

Fybroc® Series 8500 Vertical Turbine Pumps

INSTALLATION MANUAL



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ORDERING REPLACEMENT PARTS

For future reference fill in the following information from the pump nameplate. This will be necessary to ensure accuracy when ordering replacement parts.

Model _____

Size _____

Serial Number _____

Impeller Diameter Installed _____

Bearing Material _____

Material of Construction _____

WARRANTY

FYBROC pumps are warranted by the Company, insofar as the same are of its own manufacture, against defects in materials and workmanship under proper and normal use and service, for a period of one year from the date of original shipment from the factory. FYBROC's obligation is limited, however, to furnishing without charge, F.O.B. its factory, new parts to replace any similar parts of its own manufacture so proving defective within said period, provided the Buyer has given FYBROC immediate written notice upon discovery of such defect. No allowance will be made for labor charges. FYBROC shall have the option of requiring the return of the defective material, transportation prepaid, to establish the claim.

FYBROC makes no warranty or guarantee whatsoever, either express or implied, of prime mover, starting equipment, electrical apparatus, parts or material not manufactured by Fybroc, except to the extent that warranty is made by the manufacturer of such equipment and material.

FYBROC assumes no liability for damages or delays caused by defective material, and no allowance will be made for local repair bills or expenses without the prior written approval or authority of FYBROC.

Under no circumstances will FYBROC be liable for indirect, special or consequential loss or damage of any kind and the Buyer assumes all liability for the consequences of its use or misuse by the Buyer, his employees, or others.

PERFORMANCE GUARANTEE

Is at the specified point of rating only and will not cover performance under conditions varying therefrom, nor for sustained performance over any period of time.

ACCEPTANCE TESTS

If required, shall be conducted in accordance with the practices as set forth in the Hydraulic Institute Standards. The expense of any such tests shall be borne by the buyer.

PERFORMANCE REPRESENTATIONS

Are based on shop laboratory tests with cold water as outlined in the Hydraulic Institute Standards.

FIELD TESTING

Due to the inaccuracies of field testing, the results of any such tests conducted by or for the Buyer shall be interpreted as being only indicative of the actual field performance of the pump. No equipment will be furnished on the basis of acceptance by results of field tests. If the buyer, after such a test, questions the performance of the pump, he may at his option request a test to establish the performance. Such tests will be conducted in accordance with the above paragraph entitled "Acceptance Tests."

ALL WARRANTIES

- Are void if -
- a. Pipe strains are the cause of damage.
- b. Pump handles liquids other than those specified in detail.
- c. NPSH lower than required by pump impeller.
- d. Operating speed is higher than specified.
- e. Improper field installation.

RECOMMENDATIONS FOR SPECIAL MATERIALS

To combat corrosion, abrasion, erosion, or pumping solids, foreign objects, or pumping liquids at elevated temperature, any such recommendations will be based on the best available experience of FYBROC and the supplier of the material and industry, BUT WILL NOT CONSTITUTE A GUARANTEE AGAINST THESE EFFECTS.

The foregoing warranty is made in lieu of all other warranties guarantees, obligations or liabilities, expressed or implied, by FYBROC or its representatives. All statutory or implied warranties, other than of title, are hereby expressly negated and excluded.

All illustrations and provisions in specifications are descriptive and are not intended as warranties. Penalty of any kind are not acceptable unless approved in writing by an officer of CECO Environmental Corporation.

GENERAL DESCRIPTION

Fybroc® Vertical Turbine Pumps (Series 8500) are centrifugal, diffuser type, single or multi-stage, wet pit type pumps for installation in a pit, well or a tank. All pump parts in contact with the fluid are constructed of glass reinforced vinyl ester (VR-1), vinyl ester with BPO-DMA cure (VR-1 BPO-DMA) or epoxy (EY-2) resin with the exception of the shaft and hardware, which are of an alloy selected for compatibility with the fluid pumped. These pumps have an open line shaft construction, with enclosed impellers keyed onto the shaft. There are several nonmetallic line bearings throughout the pump which are all product flushed and **DO NOT** require an external flush source. The drivers are vertical, solid shaft motors.

PRE-INSTALLATION

- 1) Inspect pump and any accessories packed with the unit to assure no damage has occurred during transit. Motors are shipped separately and should also be inspected. Extreme care should be exercised when unloading the equipment. If damage is evident the transporting company should be notified before uncrating and a claim should be filed.
- 2) If the unit is to be stored prior to installation, select a location which will not be subjected to the excess moisture, corrosive vapors, construction dust and debris, etc.
- 3) The pump will be supported inside of the crate by way of a special shipping bracket (to be removed before installation and **SAVED** for future use) Additional blocking will be placed where required. The parts and accessories may be in side of the crate or attached to skids or individual packages. Inspect all container, boxes and/or packages carefully for additional parts before discarding.
- 4) When the unit is ready to be installed, remove the top and sides of the crate. Unpack all parts and accessories and remove all fasteners holding the pump unit to the crate bottom.
- 5) Check the pump serial number (located on the nameplate, attached to the upper pedestal (Item 81) against the documentation to be sure that the correct unit is being installed in the correct location.
- 6) Cross check the pump name plate with the motor name plate and make sure that the speed and horsepower correspond.

