

OPERATOR'S MANUAL

CHEMFLO 9

INCLUDING: OPERATION, INSTALLATION AND MAINTENANCE

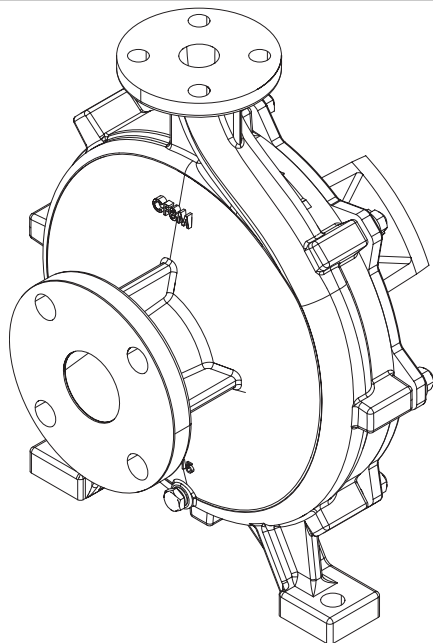
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CHEMFLO® 9 (2" X 1")

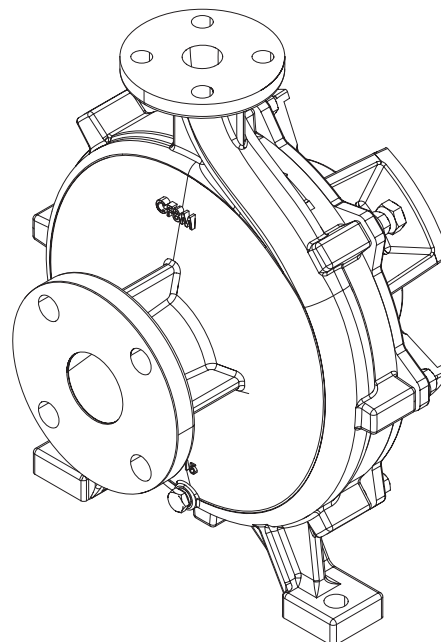


**READ THIS MANUAL CAREFULLY BEFORE INSTALLING,
OPERATING OR SERVICING THIS EQUIPMENT.**

It is the responsibility of the employer to place this information in the hands of the operator. Keep for future reference.

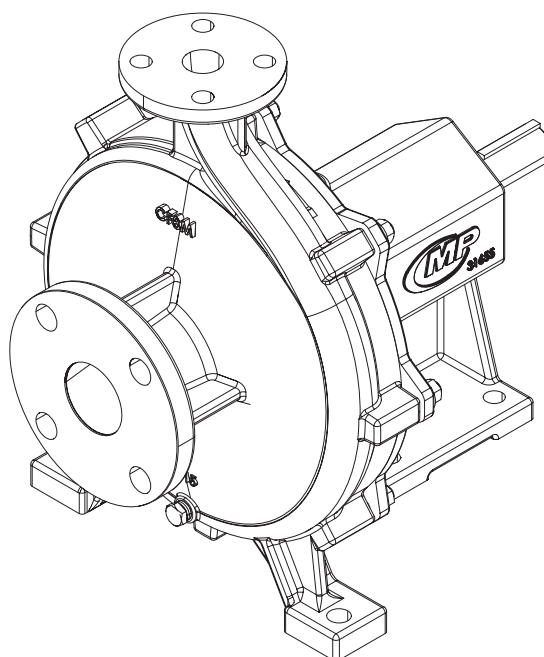


184TC and 215TC



256TC and 286TC

CC Models



Pedestal Models

Figure 1

GENERAL DESCRIPTION

CHEMFLO 9:**2" x 1" End Suction Centrifugal Pump**

Made with high quality investment cast 316 stainless steel components, the ChemFlo® series of pumps are designed to be applied in a wide range of pumping applications where stainless steel is required.

ChemFlo® 9 pumps utilize a semi-open impeller design to allow for passage of larger solid sizes and a totally enclosed impeller to meet high efficiency standards. Several seal options are available in addition to the standard type 2100 carbon / ceramic / Viton mechanical seal.

SPECIFICATIONS

Suction And Discharge	2" x 1" ANSI 150# Flange
Application	Agricultural, Commercial, Industrial, Marine, OEM
Materials of construction	316 stainless steel, CFB (nickel aluminum bronze)
Flow	
CC.....	Up to 270 gpm / (1022 lpm)
Pedestal.....	Up to 270 gpm / (1022 lpm)
Head Feet	
CC	Up to 460 ft (140 m)
Pedestal.....	Up to 460 ft (140 m)
Impeller	
CC and Pedestal	9.95" (252 mm) enclosed, cast 316 stainless steel
Motor	Up to 40 HP (29.82 kw)
Drive Options	Close coupled 184TC Close coupled 215TC Close coupled 256TC Close coupled 286TC Close coupled 324TS Pedestal PumPAK® (without motor)
Seal	Standard carbon / Ceramic / Viton Special seal material combinations available (Consult factory)
Drive Sleeve	316 stainless steel
Options	Tap for recirculation or seal flush

OPERATING AND SAFETY PRECAUTIONS

READ, UNDERSTAND, AND FOLLOW THIS INFORMATION TO AVOID INJURY AND PROPERTY DAMAGE.



⚠ WARNING Be sure hoses and other components can withstand fluid pressures developed by this pump. Check any hoses for damage or wear. Be certain dispensing device is clean and in proper working condition.

⚠ WARNING **IMPROPER GROUNDING.** Can increase spark and electrical shock risk, resulting in severe injury or death. Ground pump and pumping system.

- The pumping system must be grounded when it is pumping, flushing, recirculating, or spraying flammable materials such as paints, solvents, lacquers, etc. or used in a location where surrounding atmosphere is conducive to spontaneous combustion. Ground the dispensing valve or device, containers, hoses, and any object to which material is being pumped.
- Secure pump, connections, and all contact points to avoid vibration and generation of contact or static spark. Consult local building codes and electrical codes for specific grounding requirements. After grounding, periodically verify continuity of electrical path to ground. Test with an ohmmeter from each component (e.g., hoses, piping, pump, clamps, motor, base plate, etc.) to ground to ensure continuity. Ohmmeter should show 0.1 ohms or less.

⚠ WARNING **HAZARDOUS PRESSURE.** Can result in serious injury or property damage. Do not service or clean pump while the system is pressurized.

⚠ WARNING **HAZARDOUS MATERIALS.** Can cause serious injury or property damage. Do not attempt to return a pump to the factory or service center that contains hazardous material. Safe handling practices must comply with local and national laws and safety code requirements. Obtain Material Safety Data Sheets on all materials from the supplier for proper handling instructions.

⚠ CAUTION Check pump seals, elastomers, and all wetted parts to assure compatibility before using commission of the product.

- Verify the chemical compatibility of the pump wetted parts and the substance being pumped, flushed or recirculated. Chemical compatibility may change with temperature and concentration of the chemical(s) within the substances being pumped, flushed or circulated. For specific fluid compatibility, consult the chemical manufacturer.

⚠ CAUTION Maximum temperatures are based on mechanical stress of seals and elastomers only. Certain chemicals will significantly reduce maximum safe operating temperature. Consult the chemical manufacturer for chemical compatibility and temperature limits.

⚠ CAUTION Be certain all operators of this equipment have been trained for safe working practices, understand it's limitations, and wear safety goggles / equipment when required.

⚠ CAUTION Do not use the pump for the structural support of the piping system. Be certain the system components are properly supported to prevent stress on the pump parts.

⚠ CAUTION Prevent unnecessary damage to the pump. Do not allow pump to operate in a dry run condition or under cavitating conditions for extended periods.

⚠ CAUTION Use only genuine MP Pumps® replacement parts to assure compatible pressure rating and longest service life.

⚠ CAUTION The mechanical seal in the pump must not be operated dry.

⚠ CAUTION If a pump will be idle in freezing weather it should be drained or filled with the proper anti-freeze.

NOTICE Pump should be installed in the position consistent with the manufactures specifications.

NOTICE Re-torque all fasteners before operation. Creep of housing and gasket materials may cause fasteners to loosen. Re-torque all fasteners to insure against fluid leakage.

⚠ WARNING = Hazards or unsafe practices which could result in severe personal injury, death or substantial property damage.

⚠ CAUTION = Hazards or unsafe practices which could result in minor personal injury, product or property damage.

NOTICE = Important installation, operation or maintenance information.

STORAGE PRECAUTIONS

Do not store filled with fluid at or below freezing temp of process fluid.

