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## Tri-Clover<sup>®</sup> Tri-Blender

Models F1114L • F2114 • F2116 •  
F2116-EZ System • F3218 • F4329





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Thank you for purchasing a Tri-Clover Product!

This manual contains installation, operation, cleaning and repair instructions, with parts lists, for models F1114L, F2114, F2116, F2116-EZ-system, F3218 and F4329 Tri-Blenders manufactured by Alfa Laval. It also provides a troubleshooting chart to assist in determining blender malfunction.

**READ THIS MANUAL** carefully to learn how to service the Tri-Blender. Failure to do so could result in personal injury or equipment damage.

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# SAFETY


## IMPORTANT SAFETY INFORMATION


Safety is very important!

**DO NOT attempt to modify any Tri-Clover product.** To do so could create unsafe conditions and void all warranties. **DO NOT place any Tri-Clover product in an application where general product service ratings are exceeded.**

The following DANGER, WARNING, AND CAUTION signs and their meanings are used within these instructions.

	 <b>DANGER</b>
	Indicates an imminently hazardous situation which, if not avoided, <b>will</b> result in death or serious injury. The word Danger is used in the most extreme cases.

	 <b>WARNING</b>
	Indicates a potentially hazardous situation which, if not avoided, <b>may</b> result in minor or moderate injury. May also be used to alert against an unsafe operating or maintenance practice.

	 <b>CAUTION</b>
	Indicates a potentially hazardous situation which, if not avoided, <b>could</b> result in death or serious injury.

Safety labels are placed on every Tri-Blender. Do not remove any labeling on any Tri-Clover product. Immediately replace any label that is missing.



Part Number 38-241

# INTRODUCTION

## DESCRIPTION

The Tri-Blender consists of two basic sections, the dry material section and the liquid material section.

The Tri-Blender models F3218 and F4329 are mounted on bases. These models are mounted adjacent to the drive motor and are driven by belts running between pulleys under the base. The electrically controlled Butterfly valve is standard equipment on model F3218. The F4329 is standard without a valve or hopper. The control panel may be mounted directly to the Tri-Blender base or may be mounted in remote areas to suit your facility.

The Tri-Blender models F1114L, F2114 and F2116 are mounted on a base directly above the electric drive motor. The drive motor is mounted to the underside of the base. It is coupled to the blender by the motor shaft which extends through the base into the stub shaft that is secured to the impeller.

This model is equipped with a hand operated butterfly valve for control of the material entering the blender. Optional electrically or pneumatically controlled valves are also available.

Blender F2116 EZ-System is the same as units F1114L, F2114 and F2116 with additions of a dolly, tube assembly, motor starters and supply pump. For supply pump service information, refer to the Tri-Clover "C" Series Centrifugal Pump Service Manual.

On all models, the connection ends, the diffuser and the suction tube, the inlet adapter, the casing, screen, washer, and backplate are made of 316 stainless steel. The hopper is made of 304 stainless steel. All of the tubes are fastened with quick couple Tri-Clamps for easy care and fast access. The four legs supporting the Tri-Blenders are adjustable for easy leveling of the blender during installation.

## BASIC OPERATION

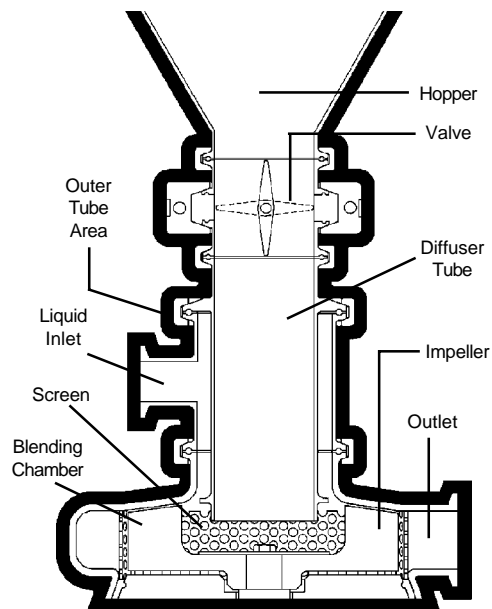
The Tri-Blender basically consists of a centrifugal pump head and impeller mounted so that the normal suction port, or inlet, is pointed upward. The inlet piping consists of a patented tube-within-a-tube arrangement. This serves to keep the liquid and dry ingredients separated until they are in the mixing chamber. The tube-within-a-tube arrangement eliminates prewetting, one of the major problems of wet-dry mixing.

The natural suction of a centrifugal pump is used to pull the powder from the hopper through the diffuser tube.

The outer tube is used to direct the liquid into the impeller. The liquid is introduced at the leading edge of the impeller blades where the pressure gradient of the Blender head is zero. Since there is no suction at this point, liquid must be pumped to the blender by external means, such as the supply pump.

The liquid inlet is mounted tangentially. The liquid entering the blender mixing chamber enters the chamber in the same direction the impeller is rotating. The impeller then strikes the liquid and accelerates it, with minimal splashing. This is how the powder inlet tube can be kept dry during operation.

In operation, the liquid pumped into the Blender is accelerated outward until it strikes the blender screen. This creates a natural back pressure that causes the liquid to flow downward and back toward the eye of the impeller. This forms a hollow envelope into which the powder is introduced by the natural suction of the blender.



# INSTALLATION

## INSTALLATION GUIDELINES

### UNPACKING EQUIPMENT

When unpacking your equipment, inspect all of the contents for damage that may have occurred during shipping. Report any damage to the carrier.

### LOCATION AND INSTALLATION

The Tri-Blender unit should be located within 3 feet (1 meter) of the liquid source for best performance and in a position where the supply piping can be short and direct with a minimum number of elbows and fittings. The liquid to the blender must be supplied by an auxiliary source. In certain applications, a discharge pump may also be required. Contact Tri-Clover for recommendations on supply and discharge pumps. It should also be readily accessible for cleaning and inspection.

The Tri-Blender unit is ready to install as received from the factory. To install the F1114L, F2114 and F2116 models, a minimum space of 20" x 20" (51cm x 51cm) will be needed to accommodate the basic unit. For the F3218, and F4329 models, a minimum space of 32" x 47" (81cm x 119cm) is required. Install the adjustable legs in the base of the unit and position the blender in the area it will be used. Turn the adjusting leg with a wrench and individually adjust the legs until the unit is level.

Attach the supply and discharge piping. Be sure that both the inlet and outlet tubes are correctly positioned and that supply and discharge piping are properly supported to avoid strain on the blender casing.

The tube OD of the inlet and outlet connections of the blender casing are:

	Liquid Inlet	Liquid Outlet	Powder Inlet
F1114L	1" (25.4mm)	1½" (38.1mm)	1½" (38.1mm)
F2114	1" (25.4mm)	1½" (38.1mm)	2" (50.8mm)
F2116	1½" (38.1mm)	1½" (38.1mm)	2" (50.8mm)
F3218	1½" (38.1mm)	2" (50.8mm)	3" (76.2mm)
F4329	2" (50.8mm)	3" (76.2mm)	4" (101.6mm)

**IMPORTANT:** If your blender is equipped with the electrically controlled Butterfly valve, be sure the valve is wired to an auxiliary 110V power source. The auxiliary wiring will let the Butterfly valve operate independently from the blender motor and will allow the valve to be closed if the drive motor stops running. If the auxiliary 110V power source also fails, the Butterfly valve is equipped with a manual override to close (or open) the valve by applying a suitable size wrench to the flats on the coupling adapter.

# INSTALLATION

## PIPING HINTS

### GENERAL

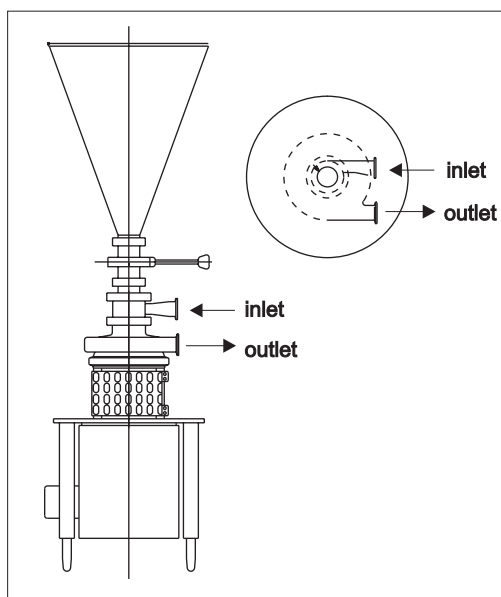
This section provides some hints on piping installation, which will aid in obtaining maximum efficiency and service from your Tri-Blender.

Piping should be independently supported at both the inlet and discharge outlet. Care should be taken that piping is properly aligned and does not put any strain on the Tri-Blender casing. The piping should have minimum line restriction.

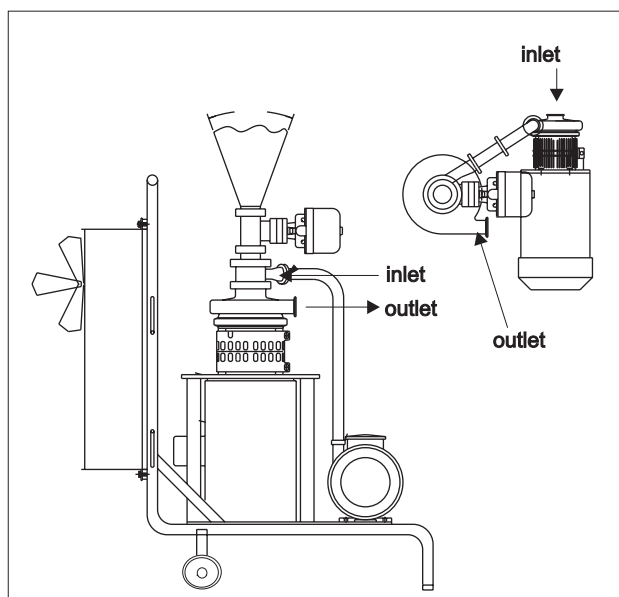
### INLET PIPING

The inlet piping should be short and follow a direct route with a minimum number of elbows and fittings. Elbows should not be used at the inlet, as friction would be greatly increased, resulting in head loss. Excessive friction losses in the inlet line could cause cavitation in the blender casing, causing poor performance, noise, vibration, and damage to equipment.

Whenever practical, the diameter of the piping at the inlet should be increased in size. An eccentric tapered reducer should be used in lieu of a concentric tapered reducer to help direct the flow into the offset tee to minimize turbulence.



