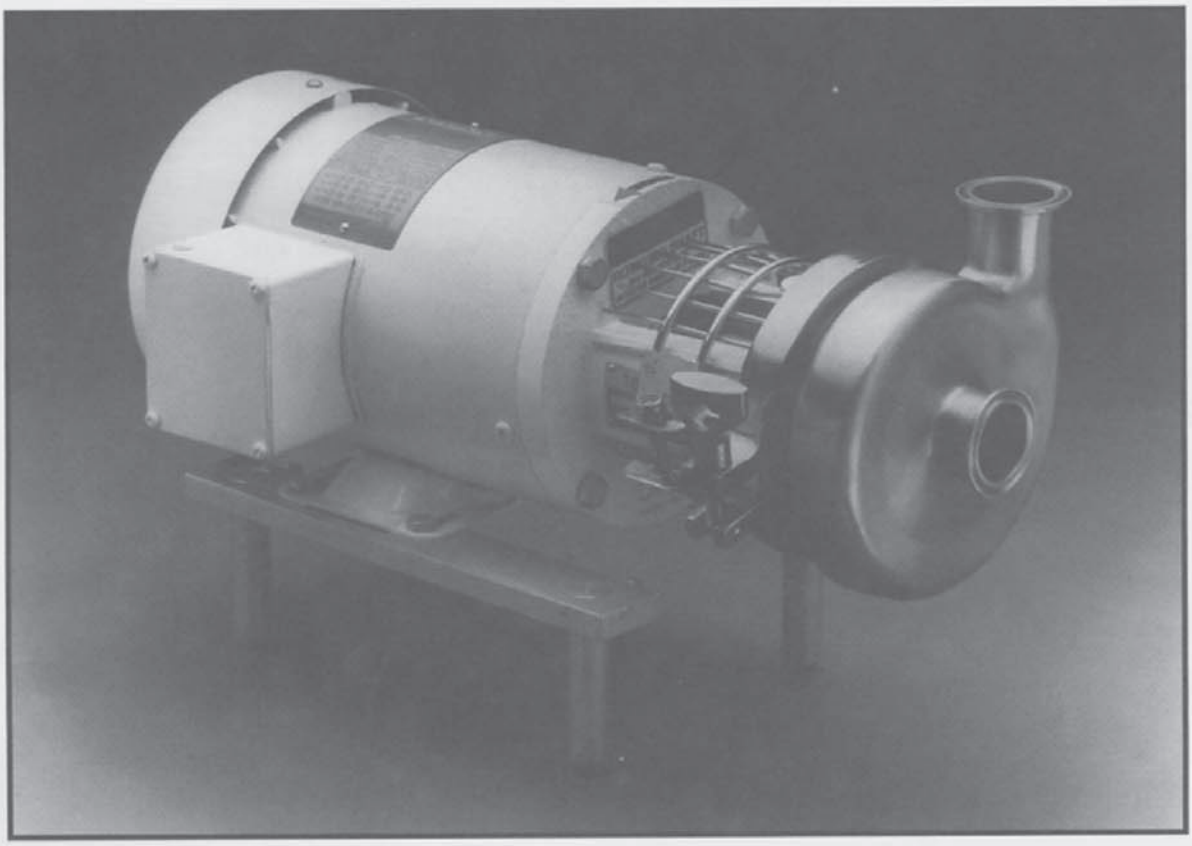
TOP LINE
PROCESS EQUIPMENT COMPANY

Read and understand this manual prior to installing, operating or maintaining this pump.



TOP-FLO®
Centrifugal Pumps
Model "TF-C" Series

OPERATION
MAINTENANCE
& PARTS LIST

TABLE OF CONTENTS

SAFETY INFORMATION 2
CLEANING SAFETY PROCEDURES 9
GENERAL INFORMATION
Warranty 3
Shipping Damage 3
Hidden Damage 3
Warranty Claim 3
Ordering/Returning Parts 18

INTRODUCTION 4
Description of Components 4
Construction 4
Mechanical Specifications 4
Motor Frame Sizes 4
Performance Characteristics 5

INSTALLATION 6
Pump Dimensions 6
Unpacking 7
Pump Location/Leveling 7

PIPING INFORMATION
Suction Piping 7-8
Discharge Piping 7
Locating Valves 7-8
Electrical 8
Flush Seal Option (Water Cascade) 8

OPERATION 8
Prior to first operation 8
Seal Service Type D 10
Cleaning Safety Procedrues 9
Preliminary Test Run 9-10
Operation Considerations 9-10

MAINTENANCE
Stub Shaft Seal Notes 11
Disassembly for Cleaning and Repair 11-12-13
Replacing Motor 12-13
Stub Shaft Adjustment 14
Drive Collar Adjustment 15
Maintenance Notes 16

TROUBLESHOOTING AND CAUSES 17

PARTS ORDERING 18
Water Cascade Assembly Parts 19
Repair Kits, All Pumps 19
PARTS LISTS 18
TF-C100 ... (With Spare Parts) 20
TF-C114 ... (With Spare Parts) 21
TF-C216 ... (With Spare Parts) 22
TF-C218 ... (With Spare Parts) 23
TF-C328 ... (With Spare Parts) 24
NOTES 25

SAFETY

TOP-FLO® "TF-C" Series centrifugal pumps have been designed to be safe and reliable when properly used and maintained.

Operators and maintenance personnel must follow safety measures. Failure to observe the instructions in this manual could result in personal injury or machine damage.

- **Do Not operate pump beyond the rated conditions for which the pump was sold.**
- **Do Not use heat to remove impeller or disassemble pump due to risk of explosion of trapped liquid.**
- **Do Not operate pump without coupling guard correctly installed.**

Warnings, cautions and notes are contained in this manual. To avoid serious injury and/or possible damage to equipment, pay attention to these messages.

WARNING Hazards or unsafe practices which COULD result in severe personal injury or death and how to avoid it.

CAUTION Hazards or unsafe practices which COULD result in minor personal injury or product or property damage.

NOTE Important information pertaining directly to the subject. (Information to be aware of when completing the task.)

WARNING
Do Not operate pump without CASING/VOLUTE clamped securely in place.

WARNING
ROTATING SHAFT
DO NOT OPERATE WITHOUT GUARD IN PLACE

WARNING
To avoid electrocution, ALL electrical should be done by a registered Electrician, following Industry Safety Standards.
All power must be OFF and LOCKED OUT during installation.

WARNING
TO AVOID POSSIBLE SERIOUS INJURY, SHUT OFF AND DRAIN PRODUCT FROM PUMP PRIOR TO DISCONNECTING PIPING.

CAUTION
Wear gloves to avoid cutting injuries from sharp pump parts.

WARNING
TO AVOID SERIOUS INJURY, DO NOT INSTALL OR SERVICE PUMP UNLESS ALL POWER IS OFF AND LOCKED OUT.

Read and understand this manual prior to installing, operating or maintaining this pump.

WARRANTY

TOP LINE PUMP WARRANTY

Seller warrants its products to be free from defects in materials and workmanship for a period of one (1) year from the date of shipment. This warranty shall not apply to products which require repair or replacement due to normal wear and tear or to products which are subjected to accident, misuse or improper maintenance. This warranty extends only to the original Buyer. Products manufactured by others but furnished by Seller are exempted from this warranty and are limited to the original manufacturer's warranty.

Seller's sole obligation under this warranty shall be to repair or replace any products that Seller determines, in its discretion, to be defective. Seller reserves the right either to inspect the products in the field or to request their prepaid return to Seller. Seller shall not be responsible for any transportation charges, duty, taxes, freight, labor or other costs. The cost of removing and/or installing products which have been repaired or replaced shall be at Buyer's expense.

Seller expressly disclaims all other warranties, express or implied, including without limitation any warranty of merchantability of fitness for a particular purpose. The foregoing sets forth Sellers entire and exclusive liability, and Buyer' exclusive and sole remedy, for any claim of damages in connection with the sale of products. In no event shall Seller be liable for any special consequential incidental or indirect damages (including without limitation attorneys' fees and expenses), nor shall Seller be liable for any loss of profit or material arising out of or relating to the sale or operation of the products based on contract, tort (including negligence), strict liability or otherwise.

GENERAL INFORMATION

SHIPPING DAMAGE

Inspect your shipment immediately. If shipping damage is found, note it on the drivers copy (packing slip) and request the driver to ask the Inspector to call. You are responsible for initiating shipping damage claims.

HIDDEN DAMAGE

If during installation, you discover hidden damage caused in shipping, contact the Shipper immediately and ask for an Inspector to call. Notify your Top Line Distributor of the problem.

WARRANTY CLAIM

Please read the Warranty statement to correctly determine if you have a claim. In warranty claims you must have a *"Returned Goods Authorized" (RGA)* from Top LIne before any returns will be accepted. Your Top Line Distributor will help you with a warranty problem.

ORDERING/RETURNING PARTS

See page 18 for complete information on ordering and returning parts. Complete the Distributor/Product information immediately and keep for later reference.

INTRODUCTION

DESCRIPTION

This manual contains installation, operation, cleaning, repair instructions and parts lists for the "TF-C" Series Centrifugal Pumps. It also provides a Troubleshooting Causes chart to help in determining and correcting possible pump problems.

The "TF-C" Series Centrifugal Pumps consist of two sections, the motor assembly, and the pump components. (See Figure 1). The pump is mounted on the drive motor with an adapter, and is coupled to the motor with a stainless steel stub shaft. The pump impeller mounts on the stub shaft and is secured with a floating impeller retainer pin.

The casing is joined to the adapter by a clamp, greatly simplifying removal and also permitting the casing outlet to be rotated to various positions. *(The TF-C100 is secured with two wing nuts and may only be mounted with the outlet facing straight up.)* The mechanical external balanced seal assures a long wear life. The drive motor is mounted on a frame with adjustable legs in accordance with sanitary design requirements and providing simple installation and easy leveling of the pump.

