and Repair Kit				
3.	✓ Grease the RH and LH rotor bearings as required, 2-3 squirts/ day				
4.	✓ Inspect the hydraulic panel condition, the actuator (cylinder) ✓ Check for any interference and the range of motion of the main panel				
5.	✓ Grease the hydraulic panel hinge (i.e. pins)				

Inspection Date:_____

Comment:	
	☐
	☐
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	☐

Fig. 3-1 Suggested Check List for Preventive Maintenance

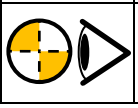
3.3 Reminder Icons

We conveniently use some icons and symbols to remind the user that some specific work must be achieved to maintain the equipment in good state of order.

Legend:

Inspect/ Adjust	Lube	Fill-in	Drain	Filter
				

3.4 Inspection and Maintenance Schedule

	Task to perform	10	50	500	1000
1	✓ Clean dust and debris ✓ Check for leaks, lose or damaged parts, odor of fuel, odor of burned devices ✓ Listen for any unusual system noise(s) that can indicate that service is required ✓ Notice all fire risks and make necessary repairs immediately				
2	✓ Sharpen the blade using the sharpening gauge provided ✓ Check the blade tightness (Torque = 338 N-m/ 249 ft-lb) using the socket provided with your Maintenance and Repair Kit (option) or an M16 size equivalent.				
3	✓ Grease the "Fixed" and "Floating" rotor bearings as required, 2-3 squirts/ day				
4	✓ Grease the front "baffle" (i.e. panel) hinge pins (OPTIONAL).				
5	✓ Clean/inspect the hoses, adapters, fittings (in and out) from the motor compartment against oil leakage. ✓ Check hoses condition and make sure all fittings are tight				
6	✓ Inspect the "Fixed" and "Floating" rotor housings for grease leakage from the housings or lube lines and adapters. ✓ Check the drive belt for wear, alignment, and tension				
7	✓ Inspect the blade support and the rings for wear and major damages				
8	✓ Clean and inspect the rotor inner plate and anvils for wear and damages				

	Task to perform	10	50	500	1000
9	✓ Check hydraulic motor parameters: ✓ Return line pressure: 150psi ≤ Pr ≤ 250psi ✓ Service line pressure: : ≤ 6000 psi			 As needed	
10	✓ Remove the drive belt and perform and exhaustive inspection of the belt and pulleys ✓ Replace parts as needed				
11	✓ Check the rotor bearing for vertical or side play (tol ≤ 0.010")				
12	✓ <u>ON THE CARRIER</u>: check oil level of the hyd. reservoir and fill it up as needed				
13	<u>ON THE CARRIER</u>: ✓ Check filter element condition or the filter electrical clogging indicator (if installed). ✓ The filter should be changed whenever the fluid is changed or whenever the filter indicator shows that it is necessary to change the filter.				
14	<u>ON THE CARRIER</u>: ✓ Change hydraulic oil: It is recommended that the fluid and filter be changed per the vehicle/machine manufacturer's recommendations or at the following intervals:			 1st	 2nd and after
	 **The hydraulic oil must be changed according to manufacturer's recommendation or as scheduled above.**				

3.5 Blade Maintenance

3.5.1 Inspection

3.5.1.1 "Safety First"

Prior to start inspection of the blades, some care must be taken to make sure it will be made in safe conditions to protect the personnel, the environment, and the equipment.

Make sure the carrier has been turned off, switch is locked and rotor is blocked to avoid unexpected rotation and injuries against the blades.

3.5.1.2 Looking for Productivity

It is recommended that you replace the blade when the use of the Sharpening Gauge becomes impossible.

1. Thoroughly clean the rotor and the blade/holders prior starting the inspection.
2. Inspect the blade holder for *wear* and precision of the surfaces and chamfers. The blade must always well seat on the blade holder.
3. Inspect the blade holder weld seams for crack or missing pieces.

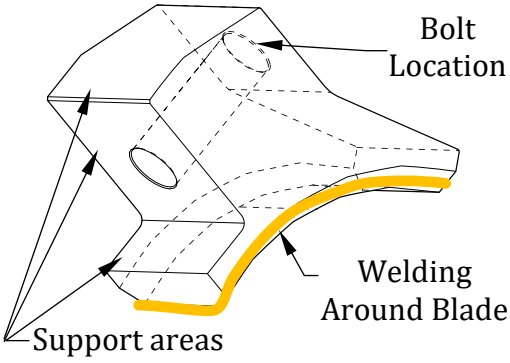


Fig. 3-2 Blade Support Inspection

4. Verify the bolt hole alignment and straightness, it could be distorted after severe impacts with rocks or unexpected "materials".
5. Inspect the blade if the remaining length is acceptable since a short blade will let more debris and mulches wear the blade holder itself.
6. Inspect the rings for worn parts, cracks, and quality of the weld seams. Do not wait the ring to be loose. If needed, grind the worn weldment along the ring to make a new one.

Do not wait for the rings to come off. If necessary, grind the worn part along the fin to weld a new one. Call your technical support to order a new one.

3.5.2 Blade Lifetime

The blades lifetime is currently depending on the three following factors:

- The material that blade is made of so, a more hardened/tempered unit should last longer when used in the same conditions as the other similar blade;
- The wood species where the mulcher is used;
- The composition of the soil where the vehicle is working on. That can be normal earth ground, sand and earth type ground, gravel type ground, soil containing rocks & stones;
- The mulching methods/working conditions currently used by the operator i.e. that can be more aggressive than another. Experienced technician who well knows the principles of operation of the mulcher hydraulic motor expect the motor to shift in high torque while working on tough material but "don't push the machine until it stalls". In the same way, he will sharpen the rotor blades regularly not waiting they'll become completely blunt so demanding more energy from their equipment and more time to finish a project.

3.5.3 Blade Selection

According to the expected work to be done, the selection of the right type of blade with the required properties must be done. We recommend the use of the genuine parts SHEAREX to make sure it will not affect the rotor balance and good operation.

3.5.4 Sharpening

3.5.4.1 Parts List

To perform blade sharpening easier, we included some tools in the Maintenance Kit as the items described below:

Qty	Description	PN
1x	Sharpening Tool (gaz, electric, …)	N/D
1x	Cubitron Carbide Paper New parts to be purchased by the user	SA03-00003
1x	Sharpening (angle) Gauge	SFG0000-1002

3.5.4.2 Instructions

1. Block the rotor to avoid rotation during blade sharpening, if needed. Use the sharpener/grinder you have on hand or provided with the MK and the carbide paper recommended which is made specifically for that purpose.
2. Start sharpening the flat surface of the blade, allow few seconds/blade. Sharpen the blade with the flat of the grinding disc or Cubitron® paper. This will ease to keep the shape and cutting angle of the blade.
3. Using the sharpening gauge, take some readings to check the angle and the shape of the blade tip/edge. When the blade becomes too short, the gauge will no longer be usable, as well as the blade.

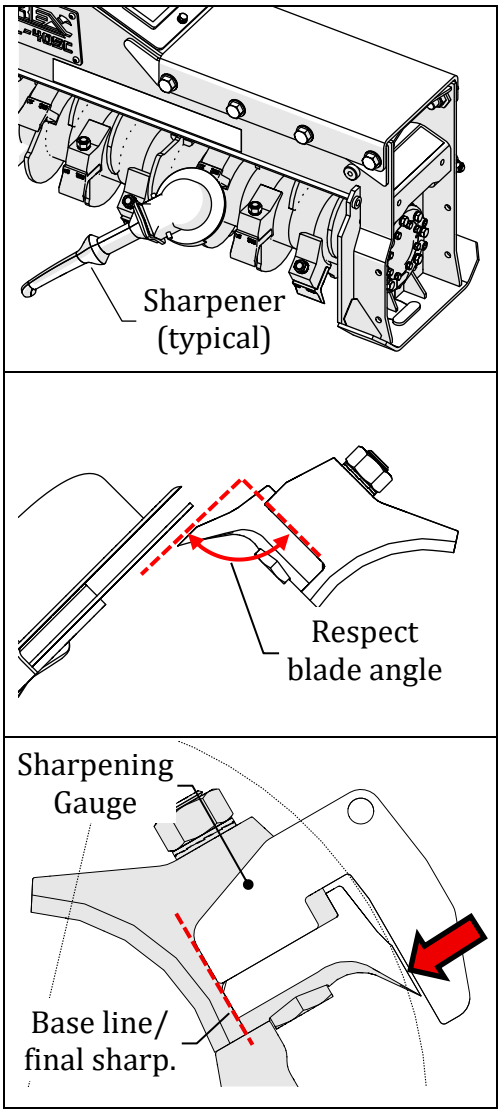


Fig. 3-3 Sharpening of the Flat Surface

Do not over-sharpen the blade, or stand tool too much time on the surface, it would overheat and change the hardness and mechanical properties of the blade.

3.5.5 Blade Replacement

3.5.5.1 Parts List

Prior to replace the used parts by a new one, refer to the items listed below. Replace the bolts, nuts, and washers with new ones every time the blades are changed.

Qty	Description	PN
16x	Blade New parts to be purchased by the user	SFL04-20
16x	Bolt, M16	SA11-00212
16x	Nut, M16	SA12-00409
16x	Lock Washer, NL-M16	SA13-00005

Replace the blades in pair, 180° apart, to keep the rotor balanced

3.5.5.2 Screws and Nuts

The screws and nuts used for blade mounting on the blade holders ARE NOT typical material that you can find in any common hardware store nearby. They are made of hardened/tempered steel properly designed for your mulcher purposes.

Therefore, it is recommended to replace these components by the genuine parts.

3.5.5.3 Lock Washers ("Nord Lock")

Nord-Lock[6] lock washers are currently used to make sure the nuts will not be loosening during operation.

They have cams on one side with a greater rise than the pitch of the bolt. They have radial teeth on the opposite side. The washers are installed in pairs, cam face to cam face.
When the bolt and/or nut is tightened, the teeth grip and seat the mating surfaces while the movement remains only across the face of the cams.

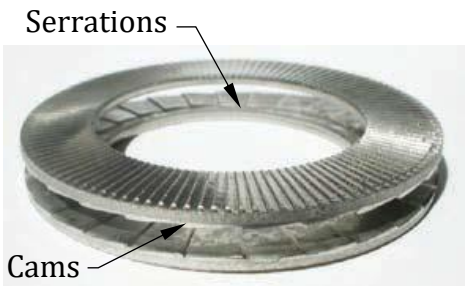


Fig. 3-4 Lock Washer Design

[6] Nord-Lock® is a pair of washers with a wedge-locking action meeting DIN 25 201

3.5.5.4 Instructions

1. Block the rotor to avoid rotation during blade removal.
2. Install the M16 nut socket on the blade nut.
3. Using an extension bar to ease the work, loosen the HN-M16 nut of the blade and remove the M16 nut, the NL-M16 lock washer, the bolt and the used-up blade.
4. Install a new set of blades, bolts, lock washers and nut to the blade holder.
5. Install the socket on the blade nut.
6. Install a 200-500 lbs-ft torque meter (with 3/4" drive) on the socket.
7. Using an extended bar or an impact wrench to ease the work, tighten the nut as specified.

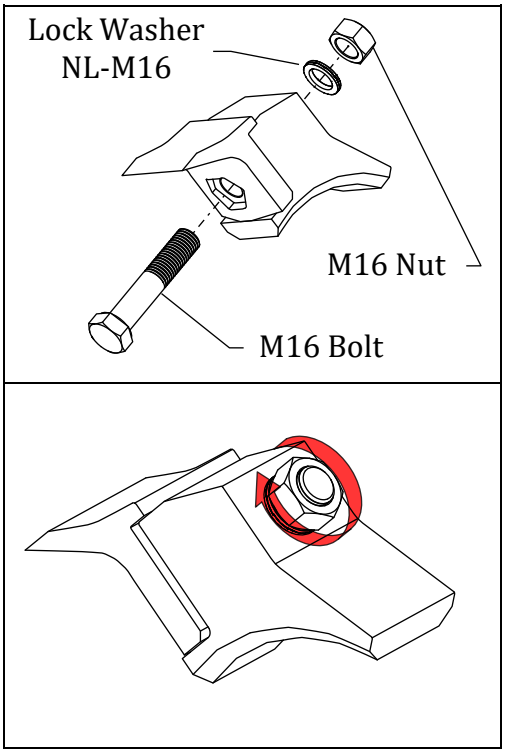


Fig. 3-5 Blade/Support Installation

Blade nut torque	**338 N-m/ 249 ft-lb**

A. When screws are re-used, make sure you install them with the same nut and in the same orientation.

B. Pay attention to replace lock washers in the right position.

3.6 Drive System Inspection

3.6.1 Compartment Inspection

3.6.1.1 Motor Compartment

Mulched material can always enter in the transmission system during operation.

Prior to turn on the mulcher, make sure there is no material in the motor enclosure or obstructing the pulleys and belt rotation.

1. Remove the M10 x 1.5- screws, the NL-M10 lock washers, and FW-M10 flat washers from the motor compartment panel (PN: SFM0020-3009) and remove the panel from the frame.
2. Thoroughly clean the motor compartment and ensure that no oil leak occurred during operation. If leak is found, it may come from adapter, O-ring or seal that must be replaced.
3. Reinstall the motor compartment panel.

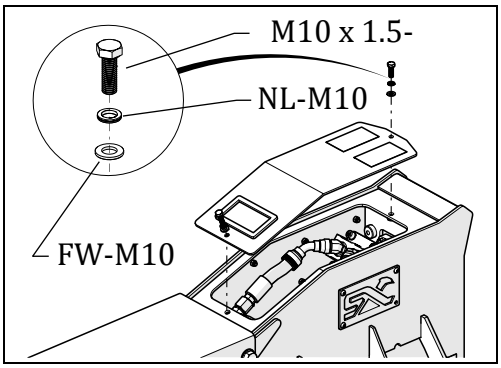


Fig. 3-6 Motor Compartment Panel Removal

3.6.1.2 Drive Belt Compartment

1. Remove the M10X1.5- screws, the NL-M10 lock washers and flat washers from the panel and remove the panel from the frame.
2. Clean the drive compartment from mulch, dirt and ensure there is no oil leak or grease leak behind the pulleys.
3. Ensure the taper lock (TL) bushings are tightened, and the pulleys are well aligned, and they all remain in good condition.
4. Inspect the drive belt for rubbing, tearing and obvious damages. If needed, fix the root cause, and make necessary adjustments.

