



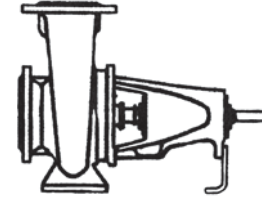
Fire Protection

FP-XA End
Suction



PRODUCT BULLETIN MODEL FP-XA END SUCTION

CPS Model FP-XA End Suction pumps are used in a variety of fire fighting applications. These rugged and efficient centrifugal pumps are designed for long life and low operational costs. Each model is of the back pull out design so when the need arises for repair or inspection, system piping does not need to be disturbed.



Material Specifications

PART	CONSTRUCTION
	BRONZE FITTED
Casing	Cast Iron
Impeller	Bronze
Shaft Sleeve	Bronze
Shaft	420 Stainless Steel
Case Wear Ring	Bronze
Power Frame	Cast Iron
Bearing Caps	Cast Iron
Bolts, Studs & Nuts	Steel
Packing	Carbon Graphite

MODEL FP-XA SPECIFICATIONS

Casing: The casing is constructed of high tensile cast iron or other specified material. It is of the volute type, carefully and accurately proportioned to permit smooth flow and to convert high velocity energy of the fluid as it leaves the impeller into pressure. Suction and discharge nozzles are casted integral with the volute and are of 250 psi dimensions. All XA models feature a 250 psi case working pressure. The casing has cast integral feet standard and the discharge port is of the vertical centerline type. Necessary vent and drain openings are provided.

Impeller: The impeller is of the end suction type, casted in one piece of bronze or other specified material. All impellers are hydraulically and dynamically balanced prior to assembly and all impellers have pump out vanes standard on the back side of the impeller to reduce material from building up near the stuffing box.

Case Wear Ring: Standard enclosed impellers are designed with integral case wear rings accurately turned to provide close running fits in casing. The diameters of these rings are such as to reduce end thrust to a minimum. On larger models a rear case wear ring is provided for additional wear resistance.

Shaft: The shaft is of high strength 420 stainless steel, ground to accurate dimensions and polished to a smooth surface. It is designed for extra stiffness to avoid all critical speeds in operation. The shaft is

protected by a shaft sleeve of ample thickness to ensure long life. The shaft sleeve can be supplied in various materials.

Casing Adapter: The casing adapter is constructed of cast iron or other specified material. The casing adapter connects the six (6) power frame assemblies to the forty-three (43) casing assemblies. The casing adapter also houses the packing and has an integral flush line standard for stuffing box lubrication. When the casing assembly is supplied of optional material, the casing adapter is also constructed of the same material due to the fact that it is also in contact with the pumped fluid.

Power Frame: The power frame is constructed of high tensile cast iron and provides support for the inboard and outboard bearings. Each bearing is of the deep groove, single row type designed to carry all thrust and radial loads encountered by the pump. All bearings are sized to maintain a minimum of 50,000 hour bearing life. Each bearing housing is sealed from water leakage by the use of an oil lip seal. The power frame has an integral oil sump that provides oil for lubrication to each bearing. An oil level eye is provided standard on the power frame to visually indicate the oil level.

Stuffing Box: The stuffing box is sized for packing with a lantern ring standard.

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Fire Protection

PRODUCT BULLETIN
MODEL FP-XA END SUCTION

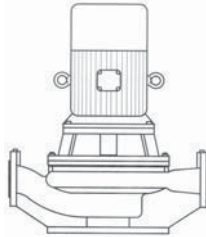


Fire Protection

FP-KTG
Vertical Inline



PRODUCT BULLETIN MODEL **KTG** END SUCTION



CPS Model FP-KTG End Suction pumps are used in a variety of fire fighting applications. These rugged and efficient centrifugal pumps are designed for long life and low operational costs. Each model is of the back pull out design so when the need arises for repair or inspection, system piping does not need to be disturbed. FP-KTG models offer centerline suction and discharge and can be mounted in several different orientations.