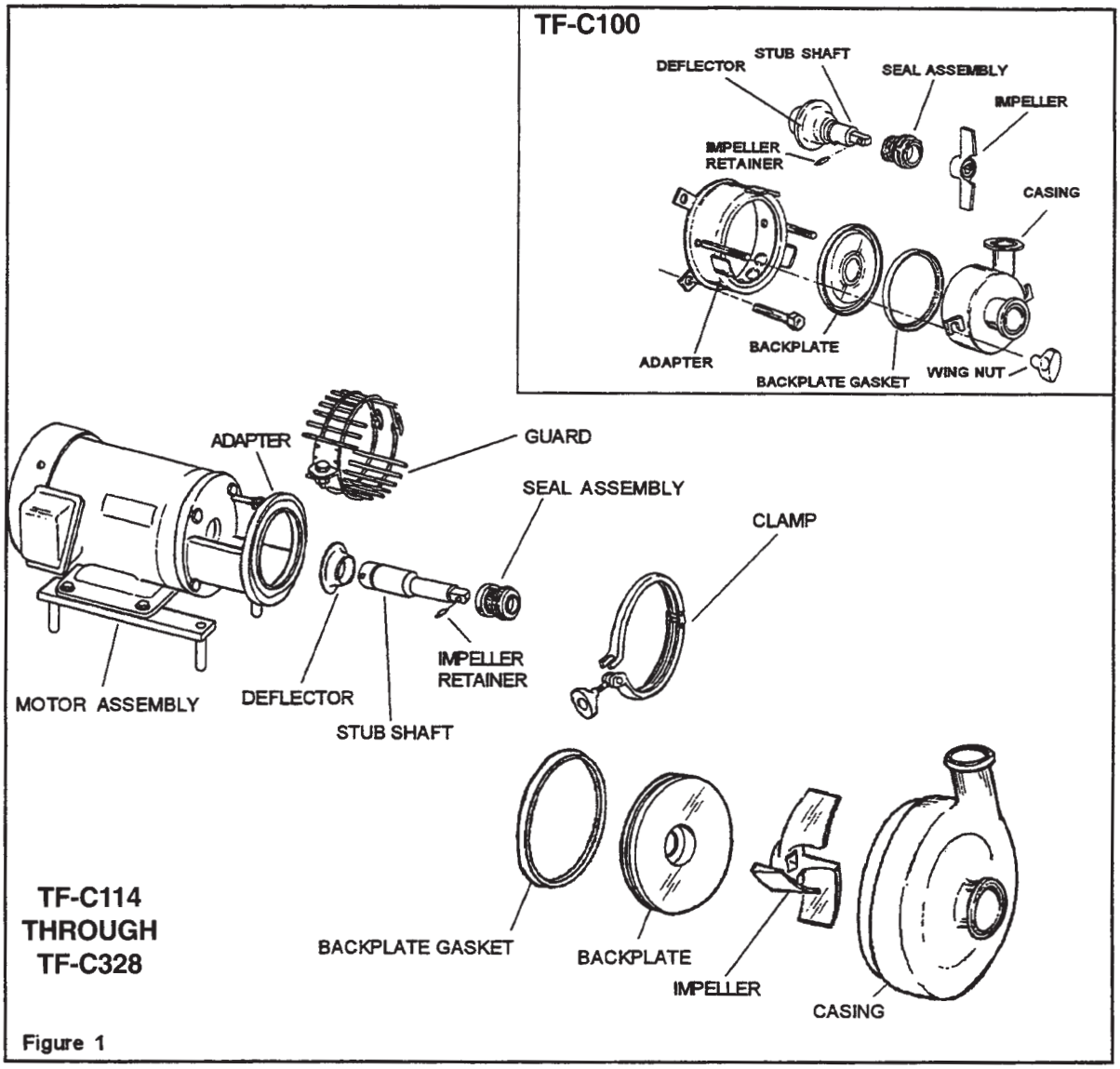


Figure 1

PERFORMANCE CHARACTERISTICS:

Nominal Capacity: To 780 GPM **Viscosity:** To 1500 CPS **Temperatures:** To 212°F.(100° C.)
Nominal Speeds: To 2100 RPM - 50HZ; To 3500 RPM - 60HZ.

STANDARD CONSTRUCTION:

- Casing, backplate and impeller are 316 stainless steel with 150 grit polished sanitary finish. (Model TF-C100 is 304 stainless)
- Port Connection: Clamp fittings are standard.
- Power: Supplied by a standard foot-mounted C-face motor, through 60 horsepower.
- Seal: "Type D" Seal material is carbon rotating on stationary stainless steel backplate. Water cascading attachment is available option ("F" Seal). Dual seal is available option ("E" Seal).
- Elastomers: Buna or Viton

MECHANICAL SPECIFICATIONS

	PORT SIZE Inches		IMPELLER DIA. Inches (mm)	
MODEL	Inlet	Discharge	Minimum	Maximum
TF-C100	1-1/2 -	1 -	3.0 (76)	3.68 (93)
TF-C114	1-1/2 2	1-1/2 1-1/2	2.5 (63)	4.0 (101)
TF-C216	2 2-1/2	1-1/2 1-1/2	4.0 (101)	6.0 (152)
TF-C218	2 3	1-1/2 1-1/2	6.0 (152)	8.0 (203)
TF-C328	3 4	2 2	5.5 (139)	8.0 (203)

AVAILABLE MOTOR FRAME SIZES FOR PUMP MODELS

TF-C100	56C 143TC-145TC	**TF-C218**	143TC-145TC 182TC-184TC 213TC-215TC 254TC-256TC 284TC-286TC
TF-C114	56C 143TC-145TC 182TC-184TC		
TF-C216	56C 143TC-145TC 182TC-184TC 213TC-215TC 254TC-256TC	**TF-C328**	182TC-184TC 213TC-215TC 254TC-256TC 284TC-286TC 324TC-326TC

INSTALLATION TOP-FLO® CENTRIFUGAL PUMP DIMENSIONS

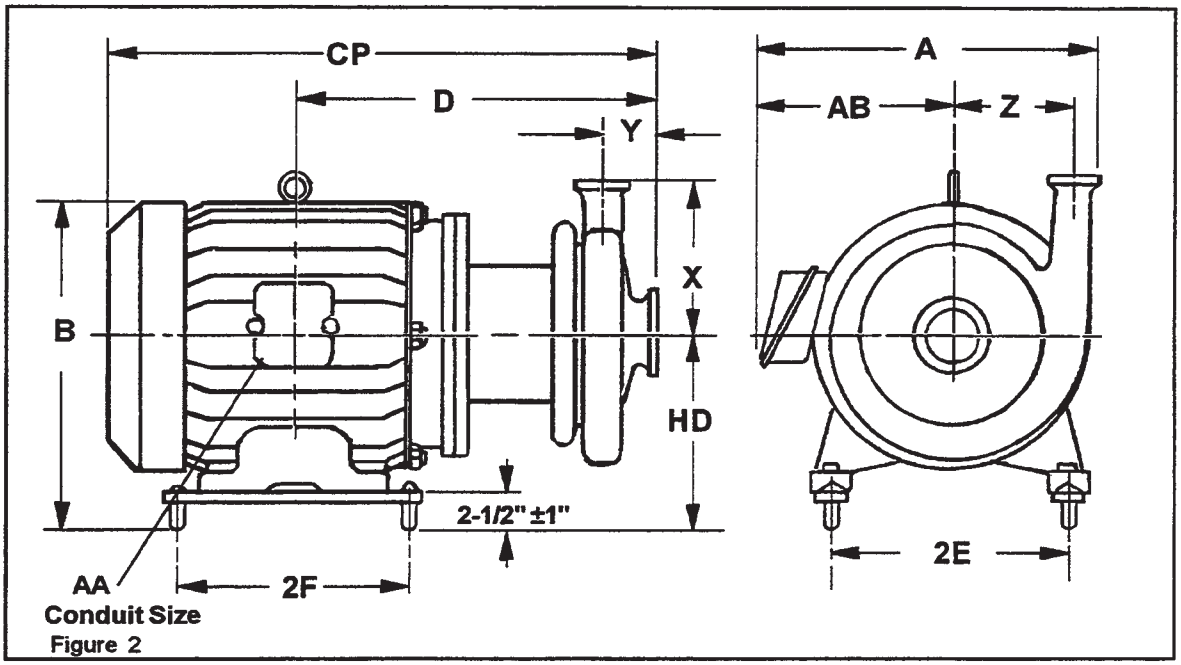


Figure 2

MODEL	SUCTION	DISCHARGE	X	Y	Z
C100	1-1/2	1	3-1/2	2.335	1-29/64
C114	1-1/2 OR 2	1-1/2	3-5/8	1-5/8	2-5/8
C216	2 OR 2-1/2	1-1/2	4-1/2	1-15/16	3-11/16
C218	2 OR 3	1-1/2	5-1/2	1-15/16	4-3/4
C328	3 OR 4	2	5-1/2	2-1/4	4-3/4

CLAMP CONNECTIONS ARE STANDARD

MODEL	FRAME	A	B	CP	D	2E	2F	HD	AA	AB
C100	56C	6-1/2	9-7/32	17-5/8	13-1/4	4-7/8	3	5-1/2	1/2	3-1/4
	143TC	9-11/16	9-1/2	19-31/32	15-13/16	5-1/2	4	6	3/4	6-15/16
C114	56C	6-1/2	9-7/32	16-11/16	12-9/16	4-7/8	3	5-1/2	1/2	3-1/4
	143TC	9-11/16	9-1/2	19-1/4	15-1/8	5-1/2	4	6	3/4	6-15/16
	145TC	9-11/16	9-1/2	19-1/4	15-1/8	5-1/2	5	6	3/4	6-15/16
	182TC	11-5/8	11-7/16	22-1/4	14-15/16	7-1/2	4-1/2	6-31/32	3/4	7-7/8
C216	143TC	9-11/16	9-1/2	19-1/4	15-1/8	5-1/2	4	6	3/4	6-15/16
	145TC	9-11/16	9-1/2	19-1/4	15-1/8	5-1/2	5	6	3/4	6-15/16
	182TC	11-5/8	11-7/16	22-1/4	14-15/16	7-1/2	4-1/2	6-31/32	3/4	7-7/8
	184TC	11-5/8	11-7/16	22-1/4	14-15/16	7-1/2	5-1/2	6-31/32	3/4	7-7/8
	213TC	13-1/8	12-15/16	25-13/16	16-15/16	8-1/2	5-/12	7-23/32	3/4	8-7/8
	215TC	13-1/8	12-15/16	25-13/16	16-15/16	8-1/2	7	7-23/32	3/4	8-7/8
	254TC	14-1/2	15-1/32	31-1/16	19-13/16	10	8-1/4	8-3/4	1	9-1/2
	256TC	14-1/2	15-1/32	31-1/16	19-13/10	10	10	8-3/4	1	9-1/2
C218	145TC	9-11/16	9-1/2	19-1/4	15-1/8	7-1/2	5	6	3/4	6-15/16
	182TC	11-5/8	11-7/16	22-1/4	14-15/16	7-1/2	4-1/2	6-31/32	3/4	7-7/8
	184TC	11-5/8	11-7/16	22-1/4	14-15/16	7-1/2	5-1/2	6-31/32	3/4	7-7/8
	213TC	13-1/8	12-15/16	25-13/16	16-15/16	8-1/2	5-1/2	7-23/32	3/4	8-7/8
C328	215TC	13-1/8	12-15/16	25-13/16	16-15/16	8-1/2	7	7-23/32	3/4	8-7/8
	254TC	14-1/2	15-1/32	31-1/16	19-13/16	10	8-1/4	8-3/4	1	9-1/2
	256TC	14-1/2	15-1/32	31-1/16	19-13/16	10	10	8-3/4	1	9-1/2

ALL DIMENSIONS IN INCHES

INSTALLATION

UNPACKING EQUIPMENT

Check all parts of your equipment and inspect for damages that may have occurred during shipping. Report any damage to the carrier.

PUMP LOCATION

- Place as close as practical to the liquid supply, keeping supply piping short and straight. Keeping pump supplied with liquid will prevent damaging cavitation.
- It must be accessible for service and inspection during operation.
- The motor must be protected from flooding.

