Installation, Operation and Maintenance of Airflex® Model WCSEP* Water Cooled Tensioners (for size 36EP)



***For prior model 36WCS**
See manual WCS 11100

⚠ Warning

Forward this manual to the person responsible for Installation, Operation and Maintenance of the product described herein. Without access to this information, faulty Installation, Operation or Maintenance may result in personal injury or equipment damage.

⚠ Caution

Use Only Genuine Airflex® Replacement Parts.
The Airflex Division of Danfoss recommends the use of genuine Airflex replacement parts. The use of non-genuine Airflex replacement parts could result in substandard product performance, and may void your Danfoss warranty. For optimum performance, contact Danfoss.

ENGINEERING TOMORROW

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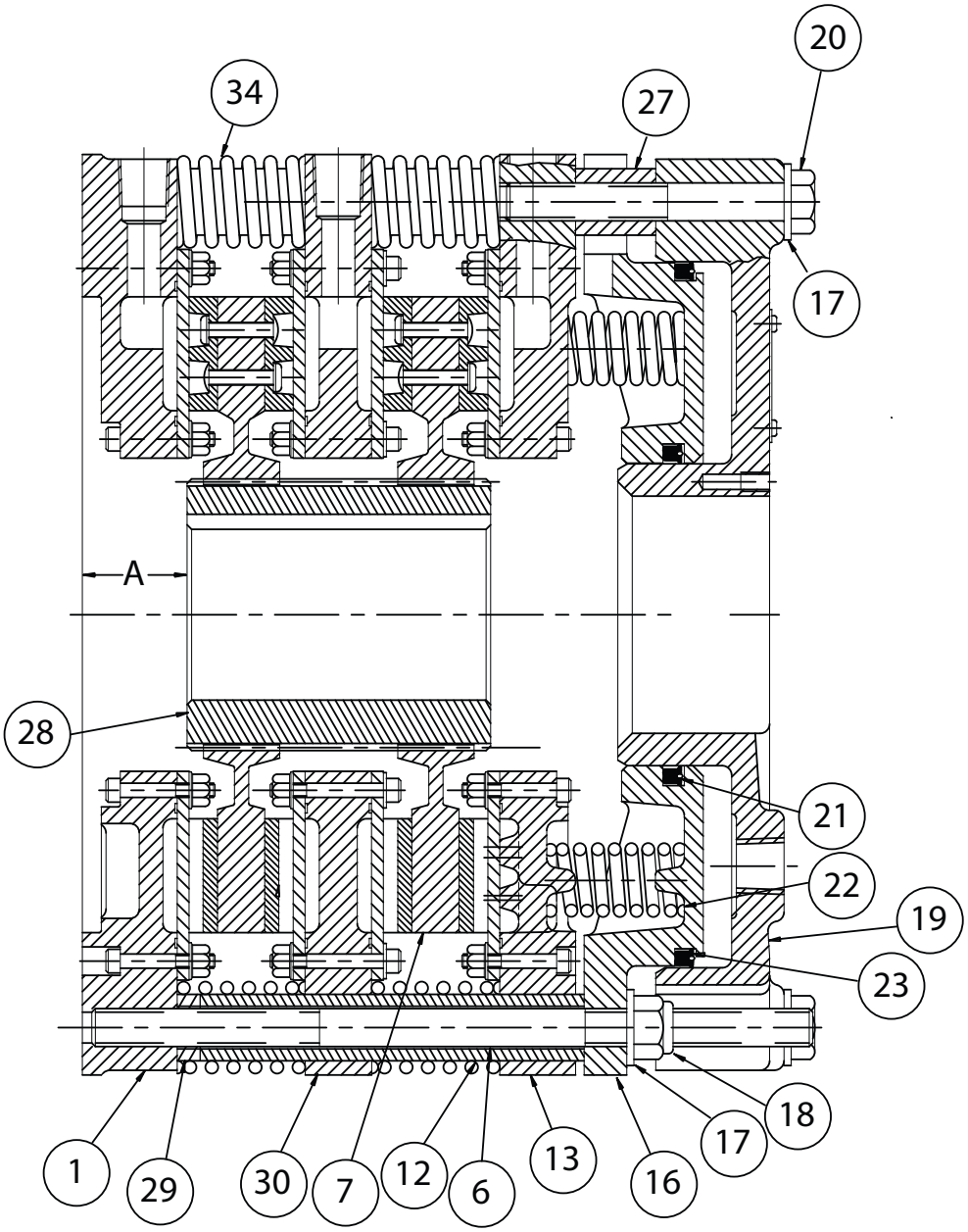


Figure 1 : WCSEP Cross Section and Item Numbers

TABLE 1
Item Description

Item	Description	Item	Description	Item	Description
1	Mounting Flange Sub-Assembly*	18	Locknut	28	Gear (not included)
6	Stud	19	Cylinder	29	Wear Spacer
7	Friction Disc Sub-Assembly*	20	Hex Head Screw	30	Reaction Plate Sub-Assembly*
12	Clamp Tube	21	Seal (Inner)	34	Release Spring
13	Pressure Plate Sub-Assembly*	22	Spring	52	Inner Spring
16	Spring Housing	23	Seal (Outer)	53	Spring Retainer
17	Flat Washer	27	Spacer Tube	105	Pipe Plug

* See Section 6.5, 6.6 and Figure 19 for sub-assembly components.

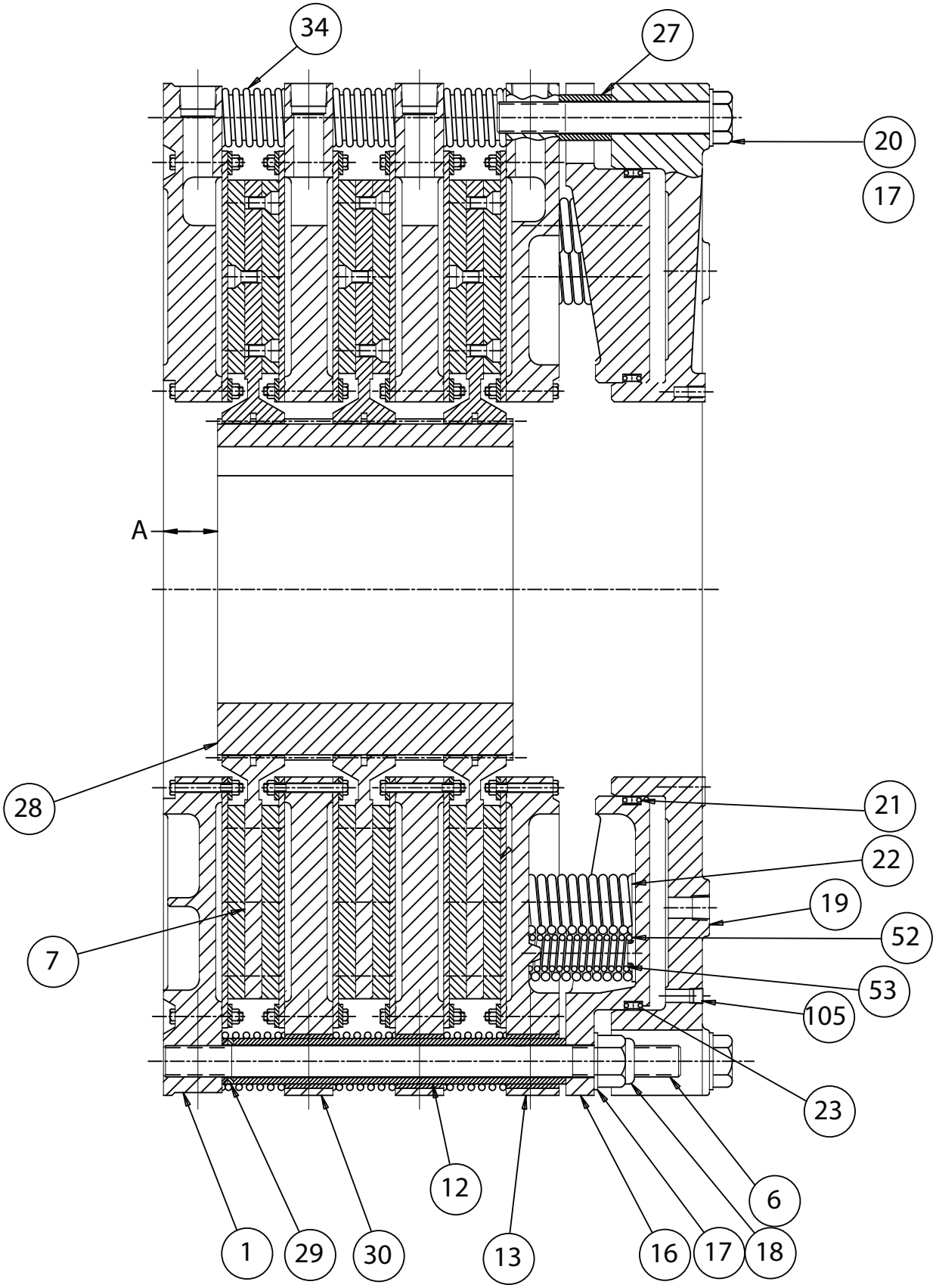


Figure 2 : 36WCSEP Cross Section and Item Numbers

1.0 INTRODUCTION

Throughout this manual there are a number of HAZARD WARNINGS that must be read and adhered to in order to prevent possible personal injury and/or damage to equipment. Three signal words " **DANGER** ", "**WARNING** " and " **CAUTION** " are used to indicate the severity of a hazard, and are preceded by the safety alert symbol ⚠

Denotes the most serious hazard, and is used when serious injury or death WILL result from misuse or failure to follow specific instructions.

Used when serious injury or death MAY result from misuse or failure to follow specific instructions.

Used when injury or product/equipment damage may result from misuse or failure to follow specific instructions.

It is the responsibility and duty of all personnel involved in the installation, operation and maintenance of the equipment on which th is device is used to fully understand the:

procedures by which hazards can be avoided.

1.1 Description

1.1.1 The Airflex WCSEP water-cooled tensioner is designed for constant tension applications. It is exceptionally well suited for high inertia stopping and rapid heat dissipation. The design of the WCSEP tensioner permits mid-shaft or end-shaft mounting. The rugged construction ensures long, trouble free service.

1.1.2 WCSEP tensioners are available in various sizes and quantities of friction discs. The model number identifies the number of discs and the nominal disc diameter. For example, 336WCSEP indicates three 36" diameter discs.

1.1.3 When size, such as 36WCSEP, is referred to in this manual, it means that the information given applies to all models using the 36" diameter water-cooled disc assembly; i.e., 236WCSEP, 336WCSEP, etc.

1.1.4 Tensioners can be used with either closed loop or open loop water systems.

1.1.5 This manual includes metric equivalents usually shown in brackets (#) following the U.S. measurement system value. Be sure to use the correct value.

1.2 How it Works

1.2.1 Referring to **Figure 1** , the gear (28) is mounted on the shaft which is to be stopped and the tensioner assembly is attached to the machine frame or a reaction bracket.

As air pressure is applied through the ports in the cylinder (19), the cylinder and pressure plate (13), which are attached to each other with hex head screws (20), flat washers (17) and spacer tubes (27), move away from the mounting flange (1), which is connected to the machine frame or reaction bracket. The pressure plate compresses the springs (22) against the stationary spring housing (16) and the clamp force is removed from the friction disc assembly (7) which rides on the gear. The shaft is then free to rotate. Multiple disc brakes utilize reac tion plates (30) between discs. The release springs (3 4) used in multiple disc brakes assist in separation of the reaction plates from the friction discs. High heat dissipation is accomplished by passing water through a special cavity behind the copper alloy wear plates. As air pressure is exhausted, the springs fo rce the pressure plate toward the mounting flange, clamping the friction disc assembly between the two members. High heat dissipation is accomplished by passing water through a special cavity behind copper alloy wear plates (3).

Torque flows through the brake from the shaft to be controlled, through the fricti on discs, through the pressure plate and reaction plates, through the clamp tubes and studs, to the m ounting flange, which is attached to a rigid surface.

2.0 INSTALLATION

Only qualified maintenance personnel should install, adjust or repair these units. Faulty workmanship will result in unreasonable exposure to hazardous conditions or personal injury.

Read these instructions thoroughly and review until you fully understand the installation sequence before proceeding with the work described in this section. Failure to follow these instructions will result in unreasonable exposure to hazardous conditions or personal injury.

Do not paint the clamp tubes (12), wear spacers (29), or the release springs (34), as this may hinder the engagement or disengagement of the tensioner.

Note: Some three and four disc units may require support on the cylinder end of the tensioner in certain high torque applications. Contact the factory for specific application information.