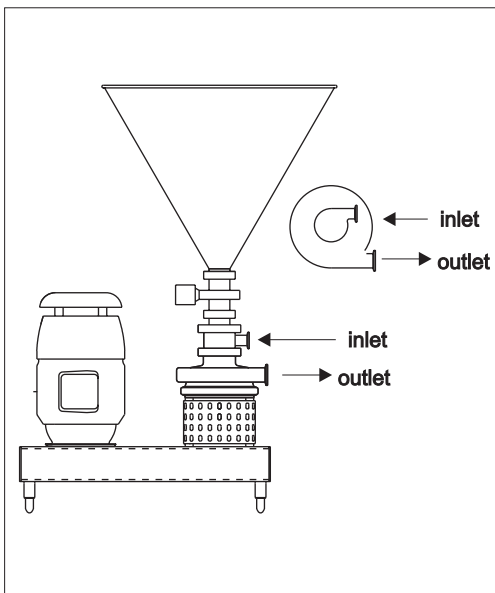
Models F1114L, F2114, F2116



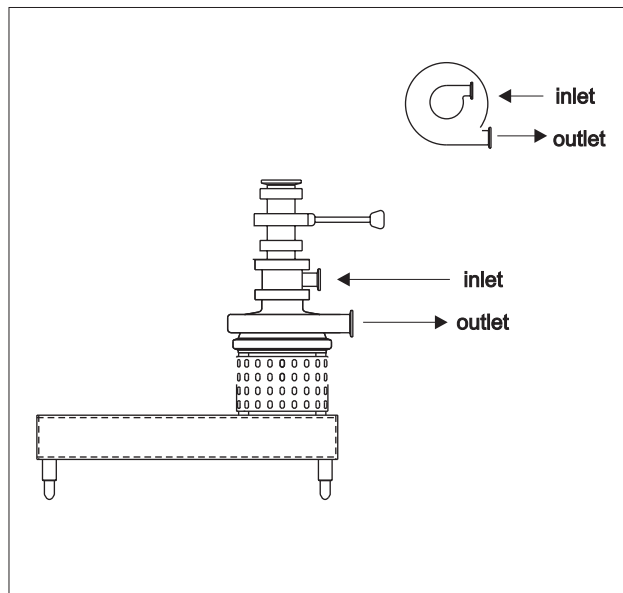
Model F2116 EZ System



# INSTALLATION



Model F3218

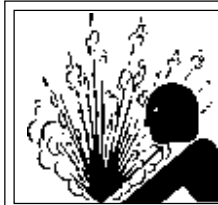


Model F4329

# MAINTENANCE

## CLEANING

For cleaning and sanitizing, it is necessary to disassemble all of the parts of the Tri-Blender, except the drive motor. Cleaning procedures are detailed in this section.



### WARNING

Relieve pressure and remove all fluid from blender prior to disassembly.



### WARNING

Remove power before servicing to prevent unintended start of the pump.

To clean the Tri-Blender:

1. Disconnect the suction and discharge piping.

If you have an F4329, skip Steps 2 through 4. It is not normally equipped with a hopper and valve.

2. Remove the Tri-Clamp® securing the hopper to the blender.
3. Remove the clamp securing the Butterfly valve end connections.
4. Disassemble the valve. Refer to separate valve manual (B51SM).
5. Remove each of the Tri-Clamps and blender tubes in a top down sequence until all that remains is the casing.
6. Remove the Tri-Clamp securing the casing to the backplate and grasp the casing firmly in both hands and pull it up and off of the backplate.

### IMPORTANT:

The impeller casing and backplate are separated by a gasket. Do not attempt to separate the two sections by inserting a tool and prying them apart. This could result in damage to the machined surfaces of the adapter ring and the gasket. A firm tug on the casing will separate the casing from the unit.

7. Remove the screen from the inside of the casing.
8. Remove the impeller and backplate.
9. Clean all of the disassembled blender components with a suitable solution and dry them before reassembly.

Note: If during the cleaning process, you notice any damaged or worn parts, replace them before reassembling the unit. Refer to the *Reassembly* section and the *Parts List* section of this manual.

10. Reassemble the blender using the reverse order of disassembly.

# MAINTENANCE

## DISASSEMBLY

### GENERAL

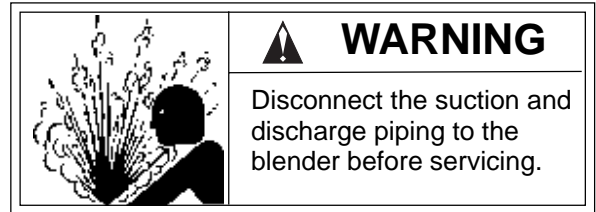
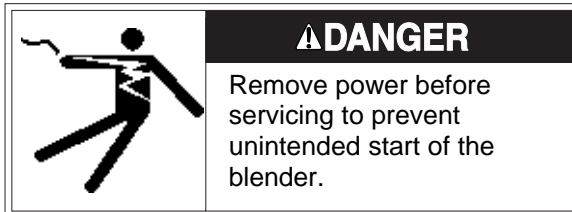
The Tri-Blender is relatively maintenance free, requiring normal cleaning and inspection to ensure optimum performance. Inspect all seals for cuts or abrasions and inspect seal faces for nicks and cracks. Replace worn or damaged parts as necessary.

### REPAIR INFORMATION

Repair of the Tri-Blender is normally accomplished by replacing defective parts. The only moving parts are the control valve, the impeller, the shafts, the seal, the belt, and the motor armature shaft. For repair or replacement of the drive motor, refer to the motor manufacturer. Refer to the *Parts List* for replacement data for the Tri-Blender parts. See the *Tri-Blender Disassembly* section below for replacement instructions.

### TRI-BLENDER DISASSEMBLY

It is recommended that all parts of the Tri-Blender be periodically inspected to prevent malfunctions caused by worn or broken parts. The following procedures will cover models F1114L, F2114, F2116, F3218, and F4329. Portions of the disassembly are identical for all models, but where differences occur, procedures for each model are included. Also disassembly varies depending on the type of seal used. There are three types of seals: D, DG, and E.



# MAINTENANCE

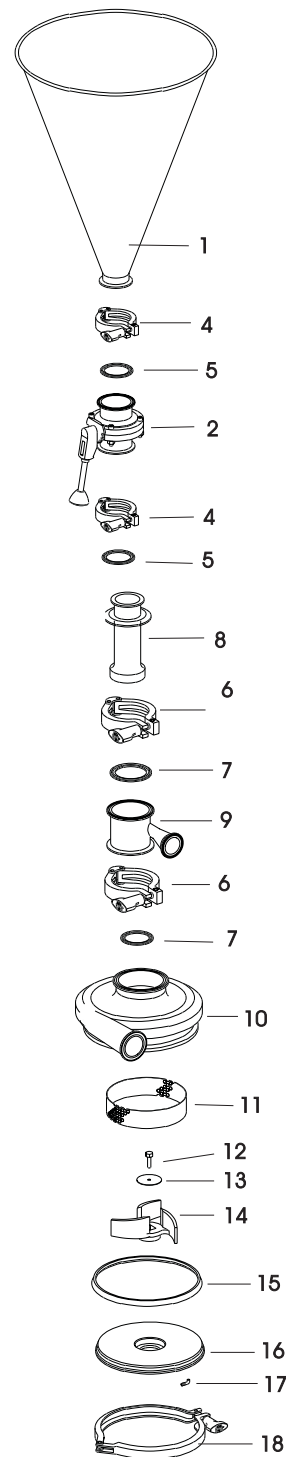
## DISASSEMBLY (Continued)

(Model F4329 is not normally equipped with a hopper and control valve. Skip Steps 1 and 2.)

1. Remove the Tri-Clamp (4) securing the hopper (1) to the blender and remove the hopper and gasket (5).
2. Remove the clamp (4) securing the control valve (2). Hold the valve while loosening the clamp to prevent the valve from falling. For repair and service of the Butterfly valve on your blender, refer to the *B Series Butterfly Valve Service and Installation Manual (B51SM)* available from Tri-Clover.
3. Remove the Tri-Clamp (6) that secures the diffuser and suction tube (8) to the inlet adapter (9) and remove the diffuser and suction tube.
4. Remove the clamp (6) that secures the inlet adapter (9) to the casing (10) and remove the inlet adapter.
5. Remove the large Tri-Clamp (18) securing the casing (10) to the backplate (16). Grasp the casing firmly in both hands and pull it straight up and off of the backplate.

**IMPORTANT:** Do not use a tool to pry the casings apart. Any object inserted between the casing and gasket could cause damage to the gasket and casing sealing surface, resulting in leakage after reassembly.

6. Remove the screen (11) from the casing (10).
7. Using a suitable wrench remove the bolt (12) and washer (13) securing the impeller (14) to the stub shaft. Remove the impeller.
8. Check all o-rings for damage or wear.

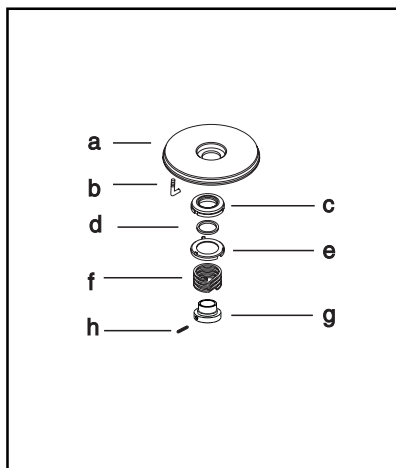


*Tri-Blender Disassembly  
(Model F3218 shown)*

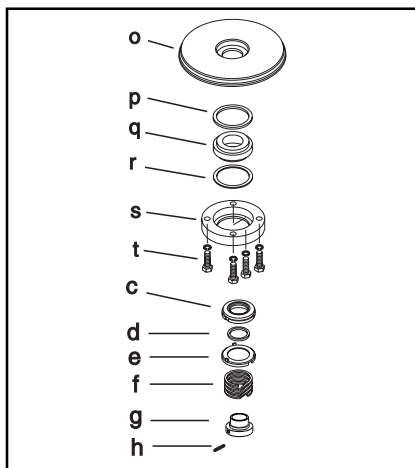
# MAINTENANCE

## DISASSEMBLY (Continued)

### Balanced Type D and DG Seals



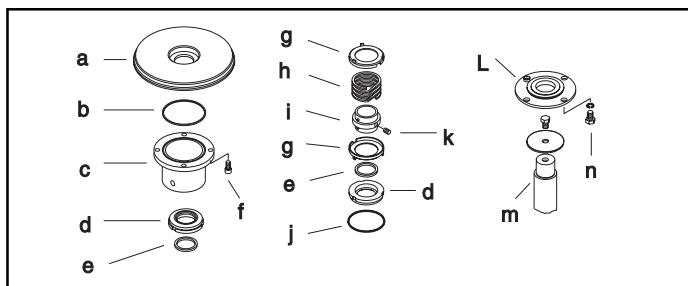
*Type D Seal*



*Type DG Seal*

1. If the backplate on your blender has pins (b), rotate the backplate (a) until the pins in the plate clear the pins in the adapter ring.
2. Remove the backplate (a). Carefully inspect the backplate, gasket and casing for the nicks, scratches or signs of wear.
3. On DG models, remove four bolt/screws (t) from backplate (o). Inspect DG insert (q), gland ring (s) and gaskets (p and r) for damage or wear and replace as required. Use caution when handling the backplate to avoid damage to the surfaces around the opening for the carbon seal.
4. Remove the carbon seal (c), o-ring seal (d), cup (e), spring (f) and drive collar (g) from the stub shaft. To remove the drive collar, loosen the setscrews (h) and lift the drive collar off of the shaft.

### Water Cooled, Balanced Double Type E Seal



*Type E Seal*

1. Disconnect the water inlet and outlet from the stuffing box (c).
2. Remove the four screws (n) that retain the follower (L) to the stuffing box (c).
3. Slide the stuffing box (c) and backplate (a) assembly off of the shaft (m).
4. Remove the inboard carbon seal (d), seal o-ring (e), cup (g), and seal spring (h) from the shaft (m).
5. Loosen two set screws (k) and remove the drive collar (i).
6. Remove the carbon seal (d), seal o-ring (e), cup (g), and the follower (l) from the stub shaft (m).