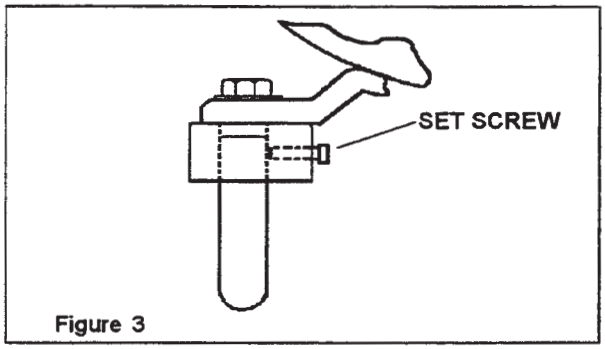


Figure 3

PUMP LEVELING

- Level the pump by loosening the set screws to adjust the length of the legs. (Figure 3)

SUPPLY AND DISCHARGE PIPING/VALVES

- Use line size equal to, or larger than, connection size on pump, especially the inlet supply line.
- Keep supply line short and straight as possible and use few as possible elbows, valves or other types of restriction. Avoid up and down rises which will trap air.
- Be certain all joints in suction line are well sealed to prevent air leaks.
- Maintain a straight length of pipe at least 4 diameters long at the pump inlet. (Figure 4)
- The pump casing may be rotated with the discharge connection pointing in any direction; best pump performance will be with the outlet up, to the left or positions in between; these positions insure a flooded casing and prevent problems due to air in the system. (Figure 6)
- Support supply and discharge piping near the pump so that no strain is put onto pump casing.
- If an expansion joint is used, install a pipe anchor between it and the pump.
- If a reducer is connected to inlet, use eccentric type (Figure 5) to prevent problems due to trapped air.

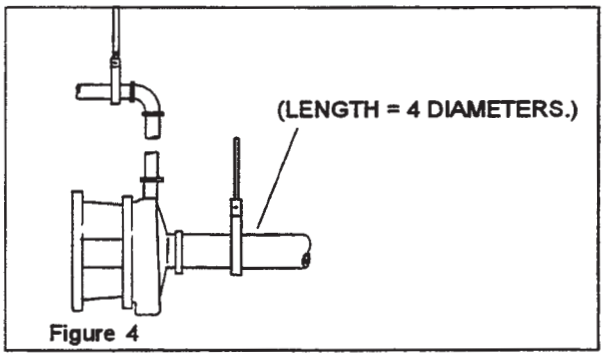


Figure 4

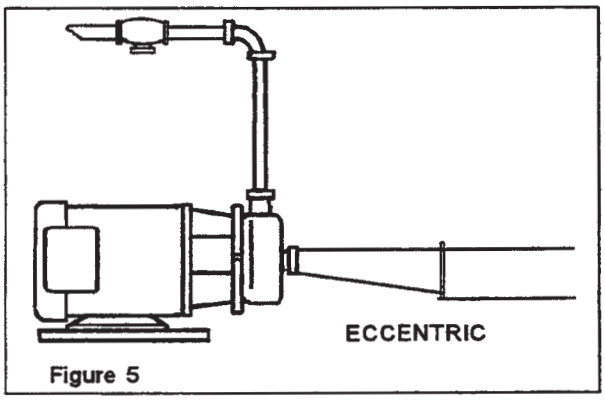


Figure 5

- Line slope will depend on application requirements; best pump operation is with supply line sloped slightly upward toward pump to prevent trapped air; if system must drain into pump casing, keep downward slope to a minimum or priming problems may occur.
- Install shutoff valves to isolate pump from supply and discharge lines to allow pump service without draining system.

CAUTION

Wear gloves to avoid cutting injuries from sharp pump and piping parts.

INSTALLATION

- This pump is not self priming. If pump is installed above supply liquid level, install foot valve or other system check valve to keep casing flooded for priming. (Figure 7)
- A throttling valve may be required to control pump flow rate to prevent motor overload; always install throttling valve in discharge piping, never in supply piping and at least 10 diameters from pump outlet. (Figure 7)

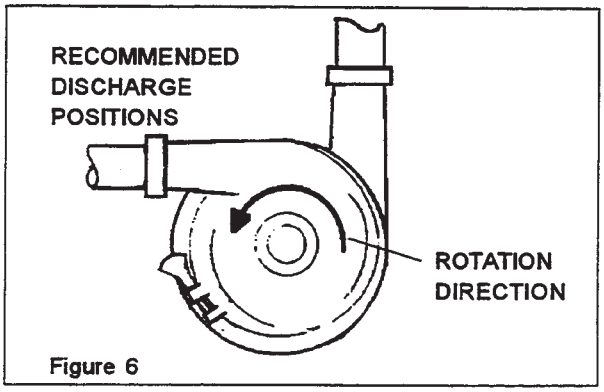


Figure 6

ELECTRICAL CONNECTIONS

WARNING

To avoid electrocution, ALL electrical installation should be done by a registered Electrician, following Industry Safety Standards. All power must be OFF and LOCKED OUT during installation.

- Read motor manufacturer's instructions before making installation. Follow Manufacturer's lubrication schedules.
- Check motor nameplate to be sure motor is compatible with electrical supply and all wiring, switches, starters, and overload protection are correctly sized.
- Check pump rotation following electrical installation. Correct rotation is counter clockwise when facing pump inlet connection. (Figure 5)

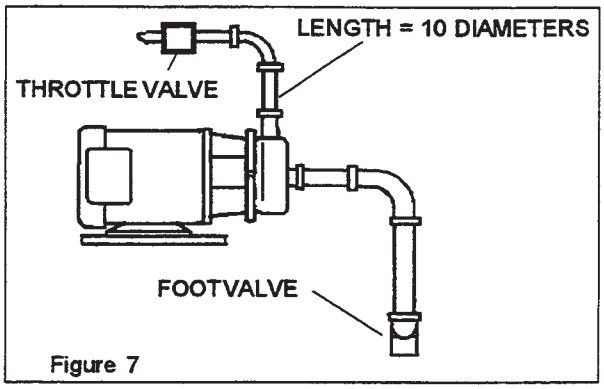


Figure 7

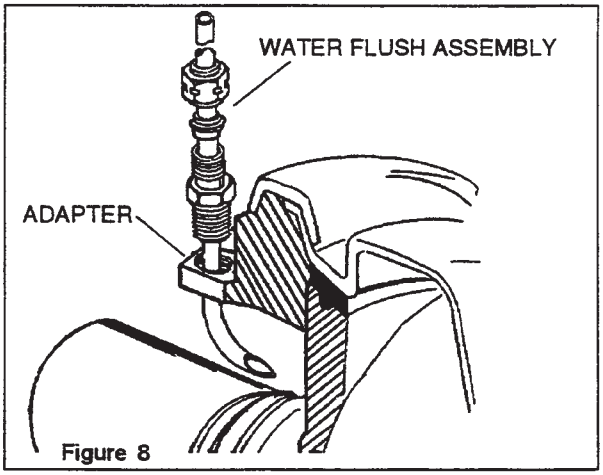


Figure 8

FLUSH SEAL OPTION

When this option is ordered, a fitting assembly is supplied for directing a flow of water onto the backplate/seal area; the water supply should be cool and filtered; if product solidifies at cool temperature, use warm or hot water. The connection is 1/4 inch O.D. tubing. Required flow is approximately 5 U.S. gallons per hour. (Figure 8)

WARNING

TO AVOID SERIOUS INJURY, DO NOT INSTALL OR SERVICE PUMP UNLESS ALL POWER IS OFF AND LOCKED OUT.

PRIOR TO FIRST OPERATION

CLEAN PUMP AND PIPING

Disassemble pump and clean all product contact parts and seal parts prior to first operation. Follow instructions in the **"Cleaning Safety Procedures"** and **"Disassembly for Cleaning and Repair"** section (Pages 11 and 14).
The pump should be thoroughly cleaned of any materials which could have accumulated during installation. Plant workers will become familiar with pump parts.

CLEANING SAFETY PROCEDURES

Manual Cleaning:

1. Do not use toxic and/or flammable solvents.
2. Lock out electrical power and shut off all air prior to cleaning equipment.
3. Keep electrical panel covers closed and power off when washing equipment.

WARNING

To prevent an accidental start-up the power source should be locked out using your lock and key.

4. Clean up spills as soon as possible.
5. Never attempt cleaning equipment while it is operating.
6. Wear proper protective apparel.

Cleaning-In-Place:

1. Make certain that all connections in cleaning circuit are properly applied and tight to avoid contact with hot water or cleaning solutions.

2. When cleaning cycle is controlled from remote or automated cleaning center, establish all manual safety procedures to avoid automatic start-up while servicing equipment in the circuit.

PRELIMINARY TEST RUN

See OPERATION on page 10 to set pump up for a test run.

CHECK FOR POSSIBLE MOTOR OVERLOAD CONDITION

Certain combinations will overload motor when operated with open, unrestricted discharge which results in too high flow rate. Additional discharge restriction may be required to lower flow rate and lower horsepower requirement. DO NOT add restriction to supply line. If pump was incorrectly selected, a smaller impeller may be required or a higher motor horsepower may be required.

If uncertain about pump selection and application, temporarily install an ammeter in the electrical service.

AMMETER TEST

Operate pump under process conditions and check motor amp draw versus nameplate full load rating. If amp draw exceeds motor rating, a system change or pump change is required.

If process conditions and/or liquid changes (higher viscosity, higher specific gravity) recheck motor amp draw.

Contact your authorized TOP-LINE® distributor for assistance.

WARNING

TO AVOID ELECTROCUTION, ONLY A QUALIFIED ELECTRICIAN SHOULD INSTALL THE AMMETER.

OPERATION CONSIDERATIONS

- Any system throttling valves or similar devices to control flow rate must be installed in the discharge line; not the supply line. Restriction in the supply line may cause cavitation and pump damage.

- "Water hammer" in the system can damage the pump and other system components. Water hammer often occurs when valves in the system are suddenly closed causing lines to move violently and with a loud noise. When this condition is present, find and eliminate the source of the water hammer. One way to eliminate water hammer is to slow down the actuation speed of the valve.

- Do not expose pump to freezing temperatures with liquid in casing. Frozen liquid in casing will damage pump. Drain casing before exposing to freezing temperatures.

OPERATION

WARNING

Skin and eye protection are required when handling hazardous or toxic fluids.

CAUTION

If pump is being drained, take necessary precautions to avoid personal injury.

NOTE: *Disposal of drainage must be in conformance with environmental regulation.*

Pump must have been correctly installed as described in "INSTALLATION" section.

SEAL FLUSH

1. If pump has the flush seal option, start flow of flush water *(approximately 5 US gallons per hour recommended rate).*

PRIME PUMP

2. Flood pump casing with liquid **BEFORE** starting pump to avoid damage to pump parts. Fill supply tank with liquid; open supply line valve (suction). Any air trapped in supply line or casing should be vented. (Figure 9)

PRIMING WITH OUTSIDE SOURCE

The pump will not self prime if liquid supply is **below** pump level. (Figure 10)

3. Close discharge valve and open air vents.

4. Open valve in outside supply line until liquid flows from vent valves.

5. Close vent valves; then outside supply line. *Use a type of check valve system to keep supply line and pump casing flooded with liquid.* Otherwise the pump must be primed before each operation. (See Figure 7)

6. **Start pump motor.**

PUMP CHECK

7. Check to see that liquid is flowing and that all piping connections and seals are leak free.

The pump may be operated against a closed discharge for a short time, however continued operation will heat liquid in casing to boiling and lead to pump damage.