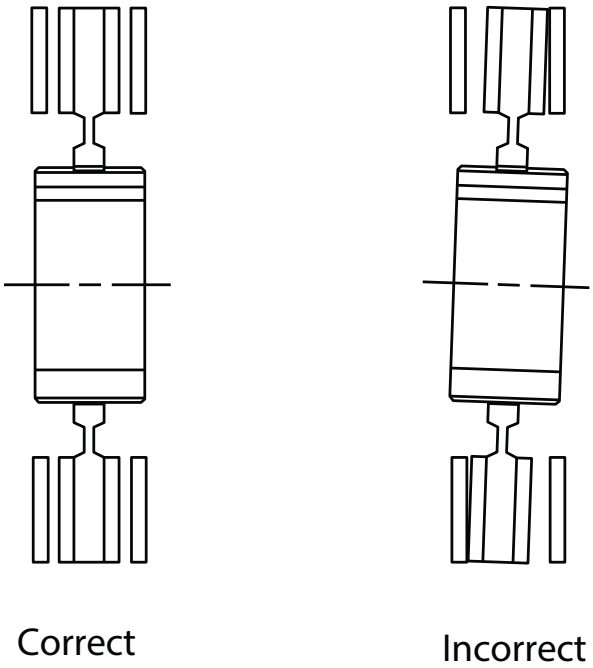


Figure 3 : Proper vs Improper alignment of WCSEP

2.1 Preparation and Alignment

2.1.1 Refer to the appropriate catalog information (available upon request) for appropriate envelope dimensions, mounting register diameters, mounting bolt circles and positions, and stud support bracket recommendations for each specific tensioner.

2.1.2 The tensioner reaction member (such as the machine frame) should have a machined register to allow for mounting and alignment control of the tensioner. The mounting surface should be designed to provide full support of the face of the mounting flange (1), preventing deflection during operation.

2.1.3 For proper operation and service life, the tensioner reaction member must be aligned to the shaft within the limits shown in Table 2.

Proper alignment is necessary to ensure that the friction discs track properly. Improper alignment will result in excessive wear to the friction material and mating surfaces, plus the gear and splined bore of the friction disc assemblies. See Figure 3.

TABLE 2
Alignment Requirements

Size	Concentricity (Parallel, TIR) of Shaft and Tensioner Inches (mm)	Perpendicularity (Angular, TIR) of Mounting Flange to Shaft* Inches (mm)
36WCSEP	0.010 (0.25)	0.019 (0.48)

* Perpendicularity measured near the outside diameter of t he mounting flange.

TABLE 3
"A" dimension on Figure 1 & 2

Size	Single	Dual	Triple	Quad
36WCSEP	2.36 (59.9)	2.36 (59.9)	2.36 (59.9)	2.36 (59.9)

2.1.4 Refer to Table 3 for the setup dimension between the tensioner mounting surface and the end of the gear (dimension "A" on **Figure 1**). Gears should be positioned to ensure that - when the tensioner is mounted - the disc splines will not overhang the end of the gear

when components are in both new and worn conditions. The gear is typically bored and keyed for a resulting Class FN2S interference fit for inch shafting and ISO System S7h6 for metric shafting. Contact Airflex Application Engineering for specific recommendations.

2.2 Mounting

2.2.1 The WCSEP must be mounted to a clean, rigid surface with hardened flat washers and screws of the grade, quantity, and size as listed in Table 4. Mounting to a properly aligned, rigid surface that fully supports the face of the mounting flange minimizes any deflection during operation and helps to ensure that the friction discs will track properly on the copper wear plates.

Note: To facilitate the mountin g process, the friction disc assemblies should be aligned to the gear and centered in the tensioner prior to mounting the gear onto the shaft. With the tensioner positioned with the mounting flange facing down, air pressure must first be applied into the cylinder to release the friction disc assemblies for alignment. Lower the gear (28) slowly and carefully into the splined bore of the friction disc assemblies (7). Adjust the discs so that they are centered in the tensioner and fit over the gear. Once the gear passes through all friction disc assemblies, exhaust the air pressure to clamp the discs into position and then remove the gear.

Maximum allowable air pressure in the cylinder (19) is 150 psig (10.2 bar).

2.2.2 Ensure that the shaft is free of nicks or burrs and the key fits properly in the shaft and gear.

2.2.3 Apply a light coat of anti-seizing compound to the shaft and key. Tap the key into the shaft keyway.

TABLE 4
Fastener Description and Assembly Torque

Item # Description	Specification	36WCSEP
4 Screw & 5 Locknut	Size	3/8-16NC2 Gr. 8
	Torque, Dry	40 (54)
18 Self Locking Nut	Size	1 3/8-6 NC Gr. 8
	Torque, Lubed	750 (1016)
Mounting Screw	Size	1-8NC Gr.8
	Quantity	14
	Torque, Lubed	660 (895)

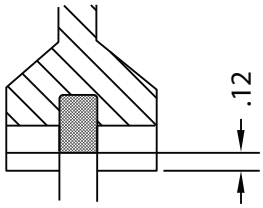
2.2.4 Heat the gear uniformly to 250°F (121°C) to expand the bore and ease assembly. Press the gear onto the shaft, making sure that the dimension between the gear and the tensioner mounting surface ("A") is maintained. See **Figure 1** and Table 3. Allow the gear to cool.

2.2.5 Apply a thin coat of MOLUB-ALLOY® OG Heavy - or equivalent - grease to the splines of the gear.

Excessive lubricant may co ntaminate friction material, resulting in erratic response or loss of torque.

The use of anti-seize or bearing greases on the gear splines may result in premature gear and disc spline wear.

2.2.6 Pre-fill the grease channel in the friction disc splines (if applicable) with MOLUB-ALLOY® OG Heavy - or equivalent - grease, as shown on **Figure 4** .



FILL GREASE CHANNEL 360° WITH MOLUB-ALLOY O.G. HEAVY GREASE TO WITHIN .12 OF I.D. AS SHOWN.

Figure 4 :Grease requirement

2.2.7 Rig the WCSEP into position and slide it over the gear. Avoid placing lifting straps or cables directly on the release springs (34).

Water inlets and outlets must be located as close as possible to the 6 o' clock and 12 o'clock positions, respectively. This will help to prevent air pockets in the water cavities, which would allow the tensioner to overheat.

2.2.8 While supporting the brake, connect an air supply to the cylinder and apply enough air pressure to release the discs in the tensioner. Attach the mounting flange (1) to the mounting surface using the appropriate fasteners. Tighten the fasteners to the specified torque value. See Table 4. After final tightening, exhaust the air pressure to engage the tensioner.

Use only the proper number and grade fasteners shown in Table 4 when installing the assembly. Use of commercial grade (Grade 2) fasteners where Grade 8 fasteners are specified may result in failure of the fasteners and a sudden and drastic reduction in brake torque.

Maximum allowable air pressure in the cylinder (19) is 150 psig (10.2 bar).

2.2.9 WCSEP tensioners should be covered to protect the unit from dirt, rain, overspray, and other sources of external contamination. In extreme environments the use of a sealed enclosure with internal strip heater is recommended to prevent moisture from collecting on the unit.

2.3 Air System

Maximum allowable air pressure is 150 psig (10.2 bar). Application of pressure exceeding maximum allowable may result in damage to the tensioner.

2.3.1 Maximum allowable pressure is 150 psig (10.2 bar).

2.3.2 Use only clean, filtered air (a 40 micron filter or better is recommended) which is free of excess moisture.

2.3.3 Air inlet sizes are shown in Table 5. Air inlets are located on the face of the cylinder (19). For cylinders with three ports, the lowest port should be located at or near the 6 o'clock position to facilitate purging of moisture that may accumulate in the air system or cylinder.

2.3.4 The final connection to the cylinder ports must be made with flexible hose.

TABLE 5
Air Inlet Size

Model	Thread Size
36WCSEP	3/4"-14 NPT

2.3.5 All pipes should be free of metal chips, cutting compound and any other foreign matter. Pipe ends should be reamed after cutting to eliminate possible restrictions. For optimum air system response, a minimum number of bends and elbows should be used.

The WCSEP tensioner does not require lubricated air; however associated control valves may. Consult the valve manufacturer for appropriate recommendations.

2.4 Coolant System

Make sure that the water inlets and outlets are positioned as close as possible to the 6 o'clock and 12 o'clock positions, respectively. This will help to minimize the formation of air pockets in the water cavity during operation, which could contribute to overheating of the tensioner.

2.4.1 Maximum allowable coolant pressure within the water cavity is 60 psig (4.1 bar) for size 36WCSEP units. See Table 7 for coolant pressure limitations as measured at the inlets and outlets of water jackets. Note that inlet pressures exceeding the maximum allowable static pressures are only permissible under dynamic flow conditions, provided that the average pressure between the inlet and outlet does not exceed the maximum allowable pressure stated above. The use of an accumulator or pressure relief valve may be desirable to reduce the effect of pressure spikes in the coolant system during operation.

High outlet pressures or surges exceeding maximum allowable may result in damage to the tensioner.

Maximum allowable water pressure is dependent upon tensioner size and specific application requirements.

Inlet pressures exceeding the maximum allowable average pressure are only permissible when the outlet pressures are at or below the limits listed in Table 7.

2.4.2 The coolant supply and discharge hose, pipe and fitting sizes, along with minimum flow rates for the tensioner rated horsepower, are listed in Table 6.

Note: The use of pipe and hose sizes that are larger than the outlet port sizes may help to reduce outlet pressures and improve coolant flow.

2.4.3 Coolant supply connections to the tensioner should provide a parallel flow through each section of the tensioner. Series flow is not recommended, as it can lead to overheating of the tensioner.

2.4.4 Inlet and outlet coolant manifolds must be provided. Manifolds should be constructed to allow for even flow through all ports. On size 36", two hoses can be routed to the reaction plates (30) to assist with balancing the flow to each wear plate.

Note: Reaction plates (30) in 36WCSEP typically have two inlet and two outlet ports to assist with obtaining balanced flow to each cooling chamber. In the event that a multiple disc tensioner includes an older style reaction plate with only one inlet and one outlet port, water flow should be restricted at the inlets to the pressure plate (13) and mounting flange (1) to allow for equally proportional heat dissipation at each cooling cavity. See **Figure 5** .

2.4.5 Use flexible connecting hose to each tensioner coolant section to allow axial travel of the pressure plate, and reaction plate(s) during tensioner operation without restricting the movement of components. When determining hose lengths, consideration should be given to movement and location of the pressure plate and reaction plate as friction material wears. Hose lengths running between the manifolds and the inlet or outlet ports should be equal in length, if possible. Reductions in the recommended line diameter should be avoided to prevent excessive line pressures.

TABLE 6
WCSEP Coolant Supply Data

No. of Discs	Disc Size	Thermal Rating [1] HP (kW)	Water Inlet and Outlet Pipe Size (Minimum piping I.D.)	Min. Flow Rate [2] GPM (dm^3/min) 100% Water	Min. Flow Rate [2] GPM (dm^3/min) 70% Water, 30% Ethylene Glycol by Vol.	Min. Flow Rate [2] GPM (dm^3/min) 60% Water, 40% Ethylene Glycol by Vol.	Min. Flow Rate [2] GPM (dm^3/min) 50% Water, 50% Ethylene Glycol by Vol.
1	36"	750 (581)	1 1/4"-11.5 NPT (1")	78 (295)	92 (348)	101 (382)	116 (439)
2		1560 (1162)		156 (590)	184 (696)	202 (764)	232 (878)
3		2340 (1743)		234 (885)	276 (1044)	303 (1146)	348 (1317)
4		3120 (2324)		312 (1181)	368 (1393)	404 (1529)	464 (1756)

1 - Thermal rating based on a 70°F (21 °C) water inlet temperature and a 50°F (28 °C) temperature rise between inlet and outlet.

2 - Flow rate is based on requirement of 1 U.S. GPM per 10 HP (1.97 kW per dm^3/min) thermal dissipation.

