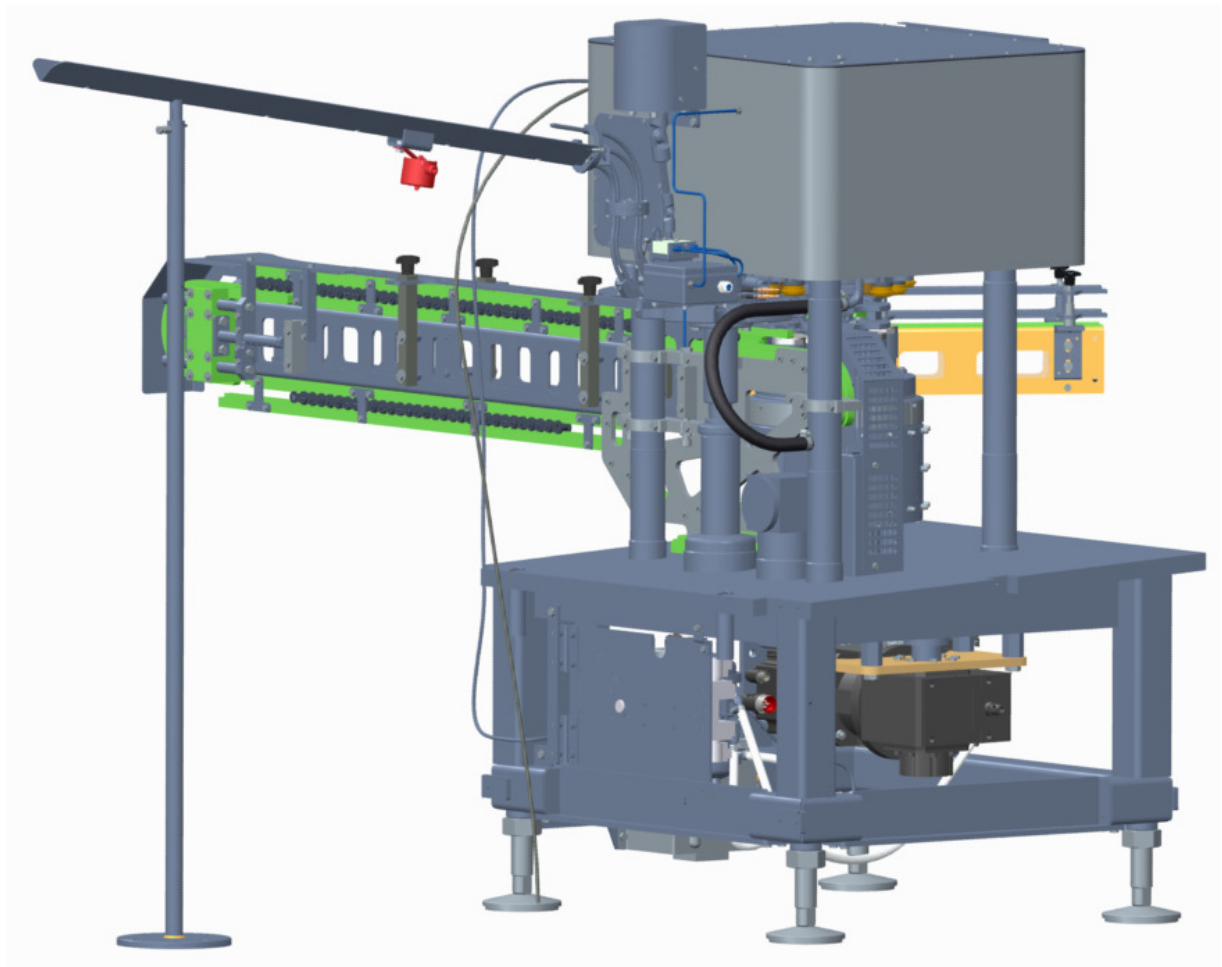


Operations Manual



Dosenverschliesser/Seamer TK250/4 & TK250/6

Machine Serial Number: 10343323-85000013S001

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Revisions 05

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Revision	Date	By	Remark
00	2018-04-16	Chane Lee	Initial release of TK250-4 Manual
01	2018-10-02	Chane Lee	Update Bill of Material
02	2018-11-08	Chane Lee	Update Bill of Material and internal pressure
03	2018-12-12	Chane Lee	Remove Section 9 (Parts Manual)
04	2019-03-28	Chane Lee	Update Section 3 & 6 to add TK250/6 info
05	2019-07-30	Chane Lee	Update Cleaning procedure, add grease pump info

Notes:

This manual was designed to be used as a reference guide only. Proper training by a qualified KHS specialist is essential to ensure the safety of the operators/technicians and integrity of the machine.

Information contained herein is considered to be accurate and reliable at the time of writing. KHS reserves all rights to update this manual without further notice.

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Table of Contents

1. Introduction	1
1.1. General Information	1
1.2. Contact Information	1
1.3. Important Information	1
2. Safety	2
2.1. General Information	2
2.2. Safety signs used in this manual	2
3. Machine specifications	3
3.1. General Information	3
3.2. Operation environment	3
3.3. Technical specifications	3
3.3.1. General Specifications	3
3.3.2. Mechanical Specifications	3
3.3.3. Electrical Specifications	4
3.3.4. General Arrangement/Floor Plan	4
4. Installation and Commissioning	5
4.1. General Information	5
4.2. Lifting and moving	5
4.3. Leveling	5
4.4. Connections	6
4.5. Commissioning	6
5. Machine Function Description	8
5.1. General Information	8
5.2. Machine general arrangement	9
5.3. Table Assembly	9
5.3.1. Seamer table frame	10
5.3.2. Main Drive Assembly	11
5.3.3. Gear Trains Assembly	11
5.4. Top Housing Assembly	12
5.4.1. Top Housing frame parts and service covers Assembly	12
5.4.2. Elevating Mechanism Assembly	13
5.4.3. Seaming Cam Assembly	14
5.4.4. Knockout Cam and Cap Centering Cam	14
5.4.5. Under Cover Gassing Manifold Assembly	15
5.4.6. Separator Drive Unit	16
5.5. Can Feed/Gassing Turret Assembly	16

5.5.1. Can Feed Star Column Assembly	16
5.6. Lower Seaming Turret Assembly	18
5.6.1. Lower Seaming Turret Frame Assembly	18
5.6.2. Lower Lifters Assembly	19
5.6.3. Return Cam Followers Assembly	20
5.6.4. Lifting/Returning Cams	21
5.7. Upper Seaming Turret Assembly	21
5.7.1. Upper Seaming Turret Frame Assembly	22
5.7.2. Seaming Spindle Assembly	22
5.7.3. Seaming Lever Shaft -1 st Operation Assembly	23
5.7.4. Seaming Lever Shaft -2 nd Operation Assembly	24
5.7.5. Seaming Lever-1 st and 2 nd Operations Assembly	24
5.7.6. Seaming Roll Mounting Assembly	25
5.7.7. Knockout Rod Assembly	25
5.7.8. Knockout Carrier Assembly	26
5.8. Discharge Turret Assembly	26
5.9. Cap Feed	27
5.9.1. Cap Feed Plate	27
5.9.2. Cover Separator	27
5.9.3. No Can No Cover	28
5.9.4. Cover Feed Chute	28
5.10. Can Feed Drive	29
5.11. Infeed Conveyor Assembly	29
5.11.1. Infeed Conveyor Support	30
5.11.2. Infeed conveyor	30
5.12. Discharge Conveyor	31
5.13. Pneumatic System	32
5.13.1. No Can No Cover Control	32
5.13.2. Seamer internal positive pressure control	32
5.14. CO ₂ Controls	33
5.14.1. Under Cover Gassing Control	33
5.14.2. Bubble Breaker Control	34
5.15. Lubrication System	34
5.15.1. Lubrication principles	35
5.15.2. Oil Reservoir	35
5.15.3. Oil Filtration System	35
5.15.4. Automatic Oil Lubrication system	36
5.15.5. Main Drive gear trains grease lubrication	37

5.15.6. Suggested lubricants	38
5.16. Format/Change Parts	39
5.17. Seaming Tooling	40
5.17.1. Seaming Chucks	40
5.17.2. Seaming Rolls 1 st and 2 nd Operations	41
5.18. Tools and Wrenches	42
5.19. Electrical Control	42
6. Machine setup, Adjustment, and Service	43
6.1. Lifting Cam/Return Cam Installation	43
6.2. Seaming Cam Installation	44
6.3. Knockout/Cap Centering Cam Installation and Adjustment	45
6.4. Seaming Chucks Setup	45
6.5. Seaming Roll Lever Installation	46
6.6. Seaming Lever Shaft Setup	47
6.7. Seaming Roll to Seaming Chuck Height Adjustment	48
6.8. Seam Thickness Adjustment	49
6.9. Planning Lifter Can Plates	50
6.10. Lifter Spring Pressure Adjustment	51
6.11. Pin Gauge Height (Pin Height) Adjustment	52
6.12. Return Cam Follower Running Clearance Adjustment	53
6.13. Cap Magazine Guides Adjustment	54
6.14. Cover Separator Wheel Adjustment	54
6.15. No-Can No-Cover Finger Adjustment	55
6.16. Cap Pusher Timing Adjustment	55
6.17. No Can No Cover Sensor and Flag Sensor Setup	56
6.18. Cover Low Stack Sensor Setup	56
6.19. Can Feed Turret Setup	57
6.20. Can Feed Chain Clearance and Timing	57
6.21. Synchronize Seamer to Filler	59
6.22. Discharge Star	59
6.23. Can Guides Adjustment	60
6.24. Knockout Pads Adjustment	60
6.25. Replace Knockout Rod	61
6.26. Under Cover Gassing Adjustment	63
6.27. Bubble Breaker Adjustment	63
6.28. Oil Lubrication System	63
6.29. Oil Change	64
6.30. Seaming Roll Lubrication	65

6.31. Main Drive Gear Case	66
6.32. Can Feed Drive Gear Case	66
6.33. Cleaning and Wash Down	66
7. Maintenance Schedule	67
8. Decommissioning, Storage, Recommissioning	68
8.1. Decommissioning	68
8.2. Storage environment	68
8.3. Maintenance required during long term storage	68
8.4. Recommissioning	68
9. Recommended Critical Spares	69
10. Appendix	
10.1. Main Drive Gear Case Manual	73
10.2. Can Feed Drive Gear Case Manual	89
10.3. Oil Filtration System	95
10.4. Oil Lubrication Pump	113



1. Introduction

1.1 General Information

This manual is based upon the most up-to-date information available at the time published. However, the descriptions, illustrations, and texts contained in this manual may differ slightly from your machine due to the continuous improvement of the design.

KHS reserves the right to make design changes for the machine described in this manual without incurring any liability for altering or updating machines sold prior to the time these improvements were made.

1.2 Contact Information

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Waukesha, Wisconsin 53186

Telephone: + 1-262-797-7200

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Website: <https://www.khs.com/>

1.3 Important Information

Do not operate or perform any maintenance on the machine until reading this manual in its entirety. Operator and maintenance staff must understand all of the material presented in this manual.

2. Safety

2.1. General Information

This section contains the general safety information that must be observed during installation, operation, change-over, as well as maintenance and service. Read this section thoroughly before operating or performing any work on the seamer.

2.2. Safety signs used in this manual

These safety signs utilized throughout this manual provide safety instructions regarding different dangerous conditions.



- Indicates a hazardous situation that, if not avoided, will result in serious injury or death.
- It is used in the most extreme situations. Highest attention required.



- Indicates a hazardous situation that, if not avoided, could result in serious injury or death.



- Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.
- Signal Words for Non-Hazard Alerting Safety Messages.



- Indicates information considered important but not directly hazard related (e.g., security, hygiene, equipment or property damage).
- Signal Words for Instructional Safety Messages.

3. Specifications

3.1. General Information

This section contains the information for identification and use of the seamer, such as labeling, application and technical data.

3.2. Operation environment

Seamer is designed to be operated at the following ambient conditions.

Ambient temperature	15 - 50°C / 59 - 122°F *
Relative humidity	10 - 92%

Table 3-1: KHS TK250 Seamers operation environment

NOTICE

*Optional heater required for seamer to operate below 18°C / 64°F

3.3. Technical specifications

3.3.1. General Specifications

Model Number	TK250/4	TK250/6
Footprint (W x L)	1200 mm x 1120 mm	
Machine Max. height	2220 mm	
Transport height	2100 mm	
Noise level	85 dB(A)	
Can Feed Line Elevation	1250 ± 25 mm, 49.25 ± 1 inch	
Gross Weight (less guarding)	2100 Kg, 4620 lbs	2200 Kg, 4840 lbs

Table 3-2: KHS TK250 Seamers general specifications

3.3.2. Mechanical Specifications

No of Seaming Heads	4	6
Maximum Speed	24,000 cph, 400 cpm	36,000 cph, 600 cpm
Minimum Speed	5,000 cph, 83 cpm	7,500 cph, 125 cpm
CIP Speed	1,800 cph, 30 cpm	2,700 cph, 45 cpm
Min Closure Outside Diameter	50 mm, 200	
Max Closure Outside Diameter	75 mm, 211	
Max Aluminum Closure Material Thickness	0.24 mm, 0.0094 inch	
Max Steel Closure Material Thickness	0.21 mm, 0.0083 inch	
Min Container Diameter	52 mm, 202	
Max Container Diameter	83 mm, 307	73 mm, 300
Min Container Height	60 mm, 2.375 inch, 206	
Max Container Height	210 mm, 8.27 inch, 804	

Table 3-3: KHS TK250 Seamers mechanical specifications

3.3.3. Electrical Specifications

Model Number	TK250/4	TK250/6
Electrical Protection	IP 65	
Primary Power	460/3/6, 380/3/50	
Secondary Power	110/60	
Control Power	24VDC	
Power Draw	(TBD) Amps	(TBD) Amps

Table 3-4: KHS TK250 Seamers electrical specifications

3.3.4. General Arrangement/Floor Plan

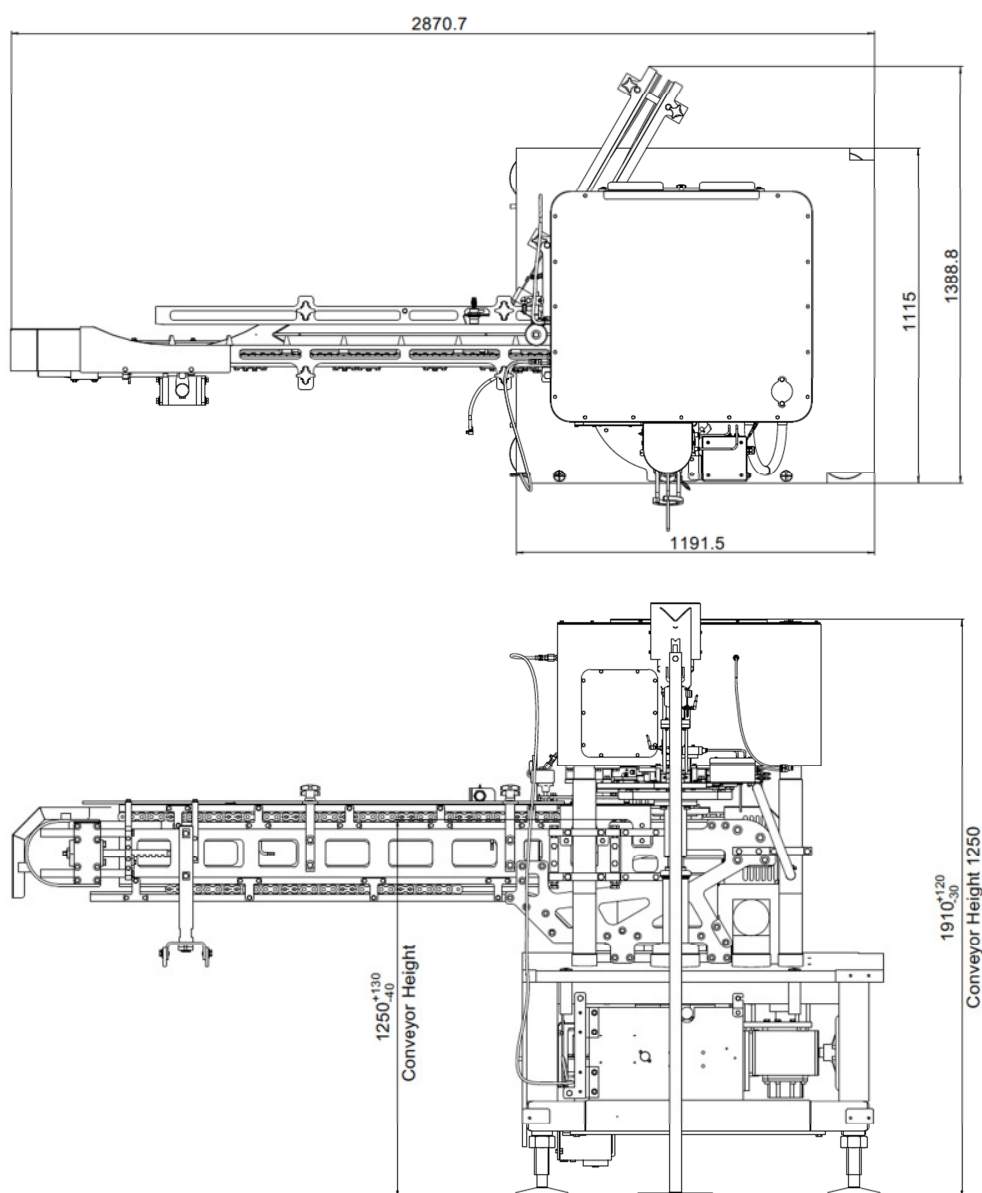


Figure 3-1: KHS TK250 Seamers general arrangement/floor plan

4. Installation

4.1. General Information

This section provides general installation instructions for the Seamer. Please read all information before uncrating the Seamer. A general arrangement/floor plan layout (Section 3.3.4) provides location for all components. Installation procedures are prepared in sequence. Installation of the Seamer and its supporting components must be approved by a KHS Field Service Department. If you order your seamer as a part of KHS filler Monobloc, your seamer has been preinstalled on the filler/seamer common base.

4.2. Lifting and moving

4.2.1. Forklift

Minimum capacity of 5,000 kilograms or 11,000 lbs. and 1.5 meters or 5 feet minimum fork length is required to lift the seamer alone without the filler. Ensure load is centered and even. Guard doors around the floor level need to be removed, and additional spacer blocks may be required between the forks and seamer table bottom cross beams to avoid contact of seamer components located below the lifting points. Avoid contact between forks and the Seamer outer guarding to prevent damage.

4.2.2. Crane

Minimum capacity of 5,000 kilograms or 11,000 lbs. for the crane, and 2000 kilograms or 4,400 lbs. capacity per chain or belt, 3 chain or belt required, are required to lift the seamer only. Attach three lifting eyebolts to the M16 holes on the Top Housing of the seamer, and use 3 equal length chains or belts with minimum 1 meter of the length. Check Filler manual for lifting filler and seamer together.



To lift filler and seamer complete assembly, check filler lifting instructions in filler manual.

4.3. Leveling

Your KHS TK250 seamer is pre-connected and leveled with KHS DVD-C filler in the factory. The installation location might have different draining gradient. Both filler and seamer are required to be re-leveled once they are set in the position.

To level the seamer and the filler, adjust the leveling pads and observing the position of the bubble indicator using machinist's level placed on the filler/seamer main frame and infeed conveyor as adjustments are made. The seamer level should be held within 0.17 mm/m (0.002 inches/foot).

4.4. Connections

Most of the seamer utilities like compressed air, CO₂, water, and electricity are pre-connected to the filler service module and main electrical console at the filler side in the factory. The end users only need to connect the soap water line for can transport lubrication. There are three 8 mm (5/16") hose barb connections for soap water located at the bottom side of the seamer infeed conveyor. KHS also recommend an additional soap water dispenser the seamer discharge conveyor and another dispenser to seamer infeed conveyor chain. These two connections are 6 mm plastic tubing.

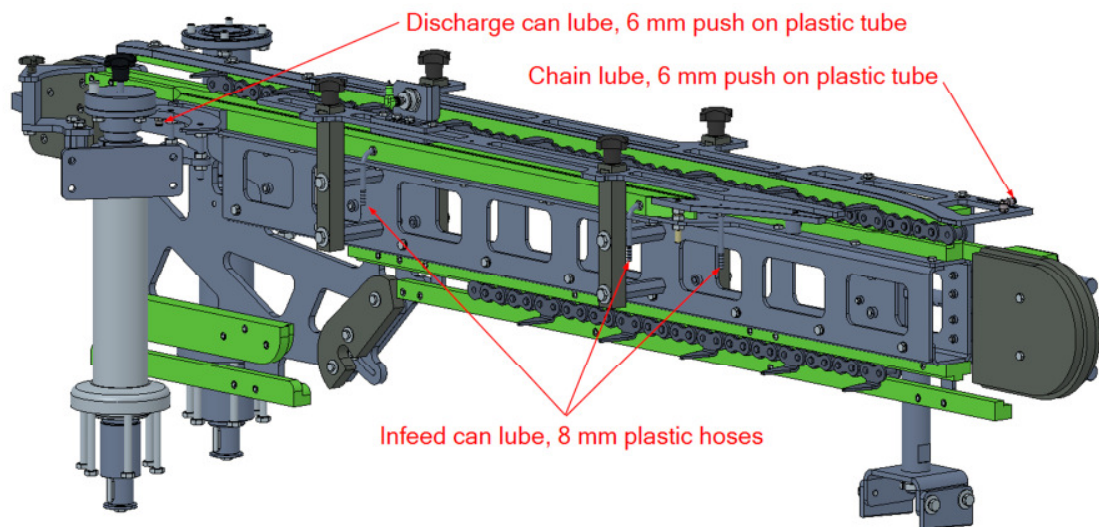


Figure 4-1: Soap water connections locations

4.5. Commissioning

Before power up, check following.

- Check mains voltage: Measure mains voltage and verify with the specifications in section 3.3.3. Electrical Specification.
- Verify the oil level in the oil reservoir and Automatic Lubrication Pump is between high and low mark. Add oil per specification on section 5.15. if needed.

Once the voltage is confirmed, power up the machine control, and check following.

- Check Oil Filtration Pump motor and Automatic Lubrication Pump motor rotation. Each pump is equipped with a pressure gauge. The pressure should rise within 30 seconds. If it does not rise in 30 seconds, two phases on the main input need to be reversed.
- Check emergency stop buttons are functional.
- Check all filler/seamer guarding interlock switches are functional.
- Verify all Seaming Chucks have not visible defects.

- Verify all Seaming Rolls are rotating easily.
- Verify both 1st and 2nd operation seam setting per lid manufacturer's specification.
- Verify the Lifter Spring pressure per can manufacturer's specification.
- Verify the Pin Height per can manufacturer's specification.
- Verify all can/lid transport parts setting per section 6.
- Check Lifting Station deflection. Be sure the Lifting Station is not stick at the down position.
- Remove all can/lid and tools from the machine.
- Rotate the seamer by hand wheel for one complete revolution of the seaming turret, and listen to any unusual metal hitting noise. If any noise is heard, it must be investigated and eliminate the cause. Also observe the seaming rolls at the same time. None of the seaming rolls should be rotating during the hand wheeling. If any seaming roll is rotating, the seam setting needs to be re-verified and reset.

After completed the above checking, the seamer is ready for the operation.

5. Machine Functional Description

5.1. General Information

The can seamer seams cans by rotating cans at the seaming stations. An assembled can with lid is held between a seaming chuck and a lifting plate. The assembly rotates while seaming rolls forming the seam. In order to seam a lid to a can, the seamer also performs additional functions.

- Synchronizes with filler
- Transports filled cans from filler to seamer
- Separates lids from its stack to an individual lid
- Evacuates oxygen from the head space of filled cans
- Assembles the filled can with lid (cap)
- Performs the 1st and 2nd operation seaming
- Provides a tie end for discharge conveyor

A programmable logic controller (PLC) controls and monitors the can seamer. A human machine interface (HMI) presents information to an operator about the state of a process. The HMI also allows the operator to accept and implement control instructions.

KHS TK250 seamers features 4 or 6 seaming stations for beer, beverage, and cannery applications at a speed up to 400 or 600 cans per minute or 24,000 or 36,000 cans per hour.

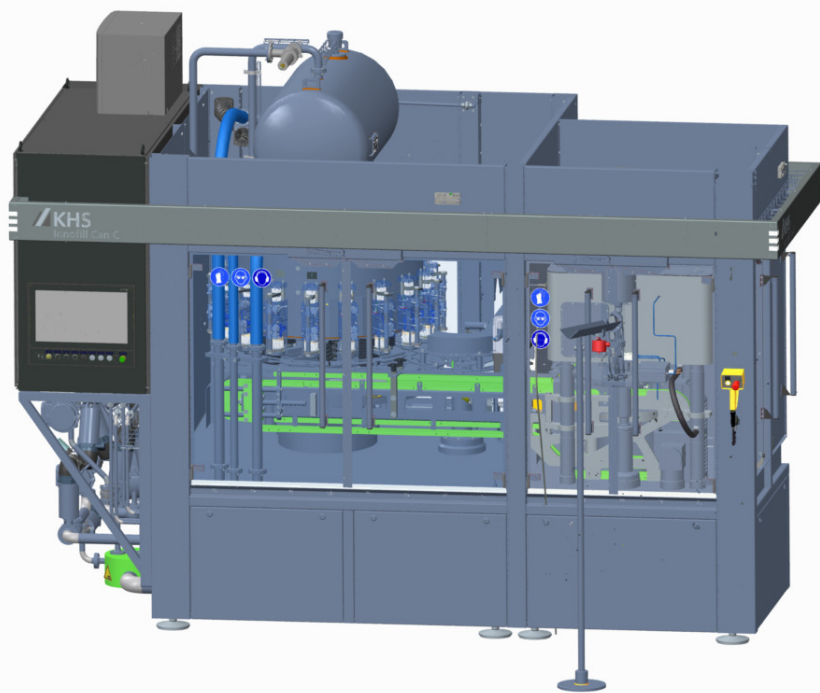


Figure 5-1: KHS TK250 Seamer connected to KHS Innofill Can C filler

5.2. Machine general arrangement

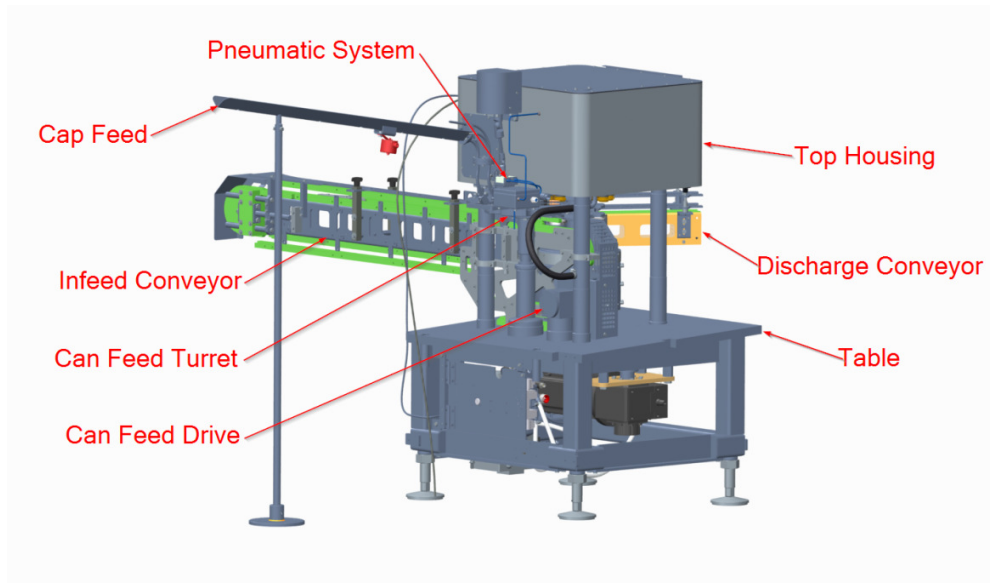


Figure 5-2: KHS TK250 Seamers General Arrangement

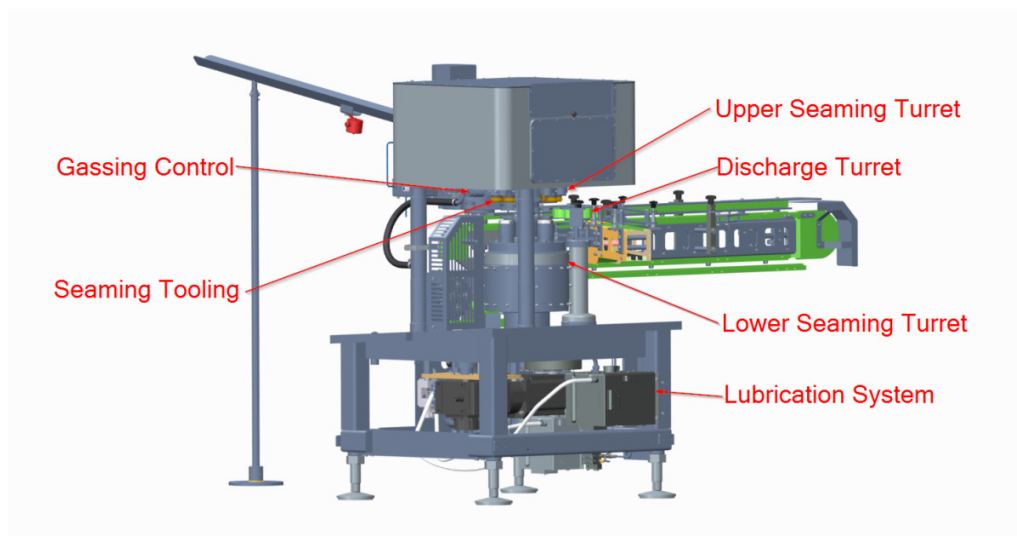


Figure 5-3: KHS TK250 Seamers General Arrangement

5.3. Table Assembly

The seamer table is the foundation or base of the machine. It supports all the parts above the top surface and below the bottom surface of table plate. The table top sloped surface ensures the water and product run off. Above the top surface, the table supports the elevating columns, top housing, can feed drive, can feed/gassing turret, seaming turret, and discharge turret. The table bottom surface supports main drive, gear train, lubrication

system, and seamer legs. It is crucial to keep table datum leveled to reduce vibration, noise, and maximize the service life of components.

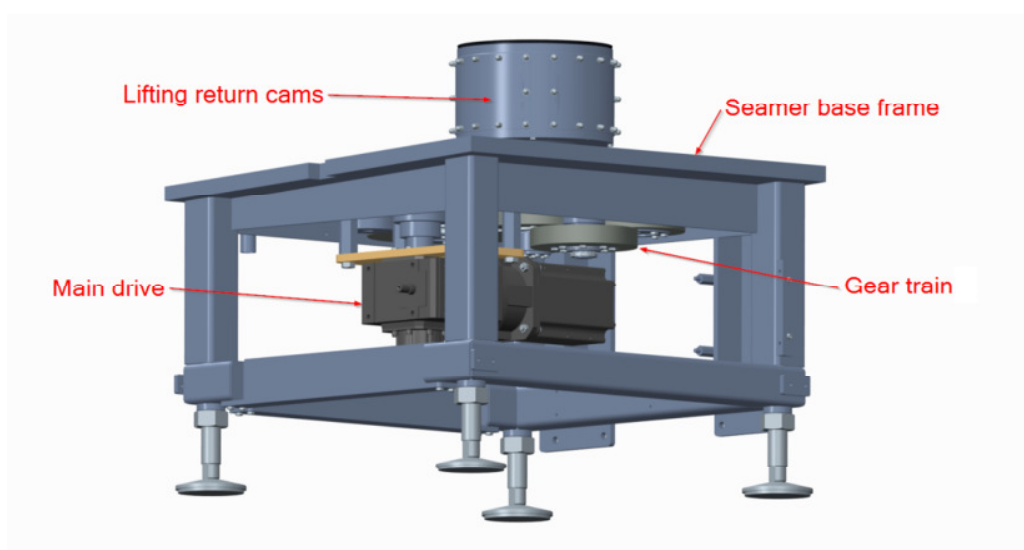


Figure 5-4: KHS TK250-4 Seamer Table Assembly

5.3.1. Seamer Table Frame

The Seamer Table Frame is constructed with high corrosion resistant material for wash down environment. All mounting surfaces, bore diameters, and positions are precisely machined to provide the high accuracy locations for seamer components. Alternation of the seamer table frame will infringe the function and accuracy of seamer. There are two removable lower beams for service access. These two beams must be re-attached after the service work is completed.

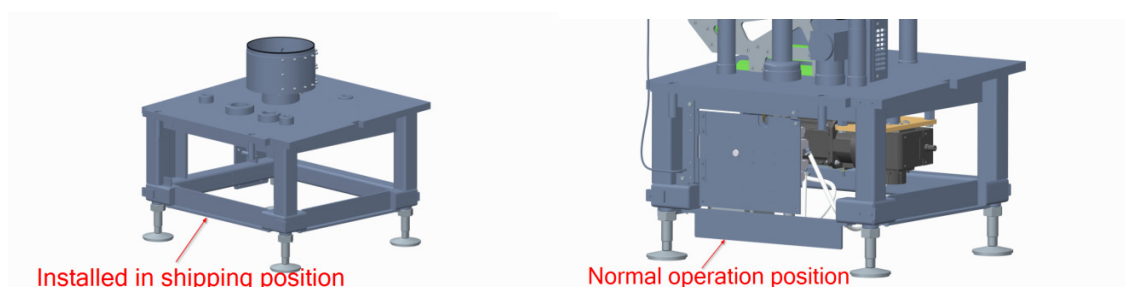


Figure 5-5: Table Cross Beam position

The beam in front of the Oil Filtration Panel is installed with the vertical plate face upward. This beam is designed as a forklift lifting point. Once the seamer is moved to the installation position, this beam should be flipped the vertical plate to face downward. This allows the Oil Filtration Panel to swing out for filter change if your oil filtration unit is located in this area.

5.3.2. Main Drive Assembly

Main Drive unit consists of a main drive motor, gear reducer, hand wheel attachment shaft, and the mounting structure. The mounting plate is used to adjust the appropriate gear backlash and alignment for the Main Drive Pinion. The Main Drive Motor provides the power for the seamer. It is synchronized with filler. The Gear Reducer optimizes the Main Drive Motor efficiency and RPM. This unique gear reducer also provides the second input shaft located 180° from the main input shaft which is coupled with Main Drive Motor. This shaft is for a removable hand crank to rotate the seamer manually during setup and adjustment.

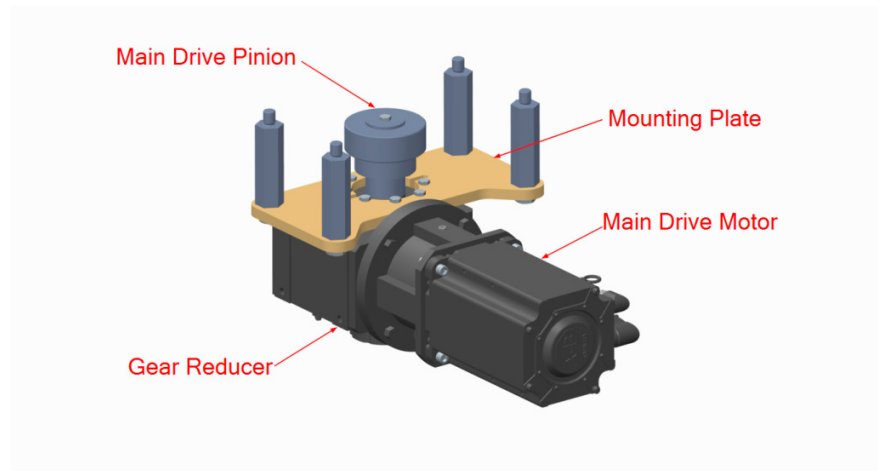


Figure 5-6: Main Drive Assembly

5.3.3. Gear Train Assembly

KHS TK250 Gear Train is designed with lubrication free material. The use of helical gears with a medium size gear transverse module provides the balance of strength and quiet operation. This seamer is fully gear driven. There is no concern of broken belts or chains which would cause severe damage to the seamer.

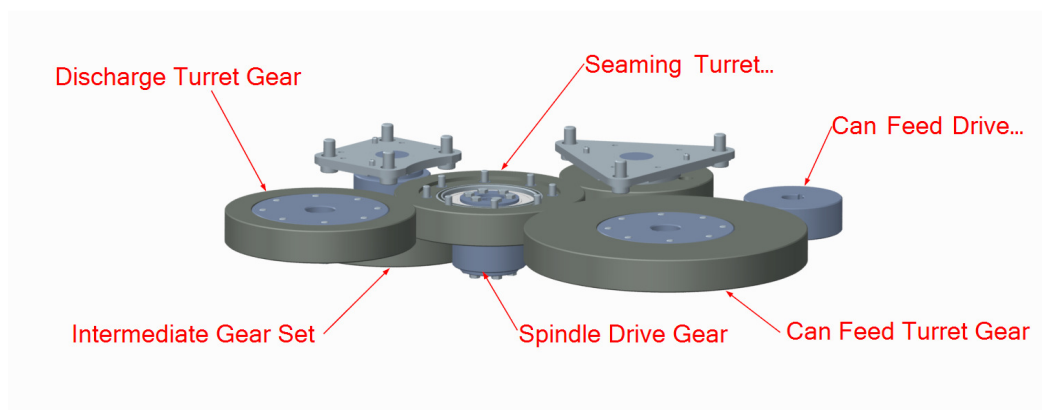


Figure 5-7: Gear Train Identification

5.4. Top Housing Assembly

The Top Housing Assembly includes Top Housing frame parts and service covers. Inside the top housing are the Elevating Mechanism, Seaming Cam Assembly, and Knockout Cam Assembly. The lid Separator Drive Unit is also mounted at the front wall of the Top Housing.

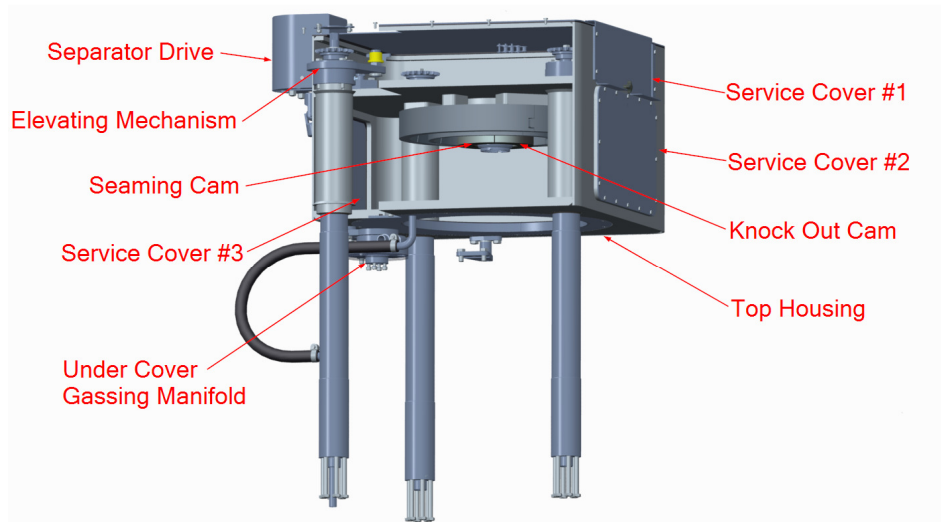


Figure 5-8: Top Housing Assembly

5.4.1. Top Housing frame parts and service covers Assembly

The Knockout Cam, Seaming Cam and Elevating Mechanism are housed inside the lower level of the Top Housing. The lower level of top housing contains oil inside while the upper level of the Top Housing remains dry. The Elevating Mechanism is located at the upper level of the Top Housing. Service Cover #1 provides tool-less easy access for the Off-Seam check. Service Cover #2 provides access to the seam adjustment and service for the Upper Seaming Turret. Service Cover #3 is only used for major overhaul for the Seaming Cam and Knockout Cam removal and installation. Besides housing the internal components, the Top Housing also provides the mounting places for the Under Cover Gassing Manifold, Separator Drive Unit, Lid Feed Assembly, air supply, oil supply, and electrical cables.

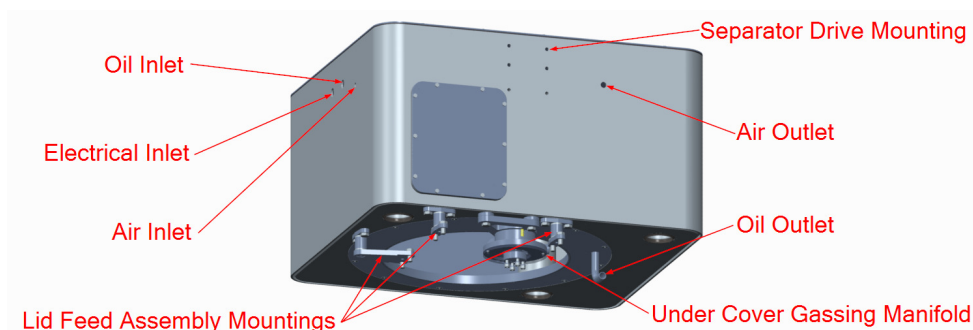


Figure 5-9: Top Housing

5.4.2. Elevating Mechanism Assembly

The seamer top housing and all components within the top housing are moving up and down by cranking the single height adjusting screw. All three columns have the same mechanisms inside that were precisely leveled in the factory prior to shipping. For any reason, if the chain is removed, the top housing must be re-checked and adjusted to assure the top housing is level and parallel to the seamer table datum. When adjusting the level of the top housing, the housing movement must be finalized with the upward movement to prevent the backlash of the mechanism. Each column adjustment motion needs to be finished in the upward direction to remove backlash.

Each column is equipped with a grease fitting which could be accessed from Top Housing top cover. One shot of No. 2 EP grease should be applied every 3 months to keep the mechanism well lubricated and prevent binding. It is also recommended to manually apply the same grease to the roller chain of the elevating mechanism.