- 7) Ensure that proper electrical service is available for the motor, per motor name plate.
- 8) Check the depth, diameter and straightness of the sump against the pump dimensions to be sure that there will be no interference. The minimum required clearance is shown on the Outline Drawing.
- 9) Check the proposed liquid level of the sump. The minimum submergence is shown on the Outline Drawing.
- 10) Clean the sump and piping before installing the pump.
- 11) Check all fasteners on the pump to make sure they did not get loose during transportation.

INSTALLATION

General:

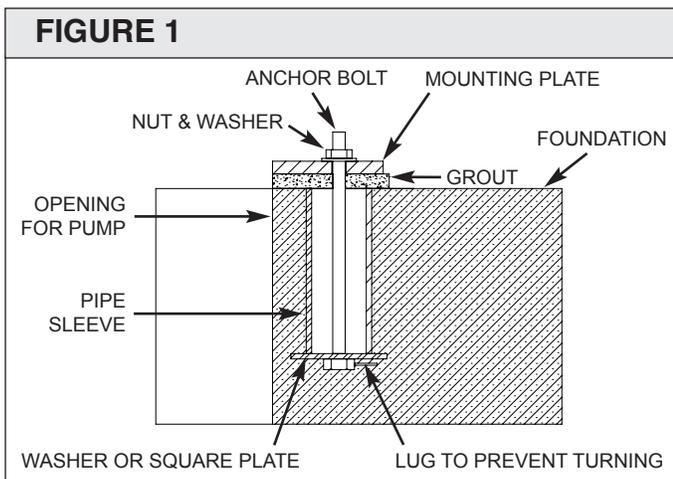
A Fybroc Vertical Turbine Pump is a precision machine, and satisfactory operation is greatly dependant on proper and careful installation.

- All machined mating surfaces (such as the top of the pedestal and motor flange) must be free of debris, rust, nicks and burrs. These surfaces should be cleaned with a piece of emery cloth.
- Pipe strain **MUST NOT** be transmitted to the discharge elbow. **DO NOT** force the piping to mate with the pump. Make sure that the piping is properly aligned to the pump. **A FLEXIBLE COUPLING IS HIGHLY RECOMMENDED BETWEEN THE DISCHARGE ELBOW AND PIPING.**
- All threads (such as those on the end of the pump shaft for the coupling and shaft mating threads) should be checked for damage and cleaned if necessary. Use thread lubricant (such as "Never Seez") sparingly on the threads. **DO NOT** allow lubricant to build up on the butt joints of the shaft. A square connection is critical for alignment.

FOUNDATION

The foundation should be level, providing rigid support for the pump and motor. It should also be of sufficient mass to dampen any vibrations developed. Typically this is accomplished by installing and grouting a Fybroc mounting plate on a concrete foundation.

Foundation bolts of the proper size should be embedded in the concrete with anti-rotation lugs, located by a drawing or template. A pipe sleeve 2x larger in diameter than the bolt should be used to allow enough lateral movement for final positioning of the bolts. (See Figure 1) Leveling wedges or shims should be placed under the sides of the mounting plate to level the unit and the foundation bolts slightly tightened.



INSTALLATION

- 1) Install the mounting plate onto the foundation.
IMPORTANT: The mounting plate **MUST** be level and supported on all four sides. Use leveling wedges or shims and grout to set the plate. Bolt down the mounting plate using all of the provided mounting holes.
- 2) **DO NOT INSTALL THE BYPASS FLUSH LINE TO THE BOTTOM BEARING PRIOR TO LIFTING THE PUMP. THE BASKET STRAINER SHOULD ALSO STAY OFF, IF APPLICABLE. THE SUCTION BELL AND WEB SHOULD BE PADDED WITH WOOD OR FOAM TO AVOID DAMAGE WHILE LIFTING. MINIMIZE DIRECT LOADING ON THE SUCTION BELL.**
- 3) **WHEN HANDLING THE PUMP UNIT, IT IS VERY IMPORTANT TO PICK UP THE UNIT BY THE TOP. REMOVE THE COUPLING GUARD.**

A rope or sling should be attached to the upper pedestal (Item 81). Serious damage may result if the unit is picked up by the column pipe (Item 91) or discharge elbow (Item 70).