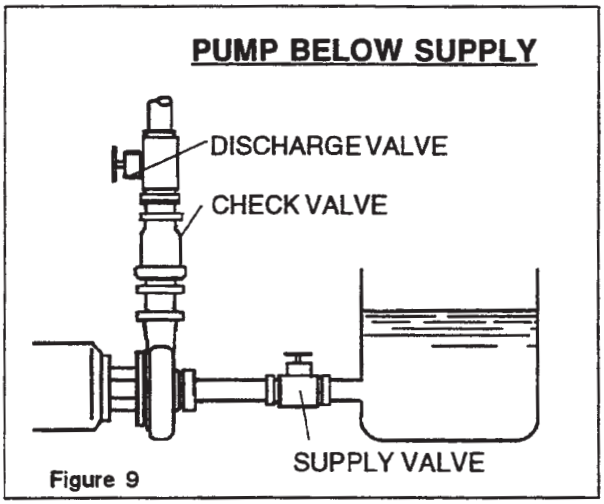


Figure 9

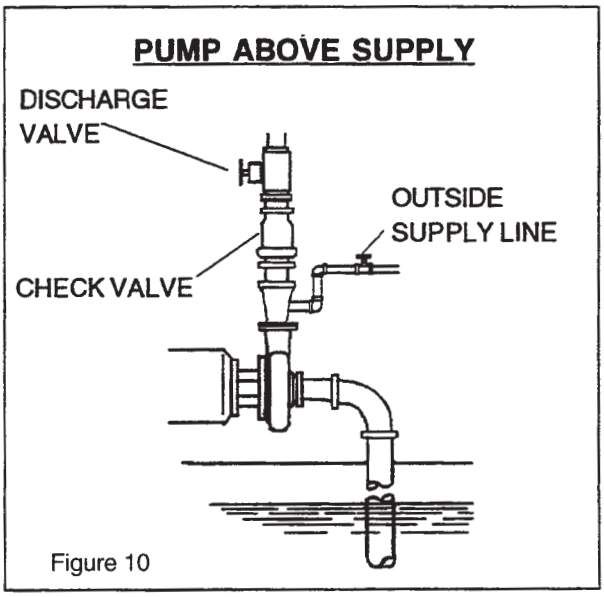


Figure 10

8. Slowly open discharge valve until desired flow is obtained. Observe pressure gages and if pressure is not attained quickly, stop pump and prime again.

STOP PUMP

9. **To stop pump, shut off power to pump motor.** *Liquid in system can flow freely through the pump; the pump does not act as a shut off valve.* **Shut off supply and discharge lines.**

UNIVERSAL STUB SHAFT TYPE D SEAL NOTES

The "universal" shaft design utilizes a drive collar as shown in *Figure 11* to assure proper location of the seal assembly. *(The TF-C100 does not use the drive collar. The TF-C100 stub shaft locates the seal assembly.)*

The drive collar must be properly located on the shaft, following procedures outlined on page 15.

This type of seal should be replaced when the face is worn away or when leakage is noted. (See Figure 12)

To remove the seal disconnect the suction and discharge piping and remove the casing, impeller and backplate. Protect the sealing face of the backplate from nicks and scratches.

***NOTE:** When the carbon seal is replaced, the position of the drive collar should be checked and reset if necessary, per the dimensions given on page 15.*

Inspection during cleaning will determine if carbon seal needs replacement. No additional drive collar adjustment is necessary unless the seal is replaced. (Figure 12)

SERVICE/REPAIR

Periodically inspect all parts of the pump to prevent malfunctions caused by worn or broken parts.

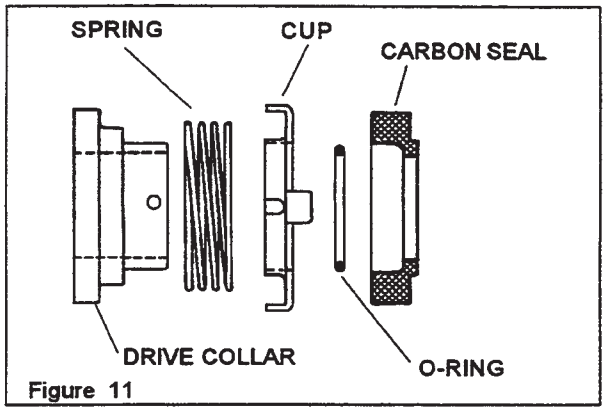


Figure 11

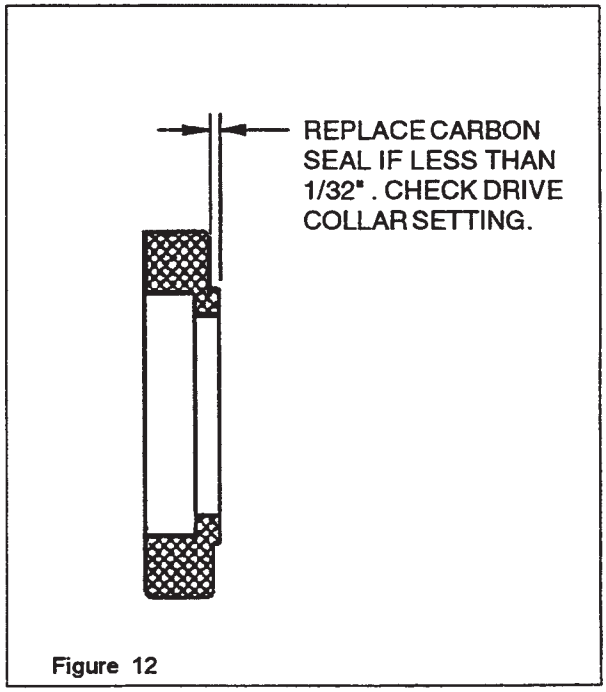


Figure 12

DISASSEMBLY, CLEANING / REPAIR

It is not necessary to disassemble the pump for cleaning if used in a CIP Installation (Clean-In-Place). See pg. 9. However, periodically take pump apart, thoroughly inspect, clean and reassemble.
(See **MAINTENANCE - DISASSEMBLY)**

CAUTION
Wear gloves to avoid cutting injuries from sharp pump parts.

1. **Shut off** product flow to pump and relieve any product pressure.

2. **Shut off** and **lock out** power to pump.

3. Disconnect the suction and discharge pipe fittings.

4. Remove the seal guard assembly with a wrench. (Figure 13)

5. Loosen clamp wing nut and swing clamp open. *On TF-C100, remove casing wing nuts.*

6. *Inspect clamp saddles and the casing for damage or wear and replace if necessary.* (Figure 13)

7. Push back on the impeller and position the retaining pin in the center of the stub shaft. This will allow the impeller to pulled off the stub shaft. (Figure 14)

8. Rotate the backplate to disengage the backplate pins from the adapter pins. Remove the backplate with gasket attached, by pulling straight off the adapter. (Figure 15)

9. Remove the backplate gasket and inspect it for wear and sealing failure.

NOTE: *Care must be taken to protect the sealing face and edges of the backplate from nicks and scratches.*

10. Remove the carbon seal, O-ring, seal cup and spring from the stub shaft by pulling them straight off the shaft. (Figure 16)

11. Carefully inspect the O-ring and the carbon seal for signs of abrasions, cuts or other wear that could cause leakage. (Figure 16)

NOTE: *When the extension end of the carbon seal is less than 1/32", replace seal. (See Figure 12)*

12. After cleaning, inspect the seal, O-ring and gasket again. Replace as necessary *(See **PARTS LISTS** section for identification.)*

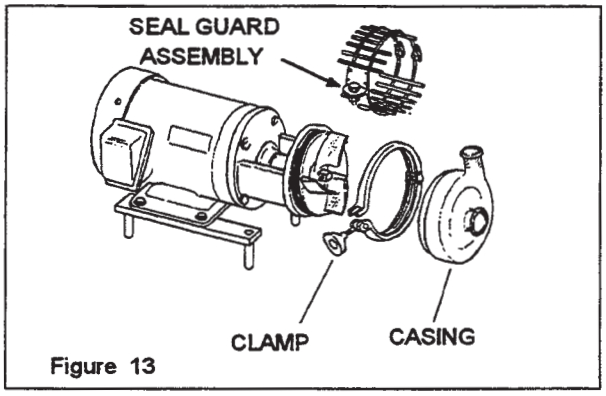


Figure 13

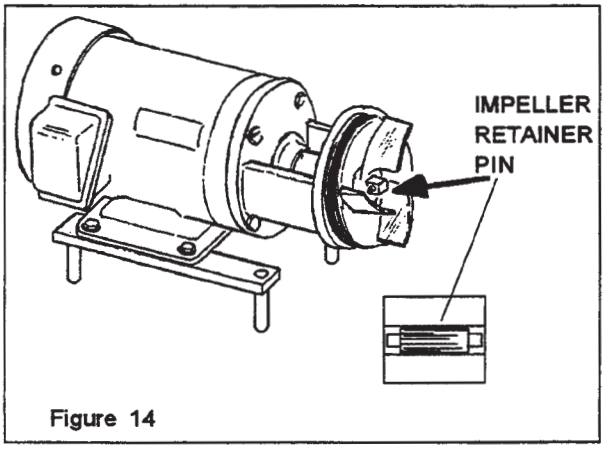


Figure 14

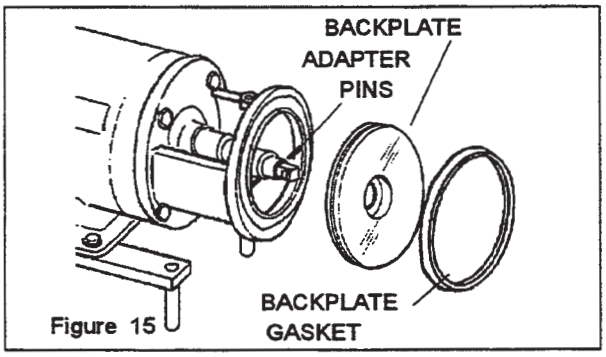


Figure 15

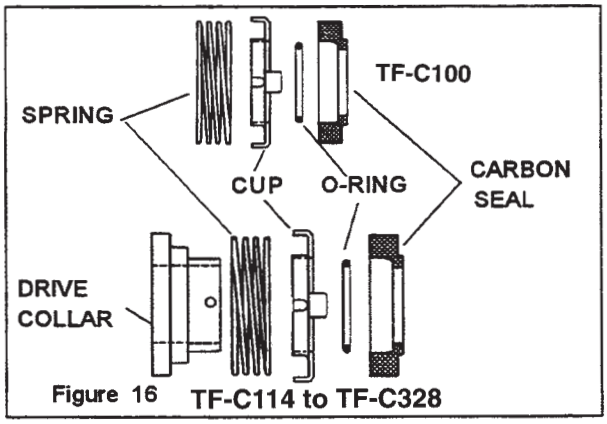


Figure 16 TF-C114 to TF-C328

13. Remove the water cascade attachment from the adapter if included. Remove the rubber shaft deflector by pulling it straight off the stub shaft. Examine it for tearing, loose fit or other defects that would allow liquid leakage into the motor along the shaft. (Figure 17)

WARNING

TO AVOID SERIOUS INJURY, DO NOT INSTALL OR SERVICE PUMP UNLESS ALL POWER IS OFF AND LOCKED OUT.

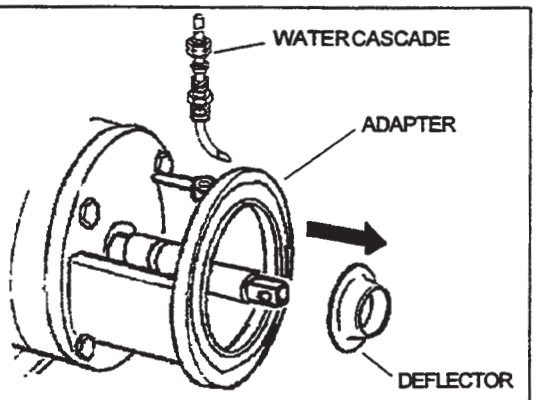


Figure 17

REPLACING MOTOR

To replace or service motor, disassemble the pump as outlined in DISASSEMBLY steps 1 through 11.