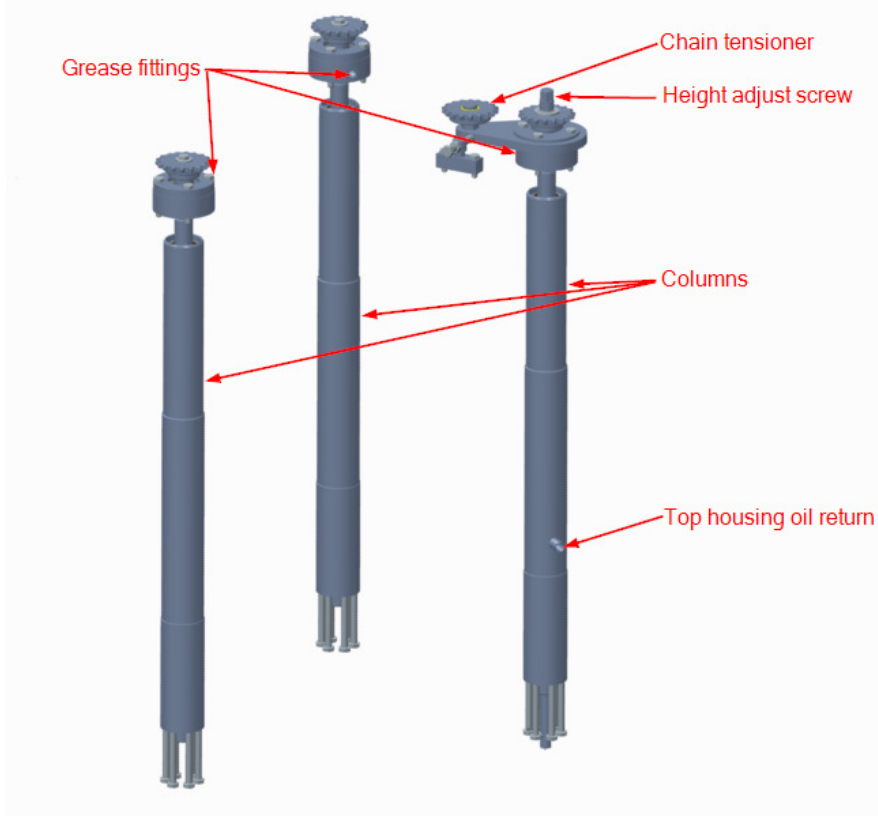


Figure 5-10: Elevating mechanism

The top housing collects the used oil. Used oil must return to the oil filtration tank located under the seamer table through the oil return port at the front right side column near the cover separator.

5.4.3. Seaming Cam Assembly

Seaming cam controls the movement of the 1st operation and 2nd operation seaming roll movements that form the double seam. By rotating the Off-Seam mechanism 180° the seaming cam could be set at Off-Seam or On-Seam position. This is set at the On-Seam position when the machine is shipped from the factory for the normal seaming operation, which allows the seamer to perform both 1st and 2nd operation seams.

To perform a 1st operation seam test, loosen 6 bolts “A” half turn and rotate the Off-Seam adjustment pin half turn counterclockwise, and then re-fasten 6 bolts. Run the machine in the jog speed ONLY to perform the 1st operation seam test. Reset back to On-Seam setting after the 1st operation seam test before running the seamer in normal speed.

NOTICE

Running seamer in normal speed with Off-seam setting could result the damage to the seaming cam.

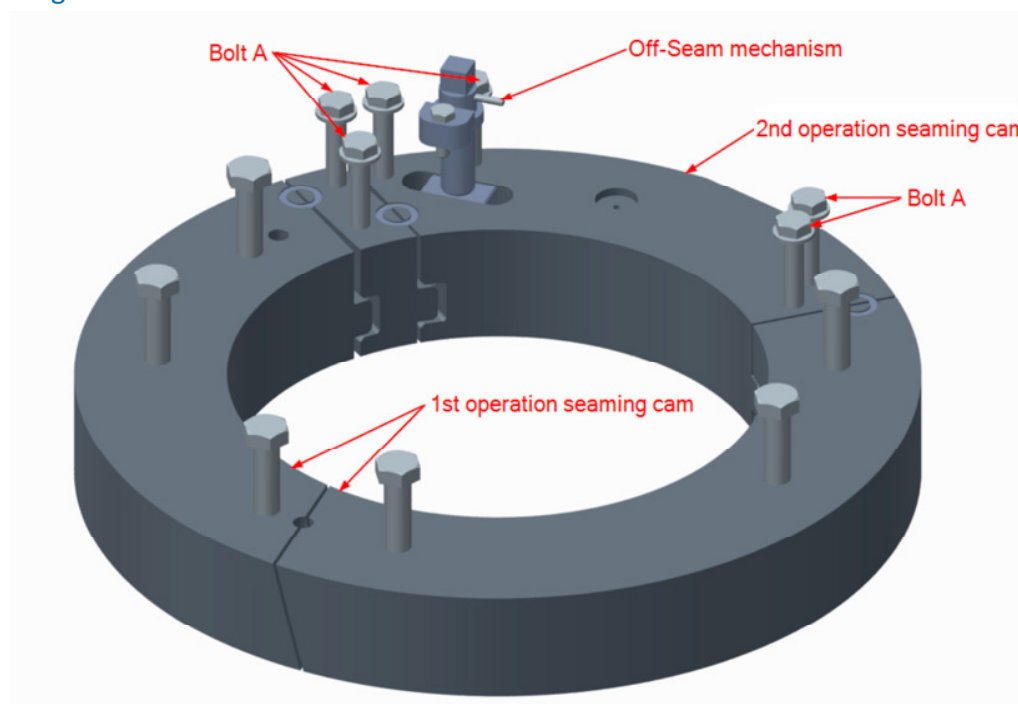


Figure 5-11: Seaming Cam

5.4.4. Knockout Cam and Cap Centering Cam

This radial cam controls the movement of the Knockout Pad vertical movement which allows the Knockout Pad to contact and control the motion of the cans and lids to keep cans stand up straight during makeup. It also ejects the seamed can from the seaming chuck after the 2nd operation seam operation. The timing of the cam could be adjusted

by loosening the 3 bolts holding each half of the cam and rotating each half of the cam independently to advance or delay the movement of the Knockout Pads.

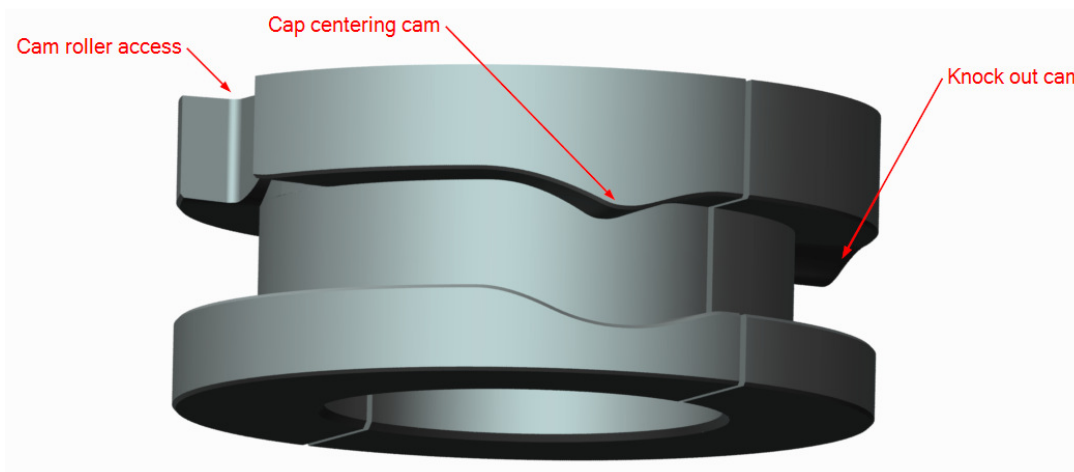


Figure 5-12: Knockout and Cap Centering Cams

5.4.5. Under Cover Gassing Manifold Assembly

The Under Cover Gassing Manifold is mounted below the bottom surface of Top housing. The manifold provides the connecting point for the CO₂ supply hose and directs the CO₂ gas into the Manifold Ring. The Manifold Ring allows the CO₂ gas to be discharge to the head space of incoming unsealed cans through the gassing turret at the correct timing. Three compression springs exert the downward force to ensure the manifold ring is properly in contact with the gassing turret to minimize the CO₂ lost. The amount of CO₂ distribution is controlled by the regulator located on the filler service module. The bearing holder above the gassing manifold houses a permanently lubricated bearing that supports the upper end of the Can Feed Turret.

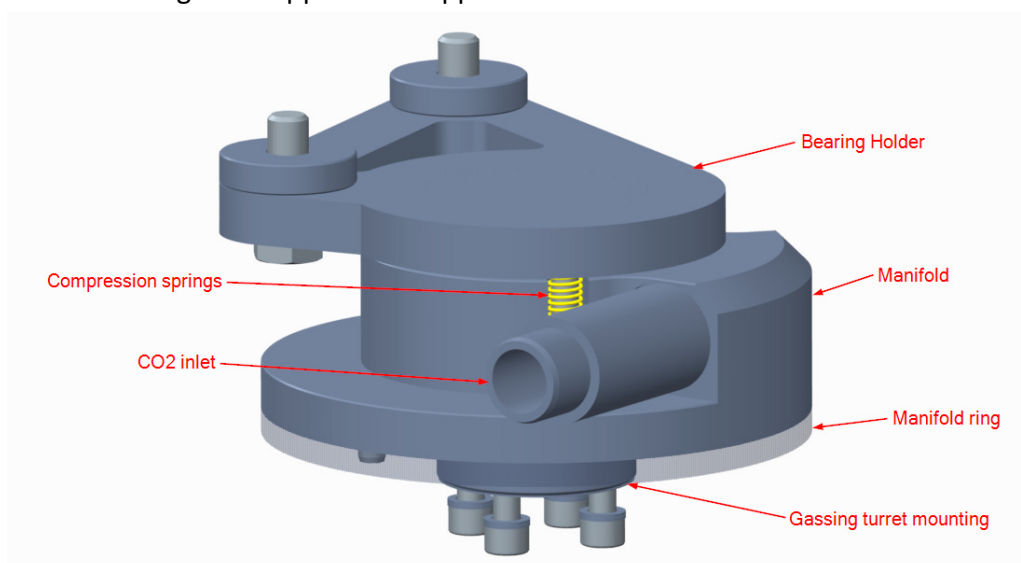


Figure 5-13: Gassing Manifold Assembly

5.4.6. Separator Drive Unit

The cover separator is driven by a slave servo motor which is following the master encoder of the filler/seamer. The motor continuously rotates one revolution per can when the seamer is running. The motor is attached to the mounting bracket fastened to the front face of the top housing. The driveshaft transmits the rotating motion to the cover separator below the motor. The drive shaft is un-guarded beside the machine guarding surround the filler/seamer. For the operator and maintenance personnel's safety, machine will not run when the guard doors are open.

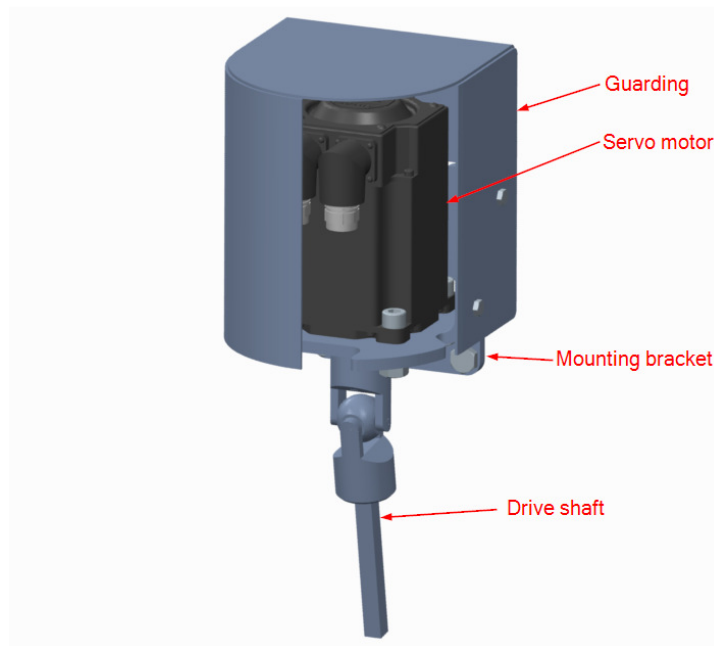


Figure 5-14: Separator Drive Assembly

DANGER

Do not alter control program or bypass machine interlock switches of the safety feature. The turning shaft could result injury when the safety feature is overrode.

5.5. Can Feed/Gassing Turret Assembly

The Can Feed/Gassing turret has dual functions. It accelerates the cans from the feed chain pitch to the seaming turret pitch. It also performs the undercover gassing function to evacuate the oxygen in the head space of filled can. Can feed turret is driven from the gear train located below the seamer table. It is synchronized with the seaming turret and feed chain through the same gear train.

5.5.1. Can Feed Star Column Assembly

Can Feed Star Column is mounted on the top of the seamer table. It supports and drives the can feed/gassing star which controls the cans in makeup position with the covers.

Prior cans pick up covers at the 90° position of the seaming turret; a controlled amount of CO₂ is released over the top of the open cans at the tangent point of the can feed star and seaming star. Once the lid is placed on the can, the CO₂ gas is shut off and the can and cover assemblies are held tight with the Lifting Stations and Knockout Pads. The CO₂ trapped inside the can head space and product will be retained.

There are two permanently lubricated bearings supporting the Can Feed Star Shaft inside the Can Feed Star Column. The Can Feed Star Hub is slip fit over the shaft, and it will move along with the Upper Turret Housing vertically when changing the pin height of the seamer. A light coat of No. 2 food grade grease is recommended between the hub and the shaft to prevent the surface galling.

Four bolts are used to hold the Can Feed Star to the hub. To adjust the timing of the Can feed Star, loosen these four bolts and the star position can be easily advanced or retarded to match the seaming star position.

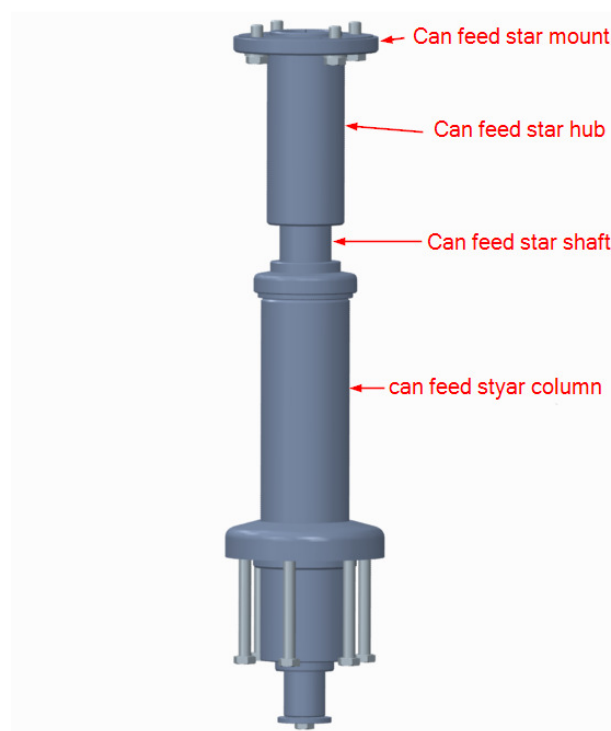


Figure 5-15: Can Feed Star Column Assembly

The Can Feed Star Shaft is un-guarded beside the external machine guarding surrounding the filler/seamer. For the operator and maintenance personnel's safety, the machine will not run when the guard doors are open.

⚠ DANGER

Do not alter control program or bypass machine interlock switches of the safety feature. The turning shaft could result injury when the safety feature is overrode.

5.6. Lower Seaming Turret Assembly

The Lower Seaming Turret Frame Assembly houses the Lower Lifters, Return Cam Follower assemblies, Lower Lifter Drive gear, and the Center Shaft. A hollow shaft is bolted on the top surface of the Lower Seaming Turret Frame which is supporting the Upper Seaming Turret. This allows the Upper Seaming Turret to slide vertically during the can height or pin height adjustment. The Hollow Shaft also provides the fixed mounting location for the Lower Seaming Star. There is no adjustment required for the Lower Seaming Star. The Seaming Turret is driven by a gear mounted at the bottom of the Lower Seaming Turret Frame, which synchronizes the Seaming Turret and all other parts of the seamer. The center Shaft is driven by an Intermediate Gear set, and the Center Shaft has two gears attached. The lower gear drives the Lower Lifters, and the upper gear drives the Seaming Spindles. Lower Lifters and Seaming Spindle rotate at the same speed and direction. The center Shaft and the Hollow Shaft also provide the oil passage from the Upper seaming Turret to the Lower Seaming Turret.

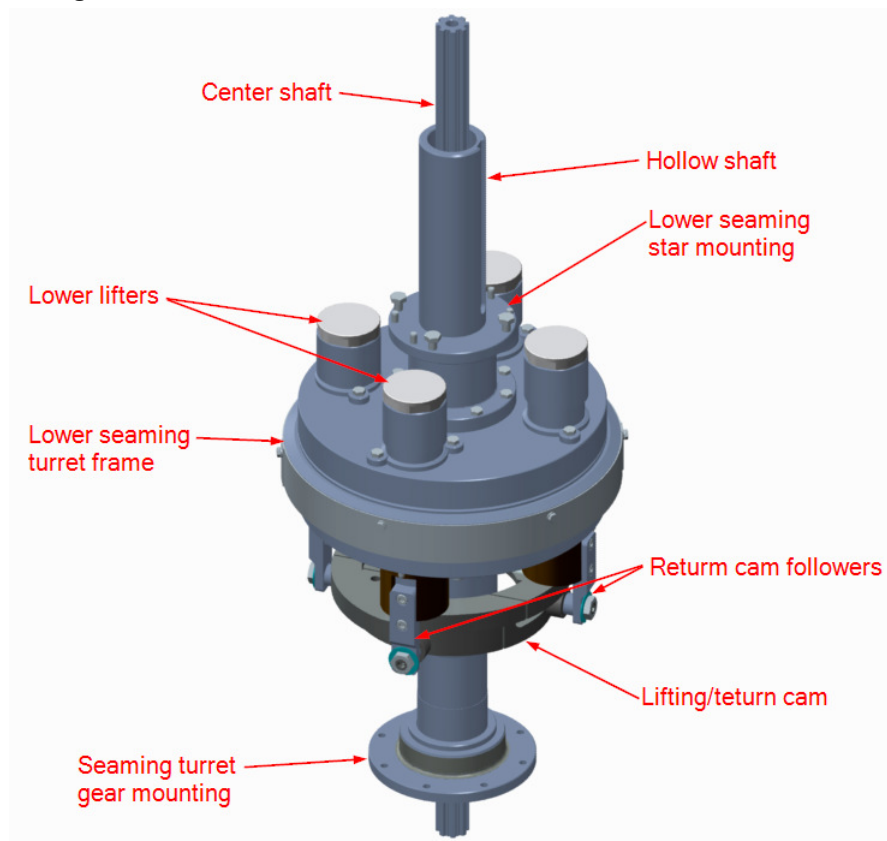


Figure 5-16: Lower Seaming Turret Assembly

5.6.1. Lower Seaming Turret Frame Assembly

The Lower Seaming Turret Frame parts include Lower Seaming Turret Top, Lower Seaming Turret Bottom, Lifter Drive Gear, Center Shaft, Hollow Shaft, Lower Turret Seal, Seal Ring, and Seal Covers. These frame parts provide the rigid mounting for the Lower

Lifters, bearings, and other components. All components within the Lower Seaming Turret could be removed or adjusted while the seamer is installed in the field.

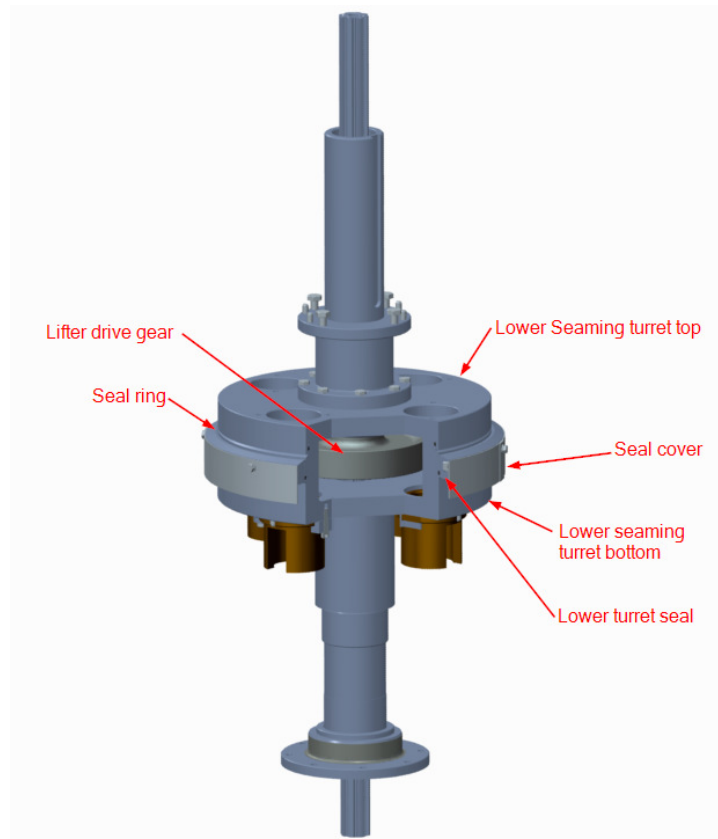


Figure 5-17: Lower Seaming Turret Frame

5.6.2. Lower Lifters Assembly

Lower Lifters provide precise vertical movement which raise and lower the cans at the makeup and discharge area. The movement and the timing are controlled by the Lifting/Return Cams. The Lifter Gears are driven from the Lifter Drive Gear mounted on the Center Shaft that rotates the top half of Lower Lifter Assemblies. The rotation motion is further transmitted to the cans that rotate during the seaming process.

The Lifter Plate Springs pressure is adjustable. The compression pressure increase when turning the spring pressure adjustment screw clockwise. The spring pressure must be adjusted according to the can manufacturer's specifications to assure the proper finished seam body hook.

The Can Plates elevation is adjustable by turning the Support Plate clockwise to raise or counter-clockwise to lower. This adjustment is used set the drop-off, 0.25 mm or 0.010", from the seamer infeed conveyor. Each turn of the support plate will raise or lower Can Plate 1 mm or 0.039".

The Lower Lifter assemblies are lubricated with oil as a part of the automatic lubrication system. Periodic manual re-lube is not required.

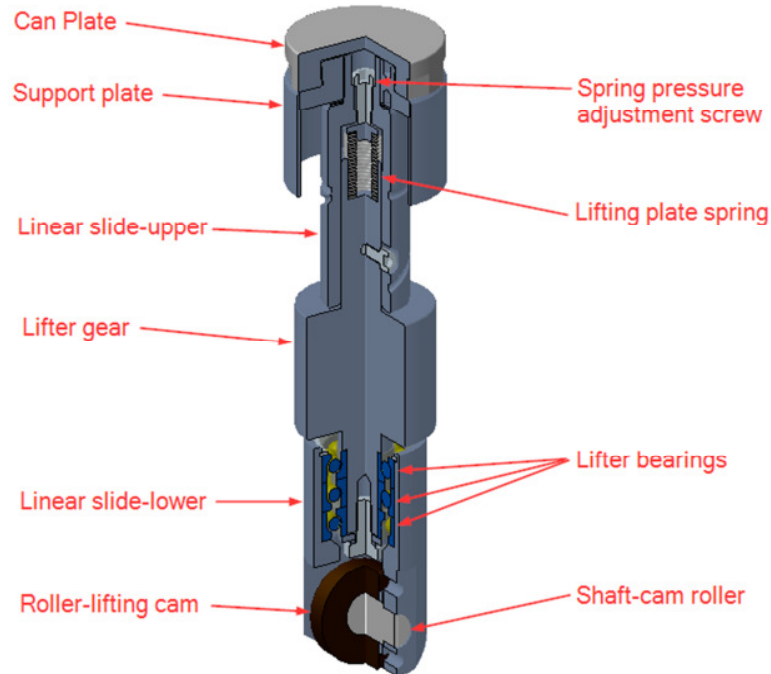


Figure 5-18: Lower Lifter Assembly

5.6.3. Return Cam Followers Assembly

The Return Cam Follower is mounted at the bottom of the Linear Slide-Lower which pulls the Lower Lifter down to the low position during the discharge. Each Return Cam Follower assembly must be individually adjusted to provide 0.1 to 0.15 mm (0.004 to 0.006") running clearance between the Roller Lifter Cam and Lifting/Returning Cams.

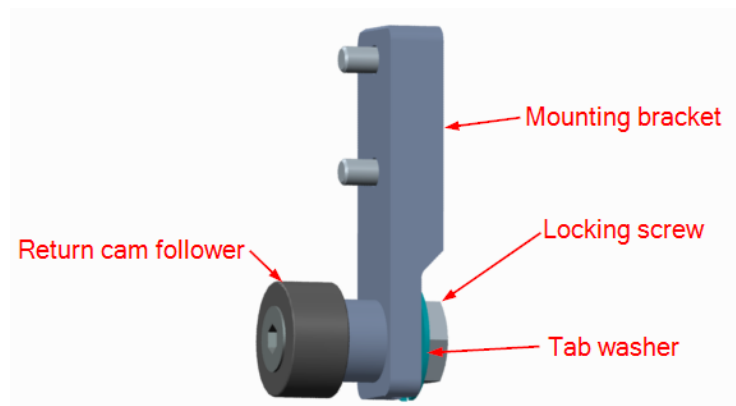


Figure 5-19: Return Cam Followers Assembly

5.6.4. Lifting/Returning Cams

There are three sections of this cam, Lifting section or Make-up section, Return section or Discharge section, and removable section. Each section is located with one dowel pin and aligned with the inner bore of the cam. The removable section could be easily removed in order to access the bolts fastening the other two sections of the cam.

NOTICE

Proper timing for the Knockout Cam/ Cap Centering Cam to Lifting/ return cam is crucial to minimize the potential can wrinkles and damage. It will require adjusting the Knockout Cam/ Cap Centering Cam in order to prevent the can wrinkles. Lifting/ return cam is not adjustable.

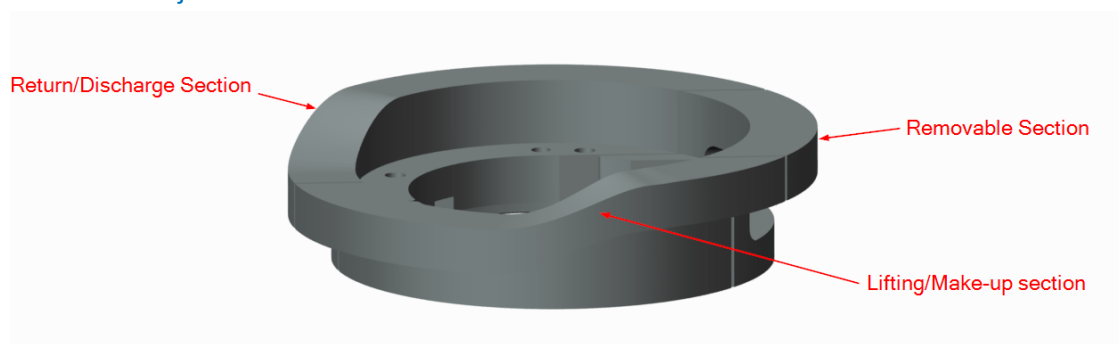


Figure 5-20: Lifting/Returning Cams

5.7. Upper Seaming Turret Assembly

Upper Seaming Turret includes the most important mechanisms that perform the seaming operations. All components in this assembly are machined with high tolerances in order to hold the critical seam specifications. Do not alter or re-machine any components in the Upper Seaming Turret without OEM pre-approval.

NOTICE

Any unauthorized alternation could cause out of specification seam, which could result in large amount of product lost. Consult with OEM prior to making any modification.

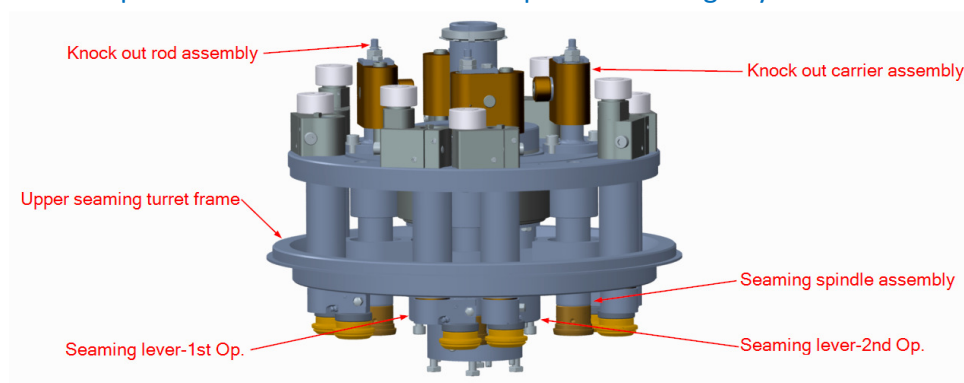


Figure 5-21: Upper Seaming Turret Assembly

The Upper Seaming Turret Assembly includes the following six major sub-assemblies. Upper Seaming Turret Frame, Seaming Spindle, Seaming Lever-1st Operation, Seaming Lever-2nd Operation, Knockout Rod, and Knockout Carrier assemblies.

5.7.1. Upper Seaming Turret Frame Assembly

The Upper Seaming Turret Frame supports the Seaming Spindles, Seaming Levers, Knockout Carrier assemblies, and spindle drive gear. It is supported by the Top Housing through the Upper Seaming Turret Bearing located inside the Seaming Turret Plate. The Seaming Turret Hub connects the Upper Seaming Turret and Lower Seaming Turret Hollow Shaft. It also provides the fixed position mounting surfaces for format parts/change parts like the Seaming Chuck Ring and the Upper Seaming Star.

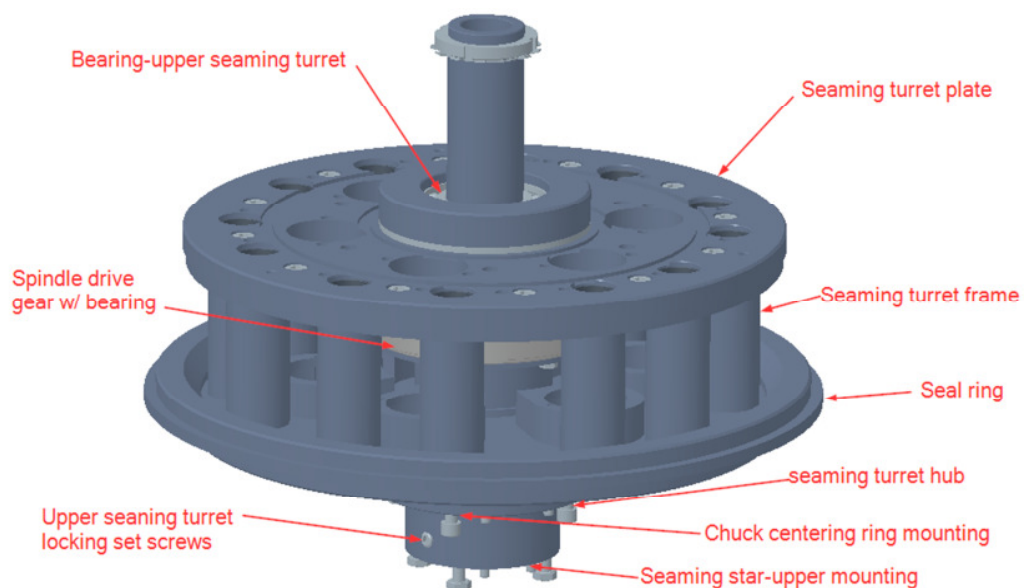


Figure 5-22: Upper Seaming Turret Frame Assembly

5.7.2. Seaming Spindle Assembly

The Seaming Spindles are mounted inside of the Upper Seaming Turret with the bottom end protruding from the bottom surface of Upper Seaming Turret. All spindles within the seaming turret are driven by the Spindle Drive Gear located at the center of the Upper Seaming Turret. Each spindle is supported by two ball bearings; one at the top end of the spindle supporting the radial load and the other mounted below the gear of the spindle which forms a simple support to resist the radial and axial load from the seaming operation.

A mechanical seal is housed by a Seal Cover which is also functioning as a bearing holder to maintain the Seaming Spindle Assembly at the design height position. Below the Mechanical Seal, there are a group of shims in various thicknesses. The total amount of shim thickness should be around 1.25 mm or 0.050". The amount of shims is

determined by the accumulated machining tolerance of all components. Adjust the number of the shims to achieve the consistent Seaming Chuck elevation within 0.05 mm or 0.002". All shims should be installed above the Seaming Spindle Spacer. They should not be located between the Seaming Spindle Spacer and Seaming Chucks.

NOTICE

Install shims between the Seaming Spindle Spacer and Seaming Chucks might cause shims to be ripped during the tightening of Seaming Chucks that could cause the metal contamination of the products.

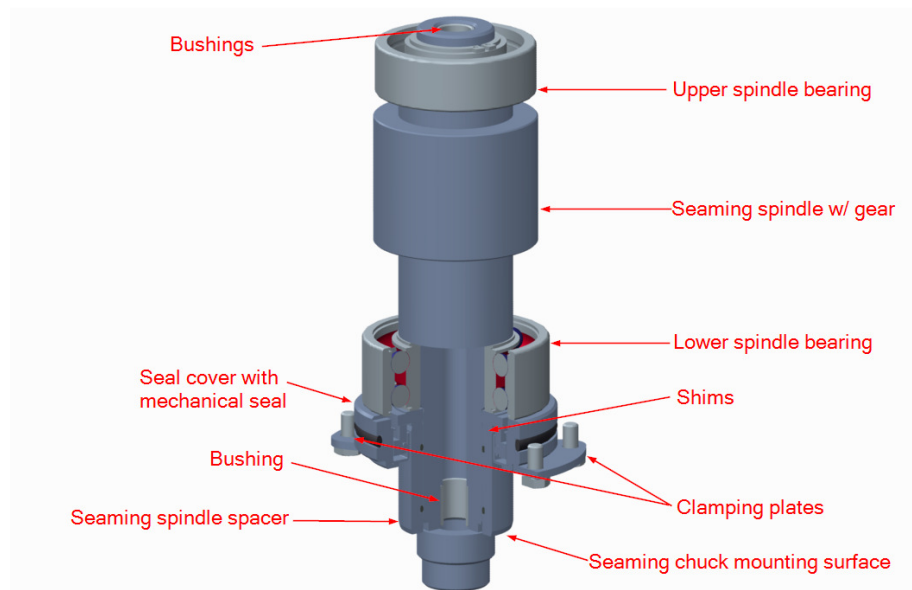


Figure 5-23: Seaming Spindle Assembly

There are two bronze bushings located inside the Seaming Spindle bore. These two bushings guide the Knockout Rod keeping it in the center of the spindle. The clearance between the bushings and the Knockout Rods should be between 0.22 to 0.34 mm or 0.009 to 0.013" when new.

5.7.3. Seaming Lever Shaft-1st Operation Assembly

The Seaming Lever Shaft transmits the motion from the Cam Follower, located at the top of the Seaming Lever Shaft, to the Seaming Lever at the bottom of the Seaming Lever Shaft where the seaming roll is mounted. The Cam Follower movement is controlled by the 1st operation seaming cam track (upper cam track of the Seaming Cam). This mechanism also provides the adjustment for seam thickness and the running clearance between Seaming Lever and Seaming Cam Lever. The Running Clearance Adjustment Screw sets the Seaming Lever to the correct axial clearance that allows the Seaming Lever Shaft to turn freely without excessive axial end play. The seam thickness

could be adjusted by loosening the Clamping screw, then turning two Seam Thickness Adjustment Screws in opposite direction evenly.

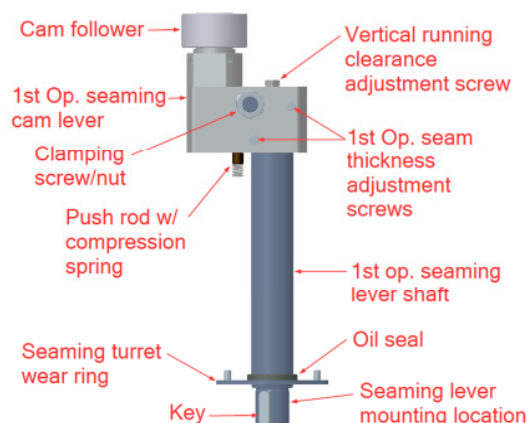


Figure 5-24: 1st Op seaming lever shaft

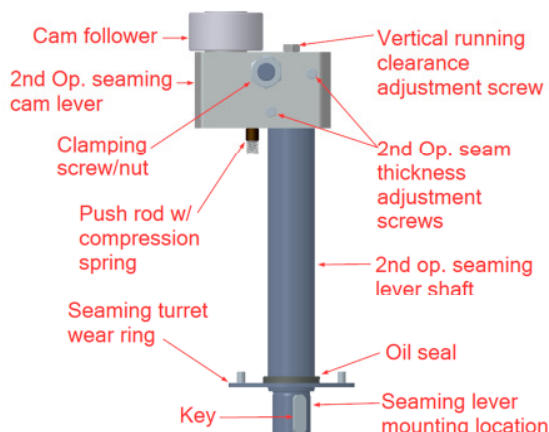


Figure 5-25: 2nd Op seaming lever shaft

5.7.4. Seaming Lever Shaft -2nd Operation Assembly

See notes in Seaming Lever Shaft-1st Operation Assembly section.

5.7.5. Seaming Lever-1st and 2nd Operations Assembly

Seaming Lever supports the Seaming Roll Mounting Assembly and transmits the motion from the Seaming Lever Shaft to the Seaming Roll. It also provides the lubrication passage for the Seaming Roll. The Flat Head Screw, grease fitting, and Grease Relief must be fastened and secured with Loctite® 243. Excessive grease might appear at the Greased Relief surface. Clean this area thoroughly after re-lubrication of Seaming Rolls to prevent product contamination.

NOTICE

Failure to apply Loctile® 243 when fastening the Flat Head Screw, grease fitting, and Grease Relief could result the unexpected separation of the components and cause machine jam and severe damage. Exercise good assembly practice of applying thread locking adhesive for all components subjected to shock and vibration.

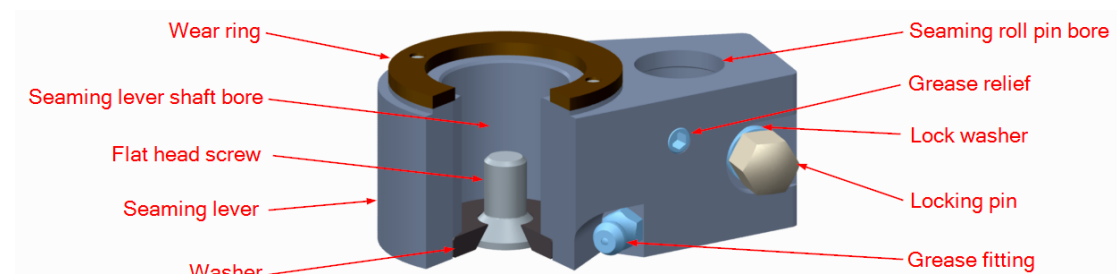


Figure 5-26: Seaming lever assembly

5.7.6. Seaming Roll Mounting Assembly

The Seaming Roll Mounting Assembly is attached to the Seaming Lever Assembly. It holds the Seaming Roll at the bottom end of the Seaming Roll Pin by the Retaining Screw. Apply Loctite® 243 thread adhesive when re-fastening the Retaining Screw to 20 N-m tightening torque. The bottom Cap also requires Loctite® 243 and 12 N-m tightening torque.

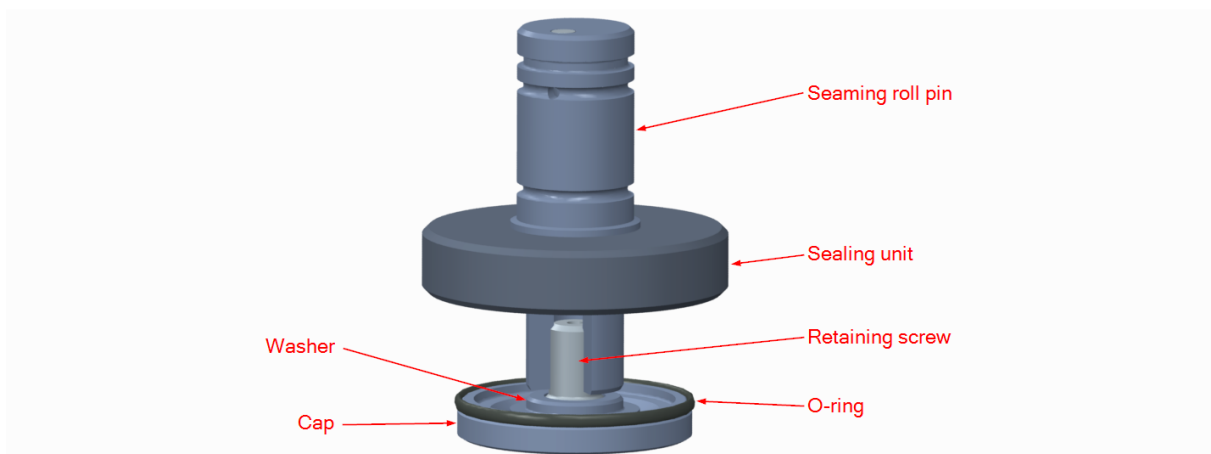


Figure 5-27: Seaming roll mounting assembly

5.7.7. Knockout Rod Assembly

The main function of the Knockout Rod is to control the can and cover assembly to be at the upright position and remain in contact with the Can Plate on the top of the Lower Lifter assembly. The Knockout Pad and the Can Plate compress the can and cover assembly during the makeup with light force generated by the Compression Spring at the top of the Knockout Rod. The Knockout Pad also ejects the seamed cans from the Seaming Chuck at the discharge. The Knockout Pad height is adjusted by turning two jam nuts at the top of the rod.