Material Specifications

PART	CONSTRUCTION
	BRONZE FITTED
Casing	Cast Iron
Impeller	Bronze
Shaft Sleeve	Bronze
Shaft	420 Stainless Steel
Case Wear Ring	Bronze
Power Frame	Cast Iron
Bearing Caps	Cast Iron
Bolts, Studs & Nuts	Steel
Packing	Carbon Graphite

MODEL FP-KTG SPECIFICATIONS

Casing: The casing is constructed of high tensile cast iron or other specified material. It is of the volute type, carefully and accurately proportioned to permit smooth flow and to convert high velocity energy of the fluid as it leaves the impeller into pressure. Suction and discharge nozzles are casted integral with the volute and are of 250 psi dimensions. All KTG models feature a 250 psi case working pressure. The casing has a cast integral foot standard with the suction and discharge ports are on the same centerline. Necessary vent and drain openings are provided.

Impeller: The impeller is of the end suction type, casted in one piece of bronze or other specified material. All impellers are hydraulically and dynamically balanced prior to assembly and all impellers have pump out vanes standard on the back side of the impeller to reduce material from building up near the stuffing box.

Case Wear Ring: Standard enclosed impellers are designed with integral case wear rings accurately turned to provide close running fits in casing. The diameters of these rings are such as to reduce end thrust to a minimum. On larger models a rear case wear ring is provided for additional wear resistance.

Shaft: The shaft is of high strength 420 stainless steel, ground to accurate dimensions and polished to a smooth surface. It is designed for extra stiffness to avoid all critical speeds in operation. The shaft is protected by a shaft sleeve of ample thickness to ensure long life. The shaft sleeve can be supplied in various materials.

Casing Adapter: The casing adapter is constructed of cast iron or other specified material. The casing adapter connects the six (6) power frame assemblies to the forty-three (43) casing assemblies.

Power Frame: The power frame is constructed of high tensile cast iron and provides support for the inboard and outboard bearings. Each bearing is of the deep groove, single row type designed to carry all thrust and radial loads encountered by the pump. All bearings are sized to maintain a minimum of 50,000 hour bearing life. Each bearing housing is sealed from water leakage by the use of an oil lip seal. The power frame has an integral oil sump that provides oil for lubrication to each bearing. An oil level eye is provided standard on the power frame to visually indicate the oil level.

Stuffing Box: The stuffing box is sized for packing with a lantern ring standard.

Motor: All KTG models utilize standard, stocked, C-Face motors that are available in many different voltages, speeds and enclosures. Each motor can be removed from the unit without complete disassembly of the pump. Also, pumps can be stocked complete, less driver and fully assembled ready for usage when the need arises. This flexibility allows the user more many additional options that JM motors do not offer. All KTG models are driven by the motor keyway requiring no special machining or drilling operation.

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PRODUCT BULLETIN
MODEL FP-XA END SUCTION

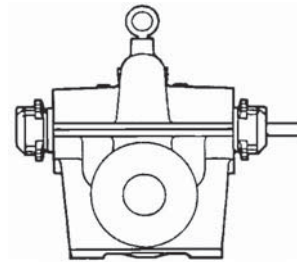


Fire Protection

FP-SP
Split Case



PRODUCT BULLETIN MODEL FP-SP DOUBLE SUCTION



Applications

CPS Model SP Double Suction pumps are used in a variety of industries. These rugged and efficient centrifugal pumps are designed for long life and low operational costs. Each model has a removable rotating assembly that can be serviced without disturbing the driver or piping. Models are available in a packed or mechanically sealed orientation for use in demanding applications.

Material Specifications

PART	CONSTRUCTION
	BRONZE FITTED
Casing	Cast Iron
Impeller	Bronze
Shaft Sleeve	Bronze
Stuffing Box	Cast Iron
Shaft	420 Stainless Steel
Case Wear Ring	Bronze
Bolts, Studs & Nuts	Steel
Packing	Graphite Braid
Mechanical Seal	Carbon/Si-C/Buna

MODEL FP-SP SPECIFICATIONS

Casing: The casing is of high tensile cast iron or other specified material. It is of the volute type with double suction, split on the horizontal centerline with the suction and discharge nozzles cast integral with the lower half. Suction and discharge nozzles are casted of 250 psi dimensions and all models feature a 250 psi case working pressure. Removal of the upper casing gives complete access to the interior of the pump without disturbing piping connections or pump alignment. The casing utilizes *Thru-Bore* lineboring technology simplifying the machining operation and allows the advantage of using only a few modular rotating assemblies. The *Thru-Bore* feature allows for the complete removal and replacement of the stuffing boxes without replacing the casing.