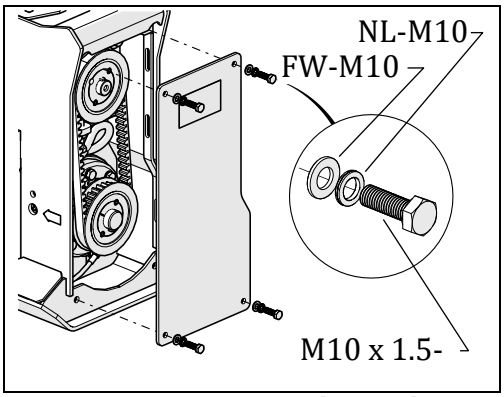


Fig. 3-7 Drive Box Panel Removal

5. Measure the play in the drive belt (1/2"≤ play ≤ 3/4" (see belt tightening…..).
6. Manually turn the rotor to make sure the belt is free.
7. Install the drive belt compartment panel and the motor compartment panel.

Since the belt is made from very robust material, some wear (10% - 20%) on the sides remains acceptable.

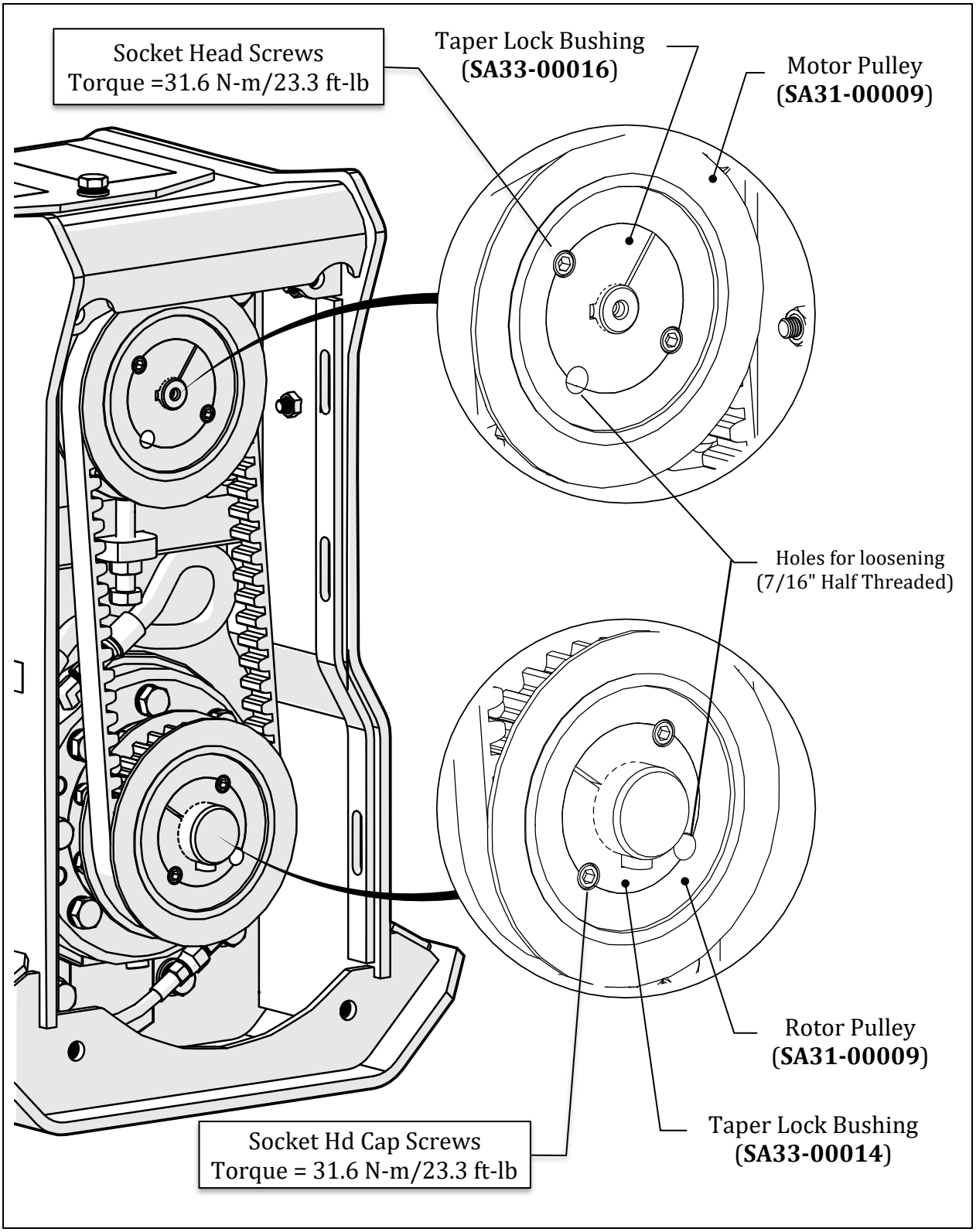


Fig. 3-8 Drive Compartment/Pulleys Description

3.6.2 Pulleys Inspection

3.6.2.1 Motor Pulley Adjustment

To remove or readjust motor pulley, the TL bushing must be loosened using the same socket head screw made for tightening purpose:

1. Take off the drive belt compartment panel.
2. Take off the (2x) 7/16"-14 socket head screws from the motor taper lock (TL) bushing half-threaded holes.
3. Insert one socket head screw in the empty hole of the TL bushing and tighten the screw. Since the screw is used as a "puller", this will separate the bushing from the pulley.

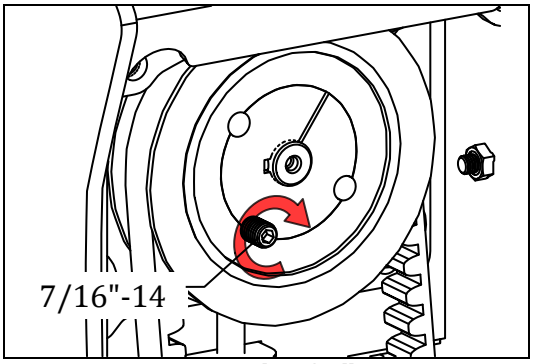


Fig. 3-9 Motor TL Bushing/Pulley Loosening

Do not overtighten the set screws to release the parts. If necessary, use a small shim in the slot of the coupling or hit the center of the pulley with a punch.

4. Slide the taper lock bushing with the pulley gently in its proper position or out of the shaft, if needed.
5. Perform the inspection of the parts.
6. Inspect the lip of the motor shaft seal. A trace of oil is a sign that an overpressure has occurred causing the shaft seal to break.
7. Slide the TL bushing with the motor pulley on the splined shaft.
8. "LIGHTLY" lubricate and install the screws into the half-threaded holes (on pulley).
9. Make sure the motor pulley is aligned with the rotor pulley. If not, release the TL bushing and slide it inwards or outward accordingly.
10. Slightly tighten the socket head screws of the TL bushing while gently hit the bushing with a punch to make sure that the parts are not seized with each other.

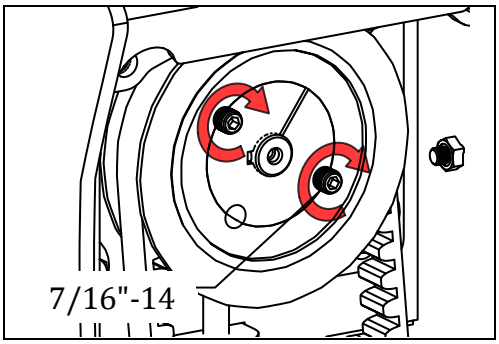


Fig. 3-10 Motor TL Bushing/Pulley Tightening

11. Tighten alternately the (2x) 7/16"-14 socket head screws until recommended torque is reached.

TL Bushing Screw Torque	**31.6 N-m/23.3 ft-lb**

12. Close/install the access panel.

3.6.2.2 Rotor Pulley Adjustment

To remove or readjust the rotor pulley, the TL bushing must be loosened using the same socket head screw made for tightening purpose:

1. Take off the drive belt compartment panel.
2. Take off the (2x) 7/16"-14 socket head screws from taper lock (TL) bushing.
3. Insert one socket head screw in the empty hole of the taper lock bushing and tighten the screw. Since the screw is used as a "puller", this will separate the bushing from the pulley.
4. Slide the taper lock bushing with the pulley gently in its proper position or out of the shaft, if needed.
5. Perform the inspection of the parts.

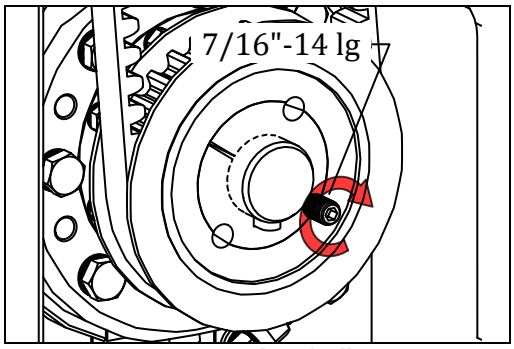


Fig. 3-11 Rotor TL Bushing/Pulley Loosening

Pay attention to the rotor RH arbor. A grease leak around the rotor bearing housing is the sign that the rotor arbor seal is defective. If so, further investigation should be performed to make sure the shaft seal and the bearing are in good condition.

Don't over-torque the set screw to free the bushing from the pulley. If necessary, use a small wedge in the slot of the bushing or hit the pulley center with a punch.

6. Slide the taper lock bushing with the rotor pulley on the keyed shaft.
7. Make sure shaft key is in proper location.
8. "LIGHTLY" lubricate and install the screws into the half-threaded holes (on pulley).
9. Slightly tighten the 2 socket head screws of the TL bushing while gently hit the TL bushing with a punch to make sure that the parts are not seized with each other.

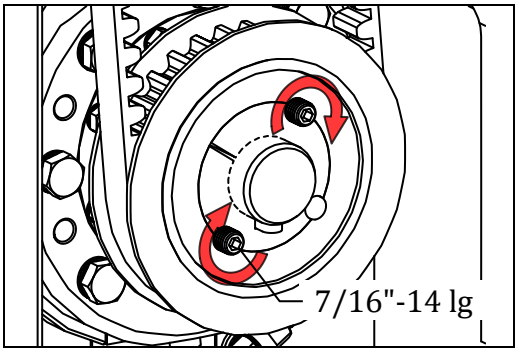


Fig. 3-12 Rotor TL Bushing/Pulley Tightening

10. Make sure the rotor pulley is aligned with the motor pulley. If not, release the TL bushing and slide it inwards or outward accordingly.
11. Tighten the (2x) 7/16"-14 socket head screws.

TL Bushing Screw Torque	**31.6 N-m/23.3 ft-lb**

12. Install the belt compartment panel.

3.6.2.3 Belt Tension Adjustment

The belt tension is adjustable with the use of a M12X1.75- "tension" screw which push the motor plate up for tightening. A locknut prevents the screw to self loosen.

To adjust the belt, proceed as follows:

1. Slightly loosen the motor plate screws (M12 x 1.75-40X40).
2. Loosen the M12 x 1.75 lock nut.
3. Measure the belt play and adjust as needed letting a 1/2" to ¾" (1 cm – 2cm) play on the side since the belt must remain free to slide back-and-forth on the pulleys.
4. Adjust the belt with the tension screw M12X1.75-60X60:
5. Turn screw RH ↷ for tightening.
6. Turn screw LH↶ for loosening.

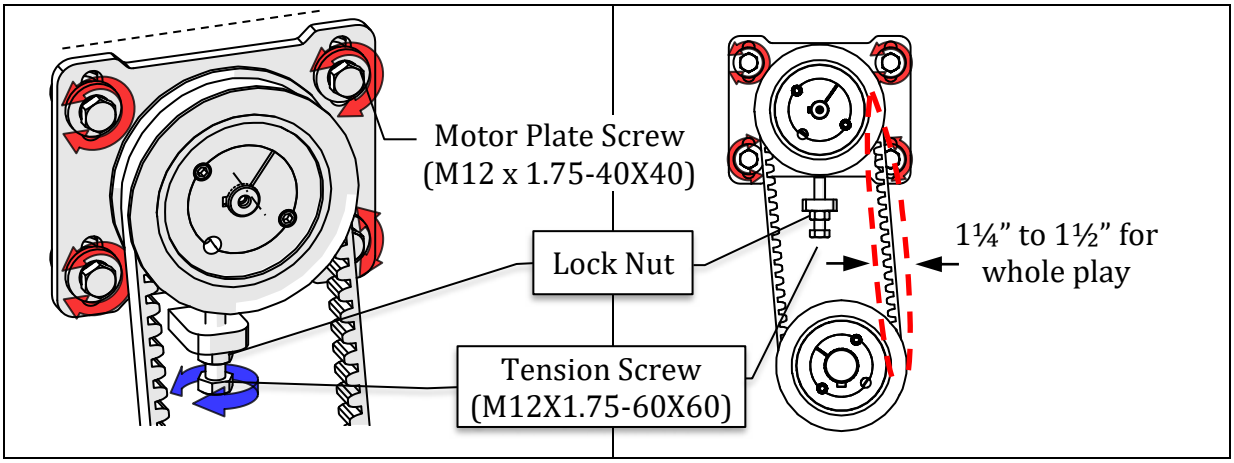


Fig. 3-13 Belt Tightening Devices

7. Firmly tighten the M12 locknut.
8. Tighten the M12X1.75 – motor plate screws.
9. Start the mulcher and observe if the belt is self aligning on the 2 pulleys. At rated speed (i.e. 3500 tr / min), the belt should be straight on the tension side and have a smooth curvature with no vibration on the loose side.

Since the Kevlar-reinforced belt tends to shrink when warming, tightening belt too much will create radial "overload" on the motor shaft that may lead the bearing to overheat during operation.

3.7 Rotor Inspection and Maintenance

3.7.1 Bearing Lubrication

3.7.1.1 Part/Tool List Recommended

A grease (manual) gun may be conveniently used to perform the bearing lubrication through the 2 grease fittings located on the frame:

Qty	Description	PN
1x	Grease gun	N/D
1x	Grease cartridge	SA03-00002

3.7.1.2 Recommended Grease

The bearings have already been greased in our facilities with grease made of a *Calcium Sulfonate Complex* product. Since this type of grease may not be available in all regions, make sure the lubricant you will be using instead is compatible with the one currently used for the mulcher bearings.

The rated speed of the rotor is 3500 rpm and the operating temperature of the bearing should be 45°C to 60°C (113°F to 140°F).

To withstands such speed and temperatures, make sure to always use an "EXTREME PRESSURE" (i.e. EP) designation grease. NLGI[7] grade 2 grease is a suitable type product for such application since it keeps its physical properties through a large range of temperature.

3.7.1.3 Grease Port Locations

Each bearing housing is mounted with a grease port (i.e. zert) and a vent.

The grease port is identified by a label apposed close by.

The vent purpose is to release the pressure from the inside the bearing during operation and allow a grease outlet if ever too much grease was mistakenly pumped inside.