- 4) Once the pump has been lifted, and prior to lowering it into the pit, install the flush line to the lower (suction bell) bearing. Also, if applicable, install the basket strainer.
- 5) The pump assembly must be lowered carefully into the pit, through the hole in the mounting plate. Care must be taken to guide the pump as it is lowered into the pit to avoid striking the sides.
- 6) There should be a minimum of 6 to 8 inches (depending on the pump size) between the bottom of the suction bell or basket strainer, and the bottom of the tank or pit. This clearance is specified on the outline drawing.
- 7) Bolt the pump to the mounting plate.
- 8) **INSTALL PUMP END COUPLING:** Slide pump hub onto pump shaft and install axial key. (This key may already be pinned into the pump hub) Thread the adjusting nut onto the pump shaft (as far down as it goes).
- 9) Lift the motor using the lifting eyes provided.
PROTECT MOTOR SHAFT TO AVOID DAMAGE.
- 10) Install motor-end coupling while the motor is lifted in the vertical position: Slide motor hub onto motor shaft until circular key way on shaft is exposed. Holding hub in this position, install the axial key and split circular key halves. Slide the motor hub down until it stops against the circular keys.
- 11) Install the motor onto the pedestal. Make sure it pilots properly into place. Secure the motor to the pedestal using the hardware provided.
MAKE SURE THAT THERE IS A GAP BETWEEN THE MOTOR HUB AND ADJUSTING NUT.
- 12) **VERY IMPORTANT: BEFORE PROCEEDING, THE MOTOR SHOULD BE WIRED AND DIRECTION OF ROTATION CHECKED. SEE ARROW ON PEDESTAL. MOTOR SHOULD ROTATE CLOCKWISE WHEN LOOKING DOWN AT THE TOP END OF THE MOTOR. REVERSE ROTATION CAN RESULT IN SERIOUS DAMAGE TO THE PUMP!!!**

IMPELLER ADJUSTMENT – ALL MODELS

The impeller adjustment on all models is accomplished through the coupling.

After the proper motor rotation direction is established, set the gap “A” (see Figure 2) between the adjusting nut and motor hub according to Table 1. “A” is the distance that the impeller must be raised.

- 1) Set the distance “A” by turning the adjusting nut.
- 2) Insert (1) long bolt through the motor hub.
- 3) Turn adjusting nut slightly until the bolt drops through a hole on the adjusting nut and through the pump coupling.
- 4) Install a nut on the end of the bolt.
- 5) Install remaining bolts and nuts.
- 6) Snug up the bolts and nuts until the coupling is drawn together securely. Tighten nuts to values shown in Table 2.

TABLE 1	
Dimensions	“A”
6X10X8	0.094
6X12X9	0.094
8X14X10	0.125
8X15X11	0.125

- 7) Turn the coupling by hand. **THE SHAFT SHOULD TURN FREELY WITH MINIMAL TORQUE. SOME SLIGHT RUBBING MAY BE NORMAL WITH A NEW PUMP BUT THERE SHOULD BE NO SIGNIFICANT BINDING.**

MECHANICAL SEAL ADJUSTMENT

After the impeller/coupling is set, the mechanical seal can be set. If using our standard John Crane 4610 Mechanical Seal:

- 1) Tighten all four set screws.
- 2) Connect the 1/4" NPT fitting to the gland.
- 3) Install the provided flush tubing.

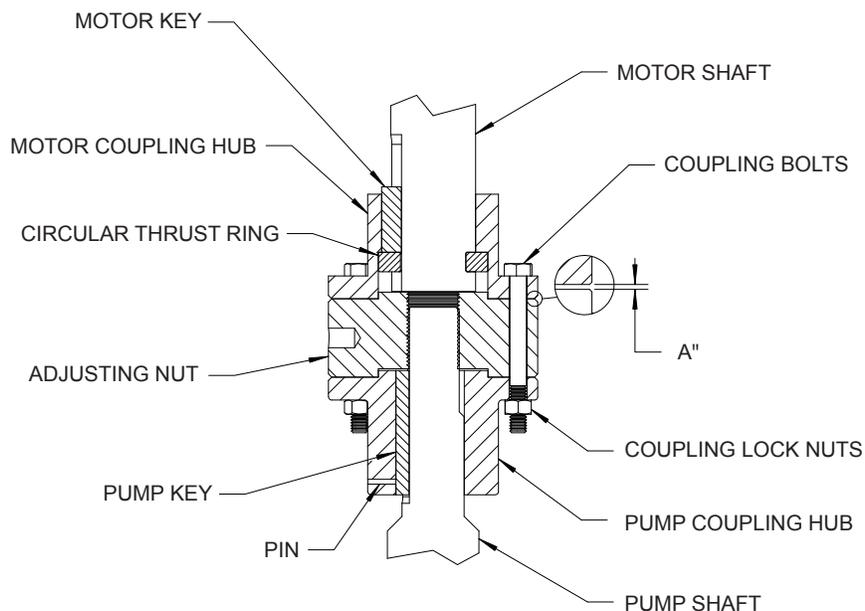
(For other seal options, see manufacturer’s instructions.)