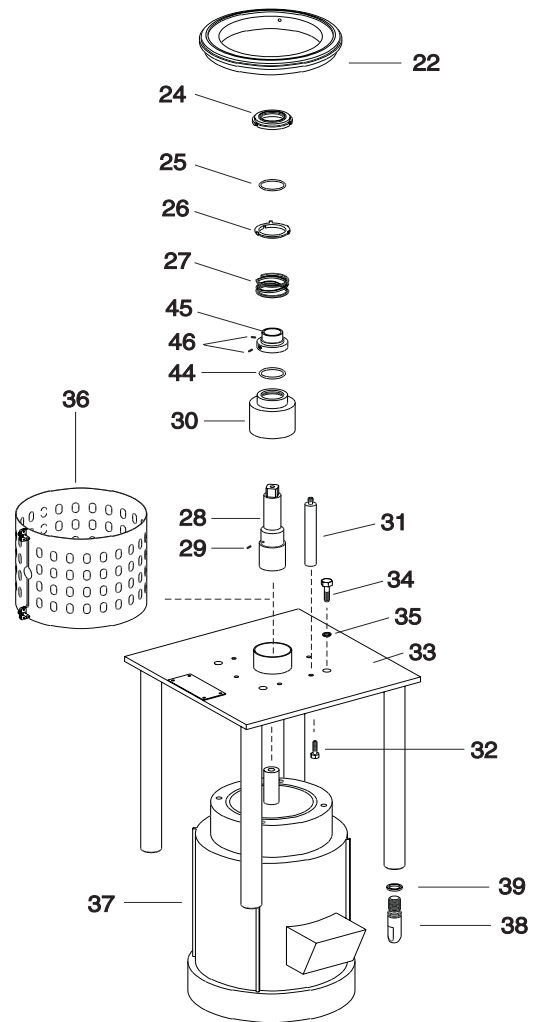
# MAINTENANCE

## DISASSEMBLY (Continued)

### STUB SHAFT AND MOTOR REMOVAL

**Models F1114L, F2114, F2116 or  
Model F2116 EZ-System**

1. (F1114L, F2114, F2116 only.) Remove the drive motor (37) from the base (33), by placing a suitable block beneath the motor and turning the adjustable legs (39) until the motor rests firmly on the block.
2. Remove the seal guard (36).
3. Remove the carbon seal (24), O-ring (25), cup (26), and spring (27) from stub shaft (28).
4. Loosen the setscrews (46) on the drive collar (45) and remove the drive collar (45) from the stub shaft (28).
5. Remove the deflector (30) by lifting it straight off.
6. Using a suitable wrench, remove the four nuts, bolts (34) and lockwashers (35) securing the motor (37) to the base (33).
7. With the motor (37) resting on the blocks, lift the base (33) off of the motor, leaving the stub shaft (28) attached to the motor.
8. Loosen the two set screws (29) securing the stub shaft to the motor armature shaft.
9. Remove the stub shaft (28) by prying beneath it with a flat bar.
10. Examine the stub shaft (28) sealing surface for nicks or scratches which can cause excessive O-ring seal wear or leakage.
11. Remove the adapter ring (22) and spacers (31) from the blender base (33) by setting the base on its side and removing the six socket head screws (32) in the bottom of the base. While removing the socket head screws hold the adapter ring (22) to prevent it from falling.
12. (F1114L, F2114, F2116 only.) Remove the adjustable legs (39) from the blender base.
13. Inspect all O-rings for damage.



*Models F1114L, F2114, F2116*

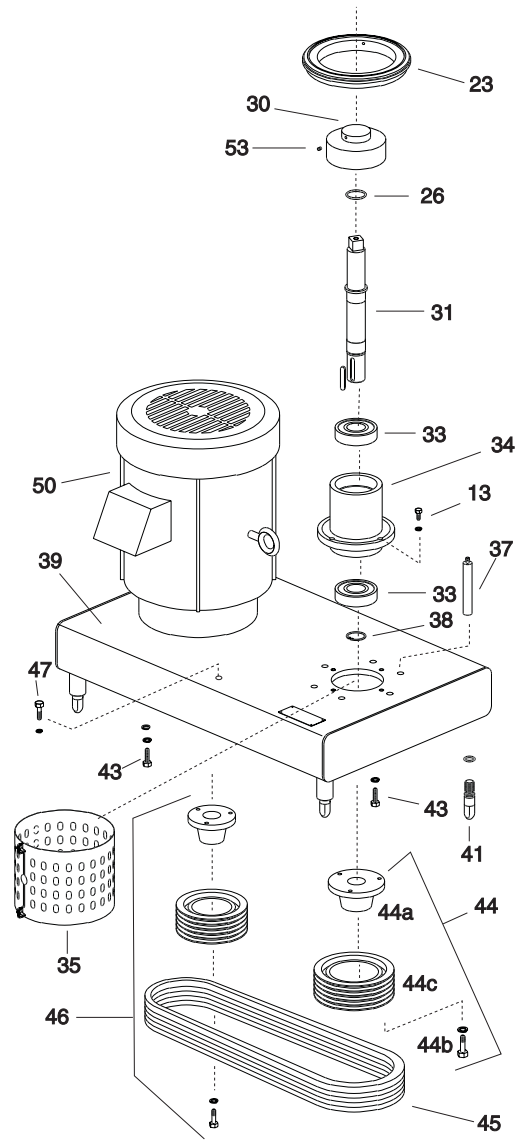
# MAINTENANCE

## DISASSEMBLY (Continued)

### Models F3218 and F4329

**Note:** When removing drive components, it is necessary to tip the entire blender and base on its side, with the motor end toward the floor. Remove the hopper, valve, tubing, casing, impeller, seal guard and seal components before tipping to make the unit easier to lift.

1. Loosen the mounting bolts (43) securing the drive motor (50) to the base (39). (The bolt holes are elongated to permit belt adjustment.)
2. Slide the motor (50) toward the blender and remove the drive belts (45).
3. Remove the bolts (44b) securing the blender pulley (44c). Use the same bolts as a forcing screw and thread it into the forcing holes, finger tight.
4. With a suitable wrench, turn the bolt (44b) until the pulley (44c) releases from the bushing (44a). Remove the forcing screw and remove the pulley.
5. Slide tapered bushing (44a) from the shaft (31).
6. Loosen the set screws (53) securing the collar (30) to the shaft (31) and remove the deflector collar.
7. Loosen the six capscrews (43) securing the adapter ring spacers (37). Hold the adapter ring (23) to prevent it from falling. Remove the capscrews and remove the adapter and spacers.
8. Set the blender down on its legs (41). Remove the four capscrews (13) securing the bearing housing (34) to the base (39).
9. Grasp the bearing housing (34) firmly in both hands and lift it out of the blender base (39).
10. Remove the retaining ring (38) and press the shaft (31) out of the housing (34). Using a suitable puller, remove the bearing (33) from the shaft and remove the other bearing from the housing.
11. Inspect the shaft (31) sealing surface for nicks or scratches. Inspect all components for cracks and distortion. Inspect the adjusting legs for worn threads and inspect all o-rings for damage.
12. Replace any worn or damaged components.



Model F3218

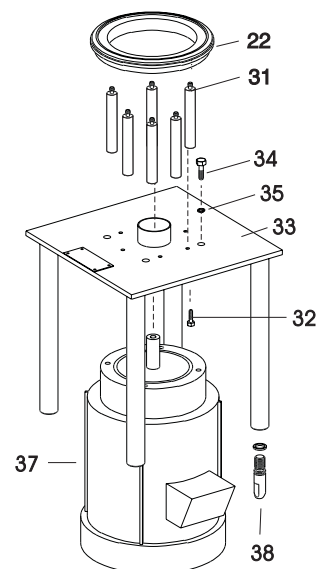
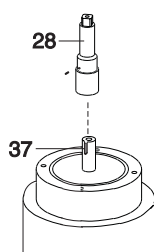
**IMPORTANT:** The bearings in the bearing housing are sealed and lifetime lubricated. If either of the bearings are worn or damaged, make certain they are replaced with exactly the same type of bearings and replaced as a set.

# MAINTENANCE

## REASSEMBLY

### Models F1114L, F2114, F2116 and F2116 EZ-SYSTEM

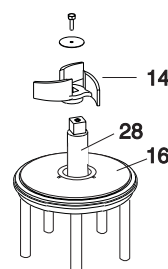
1. Install the adjusting legs (38) into the base (33). (On Model F2116 EZ-System, install base with bolts to dolly.)
2. Install the ring adapter (22) with the six spacers (31) onto the base (33), place the base on top of the motor (37) and install the motor.
3. Place the four motor mounting screws (34) in position, but do not tighten them securely at this time. The motor must remain loose enough to allow alignment of the motor stub shaft in the backplate.
4. Align the keyway in the stub shaft (28) with the key on the motor armature and slide the stub shaft down.



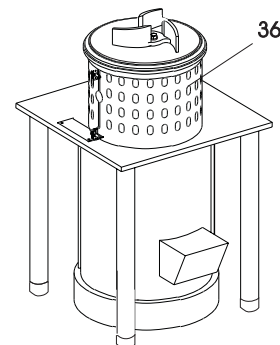
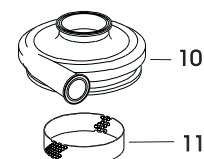
5. Place the backplate (16) with gasket over the stub shaft (28) and position the impeller (14) on the shaft.

**Note:** On older models, press down on the backplate (16) and turn it until the pin on the backplate locks with the pin on the adapter ring.

Approximately  $\frac{1}{16}$  inch (1.6mm) clearance should be between the backplate and the impeller. The set screws on the stub shaft may now be tightened securely.



6. Remove the impeller (14) and observe the position of the stub shaft (28) in the backplate (16). If the stub shaft is not centered in the backplate, move the motor (37) in the proper direction. When the stub shaft is centrally located in the backplate (16), tighten the motor mounting screws (34) securely.
7. Install the seal. Refer to *Setting the Drive Collar and Seal Replacement* section (all models) at this point.
8. Once again assemble the impeller (14), onto the stub shaft (28), securing it with the impeller washer and nut.
9. Place the blender screen (11) inside the casing (10). On newer models, it is important that the pin on the screen be located in the notch in the casing to prevent spinning. Older models do not have a pin and notch. In this case, the screen must fit snugly inside the casing to prevent the screen from spinning.
10. Place the casing (10) firmly on the backplate (16) and install the large Tri-Clamp®.
11. Install the seal guard (36).





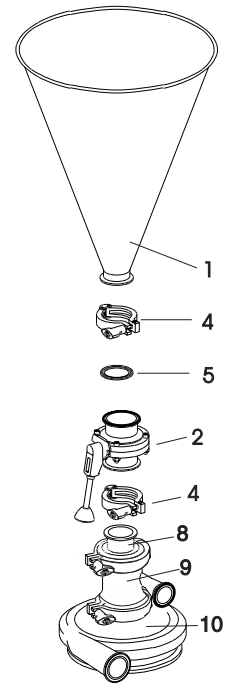
# MAINTENANCE

## REASSEMBLY (Continued)

12. Install the inlet adapter (9) and gaskets, and install and tighten the clamp.

**IMPORTANT:** Ensure that the inlet adapter (9) is placed so that the inlet tube is opposite the casing outlet tube (10). See figure at right.

13. Install the diffuser and suction tube (8) and gasket and install and tighten the clamp.
14. Install the control valve (2) and gasket (5), and install and tighten the clamp (4).
15. Install the hopper (1), and install and tighten the clamp (4).
16. Connect all the suction and discharge piping.