INSTALLATION

INSTALLATION FOR CHEMFLO END SUCTION PUMPS:

MP CHEMFLO centrifugal pumps should be installed with a flooded suction as near to the liquid source as possible. A MP CHEMFLO is not a self-priming pump. If the liquid source is located below the pump a footvalve and some provision for priming must be used. The pump housing and suction line must be completely filled with liquid before operation.

Piping should include shutoff valves and pipe unions on both the discharge and suction to isolate the pump for maintenance.

Provisions for suction and discharge pressure gages are recommended for troubleshooting. The suction line should be as short as possible, at least as large as the pump suction connection, include as few fittings as possible and those should have a long radius to keep friction losses at a minimum. If a footvalve or strainer is included the FREE AREA should be at least three times the area of the pump suction connection. The suction piping must be absolutely free of leaks.

Both suction and discharge piping should be supported independently of the pump. never draw or pull pipe into place, this may impose a strain that will result in misalignment between the pump and driver or otherwise adversely affect the operation of the pump. After connecting piping to the pump rotate the shaft several times to check for rubbing or binding.

INSTALLATION FOR CHEMFLO PUMPAKS:

If it is necessary to install the pump above the level of the liquid, a priming line should be connected directly to the suction line. A check valve must be used in conjunction with a priming line or the priming liquid will merely pass through the suction line to the liquid source. The priming of the suction line evacuates the air in the suction line and pump. This series of pumps will not handle air and therefore all air must be displaced from the suction line and pump before the pump can operate. Be sure that the pump housing is filled with liquid before starting the pump. **THE MECHANICAL SEAL IN THE PUMP MUST NOT BE OPERATED DRY.**

Pipe or hose of the same size (or larger) as inlet and outlet openings should be used on the installation. When using pipe, avoid sharp bends and use long radius elbows wherever possible. This will keep friction loss at a minimum and allow the pump to operate more effectively. Use pipe dope on all connections and be sure all fittings are airtight, especially on the suction side of the pump. An air leak on the suction side of the pump will prevent proper operation. A section of non-collapsible hose between piping and pump may be used as a vibration dampener.

BEARING INSTALLATION (PEDESTAL MODELS):

Check the shaft to insure that it rotates freely. Shafts should be aligned in accordance with the instructions of the coupling manufacturer. Final alignment must be performed after the pump has been completely installed and the pump and driver are at operating temperature. Proper shaft alignment is the responsibility of the installer.

The MP CHEMFLO centrifugal pump should be installed with a flooded suction as near to the liquid source as possible. CHEMFLO pumps are not self-priming pumps. If the liquid source is located below the pump a footvalve and some provision for priming must be used. The pump housing and suction line must be fully primed before operation. The mechanical seal in the pump must not be operated dry.

Piping should include shutoff valves on both the discharge and suction to isolate the pump for maintenance. Provisions for suction and discharge pressure gages are recommended for trouble shooting. The suction line should be as short as possible, at least as large as the pump suction connection, include as few fittings as possible and those should be long radius to keep friction losses at a minimum. If a footvalve or strainer is included the free area should be at least three times the area of the pump suction connection. The suction piping must be absolutely free of leaks.

Both suction and discharge piping should be supported independently of the pump. Never use excessive force to move the pipe into place. This may impose a strain that will result in misalignment between the pump and driver or otherwise adversely affect the operation of the pump. After connecting pipe to the pump rotate the shaft several times to check for rubbing or binding.

MOTOR MOUNTING

Check rotation of the driver to be sure it coincides with the required rotation of the pump. When viewed from the driver end the rotation of the pump is **CLOCKWISE**.

A Pumpak shaft sleeve is machined to precisely fit the shaft of your driver. No provision is made for drive key and none is required.

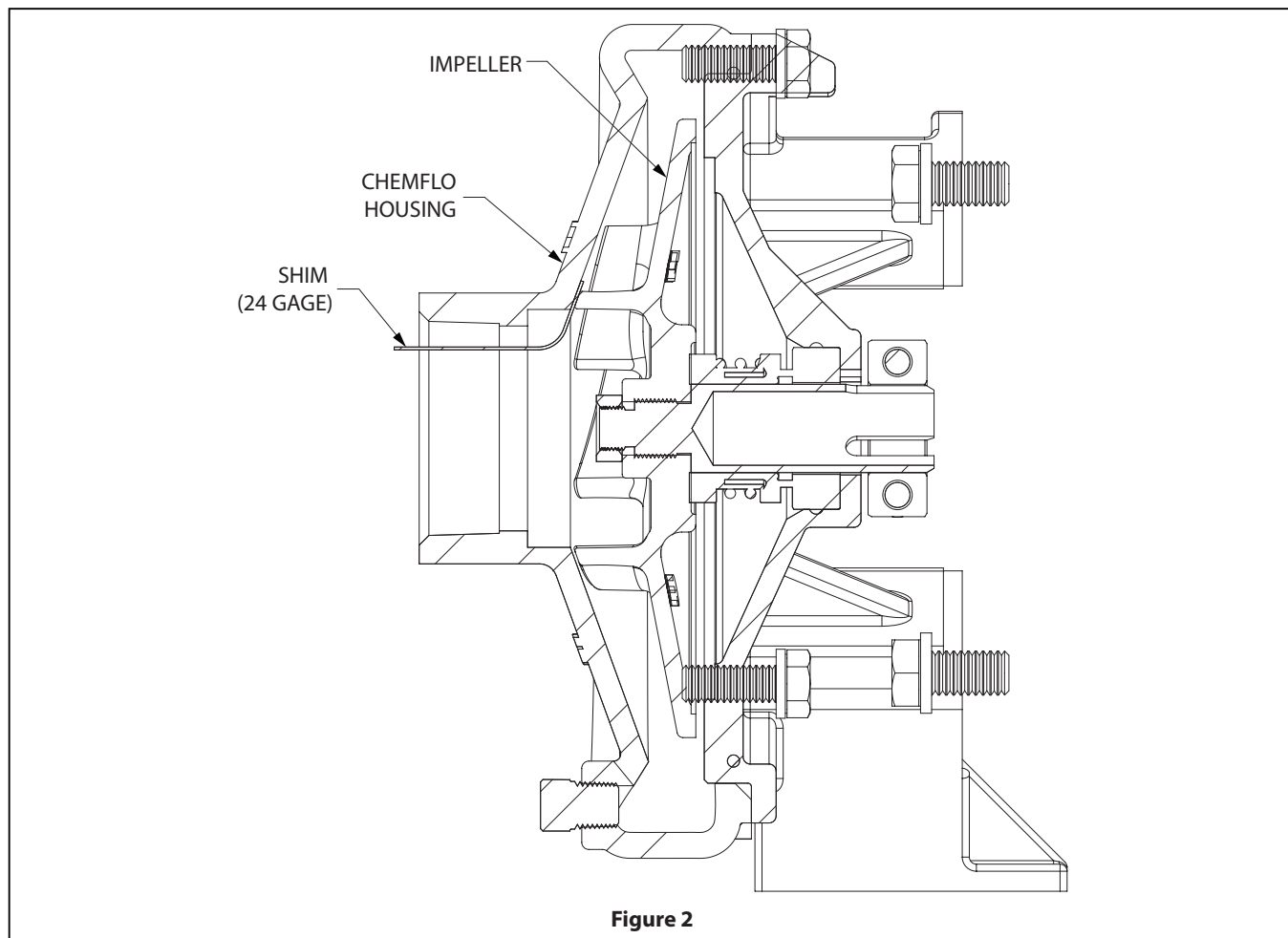
Loosen the drive clamp fasteners but do not remove. **NOTE:** If the driver shaft is keyed, remove the key before attempting to install the Pumpak. Slide the Pumpak assembly onto the driver shaft, aligning the capscrew holes in the adaptor with the tapped holes in the driver mounting face until the adaptor contacts the mounting face.