1. Remove the bolts securing the adapter to the motor frame and remove the adapter. (Figure 18)

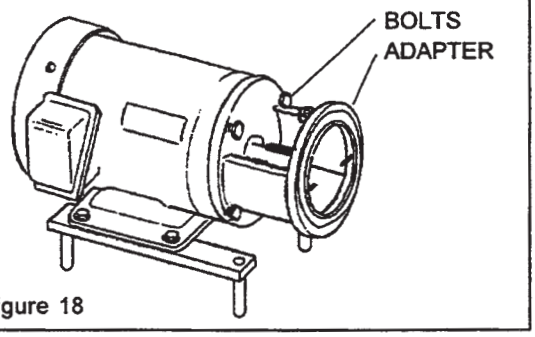


Figure 18

CAUTION

The stub shaft has four sharp diagonal grooves in the end. Wear gloves to prevent injuries to hands.

2. Loosen the two (2) set screws securing the stub-shaft to the motor shaft. Carefully remove the stub-shaft. The stub-shaft is a tight fit, but can be removed by applying pressure around the periphery of the shaft with a pry-bar. (Figure 19)

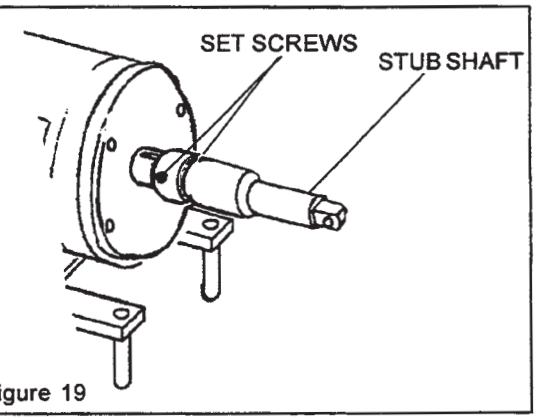


Figure 19

NOTE: *Examine the shaft sealing surfaces for nicks or scratches which can cause excessive O-ring wear or leaking.*

3. Remove the bolts securing the motor to the mounting brackets. Bolt new motor to the mounting brackets. (Figure 20)

NOTE: *Motor maintenance, repair and wiring are not covered in this manual. For specific information contact the motor manufacturer.*

If required, level the motor by adjusting the legs individually and secure them in place with the set screws. (Figure 20)

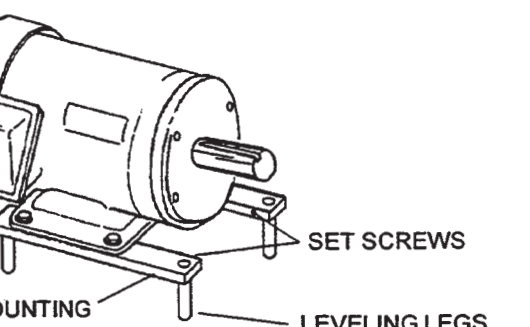


Figure 20

MAINTENANCE INSTALL ADAPTER- STUB SHAFT ADJUSTMENT

1. Install the adapter to the motor, with the drain cavity at the bottom. Insert the four bolts to secure the adapter to the motor. Tighten the bolts. (Figure 21)
2. Install the key in the motor shaft.
3. Place the stub-shaft assembly onto the motor shaft. Do not tighten the shaft set screws.

4. Install the backplate on the adapter and rotate until the backplate pins engage the adapter pins, assuring solid contact of the backplate to the adapter. (Figure 21)

5. Rotate the stub shaft until the impeller retaining hole is in a horizontal position. Insert the impeller retainer pin, and center it in the stub-shaft. Slide the impeller on the shaft. Hold the impeller tight against the shoulder in the shaft and rotate the shaft one-quarter turn until the impeller pin engages with the impeller. (Figure 22)

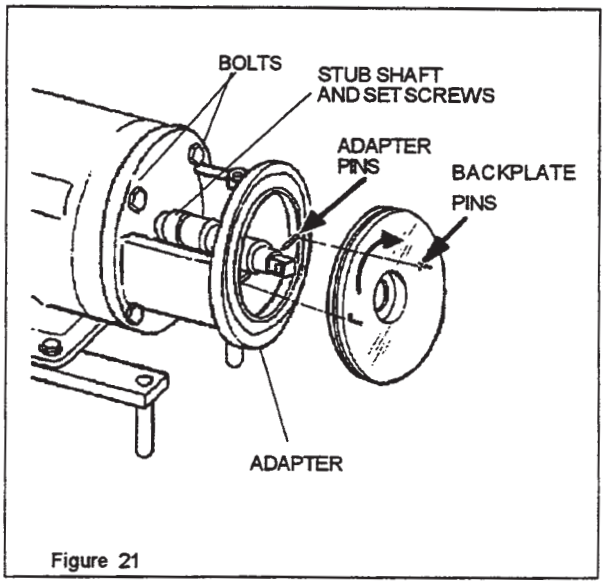


Figure 21

STUB SHAFT ADJUSTMENT

1. Push the stub-shaft/impeller assembly toward the motor until the impeller strikes the front face of the backplate.

2. Move the stub-shaft away from the motor shaft to allow 1/16 -inch maximum clearance between rear face of the impeller and the front (inside) face of the backplate. (See Figure 22)

3. Tighten the two set screws on the stub-shaft.

4. Remove the impeller retainer pin, impeller and the backplate.

5. Slide the deflector (large diameter end first) onto the shaft until it seats in the shaft groove. (Figure 23)

NOTE: *If the deflector can not be forced on with the fingers, use a blunt tool to tap it evenly into place .*

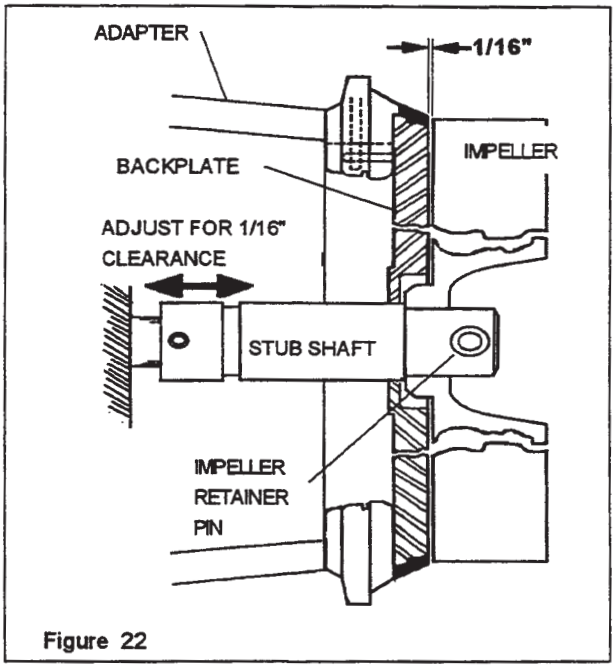


Figure 22

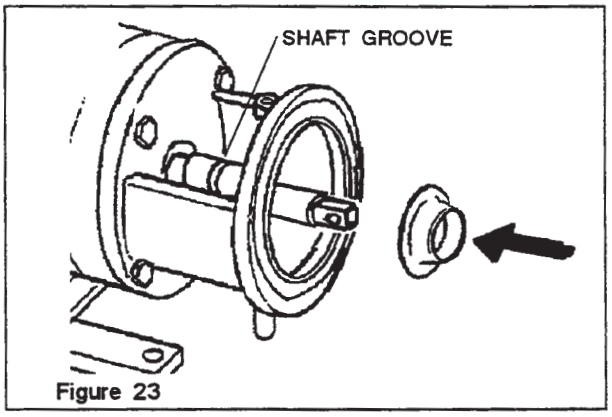


Figure 23

(Models TF-C114 through TF-C328)

1. Slide the seal drive collar onto the stub shaft as shown in Figure 24.
Use the "**A**" and "**B**" dimensions in the SEAL CHART to properly locate the drive collar on the stub shaft. Tighten the set screws to secure in place.

NOTE: *TF-C100 pump does not require drive collar.*

2. Assemble the spring, seal cup, O-ring and carbon seal, and install as a unit, taking care that slot in seal cup aligns with the pin on shaft. (Figure 25) *Gentle pressure on the O-ring will overcome resistance on the shaft.*

NOTE: Do not lubricate seals with any type of oil or grease, the seal faces will be lubricated by the product being pumped.

3. Assemble the gasket to the backplate. Install the backplate on the adapter. *Check that the seal cup slot is engaged with the pin on the drive collar.* (Figure 25)

4. Rotate the backplate until the backplate pins engage the adapter pins. (Figure 26)

5. Rotate the shaft until the pin hole in the end is in a horizontal position. Insert the impeller pin, center it in the shaft end and slide the impeller on the shaft.
Hold the impeller tight against the stub shaft and rotate the shaft one-fourth turn until the impeller pin drops and secures the impeller. (Figure 26)

6. Place the casing over the impeller/backplate, close and tighten the clamp. (Figure 27)

7. Assemble the cascade water fitting if included. Install seal guard and tighten in place. Assemble the suction line and the discharge line to the casing.

NOTE: *Check for strain or misalignment of piping to the casing. Re-adjust the casing ports and/or entire motor leveling as necessary.*

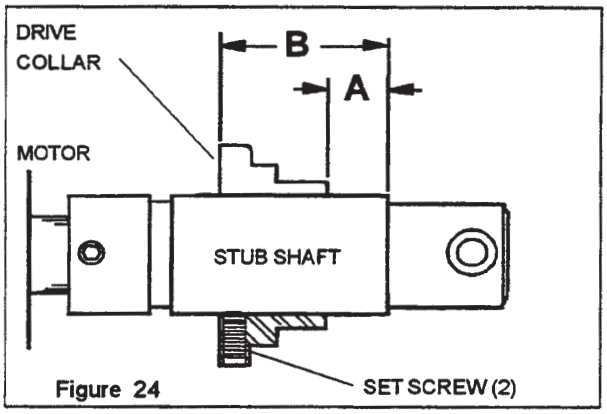


Figure 24

SEAL CHART for Figure 24

MODEL	A	B
TF-C114	9/16"	1-7/16"
TF-C216	9/16"	1-23/32"
TF-C218	9/16"	1-41/64"
TF-C328	9/16"	1-41/64"

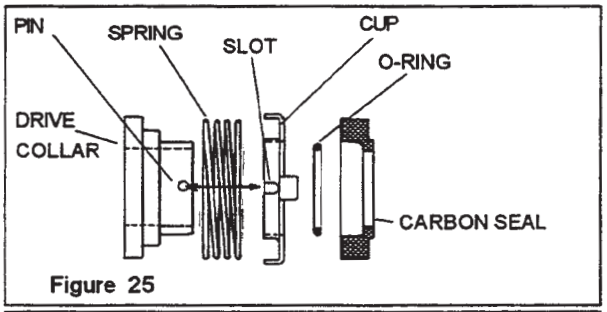


Figure 25

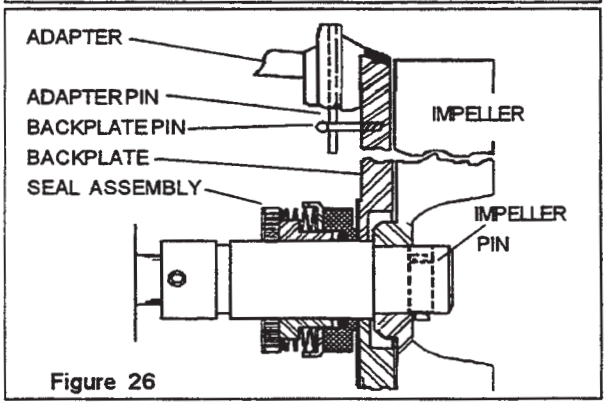


Figure 26

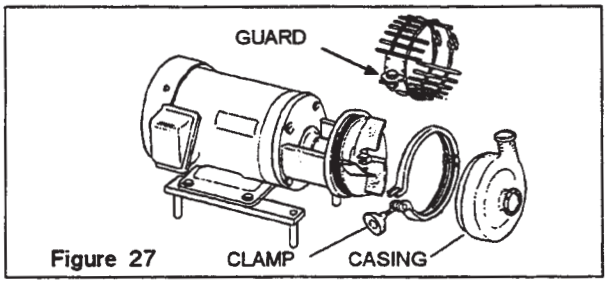


Figure 27

MAINTENANCE NOTES

A routine maintenance program can extend the life of your pump. Keep maintenance records. These will help pinpoint potential problems and causes.