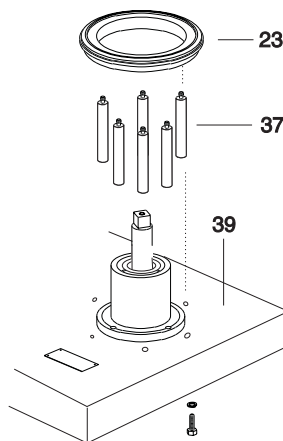
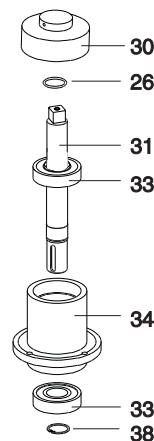


# MAINTENANCE

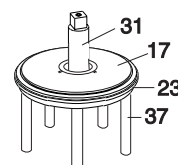
## REASSEMBLY (Continued)

### MODEL F3218 AND F4329

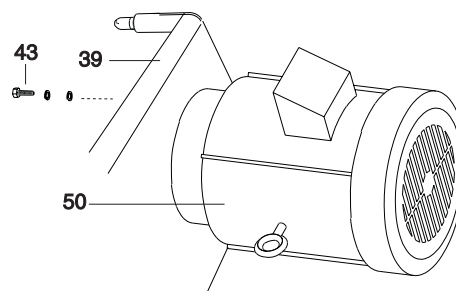
1. Install the o-ring (26) in the deflector collar (30).
2. Install one bearing (33) on the shaft (31) from the bottom until it rests against the shoulder. (If you are assembling a F4329 blender, place two bearings here.)
3. Install the shaft into the bearing housing (34).
4. Install the other bearing (33) on the shaft (31) through the bottom of the housing (34).
5. Install the retaining ring (38) on the bottom of the shaft (31).
6. Install the bearing housing (34) on top of the base (39) and tighten the bolts.
7. Install the deflector (30) on top of the bearing housing (34). If you have an older model, tighten the set screw. Newer models don't have a set screw.
8. Screw the six spacers (37) into the retainer ring (23), and bolt the spacers onto the baseplate (39).



9. Install the backplate (17) over the shaft (31) and onto the retainer ring. If you are using a DG seal, install the seal gland (with gaskets and insert) before installing the backplate.
10. Alternately tighten the spacer bolts (37) to center the shaft in the backplate. Then remove the backplate.



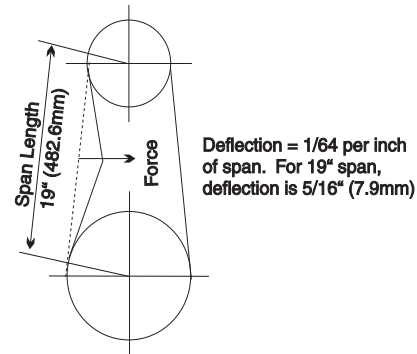
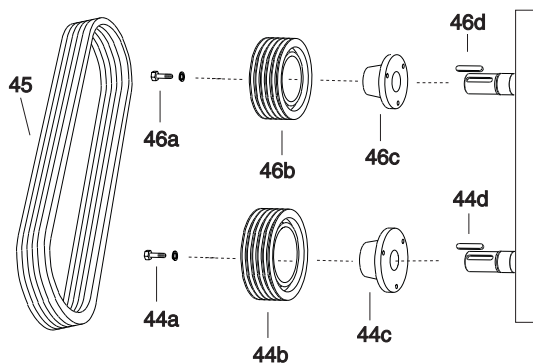
11. Tip the base on its side (39), and install the motor (50). Tighten the bolts enough so that they contact the bottom of the base. You'll use the bolts later to adjust the belt tension.



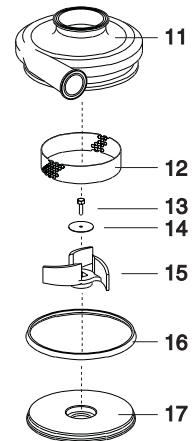
# MAINTENANCE

## REASSEMBLY (Continued)

12. Install the blender pulley key (44d), pulley (44b), and bushing (44c) and tighten the bolts (44a). Place the pulley in position using the correct mounting holes for the bolts securing the pulley.
13. Install the motor pulley key (46d), pulley (46b), and bushing (46c) and tighten the bolts (46a). Make sure that both pulleys are horizontally aligned. Draw the pulley tight with the mounting bolts by alternately tightening each bolt a small amount until all three bolts are tight.
14. Place the drive belts (45) on the motor pulley (46b) and the blender pulley (44b). It may be necessary to move the motor toward the blender to place the belts on the pulleys. Tighten the belts by moving the drive motor away from the blender housing until there is a deflection of  $\frac{5}{16}$ " (7.9 mm) using 5 to 7 pounds of force on the belt.

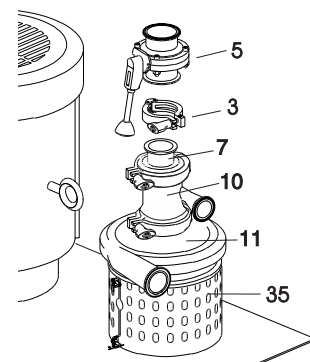


15. Secure the motor and upright the blender.
16. Assemble the seal. Refer to *Setting the Drive Collar and Seal Replacement* section (all motors) at this point. Then return to Step 17.
17. Install the backplate (17) and gasket (16).  
 Note: On older models, press down on the backplate and turn it until the pin on the backplate locks with the pin on the adapter ring.
18. Install the impeller (15), impeller washer (14), and impeller nut (13).
19. Place the blender screen (12) inside of the casing (11). It is important that the pin on the screen be located in the pocket in the casing to prevent spinning.  
 Note: Older blenders do not have a pin on the screen. In this case, the screen should fit snugly inside the casing to prevent it from spinning.
20. Place the casing (11) firmly on the backplate (17) and install the clamp.
21. Install the seal guard (36).
22. Install the inlet adapter (10) on the casing (11), securing it with a clamp.



**IMPORTANT:** Be sure to position the adapter correctly. The adapter inlet should be opposite the casing outlet. See figure at right.

23. Install the diffuser and suction tube (7) and gasket in the adapter (10), and secure it with a clamp.
24. (F3218 only) Install the butterfly valve (5) and secure it with a clamp.
25. (F3218 only) Install the hopper and gasket, and secure it with a clamp.



# MAINTENANCE

## SETTING THE DRIVE COLLAR AND SEAL REPLACEMENT

Complete these steps before returning to final reassembly steps in preceding section.

### BLENDERS WITH D OR DG SEALS

1. Install the deflector on the shaft.
2. When the drive collar has been removed or the carbon seal has been replaced, the drive collar must be positioned on the shaft by one of the two following methods:

#### **Setting the Drive Collar By Measurement**

- a. Install the backplate, gasket, and casing.
- b. Install and tighten the casing clamp.
- c. At the location behind the backplate, scribe a mark on the shaft. (See Figure A or B.)
- d. Remove the casing clamp, casing and backplate.
- e. Slide the drive collar onto the shaft.
- f. Locate the drive collar in relation to the scribe mark as shown in dimension A and secure to the shaft with the set screws. Drive collar location is critical.
- g. Install the seal spring, seal cup, seal o-ring, and carbon onto the shaft.

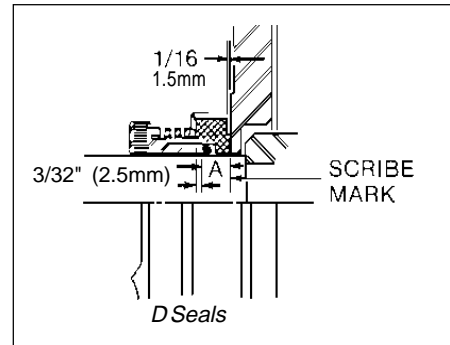


Figure A: D Seal

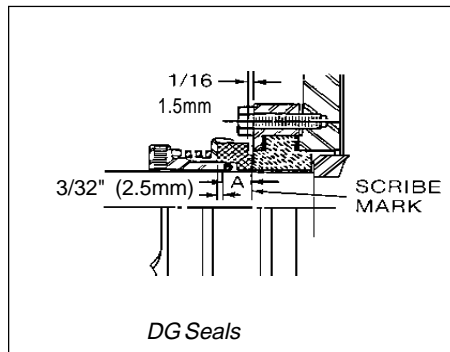


Figure B: DG Seal

#### **Setting the Drive Collar by Position**

- a. Assemble the spring, seal cup, o-ring seal, and carbon seal onto the drive collar. Care must be taken so that the spring does not rest on the tab that is bent back.
- b. Install as a unit on the shaft.
- c. Install the backplate, gasket, and casing.
- d. Install and tighten the casing clamp.
- e. Slide the drive collar and seal assembly toward the backplate until the nose of the drive collar pushes the o-ring and carbon seal tight against the backplate.
- f. Slide the drive collar away from the backplate 1/32 inch (0.8mm) and secure the drive collar in this location with the set screws.

Model	"A" Dimension
F1114L	1 <sup>1</sup> / <sub>32</sub> " (0.8mm)
F2114	1 <sup>1</sup> / <sub>32</sub> " (0.8mm)
F2116	1 <sup>1</sup> / <sub>32</sub> " (0.8mm)
F3218	1 <sup>1</sup> / <sub>32</sub> " (0.8mm)
F4329	1 <sup>1</sup> / <sub>32</sub> " (0.8mm)

3. Install the seal spring, seal cup, seal o-ring, and carbon onto the shaft. Be sure the spring is seated in each cup and the drive ear on each seal cup is in alignment with the drive pins on the drive collar.
4. (DG only) On DG models, install the DG insert and gaskets into the gland ring and screw the gland ring to the backplate.

Note: The #80P Outboard and #80R Inboard gaskets are not interchangeable. The #80R gasket is thicker and must be inboard between the backplate and the seal seat.

# MAINTENANCE

## BLENDERS WITH E SEALS

### (all models)

1. Install the backplate, gasket and casing.
2. Install and tighten casing clamp.
3. At location behind the backplate, scribe a mark on the shaft. (See Figure C.)
4. Remove casing clamp, casing, and backplate.
5. Slide the follower, one carbon seal, one seal o-ring, one seal cup, and drive collar onto the shaft.
6. Locate the drive collar in relation to the scribe mark as shown in Figure C and secure to the shaft with the set screws. Drive collar location is critical.
7. Install the seal spring, seal cup, seal o-ring, and carbon onto the shaft. Be sure the spring is seated in each cup and the drive ear on each seal cup is not in alignment with the drive pins on the drive collar.
8. Slide the stuffing box and backplate assembly over the shaft and seal parts.
9. Secure the follower to the stuffing box using four (4) screws.

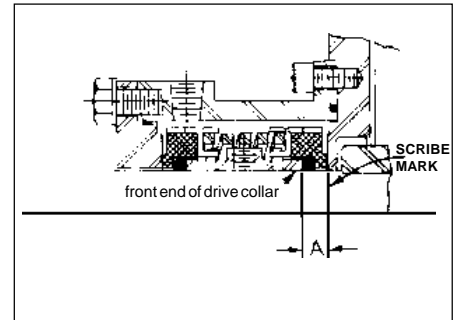


Figure C: E Seal

## ALL SEALS

1. With the blender assembled, and casing clamp tightened, if the drive collar is properly positioned, and the seal components are properly installed, the blender shaft should rotate freely by hand. If excessive effort is required to rotate the shaft, check to be sure that all components are properly installed and the drive collar is properly positioned.
2. Assemble seal guard and tighten nut.
3. Type E only: Attach the water inlet and outlet to the stuffing box.