COUPLING GUARD

Reinstall the coupling guard. Put the flush tubing through the hole in the back guard prior to installing any other fittings onto the tubing.

TABLE 2	
Coupling Size	Torque (ft*lbs)
1125	11
1625	21
2125	85

FIGURE 2



TROUBLESHOOTING

PUMP PROBLEM	PROBABLE CAUSE	SOLUTION
Pump does not run	<ol style="list-style-type: none"> 1. Motor issues <ol style="list-style-type: none"> a. Incorrect connections b. Incorrect control box c. Low voltage d. Blown fuse 2. Faulty switch 3. Faulty controls 4. Bad motor 5. Pump binding 	<ol style="list-style-type: none"> 1. Evaluate motor components. <ol style="list-style-type: none"> a. Check wiring diagram on motor and starter. b. Check specifications for HP, voltage, frequency. c. Check voltage at the motor. d. Replace fuse. 2. Repair or replace. 3. Check wiring, repair or replace. 4. Repair or replace. 5. Isolate motor, remove coupling guard, turn by hand. If the pump shaft does not turn by hand, check impeller adjustment. If OK, disassemble the pump to determine cause of binding.
No liquid delivered	<ol style="list-style-type: none"> 1. Insufficient submergence 2. Speed too low 3. Impeller eye or strainer is completely plugged 4. Lift too high for pump 5. Check valve issue 6. Pump running in reverse 7. Excessive air or gas in the liquid 	<ol style="list-style-type: none"> 1. Check liquid level in the pit. 2. Check nameplate RPM. Run motor at specified RPM. 3. Disassemble pump, check impeller and strainer. 4. Check pump performance curve. 5. Check mounting direction and manual operation. 6. Verify direction of rotation. 7. Correct.
Not enough liquid delivered	<ol style="list-style-type: none"> 1. Insufficient submergence 2. Speed too low 3. Impeller eye or strainer is partially plugged 4. Lift too high for the pump 5. Impeller is damaged 6. Excessive air or gas in the liquid 7. Excessive wear 8. Leaks somewhere in the system 	<ol style="list-style-type: none"> 1. Remove or decrease amount of air or gas in liquid. 2. Check nameplate RPM. Run motor at specified RPM. 3. Disassemble pump, check impeller and strainer. 4. Check pump performance curve. 5. Disassemble the pump, check impeller. 6. Correct. 7. Check impeller, diffuser and bell clearances. 8. Correct. 9. Repair Leaks.
Motor overloading	<ol style="list-style-type: none"> 1. Speed too high 2. Line voltage to motor incorrect 3. Pumping beyond the design point 4. Pump is binding 5. Impeller is dragging 6. Liquid is heavier than specified 	<ol style="list-style-type: none"> 1. Check nameplate RPM. Run motor at specified RPM. 2. Correct. 3. Modify line voltage to acceptable values. 4. Check pump performance curve. 5. Check mounting plate is level, shaft turns freely. 6. Check impeller adjustment. 7. Check viscosity and specific gravity of liquid.
Pump is noisy	<ol style="list-style-type: none"> 1. Pump is running close to shut-off 2. Pump is cavitating 3. Shaft is bent 4. Rotating parts are binding 5. Pump or motor bearings are worn 6. Pump and motor are misaligned 7. Pipe strain causing bending, misalignment 	<ol style="list-style-type: none"> 1. Check performance curve, open discharge valve. 2. Check performance curve. 3. Repair or replace the shaft. 4. Disassemble and inspect. 5. Disassemble and inspect. 6. Re-align pump/motor to acceptable limits. 6. Check and correct. 7. Correct.
Excessive wear	<ol style="list-style-type: none"> 1. Sand or abrasives in the liquid 2. Rotating parts are binding 3. Cavitation 	<ol style="list-style-type: none"> 1. Remove piping strain. 2. Correct, clean. Pump not designed to pump sand. 3. Remove sand and/or abrasives from liquid. Replace VR-1 parts with VR-1A. 4. Disassemble, inspect, correct. 5. Check performance curve.

PERIODIC MAINTENANCE

- 1) Periodically check the flush line from the mechanical seal. There should be a continuous, light stream of liquid flowing out of the mechanical seal gland at all times.
- 2) Check for noise (mechanical or hydraulic) and vibration.
- 3) Check discharge pressure gauge periodically.

DISASSEMBLY

- 1) Shut off Motor. Close all valves to pump isolating the pump from the system. Disconnect the power supply to the motor.
- 2) Disconnect discharge pipe.
- 3) Remove the coupling guards.
- 4) Loosen the mechanical seal set screws.
- 5) Remove the long bolts and lock nuts from the coupling. (A gap should appear between the adjusting nut and motor hub of the coupling.)
- 6) Unbolt motor and remove from motor support.
- 7) Remove the adjusting nut and pump coupling hub from the pump shaft.