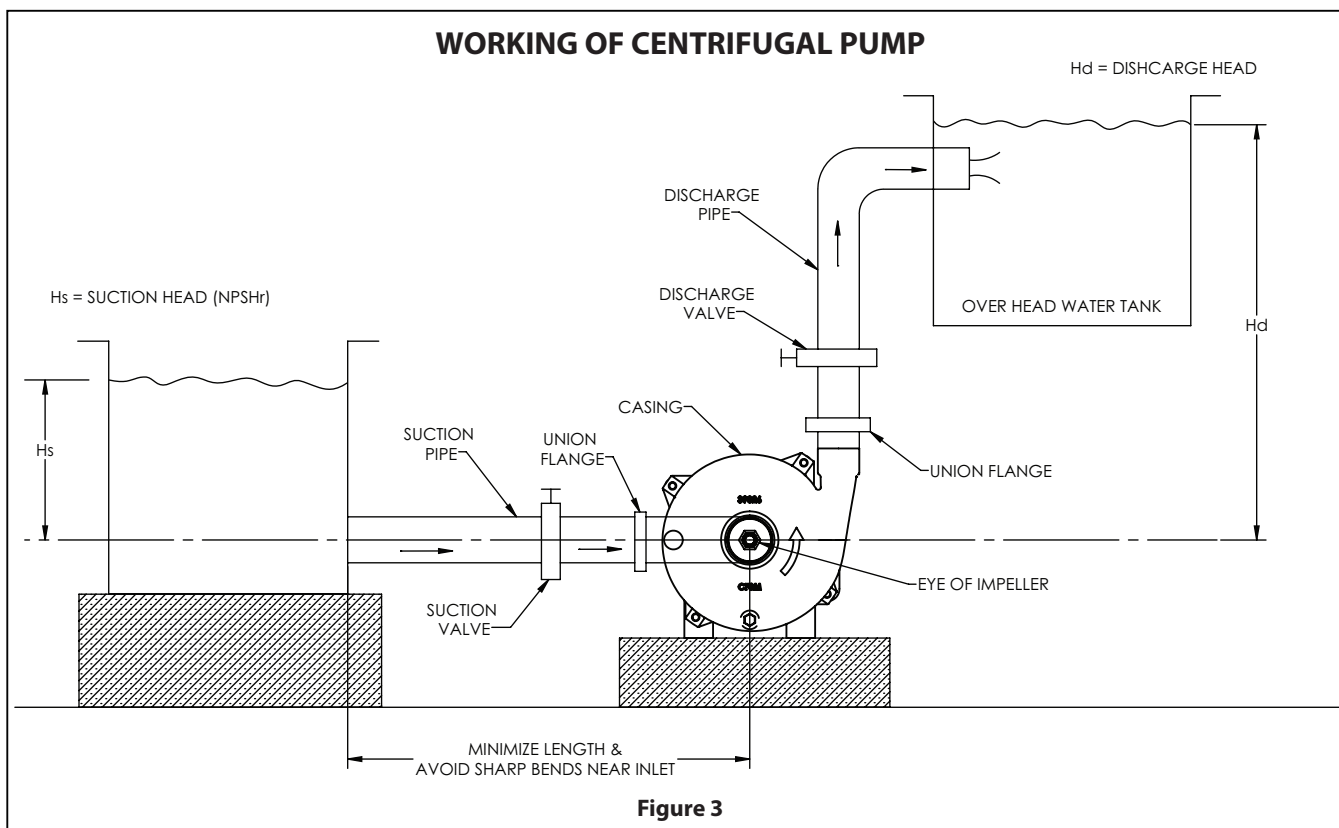
Install fasteners and tighten to secure Pumpak assembly to the driver. First center then tighten the drive clamp assembly to lock the shaft sleeve onto the driver shaft.

After all fasteners are tight including the drive clamp assembly, remove the Assembly shim from the suction connection. The shim was in place to establish clearance between the face of the impeller and pump housing. Rotate the driver slowly by hand to make certain that there is no rubbing.

TO ADJUST IMPELLER CLEARANCE:

1. Loosen the impeller drive sleeve
2. Use a tool such as a screwdriver to push the impeller back then reinsert the Assembly Shim.
3. Seal spring tension should push the impeller forward and capture the shim when the screwdriver is removed.
4. Re-tighten the shaft clamp. Remove the shim then re-check for rubbing.





OPERATING INSTRUCTIONS

Inspect the Pumpak as soon as it is received to make certain that no parts are missing or have been broken in shipment. Damage should be reported immediately to the shipping company. **CAUTION: Do not disturb the assembly shim** in the suction opening of the pump housing until after the Pumpak has been completely assembled to the driver. The Pumpak utilizes a single self-adjusting type mechanical seal that is lubricated and cooled by the liquid in the pump. **THE PUMP MUST NEVER BE OPERATED WITHOUT LIQUID IN THE HOUSING.**

WORKING OF CENTRIFUGAL PUMP:

A centrifugal pump operates through the transfer of rotational energy from one or more driven rotors, called impellers. The action of the impeller increases the fluid's velocity and pressure and directs it towards the pump outlet.

WEAR AND INSPECTION POINTS

Shaft: Inspect threads, keyways and shoulders. Replace if damaged.

Ball bearings (Pedestal and hydraulic models): Replace if worn, loose, or rough and noisy when rotated. If dirty, clean with solvent, dry and coat with a good lubricant. New bearings should not be unwrapped until ready for use.

Impellers: Replace if excessively worn or corroded. The impeller should have been statically and dynamically balanced at the factory, and static and dynamic balance must be maintained for proper operation of your equipment.

Mechanical seals: Should be inspected for, lack of lubrication, misalignment, overheating, abrasive materials damage, and corrosion.

Alignment: Proper alignment between pump shaft and motor shaft is key to the performance of shaft seals and bearings. Improper alignment can lead to premature pump failure.

Pedestal Style: Inline shaft to shaft spacing is dependent upon the coupling being used. Check the alignment carefully between the pump and the drive.

SEAL REPLACEMENT INSTRUCTIONS

DISASSEMBLE THE PUMP:

Drain the system of liquid, break suction and discharge pipe unions, and, if necessary, remove all piping from the suction and discharge openings. Remove the fasteners holding the pump adaptor to the driver, loosen the drive clamp assembly, and remove the PUMPAK.

To disassemble, remove the washers and hexnuts holding the motor adaptor to the housing. Remove the housing. The impeller, drive sleeve, seal bellows, and the spring assembly will now slide forward free of the pump adaptor.

The seal seat and seat cup will remain in the pump adaptor. If not damaged or worn, do not remove. If necessary, remove from the adaptor counter bore with a piece of wood or a screwdriver handle inserted through the adaptor from the drive end. A sharp tap or two is usually sufficient to knock out the seal seat. Use caution in removing the seal seat so as not to crack a ceramic seat.

REMOVE IMPELLER

Remove seal bellows and spring assembly. On some models, spring keeper can also be removed now before removing impeller.

NOTE: The seal bellows will be bonded to the shaft sleeve and will require some patience and caution in removal in order not to damage the seal bellow and cage.

MP Pumps rebuild kits include a new drive sleeve to avoid the possibility of damaging the drive sleeve. See back of manual for list of seal kits and corresponding rebuild kits. Impellers are also available if wear or damage is present.

Remove locknut from shaft; unscrew the impeller from the shaft sleeve counter-clockwise from the impeller end.

INSPECTION:

Check all parts for wear. For ease of reassembly shaft sleeve should have all nicks and burrs removed. Clean with light crocus cloth. Replace damaged parts with new parts.

Inspect the seal seat and washer, seat cup, and seal bellows for grooves, cuts, scuffmarks, or other deterioration. If any of the parts are damaged, a complete new assembly should be installed.

REASSEMBLY:

All dirt and foreign matter should be removed. Recommend only using new seals and elastomers when reassembling a pump.

Lubricate seal seat cup with liquid soap (P-80 emulsifier) or clean grease and press seal seat into adaptor counter bore, seating it firmly and squarely. Use caution so as not to mar the lapped face of the seal seat.

Assemble shaft sleeve; seal spring keeper, impeller and impeller nut. Before installing seal bellows and spring assembly, lubricate the shaft sleeve and rubber bellows with liquid soap (P-80 emulsifier) or clean grease and press bellows and spring assembly onto the shaft sleeve. The spring should engage the spring keeper at the impeller end of the shaft sleeve.

To be properly positioned the washer must be firmly against the rubber bellows member and the driving lugs of the washer properly engaged. The raised shoulder on the seal washer should be facing away from the impeller to contact the lapped surface of the seal seat in the adaptor.

Slide impeller and seal assembly into the adaptor. Install drive clamp assembly on the shaft sleeve but do not tighten.

INSTRUCTIONS FOR SET SCREW TYPE SEAL:

Do not remove the seal retaining clips. Slide the seal into place on the shaft. The end of the shaft will be recessed approximately $.080" \pm .020"$ from the end of the seal. The proper seal working height is achieved when the seal faces are set flush with the seal clips in place.