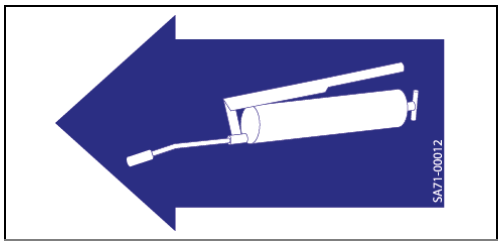


Fig. 3-14 Grease Port Location Label

[7] National Lubricating Grease Institute

3.7.1.4 Instructions

1. Locate the grease port behind the mulcher on the LH side of the frame.
2. Use the grease gun and apply **2-3** squirts into the grease adaptor of the LH bearing through the small flexible hose to the bearing. Grease volume injected may vary according to the grease gun.
3. Locate the grease port behind the mulcher on the RH side of the frame.
4. Apply **2-3** squirts into the grease adaptor of the LH bearing housing.
5. Turn the rotor manually to help greasing the bearing empty spaces.

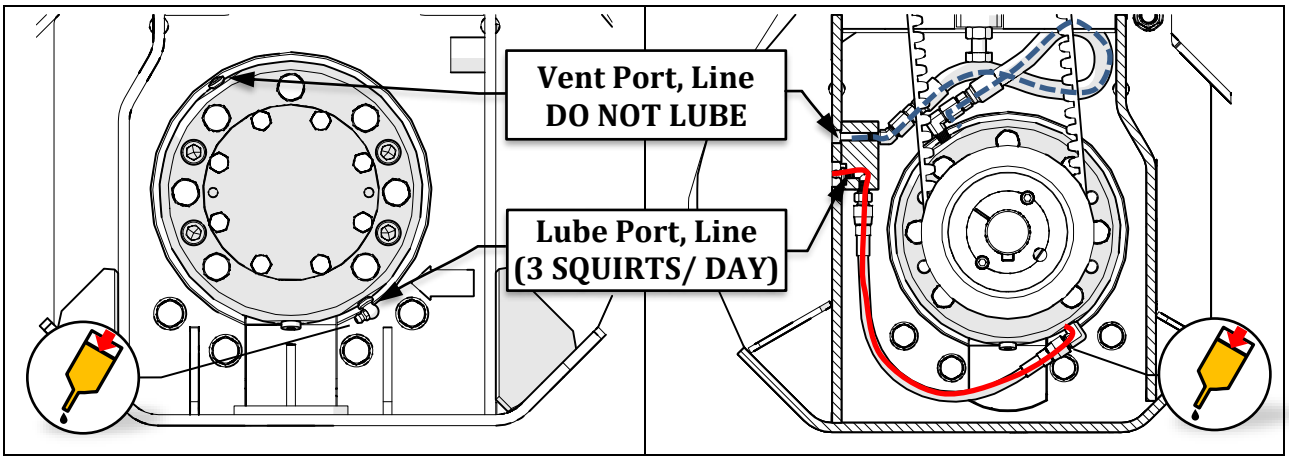


Fig. 3-15 LH/RH Bearings Lube and Vent Lines Location

Do not overfill the bearing, it may lead the bearing temperature to get higher than normal. Too much grease may damage the bearing seal and will overflow through the large flexible hose out of the vent.

From time to time, after bearing lubrication, verify the temperature of the bearing housing with an infrared thermometer (max 100°C/ 212°F) or through the Plus+ One Controller monitor (Optional).

3.7.2 Bearing Wear Evaluation[8]

3.7.2.1 Awareness

Unusual vibrations from the rotor may come from an unbalanced rotor that lost some metal piece such as a blade tip, weldments or from a "lack" in the rotor bearings such as:

- Worn bearing that need to be changed.
- Loose bearing ass'y that need to be tightened.

Since the maximum tolerance for radial play or side play is about 0.010", the most usual way to evaluate the bearing wear is to measure the clearance between the outer race and the top roller inside the bearing.

3.7.2.2 Tools List

Qty	Description	Purpose
1x	Lifting Bar	Clearance evaluation
1x	Support Block	Clearance evaluation
1x	Feeler Gauge	Clearance evaluation

3.7.2.3 Instructions

To quickly evaluate un-tightened parts on the rotor or wear on the rotor bearings, lower the mulcher to the ground and proceed as follows:

1. Insert the lifting bar under front/rear side of the rotor.
2. Install a support block at balancing point and try to move the rotor up and down:
3. If a vertical play is measured but "out-of-tolerance", the rotor bearing will certainly have to be replaced.
4. If a side play is measured but "out-of-tolerance, the rotor bearing may have to be changed, or some parts are simply untightened.
5. Check the vertical play on this side of the rotor.

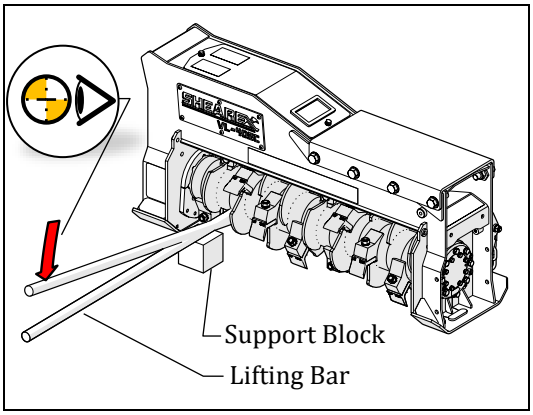


Fig. 3-16 Bearing Wear Checkup

When the bearing clearance is over the maximum tolerance, proceed further with the inspection of the rotor bearings.

[8] Although we recommend the use of the Mulcher Bearing Kit tools for bearing replacement ("K" type rotor), standard tools may also be used. Refer to the KBK Parts List for tools description.

3.7.3 "Fixed" Bearing Replacement

To access the rotor bearings for inspection / replacement or to remove the rotor from the frame, follow these steps using the *Bearing Repair Kit* (as references) or equivalent devices.

3.7.3.1 "Fixed" Bearing Removal

1. Stabilize the mulcher on a support frame.
2. Remove the drive compartment door/panel.
3. Remove the lower pulley ass'y.
4. Remove the rotor shaft key.
5. Remove the M08 screws and cover (PN: SFM0006-2001) with the seal (PN: SA26-00008) from the bearing housing (PN: SFM0006-2002).
6. Using a feeler gauge, take some readings of the MAX gap between the bearing outer race and the upper rollers (max tol. = 0,010"), otherwise, complete this removal procedure.
7. Remove the hoses, the adapters, electrical cable, and sensors (when equipped) from the bearing housing.
8. Unfold the locking tab of the lock washer (PN: SA13-00018).
9. Remove the lock nut (PN: SA12-00019) using the tool provided (PN : SFG0006-4001) from the *Bearing Repair Kit* or equivalent device.
10. Remove the lock washer.
11. Remove the M12 housing screws (PN: SA11-00047) with the lock washer (PN: SA13-00009).

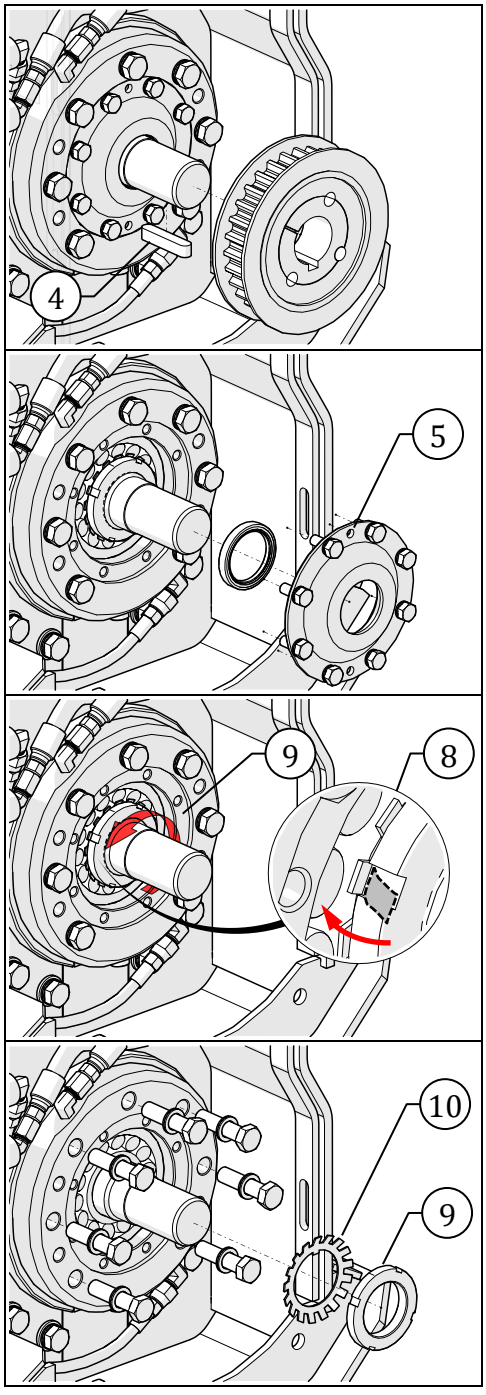


Fig. 3-17 "Fixed" Bearing Housing Removal (1/2)

12. From either side, in 3 mounting screw holes, insert/tighten 3x M12 (80 mm) socket set screws (PN: SA11-00033) through the housing holes until they are slightly tight on the rotor. They will secure the rotor in place while pulling the bearing housing out.

13. Install the 2x M12"puller screws" (PN: SA11-00034) in the housing holes from where the short socket head screws were removed.

14. Tighten the 2 puller screws to make the bearing housing come out of the mounting flange ring.

15. Pull the fixed bearing housing out of the frame.

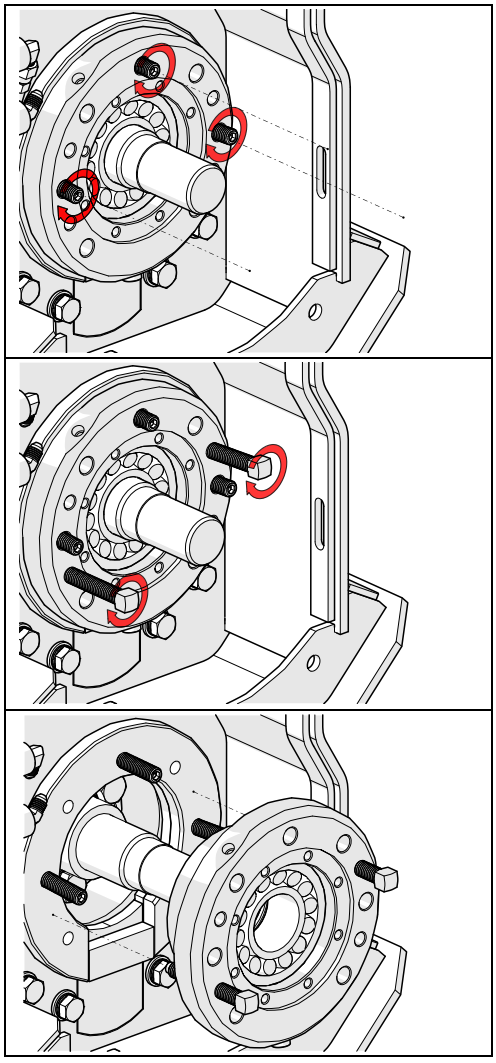


Fig. 3-18- « Fixed » Bearing Removal (2/2)

16. Put the bearing housing ass'y on a worktable for further inspection.

In order to carefully extract the bearing housing, tighten puller screws evenly, one after the other; it will prevent damage to the rotor shaft.

17. Using a puller for a safe and smooth extraction, disassemble the bearing ass'y and inspect the bearing housing inner bore, roller bearing and shaft seal for damage, overheating, and seal defect.

3.7.3.2 « Fixed » Bearing Installation

1. Clean the long rotor shaft where the bearing inner race will be mounted.
2. Spread some lubricant (i.e. grease) on the long rotor shaft surface and on the inner surface of the bearing housing flange.
3. Temporarily install the mounting cover (PN: SFG0006-2002) on the bearing housing with th M08 screws to protect the bearings and keep them in place during housing installation.
4. Slide the bearing housing (PN: SFM0006-2002) along the rotor shaft and the 3 retaining (set) screw that hold the rotor in place.
5. Temporarily install the 4 longest mounting screws (PN: SA11-00035), tighten them and remove.
6. Install the housing screws (PN: SA11-00047) with the lock washers and tighten until a 1/8″ gap remains between the housing and the frame.
7. Remove the 3 socket set screws (PN: SA11-00033) previously used for support and alignment.
8. Remove the mounting cover (PN: SFG0006-2002) from the bearing housing.
9. Install the remaining housing screws and tighten all M12 screws (**T = 81 N-m/ 60 ft-lb**).

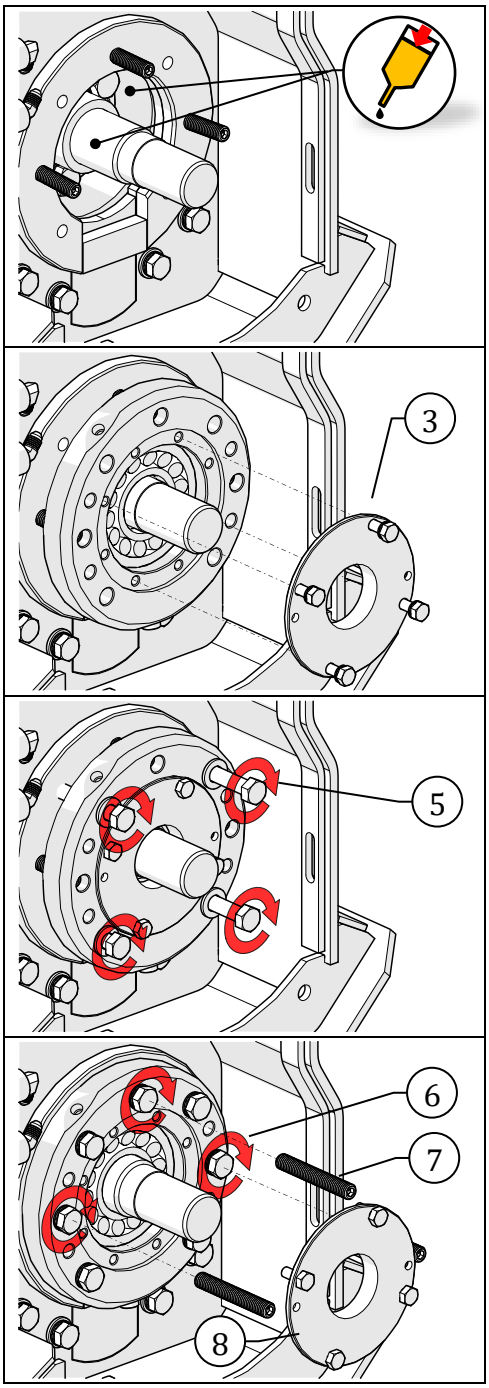


Fig. 3-19 "Fixed" Bearing Installation (1/2)

10. Check that the bearing is well seated by gently knock on using the mounting socket (PN: SFG0006-4000) or properly sized tube.
11. Install the lock washer (PN: SA13-00018) and the lock nut (PN: SA12-00019) on the rotor arbor until it seats firmly against the bearing.
12. Turn the lock nut with the tool provided (PN : SFG0006-4001) just to align the next lock washer tab with the nut notch.
13. Fold down the lock washer tab into one notch of the lock nut.
14. Install the lubrication and vent hoses fitting to the corresponding housing inlet fittings.
15. Start greasing the bearing housing using the greasing point until you see grease coming between the bearing rollers and the bearing race.
16. Thoroughly clean the bearing housing cover from potential impurities.
17. Install the housing cover (PN: SFM0006-2001) with the sealing gasket (PN: SA26-00008), the screws and lock washers.
18. Torque housing cover screws **(T = 34 N-m/25 ft-lb)**.