NOTE: At this point in the disassembly, the mechanical seal (Item 89) and/or the entire stuffing box (Item 17) can be removed for maintenance without removing the entire pump. If the entire pump is being removed, leave the stuffing box in place.

- 8) Remove the four bolts (Item 81E) holding the pump to the mounting plate.
- 9) Remove the pump unit from the pit, through the hole in the mounting plate.
- 10) Remove the flush tubing (Item 127) to the suction bell bearing. (Also remove the basket strainer if applicable)
- 11) Pad the suction bell with wood or other to avoid damage while setting the pump down.
- 12) When the pump is lying in the horizontal position, the pump column and shaft should be supported to remove any bending stress from the shaft. (The shipping bracket can also be reinstalled for convenience, to provide better support.)
- 13) Separate the Discharge Bowl (Item 1) from the Column Assembly (Item 91 or 91A) by removing the bolts, nuts and washers (Items 96B, 96C, 96D, 96E). The entire pump end should slide out easily with the shaft. **DO NOT FORCE IT.** (If it is difficult to pull out, go back and make sure the mechanical seal set screws are loose and the coupling has been removed completely.) **MAKE SURE TO KEEP THE PUMP END SUPPORTED WHILE PULLING IT OUT TO MINIMIZE BENDING STRESS ON THE SHAFT.**

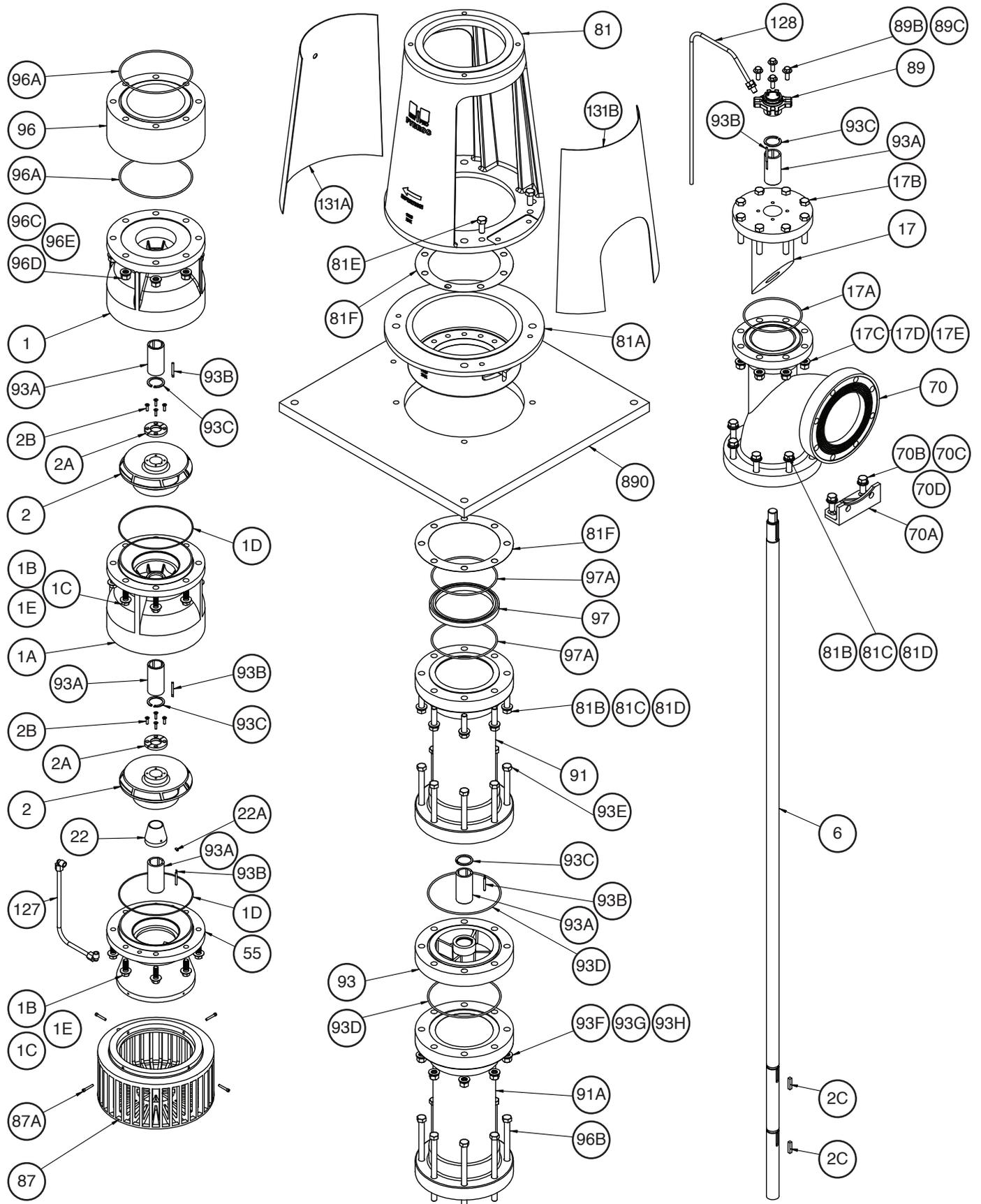
- 14) The pump end with the shaft can be removed completely and set aside where it is more convenient to work. (Depending on the length of the pump, it may not be possible or convenient to pull out the entire shaft. If the shaft is more than 10 feet (3 meters) long, it will be split somewhere along the length of the shaft. Use the flats machined into the shafts to unscrew one shaft from another. (The threads are normal Right-Hand Threads).
- 15) Disassemble the pump end from the Discharge Bowl (Item 1) down, not in reverse. So, for a multi-stage pump, separate the discharge bowl (bowl closest to the discharge) from the bowl below it (Item 1A). For a single stage pump, separate the discharge bowl (Item 1) from the suction bell (Item 55).
- 16) Slide the discharge bowl "up the shaft", away from the impeller.
- 17) Use an allen wrench to remove the four screws (Item 2B) holding the locking ring (Item 2A) to the impeller (Item 2).
- 18) Slide the impeller "up the shaft" and remove the impeller key (Item 2C) from the shaft.
- 19) Repeat steps 15-18 (x number of stages).
- 20) Remove the sleeve bearing (Item 93A) from each bowl by first removing the snap ring (Item 93C) then the pin (Item 93B). The sleeve bearing can then be tapped out of the bowl from the opposite side.
- 21) Remove the sleeve bearing (Item 93A) from the suction bell by loosening the set screw on the bottom. Once the set screw is loose, the sleeve bearing will be free to slide out.
- 22) To remove and/or replace the sleeve bearing (Item 93A) from the column bearing holder (Item 93) the column bearing holder must first be separated from the column assemblies by removing the hardware (Items 93E, F, G & H). After removing the bearing holder, remove the snap ring (Item 93C) then remove the pin (Item 93B). The sleeve bearing can then be tapped out from the opposite side of the bearing holder.