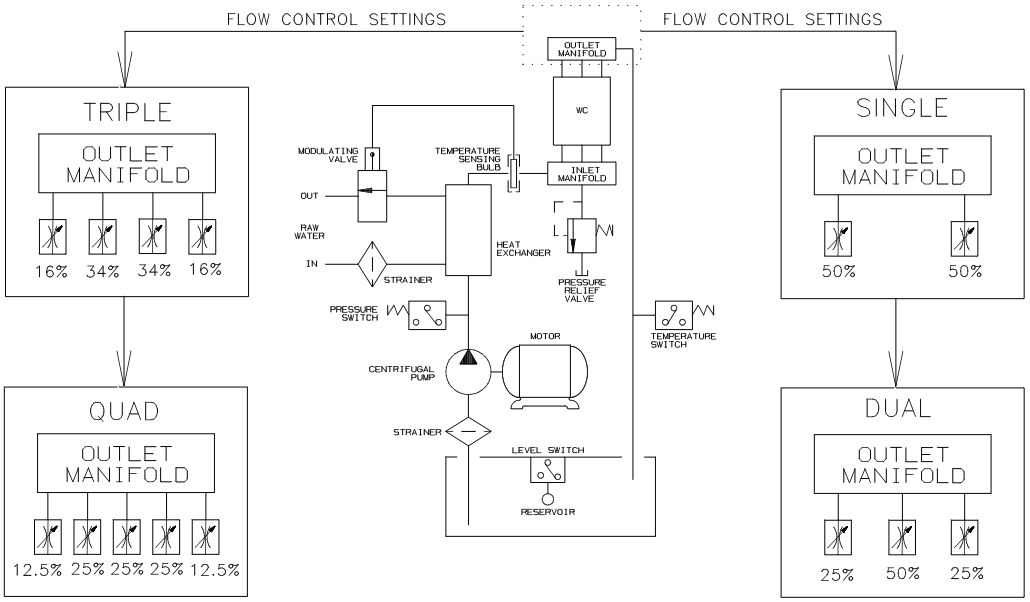


Figure 5 : : Manifold design for older style reaction plates with one inlet and one outlet

2.4.6 Avoid the use of sharp bends and elbows that will restrict water flow. Loops and bends in the lines may create air pockets, which substantially reduce the flow of coolant and can contribute to overheating.

2.4.7. Coolant and coolant supply lines should be free of foreign material (a 500 micron water filter is recommended). In the event that contaminated water is used as a coolant (not generally recommended), use of a multi-stage filter / strainer may be desirable to avoid the need for frequent cleaning of fine mesh filters.

2.4.8 **Figure 5** illustrates a typical closed loop liquid to liquid coolant system. The heat exchanger and temperature control would be replaced with a radiator, fan and motor in a liquid to air system.

2.4.9 The coolant supply temperature at the inlet should be 100°F (38°C) or lower. The coolant outlet temperature should not exceed the values given in Table 8. However, in no event should there be more than a 50°F (28°C) temperature rise between inlet and outlet. See Table 8 for maximum allowable outlet coolant temperature with various water/ethylene glycol mixtures and other cooling media.

2.4.10 **Open Loop Systems**

For efficient operation of the WCSEP, an adequate supply of filtered fresh water is required. (See 2.4.1 - 2.4.2). Excessive water hardness promotes the formation of scale deposits, which, in time, will affect the service life of the WCSEP unit. Water of high acidity or high in corrosive salts may cause electrolytic corrosion between the dissimilar metals used in the water cavities. Water treatment should be considered if the properties of the water exceed the following:

Equivalent calcium carbonate content hardness: Maximum 100 ppm.

pH value: 7.0 to 9.0.

Open loop systems should be thoroughly flushed with clean fresh water after operation to reduce the corrosive effects of contaminants on internal components.

2.4.11 **Closed Loop Systems**

For efficient operation of the WCSEP in a closed loop system, ethylene glycol coolant conforming to SAE Standard J1034 should be used. For preparation of the proper concentration of a water/ethylene glycol mixture, use make-up water which is low in corrosive ions such as chlorides and sulfates.

Recommended pH value of the water/ethylene glycol mixture: 7.5. to 10.5.

TABLE 7
Coolant Pressure

Size	Maximum Static	Maximum Inlet*
36WCSEP	60 (4.1)	60 (4.1)

* Under Dynamic Flow Conditions

NOTE : Above ratings for tensioning / winding type applications. For high cyclic applications, consult the factory.

3.0 OPERATION

3.1 Conditions of Operation

The following Hazard Warnings are to be followed for proper WCSEP functioning:

Friction lining must be worn-in to achieve product torque rating. For new installations or after repair, a minimum wear-in period for the friction couple of four hours at 50% of the rated horsepower is recommended to achieve rated torque. Verify proper operation before putting the product into service.

Protective means must be used to prevent oil, grease, dirt or coolant from coming into contact with the surfaces of the friction discs (8), or the wear plates (3). Oil or grease on these parts will significantly reduce the torque capacity of the unit. Dirt or coolant will produce erratic torque. Do not risk personal injury or damage to the equipment.

Maximum free wheeling speed must not exceed the speeds listed in Table 9. Exposure to speeds in excess of these values may cause the friction discs (8) to burst and result in extensive damage to the tensioner and/or cause personal injury.

For proper cooling of the WCSEP tensioner, it is required that the coolant inlet be located as close as possible to the 6 o'clock position and the outlet be located near the 12 o'clock position. This will help to assure that all coolant cavities are water-filled to help avoid overheating.

For operation in subfreezing temperatures, ethylene glycol antifreeze must be added to the water. The antifreeze content of the mixture is critical and sh ould not exceed 50% by volume. Excessive amounts of antifreeze will reduce cooling capacity and can cause coolant leakage due to overheating. Refer to Tables 6 & 8.

Maximum ambient temperature is 110°F (43°C). Minimum ambient temperature for closed loop systems using ethylene glycol antifreeze is 0°F (-18°C). For open loop systems using water as a coolant, the minimum ambient temperature is 45°F (7°C).

3.2 Pressure and Speed Limits

3.2.1 Maximum applied air pressure is 150 psig (10.2 bar). Minimum release pressure will vary, depending on the number of springs (22) inst alled. For tensioners that contain a standard complement of springs as listed in the part lists in this manual, the minimum pressure to release the tensioner is 80 psig (5.5 bar).

3.2.2 Maximum coolant pressure allowable within the water cavities is 60 psig (4.1 bar) for size 36WCSEP units. The use of an accumulator or pressure relief valve may be desirable to reduce the effect of pressure spikes in the coolant system during operation.

Maximum allowable water pressure is dependent upon tensioner size. Water piping elevations, restrictions in outlet piping or pressure surges may cause pressures that exceed the maximum allowable, resulting in damage to the tensioner.

3.2.3 Maximum slip speeds and free wheeling disc speeds are shown in Table 9.

TABLE 8
Maximum Mixture Outlet Coolant Temperature

Water/Ethylene Glycol Mixture % by Volume	Maximum Outlet Coolant Temperature°F (°C)
100/0	150 (66)
70/30	165 (74)
60/40	165 (74)
50/50	170 (77)

Excessive slip speeds will result in rapid friction material wear. For good life of wear components, the operating values in Table 9 should not be exceeded.

3.3 Periodic Maintenance

3.3.1 As the friction material we ars, adjustment of the tensioner may be required to keep tensioner within the proper operating stroke ra nge and to avoid dramatic loss of torque due to mechanical limits of the brake. See Section 4.0 for wear measurement, adjustment procedures and component wear limits.

Periodically examine the tensioner for wear of friction linings and wear plates and stroke range (X-gap). Failure to perform this examination periodically may result in excessive wear to components, improper operation or a significant reduction in torque, and may result in personal injury and/or damage to the machinery.

3.3.2 Periodically check for external air leakage in the area of the piston seals (21) (23). For replacement, refer to procedures in Sectio n 4.0, Maintenance.

TABLE 9
Maximum Disc Speeds

Size	Max. Slip Speed RPM	Max. Free Wheeling Speed RPM
36WCSEP	475	700

3.3.3 Moisture that may accumulate in the cylinder can be purged. With air pressure exhausted from the cylinder, remove the pipe plug (105) or the air piping connected to the port that is located closest to the 6 o'clock position on the cylinder, and apply low air pressure to assist in expelling any excess moisture. After draining the cylinder, reinstall the pipe plug or air piping, applying a pipe thread sealant on the threads prior to installation.

Applied air pressure greater than 10 psig (0.68 bar) should not be used when draining the cylinder. Use adequate shielding to avoid contact with direct spray from moisture being purged from the cylinder.

3.3.4 Periodically observe the rotating discs while the tensioner is fully released. Dragging discs may be caused by wear or contamination of the gear or disc splines, lack of spline lubrication, disc imbalance, warped discs, misalignment or low air pressure. Correct as required.

3.3.5 Pneumatic and electrical control interlocks should be periodically checked for proper settings and operation.

3.3.6 If leakage or blockage of any water-cooled chamber is suspected, a static or dynamic test may be performed as follows:

3.3.6.1 **Static Pressure Test:**

a) Release the tensioner by applying the proper air pressure.

Ensure that the machinery will remain in a safe position prior to releasing the tensioner.

b) Bleed all air from within the coolant cavity. Air bleeding must be accomplished by running coolant through the cavity with the tensioner secured in its proper operating position.

Note: Avoid contaminating the friction material with coolant or water.

Contamination of the friction material could result in erratic or loss of torque.

c) After the air has been purged from the water cavity, install a pipe plug(s) in the outlet(s) and apply maximum allowable coolant pressure measured at the inlet to the water cavity. Maximum allowable is 60 psig (4.1 bar) for size 36WCSEP units. Maintain this pressure for 30 minutes. Check for leakage at the O.D. and I.D. sealing areas.

3.3.6.2 **Dynamic Flow Test** :

a) Dynamic flow testing of the tensioner should be conducted at the required flow rate for the rated HP dissipation and coolant quality, as given in Table 6. Inlet and outlet pressures for the appropriate tensioner size as listed in Table 7 should not to be exceeded.

b) There should be no restrictions on the outlet side of the brake to cause any back pressure to the unit. Coolant inlet and outlet sizes are listed in Table 6. Full size hoses and piping should be used. Check for low flow and/or leakage at the O.D. and I.D. seal areas.

Note: The use of pipe and hose sizes that are larger than the outlet port sizes may help to reduce outlet pressures and improve coolant flow.

4.0 MAINTENANCE

Before performing any maintenance work on the WCSEP tensioner, make sure that the machinery will remain in a safe position. Failure to do so could result in serious injury or possibly death.

Only qualified maintenance personnel should install, adjust or repair the WCSEP units. Faulty workmanship will result in unreasonable exposure to hazardous conditions or personal injury.

Read these instructions thoroughly and review until you fully understand the parts replacement steps before proceeding with the work described in this section. Failure to follow these instructions can result in unreasonable exposure to hazardous conditions or personal injury.

4.1 Wear Limits

Periodically examine the tensioner for wear of friction linings and wear plates. Failure to perform this examination periodically may result in excessive wear to components, improper operation or a significant reduction in torque, and may result in personal injury and/or damage to the machinery.

4.1.1 Wear limits for the WCSEP components are shown in Table 13. If any wear limit has been reached or exceeded, that component must be repaired or replaced.

4.2 Wear Adjustment

Wear adjustment for multiple disc brakes is periodically required as the friction material and mating surfaces wear. Wear adjustment reduces the running clearances between these surfaces to help maintain the holding force of the tensioner and to maintain the responsiveness of the unit by limiting the travel of components. Mechanical lim its within the tensioner design require that adjustment be made when the adjustment points listed in Table 10 have been reached.

If a wear adjustment is not made when required, the brake torque may deteriorate to the point where the equipment will not stop properly.

4.2.1 Determining Wear

The friction material must be replaced when worn to the bottom of the groove of the friction lining - as shown on **Figure 6** - or any "Y" or "Z" dimension has reached the limits shown on Table 10. On multi-disc units, a wear adjustment is required when the "X" dimension has been reached and the friction discs or "Y" or "Z" dimension(s) are NOT worn to their limits.

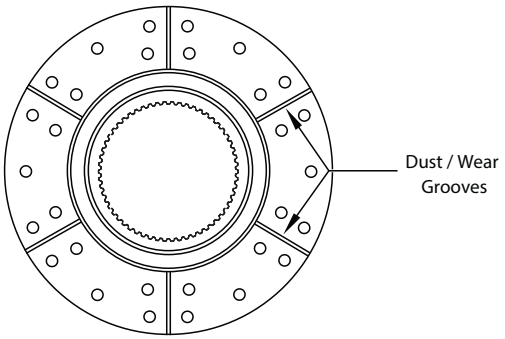


Figure 6 : Illustration of dust/wear grooves

4.2.1.1 **Single Disc Units**

With all air pressure exhausted from the cylinder, measure the "X" gap between the spring housing (16) and the pressure plate (13) and also the gap "Y" between the pressure plate (13) and the mounting flange (1) as shown in **Figure 7**. If either gap has reached the limits shown in Table 10, the friction discs and/or wear plates must be inspected to ensure that the wear limits listed in Table 13 have not been exceeded.

4.2.1.2 **Multi-disc Units**

With all air pressure exhausted from the cylinder, measure the gap "X" between the spring housing (16) and the pressure plate (13) to determine if adjustment may be required.

Measure the "Y" gap between the pressure plate (13) and the reaction plate (30), the "Y" gap between the reaction plate (30) and the mounting flange (1), and the "Z" gap between the reaction plates (30) as shown in Figures 8, 9 and 10.