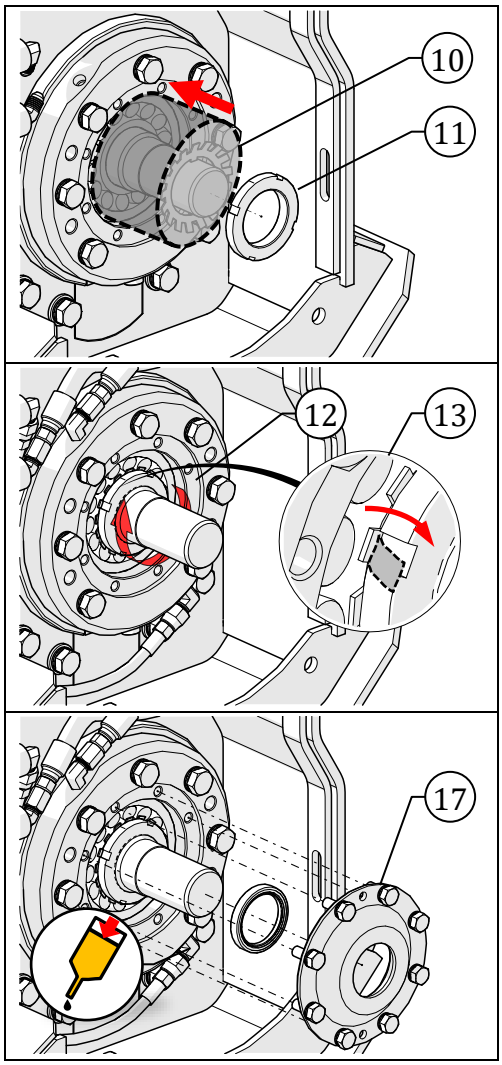


Fig. 3-20 "Fixed" Bearing Installation (2/2)

19. Complete greasing of the bearing housing with 1/3 of a grease tube.
20. Manually turn the rotor to make sure it rolls easily.

Lube-grease frequency/ rotor bearing	Grease QTY required
Daily lubrication	2-3 squirts a day
New bearing	1/3 of a grease tube (200 gr)

21. Install the shaft key on the rotor end.
22. Install the rotor pulley (réf.: **3.6.2.2**) and the belt.

3.7.4 "Floating" Bearing Housing Replacement

To access the rotor bearings for inspection / replacement or to remove the rotor from the frame, follow these steps using the *Bearing Repair Kit* (as references) or equivalent devices:

3.7.4.1 «Floating» Bearing Housing Removal

1. Stabilize the mulcher on wooden beams or other supports, to prevent the rotor from falling after the bearing housing is removed.
2. Thoroughly clean the area prior removing bearing housing cover.
3. Remove the M8 screws, lock washers and cover (PN: SFM0006-2000) from the bearing housing (PN: SFM0006-2002).
4. Using a feeler gauge, take some readings of the MAX gap between the bearing outer race and the rollers to make sure the bearing is in the specs (tol. Max. = 0,010 "), otherwise, complete this procedure.
5. Remove the lube hose/fittings and vent hose/fittings.
6. Remove the housing M12 screws (PN: 116 N-m/86 ft-lb) and lock washers.
7. Remove the 4x socked head cap screw M12-1.75 x 20-20 (PN: SA11-00204).
8. From either side, in 3 mounting screw holes, insert/tighten 3 retaining/alignment screws (PN: SA11-00033) until they are slightly tight on the rotor. They will secure the rotor in place while pulling the bearing housing out.
9. Insert 2 puller screws (PN: SA11-00034) in a cross-side way from where the « short » socket set screws were removed.
10. Tighten 2 puller screws evenly to make the bearing housing (PN: SA11-00034) come out of the mounting flange ring.

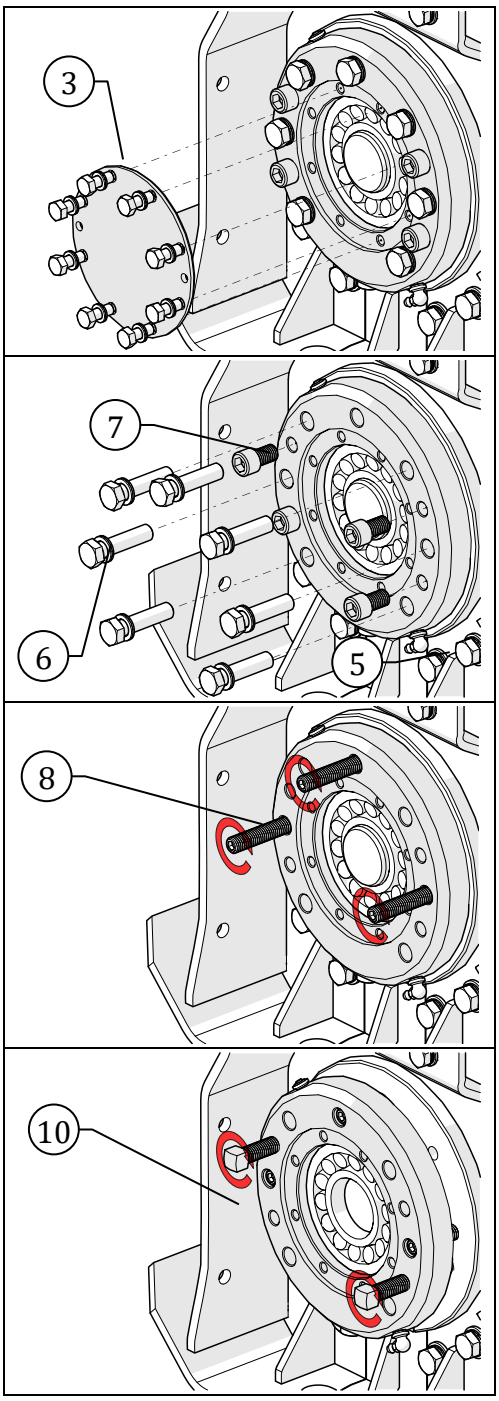


Fig. 3-21 « Floating » Bearing Removal (1/2)

11. Remove the housing.

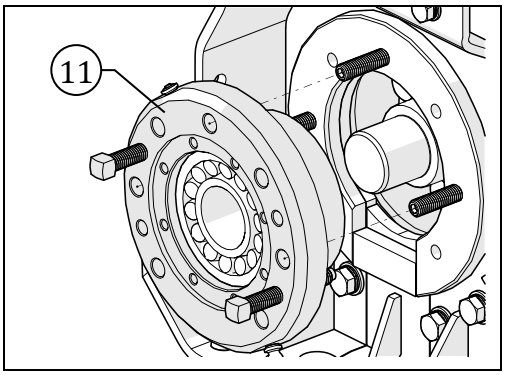


Fig. 3-22 « Floating » Bearing Removal (2/2)

In order to carefully extract the bearing housing, tighten each puller screw evenly, one after the other; it will prevent damage to the rotor shaft .

12. Put the bearing housing ass'y on a worktable.
13. Using a puller for a safe and smooth extraction, disassemble the bearing ass'y and inspect the bearing housing inner bore, roller bearing and shaft seal for damage, overheating, and seal defect.

3.7.4.2 « Floating » Bearing Installation

To install the bearing housing assembly in the housing, appropriately, proceed as follows:

1. Thoroughly clean the shaft corresponding to the bearing housing to be mounted.
2. Apply grease compound or appropriate grease on the shaft and on the inner surface of the bearing housing enclosure.
3. Temporarily install the mounting cover (PN: SFG0006-2002) on the bearing housing to protect the bearings and keep them in place during housing installation.
4. Slide the bearing housing (PN: SFM0006-2002) along the 3 socket/alignment screws (PN : SA11-00033) that hold the rotor in position on the frame.
5. Temporarily install the 4 longest mounting screws (PN: SA11-00035), tighten them and remove.
6. Install the housing screws (PN: SA11-00047) with the lock washers and tighten until a 1/8″ gap remains between the housing and the frame.
7. Remove the 3 retaining/alignment screws (PN: SA11-00033) previously used for support and alignment.
8. Remove the M8 screws and the mounting cover (PN: SFG0006-2002) from the bearing housing.

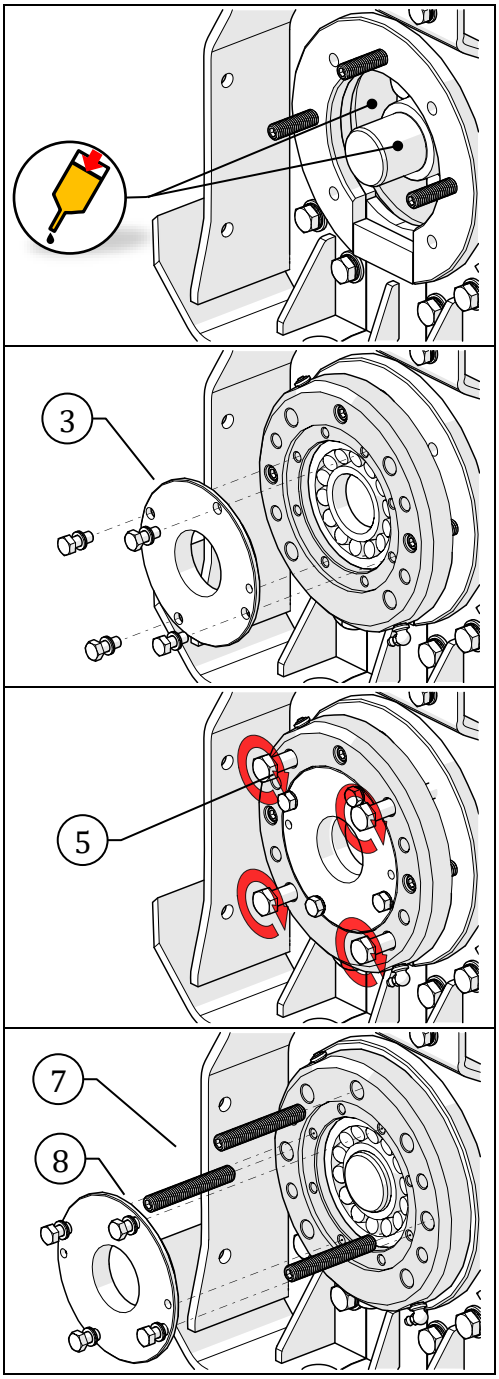


Fig. 3-23 Floating Bearing Installation (1/2)

9. Install the remaining housing screws M12 with lock washers and tighten (**T= 116 N-m/86 ft-lb**).
10. Install the 4x short set screws (PN: SA11-00204).
11. Check that the bearing is well seated by gently knock on using the mounting socket (PN: SFG0006-4000) or properly sized tube.
12. Reinstall the lube hose/fittings and vent hose/fittings.
13. Start greasing the bearing housing using the appropriate grease fitting until you see grease coming between the bearing rollers and the bearing race.
14. Thoroughly clean the bearing housing cover from old grease and debris.
15. Install the housing cover (PN: SFM0006-2000) with lock washers and M08 screws.
16. Torque housing cover M08 screws (**T = 34 N-m/25 ft-lb**).
17. Complete greasing of the bearing housing with 1/3 of a grease tube.
18. Manually rotate the rotor to make sure it rolls easily.

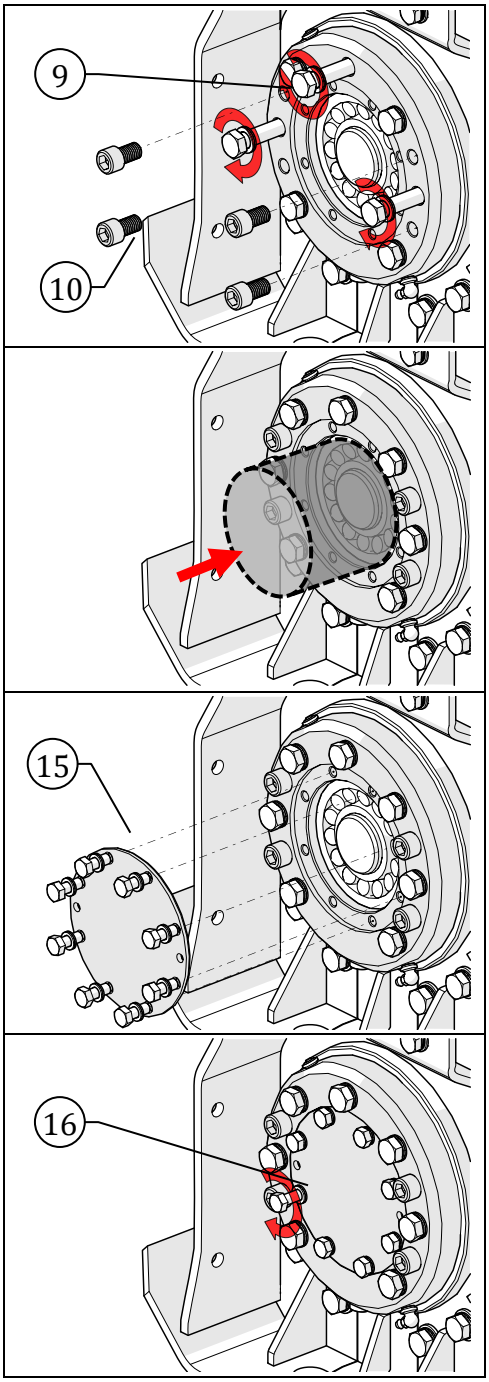


Fig. 3-24 Floating Bearing Installation (2/2)

Lube-grease frequency/ rotor bearing	Grease QTY required
Daily lubrication	2-3 squirts a day
New bearing	1/3 of a grease tube (200 gr)

3.7.4.3 Bearing Removal from Housing

To remove the bearing and shaft seal from a rotor bearing housing, proceed as follows:

1. Put rotor bearing housing face down on a worktable or other clean and flat surface.
2. Push the bearing downwards.
3. Take off the rotor shaft seal from the bearing housing.
4. Inspect the bearing housing inner bore, roller bearing and shaft seal for damage, overheating, and seal defect.