TO REASSEMBLE, REVERSE DISASSEMBLY INSTRUCTIONS.

- 22) To remove and/or replace the sleeve bearing (Item 93A) from the column bearing holder (Item 93) the column bearing holder must first be separated from the column assemblies by removing the hardware (Items 93E, F, G & H). After removing the bearing holder, remove the snap ring (Item 93C) then remove the pin (Item 93B). The sleeve bearing can then be tapped out from the opposite side of the bearing holder.

TO REASSEMBLE, REVERSE DISASSEMBLY INSTRUCTIONS.

FYBROC SERIES 8500 - PARTS AND STANDARD MATERIALS OF CONSTRUCTION



Item Number	Description	Standard Material
1	Bowl (Discharge)	VR-1
1A	Bowl (Intermediate)	VR-1
1B	Bolt, Bowl	316 SS
1C	Flat Washer, Bowl	316 SS
1D	O-Ring, Bowl	Viton
1E	Lock Washer, Bowl	316 SS
2	Impeller	VR-1
2A	Impeller Locking Ring	VR-1
2B	Impeller Screw	316 SS
2C	Key, Impeller	316 SS
6	Shaft	316 SS
17	Stuffing Box	VR-1
17A	O-Ring, Bowl	316 SS
17B	Bolt, Stuffing Box	316 SS
17C	Flat Washer, Stuffing Box	316 SS
17D	Lock Washer, Stuffing Box	316 SS
17E	Hex Nut, Stuffing Box	316 SS
22	Lower Bearing Cap	VR-1
22A	Bearing Cap Set Screw	316 SS
55	Suction Bell	VR-1
70	Discharge Elbow – 8"	VR-1
70A	Elbow Support	Steel
70B	Bolt, Elbow Support	316 SS
70C	Flat Washer	316 SS
70D	Lock Washer, Elbow Support	316 SS
81	Upper Pedestal	Ductile Iron
81A	Lower Pedestal	Ductile Iron
81B	Hex Bolt, Lower Pedestal	316 SS
81C	Flat Washer, Lower Pedestal	316 SS
81D	Lock Washer, Lower Pedestal	316 SS
81E	Hex Bolt, Upper Pedestal	316 SS