If the "X worn" dimension has been reached or exceeded and the "Y" or "Z" dimensions have not reached the limits shown in Table 10 AND none of the friction discs are worn to the bottom of the wear groove or step, wear adjustment is required. It is also recommended that wear plates be inspected to ensure that the wear limits listed in Table 13 have not been exceeded.

If the "Y" or "Z" dimensions have been reached or any of the friction discs are worn to the bottom of the wear groove or step, the tensioner should be taken out of service and rebuilt with new components as required.

If wear adjustment is not made, the brake torque may deteriorate to the point where the equipment will not stop properly.

4.2.2 Adjustment Procedure

Before performing any maintenance work on the WCSEP unit, make sure that the machinery will remain in a safe position. Failure to do so could result is serious injury or possibly death.

4.2.2.1 Wear spacers should be removed in complete sets only (one from each stud location). Mark the spacers to be removed to avoid confusion during removal.

Removal of spacers in quantities other than complete sets (layers) will result in severe damage to WCSEP components during reassembly, and could cause the brake to not function properly.

4.2.2.2 Disconnect the air supply and coolant piping from the tensioner.

4.2.2.3 If so equipped, remove the support bracket from the cylinder (19) end of the unit.

4.2.2.4 While supporting the cylinder (19), loosen the locknuts (18) ONE TURN AT A TIME and in an alternating (cross wise) pattern until the release spring tension is relieved.

The locknuts (18) must be loosened gradually to prevent damage to the tensioner components.

4.2.2.5 Remove the locknuts (18) and washers (17) and slide the cylinder (19), spring housing (16) and pressure plate sub-assembly (13) off of the studs as an assembly. Set aside in a clean area making sure not to damage the copper wear surface on the pressure plate.

Use care to avoid bumping or jarring the assembly so that the spring housing (16) does not rotate out of position in relation to the pressure plate (13) and cylinder (19).

Note: If a stud (6) should happen to come loose, remove it completely, clean the threads on the stud and the threads in the mounting flange. Apply Loctite® Primer Grade "T" to the stud threads that will engage into the mounting flange. After the Primer "T" has dried, assemble to the mounting flange after applying Loctite® #271 onto the threads. The end of the stud must not extend past the mounting surface on the mounting flange.

Loctite® #271 must be shaken prior to application.

Loctite® #271 may irritate sensitive skin. Refer to the product label for proper safety precautions.

4.2.2.6 Noting the orientation in which they are installed, remove all friction disc assemblies, reaction plate sub-assemblies (30) and release springs (34) and set aside.

4.2.2.7 Slide the clamp tubes (12) and one set of wear spacers (29) off of the studs. Reinstall the clamp tubes over the studs.

4.2.2.8 Clean off any grease from the gear (28) or friction disc assembly (7) splines. Apply a light coat of Molub-Alloy® O.G. Heavy grease, or equivalent to the gear splines.

Excessive lubricant may contaminate friction material, resulting in erratic response or loss of torque.

The use of anti-seize bearing greases on gear splines may result in premature gear and disc spline wear.

4.2.2.9 Pre-fill the grease channel in the friction disc splines (if applicable) with Molub-Alloy® O.G. Heavy grease - or equivalent, as shown in **Figure 4.**

4.2.2.10 Slide a friction disc assembly (7) onto the gear.

4.2.2.11 Place a release spring (34) over every other clamp tube (or evenly spaced as appropriate for the quantity supplied)

4.2.2.12 Slide a reaction plate (30) onto the clamp tubes.

4.2.2.13 Repeat procedures 4. 2.2.10 through 4. 2.2.12 until all friction discs, reaction plates, and release springs have been assembled.

4.2.2.14 Repeat procedures 4. 2.2.10 through 4. 2.2.12 until all friction discs, reaction plates, and release springs have been assembled.

4.2.2.15 Lubricate the threads on the ends of the studs with 30 wt. oil or anti-seize compound. Hoist the cylinder/spring housing/pressure plate assembly onto the studs and clamp tubes, pushing it against the friction disc.

4.2.2.16 Install the washers (17) onto the studs, followed by the wear spacers (29) removed in 4.2.2.7 and the locknuts (18). The wear spacers are "stored" under the locknuts for use after replacing friction discs. See **Figure 11** .

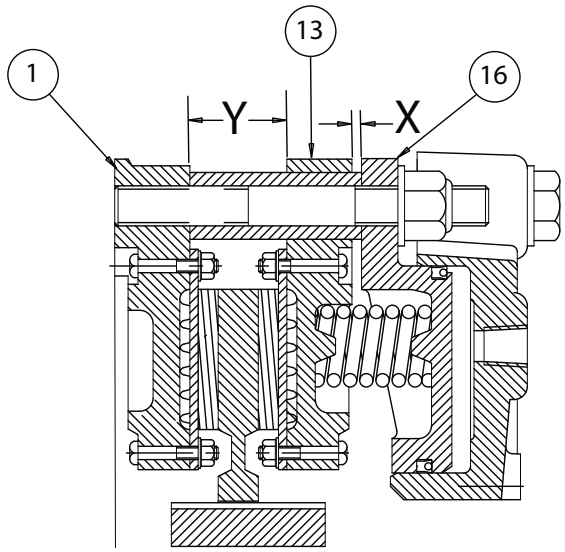


Figure 7 : 136WCSEP - "X" & "Y " gap locations for single disc

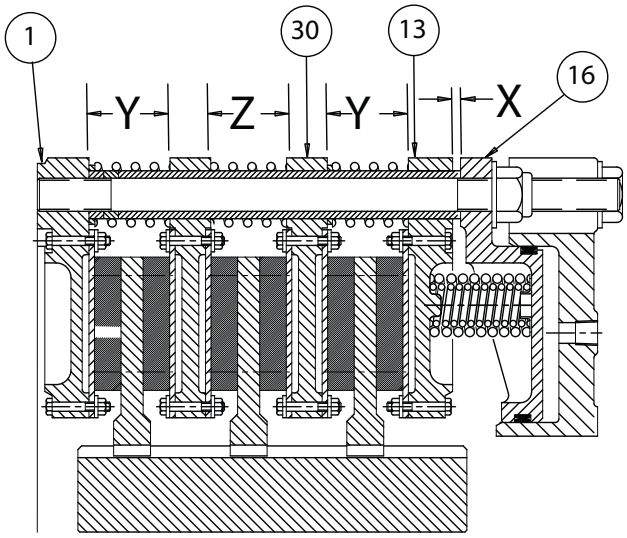


Figure 9 : 336WCSEP - "X", "Y" & " Z" gap locations for triple disc

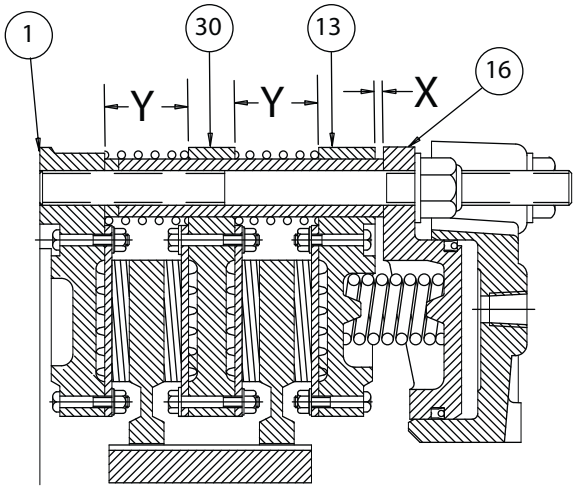


Figure 8 : 236WCSEP - "X" & "Y" gap locations for dual disc

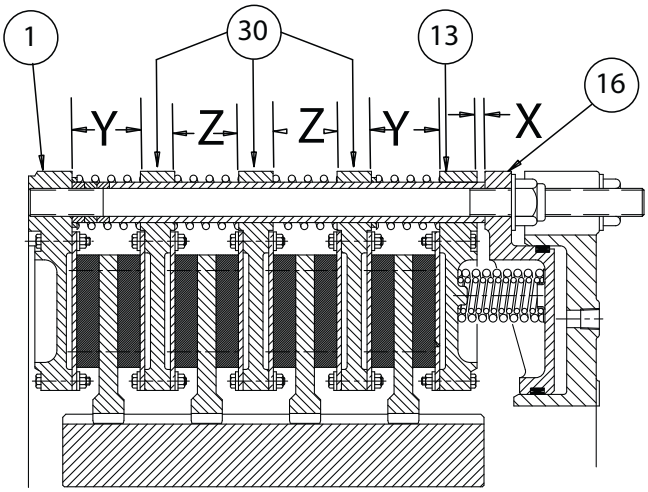


Figure 10 : 436WCSEP - "X", "Y" & "Z" gap locations for quad disc

TABLE 10
Wear Measurements X, Y, & Z Gaps
Refer to Figs. 7, 8, 9 & 10

Disc Size Inches	Qty. of Discs	X - New *	X - Max (Adjustment)	Y - New	Y - Min	Z - New	Z - Min
36EP	1	0.12 +/-.005 (3.05 +/-.13)	0.54 (13.18)	2.75 (69.85)	2.31 (58.67)	n/a	n/a
	2	0.24 +/-.050 (6.10 +/-1.27)	0.66 (16.67)	2.75 (69.85)	2.31 (58.67)	n/a	n/a
	3	0.36 +/-.100 (9.14+/-2.54)	0.78 (19.81)	2.75 (69.85)	2.31 (58.67)	2.75 (69.85)	2.31 (58.67)
	4	0.48 +/-.150 (12.19+/-3.81)	0.90 (22.86)	2.75 (69.85)	2.31 (58.67)	2.75 (69.85)	2.31 (58.67)

* Value shown is gap after wear adjustment.
New or rebuilt brakes may vary slightly from this value due to tolerances.

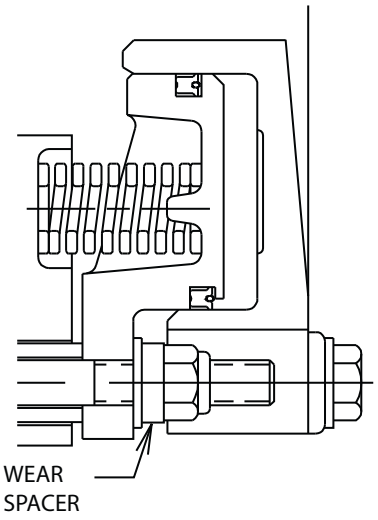


Figure 11 : Wear space location

4.2.2.17 While supporting the weight of the cylinder/spring housing/pressure plate assembly, tighten the locknuts, ONE TURN AT A TIME and in a crosswise pattern, until the spring housing is seated against the clamp tubes. Tighten the locknuts to the appropriate torque value. See Table 4.

The locknuts (18) must be tightened gradually and evenly to prevent damage to the brake components.

4.2.2.18 Reinstall the support bracket if required.

4.2.2.19 Reinstall the air and coolant piping as well as any covers previously removed.

4.3 Disassembly Procedures

Ensure that the machinery is and will remain in a safe position prior to loosening fasteners or removing the tensioner.

4.3.1 Disconnect the air supply lines and water lines from the tensioner.

4.3.2 Remove the fasteners that secure the tensioner (and support bracket, if applicable) to the mounting structure.

4.3.3 Using soft slings, rig the tensioner and slide the WCSEP off of the gear. Avoid placing slings or straps directly on the release springs (34).

4.3.4 Transport the tensioner to a clean working area and position the unit on a flat surface with the mounting flange (1) facing down.

4.3.5 If the gear (28) requires replacement, remove it from the shaft with a portable jack, using the threaded holes in the end of the gear for puller holes. Heating may be required to ease removal. Replace the gear and install per Section 2.2.

4.3.6 Match-mark the mounting flange (1), reaction plates (30), pressure plate (13), spring housing (16) and cylinder (19) to one another prior to disassembly to adequately show the proper orientation of components and various ports to one another.

4.3.7 Loosen the locknuts (18) ONE TURN AT A TIME and in sequence until the release spring force is relieved. After all spring force is relieved, removing all locknuts from the studs.

4.3.8 Lift the cylinder, spring housing, and pressure plate off of the studs as an assembly. Set the assembly aside on a clean, level area, making sure to avoid damaging the face of the piston.

Use care to avoid bumping or jarring the assembly so that the spring housing (16) does not rotate out of position in relation to the pressure plate (13) and cylinder (19).

4.3.9 Continue removing the remaining components if required.

4.3.10 Inspect all components using the wear limits in Table 13 as a reference.

4.3.11 For friction lining replacement, refer to Section 4.4.

4.3.12 For wear plate replacement, refer to Section 4.5.

4.3.13 Refer to Section 4.6 to replace seals.

4.3.14 Refer to Section 4.7 for spring replacement.

4.3.15 Assemble the tensioner per Section 4.9.

After replacement of friction material, a minimum wear-in period of four hours at 50% of the rated horsepower is recommended for the friction couple to achieve rated torque.