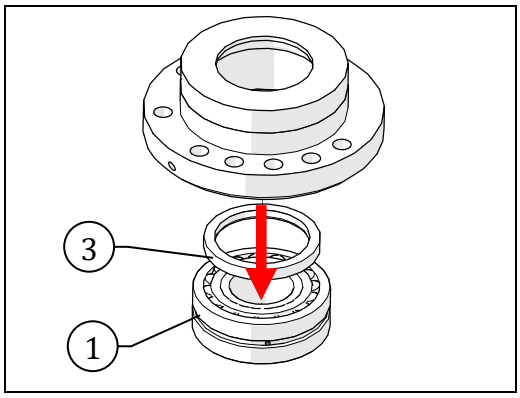


Fig. 3-25 Rotor Bearing Extraction

Use a flat screwdriver, taking care not to damage the seal enclosure in the bearing housing.

3.7.4.4 Bearing Installation (in Housing)

To easily assemble the bearing housing with all related components, use a manual press, as follows:

1. Thoroughly clean the bearing housing from grease and dirt.
2. Check that there is no sign of wear inside the bearing housing at the bearing level and replace the shaft seal if needed with new one (PN : SA34-00003).
3. Using the appropriate jig, insert the shaft seal (PN : SA26-00009) inside the bearing housing (PN : SFM0006-2002).
4. Using the mounting cover provided with the MMK (PN : SFG0006-2002), insert the bearing (PN: SA34-00003) inside the bearing housing.

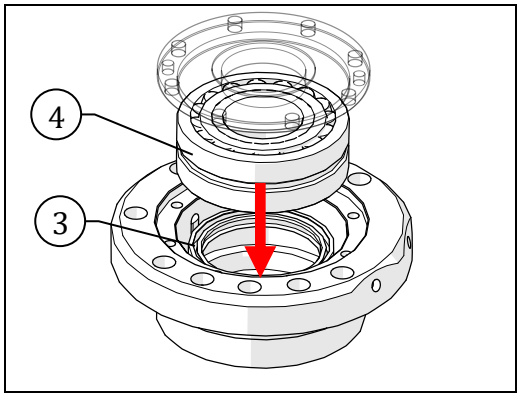


Fig. 3-26 Rotor Bearing Installation

3.8 Anvil Maintenance

3.8.1 Inspection

1. Thoroughly clean the anvils and surrounding components to clearly see the parts.
2. Inspect the anvils for wear and damages.
3. Replace anvil if any major damage or excessive wear.

Damaged and torn out parts can seriously damage the frame or it could come into contact with the blades, and be projected to a considerable distance.

3.8.2 Replacement

3.8.2.1 Parts List

Prior to replace the used parts by a new one, refer to the items listed below. Replace the bolts, nuts, and washers with new ones every time an anvil part is changed.

Qty	Description	PN
1x	Anvil	SFM0027-2001
4x	Bolt, M10x1.5-35x35	SA11-00046
4x	Flat Washer M10	SA13-00013
4x	Lock Nut, M10	SA12-00009

3.8.2.2 Instructions (replacing 1 unit)

1. Remove (4x) M10 lock nuts and the flat washers from the back side of the mulcher frame.
2. Remove (4x) M10x1.5-35x35 bolts from the anvil.
3. Remove the damaged anvil and dispose of it properly.
4. Install a new anvil with bolts, washers and lock nut as needed.
5. Tighten anvil screw nuts (**T = 67 N-m/ 49 ft-lb**).

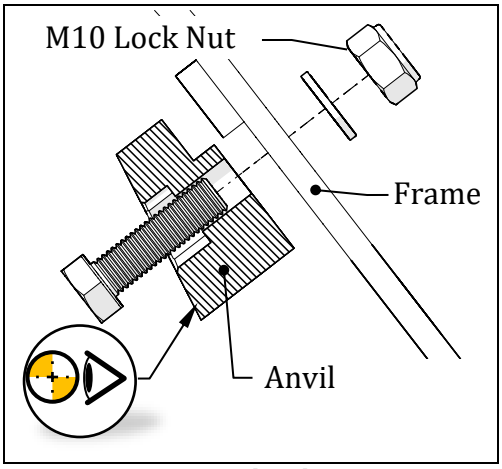


Fig. 3-27 Anvil Replacement

4 Parts List

4.1 Frame Protectors and Panels

No	Description	QTY	PN
1	Upper Cover	1	SFM0027-3009
2	Drive System Door	1	SFM0027-1025
3	Screw M10X1.5-30X30-8.8Z (47 N-m/ 34 ft-lb)	6	SA11-00020
4	Lock Washer, M10	6	SA13-00003
5	Flat Washer, M10	6	SA13-00013
6	Logo Shearex VL-20SC	1	SFM0020-1026
7	Screw, M08-1.25 x 25-25, 8.8Z (24 N-m/17 ft-lb)	6	SA11-00501
8	VL Base Mounting Plate	1	SFM0027-3010
9	Screw M20-2.5 x 70-46, 10.9Z (563 N-m/ 416 ft-lb)	2	SA11-00108
10	Lock Washer, M10	2	SA13-00022
11	Lock Nut M20X2.5, 10.9Z	6	SA12-00023

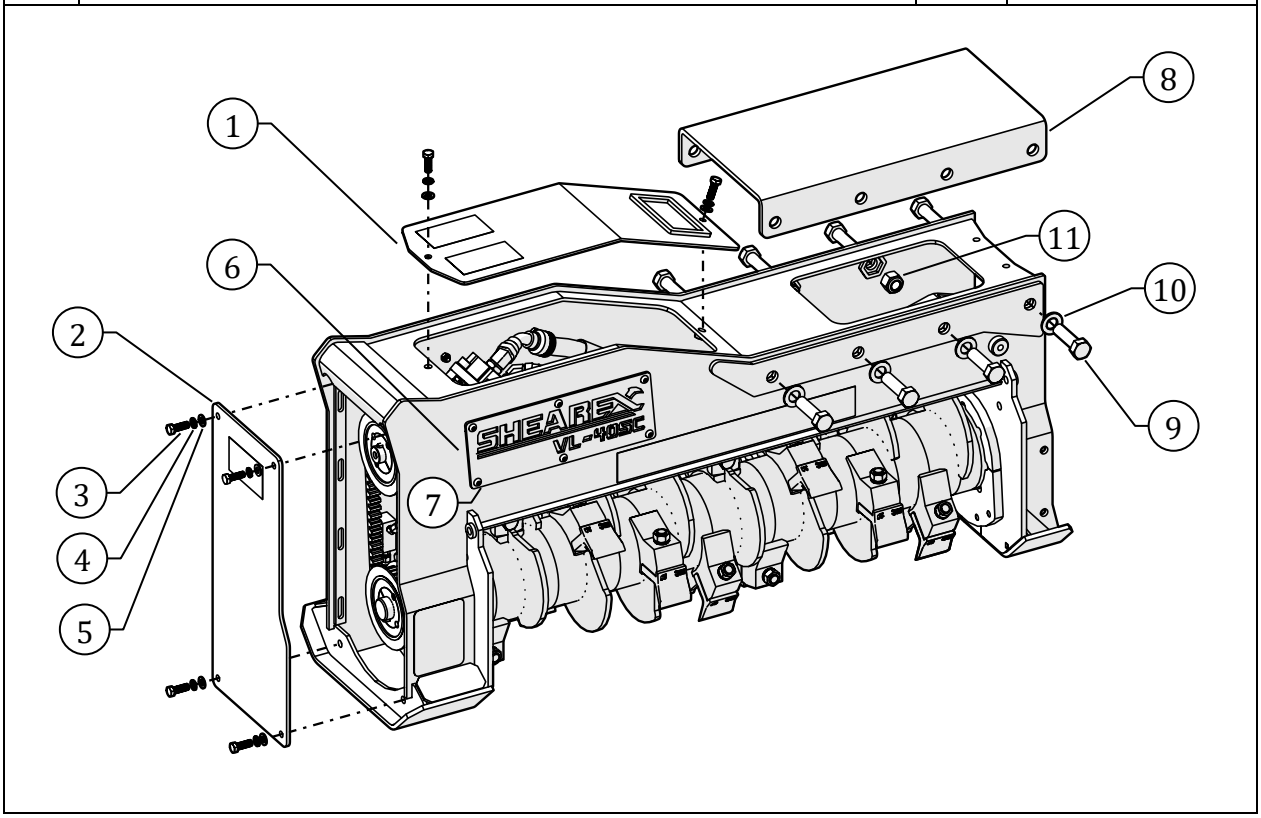


Fig. 4-1 Frame Outer Parts

4.2 Rotor Ass'y (SFM0027-5000)

No	Description	QTY	PN
1	Rotor (Welded Structure)	1	SFM0027-4000
2	Long Axle	1	SFM0006-2045
3	Drive Shaft Key	1	SA38-00004
4	Screw, M14-2.00 x 55-55, 10.9Z (186 N-m/ 137 ft-lb)	6	SA11-00103
5	Lock Washer -M14-15.2 x 23.0 x 3.4mm-Zinc	6	SA13-00014
6	Short Axle	1	SFM0006-2044
7	Screw, M14-2.00 x 55-55, 10.9Z (186 N-m/ 137 ft-lb)	6	SA11-00103
8	Lock Washer -M12-Zinc	6	SA13-00014
9	Blade (Standard Blade 4 type 20)	16	SFL04-20
10	Bolt M16X2.0-80X38-Gr.12.9 (338 N-m/ 249 ft-lb)	16	SA11-00212
11	Hex. Nut - M16X2.0-Gr.12.9-Zinc	16	SA12-00409
12	Lock Washer M16-17.2 x 25.4 x 3.3, Zinc	16	SA13-00005
13	Blade Support 2"	16	SFM0020-2002
14	C Family ring, for VL	8	SFM0020-1000

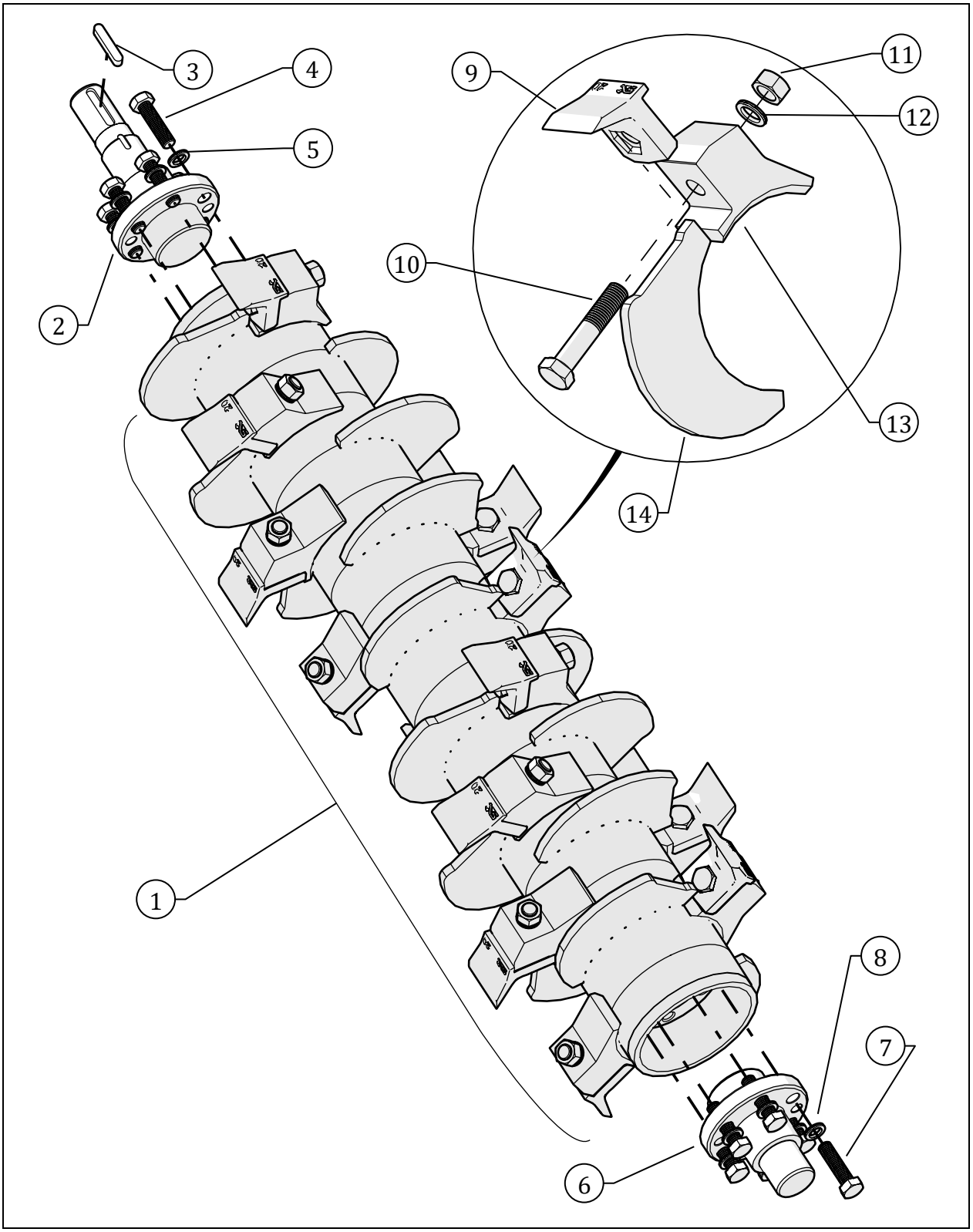


Fig. 4-2 Rotor Parts

4.3 Fixed" Rotor Bearing Ass'y (SFM0006-5000)

No	Description	QTY	PN
1	Bearing Housing	1	SFM0006-2002
2	Screw, M12X1.75-50X30-G10.9Z (116 N-m/86 ft-lb)	7	SA11-00047
3	Lock Washer, M12-Zinc	7	SA13-00009
4	Seal, DLV-60-80-10	1	SA26-00009
5	Spherical-Roller-Bearing - 22309	1	SA34-00003
6	Lock washer MB9	1	SA13-00018
7	Lock nut, KM9 M45 x 1.5	1	SA12-00019
8	Seal, DLV-40-52-7	1	SA26-00008
9	Cover of fixed side bearing, K Family	1	SFM0006-2001
10	Screw, M8-1.25 x 20-20, 10.9Z (34 N-m/25 ft-lb)	8	SA11-00028
11	Lock Washer, NL-M8	8	SA13-00004
12	Lube Hose (Fixed Side)	1	SFM0001-5011
13	Pressure relief hose (Fixed Side)	1	SFM0008-5004
14	45°-Adapter-NPTFM02-JICM04	1	SA23-00003
15	90°-Adapter-NPTFM02-JICM04	3	SA23-00002
16	Hydraulic-Grease-Nipple-0.125"-Straight	1	SA23-00005
17	Straight-Adapter-NPTFM02-JICM04	1	SA23-00004