After above setting instructions have been followed, return to Step 17 in the *Reassembly* section for final steps.

# TROUBLESHOOTING

## TROUBLESHOOTING GUIDELINES

Tri-Blenders are relatively maintenance free with the exception of sanitizing and inspection. Like any piece of machinery, however, occasional problems can arise. This section provides a means of determining and correcting most of your Tri-Blender problems. The motor manufacturer should be contacted for specific repair instructions on the motor.

The chart below has been prepared on the basis that the Tri-Blender, as installed, is properly suited to its application. Should problems arise where the remedies listed below do not cure the situation, impeller cavitation may be the problem. Symptoms of cavitation, such as noisy operation, insufficient discharge and vibration, can result when the auxiliary pump or suction tube are not properly applied. If these conditions are present, check the system and reevaluate the application. If assistance is required, contact Tri-Clover.

PROBLEM	PROBABLE CAUSE	REMEDY
1. No suction.	<ul style="list-style-type: none"> <li>a. Wrong supply pump or need of discharge pump.</li> <li>b. Leak on the suction side of the supply pump or blender.</li> <li>c. Carbon seal is worn.</li> <li>d. Wrong direction of rotation.</li> <li>e. Liquid inlet port on wrong side.</li> <li>f. Splashing in the suction throat of the Tri-Blender.</li> <li>g. High % of solids.</li> <li>h. High temperature.</li> </ul>	<ul style="list-style-type: none"> <li>a. Verify that pumps are sized correctly to suit application. Contact Tri-Clover if you require assistance.</li> <li>b. Tighten all clamps, fittings - replace worn out gaskets.</li> <li>c. Replace carbon seal on blender and/or supply pump.</li> <li>d. Reverse a three phase motor by switching any two of the three power leads at the motor or controller.</li> <li>e. Remove inlet adapter housing and relocate so it is correctly positioned as shown on the exploded view pages.</li> <li>f. High Flow - oversized supply pump; see 1a above; see 1d above.</li> <li>g. See 3b.</li> <li>h. Reduce temperature below 140°F (60°C).</li> </ul>
2. Insufficient discharge.	<ul style="list-style-type: none"> <li>a. High % of solids with screen in casing.</li> <li>b. No liquids.</li> <li>c. Product too viscous or discharge head too great.</li> </ul>	<ul style="list-style-type: none"> <li>a. Remove screen.</li> <li>b. Check supply pump.</li> <li>c. Add discharge pump.</li> </ul>

# TROUBLESHOOTING

PROBLEM	PROBABLE CAUSE	REMEDY
3. Excessive power consumption.	a. High % of solids with screen in casing. b. No liquids.	a. Remove screen. b. Install discharge pump on discharge end of the Tri-Blender.
4. Tri-Blender is noisy.	a. Magnetic hum in motor. b. Motor bearings are worn. c. Tri-Blender bearings are worn. d. Foreign matter is rotating with impeller. e. Blender screen rotating inside casing.	a. Consult motor manufacturer. b. Consult motor manufacturer. c. Replace bearings. d. Remove casing and remove foreign matter - inspect for damage. e. Replace the screen with a larger screen that fits snugly inside the casing.
5. Excessive vibration.	a. Blender is not leveled properly. b. Impeller is damaged. c. Foreign matter in casing.	a. Level blender. b. Replace impeller. c. Remove casing and remove foreign matter - inspect for damage.
6. Tri-Blender leaks.	a. O-ring seal is worn. b. Carbon seal is worn. c. Insufficient compression on seal. d. Backplate gasket is worn. e. Backplate is worn. f. Clamp is loose.	a. Replace o-ring seal. b. Replace carbon seal. c. Replace spring. d. Replace gasket. e. Replace backplate. f. Tighten clamp.

# PARTS LIST

## MODELS F1114L AND F2114

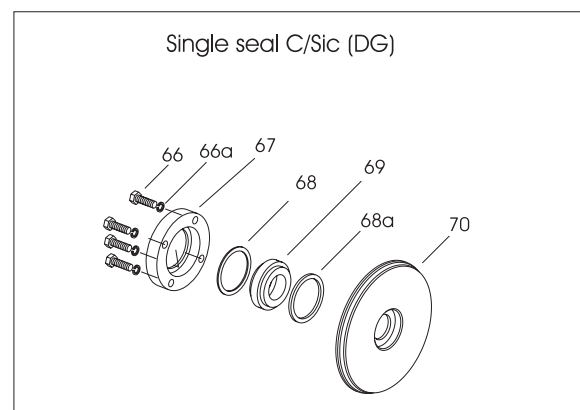
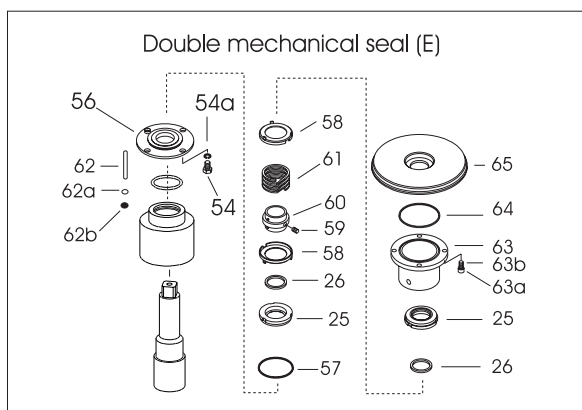
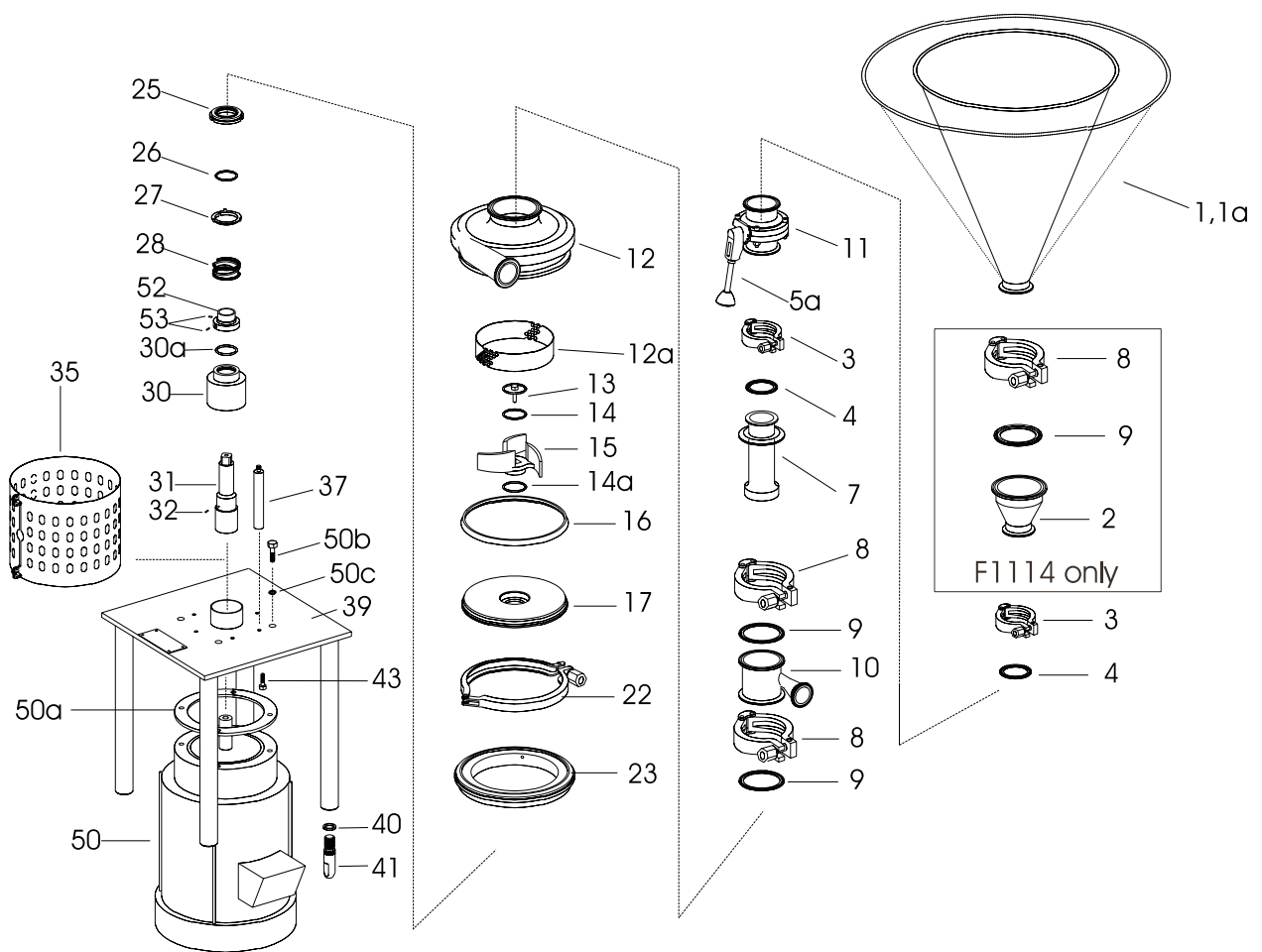
All orders for repair parts must contain the following data.

1. Complete model number (located on nameplate).
2. Tri-Blender serial number (located on nameplate).
3. Description and part key number from the parts list.

The exploded views and accompanying parts list facilitate ordering repair parts from the factory. All parts of the Tri-Blender are exploded and keyed to the parts list.