4.4 Friction Material Replacement (Sizes 36WCSEP)

Note : When replacing friction material, it is recommended that the mating wear surface be inspected for wear. See Table 13 for wear limits. A light touch up of

the wear surfaces may be performed to remove high spots or burrs if desired, but is typically not necessary.

4.4.1 Refer to Section 6.0 for the friction disc replacement part numbers.

Use only genuine, Airflex friction material. Use of material not of Airflex origin may result in unpredictable brake performance.

4.4.2 Disassemble the tensioner as per Section 4.3.

4.4.3 Remove the old screws and discard the old friction material.

Note : Use of a pinpoint torch to heat the screws and soften the Loctite® will ease removal of the screws.

4.4.4 Clean any corrosion etc. from the friction disc core surfaces.

4.4.5 Position the friction material to align the screw holes. Install several screws loosely at several of the outermost screw hole locations to properly align the friction discs or blocks.

4.4.6 When installing screws in friction blocks, install and tighten the screws from the centermost position in the block, then progress towards the outer edges of the block.

4.4.7 Following the described pattern, install one screw at a time by applying Loctite® #262 to the screw threads and tightening the screw to the proper torque value (15 ft.lb. (20 Nm)). Install and torque each remaining screw immediately after the application of Loctite®. Then proceed to the next screw. Be sure to remove, apply Loctite® and properly tighten the initial screws used for alignment of the friction disc or block.

Loctite® may cure prior to properly tightening the screw if not tightened to the proper torque value immediately after installation.

Use only Airflex-supplied screws.

Loctite® #262 must be shaken prior to application.

Loctite® #262 may irritate sensitive skin. Refer to the product label for proper safety precautions.

4.4.8 After replacement of friction material, re-assemble the tensioner per Section 4.9. During start-up, observe wear-in and operation precautions per Section 3.0, Operation.

After replacement of friction material, a minimum wear-in period of four hours at 50% of the rated horsepower is recommended for the friction couple to achieve rated torque.

4.5 Wear Plate Replacement

Note : When replacing wear surfaces, it is recommended that the mating friction material be replaced.

4.5.1 Disassemble the tensioner per Section 4.3.

4.5.2 Remove the screws and locknuts holding the wear plates and remove the wear plates. If the wear plates cannot be easily lifted off, gently tap the O.D. to break the gasket seal.

Do not attempt to break the gasket seal by prying between the wear plate and housing. Damage to the sealing surfaces may occur.

4.5.3 Inspect the water passages and, if necessary, use a wire brush to clean them. If re-painting is necessary, sand blast the water passages and paint the surfaces with PLASITE® Epoxy #9052 Polyamine coating. Dry film thickness should be 8 to 12 mils (0.2 to 0.3 mm). Be careful not to allow the paint to get into the seal grooves or onto the face of the support nubs.

If nubs in the water cavity are severely corroded, wear plates may not be properly supported. Replace the pressure plate, reaction plate or mounting flange, if necessary.

Follow manufacturer's instructions and proper safety precautions for application of epoxy coatings.

4.5.4 Assembly with Gasket Tape.

Note : The Pressure Plate (14), Reaction Plate (31) and Mounting Flange (2) will be referred to as IRON in the following paragraphs. Refer to **Figure 1** for item number references shown in parenthesis (#).

4.5.4.1 Preparation and cleaning the IRON:

Ensure that the IRON surface is smooth and free of scale, burrs and corrosion. Thoroughly clean both the inner and outer lands which will receive the Gasket. Use a solvent based cleaner such as acetone, mineral spirits, or a general-purpose wax/oil/grease remover, turning the wipe until it is free of new dark debris. Finish the cleaning process by blowing off lint on the sealing surface.

Follow manufacture's instructions and proper safety precautions for the use of solvent based cleaners (acetone, mineral spirits, or general-purpose wax/oil/grease remover).

4.5.4.2 Preparation and cleaning the Copper Wear Plate:

Ensure that the wear plate surface is smooth and free of burrs and corrosion. Thoroughly clean both the outer and inner areas which will be in contact with the gasket tape. Use a solvent based cleaner such as acetone, mineral spirits, or a general-purpose wax/oil/grease remover. Finish the cleaning process by blowing off lint on the sealing surface.

Follow manufacture's instructions and proper safety precautions for the use of solvent based cleaners (acetone, mineral spirits, or general-purpose wax/oil/grease remover).

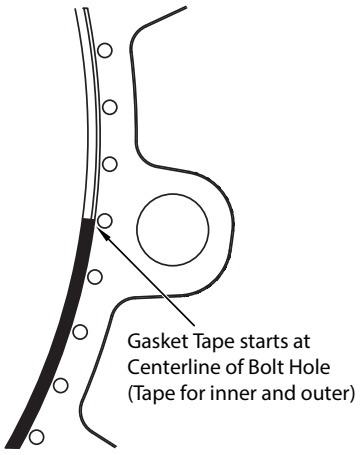


Figure 12 : Start location of gasket tape

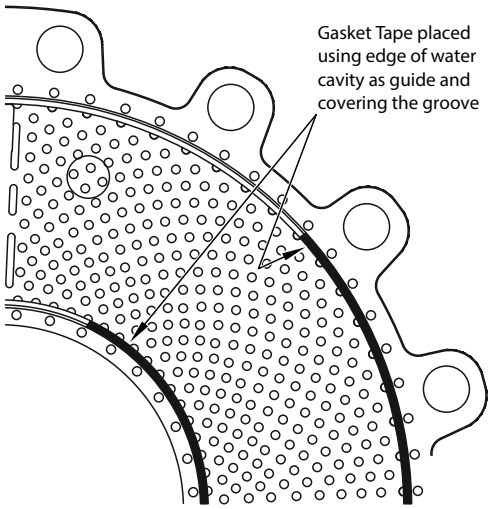


Figure 13 : Placement of gasket tape

Figure 14 : Overlap of gasket tape

4.5.4.3 Applying the Gasket Tape to the IRON:

a) Start with the sealing area nearest to the inner diameter on the IRON. Remove the adhesive backing on the gasket tape a little at a time to prevent the adhesive from picking up dirt during installation. Start by positioning one end of the tape and at the c enterline of a bolt hole as shown in **Figure 12** , using the edge of the water cavity as a guide, as shown in **Figure 13** . Proceed to apply the tape on the sealing surface following a smooth circular path, being sure to press the tape in place. Note that the tape will cover the machined groove that is located between the water cavity and bolt holes.

b) After the gasket tape has been placed around the entire circumference, overlap the starting end of the tape by a minimum of 0.44" (11.2 mm). See **Figure 14**.

c) Repeat steps (a) and (b) for the outer sealing area nearest to the outer diameter of the IRON, again using the edge of the water cavity as a guide.

Before the gasket tape is covered with the wear plate, the sealing surface should be protected to prevent contamination from dust, dirt or oils. No additional cleaning or liquid should be applied to the surface of the IRON or gasket tape.

4.5.5 Inspect the new wear plates and remove any scratches or raised edges with very fine sandpaper or steel wool. Position the smoothest side of the wear plate on the sealing surface, being careful to align the holes with those in the IRON.

4.5.6 Position the clamp rings over the holes in the wear plates and install the new hex head screws and locknuts provided, securing them finger tight.

To prevent excessive warpage and to ensure a good seal, the following hardware tightening procedure must be followed.

4.5.7 For each wear plate being replaced, follow the tightening sequence shown in **Figure 15** for the first 16 screws. The remaining screws may be tightened in any reasonable crosswise pattern. See Table 11 for tightening torque values.

TABLE 11
Wear Plate Fastener Torque

Model	Size	Torque
36WCSEP	3/8-16NC2	40 (54)

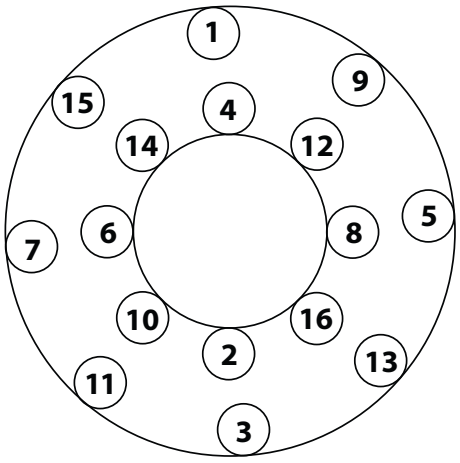


Figure 15 : Wear plate bolt tightening sequence

TABLE 12
Inlet and Outlet Port Sizes

Model	Size
36WCSEP	1-1/4-11.5 NPT

4.5.8 After completion of the assembly, each water cavity should be checked for leaks.

4.5.8.1 Using lifting straps, suspend each assembly with the water outlet port at the 12 o'clock position. Connect a water supply line to the inlet port (at 6 o'clock position). In reaction plates, plug the remaining inlet port. See Table 12 for water port sizes.

4.5.8.2 Slowly fill with water to purge all air from water cavities.

4.5.8.3 Install pipe plug(s) in the outlet port(s) and apply appropriate water pressure (6 0 psig) (4.1 bar) for size 36WCSEP. Pressure is measured at the inlet. Maintain this pressure for a minimum of 30 minutes.

4.5.8.4 Check for leakage at O.D. and I.D. seal areas. **NO** leakage is allowed.

4.5.8.5 If the assembly leaks, check the torque on each screw and re-test. If leaks still occur, the wear plate(s) or sealant groove may be damaged. Repeat procedure from 4.5.1.

4.5.8.6 Follow steps in Section 4.9 to reassemble the tensioner.

After replacement of wear plates, a minimum wear-in period of four hours at 50% of the rated horsepower is recommended for the friction couple to achieve rated torque.

4.6 Cylinder Seal Replacement

4.6.1 Disconnect the air supply lines and remove the screws (20), washers (17) and spacer tubes (27) attaching the cylinder (19) to the pressure plate (13).

4.6.2 Carefully slide the cylinder off of the spring housing (16).

Do not use compressed air to remove the cylinder from the spring housing.

4.6.3 Remove the cylinder seals (21, 23) from the spring housing and thoroughly clean the seal grooves in the spring housing.

4.6.4 Insert new seals into the grooves, noting the orientation of the seals per **Figure 16** .

4.6.5 Carefully examine the seal surfaces in the cylinder. If the surfaces have worn to point as indicated on Table 10, the cylinder must be replaced. Small nicks or scratches must be sanded smooth to prevent air leakage.

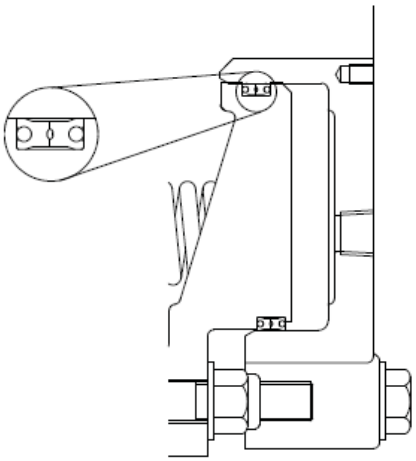


Figure 16 : Lip seal installation

4.6.6 Lubricate the seal surfaces in the cylinder with Parker O-Lube and carefully slide the cylinder onto the spring housing. Take special care to avoid damaging the seal lips.

4.6.7 Attach the cylinder to the pressure plate with the screws, washers and spacer tubes removed in 4.6.1. Use Loctite® Locquic® Primer Grade "T" to clean and prepare the screw threads and install with Loctite® #262. Using a crosswise pattern, tighten the screws to the torque value shown on Table 11.

Loctite® Primer "T" contains harmful vapors. Refer to the product label for proper safety precautions.

4.6.8 Perform an air test by applying 80 psig (5.5 bar) to release the tensioner. Shut off the air supply. If the air pressure does not drop below 70 psig (4.8 bar) after 10 minutes, the seals have been properly installed. If excessive leaking is found, disassemble and inspect the seals or sealing surfaces for damage. Repair or replace components as required.

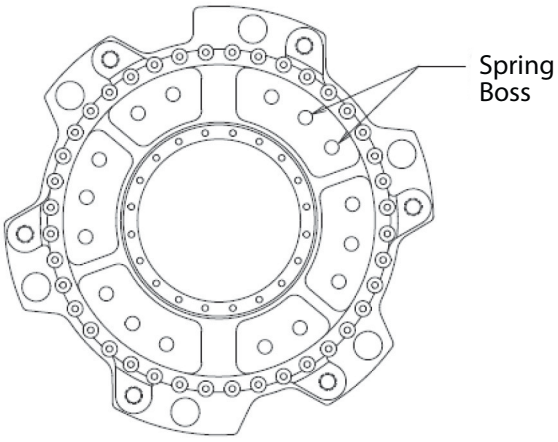


Figure 17 : Spring locations

4.7 Spring Replacement

4.7.1 Disconnect the coolant and air supply lines.

4.7.2 Loosen the locknuts (18), ONE TURN AT A TIME and in a crosswise pattern, until the spring force has been relieved.

The locknuts (18) must be loosened gradually to prevent damage to the brake components.