Routine Maintenance

- Check for unusual noise, vibration and bearing temperatures.
- Inspect pump and piping for leaks.
- Check Mechanical Seal area for leakage. Should be no leakage.
- Check backplate gasket for wear/damage.
- Bearing lubrication (See Motor Manufacturer)
- Seal Monitoring
- Vibration analysis
- Discharge pressure
- Temperature monitoring

TROUBLESHOOTING AND CAUSES

NOT ENOUGH LIQUID DELIVERED

- Impeller diameter too small for duty.
- Discharge head too high.
- Suction lift too high.
- Air leak in supply or at seal area.
- Wrong direction of rotation.
- Pump not primed.
- Speed too slow (low voltage, wrong frequency, wrong motor.
- Suction or discharge plugged or closed.
- Air entrained in liquid.
- Insufficient NPSH (Net Positive Suction Head) available.

NOT ENOUGH PRESSURE

- Impeller diameter too small for duty.
- Air leak in supply or at seal area.
- Wrong direction of rotation.
- Speed too slow (low voltage, wrong frequency, wrong motor).
- Air entrained in liquid.

MOTOR OVERLOAD

- Discharge head too low allowing pump to deliver too much liquid.
- Impeller diameter too large for duty.
- Liquid heavier or more viscous than rating.
- Electrical supply, voltage or frequency incorrect.
- Mechanical abnormality in pump
  - Impeller interference
  - Seal binding
  - Defective motor.
  - Faulty electrical connections.
  - Overload heaters too small for motor.

VIBRATION/NOISE

- Starved suction.
  - Insufficient NPSH (Net Positive Suction Head) available.
  - Supply line too long; too small; blocked
  - Air entrained in liquid.
  - Liquid too hot, too viscous.
- Impeller shaft loose or bent
- Impeller out of balance.
- Impeller hub/impeller shaft wear.
- Motor bearings worn.
- Pump not level; legs not touching floor.
- Foreign material in pump.
- Piping not supported.

RAPID SEAL WEAR

- Excessive spring loading.
- Abrasive product.
- Loose impeller shaft.
- Water hammer.
- Prolonged "dry" running.
- Abrasive solids (unfiltered) in water flushed seal supply.

SEAL LEAKS

- Gasket damaged or worn.
- Seal not installed correctly.
- Carbon seal worn or damaged.
- Inlet/Outlet connection loose or no gasket.
- Casing clamp loose.

PARTS ORDERING

HOW TO ORDER PARTS

By Phone

Telephone your repair parts or fittings order to your Distributor.
To speed your order and avoid delays, please have your **equipment model** and **serial number** and the **part numbers** from the parts list before you call your Distributor.

If you do not know your Distributors number, call Top Line Process Equipment Company at:

Phone: **800-458-6095**
Fax: **814-362-4453**

Your call will be directed to a specialist who can provide you with Distributor information for your area.

How to Return Parts

Parts may be returned for credit, subject to the conditions of our return goods policy. To obtain authorization to return a part, contact your Distributor.

Please give the following information:

- Invoice number and date
- Quantity
- Part Number (from parts list)
- Exact reason for return

Your Distributor will provide a Return Goods Authorization. *(Returns will not be accepted without advance authorization.)*

EQUIPMENT INFORMATION

Any correspondence concerning pump will require the following information be documented:

PRODUCT NAME/MODEL_____

SERIAL NUMBER:_____

DATE OF PURCHASE:_____

INVOICE NUMBER:_____

INVOICE DATE:_____

DISTRIBUTOR: _____

ADDRESS: _____

CITY: _____ STATE:____ ZIP:_____

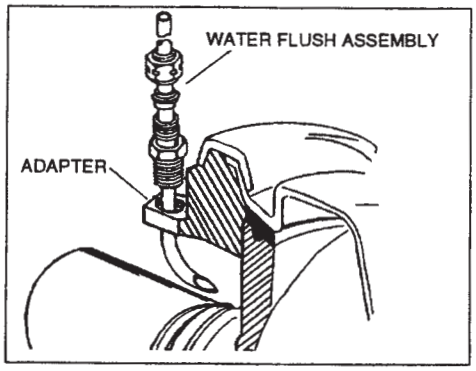
CONTACT: _____

PHONE: _____

FAX: _____

SPARE PARTS

WATER CASCADE ASSEMBLY (Consists of threaded attaching ferrule, compression fitting with nut and 1/4" diameter stainless water pipe.)



REPAIR KITS

To maintain continuous uninterrupted operation of your pump, the following kits are recommended.

Kit #1 (Consists of 1-Carbon Seal, 1-Casing Gasket, 1-O-Ring, and 1-retaining pin)

Kit #2 (Consists of 3-Carbon Seals, 3-Casing Gaskets, and 3-O-Rings)

Kit #3 (Consists of 1-Carbon Seal, 1-Spring, 1-Cup, and 1-O-Ring)

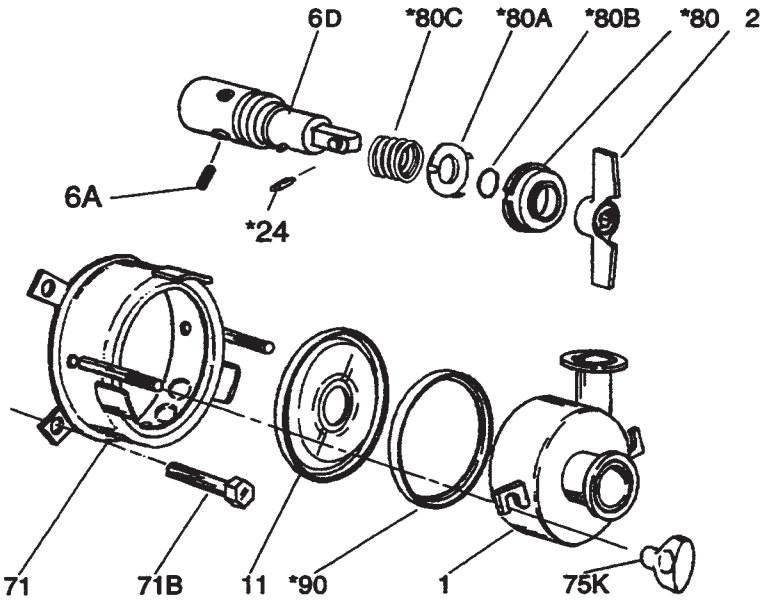
TF-C100		
	BUNA	VITON
Kit #1	5639K-1	5639V-1
Kit #2	5639K-2	5639V-2
Kit #3	5639K-3	5639V-3

TF-C114		
	BUNA	VITON
Kit #1	5649K-1	5649V-1
Kit #2	5649K-2	5649V-2
Kit #3	5649K-3	5649V-3

TF-C216		
	BUNA	VITON
Kit #1	5669K-1	5669V-1
Kit #2	5669K-2	5669V-2
Kit #3	5669K-3	5669V-3

TF-C328		
	BUNA	VITON
Kit #1	5689K-1	5689V-1
Kit #2	5689K-2	5689V-2
Kit #3	5689K-3	5689V-3

PARTS LIST TF-C100



TOP-FLO® MODEL TF-C100

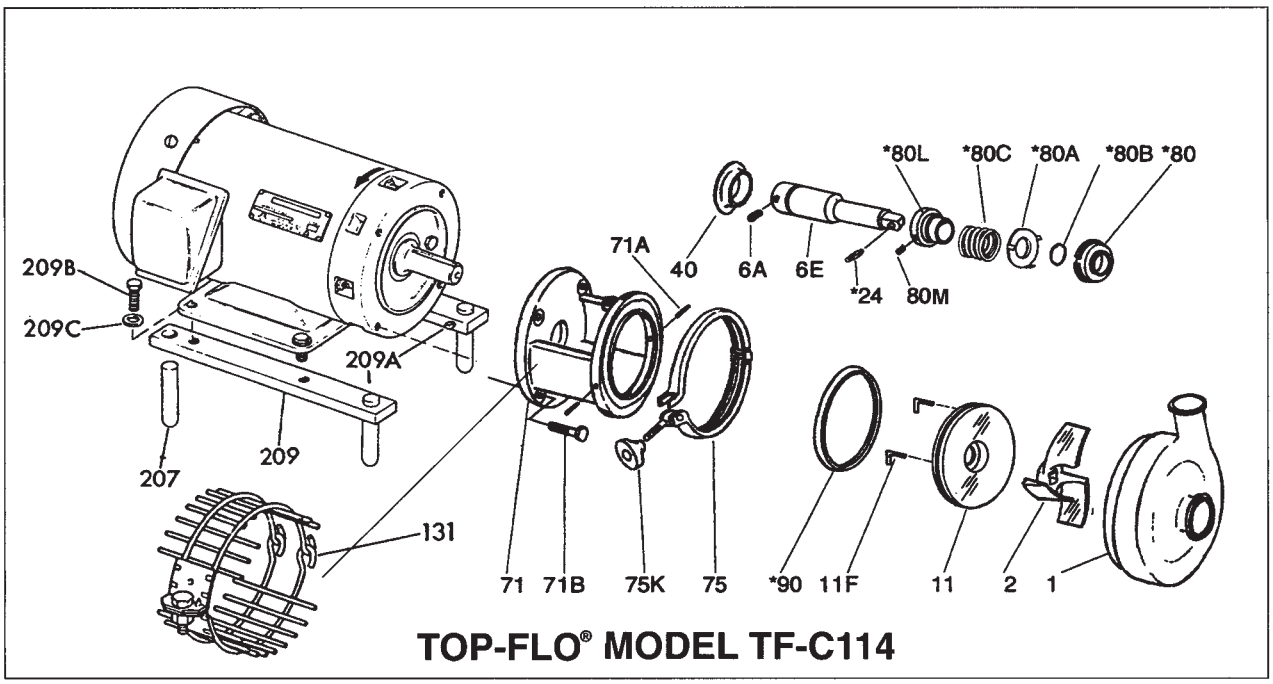
KEY	PART NO.	QTY.	DESCRIPTION
1	563911510	1	Casing 1.5" x 1"
2	56392	1	Impeller 3.68"
6A	56396A	2	Shaft Set Screw
6D	5639605	1	Stub Shaft-56C Frame
11	563911	1	Backplate
*24	563924	1	Impeller Retainer Pin
40	563940	1	Deflector
71	56397156	1	Adapter
71B	563971B	4	Adapter Mounting Bolt
75K	563971K	2	Wing Nut