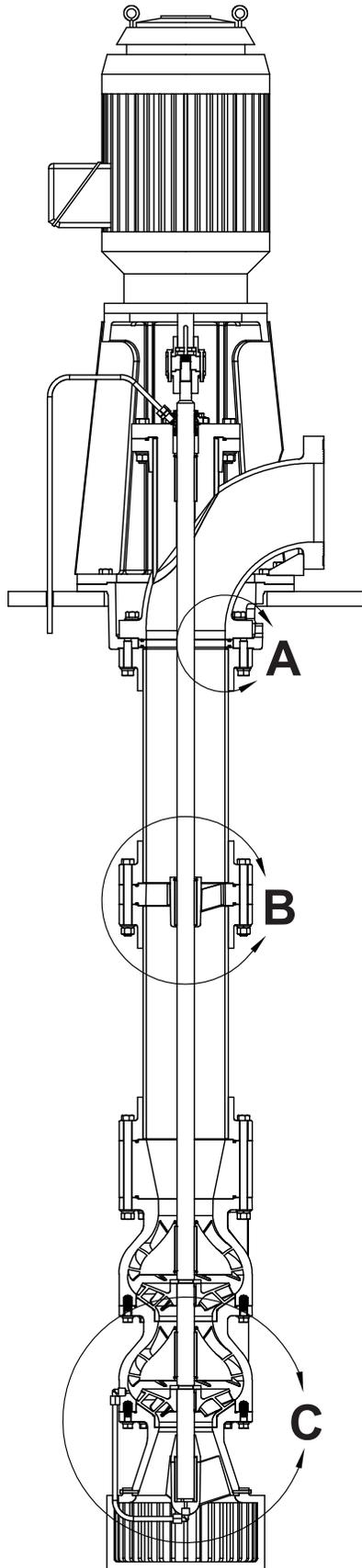
Item Number	Description	Standard Material
81F	Gasket, Lower Pedestal	Viton
87	Strainer Basket	VR-1
87A	Screw, Strainer	316 SS
89	Single Cartridge Seal	Assembly
89B	Bolt, Mechanical Seal	316 SS
89C	Flat Washer, Mechanical Seal	316 SS
91	Column (Upper)	VR-1
91A	Column (Intermediate)	VR-1
93	Column Bearing Holder	VR-1
93A	Sleeve Bearing	PPS
93B	Sleeve Bearing Pin	Teflon
93C	Sleeve Bearing Snap Ring	Polypro
93D	O-Ring, Bearing Holder	Viton
93E	Bolt, Bearing Holder	316 SS
93F	Flat Washer, Bearing Holder	316 SS
93G	Lock Washer, Bearing Holder	316 SS
93H	Hex Nut, Bearing Holder	316 SS
96	Spool Piece	VR-1
96A	O-Ring, Spool Piece	Viton
96B	Bolt, Spool Piece	316 SS
96C	Flat Washer, Spool Piece	316 SS
96D	Lock Washer, Spool Piece	316 SS
96E	Hex Nut, Spool Piece	316 SS
97	Sealing Plate	VR-1
97A	O-Ring, Sealing Plate	Viton
127	Flush Tubing, Suction Bell	Polypro
128	Flush Tubing, Mechanical Seal	Polypro
131A	Coupling Guard – Back	Steel
131B	Coupling Guard – Front	Steel
890	Mounting Plate	FRP

NOTES:

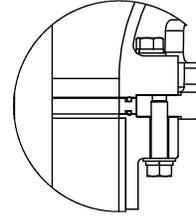
1. ABOVE REPRESENTS TYPICAL CONFIGURATION, OTHER MATERIALS ARE AVAILABLE.

2. COMPONENTS SHOWN ARE BASED ON A 2-STAG PUMP WITH 2 COLUMNS. QUANTITIES WILL CHANGE WITH PUMP LENGTH AND NUMBER OF STAGES.