4.7.3 Remove the locknuts and washers (18) and carefully remove the cylinder/spring housing/pressure plate assembly. Transport to a clean work area.

4.7.4 Match mark the cylinder, spring housing and pressure plate to one another. Loosen the screws (20) evenly and gradually until all spring force is relieved. Remove the screws and washers (17).

4.7.5 Carefully lift the cylinder and spring housing off of the pressure plate, exposing the springs (22).

4.7.6 Remove the springs and check the free height. If the free height of any spring is less than the value shown on Table 13, the entire set of springs must be replaced.

4.7.7 Install the springs in a symmetrical pattern on the pressure plate subassembly (13), distributing them as evenly as possible. Locate the springs over bosses or on the spring pockets in the pressure plate, as shown in **Figure 17** . If applicable, position the spring retainers (53) on top of the springs to hold the springs into position.

Spring retainer plates should be positioned so that they do not cross over or interfere with the ribs in the spring housing.

4.7.8 Carefully lower the spring housing/cylinder assembly onto the springs, making sure the springs engage the bosses in the spring housing. Note the orientation of the match marks made in section 4.7.4 to position the cylinder ports properly in relation to the water ports in the pressure plate.

4.7.9 Position the spacer tubes (27) between the cylinder and pressure plate, in-line with the bolt holes in the cylinder. Install the hex head screws (20) and flat washers (17). Tighten the screws in a crosswise pattern ONE TURN AT A TIME until the spacer tubes are clamped between the cylinder and pressure plate.

4.7.10 Remove the hex head screws (20) one at a time, apply Loctite® #262 to the screw threads, and reinstall the screw, tightening to the value shown in Table 4. Repeat for the remaining screws.

Loctite® may cure prior to properly tightening the screw if not tightened to the proper torque value immediately after installation.

Loctite® #262 must be shaken prior to application.

Loctite® #262 may irritate sensitive skin. Refer to the product label for proper safety precautions.

4.7.11 Lubricate the threads on the ends of the studs with 30 wt. oil or anti-seize compound. Install the washers (17) onto the studs, and assemble the locknuts (18). Tighten the locknuts, ONE TURN AT A TIME and in a crosswise pattern, until the spring housing is seated against the clamp tubes. Tighten the locknuts to the appropriate torque value. See Table 4.

The locknuts (18) must be tightened gradually and evenly to prevent damage to the brake components.

4.8 Bushing Replacement

Note: Some pressure plate and reaction plates have bushings installed in the reaction holes. (Typically corrosion resistant units, and older size 36" tensioners). See **Figure 18** . If applicable, replacement of the bushings can be performed per the following procedures.

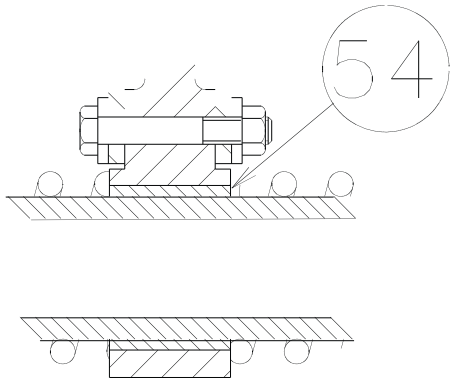


Figure 18 : Bushing replacement

4.8.1 Disassemble per Section 4.3.

4.8.2 Refer to the wear limits in Table 13 to determine if the bushings (54) require replacement.

4.8.3 Heat up the area around each bushing to soften the Loctite® and press out the old bushings.

4.8.4 Clean the bores in the mating component, removing any residual Loctite®.

4.8.5 Apply Loctite® #RC601, 635 or 680 to the bushing O.D. and mating hole in t he reaction plate using a swab. Apply enough liquid to entirely fill the space between the parts. Install t he bushings by twisting the bushing while pushing it down, until it is flush with the casting surface. Inspect to see that a ring of liquid adhesive is visible at the parting line. Reapply Loctite® if required. Allow the Loctite® to cure for 15 minutes before moving the sub assembly.

4.8.6 Assemble the tensioner per section 4.9, as required.

4.9 Assembly Procedures

Note: Friction discs and water jackets (mounting flange, end plate, and reaction plate- if applicable) should be assembled per the appropriate maintenance procedures prior to final assembly of the tensioner.

4.9.1 Position the mounting flange (1) on a flat, level surface, mounting face down.

4.9.2 Install the studs (6) into the mounting flange. The stud end with the shorter length of threads is to be assembled into the mounting flange. Clean the stud end to be assembled by applying Loctite® Locquic® Primer Grade "T" to the threads. After the threads have dried, apply Loctite® #271 on the threads to be assembled and insert the stud completely into the threaded hole in the mounting flange so that the installed end is flush or slightly recessed inside the face of mounting flange. See **Figure 1** . Using a machinist's square as a reference, hold the stud in position so that it remains perpendicular to the machined surface of the mounting flange until the Loctite® has cured. Repeat for the remaining studs.

Loctite® Locquic® Primer Grade "T" contains harmful vapors. Refer to the product label and follow proper safety precautions.

The end of the stud must not extend past the mounting surface of the mounting flange.

4.9.3 Install the appropriate number of wear spacers (29) and clamp tubes (12) over the studs.

4.9.4 Place a friction disc assembly onto the mounting flange. Center the friction disc.

4.9.5 Install a release spring over every clamp tube. For single disc WCSEP tensioners, proceed to Section 4.9.9.

4.9.6 Noting the location of the water inlets in the mounting flange, lift the reaction plate (30) into position, align the water inlets with those in the mounting flange, and slide the reaction plate over the studs and clamp tubes.

4.9.7 Install a release spring over every clamp tube.

4.9.8 Place a friction disc assembly onto the reaction plate. Repeat the sequence of steps 4.9.5 through 4.9.8 until all friction discs, reaction plates and release springs are assembled.

4.9.9 Noting the location of the water inlets in the mounting flange, lift the pressure plate (13) into position (with copper towards the friction disc) and align the water inlets with those in the mounting flange. Slide the pressure plate over the studs and clamp tubes.

4.9.10 Install the springs in a symmetrical pattern on the pressure plate subassembly (13), distributing them as evenly as possible. Locate the springs over bosses or in the spring pockets of the pressure plate, as shown in **Figure 17** . If applicable, position the spring retainers (53) on top of the springs to hold the springs into position.

4.9.11 Lower the spring housing (16) over the studs, springs and spring retainers, if applicable, aligning the match marks made during disassembly. Be sure that the cast ribs in the spring housing do not interfere with the spring retainers. If necessary, reposition the spring retainers.

Spring retainer plates should be positioned so that they do not cross over or interfere with the ribs in the spring housing.

4.9.12 Lubricate the seals (21)(23) with Dow Corning 55 O-ring lubricant and install them into the seal grooves on the spring housing (16). Note the orientation of the seal lips per **Figure 16** .

4.9.13 Lubricate the seal surfaces in the cylinder (19) and lower the cylinder onto the spring housing. Orient the cylinder so that the logo is near the 12 o'clock position, in-line with the water outlets, and that the bolt holes align with the tapped holes in the pressure plate.

4.9.14 Position the spacer tubes (27) between the cylinder and pressure plate, in-line with the bolt holes in the cylinder. Install the hex head screws (20) and flat washers (17). Tighten the screws in a crosswise pattern ONE TURN AT A TIME until the spacer tubes are clamped between the cylinder and pressure plate. Make sure that the cylinder slides over the seals properly to avoid damaging the seal lips.

4.9.15 Remove the hex head screws (20) one at a time, apply Loctite® #262 to the screw threads, and reinstall the screw, tightening to the value shown in Table 4. Repeat for the remaining screws.

Loctite® may cure prior to properly tightening the screw if not tightened to the proper torque value immediately after installation.

Loctite® #262 must be shaken prior to application.

Loctite® #262 may irritate sensitive skin. Refer to the product label for proper safety precautions.

4.9.16 Lubricate the threads on the ends of the studs with 30 wt. oil or anti-seize compound. Install the washers (17) onto the studs, and assemble the locknuts (18). Tighten the locknuts, ONE TURN AT A TIME and in a crosswise pattern, until the spring housing is seated against the clamp tubes. Tighten the locknuts to the appropriate torque value. See Table 4.

The locknuts (18) must be tightened gradually and evenly to prevent damage to the brake components.

4.9.17 Prior to installation, air test the cylinder seals per section 4.6.8.

4.9.18 Re-install the tensioner per Section 2.0.

4.10 Corrosion Protection

All previously painted areas must be touched up after maintenance or installation to provide corrosion protection.

4.10.1 Clean any contamination, scale, or loose paint from disturbed surfaces.

4.10.2 Touch up any disturbed area with an organic zinc primer.

4.10.3 Paint areas with two coats of a high solid two part, marine grade epoxy paint as per manufacturer's instructions.

5.0 ORDERING INFORMATION / TECHNICAL ASSISTANCE

5.1 Equipment Reference

5.1.1 In any correspondence regarding Airflex equipment, refer to the information on the product nameplate.

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Polypak ® is a registered trademark of Parker Hannifin Corporation.

MOLUB-ALLOY ® is a trademark of Castrol Industrial Lubricants.

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TABLE 13 Wear Limits for WCSEP Components			
Item	**Description**	**Wear Limit**	**Remarks**
#3 Wear Plate	Friction Wear Signature	Maximum Wear is: 36WCSEP - 0.050″	Wear will be in form of even wear or circular grooves in the copper surface.
#8 Friction Disc	Friction Material	Fully Worn at bottom of dust groove. Friction Material must also be replaced if contaminated with oil or grease.	Brake have adjustment provision. See Section 4.2.
#9, #28 Friction Disc Core & Gear	Gear Backlash	Maximum total backlash is 0.060″ (1.5 mm).	If step is worn in gear, gear must be replaced.
#12 Clamp Tube	Reaction Area	Maximum wear is 0.015″ (0.38 mm).	Wear will be in the form of notch or step on the side of tube.
#13, #30, #54	Reaction Holes	Maximum wear is 0.031″ (0.80 mm).	Wear will be in the form of elongation of the holes. Original hole diameters are shown on the table below.
#19 Cylinder	Seal Area	Maximum wear is 0.005″ (0.13 mm).	Wear will be in form of grooves where the seals contact the cylinder wall.
#34 Spring	Spring Free Height	Maximum free height shown on the table below	Original free height shown on the table below. Springs must be replaced in complete sets.

Reaction hole size (NEW) and Spring Free Height Limit			
Size	**Original Reaction Hole Sizes (#14, #31 & 54) inches (mm)**	**Spring (#34) Free Height**	
		Original inches (mm)	**Minimum inches (mm)**
36WCSEP	2.065 inches (52.45 mm)	4 inches (101.6 mm)	3.88 inches (98.55 mm)

6.0 PARTS

The replacement kits in this manual are for the enhanced 36WCSEP ONLY. For part refe rence and replacement kits for the prior m odel 36WCS, refer to manual WCS 11100.