With the seal clips still in place tighten the seal fasteners with a ball end allen wrench. It is important that the allen wrench not rest upon the seal housing during tightening as this may affect the position of the seal on the shaft. After the seal fasteners have been tightened the seal clips should be removed and saved.

Do not use the seal shim with setscrew type seal.

For bellows seal install the seal spacer on the backside of the impeller. Use a light grease or similar tacky material. Thread impeller onto shaft. Install jam nut. Place o-ring onto seal plate. Install impeller/bearing housing assembly into pump housing. Install lock washers and hex nuts. Rotate the shaft several times to check for rubbing or binding.

BEARING REPLACEMENT INSTRUCTIONS (PEDESTAL MODELS)

The pump utilizes a single self-adjusting type mechanical seal that is lubricated and cooled by the liquid in the pump.

THE PUMP MUST NEVER BE OPERATED WITHOUT LIQUID IN THE HOUSING.

Check rotation of the driver to be sure it coincides with the required rotation of the pump. When viewed from the driver end the rotation of the pump is CLOCKWISE.

The pump's grease lubricated bearings are sealed. They have been pre-lubricated at the factory and require no further lubrication or maintenance for the life of the bearing. Electric motors or other rotating equipment used to drive the pump should be lubricated in accordance with the manufacturer's instructions.

DISASSEMBLY:

Drain the housing by removing the drain plug. Remove the hex nuts and lock washers from the housing studs. Slide the bearing housing/impeller assembly out of the housing, it may be necessary to rotate the driver shaft out of the way. With the bearing /impeller assembly on a bench secure shaft, unthread impeller nut then unthread impeller. Remove the seal from the shaft. Lift off the seal plate. Place the seal plate face down on the bench and press the seal seat out. Remove the snap ring from the backside of the bearing housing. With a soft mallet, loosen the shaft assembly by tapping the impeller end then slide the bearing assembly from the housing. Press the bearings from the shaft.

ASSEMBLY:

Press bearings onto the shaft. Slide the shaft / bearing assembly into the bearing housing and install the snap ring. Place seal housing face up on bench. Lubricate non-PTFE seal seat with water-soluble lubricant and gently press into seal housing. If pinned seat is used be certain that pin is in place, lined up with groove in seal seat. Place seal housing onto pilot of bearing housing. Lubricate shaft with water-soluble lubricant. Slide seal onto shaft.

PARTS LIST / CHEMFLO 9 CC (184TC, 215TC, 256TC AND 286TC)

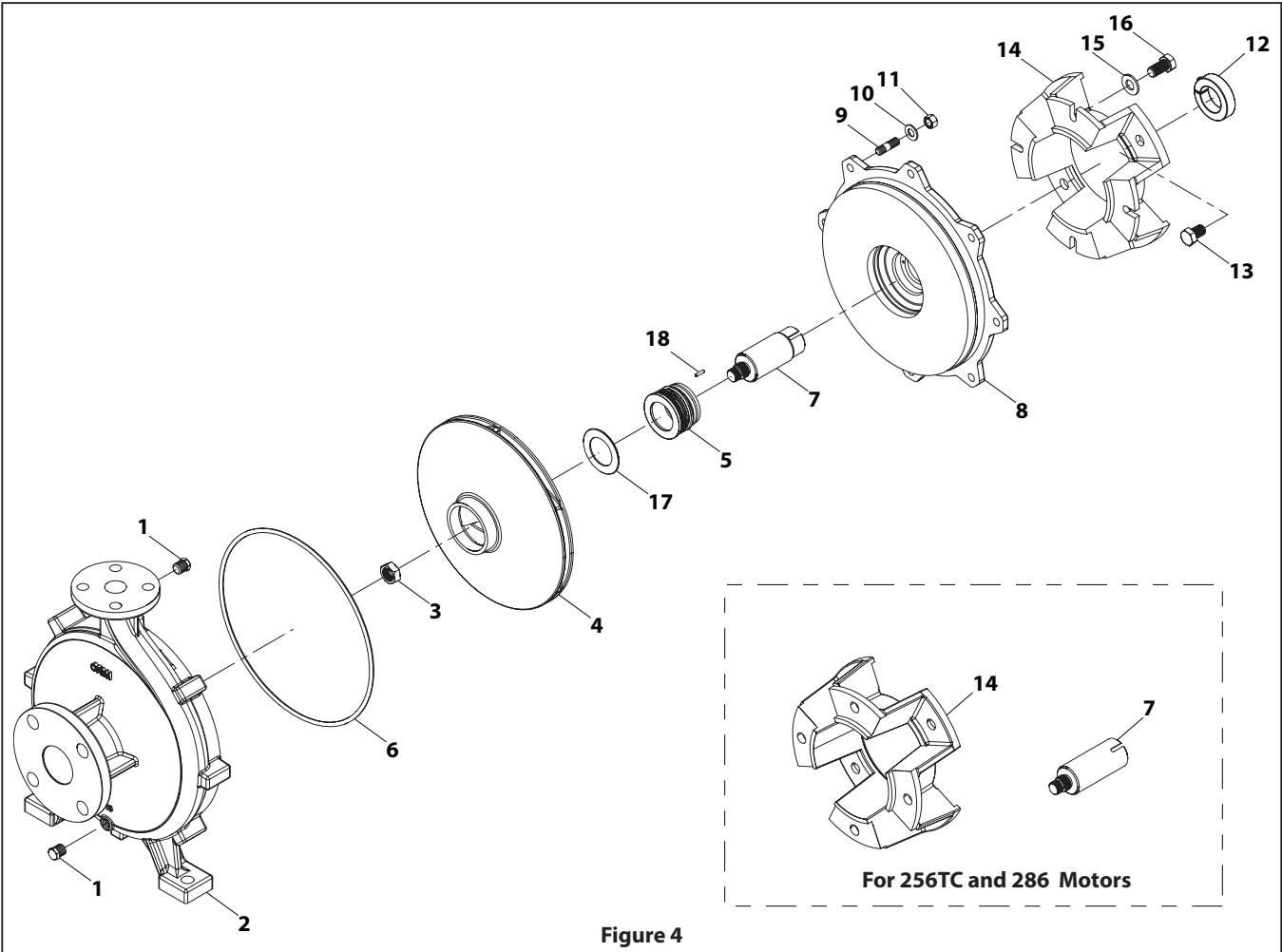


Figure 4

PARTS LIST / CHEMFLO 9 CC (184TC, 215TC, 256TC AND 286TC)

Item	Description (size)	Qty	Part No.	Mtl
1	Pipe Plug (HH 1/4 NPT)	2	21267	316 SS
2	Volute	1	33316	CF8M SS
3	Hex Jam Nut (5/8 - 18)	1	29194	316 SS
4	Impeller (Ø 9.95)	1	33330	CF8M SS
	Impeller (Ø 9.25)	1	34538	CF8M SS
	Impeller (Ø 8.65)	1	34539	CF8M SS
	Impeller (Ø 8.00)	1	34540	CF8M SS
	Impeller (Ø 9.00)	1	35859	CF8M SS
5	See Seal Table for Options (Page No 10)			
	O-Ring (AS-568-376)	1	33324	VITON
6	O-Ring (AS-568-377)	1	33325	TEFLON ECCAPS SIL
	Drive Sleeve (256TC / 286TC)	1	31833	316 SS
7	Drive Sleeve (215TC)	1	31094	316 SS
	Drive Sleeve (184TC)	1	31311	316 SS
	Seal Housing	1	33321	CF8M SS
8	Seal Housing	1	33320	CF8M SS
9	Stud (3/8 - 16 X 1.32)	8	21260	304 SS

Item	Description (size)	Qty	Part No.	Mtl
10	Flat Washer	8	28053	304 SS
11	Hexnut (3/8 - 16)	8	21268	304 SS
12	Clamp (256TC / 286TC)	1	33036	STEEL
	Clamp (184TC)	1	31099	STEEL
	Clamp (215TC)	1	31312	STEEL
13	Capscrew (1/2-13 X 3/4)	4	31235	304 SS
14	Motor Adapter (286TC)	1	33318	CAST IRON
	Motor Adapter (256TC)	1	33444	CAST IRON
	Motor Adapter (184TC / 215TC)	1	33433	CAST IRON
15	Flat Washer (1.06 X 0.50 X 0.09)	4	34350	304 SS
16	Capscrew (1/2 - 13 X 1.00)	4	33480	304 SS
17	Shim*	1	31372	316 SS
18	Expansion Pin*	1	32013	420 SS
* 31372 Spring Retainer, Use Only with Seals 31347				
* 32013 Expansion Pin, Use Only with Chemlon Seals				
* 34544 Expansion Pin, Use Only with Chemlon Seals				