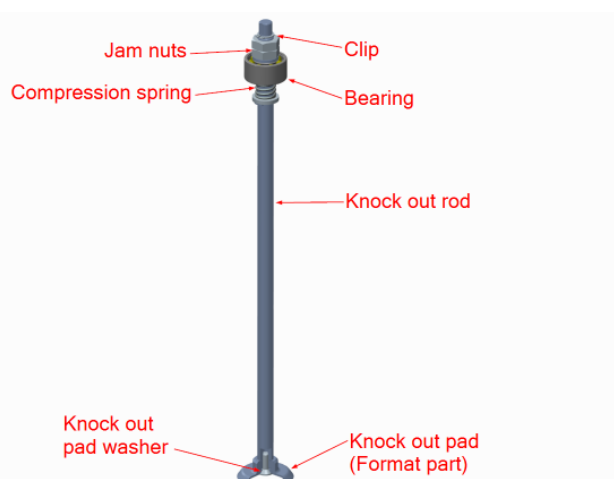


Figure 5-28: Knockout rod assembly

5.7.8. Knockout Carrier Assembly

The Knockout Carrier assembly is sliding up and down on the Knockout Rod Guide Pin and Knockout Rod Guide Flange. The Knockout Rod Guide Pin and Knockout Rod Guide Flange prevent the carrier from rotating. The stroke of the movement is controlled by the Knockout Cam. The Knockout Rod is attached to the Knockout Carrier, and it is following the carrier movement to control the can and cover at the makeup and discharge.

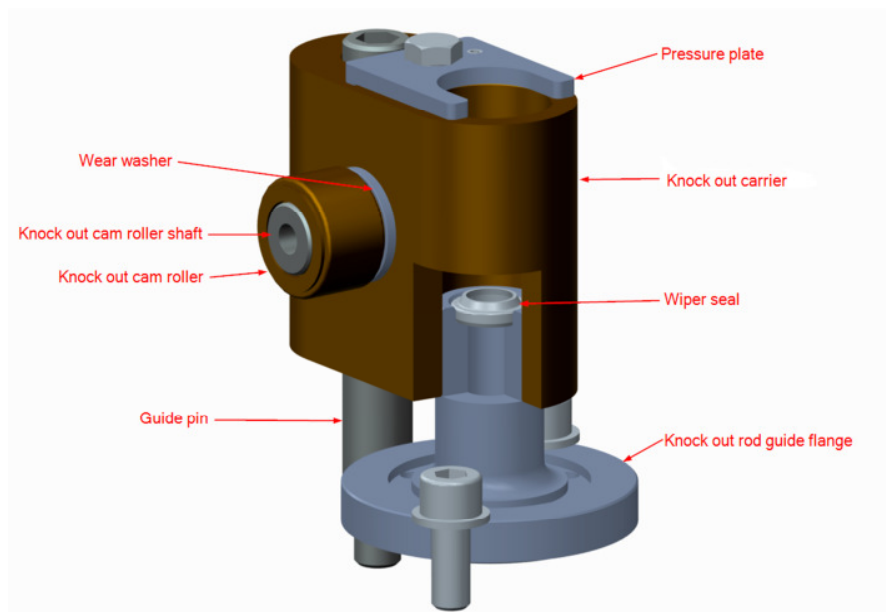


Figure 5-29: Knockout carrier assembly

5.8. Discharge Turret Assembly

The Discharge Turret transfers seamed cans from the Seaming Turret to the Discharge Turret and continues to move the seamed cans to Discharge Conveyor. The Discharge Star Post provides the mounting locations for the Discharge Guide, Discharge Wear Plate, and Discharge Conveyor.

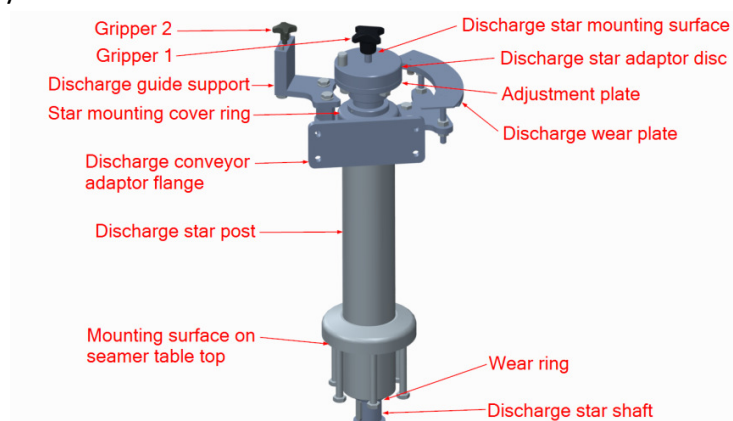


Figure 5-30: Discharge Turret Assembly

The Discharge Star is located on the top of the Discharge Star Adaptor Disc. The timing of the Discharge Star is achieved by adjusting the relative position between the Discharge Star Adaptor Disc and Adjustment Plate.

5.9. Cap Feed Assembly

The Cap Feed Assembly includes the Cover Feed Plate, Cover Separator, No Can/No Cover control, and Cover Feed Chute. The can covers are manually fed into the seamer by laying a sleeve of covers, orderly stacked, on the Cover Feed Chute which is directly connected to the Cover Separator. When the Can Sensor located at the Can Infeed Conveyor senses an incoming can, the No Can/No Cover (NC/NC) mechanism opens the cover passage, and allows the cover stack to be in contact with the Separator Wheel. The Separator Wheel separates the most bottom cover from the stack. The separated cover then is conveyed by the Cap Guides to the Makeup area to be assembled with a filled can.

5.9.1. Cap Feed Plate

The Cap Feed Plate supports the Cover Separator and NC/NC control on the top and supports the Cap Guides on the bottom surface. If multiple cover diameters are used in production, additional Cap Feed Plates are strongly recommended to pre-assemble the 2nd set of Cover Separator, No Can No Cover control, and Cap Guides as a complete unit. This will reduce the change over time.

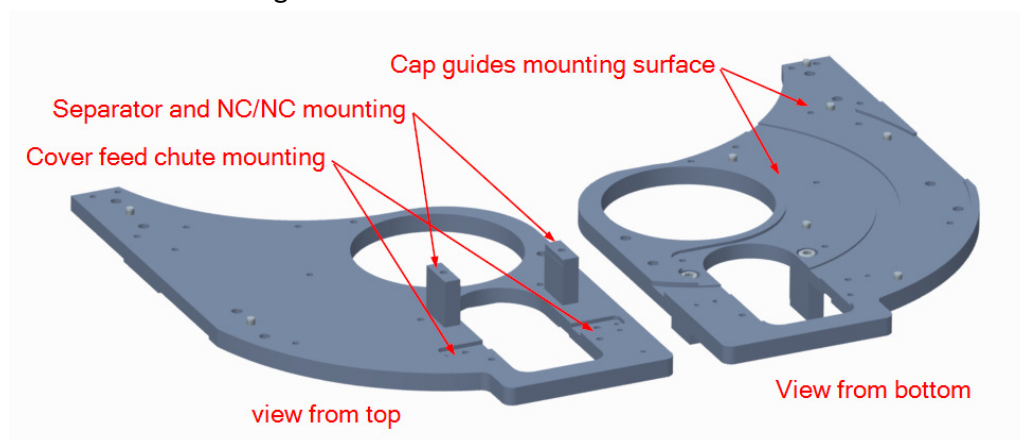


Figure 5-31: Cap Feed Plate

5.9.2. Lid Separator

The Lid Separator is driven from a servo motor mounted on the front vertical face of the Top Housing. It is able to handle cover sizes from 50 mm (200) to 75 mm (211) diameters. This single roll separator wheel design could be easily setup and adjusted with simple hand tools. The Separator Spindle holds the Separator Wheel (format part) at the lower end and Separator Timing Flag at the top. The timing Flag is sensed by a proximity sensor. The signal is synchronized with the Can Sensor on the Infeed Conveyor to open or close the cover feed passage at the correct timing. A height adjustment

mechanism is built into the Separator Bracket allowing the use of Separator Wheels with different thickness.

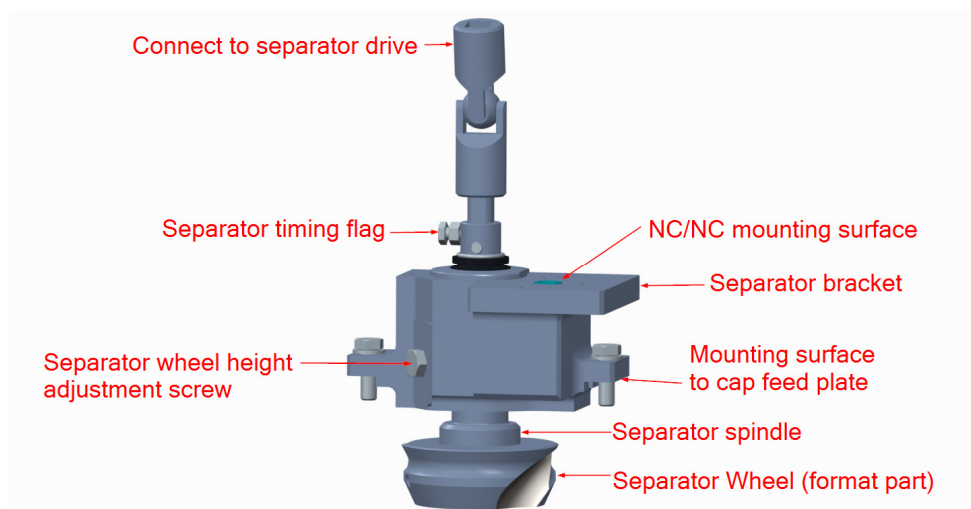


Figure 5-32: Lid Separator

5.9.3. No Can/No Cover

The No Can/No Cover mechanism controls the passage of the cover feed. If the Infeed Can Sensor detects the existence of a can on the Infeed Conveyor and a NC/NC Timing Flag signal is also detected by the Timing Flag Sensor, the NC/NC finger will be retracted (open position) and allow covers to pass through the cover passage. The NC/NC Finger will remain in the open position until the moment that Infeed Can Sensor detects no can on the Infeed Conveyor.

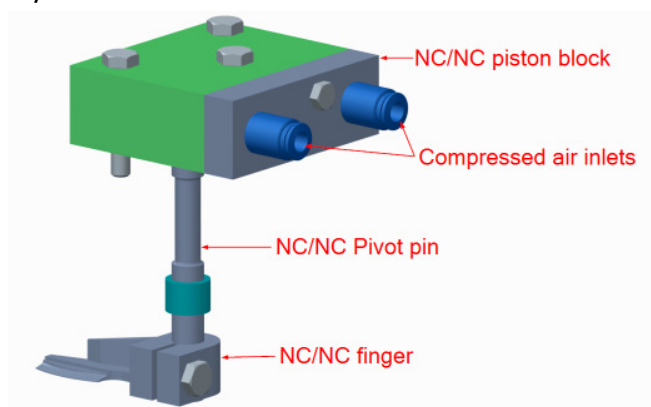


Figure 5-33: No Can No Cover

5.9.4. Lid Feed Chute

The Lid Feed Chute is a V-shaped chute that allows the operator to manually feed covers into the seamer. For the beer/beverage market, the aluminum closures/covers are normally packaged in a paper sleeve measuring about 1 meter long. Operator repetitively places a sleeve of covers on the V-chute one at a time, and then removes

the paper sleeve. Unpacked covers are gradually fed into the seamer through the Cover Separator. The V-chute is inclined at about a 10° angle downward. An electro-magnetic vibrator is used to move the unpacked covers down the V-chute without flipping back.

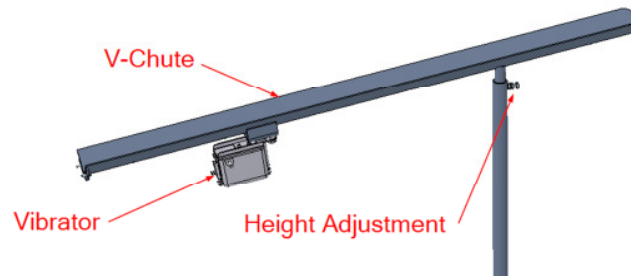


Figure 5-34: Lid Feed Chute

5.10. Can Feed Drive

The Can Feed Drive unit transmits the driving torque from bottom of the Seamer Table to the top of the Seamer Table. The Sprocket has 4 elongated obround holes on the sprocket enable the sprocket to be adjusted to the proper timing between the Feed Chain and the Can Infeed Star. The Mounting Plate attached on the output shaft side of the Gear Box serves as an alignment guide for the Can Infeed Conveyor.

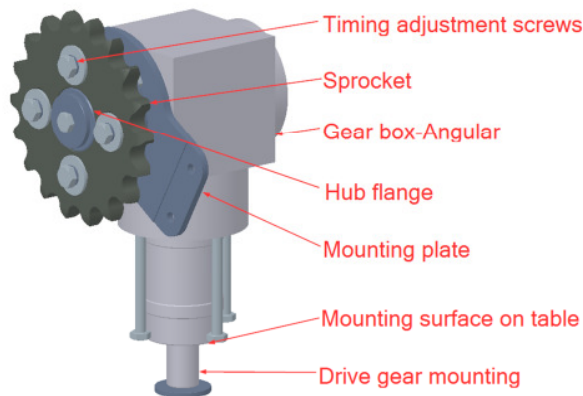


Figure 5-35: Can Feed Drive

The Feed Chain running from filler discharge to the Sprocket of Can Feed Drive carries the filled cans into the seamer. There are potential pinch points between the Feed Chain and Sprocket. Approach with caution when adjust the timing of the Feed Chain.



Do not place hands or fingers between chain and sprocket. Unexpected movement of chain could cause severe injury.

5.10.1. Infeed Conveyor Support

The seamer Infeed Conveyor is supported from both ends of the conveyor; seamer end and filler end respectively. It is bolted to a support plate mounted on the seamer columns at the seamer end and secured to a pair of mounting plates at the seamer end through a vertical post. The elevation at both ends of the conveyor could be adjusted to set the proper drop-off for the cans to transfer from the filler to the conveyor and from the conveyor to the seamer.

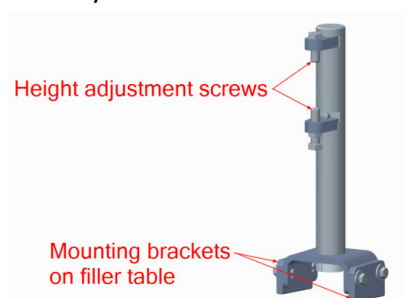


Figure 5-36: Conveyor support-Filler end

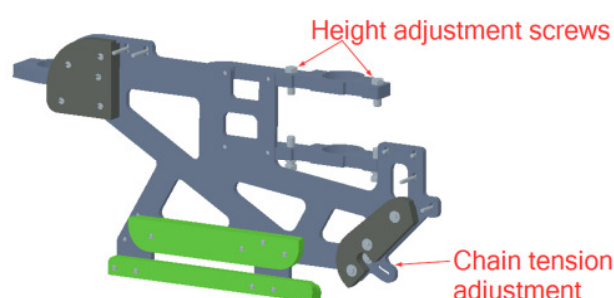


Figure 5-37: Conveyor support-seamer end

5.10.2. Infeed Conveyor

The Infeed Conveyor transport filled cans from the filler to the seamer by Infeed Chains. The lug or finger of the Infeed Chain must be properly timed to the filler backrest for a smooth transfer of cans from the filler to the conveyor. This conveyor is designed for wash down, therefore there are exposed moving parts that cannot not be covered or guarded. Extra caution must be taken when servicing the conveyor or clearing the can jams.



Pinch points exist in this area. Machine will not run when the guard door is open. When moving the seamer by hand wheel, stay clear from the moving chain to prevent from pinch injury.

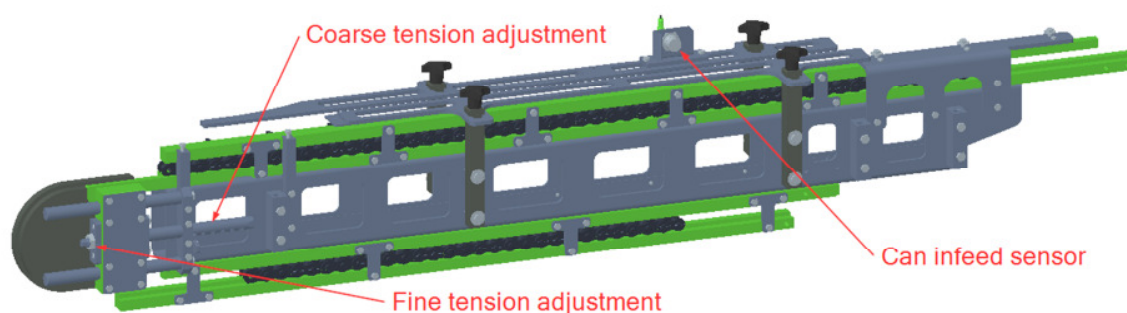


Figure 5-38: Infeed Conveyor

The Infeed Chain must remain with proper tension to eliminate the backlash. Excessive backlash will cause improper timing and product lost. The tension adjustments are

located at the filler end of the conveyor. Beside a coarse adjustment which allows 20 mm increment movement, there is also a fine adjustment screw to fine tune the chain tension and backlash.

5.11. Discharge Conveyor

The Discharge Conveyor transfers seamed cans from the Discharge Turret to the outside of seamer guarding. This is a short conveyor that allows end users to connect their own conveyor system to the seamers. There is no conveyor chain provided. End users will extend their conveyor chain to a non-driven idler chain wheel. Two meters of conveyor chain will be required to wrap around this Discharge Conveyor. The Discharge Conveyor will accept most 3.25 inches or 83.8 mm wide plastic straight running or side-flexing conveyor chains without the tabs. The following makes and models of conveyor chains could be used with this Discharge Conveyor. For other conveyor chains not listed below, please contact KHS for special design and modifications.

Regina	Rexnord	Intralox	MCC
820 K 3 ¼	820 3 ¼	820 3 ¼	SH 325
820 K 83,8			SHP 325
828 K 83,8			
831 K 3 ¼	831 3 ¼	831 3 ¼	SHD 325
831 K 83,8			
879 K 3 ¼	879 B 3 ¼		
880 K 3 ¼	880 B 3 ¼		

Table 5-1: Discharge conveyor chains

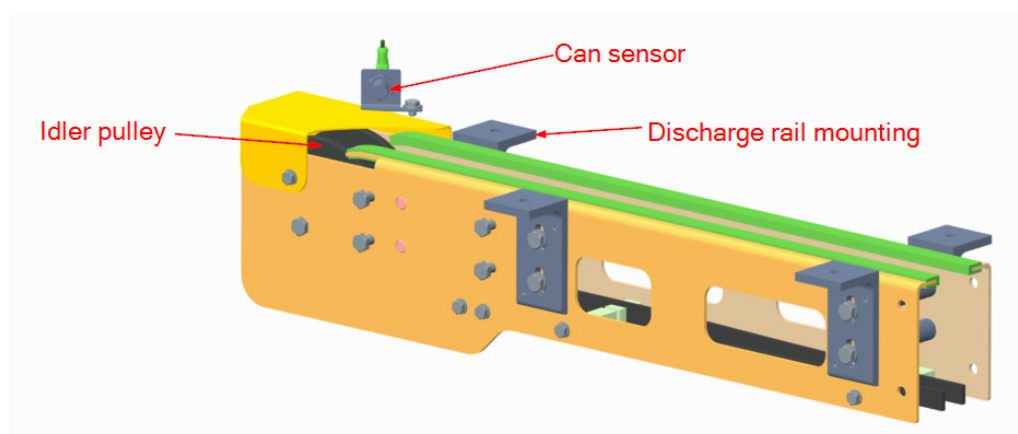


Figure 5-39: Discharge Conveyor

5.12. Pneumatic System

Your seamer comes with an integrated pneumatic system that is used to operate No Can No Cover Control and to pressurize the seamer interior. End users are responsible to provide the 6 bar (88 psi) dry compressed air to the filler service module (FSM). The maximum consumption rate for the compressed air is 30 standard m³/hour for the seamer alone. Filler will require additional amount depending on the filler model.

NOTICE

The end user must provide sufficient pressure and volume of dry air to the filler service module. Any moisture in the compressed air could cause water condensation inside the seamer and internal corrosion will occur. Insufficient pressure and/or the flow rate of compressed air could delay the No Can No Cover mechanism movement and cause missing cover or feed extra cover.

5.12.1. No Can No Cover Control

The No Can No Cover (NC/NC) Control is one of most sophisticated mechanism on the seamer. It determines the correct timing to open and close the cover passage in order to dispense or stop covers at the correct timing. When the Can Sensor located at the Can Infeed Conveyor senses an incoming can and the NC/NC Timing Flag signal is also present, the NC/NC finger will be retracted by the compressed air to open the cover feed passage and allow covers to go through the Separator Wheel. The NC/NC Finger will remain in open position until the moment the Infeed Can Sensor detects no can on the Infeed Conveyor and the NC/NC Timing Flag signal also present. Then the compressed air will close the cover passage by moving the NC/NC Finger into the closed position.

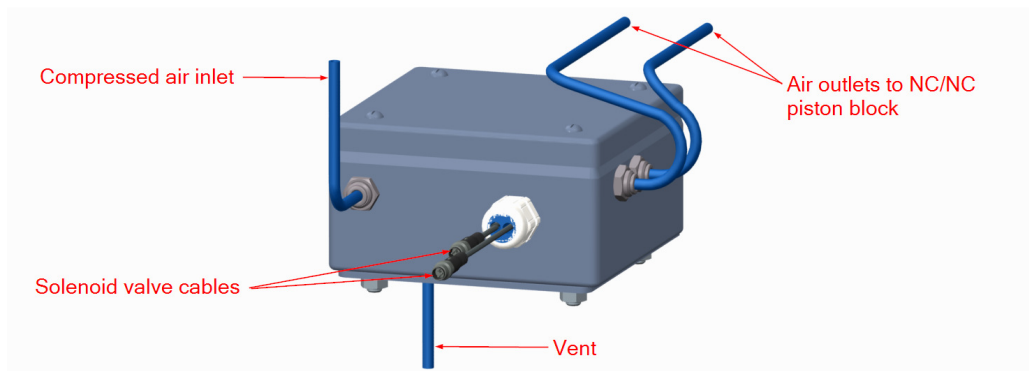


Figure 5-40: No Can No Cover Control

5.12.2. Seamer internal positive pressure control

The Seamer is normally installed in a high moisture area. It comes in contact with products, water, steam, and cleaning chemical solutions. To prevent internal corrosion, KHS applies low pressure dry air to inside of the seamer to minimize the moisture penetration. The control pressure should be set at 1 kPa or 4" of H₂O initially. Do not

exceed 1.2 kPa or 5" of H₂O maximum at the pressure regulator for any reason. This pressure must remain on all the time when the seamer is in the normal operation, wash down, CIP, or even when the seamer is completely shut down with power off.

CAUTION

Compressed air is considered a potential energy source which could cause unexpected movement of machine components or lubricant. Use Lock Out Tag Out safety practice to shut off compressed air when performing service of the seamer.

NOTICE

Seamer internal pressure should be carefully monitored. Excessive pressure could cause oil leak and possible seal damage. Lacking of positive pressure could cause seamer internal corrosion.

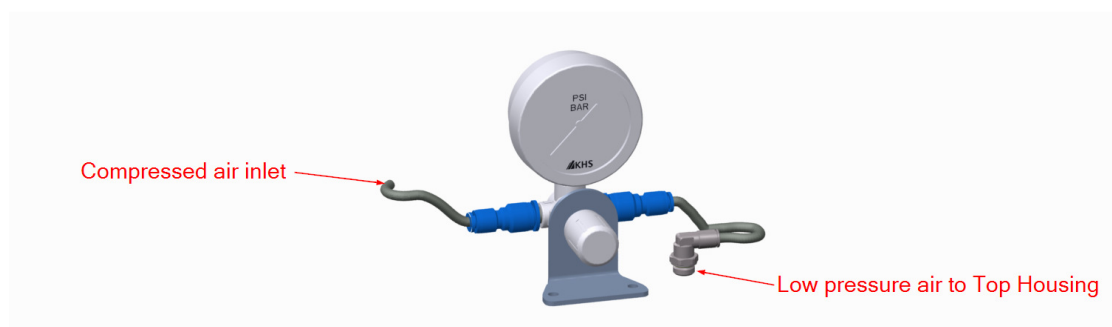


Figure 5-41: Seamer internal positive pressure control

5.13. CO₂ Control

Your KHS seamer is equipped with Under Cover Gassing (UCG) Control for all beer/beverage applications. A single bubble breaker is also included for the beer application.

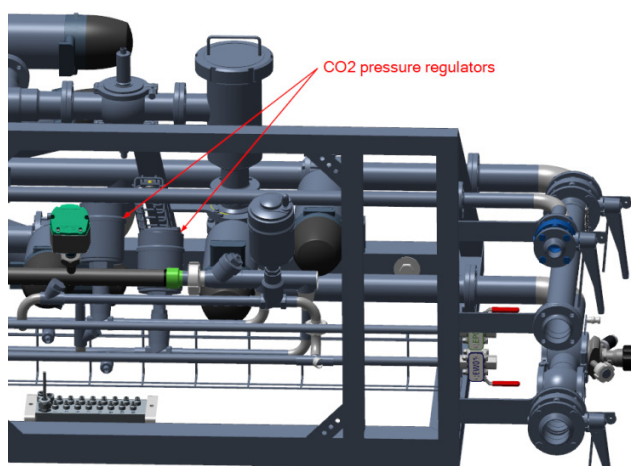


Figure 5-42: CO₂ controls

5.13.1. Under Cover Gassing Control

The standard manual wash/gassing control valve is located on the Filler Service Module (FSM) below the control console at the filler side. It could be set at wash-in-place or operation mode from HMI. A solenoid valve is also incorporated into the control system to turn on/off the UCG system when the filler/seamer is in production mode. The initial pressure should be set at 2.5 kPa. Adjust the pressure up or down to optimize the TPO and CO₂ consumption. See Filler Service Module manual for more details.

5.13.2. Bubble Breaker Control

The Bubble Breaker is used to reduce the Total Packaging of Oxygen (TPO) within the closed cans by injecting fine streams of CO₂ to the head space of the open can. These CO₂ streams break the surface tension of the large air bubbles formed after the filled cans discharge from the filler and prior to entering the seamer. The Bubble Breaker Control is integrated into the Filler Service Module. It is also integrates the wash-in-place function. The initial pressure should be set at 180 kPa. Adjust the pressure up or down to optimize the TPO and CO₂ consumption. See Filler Service Module manual for more details.

5.14. Lubrication System

More and more canning and bottling companies are choosing to use “food grade” lubricants throughout their machines. Historically, food grade lubricants had shorter service life and poorer wear protection than regular petroleum lubricants. Improved additives and synthetic base oils have done much to overcome this shortfall. Paying close attention to maintenance practices and properly choosing lubricants are keys for trouble-free operation of your KHS seamers.

USDA eliminated their internal group that registered Non Food Compounds such as Lubricants H1 and H2 in 1998. They still have the responsibility for monitoring food and beverage plants to make sure they comply in the use of these lubricants. After several years of self-certification by lubricant companies, NSF International was approved in 2001 as a 3rd party registrant for Non Food Compounds. NSF uses guidelines originally set up by the USDA. NSF conforms to ingredients as specified by the FDA.

As an equipment manufacturer, it is KHS’s responsibility to specify the lubricants that will meet the application requirements. Due to the cost and the time required to put each lubricant through the test, KHS is not able to test every lubricant available on the market. As specified in this document, users of KHS seamers may use lubricant that is equivalent or exceed the performance of the suggested lubricants listed on this document, and lubricant companies are responsible to guarantee the quality and performance of their products. If users decide to change out the lubricant, it is important to determine if that lubricant is

compatible with the factory filled lubricants, or if a complete flush/clean of the existing lubricant is necessary.

5.14.1. Lubrication principles

Appropriate Lubricants are essential to the longevity of the machine. Quality engineering is of no value if good maintenance practices are ignored or poor quality or improper lubricants are employed. Generally, good quality lubricants of the correct type will provide long, trouble-free service. In some cases, we recommend very specific products for successful operation.

When oil circulation and filtration systems are used, monitoring oil integrity on a monthly basis is recommended. Oil change out on circulating systems should never exceed a six month period or two thousand hours of run time, whichever comes first, unless specified & certified by lubricant suppliers.

5.14.2. Oil Reservoir

The KHS seamer offers an independent oil reservoir to collect the used oil instead of building an oil sump to enclose the turning gears and bearings. This approach allows particular contamination in the used oil to be apart from the moving elements that prolong the service life of moving parts.

The Oil Reservoir collects used oil from the Top Housing and the Lower Seaming Turret. The Oil Filtration pump suction line is connected to the lower part of the reservoir to deliver the used oil to the Oil Filtration System. The clean oil from the Oil Filtration System is returned to the reservoir. To prevent the high oil pressure during the cold start, an Oil Warmer is attached to the Oil Reservoir. The oil temperature is regulated by a temperature sensor located at the far side of the reservoir.

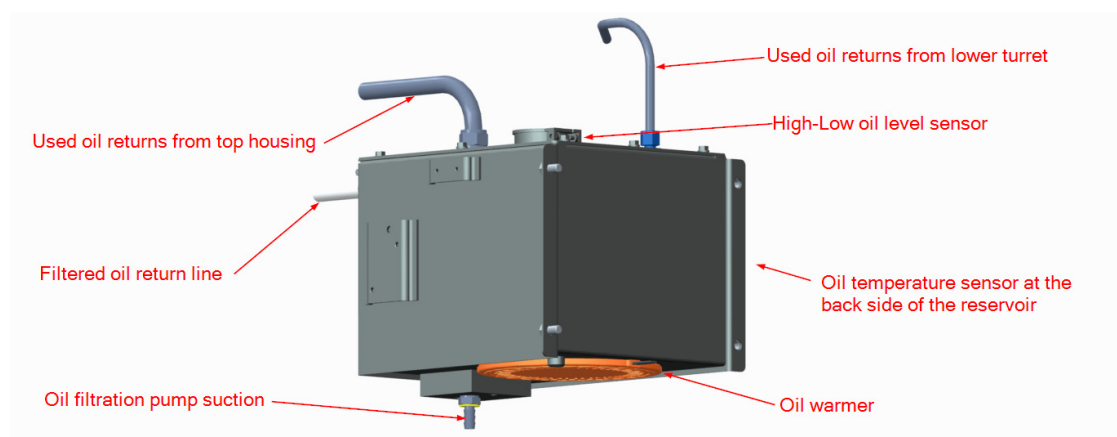


Figure 5-43: Oil Reservoir

5.14.3. Oil Filtration System

To reduce the operating cost, the KHS seamer is designed with a closed loop oil filtration system. The oil is recirculated through the machine, Oil Reservoir, Filtration System, and Automatic Lubrication System. The particulate contamination is removed by a unique designed depth filter, which also absorbs the water contamination in the used oil. Once the filter is saturated with water, the filter pressure will be reflected in the pressure gauge. A pressure switch will also send a signal to the Filler/Seamer Control PLC. A message will be displayed on HMI to remind the operator to change filter.

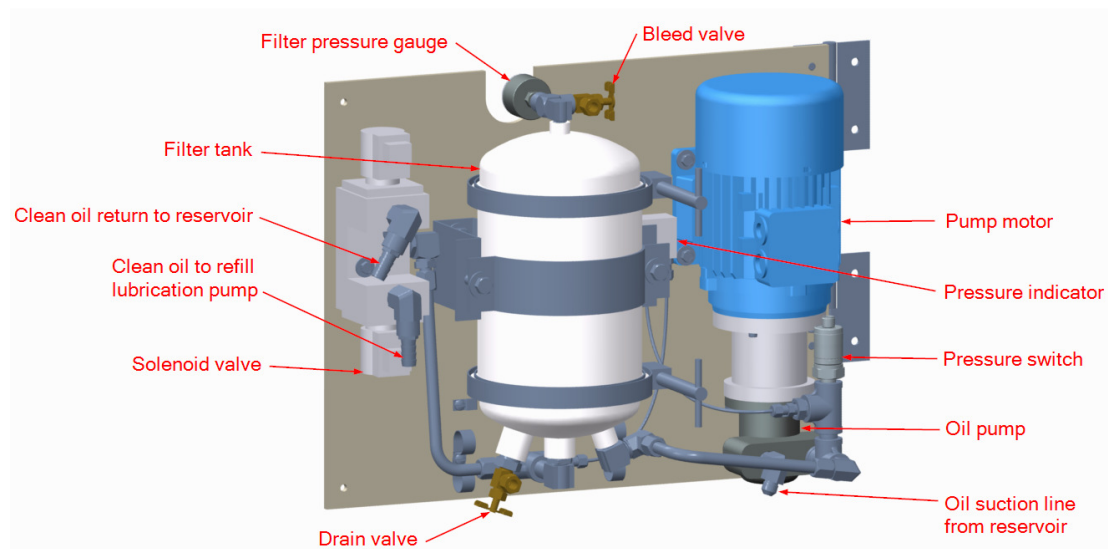


Figure 5-44: Oil Filtration System

5.14.4. Automatic Oil Lubrication System

The Automatic Oil Lubrication System includes a meter pump, a small oil tank, two metering divider valves, and connecting fittings and tubing. The 1st divider valve is located below the seamer table. It dispenses 15% of the oil from the Metering Pump to the Lower Seaming Turret and maintains constant oil level to the Lifting/Return Cam surface.

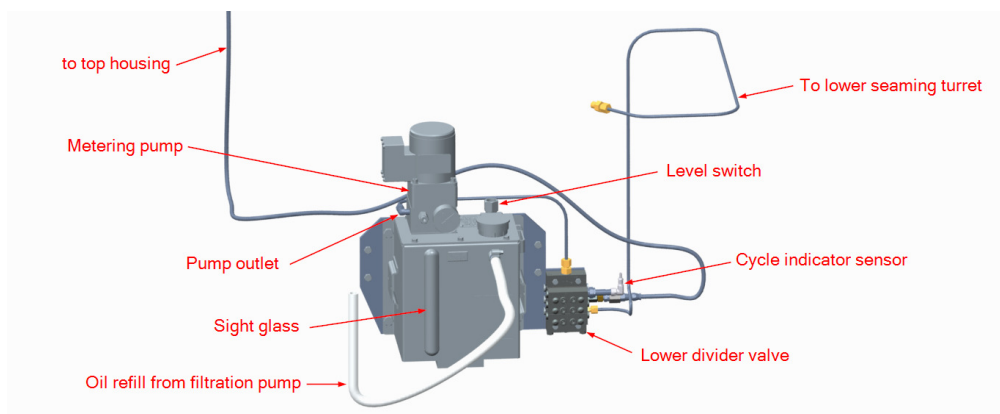


Figure 5-45: Automatic Lubrication System-below seamer table

The remaining oil is delivered to the Upper Divider Valve located in the Top Housing. Oil is further divided to lubricate the Seaming Cam and Cam Follower, Upper Seaming Turret Bearing and Gears, Knockout Cam and Cam Followers, Knockout rods and guide Pins, and Lower Seaming Turret Bearing and Lifters.

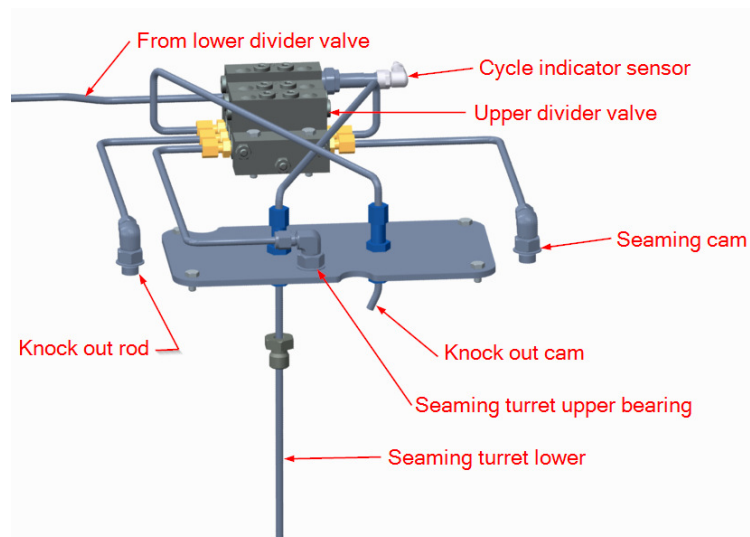


Figure 5-46: Automatic Lubrication System-Top Housing

5.14.5. Main Drive gear trains grease lubrication

The main drive gear train under the seamer table for TK250/4 model is designed to be lubrication free. There is no need to apply grease. Model TK250/6 is equipped with automatic grease lubrication system, which includes an automatic grease pump with integrated grease divider valve. The divider delivers metered amount of great to each tier of gear trains during the run time. Grease pump is shut down while the machine is not running. The pump 1 liter reservoir could be refilled from the front of the reservoir. NLGI 2 EP grease is recommended.

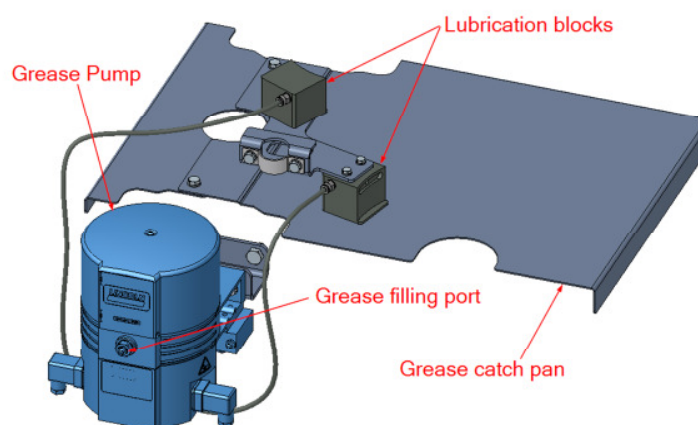


Figure 5-47: Main Drive gear trains grease lubrication, TK250/6 only

5.14.6. Suggested lubricants

The KHS TK250-4 seamer uses a few different types and grades of lubricants in various locations. Special food grade oil formulated for the seamer is used to lubricate all seamer internal bearings, gears, sleeves, and seals. Seaming Rolls are lubricated with food grade grease that has been carefully tested and proven in the canning industry. The Main Drive gear box and Can Feed Drive gear box are filled with OEM recommended lubricants. Do not mix different types of lubricants with the factory filled lubricants. The lubricant specifications are listed below on Table 5-2.

Location	Specification	Factory First Filled Lubricants
Automatic Oil Lubricators, Oil Filtration and Recirculation Systems	Special Seamer Oil 150	301142010309 (22L)
Seaming Roll Grease	Grease Grade 0 or 00	301142150606 (19 kg)
Main Drive Gear Case	Gear Lube 220	Mobil SHC CIBUS 220
Can Feed Drive Gear Case	Grease Grade 00	Shell Gadus S5 V142W-00
Can Feed Chain Lubricator	Chain Lube 100	N/A
Main Drive Gear Trains	NLGI 2 EP Grease	304142020011 (15.8 kg)

Table 5-2: Lubricants Specification

NOTICE

If the users must change to different type of lubricant at any point of time, the old lubricant must be completely removed and machine must be flushed prior adding new lubricants. Consult your lubricant provider for the compatibility.

It is important to use lubricants that meet the specification of KHS first filled lubricants. Beside the general specification listed in the Table 5-2, detail specifications for each first filled seamer lubricant are listed below.

Special Seamer Oil 150: High quality synthetic or petroleum lubricating oil contains ash-less dispersant, rust and oxidation inhibited, anti-wear protection, non-foaming, extreme pressure protection, and emulsifier additives.

Brand:		
KHS	301142010409 (205 L)	301142010309 (22 L)
Specifications:		
Viscosity Grade	ISO 150	ISO 150
Viscosity, cSt @ 40° C, ISO 3104	150	150
Viscosity, cSt @ 100° C, ISO 3104	19	19
Viscosity Index, ISO 2909	140	140
Color, ASTM D-1500, typical	Colorless, slightly pale	Colorless, slightly pale
Flash Point, °C, ISO 2592	258	258

Table 5-3: Seamer Oil 150



Seaming Roll Grease: High performance grease contains high mechanical and thermal stability, oxidation and rust protection, highly water resistant and excellent corrosion protection additives.

Manufacturer:		
KHS	301142150606 (19 kg)	301142150604 (1 kg)
Specifications:		
NLGI Grade, DIN 51818	00	00
Worked Penetration, 25°C, ISO 2137	400 -430	400 -430
Dropping Point, °C, Min., ISO 2176	>200	>200
Thickener Type	aluminum complex	aluminum complex
Base Oil Properties:		
ISO Viscosity Grade, Minimum	100	150
Viscosity, cSt @ 40° C, ISO 3104	100	150
Viscosity, cSt @ 100° C, ISO 3104	13.4	18.0
Flash Point, °C, ISO 2592	N/A	N/A

Table 5-3: Seaming roll grease

Chain Lube Oil: High quality petroleum lubricating oil contains rust and oxidation inhibitors, thermally stable with tackiness additives.

Manufacturer:		
Fuchs Lubritech	FM Chain Oil 100	
Specifications:		
Viscosity Grade	ISO 100	
Viscosity, cSt @ 40° C	100	
Appearance	Bright & Clear	
Flash Point, °C, ASTM D 92	104	
Pour Point, °C, ASTM D 97	-28	
Stringiness	Observable	

Table 5-4: Chain Lube Oil

5.15. Format/Change Parts

Format parts (change parts) are divided into two groups; cover handling and can handling parts. Each cover diameter size and can diameter size will require one set of cover handling parts and one set of can handling parts. If the can diameters or cover diameters changed more than 0.5 mm (0.020 inches), an additional set of body handling parts or cover handling parts will be required. Same diameter can bodies with different can height will not require additional can handling parts. KHS TK250 format parts are designed in a way that could handle the can height from 62 mm to 210 mm tall (206 to 804) for the same diameter can body. If the cover curl thickness changes more than 0.25 mm (0.010 inches), additional

cover handling parts will be required. Inspect format parts condition routinely. If excessive wear and tear is observed, repair or replace worn out parts.