6.1 Parts (Standard / LO-CO)

Item	Description	136WCSEP 146533E		236WCSEP 146537E		336WCSEP 146541E		436WCSEP 146546E	
		Part Number	Qty	Part Number	Qty	P art Number	Qty	Part Number	Qty
1	Mounting Flange Sub Assembly*	515400-01	1	515400-01	1	515400-01	1	515400-01	1
6	Stud	307111-06	16	307111-08	16	307111-14	16	307111-02	16
7	Friction Disc Sub Assembly*	515404	1	515404	2	515404	3	515404	4
12	Clamp Tube	515389-01	16	515389-02	16	515389-03	16	515389-04	16
13	Pressure Plate Sub Assembly*	515400-04	1	515400-04	1	515400-04	1	515400-04	1
16	Spring Housing	513764	1	513764	1	513764	1	513764	1
17	Flat Washer	000067 x 0042	32	000067 x 0042	32	000067 x 0042	32	000067 x 0042	36
18	Locknut	000110 x 0075	16	000110 x 0075	16	000110 x 0075	16	000110 x 0075	16
19	Cylinder	513988	1	513988	1	513988	1	513988	1
20	Hex Head Screw	000197 x 1338	16	000197 x 1338	16	000197 x 1338	16	000197 x 1338	16
21	Lip Seal	000402 x 0005	2	000402 x 0005	2	000402 x 0005	2	000402 x 0005	2
22	Outer Spring	308035	44	308035	44	308035	44	308035	44
23	Lip Seal	000402 x 0006	2	000402 x 0006	2	000402 x 0006	2	000402 x 0006	2
27	Spacer Tube	308150-01	16	308150-01	16	308150-01	16	308150-01	16
28	Gear (not included with assembly)	416538-####	1	416536-####	1	416535-####	1	416537-####	1
29	Wear Spacer	N/A	N/A	308150-05	16	308397	32	308150-05	48
30	Reaction Plate Sub Assembly*	N/A	N/A	515400-02	1	515400-02	2	515400-02	3
34	Release Spring	N/A	N/A	416751-01	16	307992	16	307992	32
52	Inner Spring	308034	44	308034	44	308034	44	308034	44
53	Spring Retainer	415635	14	415635	14	415635	14	415635	14
105	Pipe Plug	000077 x 0021	1	000077 x 0021	1	000077 x 0021	1	000077 x 0021	1
106	S leeve Nut	N/A	N/A	N/A	N/A	N/A	N/A	308242	4

* - Individual parts breakdown for standard WCSEP sub-assemblies are in section 6.5
For Item (1) Mounting Flange Sub Assembly - See Table 6.5.1
For Item (7) Friction Disc Sub Assembly - See Table 6.5.4
For Item (13) Pressure Plate Sub Assembly - See Table 6.5.2
For Item (30) Reaction Plate Sub Assembly - See Table 6.5.3

6.2 Parts (Standard / HI-CO)

Item	Description	136WCSEP 146533D		236WCSEP 146537D		336WCSEP 146541D		436WCSEP 146546D	
		Part Number	Qty	Part Number	Qty	Part Number	Qty	Part Number	Qty
1	Mounting Flange Sub Assembly*	515400-01	1	515400-01	1	515400-01	1	515400-01	1
6	Stud	307111-06	16	307111-08	16	307111-14	16	307111-02	16
7	Friction Disc Sub Assembly*	515424	1	515424	2	515424	3	515424	4
12	Clamp Tube	515389-01	16	515389-02	16	515389-03	16	515389-04	16
13	Pressure Plate Sub Assembly*	515400-04	1	515400-04	1	515400-04	1	515400-04	1
16	Spring Housing	513764	1	513764	1	513764	1	513764	1
17	Flat Washer	000067 x 0042	32	000067 x 0042	32	000067 x 0042	32	000067 x 0042	36
18	Locknut	000110 x 0075	16	000110 x 0075	16	000110 x 0075	16	000110 x 0075	16
19	Cylinder	513988	1	513988	1	513988	1	513988	1
20	Hex Head Screw	000197 x 1338	16	000197 x 1338	16	000197 x 1338	16	000197 x 1338	16
21	Lip Seal	000402 x 0005	2	000402 x 0005	2	000402 x 0005	2	000402 x 0005	2
22	Outer Spring	308035	44	308035	44	308035	44	308035	44
23	Lip Seal	000402 x 0006	2	000402 x 0006	2	000402 x 0006	2	000402 x 0006	2
27	Spacer Tube	308150-01	16	308150-01	16	308150-01	16	308150-01	16
28	Gear (not included with assembly)	416538-####	1	416536-####	1	416535-####	1	416537-####	1
29	Wear Spacer	N/A	N/A	308150-05	16	308397	32	308150-05	48
30	Reaction Plate Sub Assembly*	N/A	N/A	515400-02	1	515400-02	2	515400-02	3
34	Release Spring	N/A	N/A	307992	16	307992	16	307992	32
52	Inner Spring	308034	44	308034	44	308034	44	308034	44
53	Spring Retainer	415635	14	415635	14	415635	14	415635	14
105	Pipe Plug	000077 x 0021	1	000077 x 0021	1	000077 x 0021	1	000077 x 0021	1
106	Sleeve Nut	N/A	N/A	N/A	N/A	N/A	N/A	308242	4

* - Individual parts breakdown for standard WCS EP sub-assemblies are in section 6.5
For Item (1) Mounting Flange Sub Assembly - See Table 6.5.1
For Item (7) Friction Disc Sub Assembly - See Table 6.5.5
For Item (13) Pressure Plate Sub Assembly - See Table 6.5.2
For Item (30) Reaction Plate Sub Assembly - See Table 6.5.3

6.3 Parts (Corrosion Resistant / LO-CO)

Item	Description	136WCSEP TBD		236WCSEP 146537AJ		336WCSEP 146541AJ		436WCSEP TBD	
		Part Number	Qty	Part Number	Qty	Part Number	Qty	Part Number	Qty
1	Mounting Flange Sub Assembly*	N/A	N/A	515429-01	1	515429-01	1	N/A	N/A
6	Stud	N/A	N/A	307111-14	16	307111-14	16	N/A	N/A
7	Friction Disc Sub Assembly*	N/A	N/A	515435	2	515435	3	N/A	N/A
12	Clamp Tube	N/A	N/A	515389-02	16	515389-03	16	N/A	N/A
13	Pressure Plate Sub Assembly*	N/A	N/A	515429-04	1	515429-04	1	N/A	N/A
16	Spring Housing	N/A	N/A	514086	1	514086	1	N/A	N/A
17	Flat Washer	N/A	N/A	000153 x 0850	32	000153 x 0850	32	N/A	N/A
18	Locknut	N/A	N/A	000110 x 0075	16	000110 x 0075	16	N/A	N/A
19	Cylinder	N/A	N/A	512809	1	512809	1	N/A	N/A
20	Hex Head Screw	N/A	N/A	000153 x 1102	16	000153 x 1102	16	N/A	N/A
21	Lip Seal	N/A	N/A	000402 x 0005	2	000402 x 0005	2	N/A	N/A
22	Outer Spring	N/A	N/A	307824	44	307824	44	N/A	N/A
23	Lip Seal	N/A	N/A	000402 x 0006	2	000402 x 0006	2	N/A	N/A
27	Spacer Tube	N/A	N/A	308191-04	16	308191-04	16	N/A	N/A
28	Gear (not included with assembly)	N/A	N/A	416536-####	1	416535-####	1	N/A	N/A
29	Wear Spacer	N/A	N/A	308191-05	16	308191-05	32	N/A	N/A
30	Reaction Plate Sub Assembly*	N/A	N/A	515429-02	1	515429-02	2	N/A	N/A
34	Release Spring	N/A	N/A	416751-01	16	416751-01	24	N/A	N/A
52	Inner Spring	N/A	N/A	307823	44	307823	44	N/A	N/A
53	Spring Retainer	N/A	N/A	415635	14	415635	14	N/A	N/A
105	Pipe Plug	N/A	N/A	000077 x 0021	1	000077 x 0021	1	N/A	N/A
106	Sleeve Nut	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Grease	N/A	N/A	000153 x 1182	2	000153 x 1182	3	N/A	N/A

* - Individual parts breakdown for standard WCSEP sub-assemblies are in section 6.6
For Item (1) Mounting Flange Sub Assembly - See Table 6.6.1
For Item (7) Friction Disc Sub Assembly - See Table 6.6.4
For Item (13) Pressure Plate Sub Assembly - See Table 6.6.2
For Item (30) Reaction Plate Sub Assembly - See Table 6.6.3

6.4 Parts (Corrosion Resistant / HI-CO)

Item	Description	136WCSEP 146533AK		236WCSEP 146537AK		336WCSEP 146541AK		436WCSEP TBD	
		Part Number	Qty	Part Number	Qty	Part Number	Qty	Part Number	Qty
1	Mounting Flange Sub Assembly*	515429-01	1	515429-01	1	515429-01	1	N/A	N/A
6	Stud	307111-09	16	307111-14	16	307111-14	16	N/A	N/A
7	Friction Disc Sub Assembly*	515430	1	515430	2	515430	3	N/A	N/A
12	Clamp Tube	515389-01	16	515389-02	16	515389-03	16	N/A	N/A
13	Pressure Plate Sub Assembly*	515429-04	1	515429-04	1	515429-04	1	N/A	N/A
16	Spring Housing	512811	1	514086	1	514086	1	N/A	N/A
17	Flat Washer	000067 x 0042	32	000153 x 0850	32	000153 x 0850	32	N/A	N/A
18	Locknut	000110 x 0075	16	000110 x 0075	16	000110 x 0075	16	N/A	N/A
19	Cylinder	512809	1	512809	1	512809	1	N/A	N/A
20	Hex Head Screw	000197 x 1338	16	000153 x 1102	16	000153 x 1102	16	N/A	N/A
21	Lip Seal	000402 x 0005	2	000402 x 0005	2	000402 x 0005	2	N/A	N/A
22	Outer Spring	416751-07	44	307824	44	307824	44	N/A	N/A
23	Lip Seal	000402 x 0006	2	000402 x 0006	2	000402 x 0006	2	N/A	N/A
27	Spacer Tube	308204-13	16	308191-04	16	308191-04	16	N/A	N/A
28	Gear (not included with assembly)	416538-####	1	416536-####	1	416535-####	1	N/A	N/A
29	Wear Spacer	N/A	N/A	308191-05	16	308191-05	32	N/A	N/A
30	Reaction Plate Sub Assembly*	N/A	N/A	515429-02	1	515429-02	2	N/A	N/A
34	Release Spring	N/A	N/A	416751-01	16	416751-01	24	N/A	N/A
52	Inner Spring	416751-08	44	307823	44	307823	44	N/A	N/A
53	Spring Retainer	415635	14	415635	14	415635	14	N/A	N/A
105	Pipe Plug	000077 x 0021	1	000077 x 0021	1	000077 x 0021	1	N/A	N/A
106	Sleeve Nut	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Grease	N/A	N/A	000153 x 1182	2	000153 x 1182	3	N/A	N/A

* - Individual parts breakdown for Corrosion Resistant WCSEP sub-assemblies are in section 6.6
For Item (1) Mounting Flange Sub Assembly - See Table 6.6.1
For Item (7) Friction Disc Sub Assembly - See Table 6.6.5
For Item (13) Pressure Plate Sub Assembly - See Table 6.6.2
For Item (30) Reaction Plate Sub Assembly - See Table 6.6.3

6.5 Sub-Assemblies (Standard)

6.5.1 WCSEP Mounting Flange Sub-assemblies (Item Numbers (#) shown in Figure 1, 2 & 20)

Item		MODEL	36WCSEP	
		Part Description	Part No.	Qty
1		Sub Assembly Part #	515400-01	1
	2	Mounting Flange	513986	1
	3	Wear Plate	417335	1
	4	Screw	000153 x 0842	108
	5	Nut	000153 x 0844	108
	50	Inner Support Ring	414032-01	6
	51	Outer Support Ring	414033-01	9
		PTFE Gasket O.D.	308581-01	
		PTFE Gasket I.D.	308581-01	

6.5.2 WCSEP Pressure Plate Sub-assemblies (Item Numbers (#) shown in Figure 1, 2 & 20)

Item		MODEL	36WCSEP	
		Part Description	Part No.	Qty
13		Sub Assembly Part #	515400-04	1
	3	Wear Plate	417335	1
	4	Screw	000153 x 0842	108
	5	Nut	000153 x 0844	108
	14	Pressure Plate	513995	1
	50	Inner Support Ring	414032-01	6
	51	Outer Support Ring	414033-01	9
		PTFE Gasket O.D.	308581-01	
		PTFE Gasket I.D.	308581-01	

6.5.3 WCSEP Reaction Plate Sub-assemblies (Item Numbers (#) shown in Figure 1, 2 & 20)

Item		MODEL	36WCSEP	
		Part Description	Part No.	Qty
30		Sub Assembly Part #	515400-02	1
	3	Wear Plate	417335	2
	4	Screw	000153 x 0843	108
	5	Nut	000153 x 0844	108
	31	Reaction Plate	513989	1
	50	Inner Support Ring	414032-01	12
	51	Outer Support Ring	414033-01	18

6.5.4 WCSEP Friction Disc Sub-assemblies LO-CO (Item Numbers (#) shown in Figure 1, 2 & 19)

Item		MODEL	36WCSEP (LO-CO)	
		Part Description	Part No.	Qty
7		Sub Assembly Part #	515404	1
	8	Friction Disc Block	515387	16
	9	Friction Disc Core	513667	1
	57	Screw	000294 x 0407	144

6.5.5 WCSEP Friction Disc Sub-assemblies HI-CO (Item Numbers (#) shown in Figure 1, 2 & 19)

Item		MODEL	36WCSEP (MID-CO)	
		Part Description	Part No.	Qty
7		Sub Assembly Part #	515424	1
	8	Friction Disc Block	414058-03	16
	9	Friction Disc Core	513667	1
	57	Screw	000294 x 0407	144