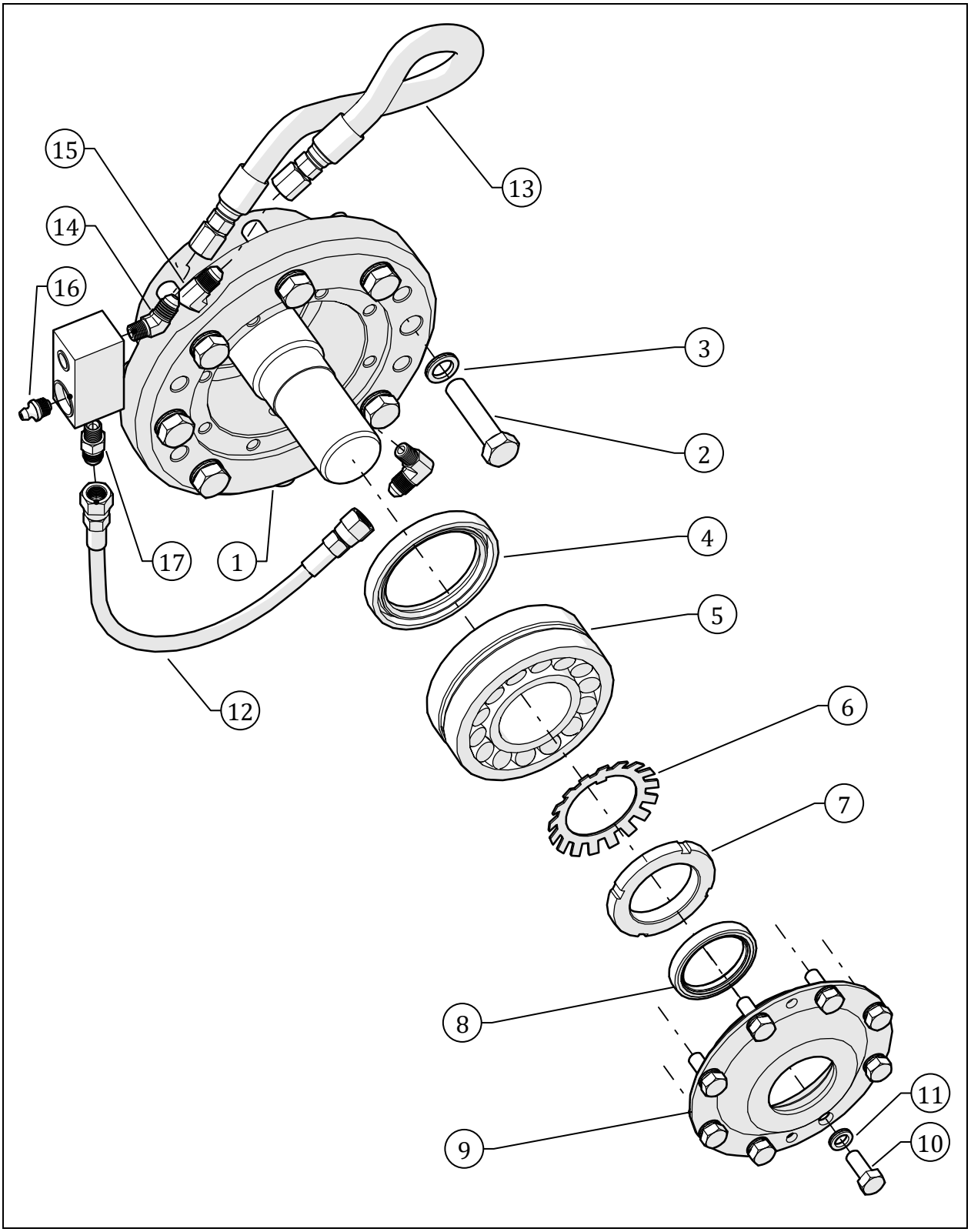


Fig. 4-3 Fixed Bearing Parts

4.4 "Floating" Rotor Bearing (SFM0006-5001)

No	Description	QTY	PN
1	Bearing Housing	1	SFM0006-2002
2	Screw M12x1.75-50X30-10.9Z (116 N-m/86 ft-lb)	7	SA11-00047
3	Lock Washer, M12-19.5 x 13 x 2.7(mm), Zinc	7	SA13-00009
4	Cap Screw M12-1.75 x 20-20mm, 12.9(65 N-m/48 ft-lb)	4	SA11-00204
5	90°-Hydraulic Grease Nipple	1	SA23-00006
6	Socket Cap Screw ("Plug") M10 x 1.00	1	SA27-00049
7	Pressure relief vent 1/8" NPT	1	SA23-00200
8	Seal, DLV-60-80-10	1	SA26-00009
9	Spherical-Roller-Bearing -(22309)	1	SA34-00003
10	Bearing Housing Cover	1	SFM0006-2000
11	Screw, M08x1.25-20X20-G10.9Z (34 N-m/25 ft-lb)	8	SA11-00028
12	Lock Washer, NL-M8-8, M8-8.7 x 13.5 x 2.5	8	SA13-00004

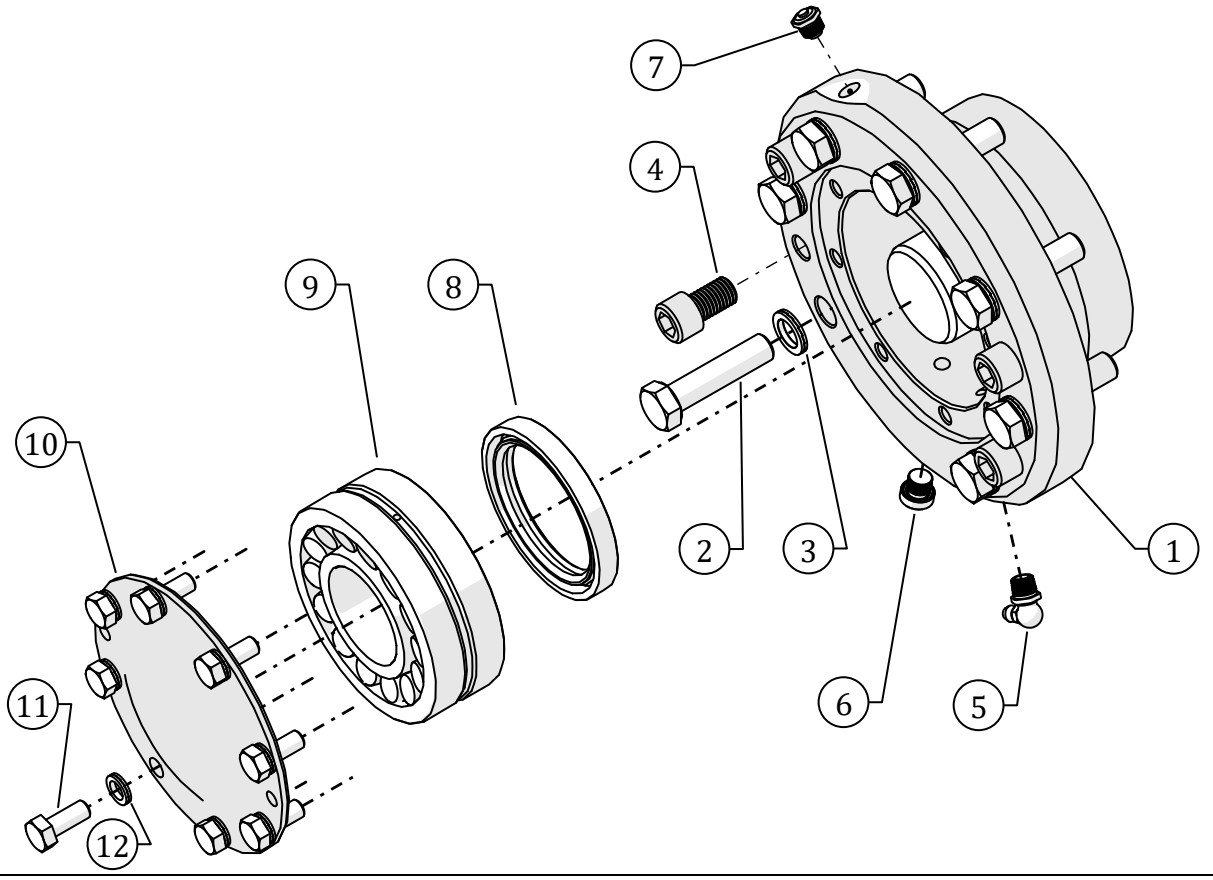


Fig. 4-4 Floating Bearing Parts

4.5 Transmission

No	Description	QTY	PN
1	Motor Support Plate	1	SFM0027-2003
2	Screw M12X1.75-40X40-10.9Z (116 N-m/86 ft-lb)	4	SA11-00054
3	Lock Washer, M12-19.5 x 13 x 2.7, Zinc	4	SA13-00009
4	Flat Washer, M12 X .188 in	4	SFM0006-1068
5	Hex. Cap Screw, M12-1.75 x 60-60, Gr. 10.9Z	1	SA11-00026
6	Hex. (Lock) Nut M12-1.75, Gr.10Z	1	SA12-00022
7	Motor Pulley (Gates), 14MX-30S-20	1	SA31-00009
8	Taper-Lock-Bushing 2012-30mm, 8mm key	1	SA33-00016
9	Set screw 7/16"-14 x 7/8"-Gr.8 (31.6 N-m/23.3 ft-lb)	2	SA11-00101
10	Belt 14MGT-994-20 71 Teeth	1	SA32-00008
11	Rotor Pulley (Gates), 14MX-36S-20	1	SA31-00009
12	Taper-Lock Bushing 2012-1.5"	1	SA33-00014
13	Set screw 7/16"-14 x 7/8"-Gr.8 (31.6 N-m/23.3 ft-lb)	2	SA11-00101

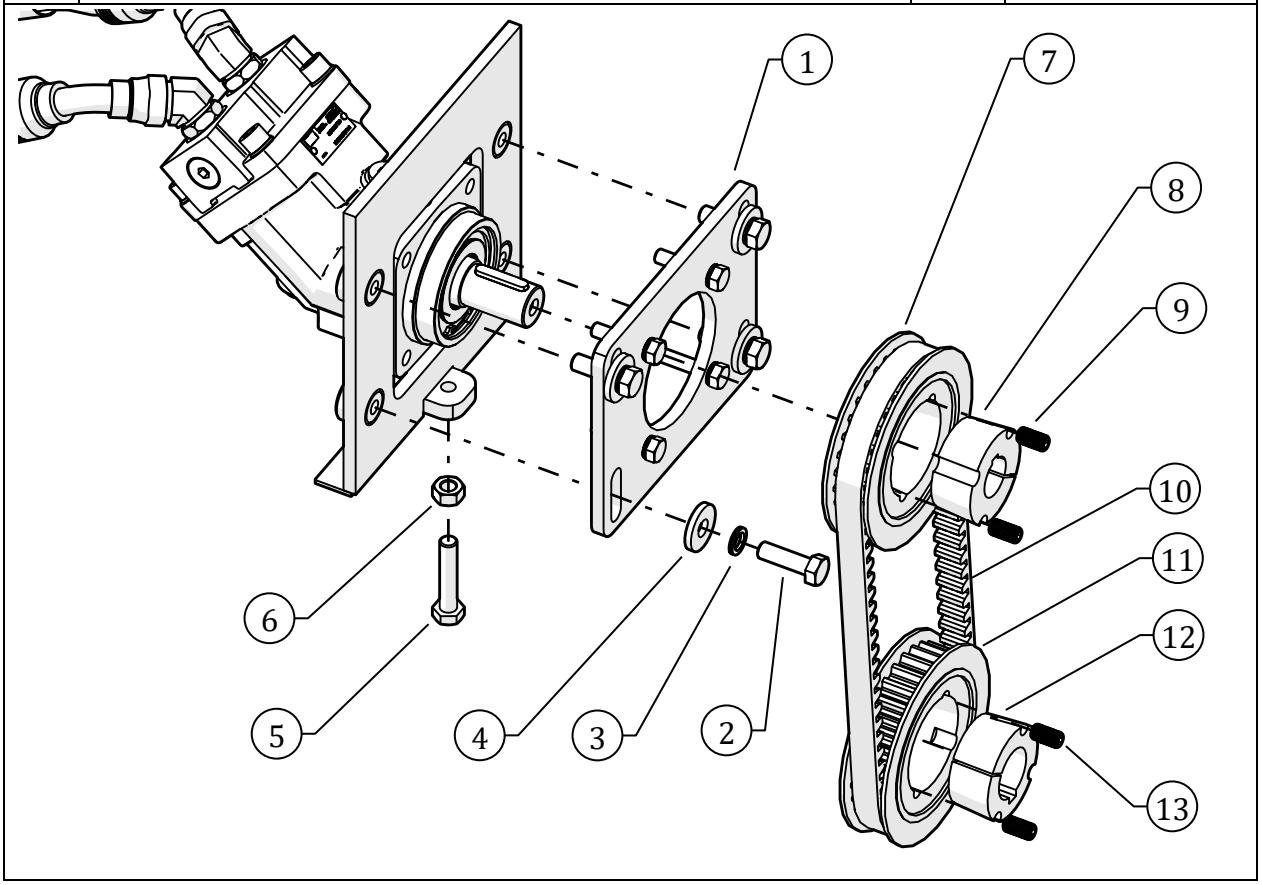


Fig. 4-5 Drive System Parts List

4.6 Motor Ass'y

No	Description	QTY	PN
1	Hydro Leduc 32cc Hydraulic Motor	1	SA21-00025
2	Motor Seals Kit	1	SA26-00025
3	Screw, M10-1.5 x 45-26mm, 10.9Z (67 N-m/ 49 ft-lb)	4	SA11-00065
4	Lock Washer M10 - 10.7 x 16.6 x 2.5(mm), Zinc	4	SA13-00003
5	Nylon Insert Hex. Lock Nut M10-1.5, Gr.8, Zinc	4	SA12-00009
6	45° Adapter JICM12-M27 (Metric)	2	SA23-00221
7	Freewheeling Hose 5½" 4Wires/6000 PSI	2	SFM0027-5002
8	T AdapterJICM12-ORBM12-JICM12	2	SA23-00028
9	Check Valve 3/4" for freewheeling	1	SA28-00017