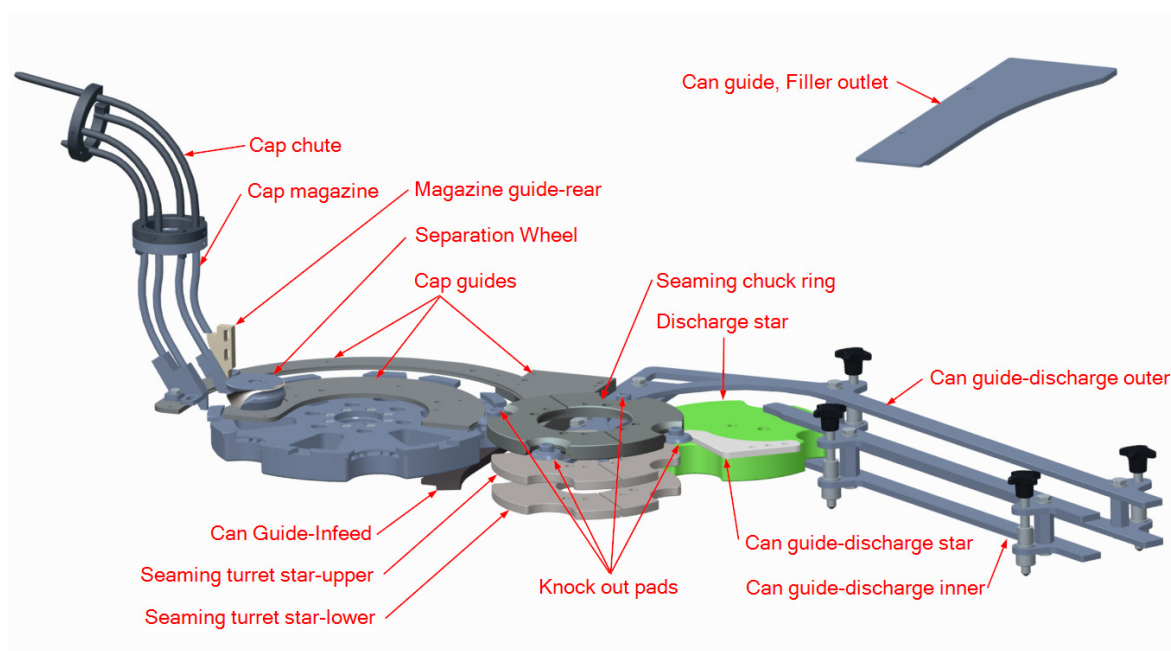


Figure 5-48: Format Parts (Change Parts)

5.16. Seaming Tooling

There are three seaming tools used in your KHS TK250 seamer; Seaming Chucks, 1st Operation Seaming Rolls, and 2nd Operation Seaming Rolls. Seaming Tooling quality and condition are crucial to your final seam quality. Use genuine KHS OEM tooling at all times. This will minimize the unexpected seam quality issues and maximize production efficiency. Keeping a complete set of spare seaming tooling on hand will be beneficial to avoid down time and seam issues.

Both operation seaming rolls need to be re-lubricated with food grade grease once every 72 hours of operation or after wash down. One pump of grease for each seaming roll using a standard duty grease gun is needed. Apply grease gently. Do not force grease in too fast. Rotate the seaming roll by hand after greasing to be sure the roll is not locked up. Inspect the Seaming Chuck anvil area. Be sure there is no cracking, chipping, coating wear, or lacquer build up. The proper seaming height and thickness setting will produce the quality seams and maximize the Seaming Tooling service life.

5.16.1. Seaming Chucks

The Seaming Chuck provides the main driving force to rotate the can and cover assembly. The contact point between the chuck and cover is pre-defined by the cover manufacturer. A different cover manufacturer for the same nominal size cover might require different Seaming Chuck geometry. All Seaming Chucks must be planed to the

similar height within 0.05 mm (.002"). Seaming Chucks are constructed with thin material. Do not apply force to the chuck when clearing a jam, adjusting Knockout Pads, and setting seaming rolls. A good Seaming Chuck fit to the cover is essential to a good quality seam. Any wear and material build up will have a negative impact of chuck fit. Examine Seaming Chuck condition routinely to avoid potential seam issues. A complete set of spare Seaming Chucks should be kept on hand all times to avoid unexpected down time.

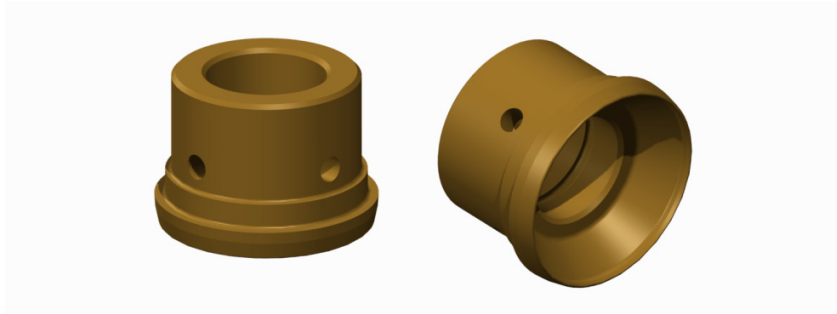


Figure 5-49: Seaming chucks

5.16.2. Seaming Rolls 1st and 2nd Operations

Seaming Rolls are one of the most crucial parts in the seamer that control the quality of the seam. The 1st operation Seaming Roll has the major influence of the final seam results. In order to achieve a good quality final seam, the 1st operation seam must be carefully adjusted to the cover manufacturer's specification. Seaming Roll groove profile determines seam integrity and quality. The Seaming thickness could be adjusted by changing the Seaming Roll and Seaming Chuck relative distance. A combination of Seaming Roll groove profile, Seaming Roll height, and lower chuck spring pressure control the seam height and countersink depth. It's recommended to have a spare set of Seaming Rolls on hand to minimize down time.

KHS Seaming Rolls come with a pair of ceramic hybrid bearing preassembled. The bearing life matches the Seaming Roll service life. Do not disassemble bearings from the Seaming roll for any reason. This only could be done at the KHS factory.

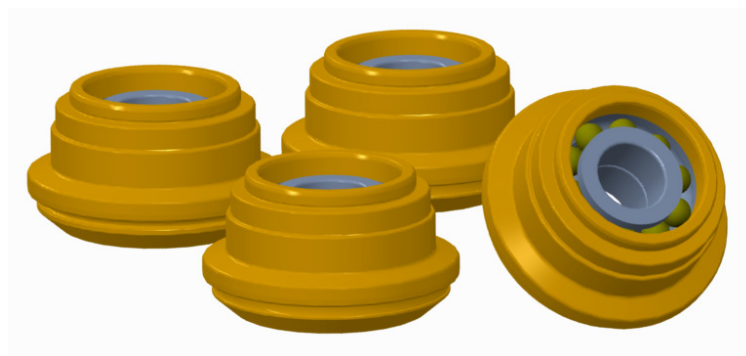


Figure 5-50: Seaming rolls



5.17. Tools and Wrenches

The regular and routine seamer adjustment and maintenance can be accomplished with regular mechanic hand tools. There are some special spanner wrenches for Seaming rolls, Seaming Chucks, Knockout Pads, and Lifter Plates removal and reinstallation. They are provided by KHS when the new machine is delivered.

5.18. Electrical Control

KHS TK250 seamer control is integrated into the KHS DVD-C filler control. See Filler manual for electrical control information.

6. Machine setup, Adjustment, and Service

The TK250 Seamer has been thoroughly tested under power and put into correct adjustment before leaving the factory. The Seamer was given a break-in run for several hours at gradually increasing speeds to assure all bearings and gears are properly broken in. Under normal operating conditions the Seamer should not lose its factory settings for many hours of production. Due to filling temperature, carbonation, and other factors, adjustments and alignment of format parts and tooling will be required. Worn or defective parts should be replaced immediately to maintain production efficiency and product quality. Check the Seamer periodically for loose or worn parts, alignment, timing, and seam setting. Make corrections if needed. In this section of manual, information is provided for setup guidelines, adjustment methods, routine maintenance requirements, major services, and replacement of components.

⚠ DANGER

Apply Lock Out Tag Out to electrical power, compressed air, water, and CO2 before working on the seamer.

6.1. Lifting/Return Cam

Tools required: 10 and 17 mm combination or socket wrenches.

The Lifting/Return Cam is the control component for the whole seamer timing setup. There is no adjustment once it is located on the pilot bore of the Seamer Table and 3 dowel pins on the top surface of the pilot bore. Two large access openings located at the service side and discharge side of the seamer allow this cam to be removed for examination or replacement if necessary. All Lifting Stations need to be removed before the Lifting/Return Cam could be removed. Follow the sequence 1, 2, and 3 as marked on Figure 6-1b to remove the cam. Reverse the sequence to install the cam. Under extreme conditions, the Cladding around the cam could be completely lifted up and out of the way for other major repairs. When lifting the Cladding, pay extra attention to the V-Ring above the Cladding. Do not damage the V-ring to prevent the oil leakage in the future.

An oil return passage is located under cam section #2. Keep the oil passage clear and open to assure the oil circulation.

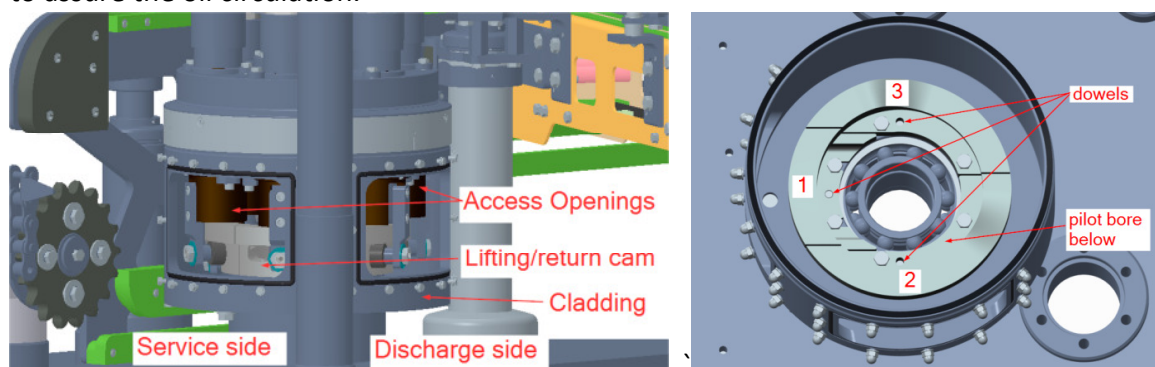


Figure 6-1a/6-1b: Lifting Cam/Return Cam

6.2. Seaming Cam

Tools required: 10, 13, 19 and 24 mm wrenches or socket wrenches.

The Seaming Cam is like the Lifting/Return Cam. The two large sections of the cam are located with 3 dowel pins. No adjustment is required. The 1st and 2nd operation seaming cycles are built in to the two cam tracks which are in sync with the Lifting Cam. To remove or install the Seaming Cam, all three service covers around the Top Housing and the top cover on the top of the top housing need to be removed for access. All Seaming Cam Followers with Seaming Cam Lever need to be removed before the removal of the Seaming Cam. Once all the Seaming Cam Levers are removed, place support blocks below the Seaming Cam, then loosen 6 bolts in green and 6 bolts in red evenly to lower the Seaming Cam to the support blocks.

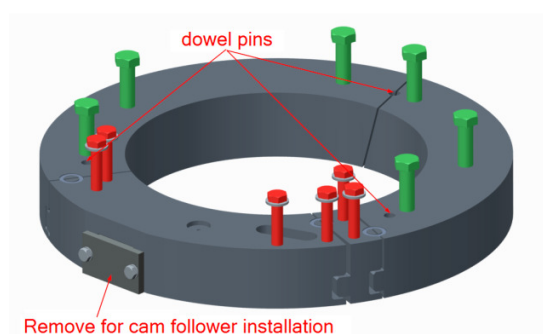


Figure 6-2: Seaming Cam

To perform a 1st operation seam test, the seamer needs to be set to 2nd operation Off-Seam mode (Off-Seam in short). Loosen 6 bolts in red color as illustrated in Figure 6-2 half turn and rotate the Off-Seam adjustment pin half turn counterclockwise, and then re-fasten 6 bolts. Run the machine in the **jog speed only** to perform the Off-Seam test. Reset back to On-Seam setting after the test before running the seamer in normal speed.

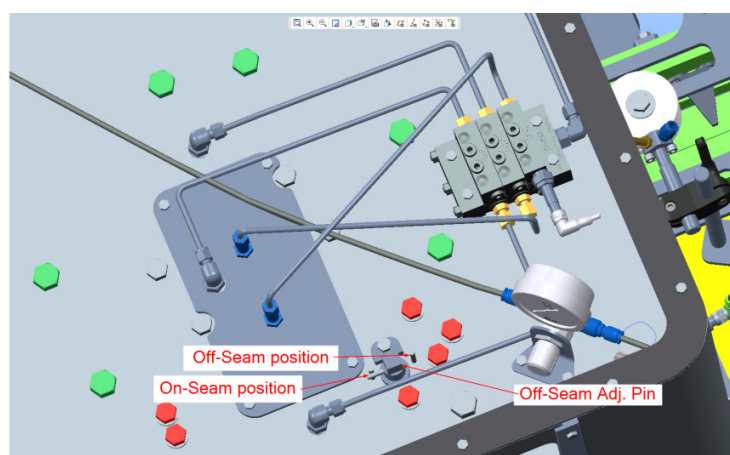


Figure 6-3: On-Seam and Off-Seam setting

NOTICE

Running the seamer at the production speed with Off-Seam setting will cause damage to the seaming Cam and the Seaming Cam Lever assemblies. Verify the seamer is set to On-Seam setting before running in production speed.

6.3. Knockout/Cap Centering Cam Installation and Adjustment

Tools required: 10 and 19 mm wrenches or socket wrenches.

The Knockout/Cap Centering Cam (K.O./C.C. Cam) is surrounded by the Seaming Cam. In order to remove or install the K.O. Cam, the seaming Cam must be removed. The K.O. Cam is secured by 4 bolts accessible from the top of the Top Housing. Rotate the cam counterclockwise to advance the Knockout Pads movement, and rotate the cam clockwise to delay the movement. K.O. Cam and C.C. Cam can be rotated independently. Rotate the C.C. Cam to allow the Knockout Pads to follow the can and cover assembly throughout the makeup area. Adjust the K.O. Cam radially until there is about 0.8 mm (0.031") clearance between cover and Knockout Pad at discharge. When tightening the bolts, the pilot bore of the cam must be tight against the pilot hub on the Top Housing. Height Adjustment of Knockout Rods should be made before adjusting the Cap Centering and Knockout Cam.

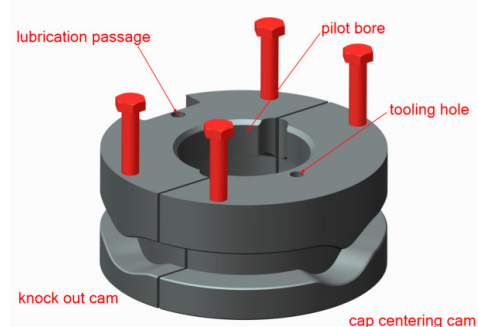


Figure 6-4: Knockout Cam

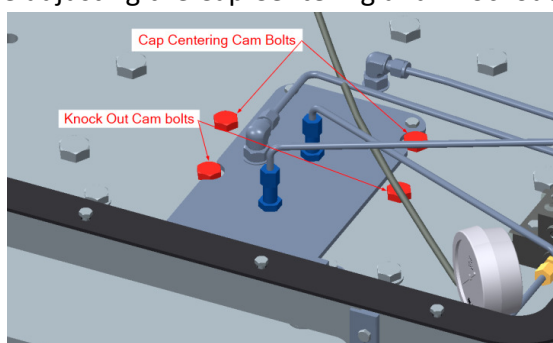


Figure 6-5: Knockout Cam Adjustment

6.4. Seaming Chucks Setup

Tools required: Hook spanner wrench KHS part number X07000754 or 5 mm (3/16") punch. To replacing the seaming chucks, all Knockout Pads and both 1st operation and 2nd operation Seaming Rolls must be removed to allow the spanner wrench or punch to access the grip holes on the side of the seaming chuck body and the removal/installation of the chucks. Once the Seaming Rolls and Knockout Pads are removed, use KHS hook spanner wrench or punch to break loose the seaming chuck by rotating the chuck counterclockwise. After the chucks are broken loose, they can be unscrewed by hand.

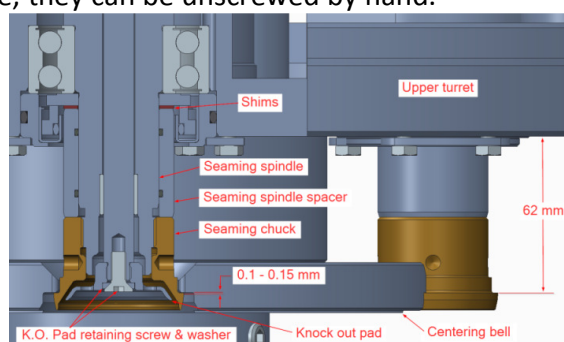


Figure 6-6: Seaming Chucks

It is recommended to mark the Seamer Chucks as they are removed so they can be reinstalled into their original locations. All seaming chucks must be planed within 0.05 mm (0.002") height relative to each other. Chuck flange also needs to be set at 0.1 to 0.15 mm (0.004-0.006") below the Centering Ring. Various thickness of shims, 85013113S010 (0.1 mm), 85013113S025 (0.25 mm), 85013113S040 (0.4 mm), are supplied in the seamer tool kits to plane the Seaming Chucks and set the clearance between Seaming Chuck and the Centering Ring. These shims must be installed above the Seaming Spindle Spacer. Do not install shims between the Seaming Spindle Spacer and the Seaming Chuck. The distance between the bottom surface of Seaming Turret and the flange of Seaming Chucks should be 62 ± 0.1 mm when chucks are properly shimmed.

6.5. Seaming Roll Lever Installation

Tools required: 5 mm hex key, thread locking adhesive (Loctite® 243)

To remove the Seaming Levers, rotate the seaming station that the lever is intended to be removed from to a position that the seaming roll outside diameter is clear of the Seaming Chuck flange. The seaming Roll Levers assembly and Seaming Roll could be removed together by loosening the M8x16 flat head screw. Once the Seaming Roll Lever is removed, the bronze Wear Ring might come off with the lever. If the bronze Wear Ring did not stay with the Seaming Roll Lever, remove it and keep it together with the lever and mark the seaming station number on the lever. It is a good practice to reinstall the lever assembly on the same seaming station where it was removed and not to mix the bronze Wear Washer with different Seaming Lever from other seaming station. This will minimize the seaming roll height and seam setting time.

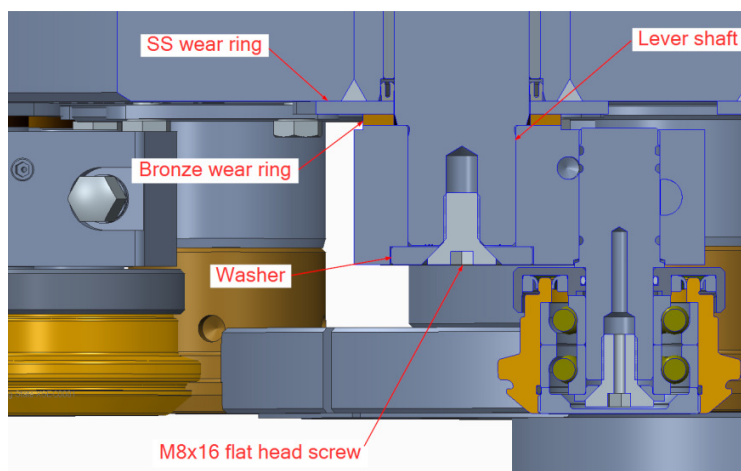


Figure 6-7: Seaming Lever removal

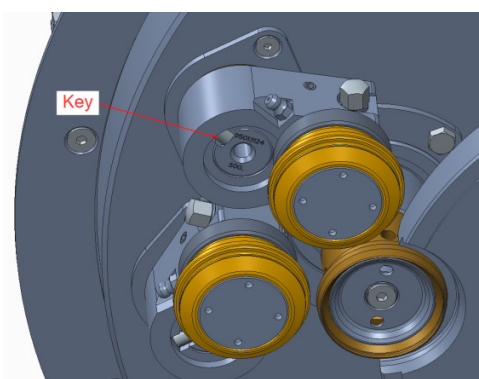


Figure 6-8: Shaft Key

Before reinstalling the Seaming Lever Assembly onto the Seaming Lever Shaft, both SS and bronze Wear Rings surface must be thoroughly cleaned. Apply a light coat of NLGI 1 or 2 food grade grease between the two Wear Rings contact surfaces. Align the lever keyway to the key on the Lever Shaft. Apply thread locking adhesive to the M8x16 flat head screw and

tighten to 8 Nm (70 in-lb). Allow sufficient time for the thread locking adhesive to cure before running the seamer.

6.6. Seaming Lever Shaft Setup

Tools required: 4 mm and 8 mm hex keys, 8 mm open wrench, 19 mm twelve-point box wrench, feeler gauge, indicator (0.02 mm/0.001"), thread locking adhesive (Loctite® 243).

In order to remove the seaming lever shaft, the Seaming Roll Lever assembly and Seaming Roll assembly must be removed first. See section 6.5 for the removal of the Seaming Roll Lever. After removing the Seaming Roll Lever, raise the seamer pin height to 200 mm (7.875"). Loosen the Clamp bolt and Clamp Nut half to one turn. Back out two Seam Adjusting Screws for 20 mm. Unscrew the Height Adjusting Screw until it is disengaged from the Seaming Lever Shaft. Pull the Seaming Lever Shaft down from the bottom of the Seaming Turret. Some oil will come out when pulling the Seaming Lever Shaft out. If the shaft will be reinstalled later, mark the number of the seaming station and the number of the operation on the shaft. It is recommended to reinstall the used shaft to its original seaming station. The 1st and 2nd operation shafts are not interchangeable.

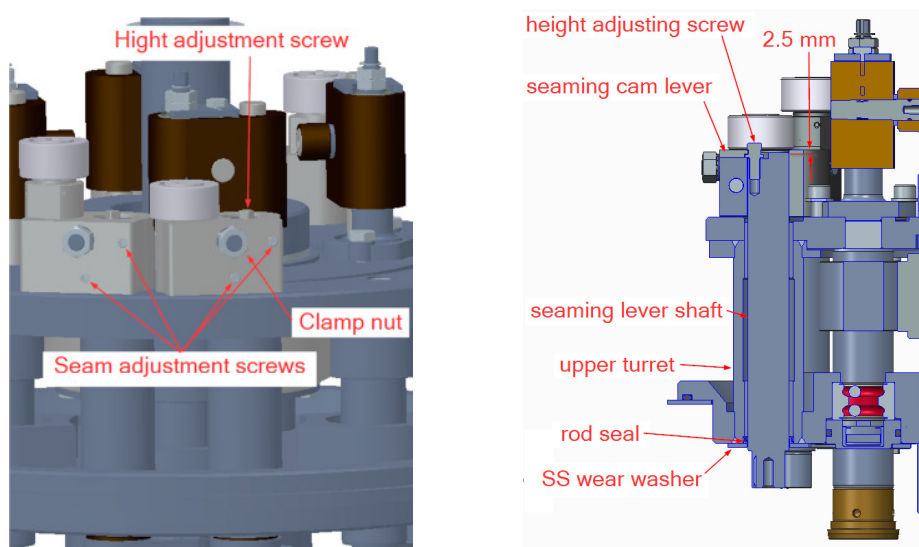


Figure 6-9: Seaming Lever Shaft

Before installing the Seaming Lever Shaft, the shaft bores must be cleaned thoroughly with bottle brush and seamer oil. Installation procedures are the reverse procedure from the removal. When pulling the shaft up with the Height Adjusting Screw, do not over tighten the Height Adjusting Screw. Leave the top of the shaft 2.5 to 3 mm (0.10 to 0.12") below the top surface of Seaming Cam Lever initially. Apply thread locking fluid to the M5 flat head screws when install the SS Wear Washer. Snug the Clamp Nut, Clamp Bolt, and the Seam Adjusting Screws. The final tightening should be completed after the Seaming Lever is installed and the Seaming Cam Lever height and seam thickness are set. Use feeler gauge or indicator to set the Seaming Lever Shaft vertical play to 0.05 to 0.10 mm (0.002 to 0.004") by turning the

Height Adjusting Screw. If the Rod Seal needed to be replaced, KHS fixture 85035020S001 must be used to install the new rod seal.

6.7. Seaming Roll to Seaming Chuck Height Adjustment

Tools required: 0.05 or 0.075 mm (0.002 or 0.003") shims, 10 mm combination wrench.

The maximum vertical clearance between the 1st Operation Seaming Roll and the Seaming Chuck flange is 0.075 mm (0.003"). The maximum vertical clearance between the 2nd Operation Seaming Roll and the Seaming Chuck flange is 0.15 mm (0.006"). When the Seaming Roll to the Seaming Chuck relative height is adjusted correctly, both 1st Operation and 2nd Operation Seaming Rolls should not contact the Seaming Chuck. Verify the setting by hand cranking the seamer for one complete revolution of the Seaming Turret. Observe the Seaming Rolls at the 1st operation and 2nd operation seam setting marks. If the roll is dragging on the Seaming Chuck, the clearance is set too narrow. It needs to be increased.

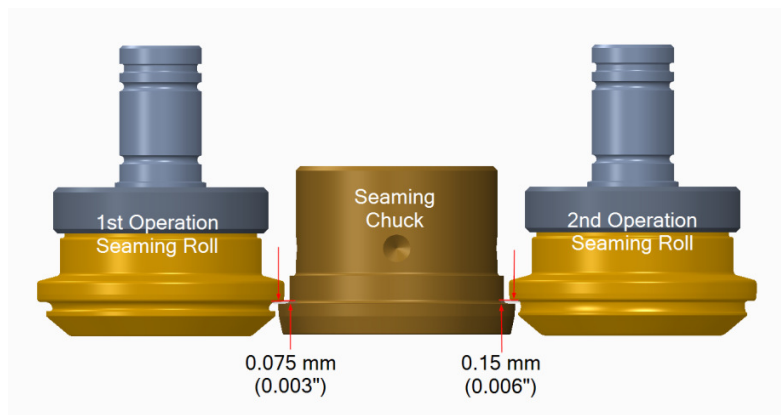


Figure 6-10: Seaming Roll to Seaming Chuck Height Setting

Adjustment in height of Seaming Rolls relative to Seaming Chucks should always be made with Seaming Rolls at the limit of their inward travel toward the Seaming Chuck and with Seaming Rolls in approximately the proper setting for seam thickness.

Rotate Seaming Turret until the center mark on the outside of the Lower Turret Belt below the Seaming Station is positioned above the marking "1 OP" or "2 OP", depending on which operation Seaming Roll is to be adjusted. All adjustments to Seaming Rolls should be made in one of these positions.

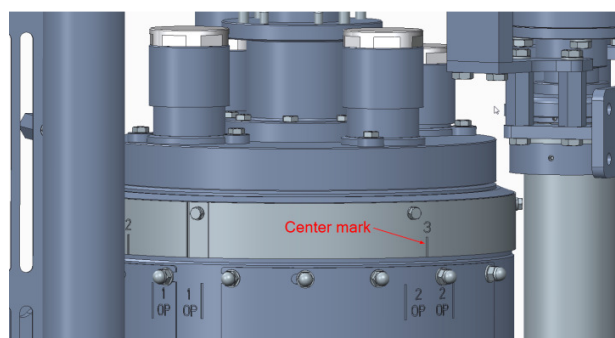


Figure 6-11: Seaming Roll Height Setting Position

Use 10 mm wrench to loosen the Clamp Nut on the side of the Seaming Lever half turn counterclockwise, then hand tight the nut. Hold the Sealing Cap outside diameter with slight downward force and rotate the Seaming Roll assembly counterclockwise (looking from bottom of the Seaming Roll) until chuck flange and roll are lightly in contact, then adjust the Pin upward approximately 1/20 of a turn for 1st Operation Seaming Rolls and 1/10 of a turn for 2nd Operation Seaming Rolls. This will set the 1st Operation Seaming Roll 0.075 mm (0.003") and 2nd Operation Seaming Rolls 0.15 mm (0.006") above the Seaming Chuck flange. Tighten the Clamp Nut then verify the setting with shim stripes.

NOTICE

Always finish the adjustment with downward force and clockwise motion to eliminate the backlash.

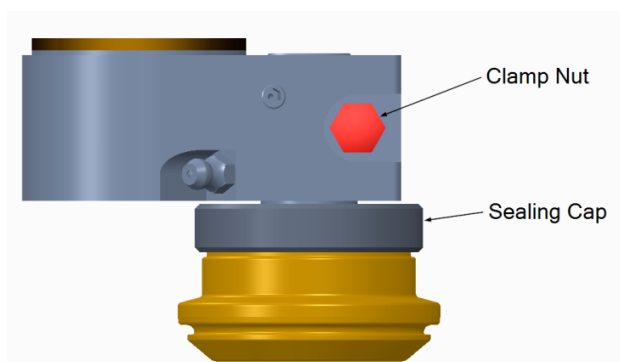


Figure 6-12: Seaming Roll to Seaming Chuck Height Adjustment

6.8. Seam Thickness Adjustment

Tools required: 4 mm and 8 mm hex keys, 19 mm twelve-point box wrench, feeler gauge.

The seam thickness is determined by the horizontal distance setting between the Seaming Roll and Seaming Chuck. The initial seam setting is based on the 1st and 2nd operation seam thickness (T1 & T2) and the Seaming Roll profiles specified by the cans and lids supplier. The initial setting dimension X1 and X2 is calculated as following. Contact KHS for the profile depth dimensions.

$$X1 = T1 - 1^{\text{st}} \text{ OP. profile depth}$$

$$X2 = T2 - 2^{\text{nd}} \text{ OP. profile depth}$$

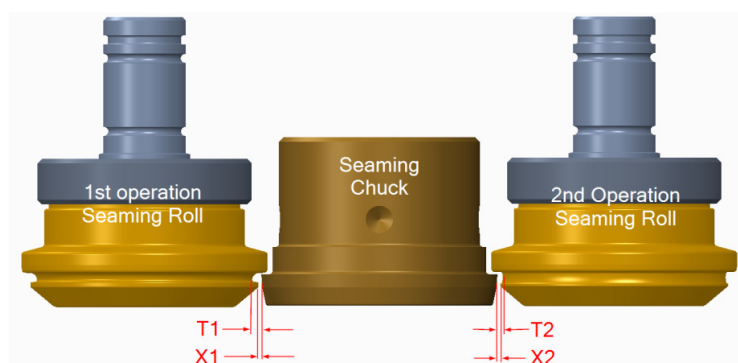


Figure 6-13: Seam Thickness Setting

Rotate Seaming Turret until the center mark on the outside of the Lower Turret Belt below the Seaming Station is positioned above the marking "1 OP" or "2 OP", depending on which operation Seaming Roll is to be adjusted. All adjustments to Seaming Rolls should be made in one of these positions. See Figure 6-11 on section 6.7. Loosen the clamp nut $\frac{1}{4}$ turn counterclockwise then hand tight. To reduce the seam thickness setting, loosen the lower left Seam Adj. Screw, and then tighten the upper right Seam Adj. Screw. Use Feeler gauges to verify the X1 or X2 gap. Retighten the lower left Seam Adj. Screw. Tighten the Clamp Nut after adjustment. Verify the Seaming Roll is not contacting the Seaming Chuck after reducing the seam thickness. To increase the seam thickness, loosen the upper right Seam Adj. Screw first, and then tighten the lower left Seam Adj. Screw.

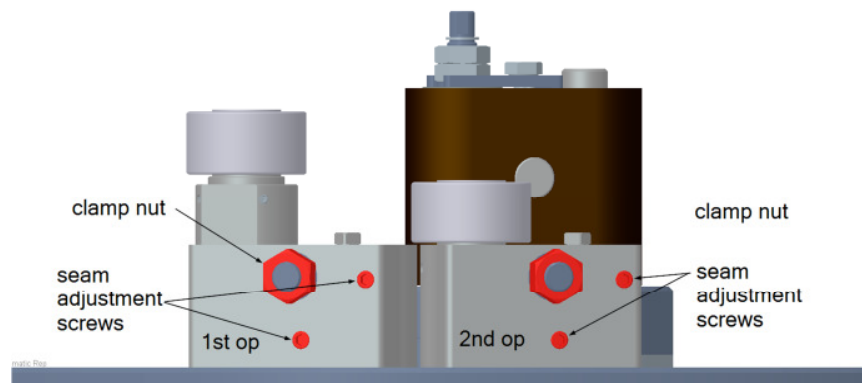


Figure 6-14: Seam Thickness Adjustment

6.9. Plane Lifter Can Plates

Tools required: KHS open wrench 85035002S001, KHS spanner wrench 304999950046, 85013172S010, 85013172S020, Depth Gauge or Depth Micrometer.

All Lifter Plates need to be set at the same plane level before setting the seamer pin height. Rotate Seaming Turret until the first seaming station center mark on the outside of the Lower Turret Belt below the Seaming Station is positioned between the two markings of "1st OP". Take a measurement from the top surface of the Lifter Plate to the top surface of the Lower Seaming Turret. The dimension should be 103 ± 0.03 mm (4.055 ± 0.001 "). To adjust the Lifter plate plane level, remove the Can Plate with KHS wrench 85035002S001 turning clockwise, and then remove the Support Plate 85013170S001 turning clockwise. Add or remove amount of the shims to achieve 103 ± 0.03 mm height. Apply a light coat of food grade anti-seize over the Support Plate and Can Plate threads before re-assemble. Snag tight the Support plate with KHS spanner wrench 304999950046. Attached Can plate and tighten with KHS open wrench 85035002S001. Verify the distance between the top surface of the Can Plate and the top surface of the Lower Turret with depth micrometer or depth gauge. Repeat the same procedures for the remaining seaming stations.

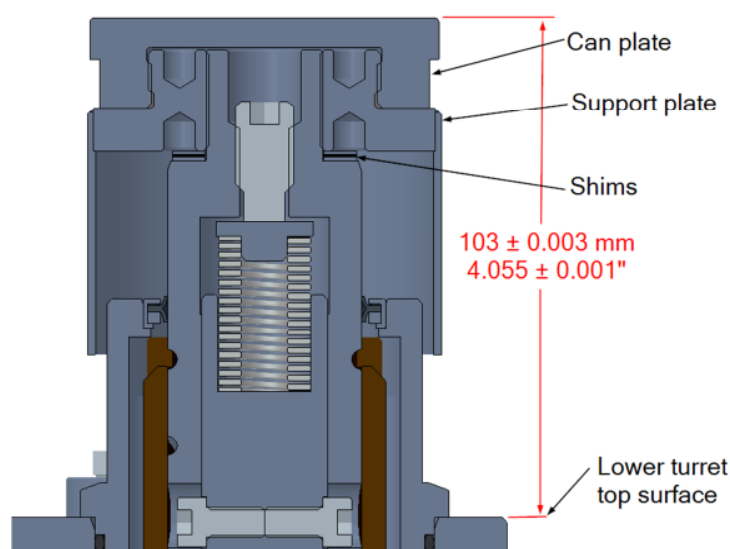


Figure 6-15: Plane Lifter Plates

6.10. Lifter Spring Pressure Adjustment

Tools required: KHS open wrench 85035002S001, 6 mm Hex Key, spring pressure gauge with Seaming Chuck adapter and spacer, thread locking adhesive.

Remove the Lifter Plate with the open wrench 85035002S001 to access the Adjustment Screw. Turn the Adjustment Screw with 6 mm Hex Key. Each clockwise turn increases 116 Newton (26 pound) of spring pressure. Rotate counterclockwise to reduce spring pressure. Use thread locking adhesive on the Adjustment Screw. Replace the lifter plate and measure the spring pressure with spring pressure gauge. See spring pressure gauge manual from your supplier for the measuring procedure.

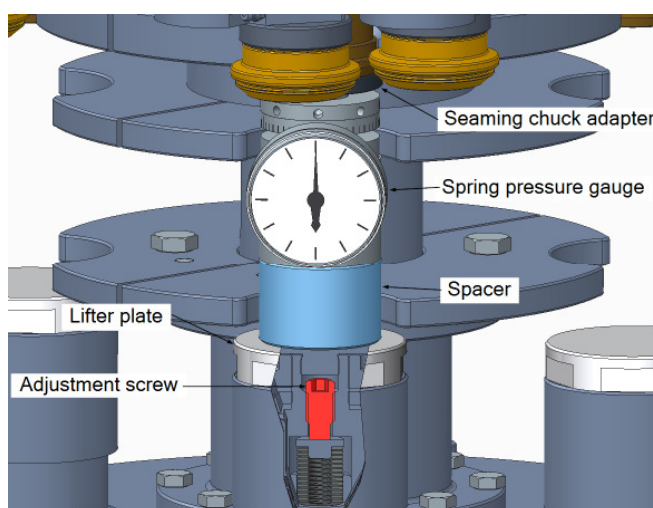


Figure 6-16: Lifter Spring Pressure Adjustment

6.11. Pin Gauge Height (Pin Height) Adjustment

Tools required: 6 mm Hex Key, 13 mm open wrench, 22 mm deep socket with socket wrench, pin height gauge or planner gauge.

Your cans supplier normally will provide the pin gauge height specification which is the distance between the bottom surface of the Seaming Chuck and top surface of the Lifter Plate at the First Operation set seam location. When this information is not available, the initial pin height could be calculated with following formula.

	Metric	Inch
Seaming Chuck Flange Thickness	6.86 mm	0.270"
+ Lifter Spring Deflection	+ 0.56 mm	+ 0.022"
+ Can Height Lost in Seaming	+ 0.53 mm	+ 0.021"
= Total Number	7.95 mm	0.312"
Can Height	122.23 mm	4.812"
- Total Number	- 7.95 mm	- 0.312"
= Pin Gauge Height	114.28 mm	4.500"

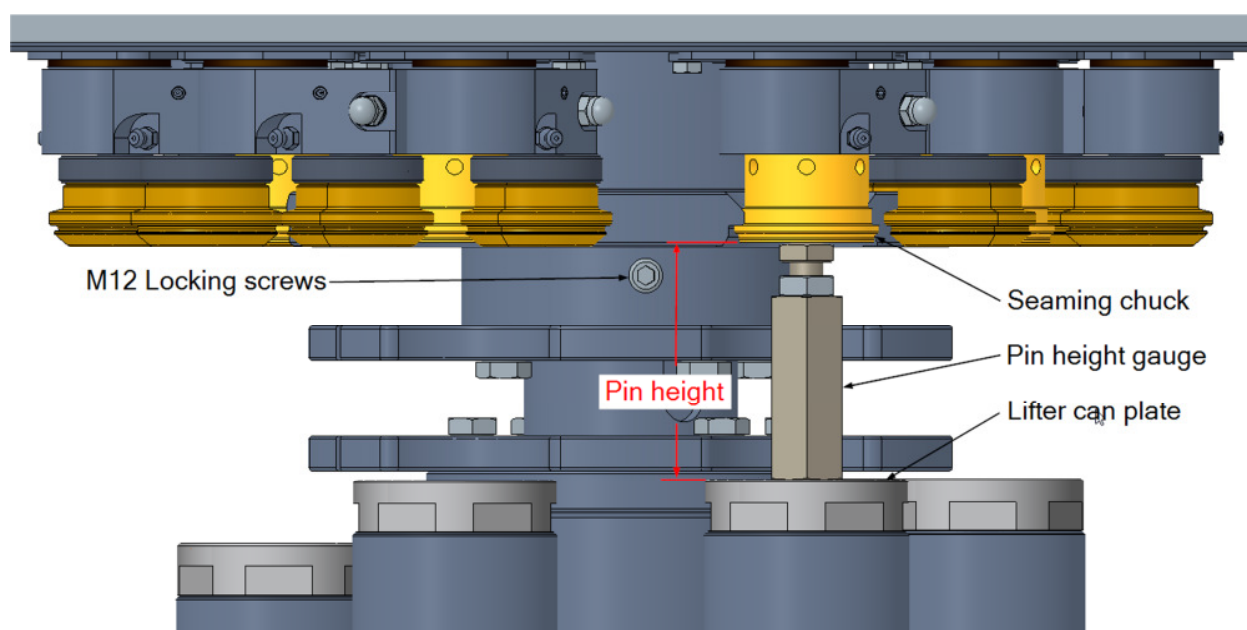


Figure 6-17: Pin Gauge Height

Rotate the number one seaming station to the first operation seam setting location. Loosen two M12 locking setscrews (Fig. 6-17) located on the hub of Seaming Turret Upper a half turn with 6 mm Hex Key. Loosen two M8 Hex Head Screws (Fig 6-18) half turn and swing open the cover located on the top surface of the Top Housing. Attach the 22 mm deep socket to the shaft. Turning clockwise to lower the pin height and counterclockwise to raise the pin height. Each turn of the Shaft will raise or lower the pin height for 3 mm (0.118").

Always finalize the pin height adjustment at the upward movement. Retighten the two M12 locking setscrews. After the initial pin height is set, fine tuning is required to optimize the final seaming results.

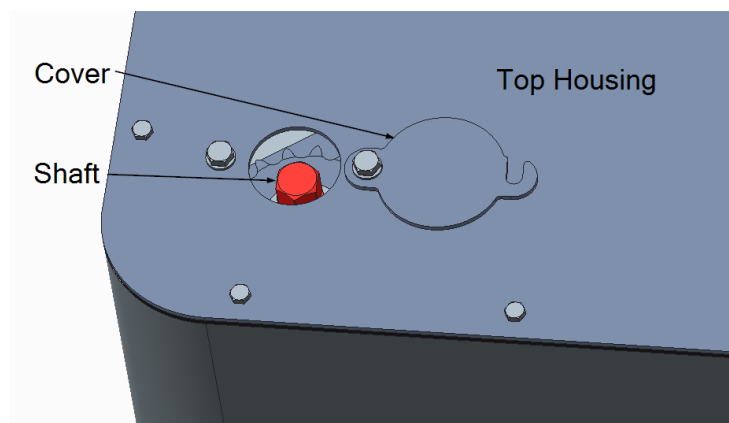


Figure 6-18: Change Pin Gauge Height

6.12. Return Cam Follower Running Clearance Adjustment

Tools required: 13 mm socket wrench or combination wrench, 6 mm hex key, feeler gauge, thread locking adhesive.