Key No.	Description	Part Number	Qty	Key No.	Description	Part Number	Qty
1	40° Hopper	F2116-55-40-01	1	31a	Stubshaft (F2114)	F2114E-06-316L	1
1a	60° Hopper	F2116-55-60-01	1	37	Spacer	F2114E-71-316L	6
2	Reducer (F1114)	31-14MP-2 X 1 ½-316	1	39	Baseplate	F2114-23-S	1
3	Clamp (F1114)	13MHHM 1 ½ - S	2	40	Leg O-ring	01-1154-13-34-U	4
3	Clamp (F2114)	13MHHM 1 ½ - S	1	41	Adjustable Leg	R-3-1-23-03-S	4
4	Gasket (Buna, F1114)	40MP-U-1 ½	2	43	Socket Head Capscrew	SC1108E-SS	6
4	Gasket (Buna, F2114)	40MP-U-1 ½	1	50	Motor	5 HP 2900 RPM	1
5a	Valve Handle	B51-1-48-S	1	50b	Capscrew	SC1710H-SS	4
7	Diffuser	F2114-05-316L	1	50c	Lockwasher	LWA1700-SS	4
8	Clamp (F1114)	13MHHM-2-S	3	52	Drive Collar	SP114D-23P-316L	1
8	Clamp (F2114)	13MHHM-2-S	4	53	Setscrews	SC1105A-SS	2
9	Gasket (F1114)	40MP-U-2	3	54	Socket Head Capscrew	SC1106E-SS	4
9	Gasket (F2114)	40MP-U-2	4	54a	Lockwasher	LWA1100-SS	4
10	Inlet Adapter	F2114-217-316L	1	56	Follower	114E-17A-316L	1
11	Butterfly Valve (F1114)	B51-1 ½-E-S	1	57	O-ring	17-106-U	1
11	Butterfly Valve (F2114)	B51-1-2-E-S	1	58	Cup (E seal)	114E-80-3P	2
12	Casing	F2114M-01-316L	1	59	Setscrews	SC903A-SS	2
12a	Screen	F2114-215-316L	1	60	Collar (E seal)	114E23-316L	1
13	Impeller Screw	F2114-26-316L	1	61	Spring (E seal)	114E-80-4A	1
14	O-ring (Buna)	17-361-U	1	63	Stuffing Box	114E-83C-316L	1
14a	O-ring (Buna)	01-1165-11-U	1	63a	Socket Head Capscrew	SC905E-SS	4
15	Impeller (F1114)	F1114L-02-316L	1	63b	Lockwasher	LWA900-SS	4
15a	Impeller (F2114)	F2114-02-316L	1	64	O-ring	17-275-U	1
16	Casing Gasket (Buna)	S114-90A-U	1	64a	O-ring	17-106-U	1
17	Backplate (F1114)	F1114LD-11-316	1	65	Backplate (E seal, F1114)	F1114LE-11-316L	1
17a	Backplate (F2114)	114D-11-316L	1	65a	Backplate (Eseal, F2114)	114E-11-316L	1
22	Casing Clamp	S114-75ARN-S	1	66	Capscrew	SC1110H-SS	4
23	Adapter Ring	F2114E-71-1-316L	1	66a	Lockwasher	LWA1100-SS	4
25	Carbon Seal	114E-80-1A	1	67	Gland Ring	SP114G-17-316L	1
26	Seal O-ring (Buna)	17-17-U	1	68	PTFE Gasket Inboard	SP114G-80-1-2-G	2
27	Cup	114D-80-3P	1	69	Seal Seat (Ceramic)	SP114G-80-1-1-CER	1
28	Spring	114D-80-4	1	69a	Seal Seat (SC)	SP114G-80-1-1-SC	1
30	Deflector	F2116E-40-S	1	69b	Seal Seat (Tungsten)	SP114G-80-1-1-TC	1
30a	Deflector O-ring (Buna)	S328-80-2-U	1	70	Backplate (DG, F1114)	F114LG-11-316L	1
31	Stubshaft (F1114)	F1114LE-06-316L	1	70a	Backplate (DG, F2114)	SP114G-11-136L	1





# PARTS LIST

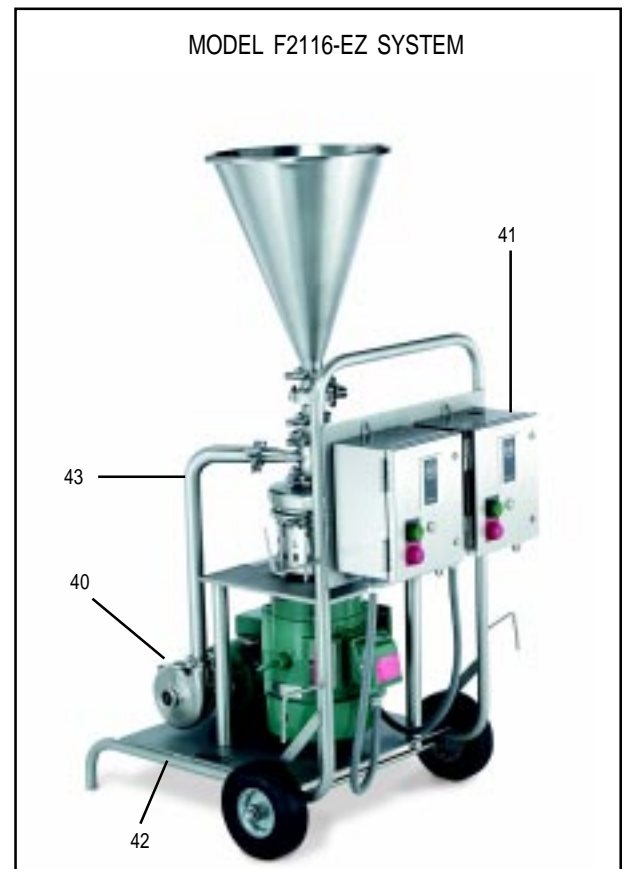
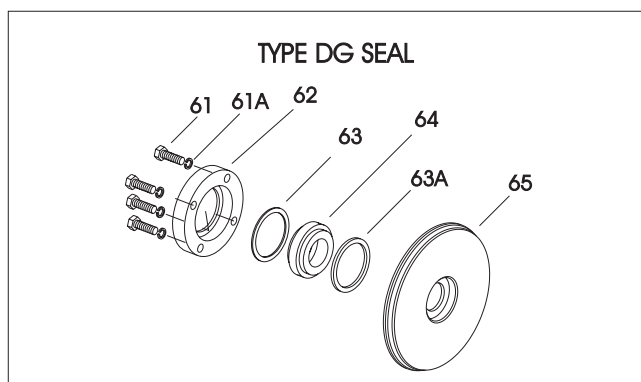
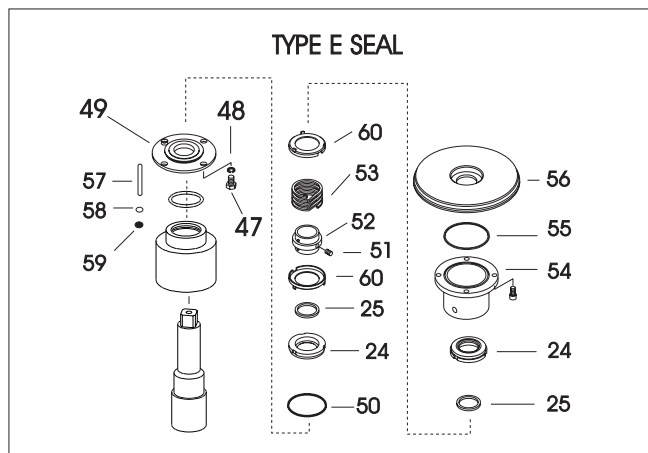
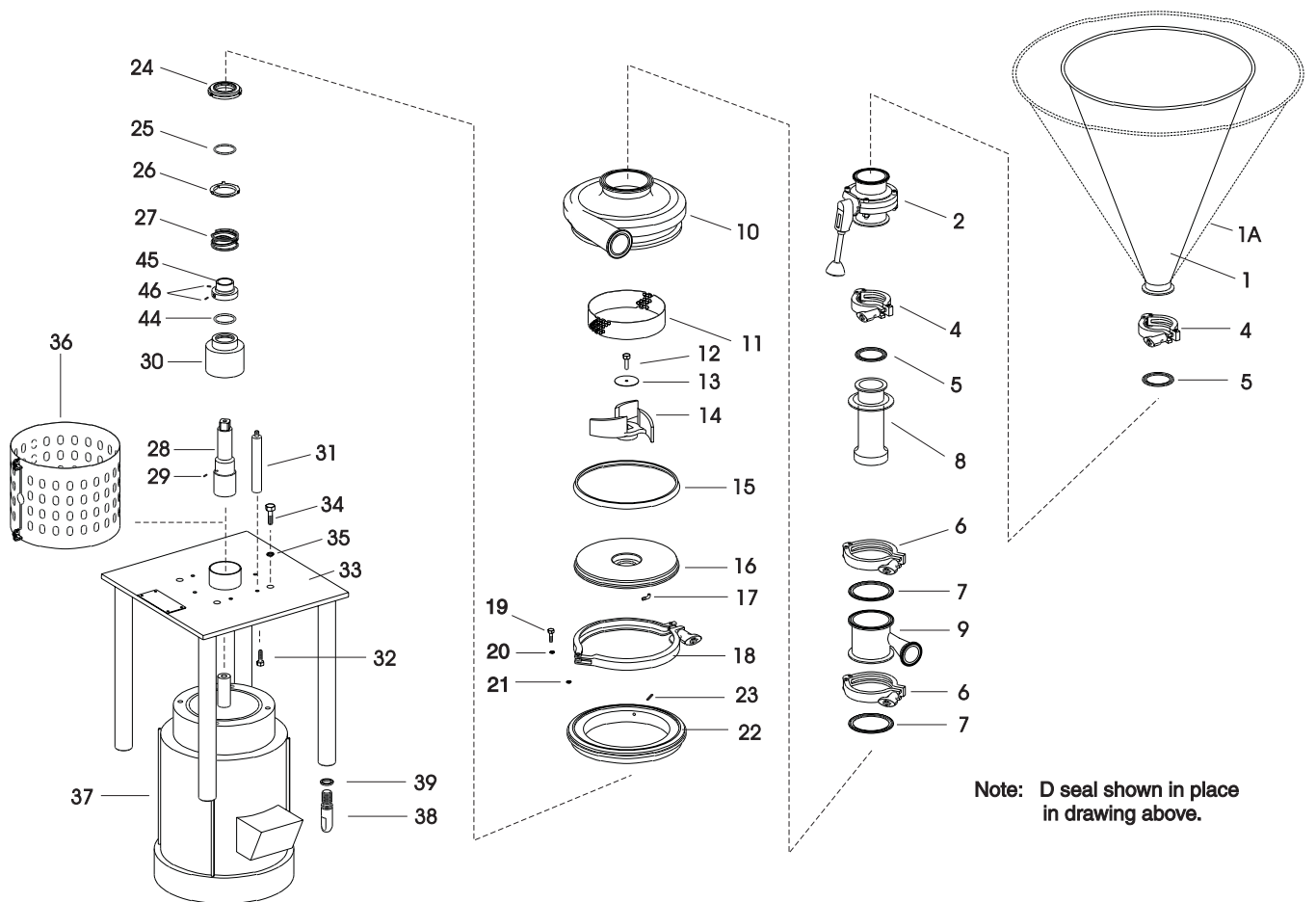
## MODEL F2116 AND F2116 EZ-SYSTEM

All orders for repair parts must contain the following data.

1. Complete model number (located on nameplate).
2. Tri-Blender serial number (located on nameplate).
3. Description and part key number from the parts list.

The exploded views and accompanying parts list facilitate ordering repair parts from the factory. All parts of the Tri-Blender are exploded and keyed to the parts list.