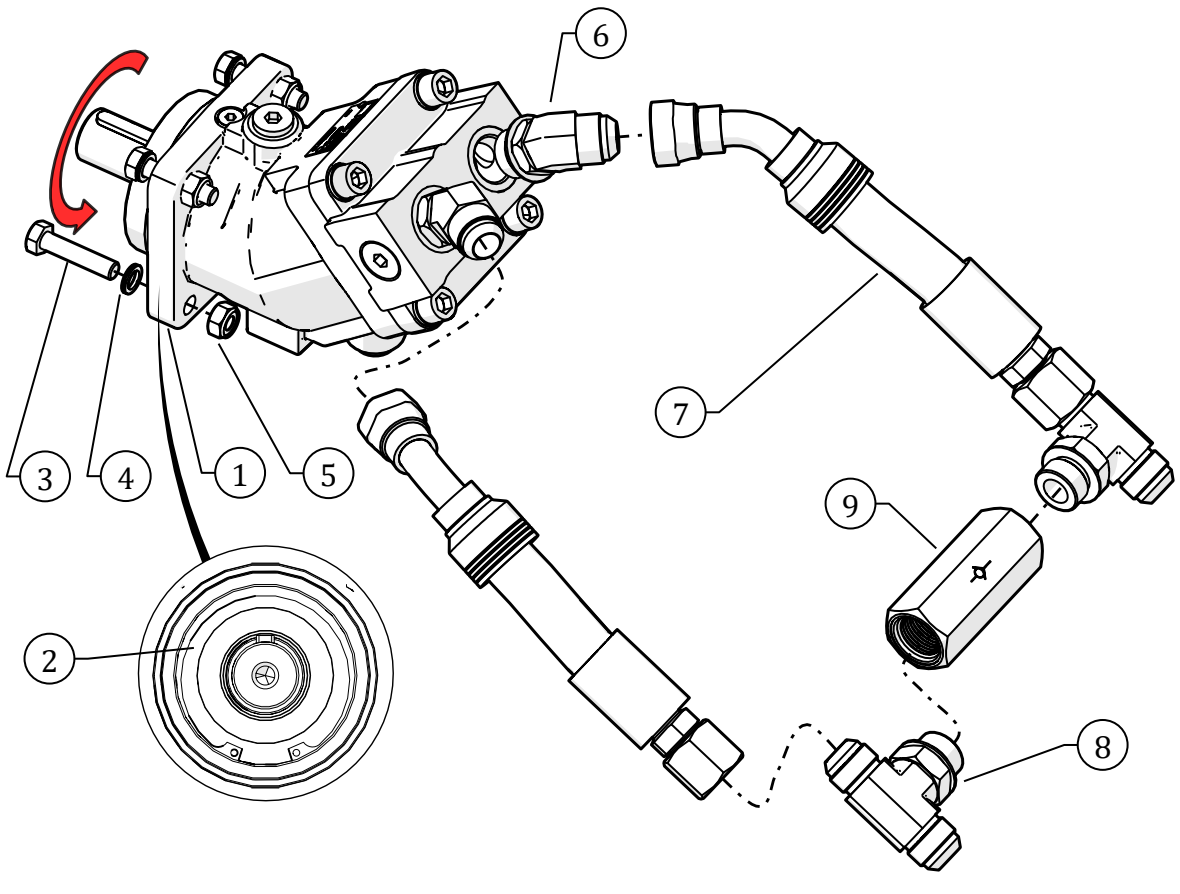


Fig. 4-6 Motor and Hydraulic Block

4.7 Protectors

No	Description	QTY	PN
1	Anvil for VL-40SC	1	SFM0027-2001
2	Screw M10-1.5x35-35, 10.9Z (67 N-m/ 49 ft-lb)	4	SA11-00046
3	Flat Washer, M10-10.7 x 19.7 x 2mm, Zinc	4	SA13-00013
4	Nylon Insert Hex. Lock Nut M10-1.5, Gr.8, Zinc	4	SA12-00009
5	3/8" Chain x 5 links, grade 70, overall length 7-5/8"	44	SA39-00002
6	VL-40SC Articulation Rod and Chain Retainer	1	SFM0027-2006
7	Flat Washer M12-13.2 x 23.6 x 2.5(mm), Zinc	2	SA13-00008
8	Nylon Insert Hex. Lock Nut M12-1.75, Gr.8, Zinc	2	SA12-00005
9	Rotor Protector (Rear)	1	SFM0020-4004
10	Rotor Protector (Front)	1	SFM0020-4005
11	Screw, M12-1.75 x 30-30, 10.9Z (116 N-m/86 ft-lb)	8	SA11-00015
12	Lock Washer M12-19.5 x 13 x 2.7(mm), Zinc	8	SA13-00009
13	Flat Washer M12-13.2 x 23.6 x 2.5(mm), Zinc	8	SA13-00008

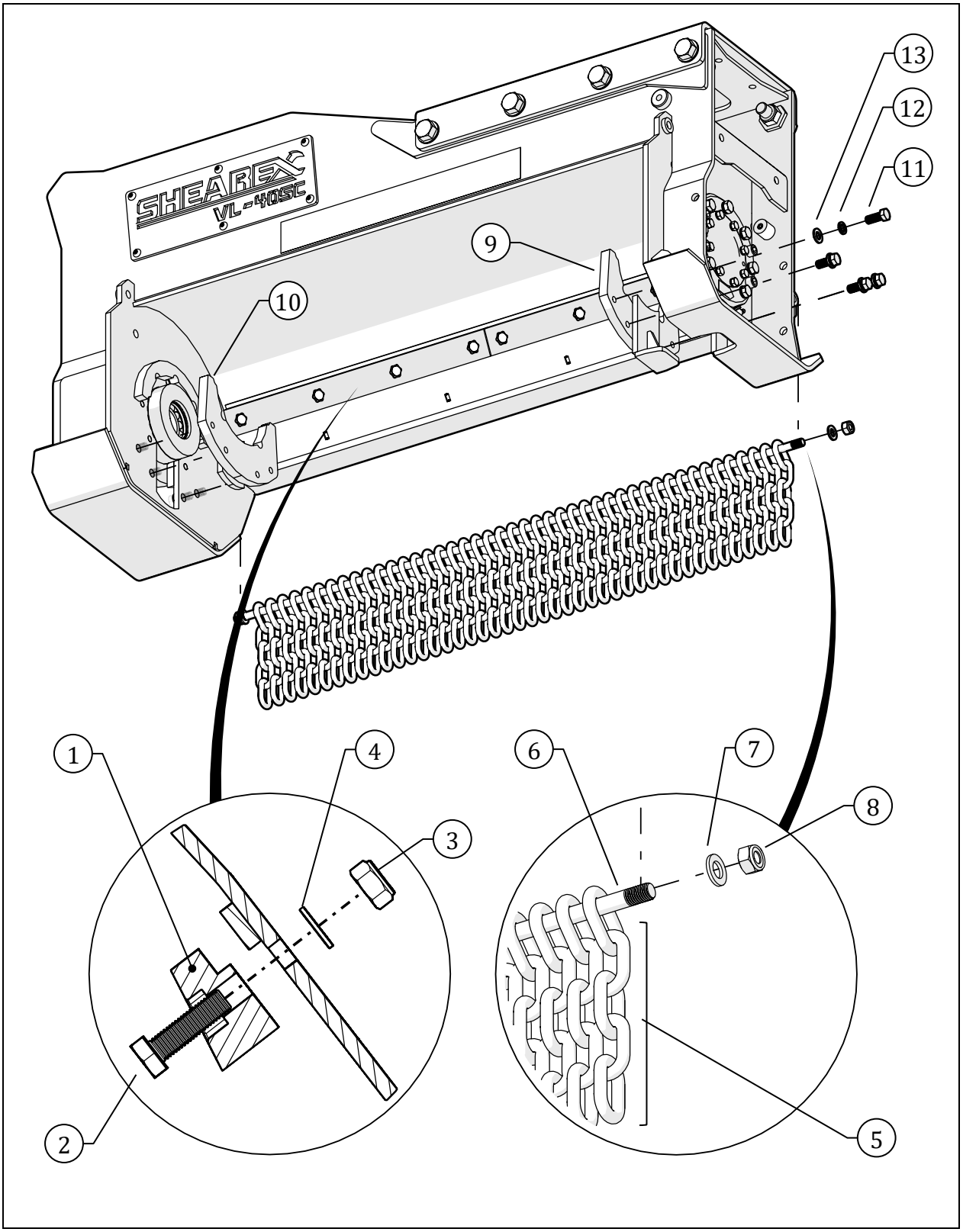


Fig. 4-7 Protective Devices Parts List

4.8 Labels Location on the Mulcher

The operator should always make sure the safety labels are still on the mulcher and legible for all people around. Here are the locations of the labels listed at section **1.4.4 LABELLING**.

No	Description	QTY	PN
1	Danger "Stand clear 300ft"	1	SA71-00021
2	Sticker "KEEP SAFE DISTANCE"	1	SA71-00043
3	High Pressure Oil (vertical)	1	SA71-00017
4	Read and Understand (vertical)	1	SA71-00013
5	Model/Serial Number Plate	1	SA71-00000
6	Pinch Point (horizontal)	1	SA71-00006
7	Maximum Return Pressure Warning	1	SA71-00078

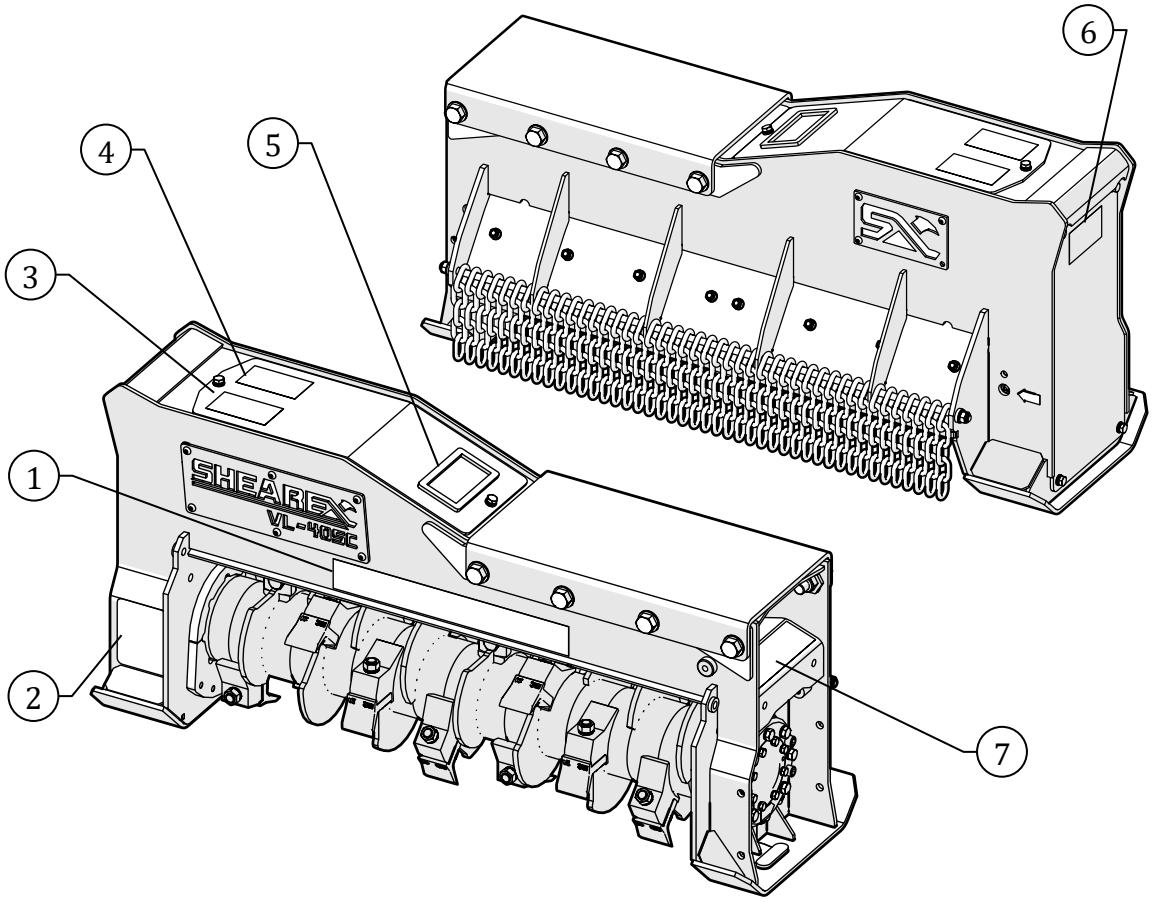


Fig. 4-8 Safety Labels Location on the Mulcher

4.9 Maintenance Kit for VL-40SC

The safety gear is the responsibility of the operator as well as the general maintenance tools for the mulcher.

However, with the purchase of a new mulcher, the Maintenance Kit (PN: SFM0024-7001-MK) provides some spare parts and tools to help the operator start the basic maintenance and specific work/task to perform on the mulcher.

Nevertheless, we still recommend the user to keep spare parts in stock to avoid delays and extra fees related to the late or "in a hurry" deliveries.

This Maintenance Kit includes the following items:

No	Description	QTY	PN
1	Blade Sharpening Gauge	1	SFG0000-1002
2	Blade Bolt Lock Washer, M16-17.2 x 25.4 x 3.3(mm), Zinc	16	SA13-00005
3	Blade Bolt Nut, M16-2.0, Gr.12.9, 16mm	16	SA12-00409
4	Hex Cap Screw, M16-2.0 x 80-38mm, 12.9	16	SA11-00212
5	Standard VL Blade type 20	16	SFL04-20
6	Roller Bearing Lubricating Grease (400g)	1	SA03-00002

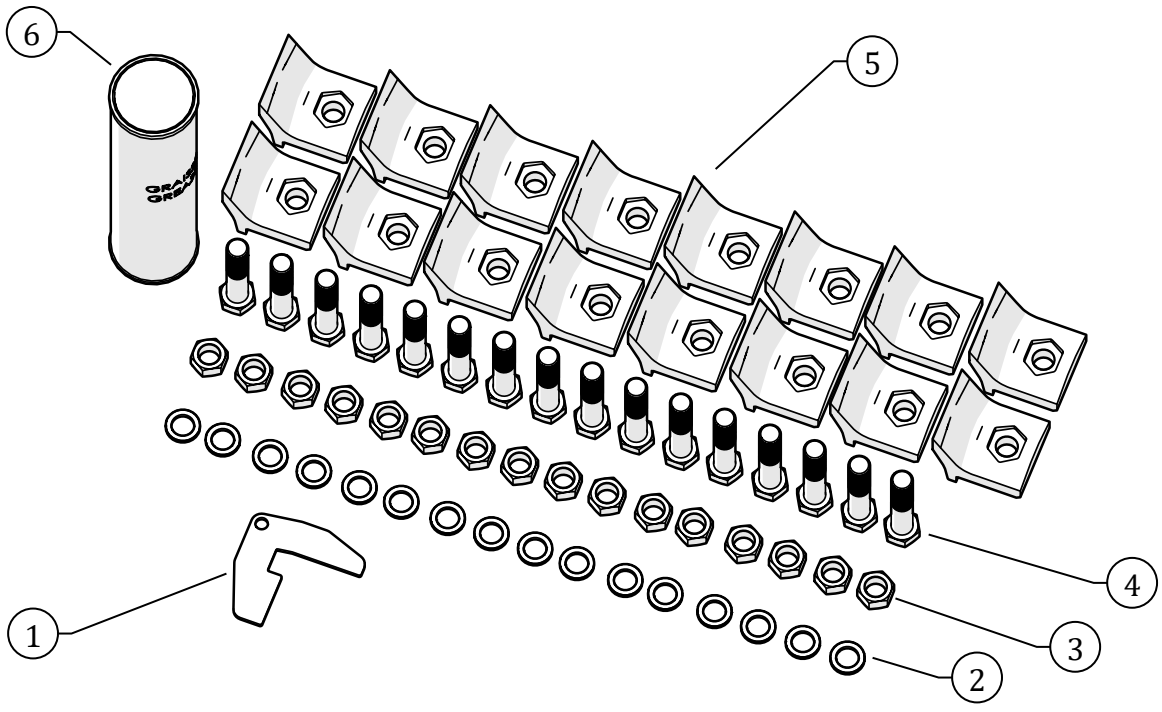


Fig. 4-9 VL-40SC Maintenance Kit[9]

[9] Parts numbers shown above may differs from a mulcher model to another.