PARTS LIST / CHEMFLO 9 PEDESTAL

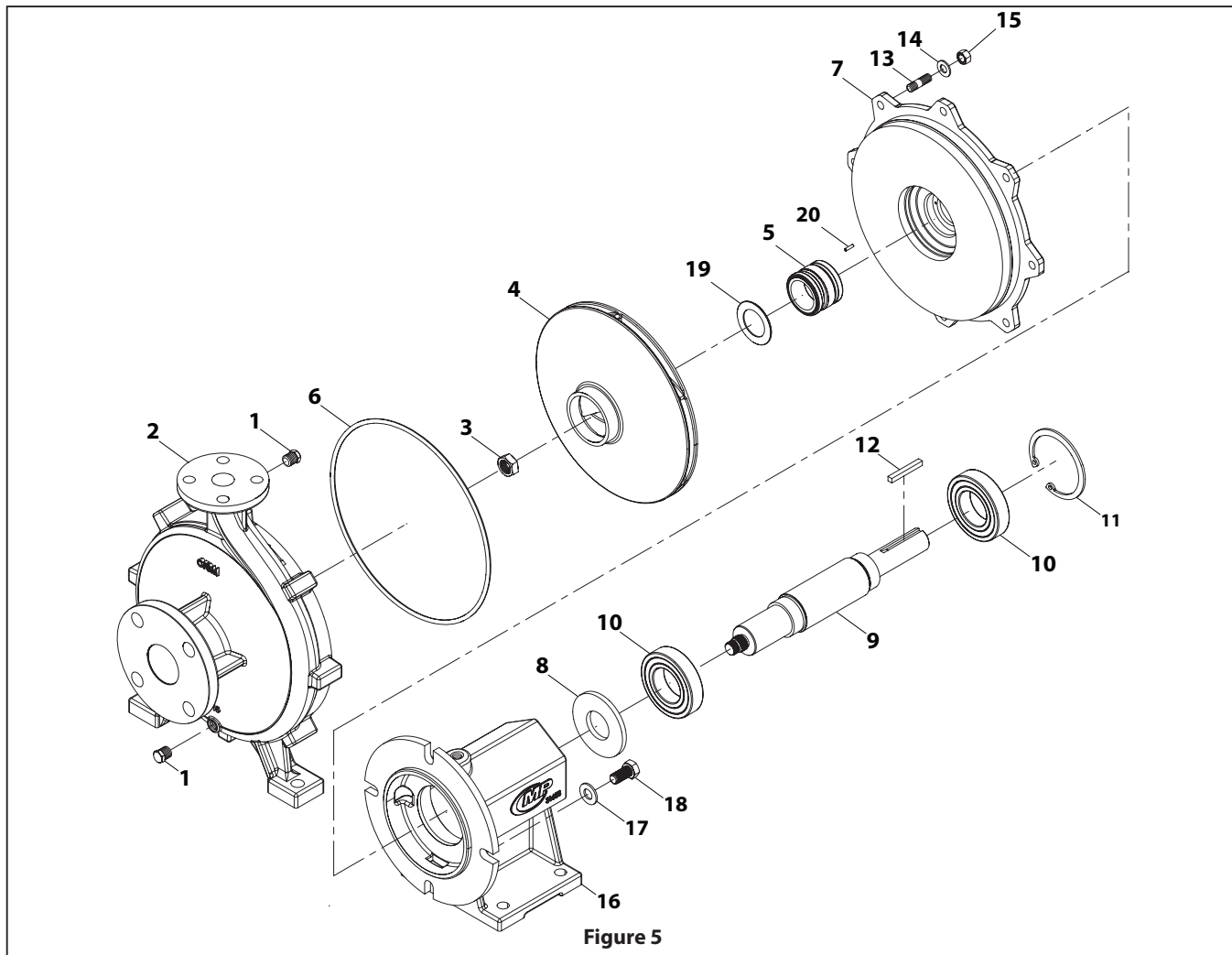


Figure 5

PARTS LIST / CHEMFLO 9 PEDESTAL

Item	Description (size)	Qty	Part No.	Mtl	Item	Description (size)	Qty	Part No.	Mtl
1	Pipe Plug (HH 1/4 NPT)	2	21267	316 SS	11	Snap Ring	1	31803	CARBON SPRING STEEL
2	Volute	1	33316	CF8M SS	12	Square Key	1	33232	STEEL
3	Hex Jam Nut (5/8 - 18)	1	29194	316 SS	13	Stud (3/8 - 16 X 1.32)	8	21260	304 SS
4	Impeller (Ø 9.95)	1	33330	CF8M SS	14	Flat Washer	8	28053	304 SS
	Impeller (Ø 9.25)	1	34538	CF8M SS	15	Hexnut (3/8 - 16)	8	21268	304 SS
	Impeller (Ø 8.65)	1	34539	CF8M SS	16	Bearing Housing	1	33482	CAST IRON
	Impeller (Ø 8.00)	1	34540	CF8M SS	17	Flat Washer (1.06 X 0.50 X 0.09)	4	34350	304 SS
	Impeller (Ø 9.00)	1	35859	CF8M SS	18	Capscrew (1/2 - 13 X 1.00)	4	33480	304 SS
	Impeller (Ø 8.75)	1	35668	CF8M SS	19	Shim*	1	31372	316 SS
5	See Seal Table for Options (Page No 10)				20	Expansion Pin*	1	32013	420 SS
6	O-Ring (AS-568-376)	1	33324	VITON	* 31372 Spring Retainer, Use Only with Seals 31347				
	O-Ring (AS-568-377)	1	33325	TEFLON ECCAPS SIL	* 32013 Expansion Pin, Use Only with Chemlon Seals				
7	Seal Housing	1	33320	CF8M SS					
8	Slinger	1	37881	NEO RUBBER					
9	Drive Shaft	1	31802	316 SS					
10	Ball Bearing	2	31804	STEEL					

SERVICE KITS

PUMP MODEL	PUMP DESCRIPTION	SEAL KIT	BEARING KIT	IMPELLER
MP38034	CF9PMP SS:20-3 256TC 8.0 T-21	MP51280	#N/A	MP34540
MP36832	CF9PMP SS:PED 8.65 T-2100	MP51278	MP51282	MP34539
MP36864	CF9PMP SS:PED 8.65 T-2100	MP51278	MP51282	MP34539
MP35881	CF9PMP SS:PED 9.25 T-2100	MP51278	MP51282	MP34538
MP36831	CF9PMP SS:PED 9.25 T-2100	MP51278	MP51282	MP34538
MP34548	CF9PMP SS:PED 9.95 T-2 STC	#N/A	MP51282	MP33330
MP33483	CF9PMP SS:PED 9.95 T-2100	MP51278	MP51282	MP33330
MP34549	CF9PMP SS:PED 9.95 T-9	#N/A	MP51282	MP33330
MP37068	CF9PMP SS:PED T-2 CSC 8.65	#N/A	MP51282	MP34539
MP37898	CF9PMP SS:PED T-2 CSC 9.95	#N/A	MP51282	MP33330
MP36835	CF9PMP SS:PED T-2100 8.00CSI	MP51278	MP51282	MP34540
MP36865	CF9PMP SS:PED T-2100 8.00CSI	MP51278	MP51282	MP34540
MP35534	CF9PPK SS:184TC 9.95 T-2100	MP51278	#N/A	MP33330
MP34545	CF9PPK SS:215TC 8.0 T-2100	MP51278	#N/A	MP34540
MP34541	CF9PPK SS:256TC 8.65 T-21	MP51280	#N/A	MP34539
MP35362	CF9PPK SS:256TC 9.25 T-21	MP51280	#N/A	MP34538
MP50622	CF9PPK SS:256TC 9.625 T-21	MP51280	#N/A	MP50621
MP51200	CF9PPK SS:256TC 9.95 T-21	MP51280	#N/A	MP33330
MP35669	CF9PPK SS:286TSC 8.75 T-21	MP51280	#N/A	MP35668
MP35858	CF9PPK SS:286TSC 9.0 T-21	MP51280	#N/A	MP35859
MP37027	CF9PPK SS:286TSC 9.25 T-21	MP51280	#N/A	MP34538
MP33481	CF9PPK SS:286TSC 9.95 T-21	MP51280	#N/A	MP33330