KEY	PART NO.	QTY.	DESCRIPTION
*80	563980	1	Carbon Seal
*80A	563980A	1	Cup
*80B	563980B	1	Seal O-Ring, Buna
*80C	563980C	1	Spring
*90	563990	1	Casing Gasket, Buna

* - Spare parts recommended
See page 19 for spare part kits

Viton parts available upon request

PARTS LIST TF-C114



TOP-FLO® MODEL TF-C114

KEY	PART NO.	QTY.	DESCRIPTION
1	564911515	1	Casing 1.5" x 1.5"
1	564912015	1	Casing 2" x 1.5"
2	56492	1	Impeller 4"
6A	56496A56	2	Shaft Set Screw, 56C
6A	56496A	2	Shaft Set Screw 14T/18T
6E	56496E56	1	Stub Shaft-56C Frame
6E	56496E14	1	Stub Shaft 14T
6E	56496E18	1	Stub Shaft 18T
11	564911	1	Backplate
11F	564911F	2	Backplate Pin
*24	564924	1	Impeller Retainer Pin
40	564940	1	Deflector, 56C-14T Frame
40	56494018	1	Deflector, 18T Frame
71	56497156	1	Adapter, 56C-14T Frame
71	56497118	1	Adapter 18T Frame
71A	564971A	2	Adapter Pin
71B	564971B56	4	Adapter Mounting Screw, 56C
71B	564971B14	4	Adapter Mounting Screw, 14T
71B	564971B18	4	Adapter Mounting Screw, 18T
75	564975	1	Clamp Assembly
75K	329901	1	Wing Nut
*80	564980	1	Carbon Seal
*80A	564980A	1	Cup
*80B	564980B	1	Seal O-Ring, Buna
*80C	564980C	1	Spring
80L	564980L	1	Drive Collar
80M	564980M	1	Drive Collar Set Screw
*90	564990	1	Casing Gasket, Buna

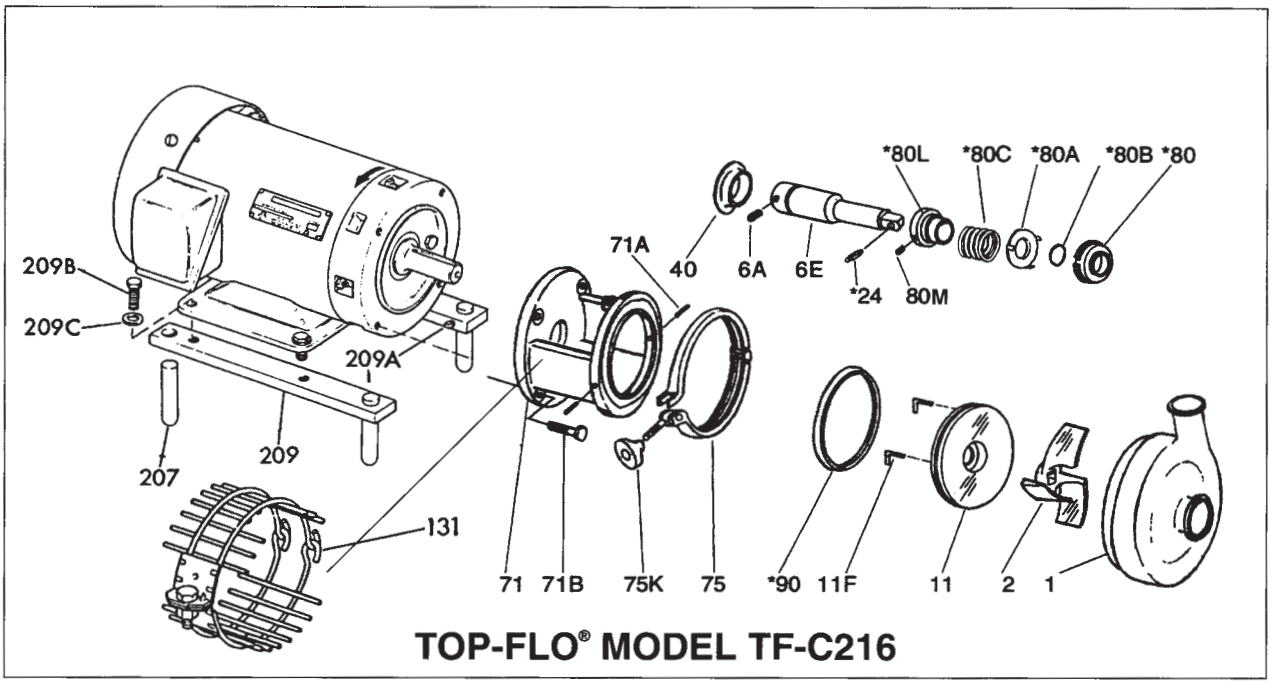
KEY	PART NO.	QTY.	DESCRIPTION
131	5649131	1	Seal Guard Assembly - 56C Frame
131	564913118	1	Seal Guard Assembly - 143TC Frame
207	5649207	4	Adjustable Leg
209	5649209	2	Adjustable Leg Bracket - 56C Frame
209	564920914	2	Adjustable Leg Bracket - 143TC Frame
209	564920914B	2	Adjustable Leg Bracket - 145TC Frame
209	564920918	2	Adjustable Leg Bracket - 182TC Frame
209	564920918B	2	Adjustable Leg Bracket - 184TC Frame
209A	5649209A	4	Set Screw (Square Head) 56C - 14T
209A	5649209A18	4	Set Screw (Square Head) 18T, 21T, 25T
209B	5649209B	4	Bracket Mounting Screw - 56C & 14T
209B	5649209B18	4	Bracket Mounting Screw - 18T
209C	5649209C	4	Washer (Leg Assembly) - 56C & 14T
209C	5649209C18	4	Washer (Leg Assembly) - 18T

* - Spare parts recommended

See page 19 for spare part kits

Viton parts available upon request

PARTS LIST TF-C216



TOP-FLO® MODEL TF-C216

KEY	PART NO.	QTY.	DESCRIPTION
1	566912015	1	Casing 2" x 1.5"
1	566912515	1	Casing 2.5" x 1.5"
2	56692	1	Impeller 6"
6A	56696A	2	Shaft Set Screw - 14T, 21T, 25T
6A	56696A56	1	Shaft Set Screw - 56C
6A	56496A	1	Shaft Set Screw - 18T
6E	56696E56	1	Stub Shaft-56C Frame
6E	56696E14	1	Stub Shaft 14T Frame
6E	56696E18	1	Stub Shaft 18T Frame
6E	56696E21	1	Stub Shaft 21T Frame
6E	56696E25	1	Stub Shaft 25T Frame
11	566911	1	Backplate
11F	564911F	2	Backplate Pin
*24	566924	1	Impeller Retainer Pin
40	566940	1	Deflector, 56C, 14T, 18T Frame
40	56694021	1	Deflector, 21T Frame
40	56694025	1	Deflector, 25T Frame
71	566971	1	Adapter, 56C & 14T Frame
71	56697118	1	Adapter 18T Frame
71	56697121	1	Adapter 21T Frame
71	56697125	1	Adapter 25T Frame
71A	564971A	2	Adapter Pin
71B	566971B56	4	Adapter Mounting Screw, 56C, 14T Frame
71B	566971B	4	Adapter Mounting Screw, 18T, 21T, 25T Frame
75	566975	1	Clamp Assembly
75K	329901	1	Wing Nut
*80	566980	1	Carbon Seal
*80A	566980A	1	Cup
*80B	566980B	1	Seal O-Ring, Buna
*80C	566980C	1	Spring
80L	566980L	1	Drive Collar
80M	566980M	1	Drive Collar Set Screw
*90	566990	1	Casing Gasket, Buna
131	5669131	1	Seal Guard Assembly 56C - 14T Frame
131	566913118	1	Seal Guard Assembly - 18T
131	566913121	1	Seal Guard Assembly - 21T & 25T

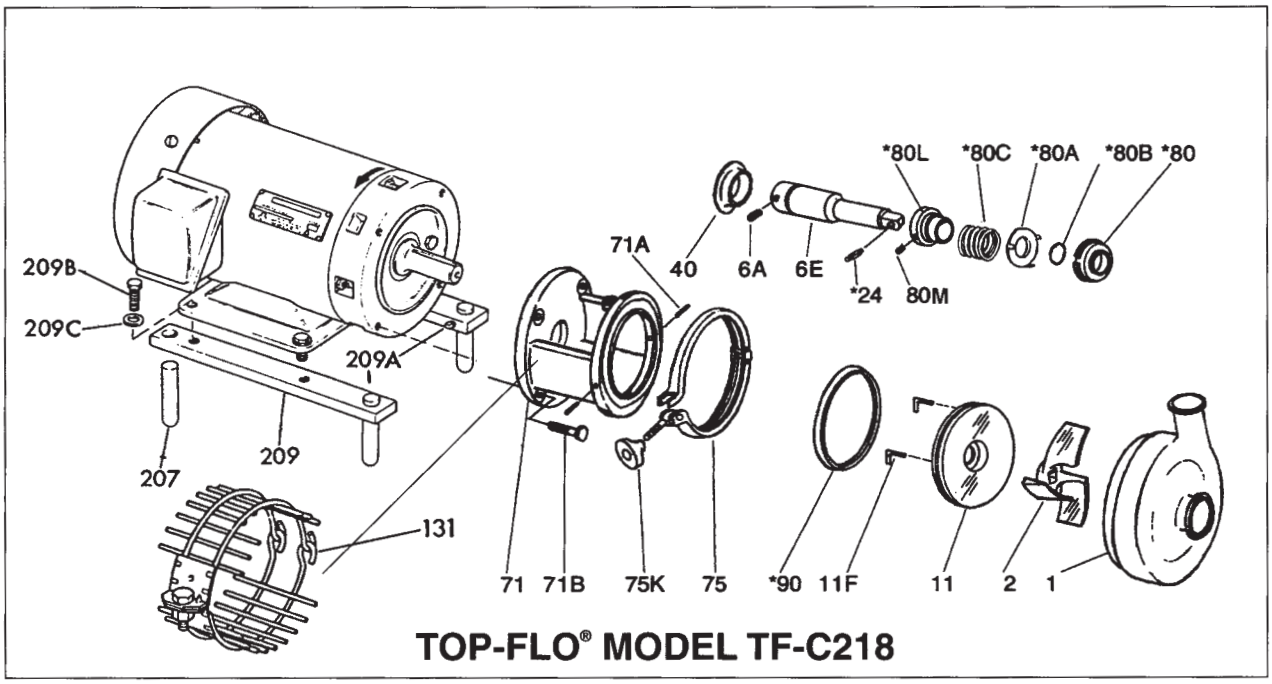
KEY	PART NO.	QTY.	DESCRIPTION
207	5649207	4	Adjustable Leg - 56C, 14T, 18T
207	566920725	4	Adjustable Leg - 25T
209	5649209	2	Adjustable Leg Bracket - 56C Frame
209	564920914	2	Adjustable Leg Bracket - 143TC Frame
209	564920914B	2	Adjustable Leg Bracket - 145TC Frame
209	564920918	2	Adjustable Leg Bracket - 182TC Frame
209	564920918B	2	Adjustable Leg Bracket - 184TC Frame
209	566920921	2	Adjustable Leg Bracket 213TC Frame
209	566920921B	2	Adjustable Leg Bracket 215TC Frame
209	566920925	2	Adjustable Leg Bracket 254TC Frame
209	566920925B	2	Adjustable Leg Bracket 256TC Frame
209A	5649209A	4	Set Screw (Square Head) 56C - 14T
209A	5649209A18	4	Set Screw (Square Head) 18T, 21T, 25T
209B	5649209B	4	Bracket Mounting Screw - 56C & 14T
209B	5669209B	4	Bracket Mounting Screw - 18T & 21T
209B	5669209B25	4	Bracket Mounting Screw - 25T
209C	5649209C	4	Washer (Leg Assembly) 56C & 14T
209C	5669209C	4	Washer (Leg Assembly) 18T, 21T, 25T