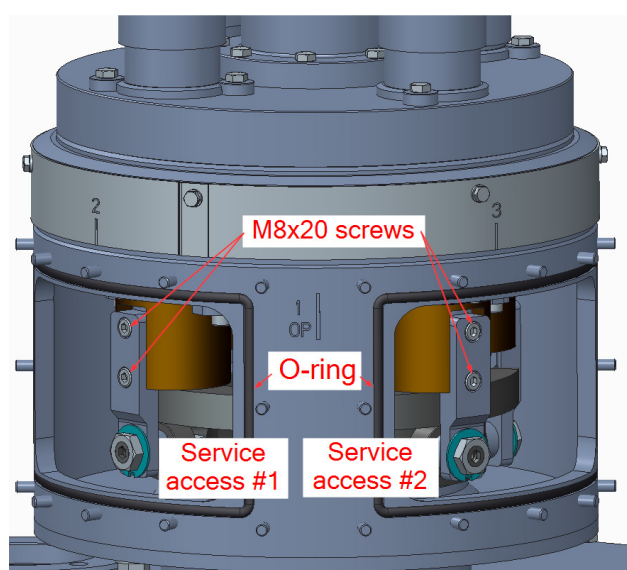


Figure 6-19: Return Cam Roll Access

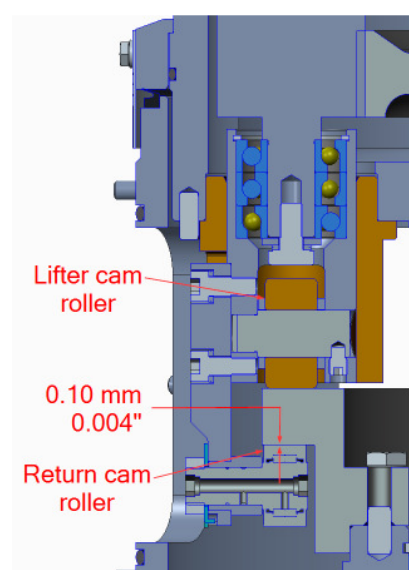


Figure 6-20: Return Cam Roll

The Return Cam Follower could be accessed through 2 service access openings locate at the discharge side and Can Feed Drive side. Remove either access cover with 13 mm wrench, and rotate the seaming station to the center of the opening. Use 6 mm hex key to loosen two M8x20 hex socket head screws for ½ turn, use the feeler gauge to set 0.1 mm (0.004") running clearance between lifter cam roller and return cam roller at the tightest spot for all stations. Retighten two M8x20 screws.

6.13. Cap Magazine Guides Adjustment

Tools required: 10 mm and 13 mm combination wrenches, feeler gauge.

Cap Magazine Guides Left and Right are tapered from the top down to within about 30 mm from the bottom where the cover will reach its lowest point. Measurements have to be taken at the lowest point of the Magazine Guides when adjustments are made. Both dimension A's should be equal, and Dimension B equals the lid curl diameter plus 0.25 to 0.5 mm (0.01 to 0.02").

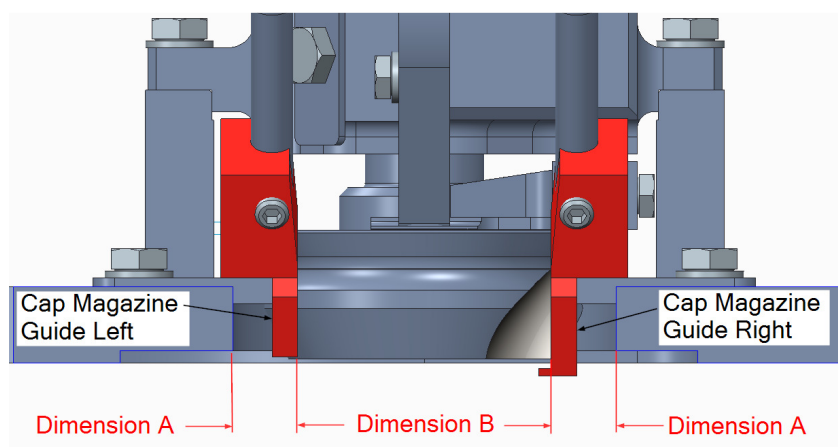


Figure 6-21: Cap Magazine Guide Left and Right Setting

Set the front edge of Cap Magazine Front flush with the ledge of Cap Guide Outer.

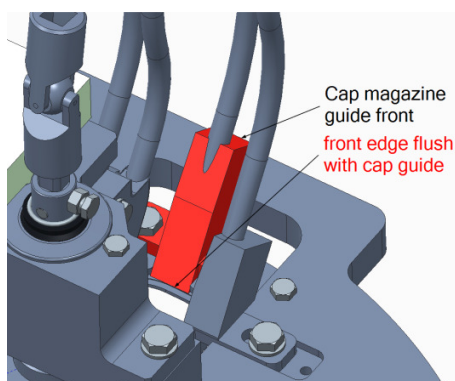


Figure 6-22: Cap Magazine Guide Front Setting

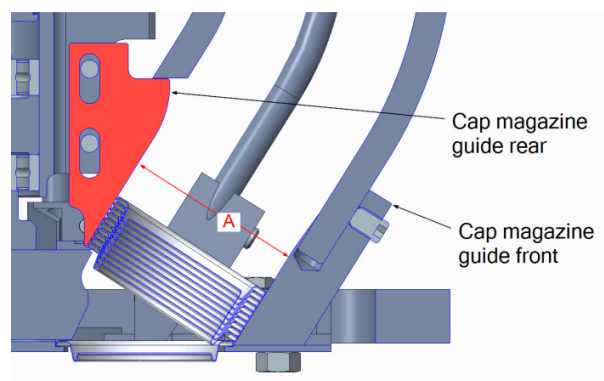


Figure 6-23: Cap Magazine Guide Rear Setting

Set Cap Magazine Guide Rear to Cap Magazine Guide Front distance A to the lid curl diameter plus 0.25 to 0.5 mm (0.01 to 0.02") at the lowest point of the Magazine Guides.

6.14. Cover Separator Wheel Adjustment

Tools required: 13 mm combination wrench, feeler gauge

To set the horizontal location of the Separator Wheel, loosen two M8x25 screws half turn. Adjust Separator Wheel to place the "Root" of the Separator Wheel even with or just in front of the Cap Guide Inner. Covers being fed should not catch on the Cap Guide Inner top edge and should fall freely to the ledge of Gap Guide Inner.

To set the vertical position, loosen one M8x20 screw half turn. Use feeler gauge to set 0.1 to 0.25 mm (0.004 to 0.010") clearance between the top surface of the lid and the bottom surface of the Separator Wheel. Retighten the screw after the proper height is set.

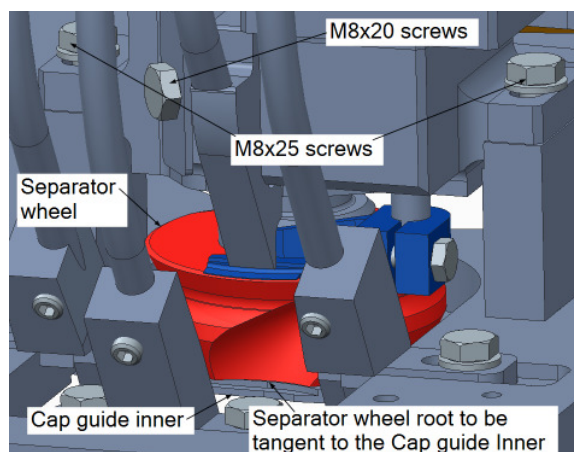


Figure 6-24: Separator Horizontal Position

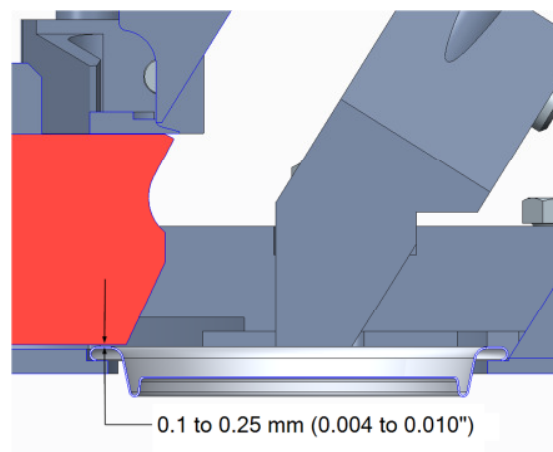


Figure 6-25: Separator Vertical Position

6.15. No-Can No-Cover Finger (NC/NC Finger) Adjustment

Tools required: 10 mm combination wrenches, feeler gauge.

If the Separator Wheel has to be raised then pay special attention to the clearance between the NC/NC Finger and Separator Wheel. This could be put into a bind. Loosen the M6x20 clamping screw half turn before raise the Separator Wheel. After height setting is completed for the Separator Wheel, set 0.07 to 0.15 mm (0.003 to 0.006") between NC/NC Finger and Separator Wheel. This should allow the NC/NC Finger to move back and forth freely without contacting the Separator Wheel. Set the projection of NC/NC Finger 1.6 mm (0.063) into the Cap Magazine Guide rear.

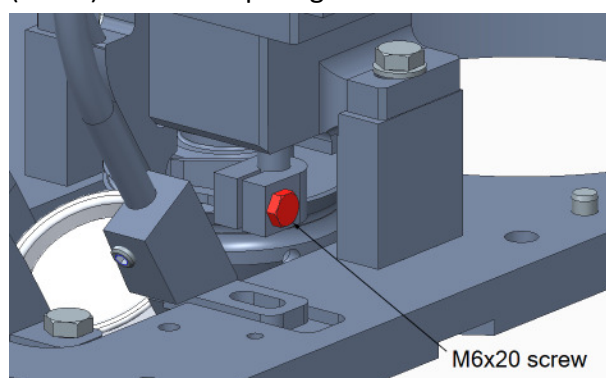


Figure 6-26: NC/NC Finger Clamping screw

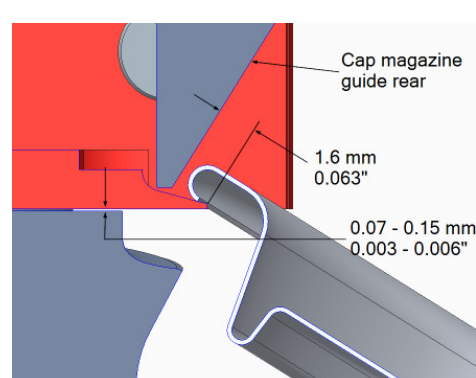


Figure 6-27: NC/NC Finger Adjustment

6.16. Separator Wheel to Cap Pusher Timing Adjustment

Tools required: none.

The Separator Wheel is driven and electronically synchronized by the Servo Motor using the timing adjustability from the Operator Control Console. The Home position of the Separator Wheel is preset at the factory. If the home position needs to be reset, contact KHS Service Department. Generally, the Separator Wheel releases a lid into the Cap Guide Rails when

the trailing Cap Pusher located on the Nozzle Plate is 6.5 to 8 mm (0.25 to 0.31") before making contact with the lid. This distance could be verified by using Hand Wheel to rotate the seamer.

6.17. No Can No Cover Sensor and Flag Sensor Setup

Tools required: 10 and 13 mm combination wrenches.

Jog the Seamer until the NC/NC Flag is in front of NC/NC sensor as seen in the Figure 6-28. Counting the number of the Can Feed Star pockets from the separator wheel to the lid/can makeup position at the cross center line of Can Feed Turret and Seaming Star. It should be 4 pockets for TK250/4 seamer and 5.5 pockets for TK250/6 seamer. Count backward the same number of infeed chain space from the center line of seamer and add 1.5 to

this number, ie. 5.5 for TK250/4 seamer and 7 pockets for TK250/6 seamer. That will be the rough position of can sensor.

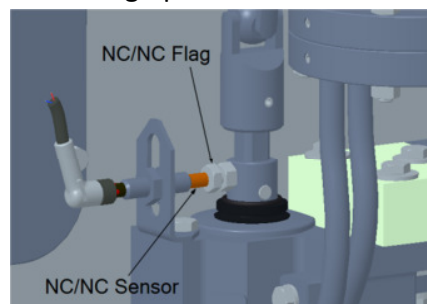


Figure 6-28: NC/NC Sensor Setup Position

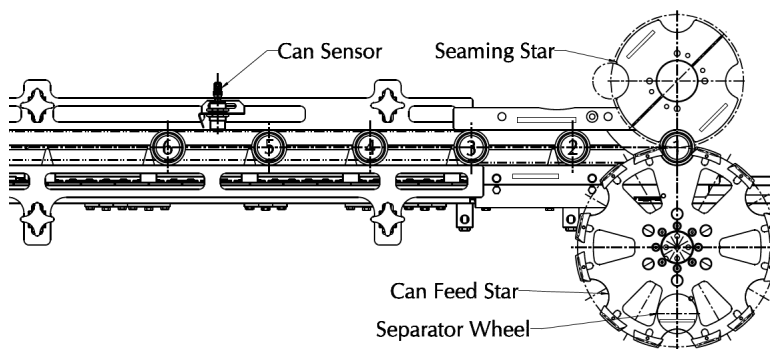


Figure 6-29: NC/NC Sensor Location

Adjust if necessary by moving the can sensor. The adjustment is not critical. It could be ± 12 mm (± 0.5 ") as long as the Flag sensor signal will rise at or before the fall of the Can sensor.

6.18. Cover Low Stack Sensor Setup

Tools required: 10 and 13 mm wrenches.

The Cover Low Stack Sensor could be installed in any location along the cap magazine and the Cover Feed V-Chute. The minimum distance of the sensor must be 100 mm (4") above the Separator Wheel. The most common location is on or below the connecting rings. The sensing head should be set within 1.5 mm (0.06") maximum from the cover stack.

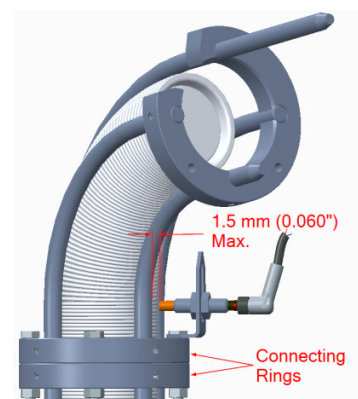


Figure 6-30: Cover Low Stack Sensor

6.19. Can Feed Turret Setup

Tools Required: 19 mm combination wrench, 6 mm hex key, 85018140S010 and 85018140S020 shims.

The proper running clearance needs to be set when a new Can Feed Turret Assembly is installed or when changeover occurs. 0.8 to 1.5 mm (0.032 to 0.060") running clearance between the bottom surface of the Can Guide Inner and the top surface of the Can Feed Turret Assembly should be maintained. Add or remove Feed Turret Shims to achieve the proper running clearance.

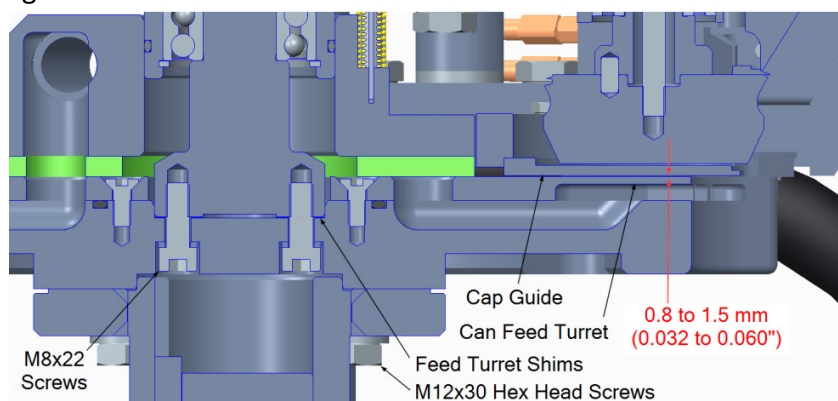


Figure 6-31: Can Feed Turret Elevation

The Can Feed Turret timing needs to be synchronized with the Seaming Star. The timing of the Can Feed Turret could be set by placing a sample can or Timing Plug at the tangent point of Can Feed Turret and Seaming Star. Loosen four M12x30 Hex Head Screws half turn, and rotate the Can Feed Turret pocket to align with Seaming Star pocket to form a complete circle.

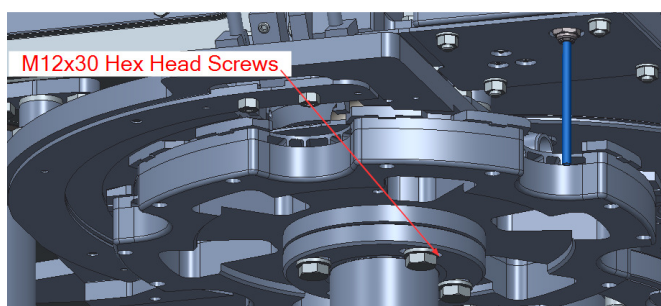


Figure 6-32: Can Feed Turret Timing Adjustment

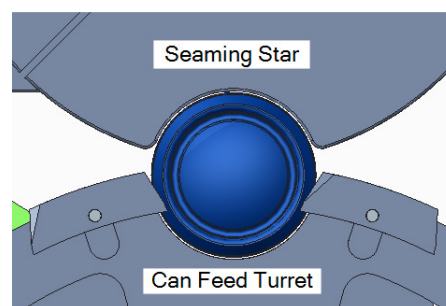


Figure 6-33: Can Feed Turret Alignment

6.20. Can Feed Chain Clearance and Timing

Tools Required: 13, 15, 19, 22, and 30 mm combination wrench

The Can Feed Chain needs to be under light tension constantly in order to keep the filler and seamer in sync. To adjust the chain tension, loosen the M8x20 screw holding the Locking Plate one turn. Disengage the Locking Plate from the Slide Rod. Hold the free end of the Slide Rod with the 22 mm wrench, and loosen the M20 Jam nut one full turn. Turn the Thread Bolt clockwise all the way which will retract the Slide Bar to the support block. Pull

the complete Chain Tensioner Assembly away from the seamer by hand, and latch the Locking Plate into the closest slot on the Slide Bar. Retighten the M8 x20 Screw, and then turn the Thread Bolt counterclockwise until you feel a slight resistance. Can Feed Chain should have the proper tension at this time. Tighten the M20 Jam Nut.

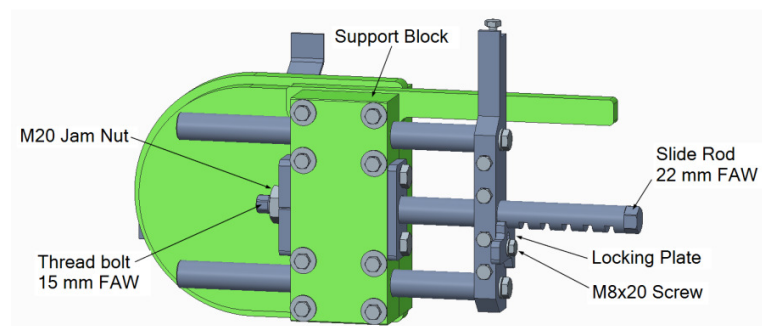


Figure 6-34: Can Feed Chain Tension Adjustment

Once the chain tension is set, proceed to set Can Feed Chain to Can Feed Turret Timing. Position a sample can or Timing Plug at the tangent point of Can Feed Turret and Seaming Star as shown on Figure 6-33. Set the Can Feed Chain Finger 3 mm (0.12") behind the can or Timing Plug at this point.

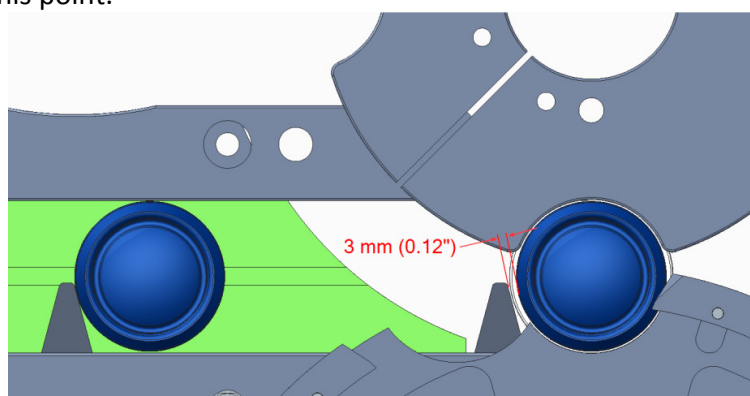


Figure 6-35: Can Feed Chain to Seamer Setting

To adjust the Can Feed Chain, remove the Chain Guard if equipped. Loosen four M12x40 screw one turn. Set the chain Finger 3 mm (0.12") from can when can is at the center of the seamer. Retighten the screws and reinstall the Chain Guard.

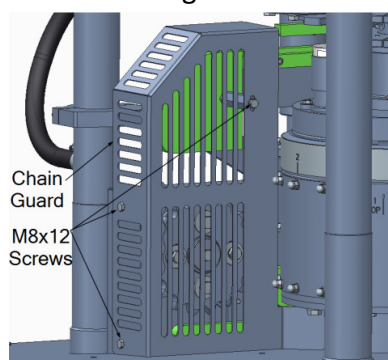


Figure 6-36: Chain Guard Removal

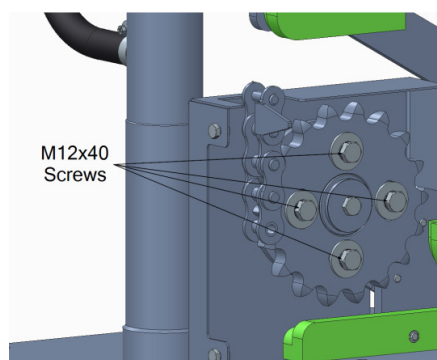


Figure 6-37: Can Feed Chain Adjustment

6.21. Synchronize Seamer to Filler

Tools required: None.

Once the Can Feed Chain has been repositioned by moving the Chain Wheel, the filler and seamer need to be resynchronized. This can only be done while the filler/seamer control is powered up.

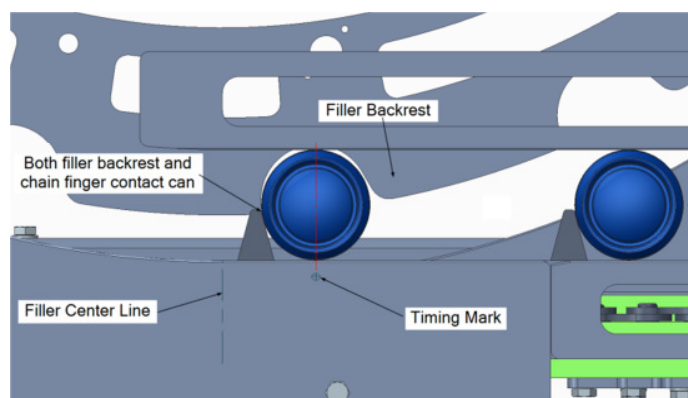


Figure 6-38: Filler/Seamer Synchronization

Jog a sample can or Timing Plug in front of the Timing Mark located on the Filler Discharge Can Guide. Both Filler Backrest and Can Feed Chain should contact the sample can or Timing Plug outside diameter at this point on the can trailing surface. Advance or retard the seamer chain by turning the rotate the seamer hand wheel to this position. Save "Home position" for filler and seamer servo control once both filler and seamer are in position. See DVD-C Can Filler Manual for how to set machine home position.

6.22. Discharge Star Timing Adjustment

Tools required: 17 mm combination wrench.

Position a seaming station by aligning it with the center line between the seaming Star and Discharge Star. Loosen the four M10x25 Screws located at the bottom surface of Discharge Star Hub half turn. Rotate the Discharge Star by hand to form a true circle. Retighten four M10x25 Screws after.

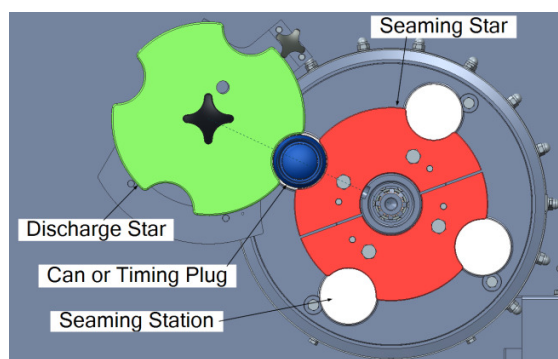


Figure 6-39: Align Seaming Star to Discharge Star

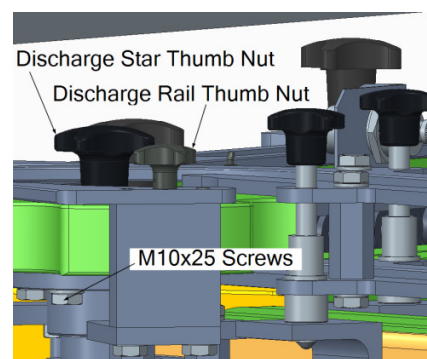


Figure 6-40: Fasteners Location

To replace the Discharge Star or perform a can size changeover, remove the Discharge Star and Discharge Rail Thumb Nuts, and then remove the Discharge rail and Discharge Star by lifting them straight upward. Do not loosen the 4 M10x25 screws. The Discharge Star timing should not move with can size changeover.

6.23. Can Guides Adjustment

Tools required: 13 mm, 14 mm combination wrench, Timing Plugs.

The Infeed & Discharge Rail running clearance must be set first before setting other rails. Loosen the two Thumb Bolts and the Clamping Bolt half to one turn. The Infeed & Discharge Rail is positioned 0.2 to 0.4 mm (0.008 to 0.016") inside the bore of the Infeed Star (Fig. 6-42). Place two sample cans or Timing Plugs in the Discharge Star bores, the diametrical clearance between sample cans or Timing Plugs should be 1 to 1.3 mm (0.04 to 0.05").

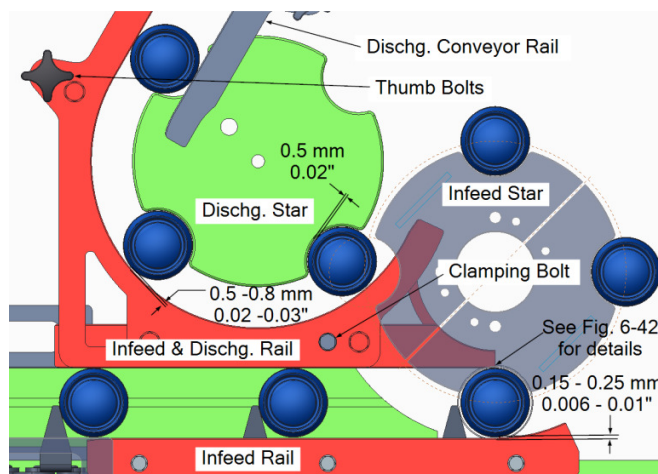


Figure 6-41: Can Guides Setup

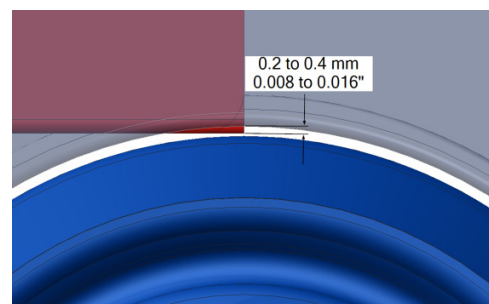


Figure 6-42: Infeed Dischg. Rail Position

Place two sample cans or Timing Plugs at the seaming station and at the leading end of the Infeed Rail. Set the Infeed Rail with 0.15 to 0.25 mm (0.006 to 0.010") running clearance. Place two sample cans or Timing Plugs at the Discharge Conveyor, and set the running clearance of Discharge Conveyor Rail to 1 to 1.3 mm (0.04 to 0.05"). Align the Infeed Conveyor Can Guides to be tangent to the Infeed & Discharge Rail and Infeed Rail.

6.24. Knockout Pads Height Adjustment

Tools required: 10 mm open wrench, two 19 mm offset thin open wrench (85035046S001), inside micrometer, feeler gauge.

Knockout Rods with Pads should contact the cover with a light pressure when the Knockout Rod is at its lowest point of travel, which is at the makeup area where the Seaming Turret and the Can Feed Turret is tangent (Fig.6-44). Height Adjustment of Knockout Rods should be made before adjusting the Cap Centering and Knockout Cam.

To adjust the Knockout Rod height, feed a cover through the machine by hand until it is in the area of makeup. The Knockout Rod should be at its lowest point. Adjustment nuts are not accessible at this point; therefore, make notes of where the Knockout Pad is in relation

to the cover. Excessive pressure on the cover or clearance between cover and pad will require adjustment. Rotate the Seamer around and locate the station being worked on between "1 OP" and the second "2 OP" (see Fig. 6-11). Make a mark on the Lower Turret Cladding directly below the center mark of the seaming station so that all Knockout Rods can be adjusted at the same location. Remove Top Housing Service Cover at the discharge side and make adjustments by holding the Knockout Rod and turning the bottom M12 Jam Nut. Clockwise rotation of the Jam Nut will raise the Knockout Rod. Make adjustments and tighten both M12 Jam Nuts against each other to ensure height position.

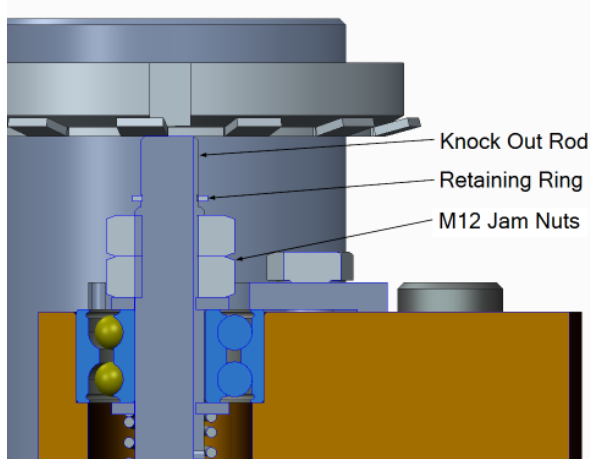


Figure 6-43: Knockout Rod Height Adjustment

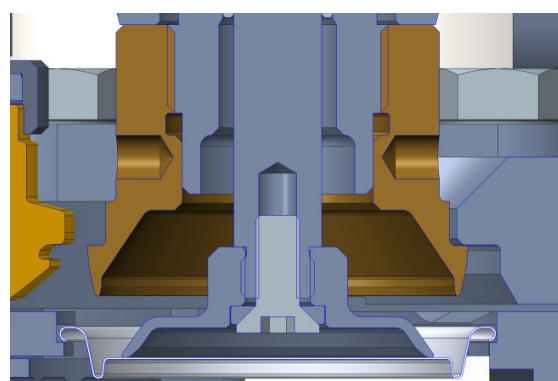


Figure 6-44: Knockout Pad Contact Lid

Feed another cover by hand for the same seaming station and observe the spring pressure on the cover when the seaming station is at the makeup location. If a light pressure is on the cover and the cover could be slide between the Cap Pushers and Cap Guide with resistance, then it is correct. If the cover is completely loose or not be able to slide with light force, then repeat above procedures.

After adjustment has been made, rotate the Seamer and place the seaming station at the position marked earlier on the Lower Turret Cladding below the seaming station center mark. Use a inside Micrometer to measure the dimension between Knockout Pad and Lifter Plate. Setup the remaining Knockout Rods at the same location with this dimension.

NOTICE

The Retaining Ring at the top of the Knockout Rod is a safety feature to prevent the Knockout Rod from dropping too low which could jam and damage the machine. Check that the Retaining Rings are installed properly after adjusting the Knockout Rod height.

6.25. Replace Knockout Rod

Tools required: 9, 14 , 19 mm open wrenches, 10, 13 mm combination wrench or socket wrench, 4 mm Hex Key, Spanner with 4 mm pins KHS Part# 304999950046, thread locking adhesive.

Remove Service covers at discharge side of seamer and Top Cover above the Top Housing. Disconnect three oil lubrication lines attached to the Access Cover and swing the tubing away to clear the Access Cover, and then remove the Access Cover by moving it straight upward. Do not tilt the Access Cover While removing it until the oil tube below the Access Cover is completely out of the Center Shaft.

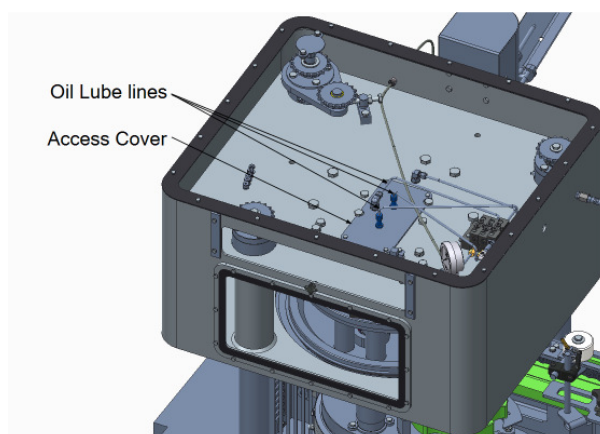


Figure 6-45: Remove Access/Service Covers and Oil Lines

Rotate the Knockout Carrier below the Access Cover opening, and remove the Knockout Pad, the Retaining Screw, and Washer. The retaining screw is made with the right hand thread and the Knockout Pad is made with left hand thread.

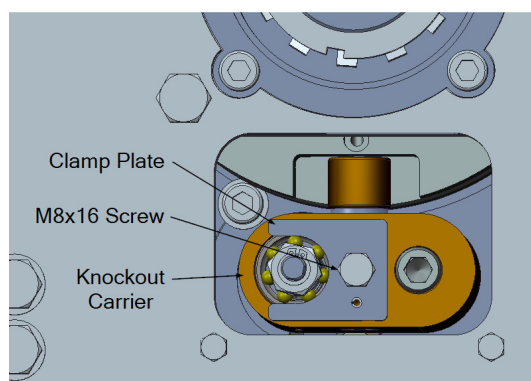


Figure 6-46: Knockout Rod Removal

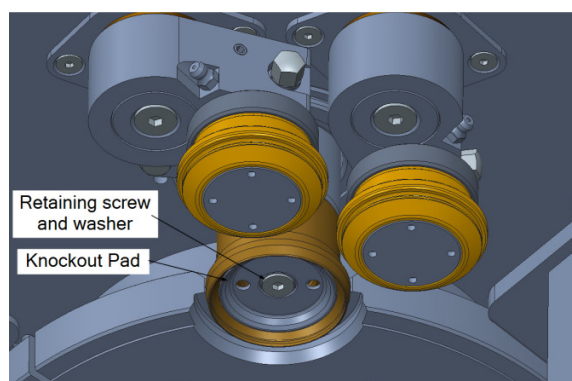


Figure 6-47: Knockout Pad Removal

Once the Knockout Pad is removed, the Knockout Carrier with Knockout Rod could be lifted out from the Access Cover opening together, and the Knockout Rod can be replaced on the work bench.

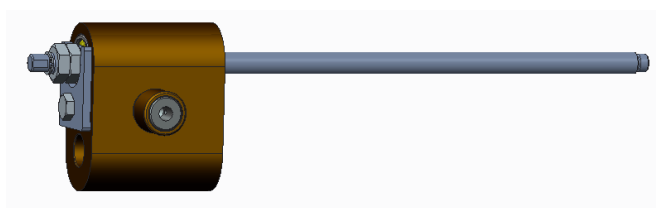


Figure 6-48: Remove Knockout Carrier and Knockout Rod Together

Use thread locking fluid on the M8x16 Screws for Clamp Plates and Retaining Screws for Knockout Pads. Do not run the machine until the thread locking fluid is cured.

6.26. Under Cover Gassing

Under Cover Gassing is controlled from the Filler Service Module and HMI. See Filler Service Module manual for adjustment.

6.27. Bubble Breaker

Bubble Breaker is controlled from the Filler Service Module and HMI. See Filler Service Module manual for adjustment.

6.28. Oil Lubrication System

The seamer is lubricated with oil by an automatic flow metering pump with an integrated oil reservoir. The metering pump supplies oil to two divider valves which distribute oil to all critical points that require constant lubrication. Do not operate the seamer if the metering pump is not functioning properly. The metering pump oil reservoir is equipped with a sight glass for visual inspection. It's important to check the oil quality and verify the water content in oil routinely.

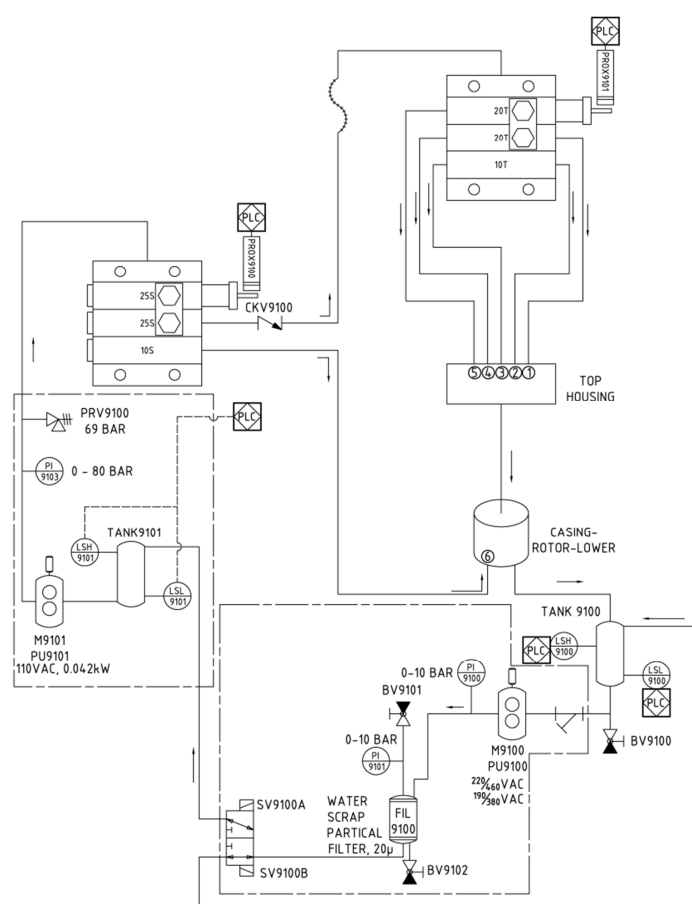


Figure 6-49: Oil Lubrication System

Used oil is collected in a twelve liter (3 gallon) capacity reservoir. The Oil Filtration System filters the used oil and returns it to the same reservoir continuously. The normal operating pressure is between .8 bar and 2 bar. During the cold start, the pressure could be up to 5 bar. It will require filter change when the pressure reaches 8.5 bar (125 PSI).

To change the oil filter, shut down the seamer and stop the oil filtration pump. Loosen M8x12 screw half turn and swing the Latch downward. Swing out the Oil Filtration Panel to allow the access of filter canister. Loosen the T-Handle to remove the strap and Upper Cap of the canister. Remove the used filter and open the drain valve at the bottom of the canister. Clean up inside of the canister and flush with clean seamer oil. Install the new filter element (KHS Part# 301999966987) and reinstall the canister cap and strap.

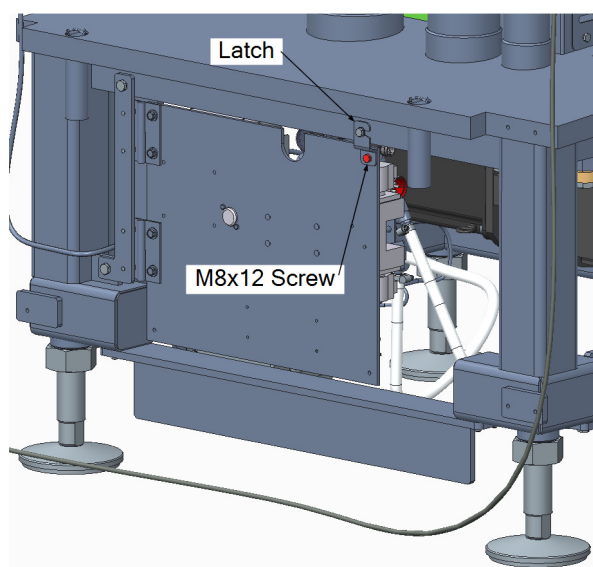


Figure 6-50: Open Filtration Panel

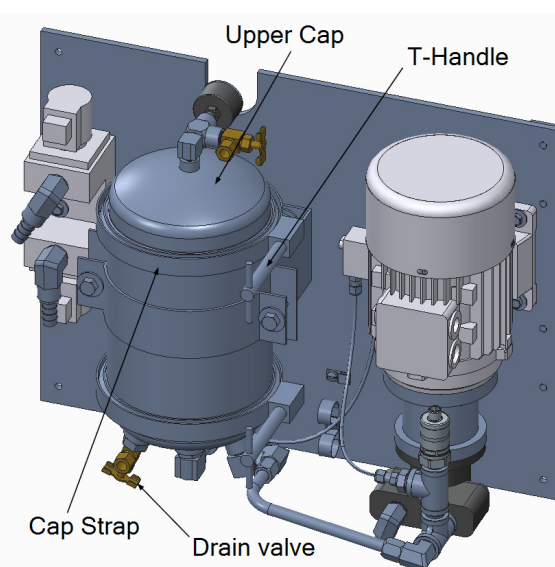


Figure 6-51: Filter Replacement

6.29. Oil Change

Tools required: #2 fillips screw driver, 10, 13 and 19 mm combination or socket wrench, 9 mm (3/8") hex key.

Depending on the type of oil used and the running condition, the oil service life could vary. At minimum, it will require an oil change for every 2000 hours of run time when using the mineral base food grade lubricant. To change oil, completely drain the oil out of the entire seamer from following areas.