SEAL TYPE OPTIONS

Seal PN	Seal Type	Shaft Dia.	Mating Ring	Material		
				Primary Ring	Elastomer	Components
31347	2	1 1/2	Tungsten Carbide	Silicon Carbide	Viton	316 SS
31374	2	1 1/2	Ceramic	Carbon	Viton	316 SS
26461	2	1 1/2	Silicon Carbide	Silicon Carbide	Viton	316 SS
26565	2	1 1/2	Ceramic	Carbon	Chemlon	316 SS
33326	2	1 3/4	Ceramic	Carbon	Viton	316 SS
33327	2	1 3/4	Tungsten Carbide	Silicon Carbide	Viton	316 SS
33328	2	1 3/4	Ceramic	Carbon	Chemlon	316 SS
34933	2	1 1/2	Silicon Carbide	Carbon	Viton	316 SS

DIMENSIONAL DATA

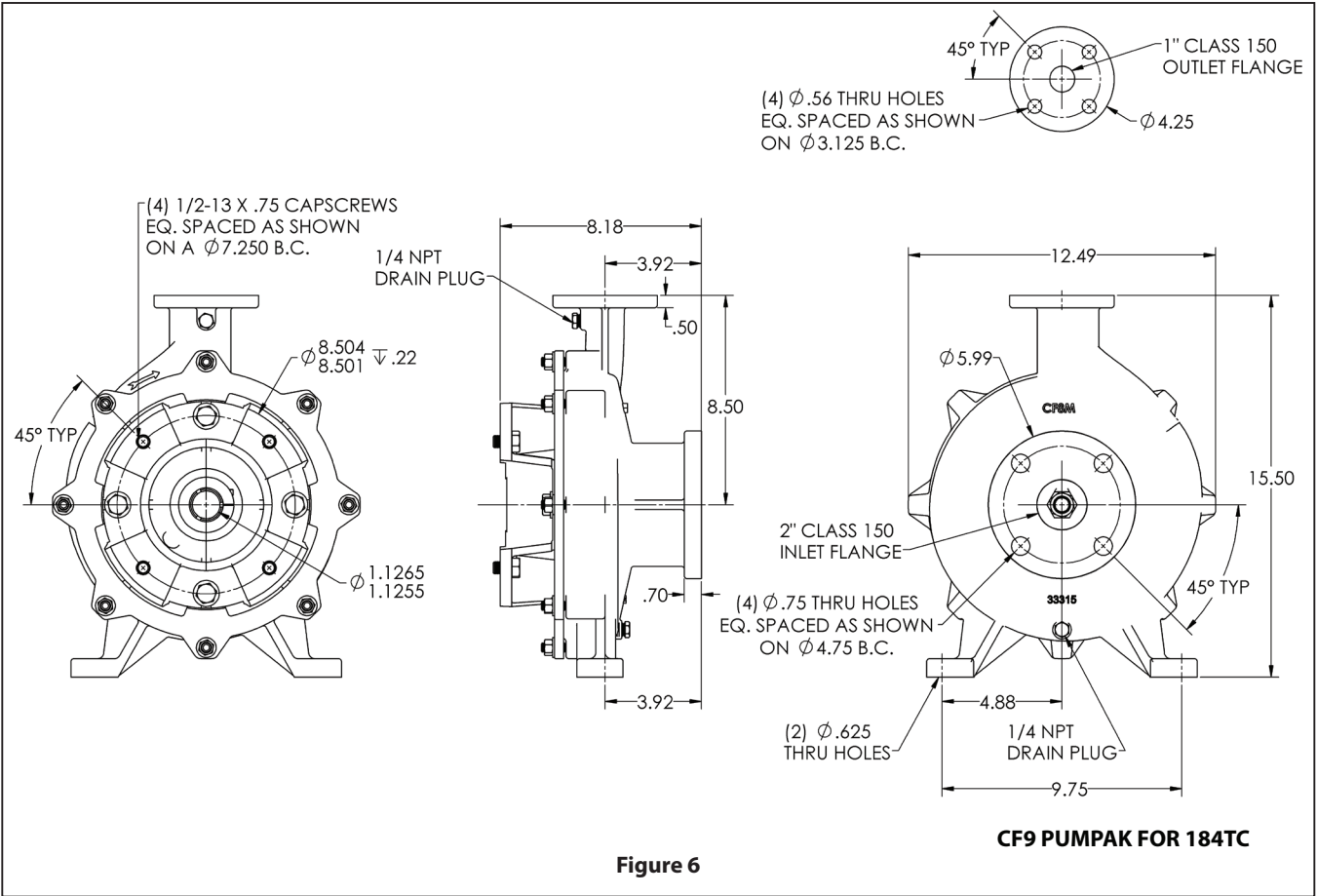


Figure 6

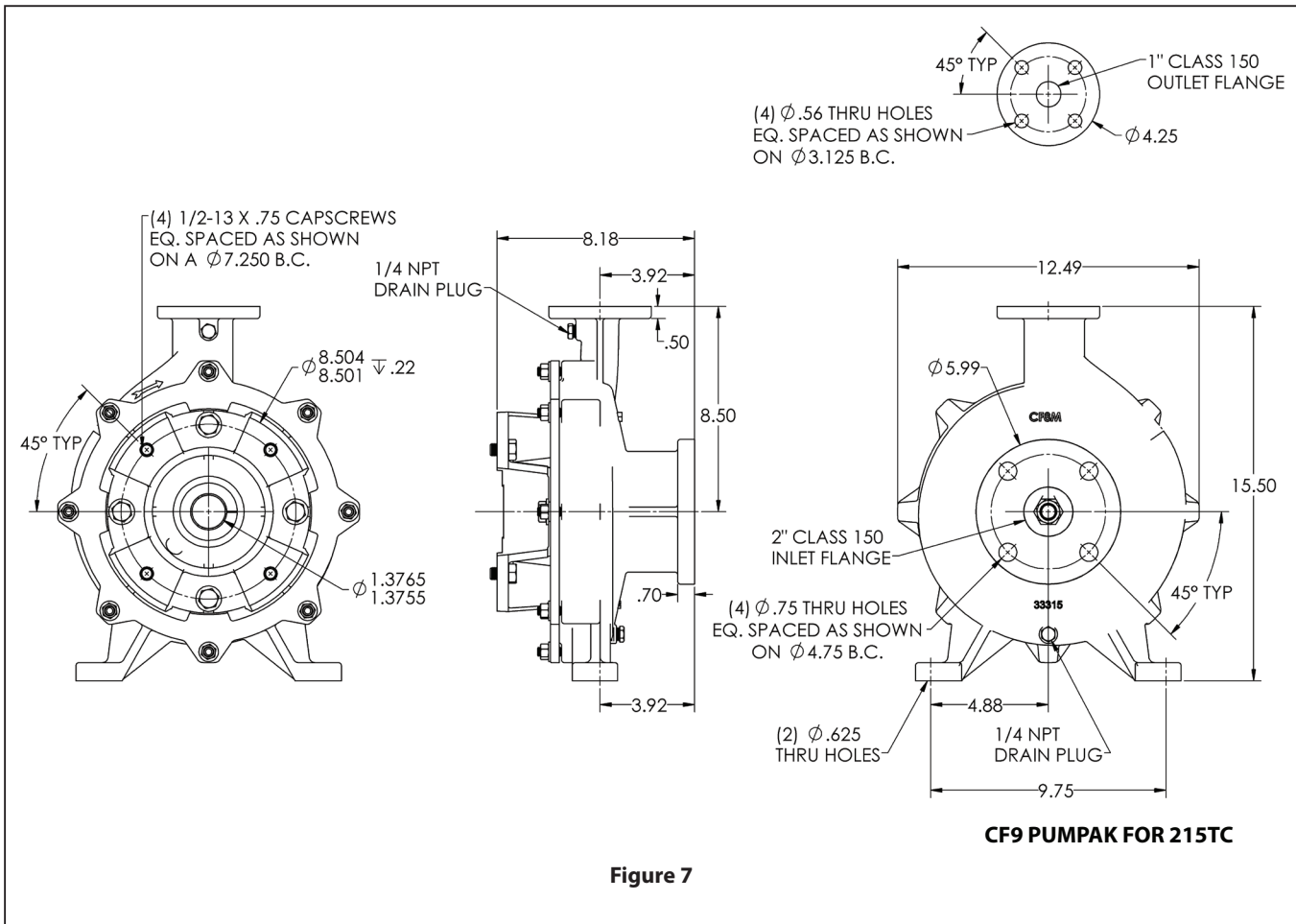


Figure 7

DIMENSIONAL DATA

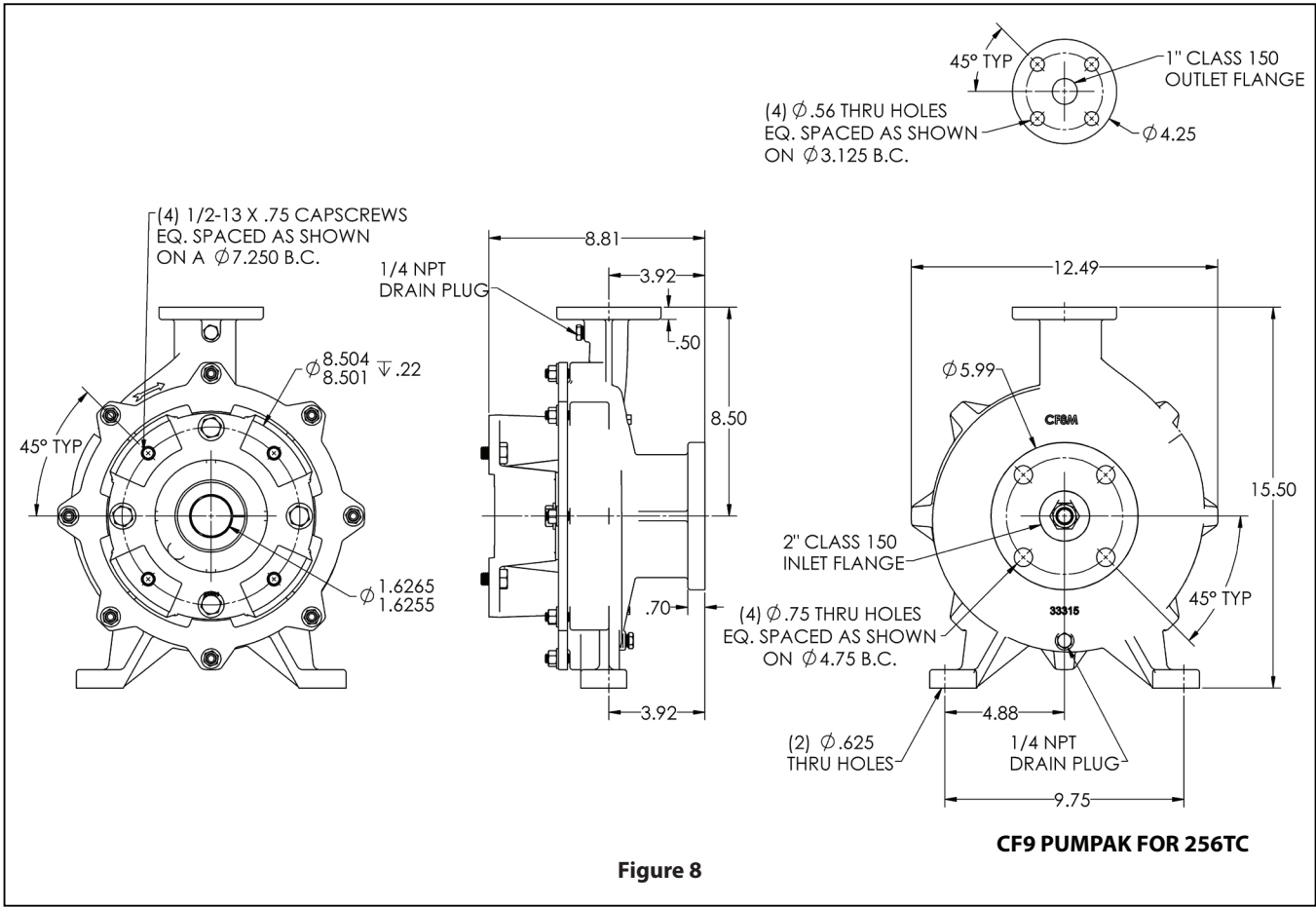


Figure 8

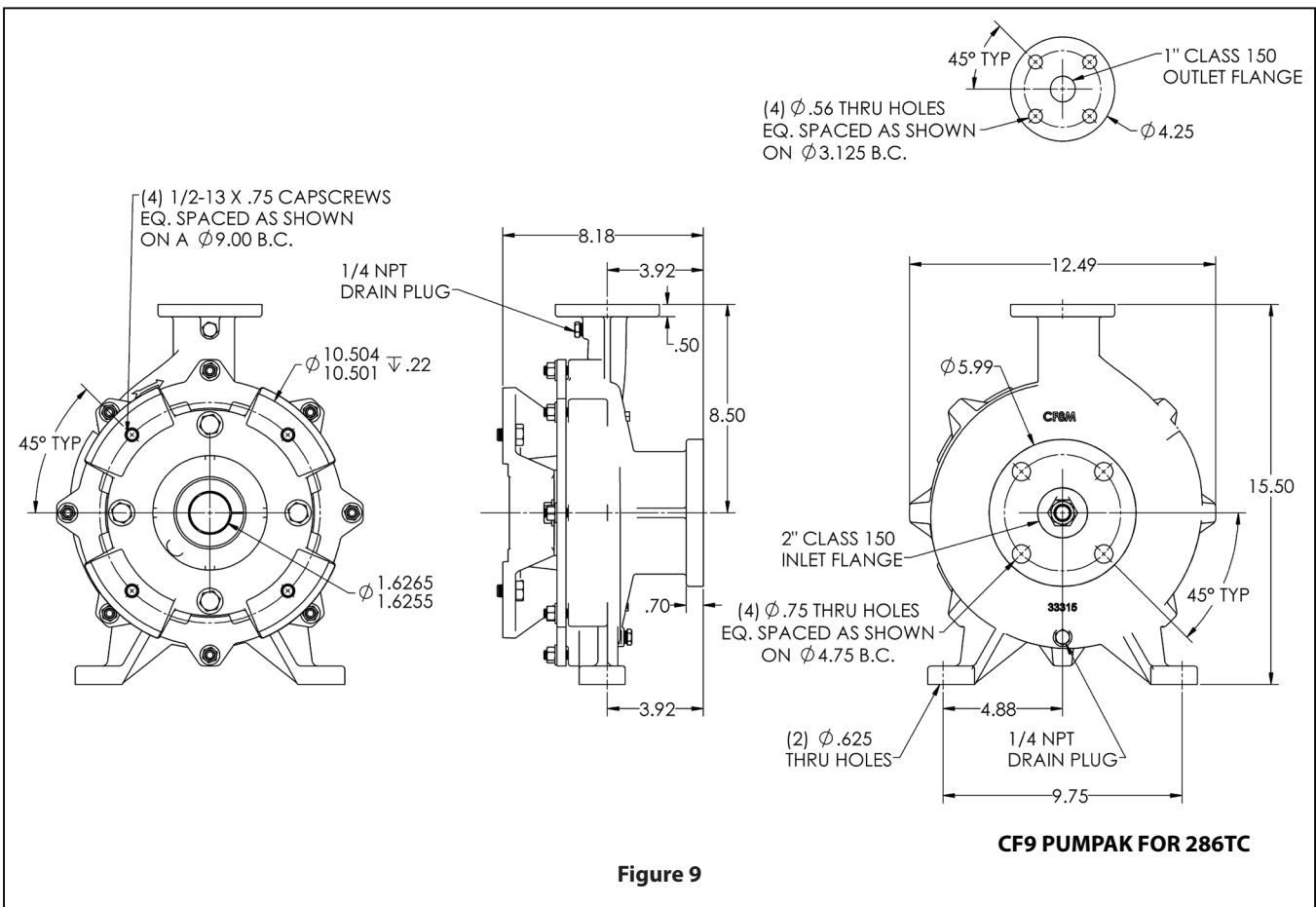


Figure 9

DIMENSIONAL DATA

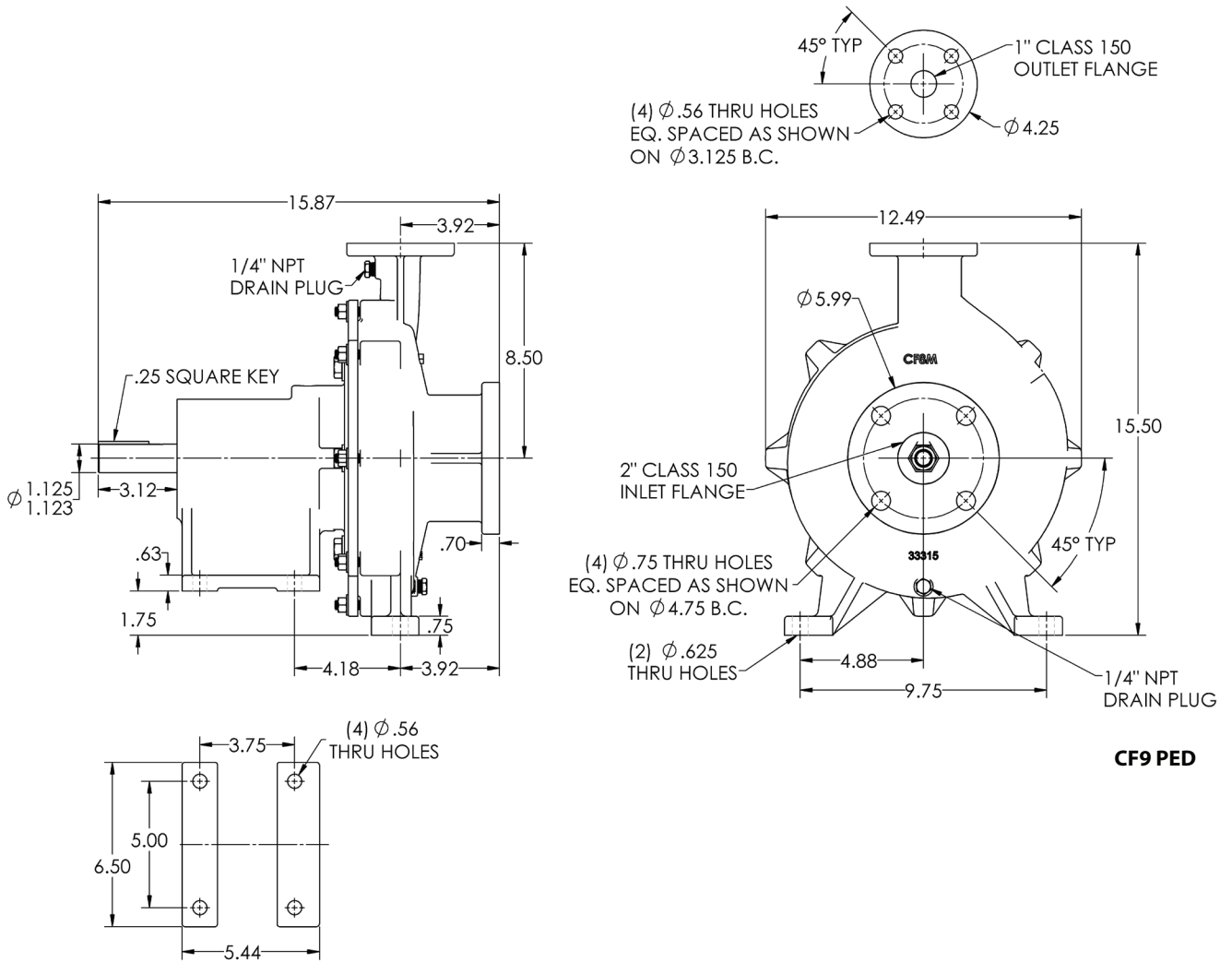


Figure 10

TROUBLESHOOTING

PROBLEM	PROBABLE CAUSE	REMEDY
No liquid delivered.	1. Pump not primed.	1. Reprime pump, check that pump and there are no obstructions in the suction line.
	2. Discharge valve closed	2. Check discharge valve.
	3. Suction line clogged.	3. Remove obstructions.
	4. Wrong direction of rotation.	4. Change rotation to concur with direction indicated on bearing housing or pump casing.
	5. Total head is too high	5. Re-evaluate head conditions.
	6. Driver is not operating at rated speed.	6. Check electric motor voltage; check engine rpm
	7. Pump is vapor bound	7. Provide additional pressure on liquid being pumped by elevating liquid source.
	8. Foot valve or suction pipe opening not submerged enough	8. Consult factory for proper depth. Use baffle to eliminate vortices.
Pump not producing rated flow or head.	1. Air leak through gasket.	1. Replace gasket.
	2. Air leak through stuffing box.	2. Replace or adjust packing/mechanical seal.
	3. Impeller partly clogged.	3. Back flush pump to clean impeller.
	4. Worn suction side plate or wear rings.	4. Replace defective parts as required.
	5. Pump is not properly primed.	5. Reprime pump, check that pump and there are no obstructions in the suction line. Check NPSHa to ensure that there is enough liquid for pump operation.