* - Spare parts recommended

See page 19 for spare part kits

Viton parts available upon request

PARTS LIST TF-C218



TOP-FLO® MODEL TF-C218

KEY	PART NO.	QTY.	DESCRIPTION
1	568912015	1	Casing, C218, 2" x 1.5"
1	568913015	1	Casing, C218, 3" x 1.5"
2	56892	1	Impeller 8"
6A	56896A	2	Shaft Set Screw
6E	56896E14	1	Stub Shaft-14T Frame
6E	56896E18	1	Stub Shaft 18T Frame
6E	56896E21	1	Stub Shaft 21T Frame
6E	56896E25	1	Stub Shaft 25T Frame
6E	56896E28	1	Stub Shaft 28T Frame
11	568911	1	Backplate
11F	564911F	2	Backplate Pin
*24	568924	1	Impeller Retainer Pin
40	568940	1	Deflector, 14T & 18T Frame
40	56894021	1	Deflector, 21T & 25T Frame
40	56894028	1	Deflector, 28T Frame
71	56897114	1	Adapter, 14T Frame
71	56897118	1	Adapter, 18T Frame
71	56897121	1	Adapter, 21T Frame
71	56897125	1	Adapter, 25T Frame
71	56897128	1	Adapter, 28T Frame
71A	564971A	2	Adapter Pin
71B	568971B14	4	Adapter Mounting Screw, 14T Frame
71B	568971B	4	Adapter Mounting Screw, 18T, 21T, 25T & 28T Frame
75	568975	1	Clamp Assembly
75K	329901	1	Wing Nut
*80	568980	1	Carbon Seal
*80A	568980A	1	Cup
*80B	568980B	1	Seal O-Ring, Buna
*80C	568980C	1	Spring
80L	568980L	1	Drive Collar
80M	566980M	1	Drive Collar Set Screw
*90	568990	1	Casing Gasket, Buna
131	568913114	1	Seal Guard Assembly - 14T
131	568913118	1	Seal Guard Assembly - 18T
131	568913121	1	Seal Guard Assembly - 21T
131	568913125	1	Seal Guard Assembly - 25T
131	568913128	1	Seal Guard Assembly - 28T

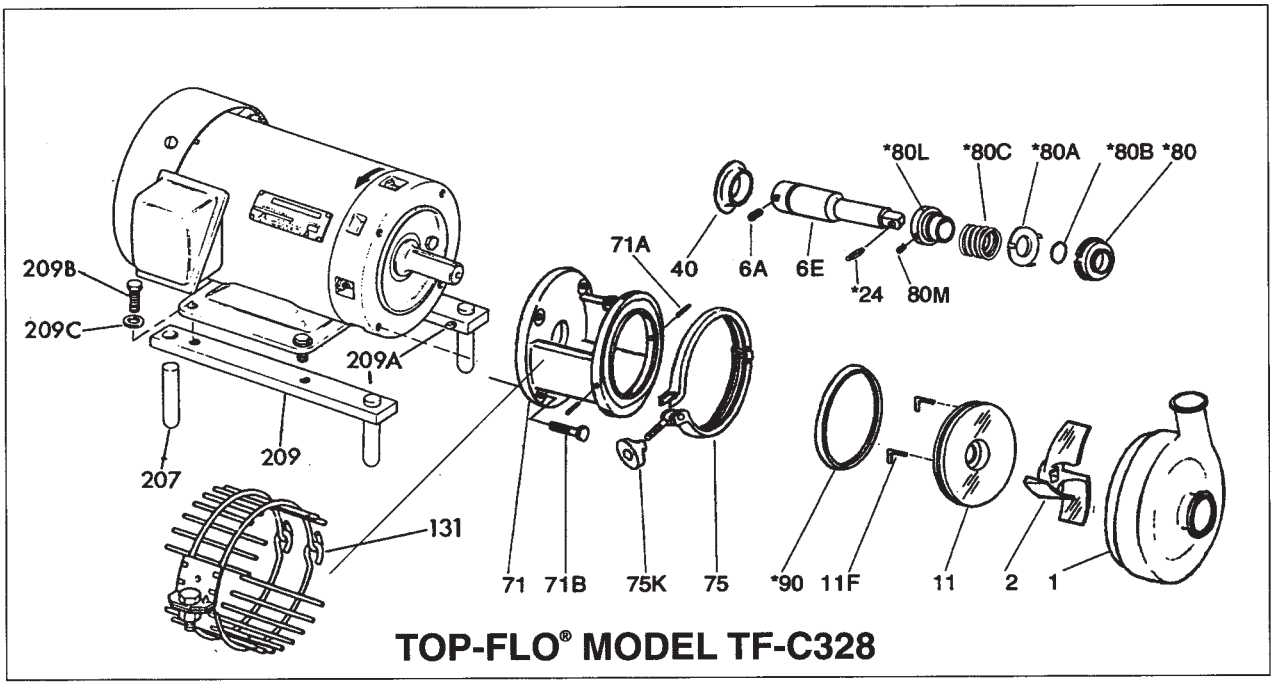
KEY	PART NO.	QTY.	DESCRIPTION
207	5689207	4	Adjustable Leg - 14T, 18T, 21T
207	566920725	4	Adjustable Leg - 25T & 28T
209	564920914	2	Adjustable Leg Bracket - 143TC Frame
209	564920914B	2	Adjustable Leg Bracket - 145TC Frame
209	564920918	2	Adjustable Leg Bracket - 182TC Frame
209	564920918B	2	Adjustable Leg Bracket - 184TC Frame
209	566920921	2	Adjustable Leg Bracket - 213TC
209	566920921B	2	Adjustable Leg Bracket - 215TC
209	566920925	2	Adjustable Leg Bracket - 254TC
209	566920925B	2	Adjustable Leg Bracket - 256TC
209	568920928	2	Adjustable Leg Bracket 284T Frame
209	568920928B	2	Adjustable Leg Bracket - 286T Frame
209A	5689209A	4	Set Screw (Square Head)
209B	5649209B14	4	Bracket Mounting Screw - 14T
209B	5689209B	4	Bracket Mounting Screw - 18T & 21T
209B	5689209B25	4	Bracket Mounting Screw - 25T & 28T
209C	5649209C	4	Washer (Leg Assembly) 14T
209C	5649209C18	4	Washer (Leg Assembly) 18T & 21T
209C	5689209C	4	Washer 25T & 28T

* - Spare parts recommended

See page 19 for spare part kits

Viton parts available upon request

PARTS LIST TF-C328



TOP-FLO® MODEL TF-C328

KEY	PART NO.	QTY.	DESCRIPTION
1	568913020	1	Casing, C328, 3" x 2"
1	568914020	1	Casing, C328, 4" x 2"
2	568923	1	Impeller 8"
6A	56896A	2	Shaft Set Screw
6E	56896E14	1	Stub Shaft 14T Frame
6E	56896E18	1	Stub Shaft 18T Frame
6E	56896E21	1	Stub Shaft 21T Frame
6E	56896E25	1	Stub Shaft 25T Frame
6E	56896E28	1	Stub Shaft 28T Frame
6E	56896E32	1	Stub Shaft 32T Frame
11	568911	1	Backplate
11F	564911F	2	Backplate Pin
*24	568924	1	Impeller Retainer Pin
40	568940	1	Deflector, 14T & 18T Frame
40	56894021	1	Deflector, 21T & 25T Frame
40	56894028	1	Deflector, 28T Frame
40	56894032	1	Deflector, 32T Frame
71	56897114	1	Adapter, 14T Frame
71	56897118	1	Adapter, 18T Frame
71	56897121	1	Adapter, 21T Frame
71	56897125	1	Adapter, 25T Frame
71	56897128	1	Adapter, 28T Frame
71	56897132	1	Adapter, 32T Frame
71A	564971A	2	Adapter Pin
71B	568971B14	4	Adapter Mounting Bolt, 14T Frame
71B	568971B	4	Adapter Mounting Bolt, 18T, 21T, 25T, 28T Frame
75	568975	1	Clamp Assembly
75K	329901	1	Wing Nut
80	568980	1	Carbon Seal
*80A	568980A	1	Cup
*80B	568980B	1	Seal O-Ring, Buna
*80C	568980C	1	Spring
80L	568980L	1	Drive Collar
80M	566980M	1	Drive Collar Set Screw
*90	568990	1	Casing Gasket, Buna
131	568913114	1	Seal Guard Assembly - 14T
131	568913118	1	Seal Guard Assembly - 18T

KEY	PART NO.	QTY.	DESCRIPTION
131	568913121	1	Seal Guard Assembly - 21T
131	568913125	1	Seal Guard Assembly - 25T
131	568913128	1	Seal Guard Assembly - 28T & 32T
207	5689207	4	Adjustable Leg - 14T, 18T, 21T
207	566920725	4	Adjustable Leg - 25T & 28T
209	564920914	2	Adjustable Leg Bracket - 143TC Frame
209	564920914B	2	Adjustable Leg Bracket - 145TC Frame
209	564920918	2	Adjustable Leg Bracket - 182TC Frame
209	564920918B	2	Adjustable Leg Bracket - 184TC Frame
209	566920921	2	Adjustable Leg Bracket - 213TC
209	566920921B	2	Adjustable Leg Bracket - 215TC
209	566920925	2	Adjustable Leg Bracket - 254TC
209	566920925B	2	Adjustable Leg Bracket - 256TC
209	568920928	2	Adjustable Leg Bracket - 284TC Frame
209	568920928B	2	Adjustable Leg Bracket - 286TC Fram
209A	5689209A	4	Set Screw (Square Head) 56C - 14T
209B	5649209B14	4	Bracket Mounting Screw 14T
209B	5669209B	4	Bracket Mounting Screw 18T & 21T
209B	5669209B25	4	Bracket Mounting Screw 25T & 28T
209C	5649209C	4	Washer (Leg Assembly) 14T
209C	5649209C18	4	Washer (Leg Assembly) 18T & 21T
209C	5689209C	4	Washer 25T & 28T

* - Spare parts recommended

See page 19 for spare part kits

Viton parts available upon request

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Form No. CP/50 RG 3/95 Rev.