1. Top Housing-Disconnect drain hose
2. Lower Turret Cladding-Remove the Drain Plug located at service side
3. Oil Reservoir- Disconnect the suction hose
4. Metering Pump Reservoir- Remove the Drain Plug located at bottom
5. Filter Canister-Drain valve at the bottom of canister

After draining, flush both reservoirs and filter canister with seamer oil. Reconnect all hoses and close all opened ports. Replace oil filter. Fill both reservoirs and filter canister with

seamer oil to the top. Open one of the Service Access Cover located at the Lower Turret Cladding (See Fig. 6-19), and add oil to the bottom edge of the opening. Pour 2 liters (2 quarts) of seamer oil over the Seaming Spindle lower bearing, Knockout Cam, and Seaming Cam. Close all service covers, and start the Oil Filtration Pump. Observe the used oil reservoir oil level. Add oil if needed.

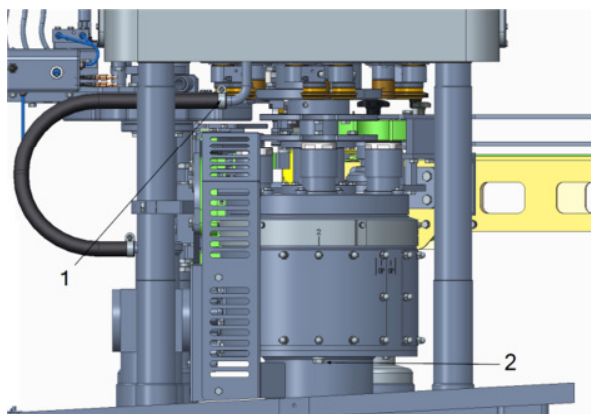


Figure 6-52: Oil Drain Locations 1 and 2

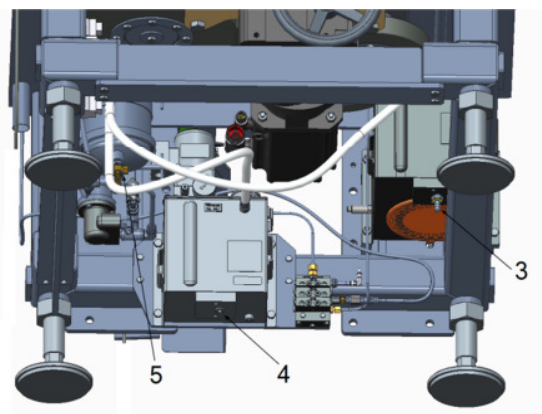


Figure 6-53: Oil Drain Locations 3, 4 and 5

6.30. Seaming Roll Lubrication

Tools Required: Standard duty manual grease gun.

Use the manual grease gun with NLGI 00 or 0 food grade grease to lubricate the Seaming Rolls at the grease fitting on the Seaming Lever. Grease flows through the Seaming Roll lubricating the Seal, Ball Bearings, and forcing out old grease or contaminants through the Relief Fittings on the Seaming Levers. Wipe off the discharge used grease at relief fittings. Charge one shot of grease slowly every 72 hours of operation or after CIP. See Section 5.15.5 for suggested lubricants.

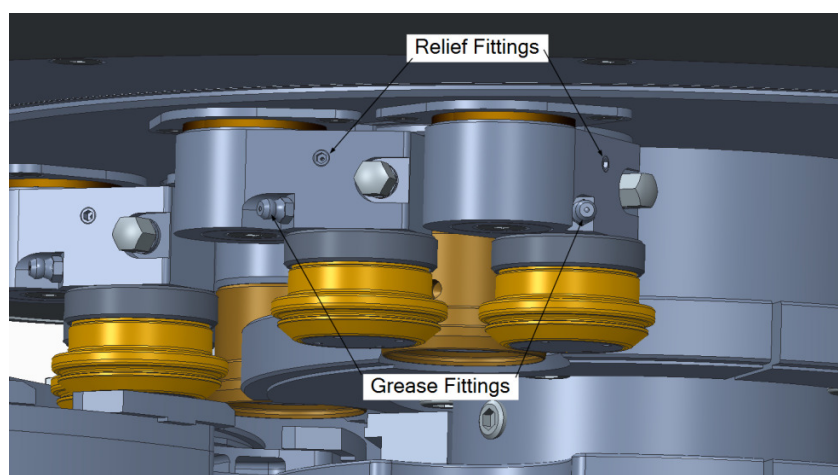


Figure 6-54: Seaming Roll Lubrication

6.31. Main Drive Gear Case

See Table 5-2 for lubricant information.

6.32. Can Feed Drive Gear Case

This gearbox is lubricated by splash lubrication. This type of lubrication ensures that the antifriction bearings are coated with lubricant continuously. The gearbox is to be filled with grease in the respective mounting position only up to the bottom of the level indicator.

See Table 5-2 for the factory first filled lubricant information.

6.33. Cleaning and wash down

NOTICE

DO NOT use high pressure water to clean the seamer Top Housing bottom surface, Upper Seaming Turret bottom surface, and Lower Seaming Turret Lifters. This could cause water ingress.

1. Thoroughly clean the Seamer between shifts or after every product change. Clean the areas below the bottom face of the Upper Turret and in the Cover Feed area. Detergents used through CIP units are determined by the customer. Flush detergents from the system after every wash down. Do not leave the detergents on the seamer longer than the recommended time by the detergent manufacturers. Do not shoot water straight up into the gap between the Upper Seaming Turret and Top Housing. Clean this area with brush.
2. All enclosed areas above the Seaming Turret bottom surface, Top housing, service covers, and Lower Turret Cladding Access Covers must be secured during cleaning. DO NOT spray water above the bottom surface of Top Housing.
3. Cold water should never be used on a warm machine. Cold water being directly applied to a warm or hot machine can produce internal condensation causing unnecessary corrosion, especially on the bearings.
4. After wash down is completed, the Seamer should run for 10 to 15 minutes at 100 cpm and the Lubrication System should be cycled to make certain that the Seaming Rolls have been flushed. The Seamer should never be left overnight after a wash down without a thorough lubrication.
5. Seaming Rolls must be lubricated after running the seamer to ensure that condensate is forced out. See Section 6.30 for the Seaming Roll lubrication.
6. If the seamer will be shut down after the wash down, keep Oil Filtration System running to remove all condensation from inside of the seamer.

7. Maintenance Schedule

Area	Check	Spec's	Frequency			
			H	D	W	M
Seam	Thickness	Per can manufacturer's Spec's	4			
	Height		4			
	Countersink depth		4			
	Cover hook		4			
	Overlap		4			
	Body hook		4			
	Seam gap		4			
	Wrinkles	< 20%		X		
Seaming Rolls	Profile grooves				X	
	Wear and tear			X		
	free turning			X		
	End play	< 0.05 mm or 0.002"			X	
	Sealing caps	No grease leak		X		
Seaming Chucks	Damage		4			
	Wear and tear			X		
Knockout Pads	Damage			X		
	Wear and tear			X		
	Height					X
Lid Separator	Separator Wheel			X		
	NC/NC finger				X	
	Metal shaving				X	
Lifter	Spring pressure	Per can manufacturer's Spec's				X
	Sticky Lifter	free moving			X	
	Lifter plate	no damage			X	
	Radial play	< 0.3 mm or 0.012"				X
	Axial Play	< 0.2 mm or 0.008"				X
Seaming Spindle	Radial play	< 0.1 mm or 0.004"				X
	Axial Play	< 0.08 mm or 0.003"				X
Seamer Height	Pin height	Per can manufacturer's Spec's			X	
Lid Guides	Wear and tear					X
	Metal debrid				X	
Cap Pushers	Wear and tear					X
Can Guides	Wear and tear					X
	Running clearance	Per seamer operator manual				X
Infeed Chain	Damaged fingers				X	
	Chain Pitch	< 1911 mm/10 fingers	2000			
Infeed Conveyor	Drop off	0.25 - 0.35 mm, 0.008 -0.014"				X
Main Drive Gear Case	Oil Change	Table 5-2 for lubricant spec's	5000			
Can Feed Gear Case	Grease Change	Table 5-2 for lubricant spec's	10000			
Lubrication	Oil level			X		
	Oil change		2000			
	Filter	6 bar or 88 psi max.	100			
Pneumatic System	Inlet pressure	6 bar or 88 psi			X	
Seamer	Wash down			X		

D: Daily, W: Weekly, M: Monthly, H: Hours of operation

8. Decommissioning, Storage, Recommissioning

8.1. Decommissioning

- Clean the seamer exterior thoroughly.
- Charge all Seaming Rolls with food grade NLGI 00 or 0 grease until grease comes out of relief ports.
- Drain all used oil from the Top Housing, Lower Turret Cladding, Metering Pump Reservoir, Used Oil Reservoir, and replenish with fresh oil. Record the oil expiration date.
- Run seamer for 10 to 15 minutes at 100 can per minutes speed with Oil Filtration pump running. After shut down the seamer, keep the Oil Filtration Pump run for another hour.
- Remove the Oil Filter from the Oil Filtration unit.
- Disconnect Electrical wires to the Main Drive Servo Motor, Lid Feed Servo Motor, Oil Filtration Pump Motor, and Oil Metering Pump Motor.
- Disconnect compress air supply line from the side of the seamer located at the filler side of seamer Top Housing.
- Disconnect CO2 supply lines for Under Cover Gassing and Bubble breaker from the Under Cover Gassing Manifold and Bubble Breaker.
- Drain all liquid from CO2 and compressed air hoses/tubing. Plug all hose and connection openings.
- Cover the seamer with heavy gauge plastic sheets from the top of seamer to the floor.

DANGER

All electrical components might have potential energy remaining even though the main power has been disconnected or switched off. Check that there is no voltage at the electrical lines on the terminal box of the control cabinet. The electric cabinet may only be opened by qualified trained electricians.

8.2. Storage environment

- Seamer must be stored in a dry, indoor location.
- Store the seamer in a low humidity area to minimize the bio growth.

8.3. Maintenance required during long term storage

- Rotate seamer by hand monthly for 3 to 4 seaming turret turns

8.4. Recommissioning

- Check the oil expiration date on record. If oil is expired when recommissioning the seamer, perform a regular oil change procedures.
- Following the normal commissioning procedures.



9. Recommended Critical Spares

KHS strongly recommends the user of KHS seamer to keep a complete set of Critical Spares on hand to minimize the unexpected down time. Use genuine KHS spare parts to ensure the performance of the seamer. If you need assistance to install the spare parts or change over, contact KHS Service Department for help.

Continue to next page

85003051S001 Table, complete		
Part Number	Description	Qty per
301024522640	V-ring	2
301024010060	O-ring	1
85013050S001 Seaming turret, Upper, complete (Falzrotor, Oberteil, komplett)		
Part Number	Description	Qty per
301024010062	O-ring	1
301104223850	Angular contact ball bearing_double-row	1
301022020920	Compression spring	3
85013050S001 Seaming turret, Upper, complete (Falzrotor, Oberteil, komplett)		
Part Number	Description	Qty per
301104220420	Angular contact ball bearing_double-row__	1
85013039S001	Housing, Rotating mechanical seal (Gehäuse, Gleitringdichtung)	1
85013041S001	Rotating mechanical seal, , 35x64x16 (Gleitringdichtung)	2
301024016711	O-ring	4
301024080013	Wiper	4
85013146S001	Roller, Knock out cam, 25 mm dia.(Rolle, Ausstoßerkurve)	1
85013007S001	Washer (Scheibe)	1
85013009S001	Knock out rod (Ausstoßerstangen)	1
85013011S001	Washer, Knock out pad (Scheibe, Ausstoßerpad)	4
301132321370	Knockout Pad Retaining Screw	4
301104220730	Angular contact ball bearing_double-row	2
85013035S001	Tab washer (Nasenblech)	4
301022020036	Spring, knockout rod	4
301104702971	Cam follower	1
85013084S001	Shoulder screw-seaming roll height adjustment	1
85013120S001	Sealing unit, Seaming Roll, upper	1
85013023S001	Washer, Cone	8
85013028S001	Retaining screw	8
301024013210	O-ring	4
85013119S001	Cap, Seaming Roll, lower	1
85013080S002 Seaming turret, Lower part, bottom, complete (Falzrotor, Unterteil)		
Part Number	Description	Qty per
85013169S001	Can plate, 72 mm (Dosenteller,, 72 mm)	1
85013170S001	Support plate, complete (Stützplatte, komplett)	1
301024011360	O-ring	2
304999951265	Spring	2
301104220040	Angular contact ball bearing	3
85013107S001	Roller, Lifting cam	2
X05049227	Cam follower	2
85013203S001	Seal Lifting station	1
85035025S001	Assembly aid-Seal Lifting station	1

85018040S001 Can infeed star column, complete (Sternlagerung, Doseneinlaufstern)		
Part Number	Description	Qty per
301104207821	Deep groove ball bearing	2
301024522260	V-ring	2
301024016340	O-ring	2
301026012850	O-ring	1
85018045S001 Discharge star column,, complete		
Part Number	Description	Qty per
301104207821	Deep groove ball bearing	2
301024522260	V-ring	2
301024016340	O-ring	2
301026012850	O-ring	1
85018070S001 Cap feed, complete (Verschlusszuführung, komplett)		
Part Number	Description	Qty per
301104201603	Deep groove ball bearing	2
X05224266	O-ring	1
301024011160	O-ring	1
301024522060	V-ring	1
301024016060	O-ring	4
85018060S001	Piston (Kolben)	2
85018061S001	Stopper, Cover (Stopper, Deckel)	1
301063010018	Magnetic valve_3/2-way	1
301063010019	Magnetic valve_3/2-way	1
85003029S001 Gear set, complete		
Part Number	Description	Qty per
301104205310	Deep groove ball bearing	1
301104207811	Deep groove ball bearing	4
301024315480	Radial packing ring	4
301024317800	Radial packing ring	1
301024014150	O-ring	1
301024010490	O-ring	1
301024010670	O-ring	1
301026012520	O-ring	1
Format Parts		
Part Number	Description	Qty per
85027__S__	Seaming Roll_First operation_komplett	1
85027__S__	Seaming Roll_Second operation_komplett	1
85027__S__	Seaming chuck__	2
85023__S__	Knock out pad	1
85023__S__	Pusher,Lid	2
85023__S__	Separation Wheel	1

Format Parts		
Part Number	Description	Qty per
85027__S__	Seaming Roll_First operation_komplett	1
85027__S__	Seaming Roll_Second operation_komplett	1
85027__S__	Seaming chuck__	2
85023__S__	Knock out pad	1
85023__S__	Pusher,Lid	2
85023__S__	Separation Wheel	1
Lubrication System		
301999966987	Oil Filter	4
301999966990	Pump seal kits-Viton	1
301999967001	Solenoid valve coil, 24 VDC	1
301142150606	Seaming roll grease, 19 kg	1
301142010309	Seamer oil, 22L, 5.8 gal	2

10. Appendix

10.1. Main Drive Gear Case Manual



Installation & Troubleshooting Manual

Form 442900

MGS® / ServoFit®

Speed Reducers / Precision Gearheads

Geared to a higher standard™

 **STÖBER**

Installation & Troubleshooting

Follow all directions in the service instruction manual. Obey all federal, state and local safety regulations when operating the drive.

- Always be sure electrical power is off while making electrical connections and during installation and maintenance of the unit.



- Keep clothing, hands, and tools away from ventilation openings on motors and from all rotating parts during operation.
- Lift the drive with a double rope sling or other proper lifting equipment of adequate strength. Make sure load is secured and balanced to prevent shifting when unit is being moved. Lifting drives by hand may be dangerous and should be avoided.
- The intended use of lifting lugs is to handle the weight of the unit only. Never use a lifting lug to lift attached assemblies.
- Never operate drive at speeds higher than those shown on the nameplate, or personal injury may result. Contact STOBBER Drives Inc., if there is any change of operating conditions from those for which the unit was originally sold (as stamped on the nameplate). Failure to comply could result in personal injury and or machinery damage.
- Always follow good safety practices at all times.

Each drive is tested before delivery. Before installation, however, it is advisable to examine the unit for possible damage which might have occurred during transit. If damage is discovered, it should be immediately reported to the transport agent.

If installation is delayed after receipt of the unit, the drive should be stored in a clean, dry place until put into service. Long term storage requires special procedures. If not kept in a heated, dry area, consult STOBBER Drives, Inc. for storage instructions.

Important: *If it is necessary to clean drive shafts, take care to protect the oil seals.*

Caution: *Do not use any device to hammer the unit onto the output shaft during installation since the bearing races could be damaged.*

For additional information or to address other questions regarding the installation, operation, maintenance or lubrication of the unit, visit our website or call STOBBER Technical Support.



MGS® / ServoFit®

Speed Reducers / Precision Gearheads

MGS®/ServoFit® Lubrication

All units are shipped filled with the required amount of lubrication (Mobil XP600). If food grade or synthetic oil is requested, it will be Mobil SHC Cibus 220 Food Grade or Mobil SHC630 synthetic.

With STOBER reducers very little, or often, no maintenance is required under normal operating conditions.

Cibus® is a registered trademark of Exxon Mobil Corporation.

Units without breathers are lubricated for life.

For units with breathers, we recommend that the lubrication be changed according to the schedule below.

For all Units:

Units must be mounted according to the mounting position on the nameplate for proper lubrication!

Characteristic of STOBER Standard Lubricants

	Mobil 600 XP220	Mobil SHC Cibus® 220 Food Grade	Mobil SHC629	Mobil SHC630
Anti-Foaming Additives	X	X	Excellent	Excellent
Corrosion Protection	X	Optimum	X	Optimum
Extreme Pressure Additives	X	X	X	X
Friction and Wear Reducing Characteristics	X	Excellent	X	Superior
Oxidation Protection	X	Enhanced	X	Enhanced
Wide Temperature Range		X	X	X

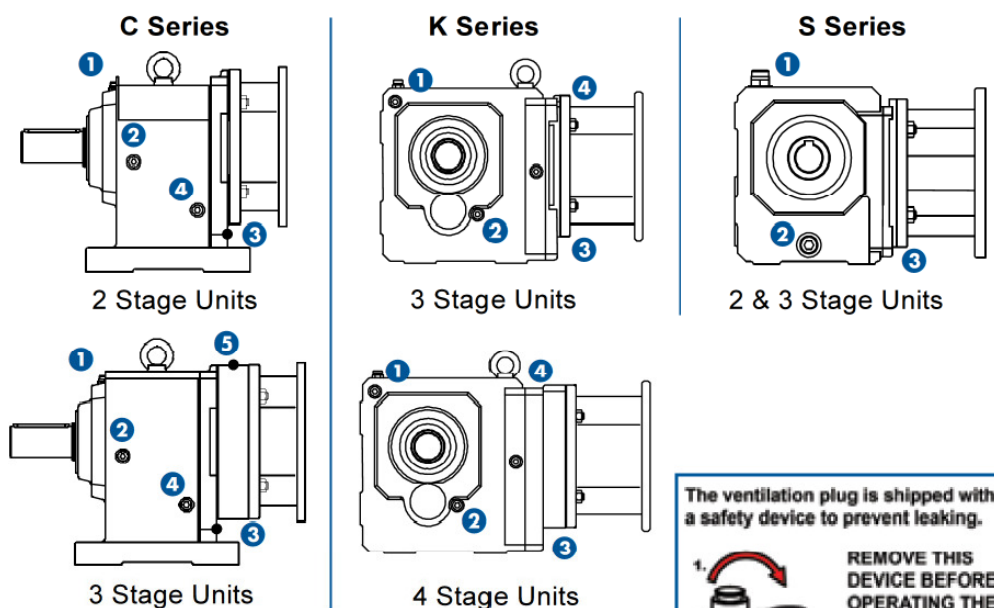
Lubrication Schedule:

Normal/Dry Operating Conditions: After 10,000 Hours

Wet Operating Conditions: After 5,000 Hours

Installation & Troubleshooting

MGS®/ServoFit® Breather and Drain Plug Locations



Note: For units with the Food and Corrosion Resistant option, there is no breather. Contact STÖBER to learn about F6, C6 or larger, and K5 or larger Food and corrosion Resistant unit.

Drain Plug and Breather Vent Locations by Mounting Position

Mtng Pos		C & K Series					S Series			
		①	② *	②a *	③	④	①	② *	②a *	③
EL1	All C & K	Vent			Drain		Vent	Drain		
EL2	All C & K	Drain			Vent		Drain	Vent		
EL3	All C & K		Vent	Drain				Vent	Drain	
EL4	All C & K		Drain	Vent				Drain	Vent	
EL5	C (2 stage) K (3 stage)	Drain			Vent		Drain			Vent
	C (3 stage) K (4 stage)	Drain				Vent				
EL6	C (All) K (3 stage)	Vent			Drain		Vent			Drain
	K (4 stage)	Vent				Drain				

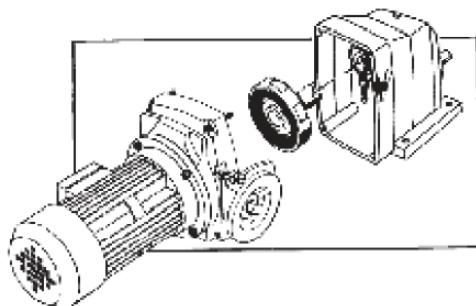
* Position 2a is on the opposite side of 2.

Installation & Troubleshooting

Changing the Traction Ring

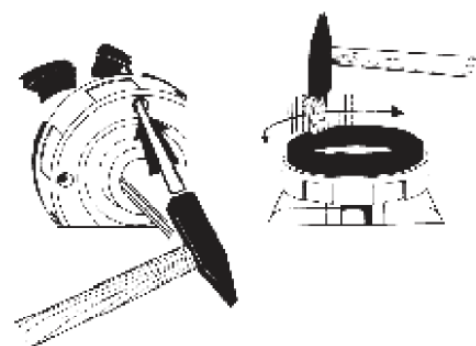
Caution: Appropriate eye protection must be worn prior to beginning this procedure.

1. Remove the 4 socket head cap screws and remove the housing cover.
2. Carefully pull out the traction ring complete with the flange and shaft from the bearings.



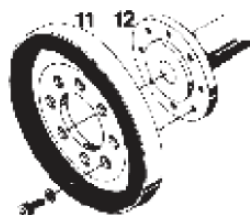
Caution: Protect the precision ground shaft from damage.

3. Remove the traction ring from its flange as shown below.



4. Press in the new traction ring by applying light hammer strokes until the ring is evenly seated. Use a block of hardwood between the hammer and the ring or use a soft mallet. Be careful not to damage the new traction ring. Clean the housing and the ring hub.

5. If desired, replace the traction ring, flange (11), and shaft assembly (12) complete (Kit C).



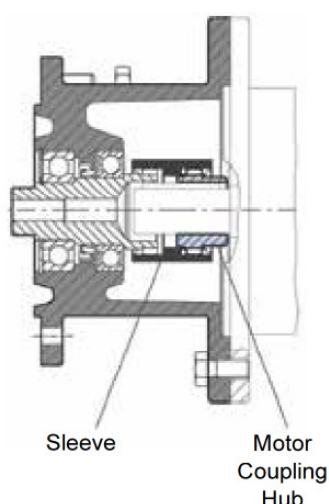
6. Carefully replace the traction ring and shaft taking precaution not to damage the oil seal. Rotate the ring/shaft assembly to be sure the cams are properly seated.
7. Be sure the annular contact surface of the traction ring and the drive cone surface are not damaged during assembly, and are free from grease. Wipe off any oil or grease with a dry rag, or preferably a clean paper tissue.
8. When reassembling the housing, do not use more force than is necessary to overcome the spring pressure.
9. Replace the lubricant in the bearing/cam chamber with the proper amount of lubricant. Replace the oil fill plug.
10. Grease the motor slideways by pumping small amounts of grease through the grease fittings.
11. The new traction ring requires time to run in. Therefore, avoid running the drive at full load during the first few hours of operation.



MGS® / ServoFit®

Speed Reducers / Precision Gearheads

MGS® Motor Adapters



Motor coupling hub and sleeves are provided with the motor adapter. These parts, with a coupling shaft component that is part of the reducer, make a complete coupling to connect the motor to the reducer.

See page 44 for NEMA motor mounting

See page 46 for MR Adapter to NEMA motor mounting with fast, accurate, easy-to-use STOBER hub gage

Caution: If the motor coupling is not installed correctly, the input bearing may fail due to pre-load. This will void the warranty of the reducer and possibly fail the motor.

"MR" Motor Adapters (K, C, F, S)

Adapter	NEMA Frame	Motor Hub	Part Number	Sleeve	Part Number
MR140/050	56C	M-19 x 5/8	44308	M-19	26336
MR160/050	56C	M-24 x 5/8	44309	M-24	21741
MR160/140	143/145TC	M-24 x 7/8	44294	M-24	21741
MR200/050	56C	M-32 x 5/8	94022	M-32	20364
MR200/140	143/145TC	M-32 x 7/8	44307	M-32	20364
MR200/180	182/184TC	M-32 x 1-1/8	44295	M-32	20364
MR250/180	182/184TC	M-38 x 1-1/8	44298	M-38	21743
MR250/210	213/215TC	M-38 x 1-3/8	44299	M-38	21743
MR300/180	182/184TC	M-48 x 1-1/8	94005	M-48	21745
MR300/210	213/215TC	M-48 x 1-3/8	B48/34.925	M-48	21745
MR300/250	254/256TC	M-48 x 1-5/8	44303	M-48	21745
MR300/280	284/286TC	M-48 x 1-7/8	44304	M-48	21745
MR350/320	324/326TC	M-65 x 2-1/8	44305	M-65	21746
MR350/360	364/365TC	M-65 x 2-3/8	44306	M-65	21746

"MS_R" Motor Adapters (KSS, PSS)

Adapter	NEMA Frame	Motor Hub	Part Number	Sleeve	Part Number
MS1R050	56C	M-19 x 5/8	44308	M-19	26336
MS2R050	56C	M-24 x 5/8	44309	M-24	21741
MS2R140	143/145TC	M-24 x 7/8	44294	M-24	21741
MS3R050	56C	M-24 x 5/8	44309	M-24	21741
MS3R140	143/145TC	M-24 x 7/8	44294	M-24	21741
MS3R180	182/184TC	M-32 x 1-1/8	44295	M-32	20364
MS4R050	56C	M-24 x 5/8	44309	M-24	21741
MS4R140	143/145TC	M-24 x 7/8	44294	M-24	21741
MS4R180	182/184TC	M-32 x 1-1/8	44295	M-32	20364
MS5R050	56C	M-32 x 5/8	94022	M-32	20364
MS5R140	143/145TC	M-32 x 7/8	44307	M-32	20364
MS5R180	182/184TC	M-32 x 1-1/8	44295	M-32	20364
MS7R180	182/184TC	M-32 x 1-1/8	44295	M-32	20364

"ML" Motor Adapters (KL)

Adapter	NEMA Frame	Motor Hub	Part Number	Sleeve	Part Number
ML2R050	56C	M-19 x 5/8	44308	M-19	26336

Installation & Troubleshooting

MGS® Motor Adapter Change

The motor adapter provided for change will have the input pinion installed and the replacement gasket included. The gasket will be mounted between the motor adapter and reducer cover. The motor coupling hub and sleeve will not be replaced. It is not necessary to remove the motor hub from the motor shaft, but the coupling sleeve should be removed from the old motor adapter and used in the replacement adapter. In the event the unit is installed on an operating drive, follow all safety procedures before attempting to replace the adapter.

Replacement Procedure

Step 1 Remove the motor bolts and motor from the reducer.

Step 2 Drain oil.

When replacing the motor adapter, it is recommended to replace the oil as well. Loosen the top oil fill plug to relieve oil pressure within the reducer. Remove the oil drain plug at the lowest point on the reducer and drain oil. Caution oil may be hot. Remove the top oil fill plug to allow the oil to drain from the reducer.

Step 3 Remove the motor adapter.

Clean any gasket material that may remain on the housing cover. Failure to remove this material may lead to a future leak in this area.

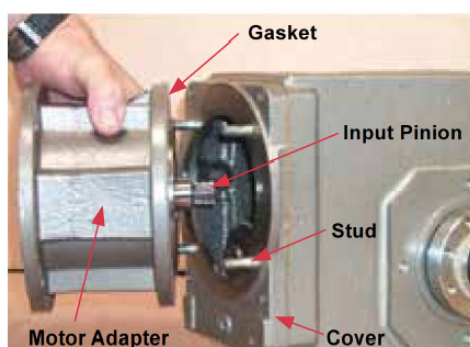
Step 4 Install replacement motor adapter.

The gasket must be mounted flat against the surface of the motor adapter and cover.

Step 5 Thread nuts onto studs in cover.

Using a torque wrench, tighten the nuts to the following values:

MR140/050B	25 Nm (220 in. lbs.)
MR160/050B	25 Nm (220 in. lbs.)
MR160/140B	25 Nm (220 in. lbs.)
MR200/180B	47 Nm (415 in. lbs.)



Step 6 Reinstall the motor.

Check the distance of the motor hub before re-installing the motor. If the unit is on an existing drive, insert the coupling sleeve into the motor adapter and reattach the motor which already has the coupling hub installed. Tighten motor bolts.

If the unit is on a new installation, follow the correct mounting procedure for installing a motor. (See page 44)

Step 7 Replace oil.

The unit must be refilled with the proper lubricant. STOBBER recommends flushing the unit before replacing the oil if any gasket material or other contaminants have entered the unit during the MR replacement process. Run the unit for 20-30 minutes before draining the oil. This will pull contaminants into the oil so they can be removed.

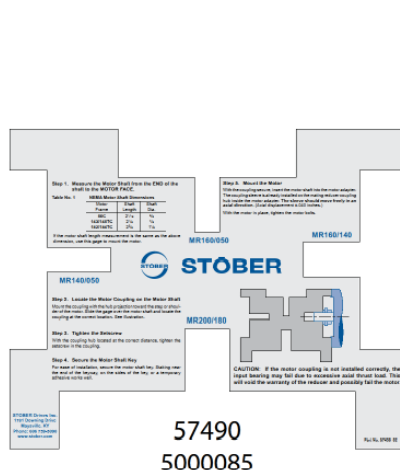
Measure and refill the oil. Check the nameplate for the correct lubrication quantity or check the STOBBER web site:

http://www.stober.com/lubrication_quantity/

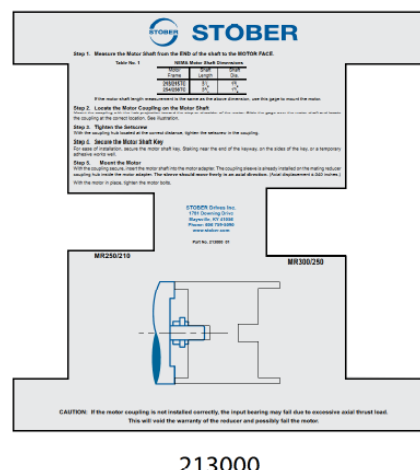
- Standard and Corrosion Resistant Duty Units are shipped with Mobil 600XP220.
- Food duty units are shipped with Mobil SHC CIBUS 220 food grade oil

Installation & Troubleshooting

Paper/Stainless Steel Motor Hub Mounting Gages



57490
5000085



213000

Gages for C, F, K, S Series

	Paper	Stainless Steel
Gages for use with MR140/050, MR160/050, MR160/140 and MR200/180 adapters	57490	5000070
Gage for use with MR 250/210 and MR300/250 adapters	213000	5000069

Gages for KSS Series

	Paper	Stainless Steel
Gages for use with KSS Series all MS style adapters	5000085	5000084



MGS® / ServoFit®

Speed Reducers / Precision Gearheads

ServoFit® Servo Motor Mounting (All units except KSS)

Servo motors are mounted to ServoFit® gearheads using one of several style motor adapters (MA, MT, MQ). These patented adapters use a friction locking triple split collet to clamp on the shaft instead of using a key. A split bushing is included when the motor shaft is smaller than the input bore in the gearhead. The coupling operates free of backlash and, if installed correctly, requires no maintenance.

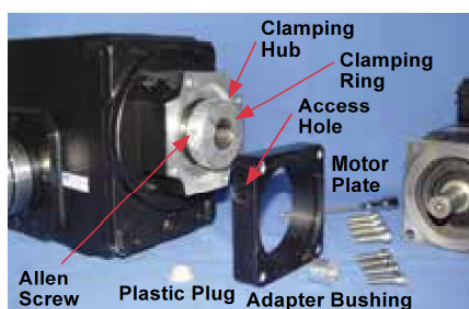
Tolerances for the motor must be ISO j6 on the pilot diameter and ISO k6 on the motor shaft, see Table 1. The motor shaft does not require a key but shaft runout, pilot concentricity and perpendicularity should meet DIN standard 42955-N when possible.

ISO metric threads are designated by the letter "M" followed by the nominal diameter and the pitch, separated by the "x" sign. Example: M6 x 0.75. (NOTE: The absence of the pitch number indicates course pitch by default.) The pitch number for tapped holes on STOBBER specifications are: M5 x 0.80, M6 x 1.00, M8 x 1.25, M10 x 1.50, M12 x 1.75, and M16 x 2.00.

Important: Clean the motor shaft with degreaser to remove any film of oil or grease.

Table 1 Tolerances for Motors

k6 - Shaft Diameter	Metric (µm)
over 6 - 10	+10 / +1
over 10 - 18	+12 / +1
over 18 - 30	+15 / +2
over 30 - 50	+18 / +2
j6 - Pilot Diameter	Metric (µm)
over 10 - 18	+8 / -3
over 18 - 30	+9 / -4
over 30 - 50	+11 / -5
over 50 - 80	+12 / -7
over 80 - 120	+13 / -9
over 120 - 180	+14 / -11
over 180 - 250	+16 / -13
over 250 - 315	+16 / -16
over 315 - 400	+18 / -18



Step 1 Remove the access hole plastic plug.

Carefully remove the plastic plug from the access hole in the motor plate. For new installations, the plastic plug, wrench, instructions, and bushing, when required, are contained in a plastic bag included in the shipping carton.



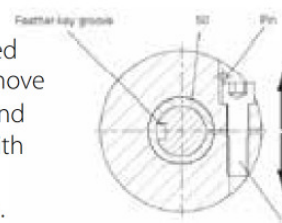
Step 2 Align screw with access hole.

Visually align the access hole with the Allen screw in the clamping ring by turning the gearhead output shaft or the input coupling. (Shown with wrench for illustration purposes.)



Step 3 Install bushing (when applicable).

For MA units with feather keyed motor shafts, remove the feather key and align the shaft with the feather key groove as shown.



Degrease motor shaft and bore hole of the coupling hub on the motor side. If an adapter bushing is needed, degrease the bushing inside and outside.

Installation & Troubleshooting

Remove plastic plug from assembly hole of the adapter housing. Align clamping bush, if available, according to the picture. Place motor onto adapter housing. Ideally mount the motor in a vertical position to minimize unfavorable displacement.

Align the slot in the adapter bushing with the slot in the coupling hub. Slide the bushing into the input bore until the collar of the bushing touches the shaft end.



Step 4 Carefully mount the motor.

Place the gearhead (with the bushing installed where necessary) onto the motor shaft. (If there is a keyway in the motor shaft, align the slot in the clamping hub with the keyway.) Support the gearhead while sliding it onto the motor shaft.

Important: *It is critical that the gearhead is not forced onto the shaft, and that the motor is concentric with the gearhead coupling.*



Step 5 Bolt the motor flange to the gearhead motor plate.

Tighten the motor bolts to the recommended tightening torque listed below.



Motor Bolt Tightening Torque (Nm)

M4	3	M12	85	M22	580
M5	5.9	M14	135	M24	730
M6	10	M16	210	M27	1100
M8	25	M18	300	M30	1450
M10	49	M20	425	M36	2600

Step 6 Tighten the motor adapter coupling screw.

With a torque wrench, tighten the Allen screw on the coupling to the recommended tightening torque according to Table 2, page 50.



A torque wrench extension is provided with each gearhead. If there are two (2) screws, be sure to tighten them equally.

Step 7 Re-insert the access hole plastic plug.





MGS® / ServoFit®

Speed Reducers / Precision Gearheads

MGS®/ServoFit® Output Flange Installation (Hollow Bore Units)

If the STOBER reducer is supplied with an output flange, the flange side of the reducer will bolt to the equipment flange. The tolerance for the hollow bore is shown in Table 1 below. The shaft should be toleranced to fit this bore accordingly.

Table 1 Bore Tolerance (F, K, KL, KSS, S)

Bore Range	Tolerance	
	dh	uh
0.39 – 0.71	+0.0007 / -0.0000	
0.71 – 1.18	+0.0008 / -0.0000	
1.18 – 1.97	+0.0010 / -0.0000	+0.0019
1.97 – 3.15	+0.0012 / -0.0000	-0.0000
3.15 & up	+0.0014 / -0.0000	

Since your STOBER reducer has been supplied with an output flange please discard the keeper plate. The keeper plate, inside the hollow bore, is held in place with snap rings and can be easily removed for location on either end.

Check the flange and machine mounting interface to ensure they have compatible dimensions for proper installation.

The first dimension to check is the protruding boss (dimension "b1") of the flange (see Figure 1). This portion of the flange will be utilized for centering the gearbox on the conveyor to ensure concentricity. The tolerance of the protruding boss is shown in the Table 2. The machined bore in the mounting surface of the machine should fit this boss accordingly.

The bolt circle diameter (dimension "e1") and mounting hole configurations are also shown in Table 2. Check the bolt circle diameter and mounting hole configuration to ensure proper alignment with the machine mounting surface.

Figure 1

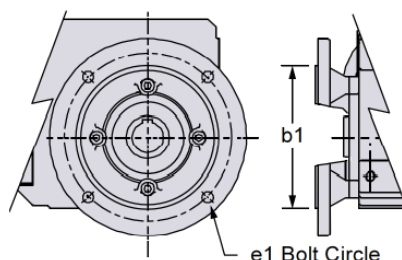


Table 2 Flange Dimensions (in)

Base Module	b1		e1	
	in		in	Tap
KL202	3.740	+0.0005/-0.0004	5.90	M8
K1	4.331	+0.0005/-0.0004	5.12	M8
K2	5.118	+0.0006/-0.0004	6.50	M10
K3	5.118	+0.0006/-0.0004	6.50	M10
K4	7.087	+0.0006/-0.0004	8.46	M12
K5	7.087	+0.0006/-0.0004	8.46	M12
K6	9.055	+0.0006/-0.0005	10.43	M12
K7	9.842	+0.000/-0.001	11.81	M16
K8	11.811	+0.000/-0.001	13.78	M16
K9	13.780	+0.000/-0.001	15.75	M16
K10	17.716	+0.000/-0.002	19.69	M16
F1	4.331	+0.0005/-0.0004	5.12	M8
F2	5.118	+0.0006/-0.0004	6.50	M10
F3	7.087	+0.0006/-0.0004	8.46	M12
F4	7.087	+0.0006/-0.0004	8.46	M12
F6	9.055	+0.0006/-0.0005	10.43	M12
S1	4.331	+0.0005/-0.0004	5.12	M8
S2	5.118	+0.0006/-0.0004	6.50	M10
S3	7.087	+0.0006/-0.0004	8.46	M12
S4	7.087	+0.0006/-0.0005	8.46	M12

The machine/conveyor mounting surface may have a tapped hole instead of a thru hole around the bore.

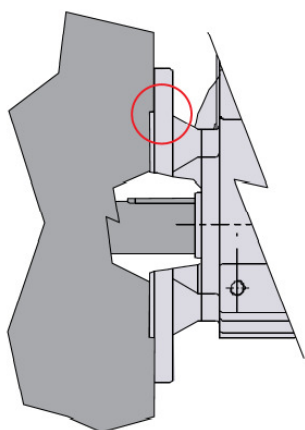
If all dimensions are acceptable for interface with the STOBER flange, you are ready to install the gearbox on the machine shaft.

Installation & Troubleshooting

Installing the reducer

Before installation, brush the inside of the bore with rust inhibiting grease. Do not mount the reducer dry as removal may be impossible

Line the reducer bore up with the keyway of the machine shaft and guide the reducer onto the shaft. The flange should be facing the machine surface it will be bolted onto. Avoid hammering the gearbox onto the shaft as this may damage the bearings. Slide the gearbox onto the shaft until the flat face of the flange is flush with the mounting surface.



If the boss of the flange does not easily slide into the pilot bore of the machine surface (circled in red), do not force the flange into place. This could result in premature failure of the gearbox bearings due to misalignment. Ensure that the gearbox mounting holes are properly aligned with the mounting surface holes.

Once the flange is in proper position, install the bolts thru the reducer's flange holes into the mounting surface. If the mounting surface has tapped holes, you should then tighten the mounting bolts to the correct torque specification based on the bolt grade and size. If the mounting surface has a thru hole, you will need to place a nut and washer of the correct size onto the back side of the mounting bolt, then tighten to the correct torque specification based on the bolt grade and size. Once all bolts have been tightened to the correct torque specification, the STOBBER reducer is ready for operation.

Removal

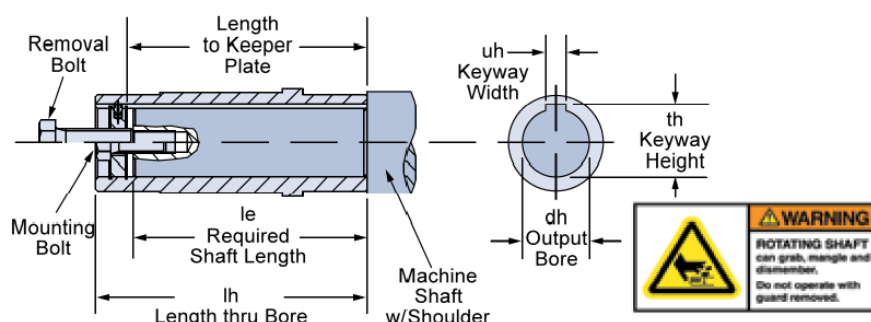
To dismantle the unit from the shaft, remove the bolts from the STOBBER flange. After all flange bolts have been removed, the reducer will be ready to slide off the shaft. Removal of the reducer will be easier if the bore is greased before installation.