Impeller: The impeller is of the double suction, enclosed, non-overloading type. It is made of bronze, or other specified material, machined and polished all over and dynamically and hydraulically balanced. The impeller is keyed to the shaft and secured by locknuts. It is adjustable for position.

Case Wear Rings: Case wear rings are made of bronze or other specified material. They are designed with a large wearing surface with the diameter at wearing surface reduced to a minimum, and are firmly secured in the casing by dowel pins.

Shaft: The shaft is of 420 stainless steel, ground and polished to a smooth surface. It is designed for extra stiffness to avoid all critical speeds in operation, and is threaded for bearing and impeller lock nuts. The portion of the shaft that is exposed to the pumped fluid is covered

with renewable bronze shaft sleeves screwed on against the impeller with right and left hand threads which cannot work loose during operation. Shaft sleeves have external o-rings, in lieu of internal o-rings, to stop leakage of product.

Stuffing Boxes/Seal Chambers: The stuffing boxes are extra deep, being designed for packing and lantern ring. Under each stuffing box is a drip pocket with tapped drain outlet. The stuffing boxes are completely removable and replaceable.

Bearings: Both the inboard and outboard ball bearings are of the single row, deep groove type, precision grade, with cartridge mounting, permitting the removal of the shaft without exposing or disturbing the bearing assembly. They are of extra large capacity for both radial and thrust loads. The outboard bearing is confined rigidly in the bearing housing to take end thrust, while the inboard bearing is set with sufficient clearance to allow for shaft expansion. All bearings are sized to maintain a minimum of 50,000 hour bearing life. Each bearing is designed for grease lubrication and is provided with a water slinger to prevent leakage from the stuffing box into the bearing. A zerk fitting is furnished for each bearing. Each bearing housing is sealed from water leakage by the use of an oil lip seal.

Both bearings can be removed and replaced without removing the rotating assembly from the pump, greatly simplifying the repair process.



Fire Protection

FP-VT
Vertical Turbine



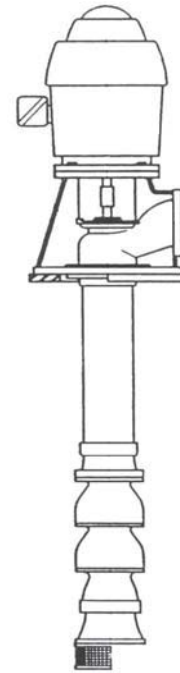
PRODUCT BULLETIN MODEL FP-VT CAST IRON HEAD VERTICAL TURBINE

Short-Set Cast Iron Head Vertical Turbines

The CPS Vertical FP-VT Turbine pumps are designed for long, dependable life in fire fighting applications. CPS Engineers have met this demand with the vertical turbines offered today. We have incorporated in our design, ideas and suggestions from competent engineers from all sections of the country.

Material Specifications

PART	CONSTRUCTION		
	BRONZE FITTED	ALL IRON	ALL BRONZE
Bowl Assembly	Cast Iron	Cast Iron	Bronze
Bowl Bearings	Bronze	Bronze	Bronze
Impeller(s)	Bronze	Cast Iron	Bronze
Bowl Shaft	416 SS	416 SS	416 SS
Strainer	Galvanized Steel	Galvanized Steel	Galvanized Steel
Discharge Column	A53 Steel	A53 Steel	A53 Steel
Column Shaft	C1045 Steel	C1045 Steel	C1045 Steel
Column Bearings	Rubber	Rubber	Rubber
Discharge Head	Cast Iron	Cast Iron	Cast Iron



PUMPING CONDITIONS:

Fluid to be Pumped:
Design Capacity (USGPM):
Differential Head (FEET):
Maximum RPM:
Minimum acceptable bowl efficiency, (%):
Viscosity (SSU):
Specific Gravity:
Suction Pressure (PSIG)
Temperature (°F):

COMMERCIAL
Fire Protection

PRODUCT BULLETIN
MODEL FP-VT VERTICAL TURBINE



MODEL SHORT SET CAST IRON VT SPECIFICATIONS

Bowl Assembly: The pump bowls shall be of close grained, cast iron ASTM A48 Class 30. The water passages on bowl sizes 6" through 16" shall be lined with porcelain enamel or fusion epoxy lined to reduce friction loss, shall be free of blow holes, sand holes and other detrimental defects, and shall be accurately machined and fitted. The impellers shall be of bronze (enclosed or semi-open) and dynamically balanced. Impellers through 16" shall be securely fastened to the shaft with taper split bushings of steel. Larger sizes shall be double-keyed. Impellers shall be adjusted vertically by an external means.

The pump shaft shall be of A582 grade 416 stainless steel, turned, ground and polished. It shall be supported by bronze bearings above and below each impeller. The suction case bearing shall be grease lubricated and protected by a bronze sand collar. The size of the shaft shall be no less than that determined by ANSI/AWWA Specifications E101, Section A4.3 paragraph 4.3.3.

Strainer: A _____ basket type clip-on strainer shall be provided having a net inlet area equal to at least four times the suction pipe area. The maximum opening size shall not be more than 75 percent on the minimum opening of the water passage through the bowl and impeller.

Column Assembly: The lineshafts shall be of _____. They shall be furnished in inter-changeable sections not over _____ feet in length.

The butting faces shall be machined square to the axis of the shaft, with maximum permissible axial misalignment on the thread axis with the shaft axis 0.002" in 6". The size of the shaft shall be no less than that determined by ANSI/AWWA-E101 Specifications Section 5.5 for C1045 lineshaft and shall be such that elongation due to hydraulic thrust will not exceed the axial clearance of the impellers in the pump bowls. Maximum runout in 10' shall not exceed 0.005".

The lineshafts shall be provided with ASTM A269 grade 304 stainless steel threaded sleeves at the location of each lineshaft bearing. The use of glues or any other means of securing the sleeve to the shaft, that is not field replaceable without the use of heat or special tools is not acceptable. The lineshaft bearing shall be of 70 minimum shore hardness, neoprene, snap-in type, internally spiral grooved to flush out sand and other abrasives, mounted inside bronze bearing retainers held in position in the column pipe. Bearing spacing shall not exceed 10' for 1800 RPM of 5' for 2200 RPM and above.

The outer column pipe shall be 5" and larger of ASTM A53 grade B steel pipe of ASTM A120 in interchangeable sections not over 10' in length for 1800 RPM and 5' in length for 2200 RPM and above.

THREADED: The ends of each section faced parallel and machined with 8 straight threads per inch permitting the end to butt and insuring alignment when connected by standard mill steel coupling.

FLANGED: The column assembly shall be flanged and machined to accept bearing retainer in such a way as not to allow any movement of retainer after flanges are bolted securely together and to implement proper

sealing of the column. The weight of the column pipe shall be no less than that stated in ANSI/AWWA Specification E101, Section 5.1 "Standard Specifications for Discharge Column Pipe." The column size shall be such that friction loss will not exceed 5' or 100', based on the rated capacity of the pump. If possible, the column size shall be such also be such as to provide a velocity of not less than 5 feet per second at the rated capacity.

Top and bottom sections of column pipe on product lubricated pumps shall not exceed 5' in length.

Discharge Head: The discharge head shall be of close grain, cast iron, ASTM A48 class 30, free of sand holes and other defects, accurately machined and with a surface discharge. Discharge flange shall be machined and drilled to ANSI standards for 125 lb. rating and shall be _____ inches nominal inside diameter. The top of the discharge head shall have a rabbet fit to accurately locate the vertical hollow shaft driver, and have a diameter equal to the drive base diameter (BD) and less than _____ inches.