	6. Driver is not operating at rated speed.	6. Check electric motor voltage; check engine rpm
	7. Pump is vapor bound	7. Provide additional pressure on liquid being pumped by elevating liquid source. or consider installing an air release valve in the discharge line to remove the air to allow the pump to become dynamic.
	8. Insufficient suction head.	8. Ensure that suction line shutoff valve is fully open and line is unobstructed.
	9. Worn or broken impeller.	9. Inspect and replace if necessary.
Pump starts then stops pumping.	1. Excessive air in liquid.	1. Clean and tighten all suction connections; relocate suction inlet in liquid source.
	2. Defective packing or seal.	2. Replace packing or seal.
	3. Pump is vapor bound.	3. Provide additional pressure on liquid being pumped by elevating liquid source. or consider installing an air release valve in the discharge line to remove the air to allow the pump to become dynamic.
	4. Air or vapor pockets in suction line.	4. Rearrange piping to eliminate air pockets.
	5. Air leak in suction line.	5. Repair leak.
Bearings run hot.	1. Improper alignment.	1. Re-align pump and drive.
	2. Improper lubrication.	2. Check lubricate for suitability and level.
	3. Lube cooling.	3. Check cooling system

PROBLEM	PROBABLE CAUSE	REMEDY
Pump is noisy or vibrates.	1. Improper pump/driver alignment.	1. Align shafts.
	2. Partly clogged impeller causing imbalance.	2. Back-flush pump to clean impeller.
	3. Broken or bent impeller or shaft.	3. Replace as required.
	4. Foundation not rigid.	4. Tighten bolts of pump and motor or adjust stilts
	5. Worn bearings.	5. Replace.
	6. Suction or discharge piping not anchored or properly supported.	6. Anchor per Hydraulic Institute Standards Manual recommendation.
	7. Pump is cavitating.	7. Check NPSHa, Air leaks to ensure that there is enough liquid for pump operation.
Excessive leakage from stuffing box/seal chamber.	1. Worn mechanical seals.	1. Replace worn parts.
	2. Overheating mechanical seal.	2. Check lubrication and cooling lines.