MGS® / ServoFit®

Speed Reducers / Precision Gearheads

MGS®/ServoFit® Hollow Output (F, K, KL, KSS, S)



STOBER reducers with a hollow output can be mounted to the equipment shaft from either side. Tolerances for the hollow bore are shown in Table 1. Be sure to tolerance the equipment shaft to fit accordingly.

Table 1 Bore Tolerance (F, K, KL, KSS, S)

Bore Range	Tolerance	
	dh	uh
0.39 – 0.71	+0.0007 / -0.0000	
0.71 – 1.18	+0.0008 / -0.0000	
1.18 – 1.97	+0.0010 / -0.0000	+0.0019 -0.0000
1.97 – 3.15	+0.0012 / -0.0000	
3.15 & up	+0.0014 / -0.0000	

STOBER hollow output reducers utilize a keeper plate to prevent axial movement of the unit on the equipment shaft. The keeper plate is held in place with snap rings. Each keeper plate has a spring pin to prevent it from rotating inside the bore. The keeper plate is also drilled and tapped in the center to accept the removal bolt.



Step 1 Drill and tap equipment shaft.

STOBER recommends you drill and tap the equipment shaft a minimum one size smaller than the tap in the keeper plate. If the keeper plate is drilled for a 1/2" removal bolt, we recommend a 3/8" bolt for securing to equipment shaft.

Important: The machine shaft length should not be longer than the "le" dimension, Table 2. A shaft length of "le minus 0.125" will allow the shaft shoulder to pull against the face of the bore of the reducer.

Step 2 Install the keeper plate.

The keeper plate is installed on the outboard side of the unit (away from equipment shaft). Insert the first snap ring in the inner most slot. Then insert the keeper plate making sure to align the spring pin with the keyway. Insert the remaining snap ring to contain the keeper plate.



Left: Installed keeper plate with snap ring viewed from outboard side of unit; Right: Keeper plate looking through equipment shaft entry side. Note spring pin aligned in keyway. (When installed, the equipment shaft will butt up to the keeper plate.)

Installation & Troubleshooting

Important: Before installation, brush the inside of the bore with rust inhibiting grease. Do not mount the reducer dry as removal may be impossible.

Caution: When mounting the unit onto the shaft, avoid hammering as this may damage the bearings.

Step 3 Mount onto equipment shaft.

Slide reducer onto equipment shaft. Insert the mounting bolt through the keeper plate and into the threaded shaft end.

Removal of Hollow Output Reducers Using Keeper Plate

To dismantle the STOBBER unit from the equipment shaft, remove the mounting bolt. In its place, thread the removal bolt into the keeper plate to press against the shaft and loosen the shaft from the unit. (Removal of the reducer will be easier if the hollow output is greased before installation.)

For parts breakdown on a specific reducer, use our web site or call Customer Service at 606.759.5090.

Table 2 Hollow Output Sizes*

Base Module	lh (in)	th (in)	uh (in)	Imperial – Inches			Metric – mm		
				dh	le	Removal Bolt 1	dh	le	Removal Bolt 1
F1	3.74	0.84	3/16	3/4	2.87	3/8 – 16	20H7	73	M6
F2	4.53	1.12	1/4	1	3.62	1/2 – 13	25H7	92	M12
F3	5.12	1.37	1/4	1-1/4	4.06	1/2 – 13	30H7	103	M12
F4	5.71	1.67	3/8	1-1/2	4.49	3/4 – 10	40H7	114	M20
F6	7.09	2.23	1/2	2	5.63	3/4 – 10	50H7	143	M20
K1	4.72	1.11	1/4	1	3.86	1/2 – 13	25H7	98	M12
K2	5.83	1.31	1/4	1-3/16	4.78	1/2 – 13	30H7	121.5	M12
K3	6.30	1.52	5/16	1-3/8	4.92	5/8 – 11	35H7	125	M16
K4	7.40	1.67	3/8	1-1/2	6.18	3/4 – 10	40H7	157	M20
K5	7.87	2.13	1/2	2	6.46	3/4 – 10	50H7	164	M20
K6	8.46	2.23	1/2	2	7.05	3/4 – 10	50H7	164	M20
K7	9.53	2.66	5/8	2-3/8	8.43	1 – 8	60H7	214	M24
K8	11.81	3.03	5/8	2-3/4	10.35	1 – 8	50H7	164	M20
K9	13.78	3.59	3/4	3-1/4	11.89	1 – 8	90H7	302	M30
K10	16.14	4.31	1	4	14.25	1-1/4 – 7	100H7	361	M30
KL2	4.17	0.84	0.188	3/4	3.13	3/8 – 16	—	—	—
KSS1	4.72	1.11	1/4	1	3.86	1/2 – 13	—	—	—
KSS2	5.83	1.37	1/4	1-1/4	4.78	1/2 – 13	—	—	—
KSS3	6.30	1.52	5/16	1-3/8	4.92	5/8 – 11	—	—	—
KSS4	7.40	1.67	3/8	1-1/2	6.18	3/4 – 10	—	—	—
S1	4.72	1.11	1/4	1	3.86	1/2-13	20H7 25H7	98	M8 M12
S2	5.91	1.52	5/16	1-3/8	4.69	5/8-11	30H7 35H7	122 119	M12 M16
S3	6.61	1.67	3/8	1-1/2	5.39	3/4-10	40H7	136	M20
S4	7.48	1.92	3/8	1-3/4	6.24	3/4-10	50H7	153	M20

* Most outputs available in carbon or stainless steel. KSS are stainless steel only.



MGS® / ServoFit®
Speed Reducers / Precision Gearheads

Warranty

STOBER products shall be free from defects in material and workmanship for a maximum of 5-years (single shift operation or 30 months multiple shift operation) for ServoFit products (ServoFit Modular System, ServoFit Precision Planetary Gearheads, and ServoFit Geared Motors) and MGS Long Life products; 3-years (single shift operation or 18 months multiple shift operation) for other MGS products; 2-years (single shift operation or 12 months multiple shift operation) for ComTrac products, from the date of shipment to the Customer. For ServoFit products, the motor on ServoFit Geared Motors, as well as all normal wear items, including oil seals and bearings, shall be covered for a period of 2-years (single shift operation or 12 months multiple shift operation). In the event that a product proves to be defective, STOBER's sole obligation shall be, at its option, to repair or replace the product. The repaired or replacement product will be shipped F.O.B. STOBER's facilities, freight prepaid by STOBER.

No employee, agent or representative of STOBER has the authority to waive, alter, vary or add to the terms hereof without the prior written approval of an officer of STOBER. It is expressly agreed that (a) this section constitutes the final expression of the parties' understanding with respect to the warranty and (b) this section is a complete and exclusive statement of the terms of the warranty.

STOBER shall have no obligation under the warranty set forth above in the event that:

- (a) The Customer fails, within the warranty period to notify STOBER in writing and provide STOBER with evidence satisfactory to STOBER of the alleged defect within five (5) days after it becomes known to the customer;
- (b) After inspection of a product, STOBER determines, in its sole discretion, that it is not defective in material or workmanship;
- (c) Repair or replacement of a product is required through normal wear and tear;
- (d) Any part in a product or any ingredient contained in a product requires replacement or repair through routine usage or normal wear and tear;
- (e) A product is not maintained or used in accordance with STOBER's applicable operating

and/or maintenance manuals, whether by the Customer or any third party;

- (f) A product has been subject to misuse, misapplication, negligence, neglect (including, but not limited to, improper maintenance or storage), accident, catastrophe, improper installation, modification, adjustment, repair or lubrication, whether by the Customer or any third party, without the prior written consent of STOBER. Misuse shall include, but not be limited to, deterioration in a product due to chemical action and wear caused by the presence of abrasive materials;
- g The system of connected rotating parts into which the product becomes incorporated is not compatible with the product, or it is not free from critical speed or torsional or other type of vibration within the specified operating range, no matter how induced; or
- (h) The transmitted load and imposed torsional thrust and overhung loads are not within the published capacity limits for the unit sold.

Items manufactured by other parties but installed in or affixed to STOBER's products are not warranted by STOBER and bear only those warranties, express or implied, which are given by the manufacturer of such items, if any.

THE WARRANTY SET FORTH ABOVE IS INTENDED SOLELY FOR THE BENEFIT OF THE CUSTOMER AND DOES NOT APPLY TO ANY THIRD PARTY. ALL CLAIMS MUST BE MADE BY THE Customer AND MAY NOT BE MADE BY ANY THIRD PARTY. THIS WARRANTY MAY NOT BE TRANSFERRED OR ASSIGNED, IN WHOLE OR IN PART, BY THE Customer FOR ANY REASON WHATSOEVER. ANY SUCH ATTEMPTED TRANSFER OR ASSIGNMENT SHALL BE NULL AND VOID.

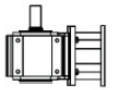
THIS WARRANTY TAKES THE PLACE OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, WHICH ARE HEREBY DISCLAIMED AND EXCLUDED BY STOBER, INCLUDING WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF USE AND ALL OBLIGATIONS OR LIABILITIES ON THE PART OF STOBER FOR DAMAGES ARISING OUT OF OR IN CONNECTION WITH THE USE, REPAIR OR PERFORMANCE OF THE PRODUCTS



Lubrication Quantity

"S" Series – Right Angle Helical/Worm

GENERAL PURPOSE Lubricant Quantity – Mounting Position **MUST** be Specified.

UNIT	MOUNTING POSITION											
												
	EL1		EL2		EL3		EL4		EL5		EL6	
	ozs.	liters	ozs.	liters	ozs.	liters	ozs.	liters	ozs.	liters	ozs.	liters
S102	16.9	0.50	25.7	0.76	20.3	0.6	20.3	0.6	32.1	0.95	23.7	0.7
S202	33.8	1.00	50.7	1.5	40.6	1.2	40.6	1.2	64.2	1.9	54.1	1.6
S203	40.6	1.20	47.3	1.4	47.3	1.4	47.3	1.4	71.0	2.1	60.8	1.8
S302	52.4	1.55	74.3	2.2	60.8	1.8	60.8	1.8	101.4	3.0	81.1	2.4
S303	62.5	1.85	84.5	2.5	84.5	2.5	84.5	2.5	110.8	3.28	91.2	2.7
S402	87.9	2.60	118.3	3.5	91.2	2.7	91.2	2.7	148.7	4.4	118.3	3.5
S403	108.1	3.20	135.2	4.0	121.7	3.6	121.7	3.6	162.2	4.8	128.4	3.8



General Operating Instruction GEAR REDUCER

Table of contents

1. Safety instructions for the operation of gearboxes.....	2
2. General instructions	2
3. Personnel.....	2
4. Intended use while observing the relevant technical regulations	3
5. Transport, storage	3
6. Setup, assembly.....	3
7. Alignment / Connection	4
8. Putting into service.....	4
9. Components	4
10. Maintenance.....	4
11. Lubrication.....	5
11.1. Lubrication intervals	5
12. Cleaning	5
13. Operating instructions.....	5
14. Malfunctions.....	5
15. Warranty and liability	5

	General Operating Instruction GEAR REDUCER		CH-BV-001-EN
			2013-06-23 Rev. a
	Page 2 of 6		

1. Safety instructions for the operation of gearboxes

Symbols in the operating and maintenance instructions



Instructions for maintenance and putting into service



Safety precautions to avoid **personal injury**

NOTE

Safety precautions to avoid **damage to the gearbox**

CAUTION!

Observe the **operating instructions**



DANGER OF BURNS

Under certain operating conditions, high surface temperatures may occur on the housing within the permissible oil temperatures.



DANGER OF SCALDING

Oil change may involve danger of scalding due to leakage of hot oil.

2. General instructions

These safety instructions shall apply in addition to the respective product-specific operating instructions and must be observed at all times for reasons of safety. These instructions shall apply to gearboxes, their components and attachments (e.g. engines, oil systems, etc.), which are hereinafter collectively referred to as gearboxes. These safety instructions are aimed to protect persons and objects against damage and risks which may arise from improper use, incorrect operation, inadequate maintenance or other incorrect handling of gearboxes within industrial installations.



RISK OF INJURY!

Gearboxes have rotating parts and surfaces that may become hot during operation. Always observe the warning and information signs attached to the machine.

These operating instructions do not contain any details and information on industrial safety; the corresponding documents are to be supplied by the end manufacturer. While using the gearbox, the end manufacturer is obliged to cover the rotating shaft extensions and any components attached to it. The gearboxes must be set up in such a way that they are not exposed to any harmful impacts (e.g. water, chemical fumes, acids, extreme temperatures). In the event of noncompliance with these instructions or unauthorised interventions, the gearbox manufacturer provides no warranty and any resulting claims for compensation will be rejected. If the shaft extensions are exposed to additional axial or radial forces, the manufacturer is to be consulted. The gearboxes must be used in compliance with the contractual specifications.

3. Personnel

CAUTION!

All necessary work on electric or mechanical drive units, in particular also planning work, transport, assembly, installation, putting into service, maintenance and repair, may only be performed by adequately qualified personnel.

It must be ensured that the supplied operating instructions and all other documents of the product documentation are available while performing all corresponding work. Furthermore, all personnel are obliged to observe these instructions at all times. All work must be supervised by competent specialists. Qualified personnel are understood to be persons who are authorised by the person in charge of the installation's safety to perform the necessary work on account of their qualification, experience and instruction as well as their knowledge of

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Tel: +49 (0) 35955 721-0 Fax: +49 (0) 35955 721-21	Website: www.ant-schaefer.de	Email: info@ant-schaefer.de	Edited by CH-ES

	General Operating Instruction GEAR REDUCER		CH-BV-001-EN
			2013-06-23 Rev. a
	Page 3 of 6		

relevant standards, regulations, accident prevention rules and operating conditions and are able to recognise and avoid possible risks. These qualifications also include knowledge of first-aid measures and the local rescue facilities. Unqualified personnel shall be prohibited from performing work on gearboxes.

4. Intended use while observing the relevant technical regulations

Unless otherwise expressly agreed, these gearboxes are intended for use in commercial installations. They comply with the contractually agreed standards. Unless expressly intended for this purpose, they must not be used in explosion-hazardous areas (refer to the additional instructions). If in a special case – use in non-commercial installations – increased safety precautions are required (e.g. protection against access by children's fingers), these conditions must be ensured when setting up the installation. The gearboxes are designed and manufactured according to the specifications stated in the respective order. Any deviating information provided on the rating plate must be taken into account.

CAUTION!

The conditions at the site of operation must correspond to all performance specifications provided in the relevant documentation (e.g. dimensioned drawing, type identification plate). Gearboxes are components intended for installation in machines within the meaning of the Machine Directive 2006/42/EC. It is forbidden to use the machine until conformity of the end product with this directive is ascertained (refer to EN 60204-1).

5. Transport, storage

When transporting the gearboxes, the eye bolts – where provided – must be firmly tightened down to their contact surface. They may only be used for transporting the drive unit and not for lifting both the drive unit and the machine driven. The gearboxes may be supplied unfilled or filled.

CAUTION!

The gearboxes may only be transported with the vent (oil level gauge) facing up. The gearboxes must be stored on even surfaces, not on top of each other, and must be secured against contact damage.

Any damage detected after delivery must be immediately reported to the haulage company; if necessary, putting into service must be suspended. When storing the gearboxes, a dry, dust-free, low-vibration ($v_{eff} < 0,2 \text{ mm/s}$) environment with a constant temperature (damage sustained during storage) is to be provided. When storing the gearboxes properly, the gearbox manufacturer provides a 12-month warranty for the durability of the internal parts of the gear unit and a 6-month warranty for the durability of the protruding shaft journals (subject to deviations). The warranty term commences on the date of delivery.



The vent must be protected and kept clean at all times.

When storing the gearboxes for longer periods of time, the service life of lubricants and seals is reduced. Warranty is not provided for any damage attributed to improper storage. There is a risk of breakage at very low temperatures (below approx. -20°C). When replacing the eye bolts, drop-forged eye bolts conforming to DIN 580 are to be used.

6. Setup, assembly

Prior to assembly, the gearbox is to be cleaned to remove any anticorrosion agents and adherent foreign bodies. All bare spots are to be slightly greased. The gearbox is to be fastened in the intended position by means of its foot or flange. Shaft-mounted gearboxes with hollow shafts are to be attached to the driven shaft using the aids provided. Gearbox bases must be stationary. There may be no vibrations of adjacent bases or resonant vibrations. Steel structures on which gearboxes are mounted must be torsion-free. Fasteners, steel structure, substructure and torque support must be rated for the high forces to be anticipated during operation (e.g. mass and torque of the gearbox) and sufficiently secured against loosening.

NOTE

Additional external forces must not be transmitted to the gearbox to ensure its functional safety.

C.H. Schäfer Getriebe GmbH Hauptstrasse 42 D-01896 Ohorn/Sachsen Tel: +49 (0) 35955 721-0 Fax: +49 (0) 35955 721-21	Due to further product research and development, we reserve the right to change the information provided herein without prior notice. © C.H. Schäfer Getriebe GmbH		
	Website: www.ant-schaefer.de	Email: info@ant-schaefer.de	Edited by CH-ES

	General Operating Instruction GEAR REDUCER		CH-BV-001-EN
			2013-06-23 Rev. a
	Page 4 of 6		

The gearbox manufacturer accepts no liability for any damage arising from the displacement of the base or the steel substructure. The output shaft(s) and any second shaft extension as well as the transmission elements mounted on it (couplings, chain wheels, etc.) are to be covered so that they cannot be touched.

7. Alignment / Connection

While putting down and aligning the gearbox on the base, particular attention is to be paid that the contact surfaces are even to avoid tension of the gearbox housing when tightening the screws. Fastening screws of at least class 8.8 are required for the gearbox. If additional radial and axial forces have been agreed for the shaft extensions of the gearbox, the fastening screws must exhibit the contractually agreed material quality. Unless a deviating angle of inclination is prescribed at the site of operation, the gearboxes are to be aligned horizontally; the maximum deviation must not exceed 2 mm per 1 m. When aligning the shaft extensions with adjacent machines, the permissible tolerances of the couplings to be fitted must be observed. The shafts must not get stuck in the bearings. Shaft displacements during operation due to e.g. gear tooth pressure or temperature influence are to be taken into account.

CAUTION!

All work may only be performed by qualified specialist personnel on idle machines that are disconnected and secured against being switched on again. This also applies to auxiliary circuits (e.g. stationary heating). Any transport securing devices must be removed prior to putting the gearbox into service. The drive unit must be protected against overload and in dangerous situations also against automatic restarting due to inadvertent starting.

8. Putting into service



When the gearbox is at standstill, the oil level must be at the middle of the oil level sight glass or the bottom oil level indicator. The oil volumes indicated on the type identification plate are only approximate values. The gearbox must not be refilled during operation.

The gearbox may only be put into service if the oil temperature is within the specified operating temperature limits. During operation, the maximum temperature of the lubricant must not exceed approx. 110°C. Before putting the gearbox into service, any protective films are to be removed, the mechanical connection to the driven components disconnected as far as possible and the serviceability checked in no-load state. Feather keys are to be removed or secured in such a way that they cannot be ejected. After putting into service for the first time, the gearbox is to be monitored for at least one hour for unusual heat or noise. If the shaft extensions are within reach, they are to be covered by the installer or operator so that they cannot be touched.

9. Components

When adding further components to the gearbox (e.g. brake, engine, etc.), the documentation of these components must be observed in addition. If they are not available, they are to be requested from the manufacturer.

10. Maintenance

In order to prevent malfunctions, danger and damage, the drive units must be examined at regular intervals depending on the operating conditions. The lubrication intervals for bearings and gearboxes specified in the respective operating instructions must be observed. Worn or damaged components must be replaced using original spare parts or standard components. For all inspection and maintenance work, Section 5 and the information provided in the detailed operating instructions must be observed.



Maintenance also includes temperature check at the bearing points, oil level check (measurement and refilling only when the gearbox is at standstill), supervision of oil change, inspection for noise generation, inspection for oil-tightness and cleaning of vent and vent hole.

CAUTION!

We expressly point out that any spare parts and accessories not supplied by C.H. Schäfer Getriebe GmbH are not inspected and approved by us. Any liability of the gearbox manufacturer for damage caused by the use of non-original spare parts and accessories shall be excluded. The use of non-original parts may change the structural properties of the gearbox, thus affecting its functional safety.

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	General Operating Instruction GEAR REDUCER		CH-BV-001-EN
			2013-06-23 Rev. a
	Page 5 of 6		

11. Lubrication

Unless otherwise agreed, the gearbox is lubricated by splash lubrication. This type of lubrication ensures that the antifriction bearings are automatically supplied with oil. In case of oil lubrication, the gearbox interior is ventilated via a vent at the uppermost point of the housing. In all cases where gearboxes are installed in free atmosphere or at places where they are subject to strong temperature variations, the amount of condensed water is to be checked in addition to conducting the inspections (cf. Section 10) to prevent corrosion of internal parts during longer operational interruptions. If the gearboxes are shut down for longer periods of time, treatment with anti-corrosion oil is recommended according to the manufacturer's usual specifications. If this oil is not compatible with the lubricant, it is to be completely removed before putting the gearbox into service again. The gearbox is to be filled with oil in the respective mounting position only up to the bottom oil level indicator.

CAUTION!

The oil viscosity and oil class indicated on the type identification plates as well as the specifications given in the Technical Data Sheet and the instructions provided in the operating instructions must be observed! Gearbox oils with different properties are only permitted after consultation.

11.1. Lubrication intervals

If the gearboxes are lubricated with mineral oil, this needs to be changed after the first 500 hours of operation. Further oils changes need to be performed after 10,000 hours of operation.



DANGER OF SCALDING!
Hot gearbox oil may cause severe burns. Always observe the warning and information signs attached to the machine. Make sure to take appropriate safety precautions.

The oil is to be drained at operating temperature. After draining the oil, the gearbox is to be flushed. The flushing oil must be compatible with the gearbox oil used. Only after any oil sludge, rubbings as well as any residues of gearbox oil and flushing oil are removed may the fresh oil be filled in using a close-meshed hair sieve. Maximum cleanness must be ensured during oil change (cf. Section 1.7 for oil filling). This specification is not applicable if the gearboxes are equipped with synthetic lifetime lubrication by the manufacturer; however, these lubricants also need to be changed after 5 to 7 years at the latest. Grease-lubricated gearboxes must be disassembled to clean the components. The fresh grease must be dosed in such a way that only a small air cushion is formed within the gearbox. The change of synthetic oils is performed analogously to that of mineral oil.

Due to their incompatibility with shaft sealing rings, sulphur-alloyed oils must not be used. The use of other alloyed oils with the same properties is permitted. For an up-to-date and complete overview of oils permitted for use, please refer to the operating instructions / lubricant recommendation. If this is not supplied, it is to be requested from the gearbox manufacturer.

12. Cleaning

NOTE

The gearboxes may only be cleaned with solvents that do not damage the sealing elements. As a general rule, cleaning with high-pressure cleaning devices is prohibited. If the gearbox housing is penetrated by water or cleaning solution, the warranty expires with immediate effect.

13. Operating instructions

For the sake of clarity, operating and safety instructions do not contain all information relating to all gearbox models and cannot take account of every conceivable case of installation, operation or maintenance. The instructions are essentially limited to those required by qualified personnel to perform their work properly. Any ambiguities are to be clarified with the manufacturer.

14. Malfunctions

Any variations compared to normal operation, e.g. higher temperatures, vibrations, noises and other signs are indications of the proper functionality being affected. In order to avoid malfunctions that may directly or indirectly cause personal injury or material damage, the competent maintenance personnel must be informed. In case of doubt, the gearbox must be switched off immediately.

15. Warranty and liability

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	General Operating Instruction GEAR REDUCER		CH-BV-001-EN
			2013-06-23 Rev. a
	Page 6 of 6		

The manufacturer's warranty obligations are set out in the respective supply contract, which is neither extended nor restricted by these safety instructions or other instructions. These safety instructions are to be kept in a safe place!

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10.3. Oil Filtration System



FILTRATION INC.

30241 Tomas

Rancho Santa Margarita, CA 92688

Phone: 949.546.0809

steveparker@htifiltration.com

810-065

KHS 85028001S001

3982



OPERATORS MANUAL
HYDRA-SUPREME FLUID SCRUBBING SYSTEM
Model 810-065
CAN SEAMING GEAR BOX FILTRATION SYSTEM

INTRODUCTION:

Hydra-Supreme fluid scrubbing systems are high performance industrial filters designed to remove particulate, oxidized oil and water from heavy duty gear boxes and transfer cases. This particular model, 810-065 is specifically designed for cleaning the lubrication oil in KHS slow speed can seaming systems. Constructed from durable, corrosion resistant materials, it is designed for constant, uninterrupted use without immediate supervision. This system will assure a high degree of fluid purity with an absolute minimum of maintenance and service requirements.

SYSTEM OPERATION:

The Hydra-Supreme fluid scrubbing system utilizes a patented cellulose element to clean the working fluid of accumulated debris. The cleaning process utilizes three interlocking processes to remove solid particulate, varnish and water from the oil. By combining barrier filtration, chromatographic separation and absorption all three of the listed contaminants can be removed from the oil simultaneously and efficiently. As the filter traps the contaminants it builds up pressure and the flow decreases, signaling the need for filter replacement.

SYSTEM PRESSURE:

Pressure readings will vary with the viscosity of the oil used, the operating temperature of the reservoir and the amount of debris absorbed by the filter. A rule of thumb is to change out the filter when a 30 PSI increase has occurred under identical operating temperatures. All filters should be changed at 60-65 PSI. Typical oil operating temperature is 100⁰ F or 40⁰ C. Colder operating temperatures may require the application of a heating blanket on the canister.

<u>Viscosity</u>	<u>Flow Rate</u>	<u>Typical Pressure</u>	<u>Change Out Pressure</u>
ISO 100 (750 SUS)	.25 GPM	30-35 PSI	60-65 PSI

Typical filter change out points is 30 PSI increase in original operating pressure or a maximum of 65 PSI.

Under no circumstance should your unit ever exceed 85 psi. Should this happen shut down the system and contact HTI's Technical Service Department at (949) 456-0763 for assistance.

SYSTEM LOCATION:

Although the Hydra-Supreme system uses a self priming pump it is important to keep the filter as



close to the reservoir as possible. The suction line should be less than 8' long and a minimum of ½" ID.

The system, and pump motor in particular, should be protected from falling and pooling water.

PLUMBING:

The suction port utilizes a 1/2" inlet with a male 37° male JIC hose fitting. A maximum hose length of 8' is recommended

The return line fittings on the solenoid valve also utilize a 1/2" a male 37° male JIC hose fitting.

Sealing caulk or Teflon tape is also recommended when working on all SAE or NPT threaded fittings.

Oil flow should be from the bottom of the reservoir and the clean oil returned to the top to avoid recirculating clean oil only.

ELECTRICAL:

The electrical power system should be independent of the machine power as the oil scrubbing system should run continuously for efficient contaminant control. See the electrical connection drawing for electrical details.

INITIAL START-UP PROCEDURE

Upon completion of the electrical and hydraulic connections the Hydra-Supreme is ready for start-up. The internal pump relief is factory set for a maximum operating pressure of 85 psi. If your unit exceeds this level during any phase of operation it should be turned off immediately and HTI should be contacted for instructions. If the machine oil is cold the system will show high startup pressures that will subside as the oil warms to operating temperature.

Open all valves on the inlet and return lines.

Turn on the electrical power.

Crack open the bleed valve on the top of the canister.

As soon as the fluid starts to flow from the bleed hole close the valve securely and wipe away the fluid from the canister lid.

Let the system warm up to typical operating temperature and check for leaks before leaving the work area.

FILTER ELEMENT REPLACEMENT

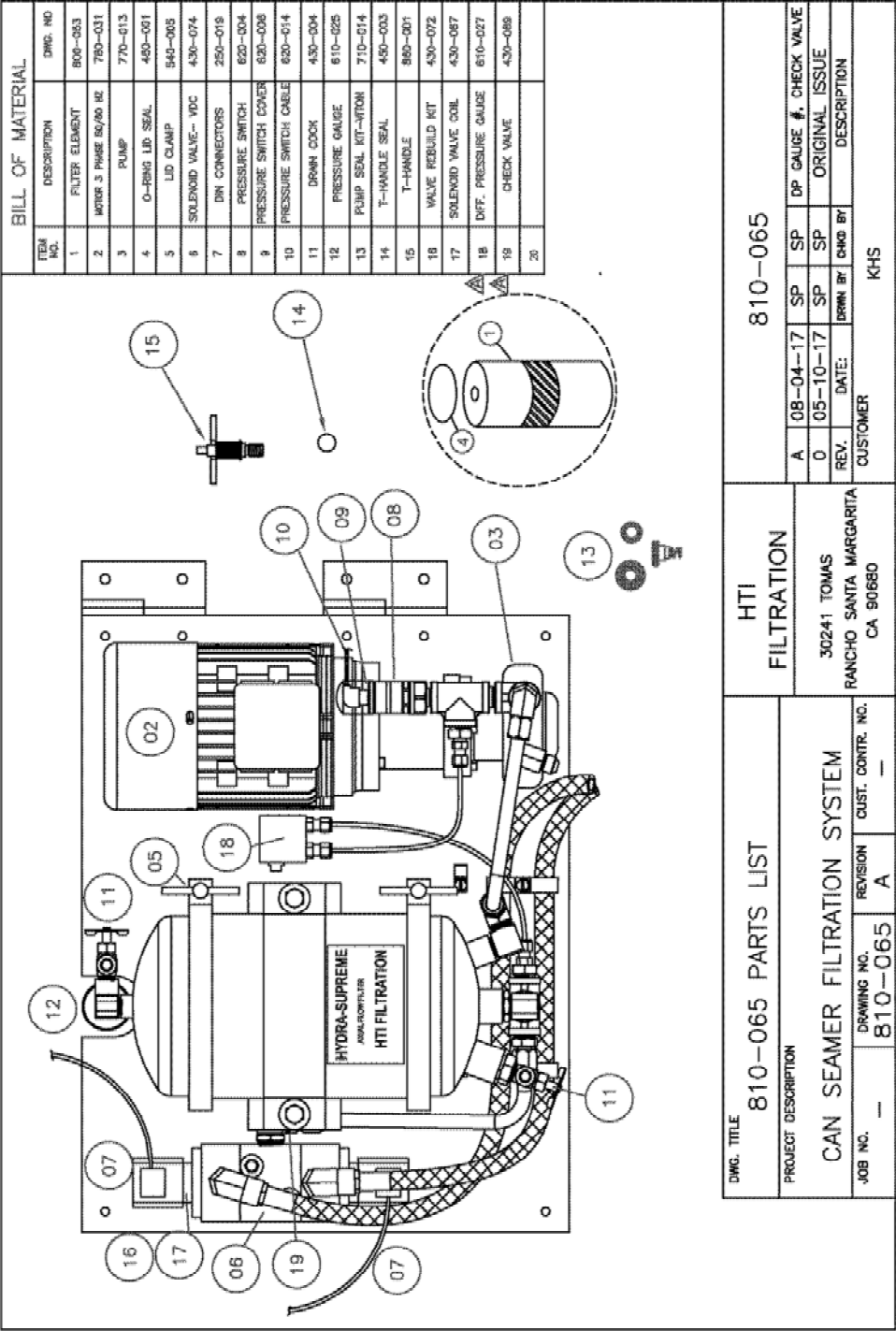
This system uses replacement filter element 800-053

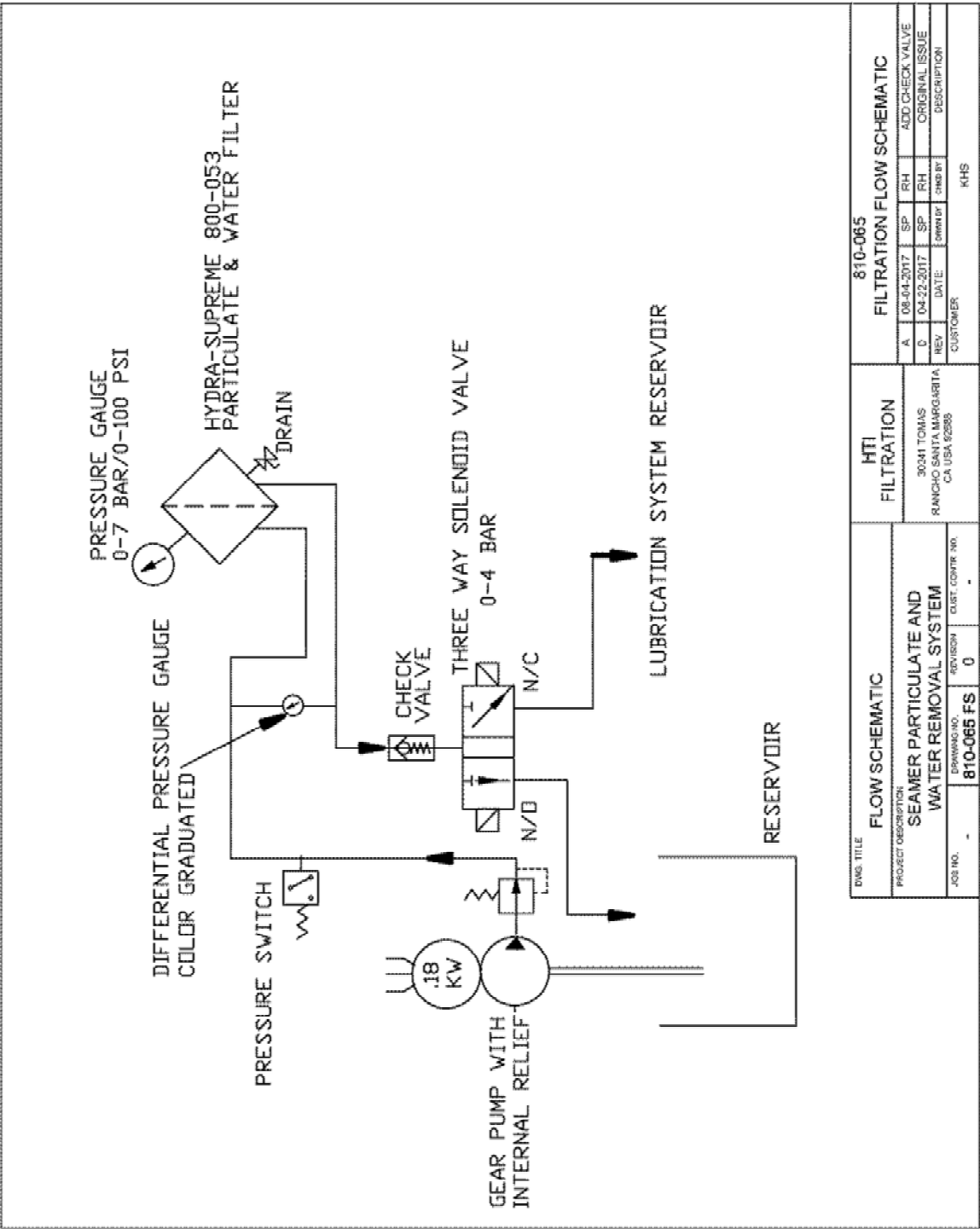
Step 1: Turn off the Filter System. It is not necessary to turn off the host machine to service the Hydra-Supreme filter. Confirm that the system pressure returns to 0 PSI.

Step 2: Position a capture vessel below the drain hose. Open the ball valve on the

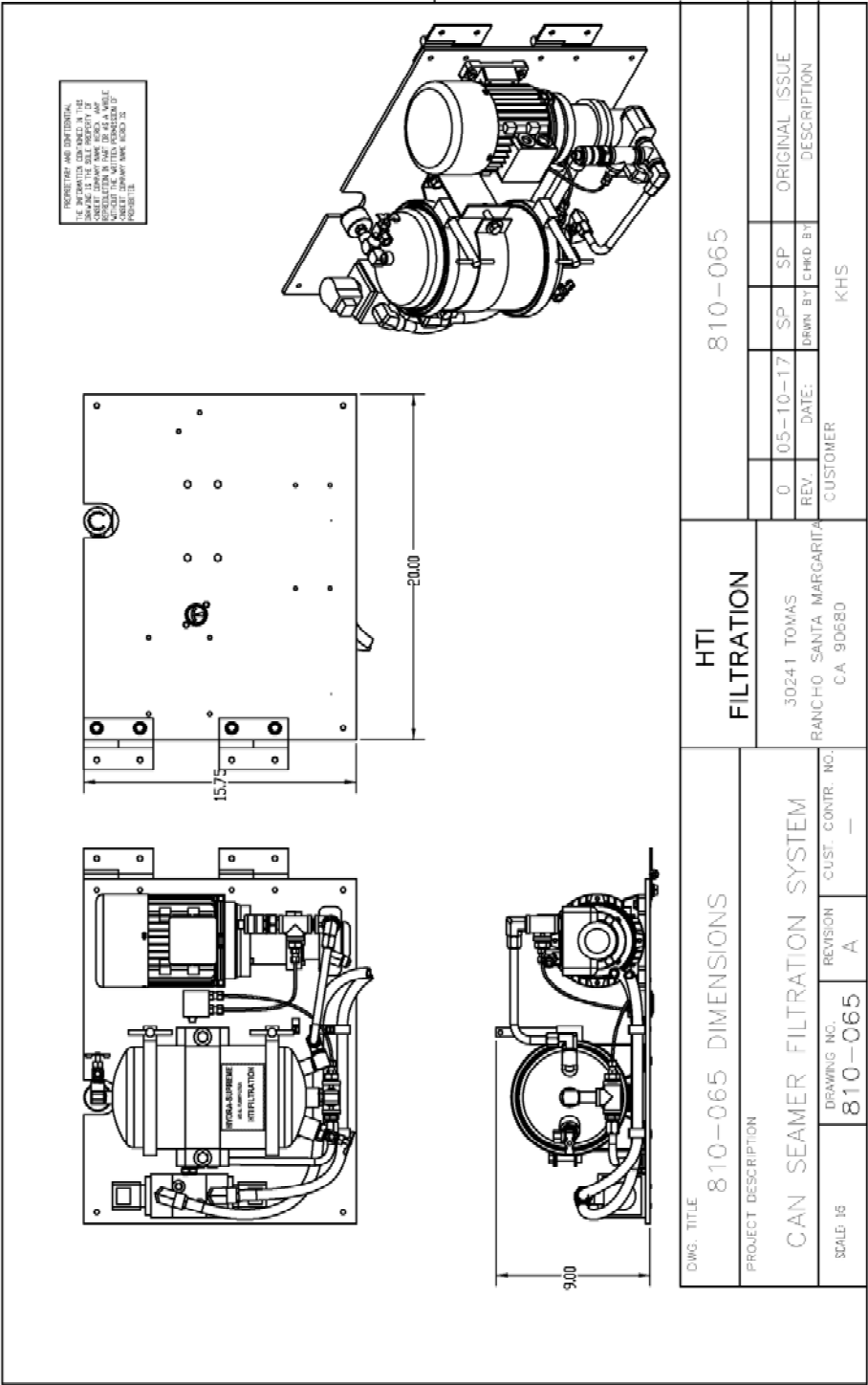
bottom of the canister, and then open the bleed cock on the top of the canister. Drained oil can later be used to refill the canister.

- Step 3: Remove the canister clamp ring and lift off the canister lid.
- Step 4: Examine the canister "O" ring seal for cracks and wear spots. If the canister lid seal was leaking, or if the "O" ring shows signs of wear, replace the seal.
- Step 5: Unscrew the "T" handle assembly that holds the filter in place. The cup seal on the handle assembly should be smooth and free of rough spots or tears. Replacement seals are available.
- Step 6: Slice open the end of the plastic bag holding the new element. Remove the new element and set in a clean area. Lift the filter element off of the center post and slide it into plastic bag.
- Step 7: Slide new element over the center post. The 'down' side has the black O-ring and the 'up' side has a ferrule with the metal bale and a deep port for the T-handle to fit inside.
- Step 8: Close drain valve and slowly refill canister with the oil captured in the bucket.
- Step 9: Put the "O" ring back on the canister lip, replace lid, clamp and tighten.
- Step 10: Start the pump motor and allow air to bleed out through bleed cock on top of canister. Close bleed cock when fluid starts to come out. Wipe off unit and check for leaks.
- Step 11: Allow the old filter to drain free of oil, typically 24 hours and dispose of according to local regulations.

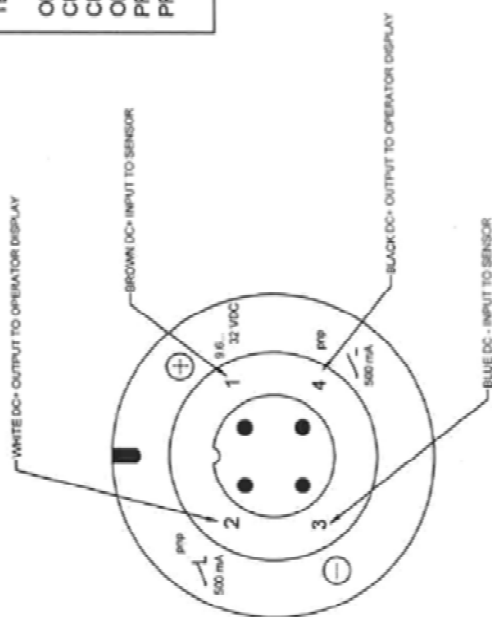




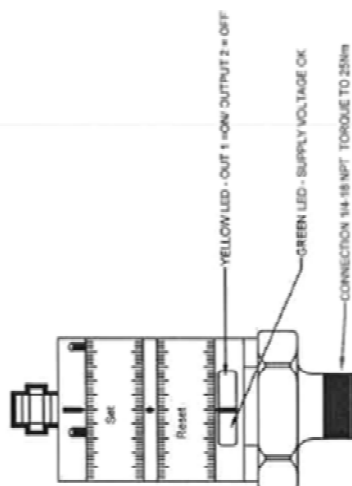
DWS TITLE		FLOW SCHEMATIC		HTI FILTRATION		810-065 FILTRATION FLOW SCHEMATIC						
PROJECT DESCRIPTION		SEAMER PARTICULATE AND WATER REMOVAL SYSTEM		30241 TOMAS RANCHO SANTA MARGARITA CA USA 92888								
JOB NO.	-	DRAWING NO.	810-065 FS	REVISION	0	CUST. CONTR. NO.	-	A	08-04-2017	SP	RH	ADD CHECK VALVE
								D	04-22-2017	SP	RH	ORIGINAL ISSUE
								REV.	DATE:	3004197	2ND BY	DESCRIPTION
								CUSTOMER				KHS



OPERATING VOLTAGE -	9.6 TO 32 VDC
CURRENT RATING (mA) -	500
CURRENT CONSUMPTION -	<25
OPERATING TEMPERATURE -	-25 TO 80 C
PROTECTION -	IP 67 / III
PRESSURE RANGE-	0...400 BAR 0 5800 PSI



NOTE:
USE 620-005 RIGHT ANGLE CONNECTOR
USE 620-006 COVER



ENG. TITLE	PROJECT DESCRIPTION	ISSUING NO.	REVISION	CUST. CONTROL NO.
PRESSURE SWITCH ILLUSTRATION	PRESSURE SWITCH 620-004	620-004		
JOB NO.				