Key No.	Description	Part Number	Qty	Key No.	Description	Part Number	Qty
1	40° hopper	F2116-55-40-01	1	35	Lockwasher	LWA1700-SS	4
1A	60° hopper	F2116-55-60-01	1	36	Seal guard	CS216-18T-131-A-S	1
2	Manual Butterfly Valve	B51-2-E-S	1	38	Adjustable Leg	R-3-1-23-03-S	1
4	Clamp	13MHM-2-S	2	39	O-ring - Leg Buna N	01-1154-13-34-U	4
5	Gasket	40MP-U-2	2	40	Supply Pump	C114MD56T-S	4
6	Clamp	13MHM-3-S	2	42	Dolly Assembly	F2116-SYS-02	1
7	Gasket	40MP-U-3	2	43	Tube Assembly	F2116-SYS-03	2
8	Difuser & Suction Tube	F2116-05-316	1	44	Seal O-ring - Buna	S328-80-2-U	1
9	Inlet Adapter	F2116-217-316	1	45	Drive Collar - D Seal	SP216D-23P-S	1
10	Casing	F2116M-01-316L	1	46	Setscrew-Drive Collar D Seal	SC1105A-SS	2
11	Screen	F2116-215A-1-316L	1	47	Screw - Follower	SC1306H-SS	4
12	Capscrew	SC1108H-SS	1	48	Lockwasher - Follower	LWA1300-SS	4
13	Washer	F2116-54A-316	1	49	Follower	F2116E-17-316	1
14	Impeller	F2116-02A-316	1	50	Follwer O-ring - Buna N	17-275-U	1
15	Gasket	S216-90A-U	1	51	Setscrew - Drive Collar E Seal	SC1103A-SS	2
16	Backplate-D seal	CS216D11-316	1	52	Drive Collar - E Seal	2116E-23-316	1
17	Backplate Pin	216D-11-1-S	1	53	Spring - E Seal	216E-80-4A	1
18	Clamp	S216-75AR-S	1	54	Stuffing Box - E Seal	216E-83B-316	1
19	Capscrew	SC1110H-SS	1	55	Stuffing Box O-ring	17-122-U	1
20	Spacer	114D-75A-7-03	1	56	Backplate-E Seal	216E-11B-316	1
21	Nut, Acorn	MS-18-112-N	1	57	Stud - E Seal	F2116E-82-S	4
22	Adapter	CS216-71-1-S	1	58	Lockwasher - E Seal	LWA1100-SS	4
23	Adapter pin	216D-71A-1-S	1	59	Nut - E Seal	NU1100H-SS	4
24	Carbon Seal	216E-80-1A	1	60	Cup - E Seal	216E-80-3P	2
25	Seal O-ring - Buna N	01-1165-19-U	1	61	Screw-Gland Ring-DG Seal	SC1310H-SS	4
26	Cup - D Seal	216D-80-3P	1	61a	Lockwashers - DG seal	LWA1300-SS	4
27	Spring - D Seal	216D-80-4	1	62	Gland Ring-DG Seal	SP216G-17-316	1
28	Stubshaft	F2116E-EXP-06-316L	1	63	PTFE Gasket Outboard	SP216G-80-1-2-G	1
29	Setscrew-Shaft	SC1104GG-SS	2	63a	PTFE Gasket Inboard	SP216G-80-1-2A-G	1
30	Deflector	F2116E-40-S	1	64	Seal Seat - DG Seal	SP216G-80-1-1-CER	1
31	Spacer	F2116E-71-S	6	64	Seal Seat - DG Seal	SP216G-80-1-1-SC	1
32	Capscrew	SC1108E-SS	6	64	Seal Seat - DG Seal	SP216G-80-1-1-TC	1
33	Base	F2116-EXP-23A-S	1	65	Backplate - DG Seal	SP216G-11-316	1
34	Capscrew	SC1710H-SS	4				



# PARTS LIST

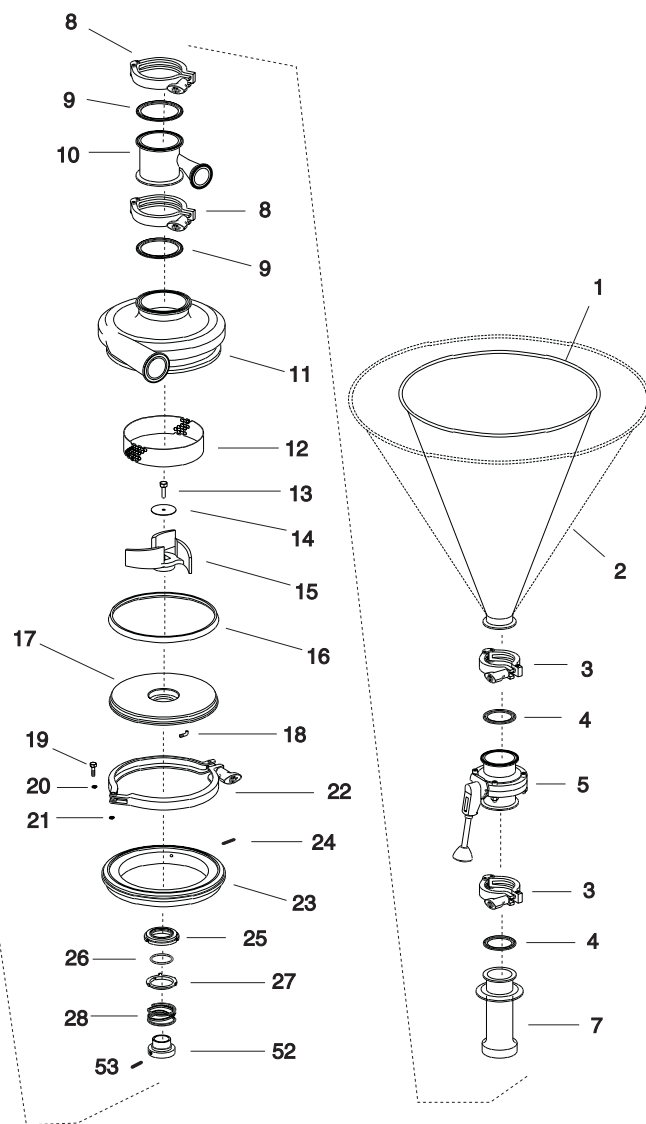
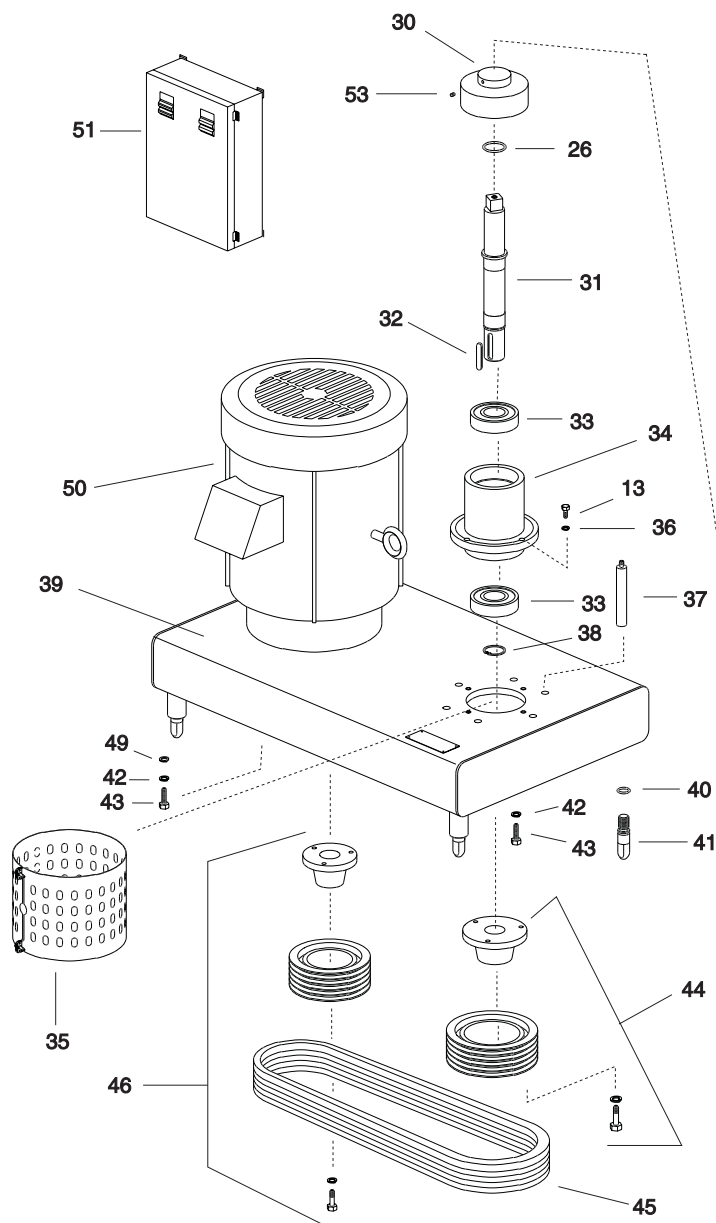
## MODEL F3218

All orders for repair parts must contain the following data.

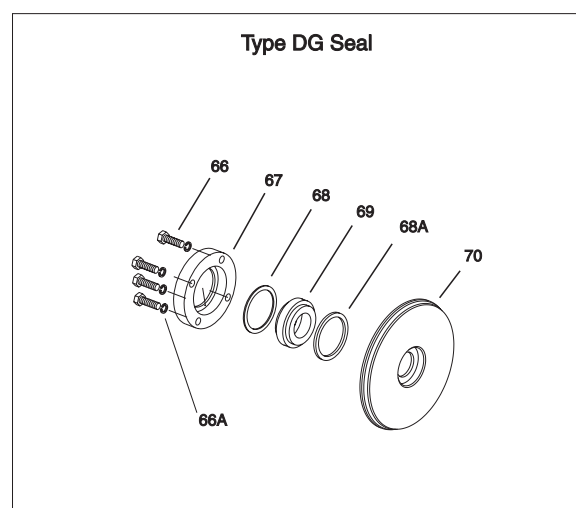
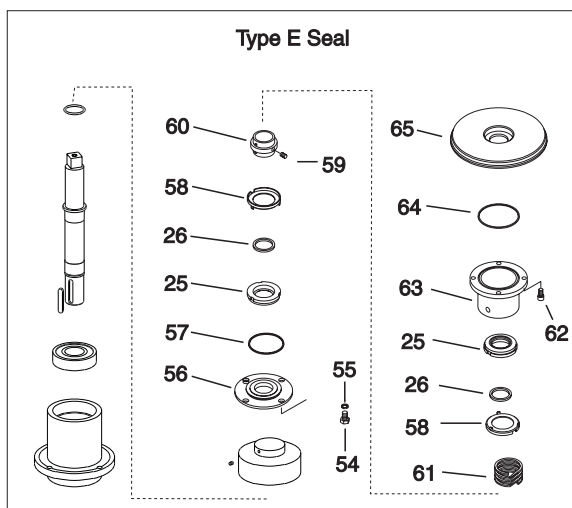
1. Complete model number (located on nameplate).
2. Tri-Blender serial number (located on nameplate).
3. Description and part key number from the parts list.

The exploded views and accompanying parts list facilitate ordering repair parts from the factory. All parts of the Tri-Blender are exploded and keyed to the parts list.