The standard cast iron stuffing box shall be rated for 125 PSI discharge pressure and shall be fitted with graphite acrylic packing. It shall have a lantern ring or grease chamber placed as required below the top packing ring. Throttle bearing shall be bronze with stainless steel bolting and with brass or stainless steel adjusting nuts. Sealing between the stuffing box and the discharge head shall be accomplished by means of an o-ring.

If the discharge pressure exceeds 125 PSI, a high pressure bypass style packing box shall be supplied with a minimum of six rings of packing and two lantern rings and a bypass to sump.

The top lineshaft can be of _____ and shall not exceed 10' in length and can be equipped with a 304 stainless steel threaded replacement sleeve locked in place by a lineshaft coupling for packing wear area. Impeller adjustment shall be provided at the top of the headshaft by means of adjusting nut which shall be positively locked in position. The headshaft shall also be _____ and shall be connected to the top lineshaft beneath the motor to facilitate ease of assembly and maintenance.

Motor: The electric motor shall be vertical hollow shaft _____ RPM., three phase (50 or 60 Hz) _____ volts with a non-reverse ratchet, P-base, squirrel cage induction design. Enclosure shall meet NEMA weather protected type 1 design with stainless steel screens to prevent entrance of rodents. Motor shall have Class B or Class F insulation with temperature rise as specified by NEMA standards for class insulation used and shall have a 1.15 service factor.

Thrust bearing shall be chosen to handle the continuous down thrust as specified by the pump manufacturer with an AFBMA B-10 one-year minimum or five year average life under design conditions. Provisions shall be made for momentary upthrust equal to 30 percent of rated down thrust. The motor rating shall be such that at design it will not be loaded beyond nameplate rating and at no place on the pump curve shall the loading exceed the service factor.

SHORT SET VERTICAL TURBINE SECTIONAL DRAWING

Item Number	Item Description
1	Discharge Head
2	Head Column Flange
3	Head Column Flange Gasket
4	Studs
5	Nuts
6	Head Discharge Flange
7	Head Discharge Flange Gasket
8	Discharge Flange Assembly Cap Screws
9	Discharge Flange Assembly Nuts
10	Head Discharge Flange Assembly Studs
11	Head Discharge Flange Assembly Nuts
14	Head Packing Housing with Bearing
15	O-Ring
16	Head Packing Housing Cap Screws
17	Oil Lubricated Headshaft
18	Water Lubricated Headshaft
18A	Top Shaft
19	Headshaft Flinger
20	Headshaft Adjusting Nut
22	Packing (Set)
23	Packing Follower
25	Head Packing Housing Grease Fittings
26	Packing Follower Studs
27	Packing Follower Retainer Nuts
28	Adapter Flange
29	Adapter Flange O-Ring
30	Adapter Flange Assembly Cap Screws
31	Oil Lubricated Headshaft Bearing
32	Water Lubricated Headshaft Bearing
33	Water Lubricated Headshaft Bearing
34	Adjusting Nut Machine Screw
40	I/C Tension Nut
41	Tension Nut Set Screw
42	I/C Seal Ring
43	I/C Seal Ring Nut
44	Headshaft Bearing Assembly Cap Screws
45	Headshaft Bearing Dust Seal
49	Solenoids Valve
53	Vented Sight Drip Valve
54	Tubing for Oil Lubrication
55	Oil Line Connector for Headshaft Bearing
59	Oil Level Sight Glass
63	2' Long O/C Adapter Nipple TBE Top Section
64	Inner Column Adapter 2' 4" Long Stretch Nipple
65	Oil Lubricated Lineshaft Bearing
66	Oil Lubricated Lineshaft Adapter Bearing
67	Shaft Coupling
68	Shaft Adapter Coupling
69	O/C Coupling