HTI INC.	11820 WESTERN AVE. LOS ANGELES CA 90040	<table><tr><td>D</td><td>08-10-12</td><td>SP</td><td>SP</td><td>ORIGINAL ISSUE</td></tr><tr><td>REV</td><td>DATE</td><td>ISSUE BY</td><td>ISSUE BY</td><td>DESCRIPTION</td></tr><tr><td colspan="5">CUSTOMER</td></tr></table>	D	08-10-12	SP	SP	ORIGINAL ISSUE	REV	DATE	ISSUE BY	ISSUE BY	DESCRIPTION	CUSTOMER				
D	08-10-12	SP	SP	ORIGINAL ISSUE													
REV	DATE	ISSUE BY	ISSUE BY	DESCRIPTION													
CUSTOMER																	

MOTOR CIRCUIT

16-4 SEDDV CABLE 4 M LENGTH

FAN
END

BLACK RED WHITE

L1 L2 L3
W1 V1 U1
O O O
T3 T2 T1

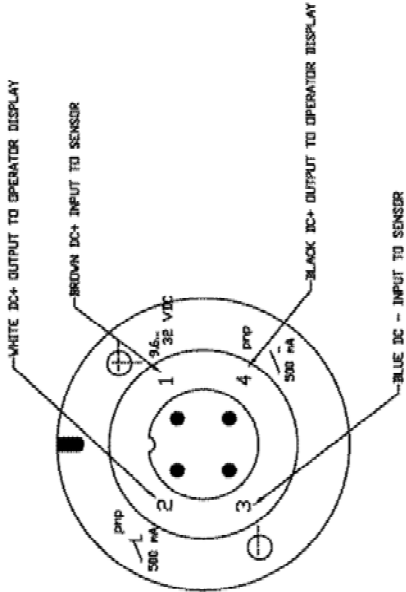
W5 V5 U2
O O O
T6&9 T5&8 T4&7

SHAFT
END

M.G.M. MOTORS
.25 HP/.18 KW
1120 RPM/900 RPM

WARNING LIGHT CIRCUIT

22 AWG BLACK PUR, 5 M length



OWN TITLE	810-065 WIRING	HTI FILTRATION	810-065 WIRING SCHEMATIC
PROJECT DESCRIPTION	METRIC 3 PHASE FILTER	NON-HI TONAS Bavaria Tona Margaria Da 02000	
DRAWING NO.	810-065 WS	REVISION	0
DATE	0	DATE	0
CUSTOMER	KHS	DESCRIPTION	

ADDITIONAL INSTRUCTIONS FOR USA & CANADA **INSTRUCTIONS COMPLÉMENTAIRES POUR USA ET CANADA**

In the following instructions you can find additional information about the motor wiring. We recommend you to read carefully these additional information which must be preserved together with the "Use and Maintenance" booklet supplied with the motor. For any clarifications please contact the M.G.M. motori elettrici SpA organization.

Les instructions suivantes sont des instructions complémentaires relatives au branchement électrique. Nous vous recommandons de lire attentivement ces instructions qui doivent être conservées avec le manuel de mise en route et de manutention du moteur. Pour toutes les éventuelles précisions, veuillez contacter l'organisation de M.G.M. motori elettrici S.p.A.



Before connecting the motor to the power supply it is necessary to connect the earth wire in accordance with the standards and regulations in force by trained personnel to prevent serious electrical shocks.



Avant de brancher le moteur au secteur d'alimentation, il est nécessaire de mettre le moteur à la terre en accord aux normes en vigueur. Celui-ci doit être installé par un personnel qualifié afin de prévenir tout incident électrique.

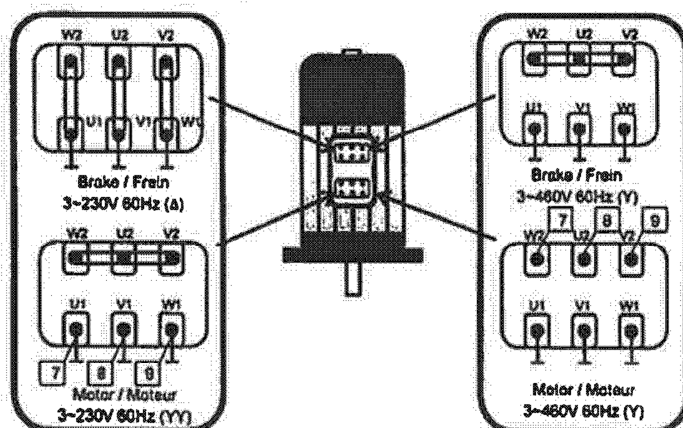
BA Motor, AC Brake / Moteur BA, Frein AC

Motor voltage / Tension du moteur: 230V/480V/60Hz (YY/Y)

Brake voltage / Tension du frein: 230V/480V/60Hz (Δ/Y)*

Motor wire markers: 1-brown, 2-red, 3-orange, 4-yellow, 5-green, 6-blue, 7-violet, 8-grey and 9-white.
Motor at 3-230V (YY), connect to U1 wires 1 and 7, connect to V1 wires 2 and 8, connect to W1 wires 3 and 9. Connect wires 4, 5 and 6 to W2, U2 and V2 respectively and connect together W2, U2 and V2 with the links.
Motor at 3-480V (Y), remove the links connecting U2, V2, W2 and move only the wires marked with 7 (violet marker), 8 (grey marker) and 9 (white marker) from U1, V1, W1 to W2, U2, V2.
 Supply through U1, V1 and W1.
 Interchange any two line leads to reverse rotation.
Brake:
Brake at 3-230V (Δ), connect U1 and W2, V1 and U2, W1 and V2 with the links according to the diagram below.
Brake at 3-480V (Y), connect W2, U2 and V2 with the links according to the diagram below.
 Supply through U1, V1 and W1.

Identificateurs pour fils du moteur: 1-marron, 2-rouge, 3-orange, 4-jaune, 5-vert, 6-bleu, 7-violet, 8-gris et 9-blanc.
Moteur à 3-230V (YY), connecté les fils 1 et 7 à la borne U1, connecté les fils 2 et 8 à la borne V1, connecté les fils 3 et 9 à la borne W1. Connecté respectivement les fils 4, 5 et 6 à W2, U2 et V2 et connecté ensemble les bornes W2, U2 et V2 avec les barrettes.
Moteur à 3-480V (Y), enlever les barrettes connectant U2, V2, W2 et déplacé les fils 7(violet), 8 (gris) et 9 (blanc) de U1, V1, W1 à W2, U2, V2.
 Alimenter le moteur aux bornes U1, V1 et W1.
 Échanger deux lignes d'alimentation pour inverser le sens de rotation.
Frein:
Frein à 3-230V (Δ), connecté U1 et W2, V1 et U2, W1 et V2 avec les barrettes selon le diagramme ci-dessous.
Frein à 3-480V (Y), connecté W2, U2 et V2 avec les barrettes selon le diagramme ci-dessous.
 Alimenter le frein aux bornes U1, V1 et W1.



* 230V/480V/60Hz brake voltage is only available from size 71 to 112 / La tension de frein 230V/480V/60Hz est disponible seulement pour les moteurs de tailles 71 à 112.

Motor voltage / Tension du moteur: 220V/380V/60Hz, 265V/460V/60Hz, 330V/575V/60Hz (Δ/Y)**
Brake voltage / Tension du frein: 220V/380V/60Hz, 265V/460V/60Hz, 330V/575V/60Hz (Δ/Y)**

Motor:

Motor in Δ connection (220V, 265V or 330V), connect U1 and W2, V1 and U2, W1 and V2 with the links according to the diagram below.

Motor in Y connection (380V, 460V or 575V), connect W2, U2 and V2 with the links according to the diagram below.

Supply through U1, V1 and W1.

Interchange any two line leads to reverse rotation.

Brake:

Brake in Δ connection (220V, 265V or 330V), connect U1 and W2, V1 and U2, W1 and V2 with the links according to the diagram below.

Brake in Y connection (380V, 460V or 575V), connect W2, U2 and V2 with the links according to the diagram below.

Supply through U1, V1 and W1.

Moteur:

Moteur connecté en Δ (220V, 265V ou 330V), connecté U1 et W2, V1 et U2, W1 et V2 avec les barrettes selon le diagramme ci-dessous.

Moteur connecté en Y (380V, 460V ou 575V), connecté W2, U2 et V2 avec les barrettes selon le diagramme ci-dessous.

Alimenter le moteur aux bornes U1, V1 et W1.

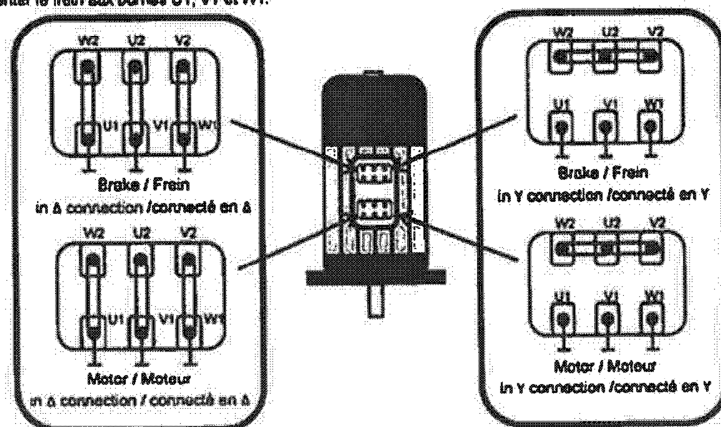
Échanger deux lignes d'alimentation pour inverser le sens de rotation.

Frein:

Frein connecté en Δ (220V, 265V ou 330V), connecté U1 et W2, V1 et U2, W1 et V2 avec les barrettes selon le diagramme ci-dessous.

Frein connecté en Y (380V, 460V ou 575V), connecté W2, U2 et V2 avec les barrettes selon le diagramme ci-dessous.

Alimenter le frein aux bornes U1, V1 et W1.



BA Motor, DC Brake / Moteur BA, Frein DC
BM Motor, DC Brake / Moteur BM, Frein DC

Motor voltage / Tension du moteur: 230V/460V/60Hz (YY/Y)
Brake voltage / Tension du frein: 1~110V/60Hz, 1~230V/60Hz, 1~330V/60Hz

Motor wire markers: 1-brown, 2-red, 3-orange, 4-yellow, 5-green, 6-blue, 7-violet, 8-grey and 9-white.
Motor at 3~230V (YY), connect to U1 wires 1 and 7, connect to V1 wires 2 and 8, connect to W1 wires 3 and 9.
Connect wires 4, 5 and 6 to W2, U2 and V2 respectively and connect together W2, U2 and V2 with the links.

Motor at 3~460V (Y), remove the links connecting U2, V2, W2 and move only the wires marked with 7 (violet marker), 8 (grey marker) and 9 (white marker) from U1, V1, W1 to W2, U2, V2.

Supply through U1, V1 and W1.

Interchange any two line leads to reverse rotation.

Brake:

The brake must be fed through the rectifier at the single phase voltage (1~110V/60Hz, 1~230V/60Hz or 1~330V/60Hz) stated on the name plate. Connect lines on the wave sign (-) connector of the rectifier.

Identificateurs pour fils du moteur: 1-marron, 2-rouge, 3-orange, 4-jaune, 5-vert, 6-bleu, 7-violet, 8-gris et 9-blanc.

Moteur à 3~230V (YY), connecté les fils 1 et 7 à la borne U1, connecté les fils 2 et 8 à la borne V1, connecté les fils 3 et 9 à la borne W1. Connecté respectivement les fils 4, 5 et 6 à W2, U2 et V2 et connecté ensemble les bornes W2, U2 et V2 avec les barrettes.

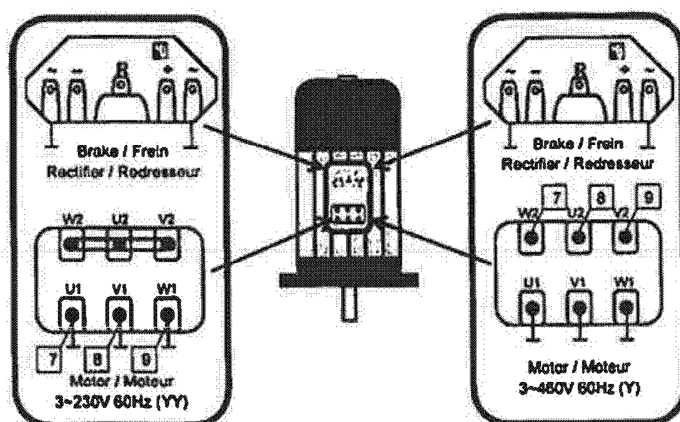
Moteur à 3~460V (Y), enlever les barrettes connectant U2, V2, W2 et déplacé les fils 7(violet), 8 (gris) et 9 (blanc) de U1, V1, W1 à W2, U2, V2.

Alimenter le moteur aux bornes U1, V1 et W1.

Échanger deux lignes d'alimentation pour inverser le sens de rotation.

Frein:

Le frein doit être alimenté au travers du redresseur à la tension monophasée indiquée sur la plaque signalétique (1-110V/60Hz, 1-230V/60Hz ou 1-330V/60Hz). Connecter les lignes d'alimentation aux bornes du redresseur portant le signe de vague (~).



Motor voltage / Tension du moteur: 220V/380V/60Hz, 285V/480V/60Hz, 330V/575V/60Hz (Δ/Y)
Brake voltage / Tension du frein: 1-110V/60Hz, 1-230V/60Hz, 1-330V/60Hz

Motor:

Motor in Δ connection (220V, 285V or 330V), connect U1 and W2, V1 and U2, W1 and V2 with the links according to the diagram below.

Motor in Y connection (380V, 480V or 575V), connect W2, U2 and V2 with the links according to the diagram below.

Supply through U1, V1 and W1.

Interchange any two line leads to reverse rotation.

Brake:

The brake must be fed through the rectifier at the single phase voltage (1-110V/60Hz, 1-230V/60Hz or 1-330V/60Hz) stated on the name plate. Connect lines on the wave sign (~) connector of the rectifier.

Moteur:

Moteur connecté en Δ (220V, 285V ou 330V), connecté U1 et W2, V1 et U2, W1 et V2 avec les barrettes selon le diagramme ci-dessous.

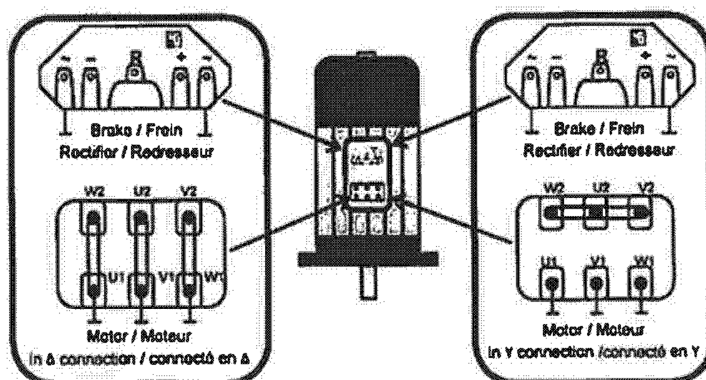
Moteur connecté en Y (380V, 480V ou 575V), connecté W2, U2 et V2 avec les barrettes selon le diagramme ci-dessous.

Alimenter le moteur aux bornes U1, V1 et W1.

Échanger deux lignes d'alimentation pour inverser le sens de rotation.

Frein:

Le frein doit être alimenté au travers du redresseur à la tension monophasée indiquée sur la plaque signalétique (1-110V/60Hz, 1-230V/60Hz ou 1-330V/60Hz). Connecter les lignes d'alimentation aux bornes du redresseur portant le signe de vague (~).



SM(X) Motor / Moteur SM(X)

Motor voltage / Tension du moteur: 230V/480V/60HZ (YY/Y)

Motor wire markers: 1-brown, 2-red, 3-orange, 4-yellow, 5-green, 6-blue, 7-violet, 8-grey and 9-white.
 Motor at 3-230V (YY), connect to U1 wires 1 and 7, connect to V1 wires 2 and 8, connect to W1 wires 3 and 9.
 Connect wires 4, 5 and 6 to W2, U2 and V2 respectively and connect together W2, U2 and V2 with the links.
 Motor at 3-480V (Y), remove the links connecting U2, V2, W2 and move only the wires marked with 7 (violet marker), 8 (grey marker) and 9 (white marker) from U1, V1, W1 to W2, U2, V2.
 Supply through U1, V1 and W1.
 Interchange any two line leads to reverse rotation.

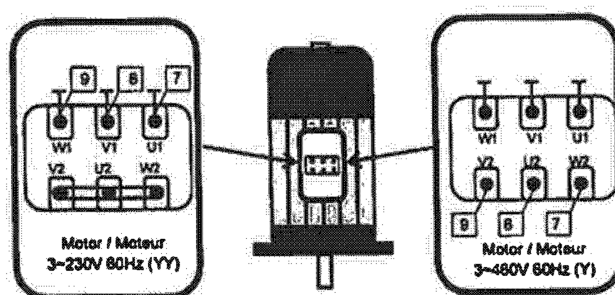
Identificateurs pour fils du moteur: 1-marron, 2-rouge, 3-orange, 4-jaune, 5-vert, 6-bleu, 7-violet, 8-gris et 9-blanc.

Moteur à 3-230V (YY), connecté les fils 1 et 7 à la borne U1, connecté les fils 2 et 8 à la borne V1, connecté les fils 3 et 9 à la borne W1. Connecté respectivement les fils 4, 5 et 6 à W2, U2 et V2 et connecté ensemble les bornes W2, U2 et V2 avec les barrettes.

Moteur à 3-480V (Y), enlever les barrettes connectant U2, V2, W2 et déplacé les fils 7(violet), 8 (gris) et 9 (blanc) de U1, V1, W1 à W2, U2, V2.

Alimenter le moteur aux bornes U1, V1 et W1.

Échanger deux lignes d'alimentation pour inverser le sens de rotation.



Warning: On motor type SM 56, the position of the terminal block is 90 degrees rotated compared to this drawing.
 Attention: Pour les moteurs de type SM 56, la position du bloc de terminal est à 90 degrés comparé à ce dessin.

Motor voltage / Tension du moteur: 220V/380V/60HZ, 265V/480V/60Hz, 330V/575V/60Hz (Δ/Y)**

Motor:

Motor in Δ connection (220V, 265V or 330V), connect U1 and W2, V1 and U2, W1 and V2 with the links according to the diagram below.

Motor in Y connection (380V, 480V or 575V), connect W2, U2 and V2 with the links according to the diagram below.

Supply through U1, V1 and W1.

Interchange any two line leads to reverse rotation.

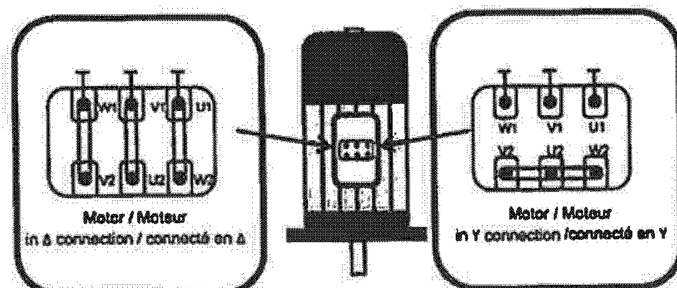
Moteur:

Moteur connecté en Δ (220V, 265V ou 330V), connecté U1 et W2, V1 et U2, W1 et V2 avec les barrettes selon le diagramme ci-dessous.

Moteur connecté en Y (380V, 480V ou 575V), connecté W2, U2 et V2 avec les barrettes selon le diagramme ci-dessous.

Alimenter le moteur aux bornes U1, V1 et W1.

Échanger deux lignes d'alimentation pour inverser le sens de rotation.



Warning: On motor type SM 56, the position of the terminal block is 90 degrees rotated compared to this drawing.
 Attention: Pour les moteurs de type SM 56, la position du bloc de terminal est à 90 degrés comparé à ce dessin.

** Other voltage are available in (Δ/Y) connection / D' autres tensions sont disponible en connexion (Δ/Y)

**TROUBLESHOOTING GUIDE
HTI FILTRATION SYSTEM
KHS MODEL 810-065**

When using this guide please remember that all pressure readings are to be taken with the system at normal operating temperatures.

SYMPTOM	CAUSE	CORRECTIVE ACTION
ERRATIC FLOW RATE, BUBBLES IN OIL STREAM	AIR LEAK IN INLET FITTING	CHECK FITTINGS FOR TIGHTNESS AND INTEGRITY,
	CUT OR PINCHED FEED HOSE	VISUALLY CHECK INLET HOSE FOR DEFECTS
	LEAKING PRESSURE RELIEF VALVE COVER GASKET	REPLACE GASKET IF ACORN OR ADJUSTER NUT HAS BEEN MOVED
EXCESSIVE INITIAL PRESSURE (ABOVE 40PSI)	OUTLET PIPING RESTRICTION	CHECK HOSE FOR RESTRICTION OR A CLOSED VALVE
	OIL TOO THICK (OVER 750 SUS @100°F)	CHECK OIL VISCOSITY (MAX: 750 SUS @100°F)
	OIL RUNS TOO COLD-OIL DOESN'T GET OVER 80° F.	CHANGE TO LIGHTER GRADE OF OIL, INSTALL HEATER
LOW FLOW RATE WITH LOW PRESSURE	AIR BUBBLE IN PUMP	OPEN AIR VENT ON CANISTER AND THEN, RESTART PUMP
	INSUFFICIENT MOTOR POWER	CHECK FOR PROPER PUMP VOLTAGE AND ROTATION
	OIL BYPASSING THROUGH RELIEF VALVE	CONFIRM THAT RELIEF VALVE HAS NOT BEEN TAMPERED WITH
LOW FLOW RATE WITH HIGH PRESSURE	LOADED FILTER	REPLACE FILTER ELEMENT
	RESTRICTED OUTLET LINES, CLOSED OUTLET VALVE	CHECK AND CLEAR RETURN LINES CONFIRM VALVE IS OPEN
EXCESSIVE END PRESSURE	RELIEF VALVE SET TOO HIGH	RE-SET RELIEF VALVE TO 75 PSI
SHORT FILTER LIFE	EXCESSIVE WATER IN OIL	CHECK SEALS, MAKE SURE COVERS ARE ALL IN PLACE
LEAK AT LID CLAMP	CUT OR ERODED SEAL	REPLACE AS NEEDED
	LID NOT TIGHT	TIGHTEN CLAMP BOLT
WARNING LIGHT COMES ON BELOW 60 PSI OR ABOVE 75 PSI	PRESSURE SWITCH SET WRONG	RESET PRESSURE SWITCH
07-23-17		

TROUBLESHOOTING GUIDE
HTI FILTRATION SYSTEM
KHS MODEL 810-065

When using this guide please remember that all pressure readings are to be taken with the system at normal operating temperatures.

SYMPTOM	CAUSE	CORRECTIVE ACTION
ERRATIC FLOW RATE, BUBBLES IN OIL STREAM	AIR LEAK IN INLET FITTING	CHECK FITTINGS FOR TIGHTNESS AND INTEGRITY,
	CUT OR PINCHED FEED HOSE	VISUALLY CHECK INLET HOSE FOR DEFECTS
	LEAKING PRESSURE RELIEF VALVE COVER GASKET	REPLACE GASKET IF ACORN OR ADJUSTER NUT HAS BEEN MOVED
EXCESSIVE INITIAL PRESSURE (ABOVE 40PSI)	OUTLET PIPING RESTRICTION	CHECK HOSE FOR RESTRICTION OR A CLOSED VALVE
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LOW FLOW RATE WITH HIGH PRESSURE	LOADED FILTER	REPLACE FILTER ELEMENT
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WARNING LIGHT COMES ON BELOW 60 PSI OR ABOVE 75 PSI	PRESSURE SWITCH SET WRONG	RESET PRESSURE SWITCH
07-23-17		



www.htfiltration.com

30241 Tomas
Rancho Santa Margarita,
CA 92688

Phone: 949-546-0809
FAX: 949-269-6438

810-065 System Calibration
Revision: R1

Customer: KHS Inc. Date: 8/2/17
Purchase Order No: W1238739
Customer Part No.: 85028001S001 Serial Number: 3982
Model Number: 810-065

Motor Voltage: 230/460 ; 200-400 60 ; 50 Hz
Motor Serial No.: 6421356
Motor Amps: L1: 0.07 L2: 0.07 L3: 0.07

Test Fluid Used: Lubriplate SSO-FG-150 Fluid Temp.: 106 F

Pump Relief Setting: 95-100 PSI Pressure Switch Setting: 60 PSI
Operating Pressure: Return to Base: 38 Lube Refill: 37
Differential Pressure Sensor Operation: 5/8 Green

Pre-Delivery Check List

800-053: ☒ Tube Caps in Place: ☒ Serial No. Label: ☒
Operator Manual Enclosed: ☒ Bleed Cocks Tight: ☒ Drain Cocks Tight: ☒

Inspected By: 

Date: 10-19-17



HTI Filtration Corp.

30241 Tomas Rancho Santa Margarita, CA 92688 949 546-0745 sales@htifiltration.com

STANDARD WARRANTY

This filter system was inspected before shipment from our plant. To the original purchaser of this system HTI FILTRATION 30241 Tomas, Rancho Santa Margarita, CA 92688 warrants its' products free from defects in material and workmanship for a period of 1 year from date of purchase.

HTI FILTRATION makes no other express warranty, and HTI excludes and buyer waives any and all implied warranties including, without limitation, implied warranties in connection with the design, sale, merchantability or fitness of the goods for any particular use or purpose.

In order for any claim under this warranty to be valid, HTI must receive from the buyer, within a reasonable time not to exceed thirty (30) calendar days after any defect is discovered, written notice of the claimed defect along with a detailed report of the conditions of use at the time of discovery of the defect. Parts which fail or become defective during the warranty period, except as a result of freezing, melting, improper installation, use or care, shall be replaced or repaired, at HTI's option, without charge within 90 days of the receipt of the defective part, barring unforeseen delays. HTI shall in no event be responsible for the repairs made by others without the express written permission and consent of HTI.

To obtain warranty replacement or repairs, defective components or parts should be returned, freight prepaid, to place of purchase or nearest authorized service center. HTI shall not be responsible for cartage; removal and/or reinstallation labor or any other such costs incurred in obtaining warranty replacements. In no event shall HTI be responsible for any incidental or consequential damage, whether foreseeable or not, and whether or not such damage occurs or is discovered before or after repair or replacement.

The forgoing warranty does not apply to wear components, seals or filtration elements.

This warranty extends only to the original buyer and HTI makes no other warranty, expressed or implied, to other persons or entities. If buyer makes any warranty or representation inconsistent with or in addition to the warranty stated hereinabove, the buyer shall, at its own expense, defend and hold HTI harmless from any claim thereon of any nature whatsoever.

10.4. Oil Lubrication Pump

Miniature MeterFlo® Pump Packages



DESCRIPTION

Miniature MeterFlo is an electric, motor-driven pump package with a series of pumping units designed for use with virtually any type of lube system requiring oil flow up to 14 in³/minute (229cc/min.). Each of these lube packages consists of a 115 VAC, 60Hz motor direct coupled to a gear pump and mounted on a steel reservoir. A wide range of displacements, reservoir sizes, and optional accessories are available. In continuous duty, these pump assemblies are rated for service up to 1,000 psi (69 bar).

FEATURES

- Nominal displacements of 1.5, 8, and 14 in³/min. (16, 82, 131, and 229 cc/mm.)
- An adjustable internal relief protects pump from excessive pressures. Factory set at 1,000 psi (69 bar)
- Reservoirs with removable covers, sized at 1.5, 3, and 5 gallons (5.7, 11.4, and 18.9 liters)
- Reservoir has a suction line strainer, return line port, visual level gauge, pressure gauge and filler/strainer with spring return cap
- Options include low level switch, high pressure indicator, and lube cycle timer

OPERATION

The motor/pump assembly on a Miniature MeterFlo package runs continuously whenever power is applied. On/off cycles are available by using the optional timer that has user selectable off and on times. Optional low level and high pressure switches can be wired to warning lamps on an operator's panel, or to a central control room.



APPLICATIONS

A Miniature MeterFlo package is ideal for smaller series progressive systems requiring continuous metered lubrication with an electrically driven pump. Combined with Trabon® MSP flow controls and/or cycle switch assemblies, a Miniature MeterFlo package can be operated on a timed cycle for precision lubrication. This can be accomplished by returning unused flow to tank through an MSP® shunt valve after the lube requirements of the system have been met. Another alternative is to use cycle switch contacts in a latching relay circuit to keep the pump on until lube requirements of the system are satisfied.

In an orifice system, Miniature Meterflo can be operated in either continuous or timed mode. Usually, precision metering is not a criteria in this type of system.

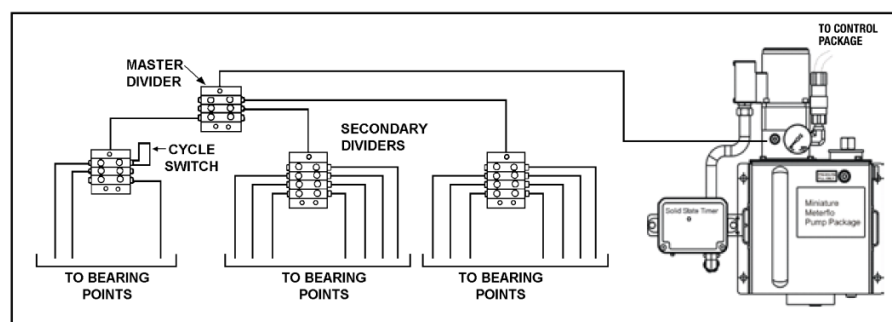


Figure 1.

PROVEN QUALITY. LEADING TECHNOLOGY.

Miniature MeterFlo Pump Package

L12600

SPECIFICATIONS	
PUMP ASSEMBLY:	
Motor Voltage	115 ± 10% VAC, 0.67A, 40W, 60 Hz
Motor Power (thermally protected)	1/19 HP
Motor Speed (before gear reduction)	1500 RPM
Pump Displacement	See Figures 2a - 2d
Pump Pressure Rate	see pump option, page 4
Relief Valve	300-2000 psi (21-138 bar), Factory set @ 1000 psi (69 bar)
Suction Strainer	140 micron stainless steel mesh
Pressure Gauge	0-1500 psi (0-100 bar)
Housing Materials	Painted Steel
Electrical Connections	3 Wire Hook-Up Inside Junction Box
RESERVOIR ASSEMBLY:	
Volume	See Table 1
Reservoir Materials	
Tank	Painted Steel
Level Gauge	Clear Nylon
OPTIONS:	
Low Level Switch Part No. 563014 (456-010-171)	
Actuator	Float Assembly
Contacts	Supplied N.C., Held Open, Rotate Float for N.O.
Max Contact Rate (resistive load)	0.30 amps @ 24 VDC
High Pressure Switch Part No. 557828 (542-210-107)	
Actuator	Diaphragm
Contacts	N.O. and N.C.
Contact Rate (inductive load)	0.3 amps
Pressure Range	400-4700 psi (38-324 bar) Factory set @ 750 psi (52 bar)
Controller Part No. 562872 (163-400-000)	
115 VAC Solid-State Timer (see Bulletin L14521)	

PUMP FLOW DATA

Note: All graphs are based on tests at 70°F at 10% and continuous duty cycles.

A = 10 Wt. (160 sus) Oil
B = 40 Wt. (2,500 sus) Oil
C = 70 Wt. (15,000 sus) Oil

Figure 2a.

PUMP
OPTION "PA"
1 in³/min

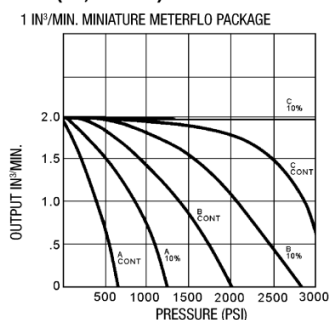


Figure 2b.

PUMP
OPTION "PB"
5 in³/min

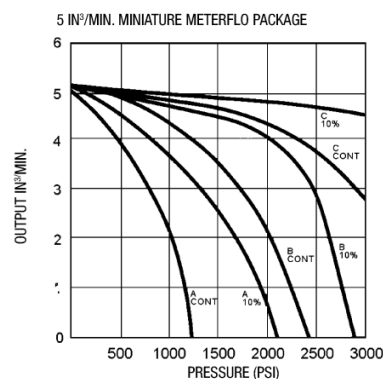


Figure 2c.

PUMP
OPTION "PC"
8 in³/min

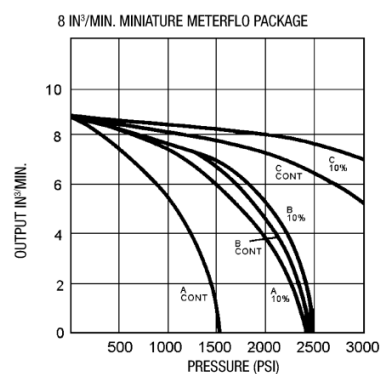
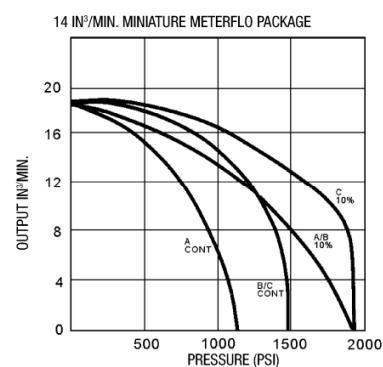


Figure 2d.

PUMP
OPTION "PD"
14 in³/min



PUMP SELECTION

The gear pumps being supplied in the Miniature MeterFlo packages are "wet" gear pumps, meaning there is some inherent leakage at the gear housing. This is more evident with low viscosity oils than with high viscosity oils. In order to correctly size pump output to meet system requirements, one must know lubricant viscosity, duty cycle and approximate operating pressure. With these parameters and the Figure 2 output graphs on page 2, the proper pump can be selected. Outputs at different duty cycles can be estimated by sketching intermediate curves of the same general shape on these graphs.

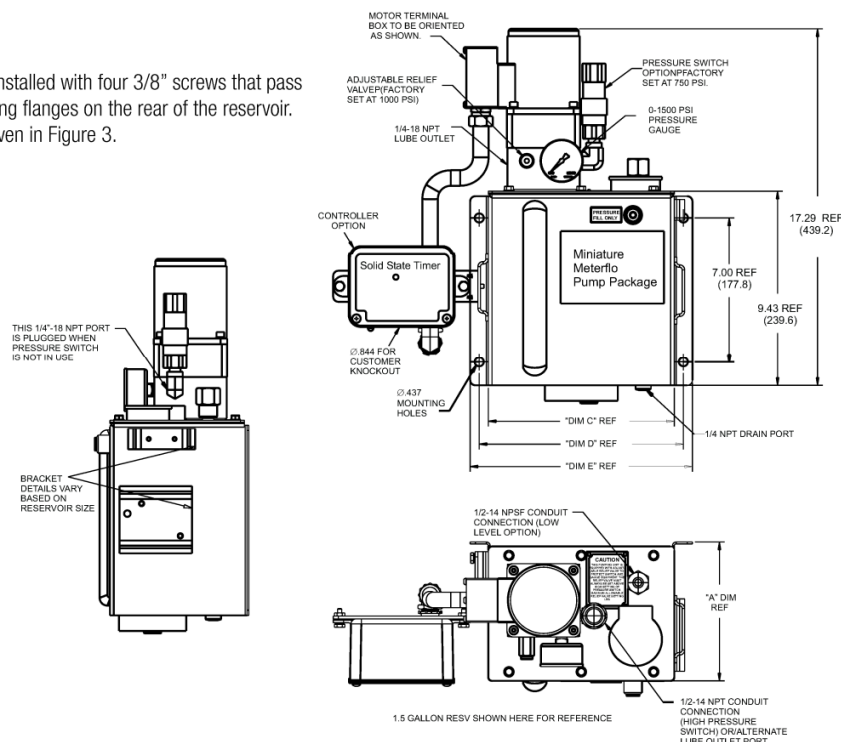
INSTALLATION DATA

Mounting

The entire lube package is installed with four 3/8" screws that pass through holes in two mounting flanges on the rear of the reservoir. Mounting dimensions are given in Figure 3.

Inches (mm)

Figure 3.



RESERVOIR SIZE	"A" DIM.	"B" DIM.	"C" DIM.	"D" DIM.	"E" DIM.
1.5 GALLON (5.7 LITERS)	6.75 (171.4)	3.35 (85.2)	9.00 (228.6)	9.87 (250.8)	10.75 (273.0)
3 GALLON (11.4 LITERS)	12.72 (323.0)	3.79 (96.3)	10.25 (260.3)	11.12 (282.6)	12.00 (304.8)
5 GALLON (19 LITERS)	12.72 (323.0)	3.79 (96.3)	15.50 (393.7)	16.37 (415.9)	17.25 (438.1)

Priming

The pump will prime itself whenever the reservoir is at least half full.

Electrical Hookup

Figure 4 is a simplified schematic for the entire pumping unit with all options shown. The electrical hookups are shown in Figures 5a.—5c. Wiring to the motor and optional switches should be with 16 AWG stranded wire and insulation rated for 115 VAC and 105°C. (If the timer option is used, connections are to a terminal strip inside the timer.)

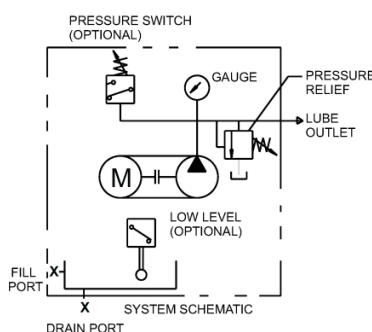


Figure 4

Figure 5a. Controller Wiring

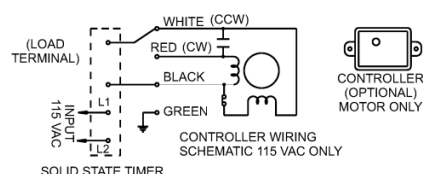


Figure 5b. Pressure Switch Wiring

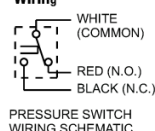
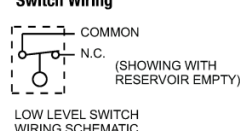


Figure 5c. Low Level Switch Wiring





MAINTENANCE INFORMATION

Normally, the only maintenance required on Miniature MeterFlo packages is filling the reservoir, and cleaning the suction strainer. Use only fresh, uncontaminated oil to fill the reservoir. Check the suction strainer annually, or more often if the pump is becoming noisy (cavitating) between cleanings. The suction strainer is accessed by removing the reservoir cover. It is also a good idea to periodically verify pump operation (lube delivery), the calibration of the timer settings and pressure switch setting, and the actuation depth of the low level switch, if these options are used.

SPARE PARTS ORDERING INFORMATION		
Description	Part No.	Old Part No.
Pump Assembly w/Motor, 1 in ³ /min	564412	540-800-610
Pump Assembly w/Motor, 5 in ³ /min	564413	540-800-620
Pump Assembly w/Motor, 8 in ³ /min	564414	540-800-630
Pump Assembly w/Motor, SAE Ports, 8 in ³ /min	—	540-801-045
Pump Assembly w/Motor, 14 in ³ /min	564415	540-800-640
Motor, 115 VAC	557286	493-040-065
Gear Box, 1 in ³ /min (12.5:1)	557293	493-060-007
Gear Box, 5 in ³ /min (5:1)	557292	493-060-006
Gear Box, 8 in ³ /min (3:1)	557291	493-060-005
Gear Box, 14 in ³ /min (3:1)	557291	493-060-005
Gear Pump Only, 1 to 8 in ³ /min	557822	540-800-603
Gear Pump Only, 14 in ³ /min	557821	540-800-430
115 VAC Solid-State Timer	562872	163-400-000
Pressure Switch	557828	542-210-107
Low Level Switch Assembly	563014	456-010-171
Suction Strainer	557810	540-666-008
Relief Valve	563558	540-835-100
Replacement Level Switch	557825	541-603-001

HOW TO ORDER

NOTE: Utilize number code not lettered code for ordering purposes.

MM	-	X	-	X	-	X	-	X
Reservoir Option 1 RA, 1.5 gallon reservoir 2 RB, 3 gallon reservoir 3 RC, 5 gallon reservoir								
Pump / Flow Option (*) 1 PA, 1 cu.in. / minute (1,500 psi maximum operating pressure) 2 PB, 5 cu.in. / minute (2,000 psi maximum operating pressure) 3 PC, 8 cu.in. / minute (2,000 psi maximum operating pressure) 4 PD, 14 cu.in. / minute (1,500 psi maximum operating pressure)								
Pressure Switch Option 1 SO, no pressure switch 2 SA, high pressure switch								
Low Level Option 1 LO, no low level switch 2 LA, low level switch, reed-type, SPST - 563014								

(*) All pump flow rates are based on 160 SUS (at 100 F) 10W oil, 70 F at 1,000 psi.

Example: Miniature Meterflo (MM) pump package consisting of a 3 gallon reservoir, 5 cu.in./minute pump output, high pressure switch and low level switch. Ordering Code: MM2222

Contact us today!

To receive product information or talk with a Graco representative, call 800-533-9655 or visit us online at www.graco.com.



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