	3. Shaft sleeve scored.	3. Remachine or replace as required
Motor requires excessive power.	1. Head lower than rating; pumps too much liquid.	1. Consult factory. Install throttle valve, trim impeller diameter.
	2. Speed is too high.	2. Electric motor wiring is wrong. Replace motor.
	3. Wrong direction of rotation.	3. Check wiring diagram.
	4. Impeller is clogged.	4. Back flush pump to clean impeller.
	5. Impeller is binding.	5. Relieve strain on casing; adjust impeller clearance.
	6. Driver and pump are misaligned.	6. Realign driver with pump.
	7. Power frame shaft is bent.	7. Replace shaft.
	8. Worn suction side plate or wear rings.	8. Replace defective parts as required.
	9. Liquid heavier than expected.	9. Check specific gravity and viscosity.
	10. Stuffing box too tight.	10. Readjust packing. Replace if worn.
	11. Rotating parts bind.	11. Check internal wearing parts for proper clearances
Pump fails to prime or loses its prime.	1. Air leaks in suction line.	1. Clean and tighten all suction connections; relocate suction inlet in liquid source.
	2. Suction strainer is clogged. Suction lift is too high.	2. Clean debris from strainer. Re-evaluate pump requirements and correct suction conditions.
	3. Defective priming valve.	3. Replace valve.
	4. Defective seal.	4. Replace seal.
Insufficient pressure.	1. Excessive air in liquid.	1. Clean and tighten all suction connections; relocate suction inlet in liquid source.
	2. Driver is not operating at rated speed.	2. Check electric motor voltage; check engine rpm
	3. Wrong direction of rotation.	3. Change rotation to concur with direction indicated on bearing housing or pump casing.
	4. Total head is too high.	4. Re-evaluate head conditions.
	5. Worn suction side plate or wear rings.	5. Replace defective parts as required.
	6. Broken or bent impeller or shaft.	6. Replace as required.
	7. Air leak through gasket.	7. Replace gasket.
	8. Liquid is vaporizing	8. Provide additional pressure on liquid being pumped by elevating liquid source. Check temperature of liquid being pumped'