Item Number	Item Description
70	Oil Lubricated O/C Section (10' 0" long) TBE
71	I/C Section (5' 0" long)
72	Oil Lubricated L/S Section (10' 0" long)
73	Oil Lubricated O/C Section (5' 0" long) TBE
74	Oil Lubricated L/S Section (5' 0" long) TBE
75	I/C Stabilizing Spider
76	Water Lubricated O/C Section
77	Water Lubricated O/C Section
78	Water Lubricated L/S Bearing Spider
79	Water Lubricated L/S Bearing
80	Water Lubricated L/S Sleeve
81	Water Lubricated L/S Extension (3' 9-7/8" long)
82	Water Lubricated L/S Section (5' 0" long)
83	Water Lubricated L/S Section (10' 0" long)
84	Water Lubricated Bowl Shaft
85	Oil Lubricated Bowl Shaft
88	Oil Lubricated Discharge Case
89	Oil Lubricated Discharge Case Bearing
90	Water Lubricated Case Bearing
91	Water Lubricated Case Bearing
93	Water Lubricated Case Bearing
94	Sand Cap Set Screws
96	Shaft Seal
97	I/C Adapter Coupling
101	Top Bowl Assembly
102	Top Bowl Bearing
103	Bowl Assembly (Enclosed Type)
104	Bowl Bearing
105	Bowl Assembly (Semi-Open Type)
106	Impeller (Enclosed Type)
107	Impeller (Semi-Open Type)
108	Taper Lock
109	Suction Case Assembly (Enclosed Type)
110	Suction Case Bearing
111	Suction Case Assembly
113	Suction Case End Plug
114	Suction Case Sand Cap
115	Optional Set Screws for Brass Sand Cap
116	Bowl Suction Flange
117	Bowl Assembly Cap Screws
119	Suction Bell (Optional)
124	Oil Lubricated O/C Section (20' 0" long)
125	Oil Lubricated L/S Section (20' 0" long)
126	Vented Toggle Valve
149	Oil Lubricated O/C Assembly T&C (10' 0" long)
150	Oil Lubricated O/C Assembly T&C (5' 0" long)
151	Oil Lubricated O/C Assembly T&C (20' 0" long)
152	Water Lubricated O/C Assembly T&C (10' 0" long)
153	Water Lubricated O/C Assembly T&C (5' 0" long)

Recommended spare parts are in **BOLD**.



MODEL SHORT SET CAST IRON VT SPECIFICATIONS

Bowl Assembly: The pump bowls shall be of close grained, cast iron ASTM A48 Class 30. The water passages on bowl sizes 6" through 16" shall be lined with porcelain enamel or fusion epoxy lined to reduce friction loss, shall be free of blow holes, sand holes and other detrimental defects, and shall be accurately machined and fitted. The impellers shall be of bronze (enclosed or semi-open) and dynamically balanced. Impellers through 16" shall be securely fastened to the shaft with taper split bushings of steel. Larger sizes shall be double-keyed. Impellers shall be adjusted vertically by an external means.

The pump shaft shall be of A582 grade 416 stainless steel, turned, ground and polished. It shall be supported by bronze bearings above and below each impeller. The suction case bearing shall be grease lubricated and protected by a bronze sand collar. The size of the shaft shall be no less than that determined by ANSI/AWWA Specifications E101, Section A4.3 paragraph 4.3.3.

Strainer: A _____ basket type clip-on strainer shall be provided having a net inlet area equal to at least four times the suction pipe area. The maximum opening size shall not be more than 75 percent on the minimum opening of the water passage through the bowl and impeller.

Column Assembly: The lineshafts shall be of _____. They shall be furnished in inter-changeable sections not over _____ feet in length.

The butting faces shall be machined square to the axis of the shaft, with maximum permissible axial misalignment on the thread axis with the shaft axis 0.002" in 6". The size of the shaft shall be no less than that determined by ANSI/AWWA-E101 Specifications Section 5.5 for C1045 lineshaft and shall be such that elongation due to hydraulic thrust will not exceed the axial clearance of the impellers in the pump bowls. Maximum runout in 10' shall not exceed 0.005".