6.6 Sub-Assemblies (Corrosion Resistant)

6.6.1 WCSEP Mounting Flange Sub-assemblies (Item Numbers (#) shown in Figure 1, 2 & 20)

Item		MODEL	36WCSEP	
		Part Description	Part No.	Qty
1		**Sub Assembly Part #**	515429-01	1
	2	Mounting Flange	513986	1
	3	Wear Plate	417335	1
	4	Screw	000153 x 0842	108
	5	Nut	000153 x 0844	108
	50	Inner Support Ring	414032-01	6
	51	Outer Support Ring	414033-01	9
		PTFE Gasket O.D.	308581-01	1
		PTFE Gasket I.D.	308581-02	1

6.6.2 WCSEP Pressure Plate Sub-assemblies (Item Numbers (#) shown in Figure 1, 2 & 20)

Item		MODEL	36WCSEP	
		Part Description	Part No.	Qty
13		**Sub Assembly Part #**	515429-04	1
	3	Wear Plate	417335	1
	4	Screw	000153 x 0842	108
	5	Nut	000153 x 0844	108
	14	Pressure Plate	512794	1
	50	Inner Support Ring	414032-01	6
	51	Outer Support Ring	414033-01	9
	54	Bushing	203863-04	16
		PTFE Gasket O.D.	308581-01	1
		PTFE Gasket I.D.	308581-02	1

6.6.3 WCSEP Reaction Plate Sub-assemblies (Item Numbers (#) shown in Figure 1, 2 & 20)

Item		MODEL	36WCSEP	
		Part Description	Part No.	Qty
30		**Sub Assembly Part #**	515429-02	1
	3	Wear Plate	417335	2
	4	Screw	000153 x 0843	108
	5	Nut	000153 x 0844	108
	31	Reaction Plate	512813	1
	50	Inner Support Ring	414032-01	12
	51	Outer Support Ring	414033-01	18
	54	Bushing	203863-03	16
		PTFE Gasket O.D.	308581-01	2
		PTFE Gasket I.D.	308581-02	2

6.6.4 WCSEP Friction Disc Sub-assemblies LO-CO (Item Numbers (#) shown in Figure 1, 2 & 19)

Item		MODEL	36WCSEP (LO-CO)	
		Part Description	Part No.	Qty
7		**Sub Assembly Part #**	515435	1
	8	Friction Disc Block	515387	16
	9	Friction Disc Core	514139	1
	57	Screw	000421 x 0407	144

6.6.5 WCSEP Friction Disc Sub-assemblies HI-CO (Item Numbers (#) shown in Figure 1, 2 & 19)

Item		MODEL	36WCSEP (MID-CO)	
		Part Description	Part No.	Qty
7		**Sub Assembly Part #**	515430	1
	8	Friction Disc Block	515386	16
	9	Friction Disc Core	514139	1
	57	Screw	000421 x 0407	144

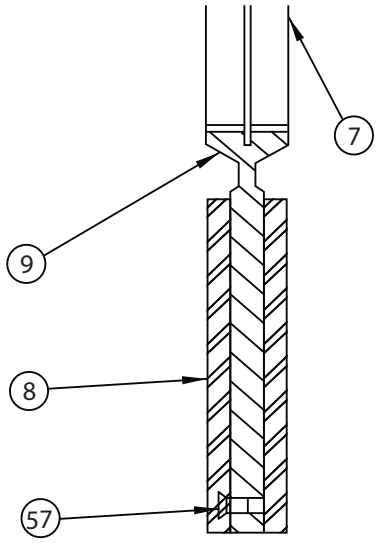


Figure 19 : WCSBEP Friction Disc Sub-Assemblies

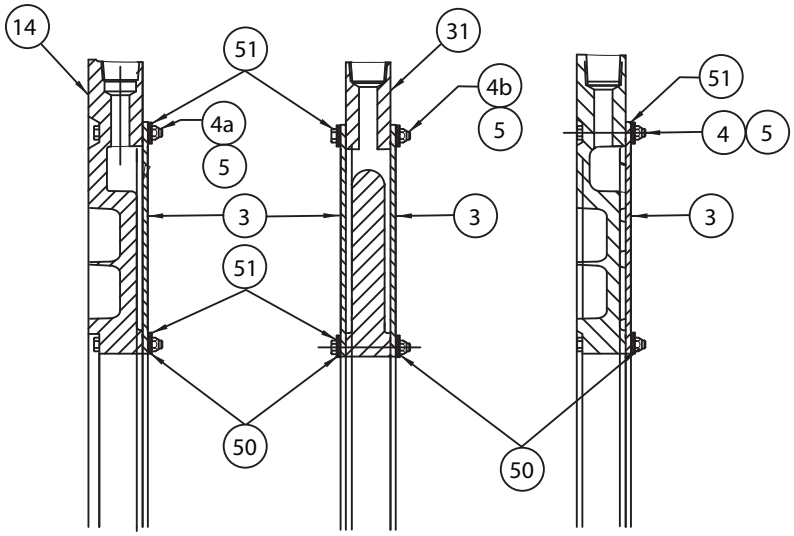


Figure 20 : Parts breakdown for 36WCSEP

7.0 KITS

Note : Item Numbers (#) for Kits Are Shown on **Figures 2, 19 & 20 .**

7.1 Friction Disc Kits (Standard / LO-CO)

Parts Included in Kit		Loctite® #242 Sealant		Flat Head Screw (57)		Friction Disc (8)		Wear Spacer (29)		Instruction Sheet	
Model	**Kit P/N**	**Part No.**	**QTY**	**Part No.**	**QTY**	**Part No.**	**QTY**	**Part No.**	**QTY**	**Part No.**	**QTY**
136EP	108134B	000153 x 1168	1	000294 x0407	144	515387	16	N/A	N/A	204210	1
236EP	108134BA	000153 x 1168	2	000294 x0407	288	515387	32	308397	16	204210	1
336EP	108134BB	000153 x 1168	3	000294 x0407	432	515387	48	308397	32	204210	1
436EP	108134BC	000153 x 1168	4	000294 x0407	576	515387	64	308397	48	204210	1

7.2 Friction Disc Kits (Standard / Mid-CO)

Parts Included in Kit		Loctite® #242 Sealant		Flat Head Screw (57)		Friction Disc (8)		Wear Spacer (29)		Instruction Sheet	
Model	**Kit P/N**	**Part No.**	**QTY**	**Part No.**	**QTY**	**Part No.**	**QTY**	**Part No.**	**QTY**	**Part No.**	**QTY**
136EP	108134F	000153 x 1168	1	000294 x0407	144	515388	16	N/A	N/A	204210	1
236EP	108134FA	000153 x 1168	2	000294 x0407	288	515388	32	308397	16	204210	1
336EP	108134FB	000153 x 1168	3	000294 x0407	432	515388	48	308397	32	204210	1
436EP	108134FC	000153 x 1168	4	000294 x0407	576	515388	64	308397	48	204210	1

7.3 Friction Disc Kits (Standard / HI-CO)

Parts Included in Kit		Loctite® #242 Sealant		Flat Head Screw (57)		Friction Disc (8)		Wear Spacer (29)		Instruction Sheet	
Model	**Kit P/N**	**Part No.**	**QTY**	**Part No.**	**QTY**	**Part No.**	**QTY**	**Part No.**	**QTY**	**Part No.**	**QTY**
136EP	108134D	000153 x 1168	1	000294 x0407	144	TBD	16	N/A	N/A	204210	1
236EP	108134DA	000153 x 1168	2	000294 x0407	288	TBD	32	308397	16	204210	1
336EP	108134DB	000153 x 1168	3	000294 x0407	432	TBD	48	308397	32	204210	1
436EP	108134DC	000153 x 1168	4	000294 x0407	576	TBD	64	308397	48	204210	1

The replacement kits in this manual are for the enhanced 36WCSEP ONLY. For part reference and replacement kits for the prior model 36WCS, refer to manual WCS 11100.

7.4 Friction Disc Kits (Corrosion Resistant / LO-CO)

Parts Included in Kit		Loctite® #242 Sealant		Flat Head Screw(57)		Friction Disc (8)		Wear Spacer (29)		Grease		Instruction Sheet	
Model	Kit P/N	Part No.	QTY	Part No.	QTY	Part No.	QTY	Part No.	QTY	Part No.	QTY	Part No.	QTY
136EP	108134C	000153 x 1168	1	000421 X 0407	144	515387	16	N/A	N/A	000153 x 1182	1	204211	1
236EP	108134CA	000153 x 1168	2	000421 X 0407	288	515387	32	308400	16	000153 x 1182	1	204211	1
336EP	108134CB	000153 x 1168	3	000421 X 0407	432	515387	48	308400	32	000153 x 1182	1	204211	1
436EP	108134CC	000153 x 1168	4	000421 X 0407	576	515387	64	308400	48	000153 x 1182	4	204211	1

7.5 Friction Disc Kits (Corrosion Resistant / Mid-CO)

Parts Included in Kit		Loctite® #242 Sealant		Flat Head Screw(57)		Friction Disc (8)		Wear Spacer (29)		Grease		Instruction Sheet	
Model	Kit P/N	Part No.	QTY	Part No.	QTY	Part No.	QTY	Part No.	QTY	Part No.	QTY	Part No.	QTY
136EP	108134G	000153 x 1168	1	000421 X 0407	144	515388	16	N/A	N/A	000153 x 1182	1	204211	1
236EP	108134GA	000153 x 1168	2	000421 X 0407	288	515388	32	308400	16	000153 x 1182	1	204211	1
336EP	108134GB	000153 x 1168	3	000421 X 0407	432	515388	48	308400	32	000153 x 1182	1	204211	1
436EP	108134GC	000153 x 1168	4	000421 X 0407	576	515388	64	308400	48	000153 x 1182	4	204211	1

7.6 Friction Disc Kits (Corrosion Resistant / HI-CO)

Parts Included in Kit		Loctite® #242 Sealant		Flat Head Screw(57)		Friction Disc (8)		Wear Spacer (29)		Grease		Instruction Sheet	
Model	Kit P/N	Part No.	QTY	Part No.	QTY	Part No.	QTY	Part No.	QTY	Part No.	QTY	Part No.	QTY
136EP	108134E	000153 x 1168	1	000421 X 0407	144	515386	16	N/A	N/A	000153 x 1182	1	204211	1
236EP	108134EA	000153 x 1168	2	000421 X 0407	288	515386	32	308400	16	000153 x 1182	1	204211	1
336EP	108134EB	000153 x 1168	3	000421 X 0407	432	515386	48	308400	32	000153 x 1182	1	204211	1
436EP	108134EC	000153 x 1168	4	000421 X 0407	576	515386	64	308400	48	000153 x 1182	4	204211	1

The replacement kits in this manual are for the enhanced 36WCSEP ONLY. For part reference and replacement kits for the prior model 36WCS, refer to manual WCS 11100.

7.7 Cylinder Seal Kit

Parts Included in Kit		Seal Lubricant O-Ring Lube		Lip Seal (Inner) (21)		Lip Seal (Outer) (23)		Instruction Sheet	
Model	Kit P/N	Part No.	QTY	Part No.	QTY	Part No.	QTY	Part No.	QTY
36EP	107662C	000153 x1239	1	00402 x 0005	2	000402 x 0006	2	204067	1

7.8 Wear Plate Kits for Mounting Flange and Pressure Plate

Parts Included in Kit		Screw (4)		Lock Nut (5)		Wear Plate (3)		Inner Support Ring (50)		Outer Support Ring (51)		PTFE Gasket O.D.		PTFE Gasket I.D.		Instruction Sheet	
Model	Kit P/N	Part No.	QTY	Part No.	QTY	Part No.	QTY	Part No.	QTY	Part No.	QTY	Part No.	QTY	Part No.	QTY	Part No.	QTY
36EP	108132A	000153 x 0842	216	000153 x 0844	216	417335	2	414032-01	12	414033-01	18	308581-01	2	308581-02	2	204209	1

7.9 Wear Plate Kits for Reaction Plate

Parts Included in Kit		Screw (49)		Lock Nut (5)		Wear Plate (3)		Inner Support Ring (50)		Outer Support Ring (51)		PTFE Gasket O.D.		PTFE Gasket I.D.		Instruction Sheet	
Model	Kit P/N	Part No.	QTY	Part No.	QTY	Part No.	QTY	Part No.	QTY	Part No.	QTY	Part No.	QTY	Part No.	QTY	Part No.	QTY
36EP	108132E	000153 x 0843	108	000153 x 0844	108	417335	2	414032-01	12	414033-01	18	308581-01	2	308581-02	2	204209	1

The replacement kits in this manual are for the enhanced 36WCSEP ONLY. For part reference and replacement kits for the prior model 36WCS, refer to manual WCS 11100.

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