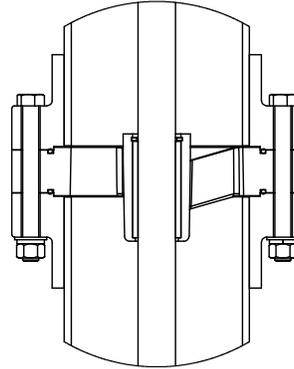
FYBROC SERIES 8500 – TYPICAL SECTIONAL



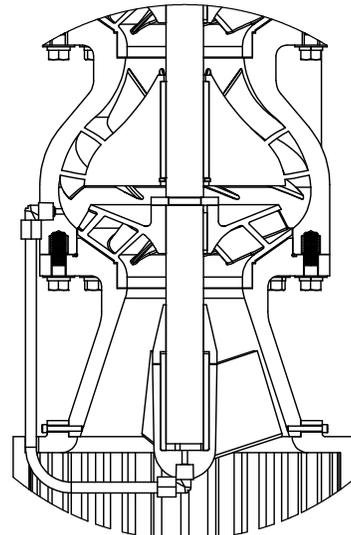
DETAIL A
SCALE 1:8



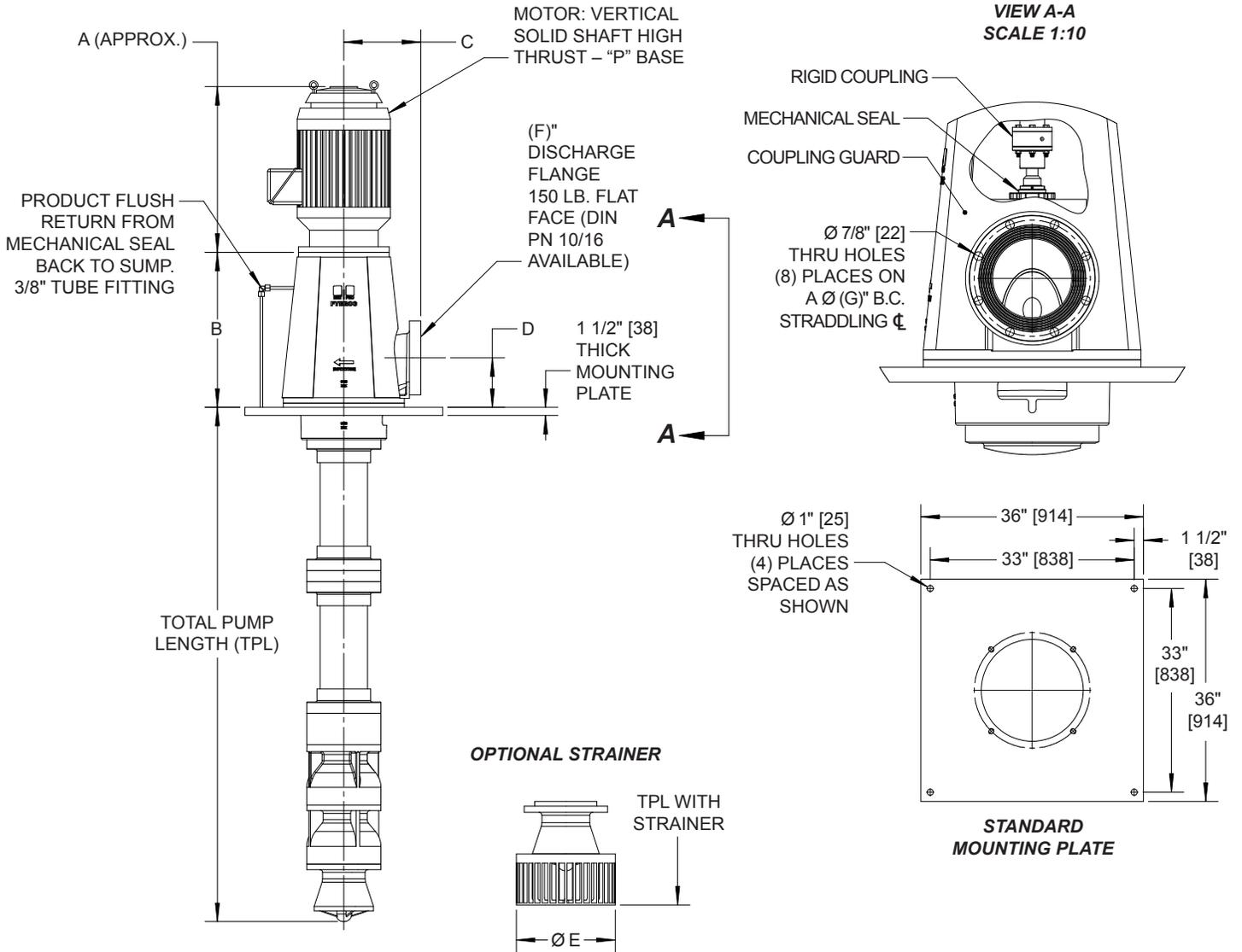
DETAIL B
SCALE 1:8



DETAIL C
SCALE 1:8



FYBROC SERIES 8500 – PUMP DIMENSIONS



FOR REFERENCE ONLY. DO NOT USE FOR INSTALLATION.

MOTOR FRAME DIMENSIONS	
MOTOR FRAME	A (INCHES) [mm]*
182-184 VP	19 [483]
213-215 VP	19 [483]
254-256 VP	25 [635]
284-286 VP	28 [711]
324-326 VP	30 [762]
364-365 VP	32 [813]
405 VP	47 [1194]
444 VP	48 [1219]
447 VP	52 [1321]

DIMENSIONS				
	6X10X8	6X12X9	8X14X10	8X15X11
B	22 1/8 [562]	22 1/8 [562]	28 1/4 [718]	28 1/4 [718]
C	11 1/2 [292]	11 1/2 [292]	14 [356]	14 [356]
D	8 [203]	8 [203]	8 [203]	8 [203]
E	13 1/2 [343]	13 1/2 [343]	16 [406]	16 [406]
F	6 [152]	6 [152]	8 [203]	8 [203]
G	9 1/2 [241]	9 1/2 [241]	11 3/4 [299]	11 3/4 [299]

* “A” DIMENSION IS APPROXIMATE AND MAY VARY ACCORDING TO MOTOR MANUFACTURER.

NOTE: ALL DIMENSIONS IN INCHES AND [MILLIMETERS].

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Blank area for notes.

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