4.10 Bearing Tool Kit (Optional)

After a while, the rotor bearing will eventually need to be overhauled and/or replaced. Since the replacing parts nor tools for the bearing change are not provided with the purchase of a new mulcher, it is up to the user to get the recommended tools for this purpose from his own facilities or our optional "Bearing Tool Kit" (PN: SFM-7001-KBK).

This Bearing Tool Kit includes the following items:

No	Description	QTY	PN
1	Bearing Installation Socket	1	SFG0006-4000
2	KMT Nut Socket	1	SFG0006-4001
3	Mounting Cover	1	SFG0006-2002
4	Retaining Socket Set Screw M12-1.75 x 80-80mm	6	SA11-00033
5	Extracting Screw M12X1.75-80X80-Ext.Tip	4	SA11-00034
6	Hex. Cap Screw M12-1.75 x 75-75mm, Gr.8.8, Zinc	4	SA11-00035
7	Flat Washer M12-13.2 x 23.6 x 2.5(mm), Zinc	4	SA13-00008

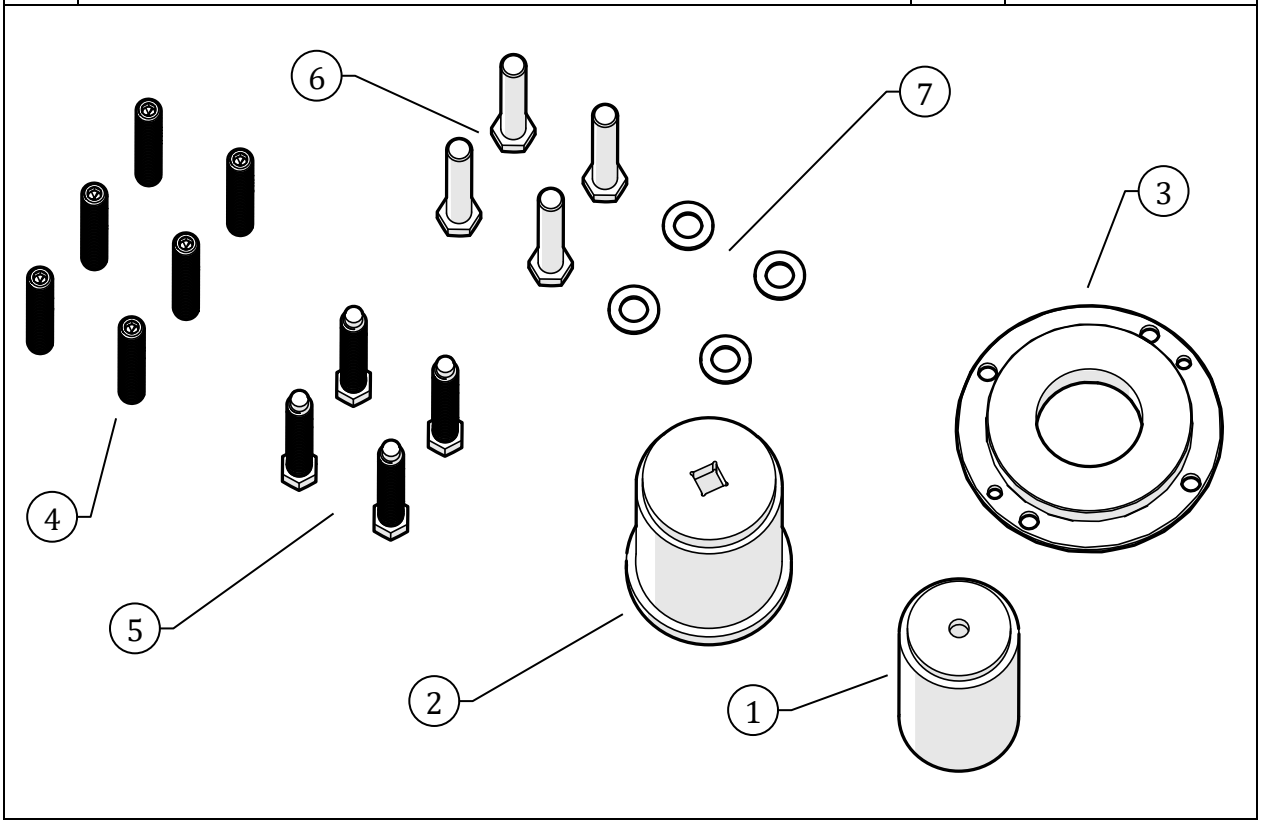


Fig. 4-10 Bearing Tool Kit[10]

[10] The number of parts shown above may be different from one model set to another.

4.11 Scraping Heel (Optional)

The scraping heel is a convenient device that can ease the work with the mulcher. It is relatively easy to install at the rear of the mulcher.

No	Description	QTY	PN
1	VL-20/30/40SC Welded Heel	1	SFM0020-4009
2	Screw M12-1.75 x 35-35, 10.9Z (116 N-m/86 ft-lb)	4	SA11-00001
3	Lock Washer M12-19.5 x 13 x 2.7(mm), Zinc	4	SA13-00009
4	Flat Washer M12-13.2 x 23.6 x 2.5(mm), Zinc	4	SA13-00008
5	Screw M10-1.50 x 30-30, 8.8Z (47 N-m/ 34 ft-lb)	2	SA11-00020
6	Lock Washer M10-10.7 x 16.6 x 2.5(mm), Zinc	2	SA13-00003
7	Flat Washer M10-10.7 x 19.7 x 2(mm), Zinc	2	SA13-00013
8	Floating side bearing grease hose	1	SFM0020-5006
9	90° Adapter NPTFM02-JICM04	1	SA23-00002
10	Straight-Adapter-NPTFM02-JICM04	1	SA23-00004
11	Hydraulic-Grease-Nipple-0.125-Straight	1	SA23-00005

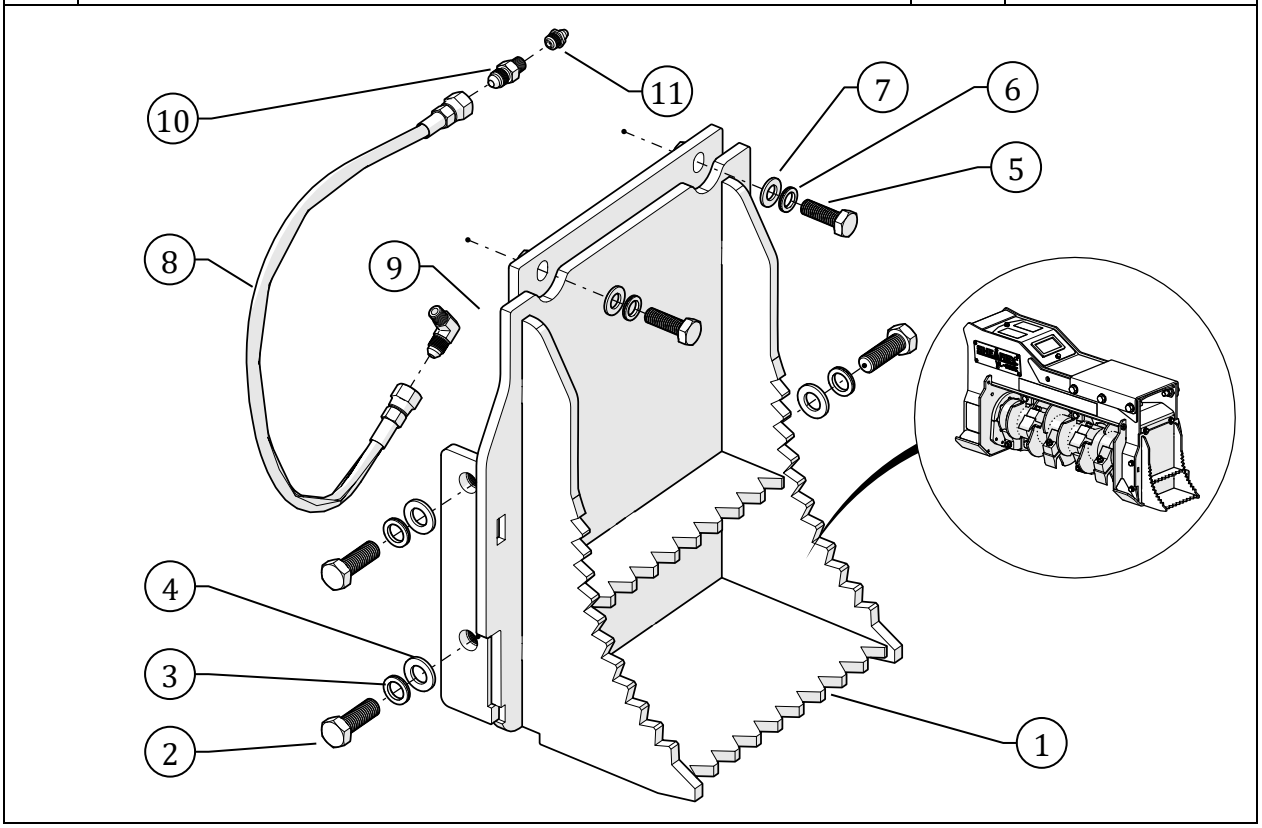


Fig. 4-11 Scraping Heel

4.12 Front Deflector (Optional)

The front deflector (i.e. *F. Deflector VL-40SC*) may be a good device to reduce spreading debris in front of the mulcher.

It is made of a simple flat plate on a pivot pin that can be easily installed in two preset holes.

No	Description	QTY	PN
1	VL-40SC Front Deflector	1	SFM0027-4007
2	VL-40SC Deflector Hinge Rod	1	SFM0027-2006
3	Flat Washer M12-13.2 x 23.6 x 2.5(mm), Zinc	2	SA13-00008
4	Nylon Insert Hex. Lock Nut M12-1.75, Gr.8, Zinc	2	SA12-00005

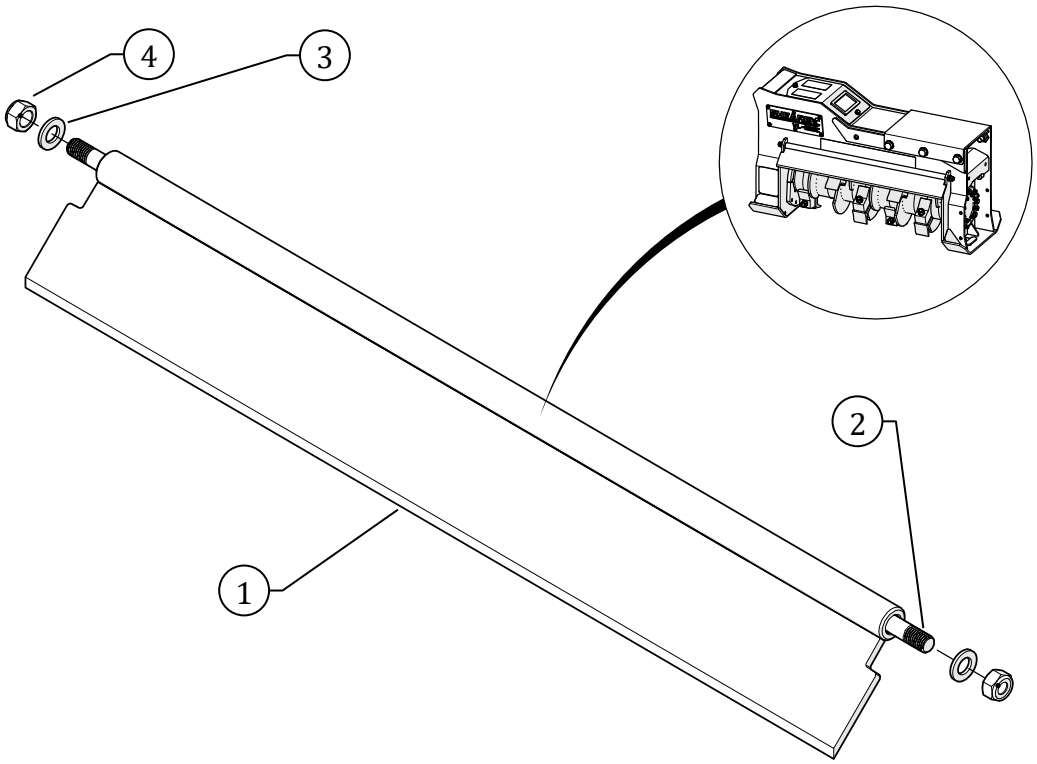


Fig. 4-12 Front Deflector

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6 Addendum - Hydraulic Motor Operation

6.1 Terminology

To ease the reading and quick acquisition of the knowledge to operate and maintain the mulcher in good state of order, we used many terms and abbreviations through out this manual.

V_{gmax}:	Max, theoretic possible motor displacement per revolution (in^3/rev)	
V_{gmin}:	Minimum displacement setting of desired unit (in^3/rev)	
V_g:	Motor displacement per rev. (in^3/rev)	
x :	Minimum displacement (%)	
y :	Maximum displacement (%)	
p_e:	Entering "High" pressure (psi)	
p_o:	Outlet "Return" pressure (psi)	
η_v:	Motor volumetric efficiency	
η_{mh}:	Mechanical-hydraulic efficiency	
η_t:	Motor total efficiency	
Δp:	Entering P° – Outlet P° (psi)	$= p_e + p_o$
T:	Output torque (lb•ft),	$= \frac{V_g \bullet \Delta p \bullet \eta_{mh}}{24 \bullet \pi}$
q_v:	Inlet flow (US gal/min),	$= \frac{V_g \bullet n}{231 \bullet \eta_v}$
P_e:	Output power (HP),	$= \frac{V_g \bullet n \bullet \Delta p \bullet \eta_t}{396\,000}$
n:	Rotational speed (rpm)	$= \frac{Q_e \bullet 231 \bullet \eta_v}{V_g}$