Key No.	Description	Part Number	Qty	Key No.	Description	Part Number	Qty
1	40 ° hopper	D3218-55-40-01	1	39	Base	D3218-23B	1
2	60 ° hopper	D3218-55-60-01	1	40	O-ring-Leg - Buna N	01-1154-13-34-U	4
3	Clamp	13MHM-3-S	2	41	Leg	R3-1-23-03-S	4
4	Gasket	40MP-U-3	2	42	Lockwasher-Spacer	LWA1700-SS	10
5	Manual Butterfly Valve	B51-3-E-S	1	43	Capscrew-Spacer	SC1710H-SS	10
7	Diffuser and Suction Tube	F3218-05-316	1	44	60 Cycle Blender Pulley	D3218-106-3-3V4.5X1.5	1
8	Clamp	13MHM-4-S	2	44	50 Cycle Blender Pulley	D3218-106-3-3V4.12X1.500	3
9	Gasket	40MP-U-4	2	45	Drive Belt	D3218-3V-530	1
10	Inlet Adapter	F3218-217-316	1	46	60 Cycle Motor Pulley	D3218-108-3-3V6.0X1.625	2
11	Casing	F3218M-01-316L	1	46	50 Cycle Motor Pulley	D3218-108-3-3V6.5X1.625	2
12	Screen	D3218-215A-1-316	1	47	Capscrew	SC1106H-SS	4
13	Capscrew	SC1510H-SS	1	48	Lockwasher	WA1100-SS	1
14	Washer	F3218-54-316	1	49	Washer	WA1700-SS	1
15	Impeller	F3218-02A-316	1	52	Drive Collar-D Seal	SP328D-23P-S	1
16	Gasket - Buna	S328-90A-U	1	53	Setscrew-D Seal Drive Collar	SC1105A-SS	4
17	Backplate-D seal	CS328D-11-316	1	54	Screw-Follower	SC1308H-SS	4
18	Backplate Pin	216D-11-1-S	2	55	Lockwasher-Follower	LWA1300-SS	4
19	Capscrew	SC1110H-SS	1	56	Follower	328E-17-316	1
20	Spacer	114D-75A-7-03-S	1	57	Follower O-ring	17-274-U	1
21	Nut, Acorn	MS-18-112-S	1	58	Carbon Seal-E Seal	328E-80-1A	2
22	Clamp	S328-75AR-S	1	59	Setscrew-E Seal Drive Collar	SC1103A-SS	2
23	Adapter Ring	CS328-71-1-S	1	60	Drive Collar-E Seal	328E-23-316	1
24	Pin, Adapter Ring	216D-71A-1-S	2	61	Spring-E Seal	328E-80-4A	1
25	Carbon Seal	328E-80-1A-Mat'l	1	62	Screw-Stuffing Box	SC1307E-SS	4
26	Seal O-ring	S328-80-2-U	2	63	Stuffing Box	F3218E-83B-316	1
27	Cup-D Seal	328D-80-3P	1	64	Stuffing Box O-ring	17-153-U	1
28	Spring-D Seal	328D-80-4	1	65	Backplate-E Seal	328E-11B-316	1
30	Collar/Deflector	F3218-40E-S	1	66	Screw-Gland Ring	SC1310H-SS	4
31	Shaft	F3218-06-316	1	67	Gland Ring	SP328G-17-316L	4
32	Key, Pulley	D3218-46	1	68	PTFE Gasket, Outboard	SP328G-80-1-2-G	1
33	Bearing-Sealed	D3218-18	2	68A	PTFE Gasket, Inboard	SP328G-80-1-2A-G	2
34	Bearing Housing	F3218-99-S	1	69	Seal Seat	SP328G-80-1-1-CER	2
35	Seal Guard Assembly	F3218D-131-S	1	69	Seal Seat	SP328G-80-1-1-SC	1
36	Lockwasher	LWA1500-SS	4	69	Seal Seat	SP328G-80-1-1-TC	1
37	Spacer	D3218-71A-S	6	70	Backplate-DG	SP328G-11-316L	1
38	Retainer Ring	D3218-177	1				



Note: D seal shown in place  
in drawing above.



# PARTS LIST

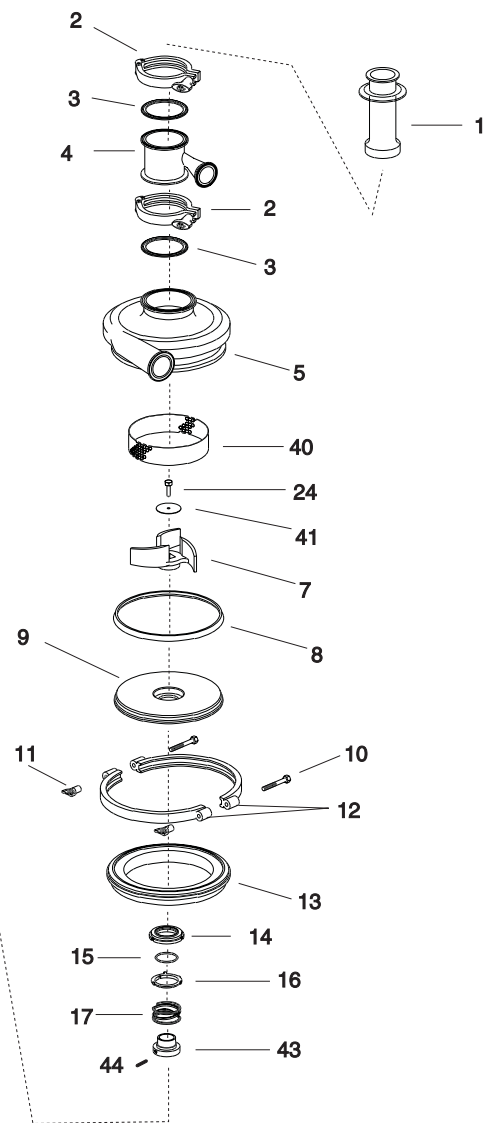
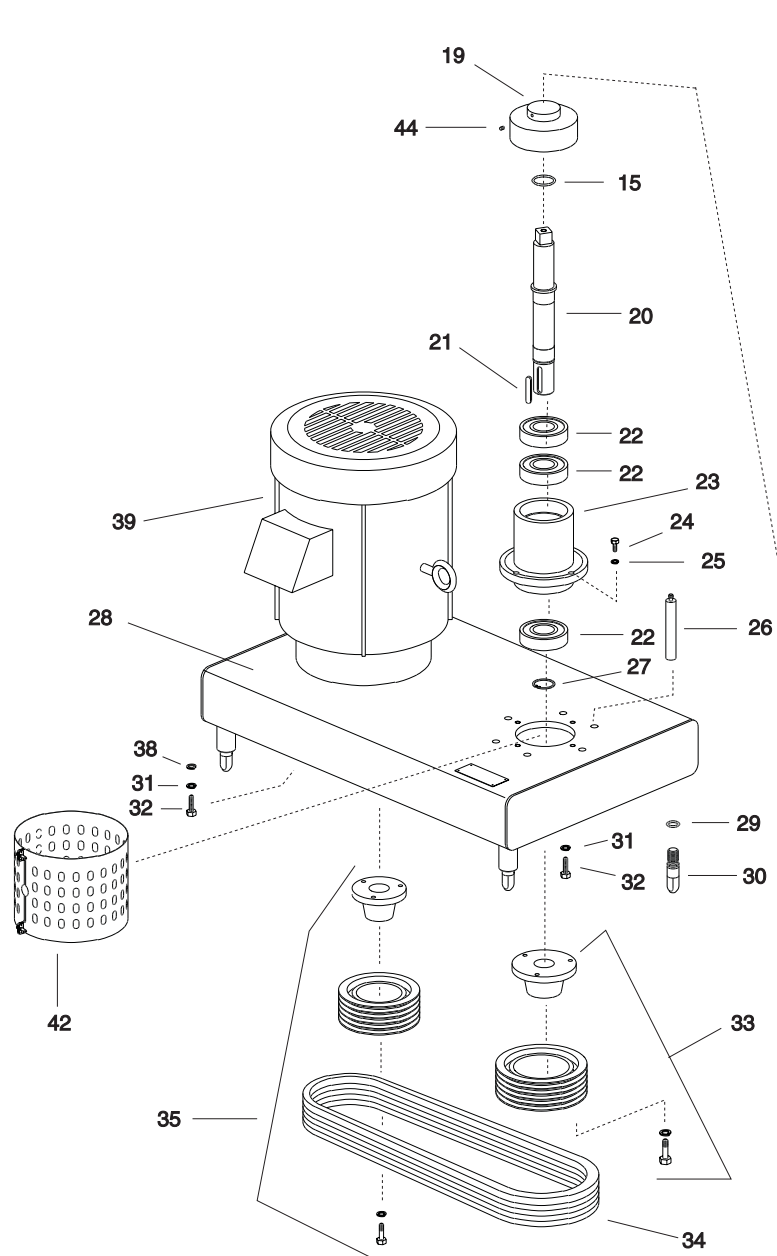
## MODEL F4329

All orders for repair parts must contain the following data.

1. Complete model number (located on nameplate).
2. Tri-Blender serial number (located on nameplate).
3. Description and part key number from the parts list.

The exploded views and accompanying parts list facilitate ordering repair parts from the factory. All parts of the Tri-Blender are exploded and keyed to the parts list.

Key No.	Description	Part Number	Qty	Key No.	Description	Part Number	Qty
1	Diffuser and Suction Tube	F4329-05-316	1	34	Drive Belt	D3218-110-3V-530	4
2	Clamp	13MHHM-5-S	2	35	60 Cycle Motor Pulley	F4329-108-4-3V6.0-1.625	1
3	Gasket	40MO-U-5	2	35	50 Cycle Motor Pulley	F4329-108-4-3V6.5-1.625	1
4	Inlet Adapter	F4329-217-316	1	36	Capscrew	SC1106H-SS	2
5	Casing	F4329M-01A-316L	1	37	Lockwasher	WA1100-SS	2
7	Impeller	F4329-02B-316	1	38	Washer	WA1700-SS	4
8	Gasket	SP5410-90A-U	1	40	Screen	F4329-215A-1-316L	1
9	Backplate-D Seal	SP5410D-11A-316	1	41	Impeller Washer	F4329-54A-316	1
10	Capscrew	SC1324H-SS	2	42	Seal Guard	F3218D-131-S	1
11	Wing Nut	A13MHH-1½-03F-M	2	43	Drive Collar-D Seal	SP328D-23P-S	1
12	Clamp	SP4410-75D-S	1	44	Setscrew-D Seal Drive Collar	SC1105A-SS	1
13	Adapter ring	F4418-71-1-S	1	45	Screw-E Seal Follower	SC1308H-SS	4
14	Carbon Seal	328E-80-1A	1	46	Lockwasher-E Seal Follower	LWA1300-SS	4
15	Seal O-ring	S328-80-2-U	2	47	Follower	328E-17-316	4
16	Cup- D Seal	328-80D-3P	1	48	Follower O-ring	17-274-U	1
17	Spring-D Seal	328D-80-4	1	49	Drive Collar-E Seal	328E-23-316	1
19	Collar/Deflector	D3218-40A-S	1	50	Spring	328E-80-4A	1
20	Drive Shaft	F4329E-06C-316	1	51	Stuffing Box-E Seal	F3218E-83B-316	1
21	Key Pulley	D3218-46	1	52	Stuffing Box O-ring	17-153-U	1
22	Sealed Bearing	D3218-18	3	53	Backplate-E Seal	SP5410E-11C-316	1
23	Bearing Housing	F3218-99-S	1	54	Screw Stuffing Box	SC1307E-SS	1
24	Capscrew - Housing	SC1510H-SS	5	55	Setscrew-E Seal Drive Collar	SC1103A-SS	4
25	Lockwasher - Housing	LWA1500-SS	4	56	Cup-E Seal	328E-80-3P	2
26	Spacer	D3218E-71A-S	6	57	Screw-DG Gland Ring	SC1310H-SS	2
27	Retaining ring	D3218-177	1	57a	Washer - DG Gland Ring	LWA-1300-SS	4
28	Base	F4329-23A-S	1	58	Gland Ring	SP328G-17-316L	1
29	O-ring-Leg	01-1154-13-34-U	4	59	PTFE Gasket - Outboard	SP328G-80-1-2-G	1
30	Adjustable Leg	R3-1-23-03-S	4	59a	PTFE Gasket - Inboard	SP328G-80-1-2A-G	1
31	Lockwasher-Spacer	LWA1700-SS	10	60	Seal Seat	SP328G-80-1-1-CER	1
32	Capscrew-Spacer	SC1710H-SS	10	60	Seal Seat	SP328G-80-1-1-SC	1
33	60 Cylce Blender Pulley	F4329-106-4-3V4.5x1.5	1	60	Seal Seat	SP328G-80-1-1-TC	1
33	50 Cycle Blender Pulley	F4329-106-4-3V4.12x1.5	1	61	Backplate-DG Seal	SP4410G-11-316L	1



Note: D seal shown in place in drawing above.