The lineshafts shall be provided with ASTM A269 grade 304 stainless steel threaded sleeves at the location of each lineshaft bearing. The use of glues or any other means of securing the sleeve to the shaft, that is not field replaceable without the use of heat or special tools is not acceptable. The lineshaft bearing shall be of 70 minimum shore hardness, neoprene, snap-in type, internally spiral grooved to flush out sand and other abrasives, mounted inside bronze bearing retainers held in position in the column pipe. Bearing spacing shall not exceed 10' for 1800 RPM of 5' for 2200 RPM and above.

The outer column pipe shall be 5" and larger of ASTM A53 grade B steel pipe of ASTM A120 in interchangeable sections not over 10' in length for 1800 RPM and 5' in length for 2200 RPM and above.

THREADED: The ends of each section faced parallel and machined with 8 straight threads per inch permitting the end to butt and insuring alignment when connected by standard mill steel coupling.

FLANGED: The column assembly shall be flanged and machined to accept bearing retainer in such a way as not to allow any movement of

retainer after flanges are bolted securely together and to implement proper sealing of the column. The weight of the column pipe shall be no less than that stated in ANSI/AWWA Specification E101, Section 5.1 "Standard Specifications for Discharge Column Pipe." The column size shall be such that friction loss will not exceed 5' or 100', based on the rated capacity of the pump. If possible, the column size shall be such also be such as to provide a velocity of not less than 5 feet per second at the rated capacity.

Top and bottom sections of column pipe on product lubricated pumps shall not exceed 5' in length.

Discharge Head: The discharge head shall be of close grain, cast iron, ASTM A48 class 30, free of sand holes and other defects, accurately machined and with a surface discharge. Discharge flange shall be machined and drilled to ANSI standards for 125 lb. rating and shall be _____ inches nominal inside diameter. The top of the discharge head shall have a rabbet fit to accurately locate the vertical hollow shaft driver, and have a diameter equal to the drive base diameter (BD) and less than _____ inches.

The standard cast iron stuffing box shall be rated for 125 PSI discharge pressure and shall be fitted with graphite acrylic packing. It shall have a lantern ring or grease chamber placed as required below the top packing ring. Throttle bearing shall be bronze with stainless steel bolting and with brass or stainless steel adjusting nuts. Sealing between the stuffing box and the discharge head shall be accomplished by means of an o-ring.

If the discharge pressure exceeds 125 PSI, a high pressure bypass style packing box shall be supplied with a minimum of six rings of packing and two lantern rings and a bypass to sump.

The top lineshaft can be of _____ and shall not exceed 10' in length and can be equipped with a 304 stainless steel threaded replacement sleeve locked in place by a lineshaft coupling for packing wear area. Impeller adjustment shall be provided at the top of the headshaft by means of adjusting nut which shall be positively locked in position. The headshaft shall also be _____ and shall be connected to the top lineshaft beneath the motor to facilitate ease of assembly and maintenance.

Motor: The electric motor shall be vertical hollow shaft _____ RPM., three phase (50 or 60 Hz) _____ volts with a non-reverse ratchet, P-base, squirrel cage induction design. Enclosure shall meet NEMA weather protected type type 1 design with stainless steel screens to prevent entrance of rodents. Motor shall have Class B or Class F insulation with temperature rise as specified by NEMA standards for class insulation used and shall have a 1.15 service factor.

Thrust bearing shall be chosen to handle the continuous down thrust as specified by the pump manufacturer with an AFBMA B-10 one-year minimum or five year average life under design conditions. Provisions shall be made for momentary upthrust equal to 30 percent of rated down thrust. The motor rating shall be such that at design it will not be loaded beyond nameplate rating and at no place on the pump curve shall the loading exceed the service factor.

SHORT SET VERTICAL TURBINE SECTIONAL DRAWING

Item Number	Item Description
1	Discharge Head
2	Head Column Flange
3	Head Column Flange Gasket
4	Studs
5	Nuts
6	Head Discharge Flange
7	Head Discharge Flange Gasket
8	Discharge Flange Assembly Cap Screws
9	Discharge Flange Assembly Nuts
10	Head Discharge Flange Assembly Studs
11	Head Discharge Flange Assembly Nuts
14	Head Packing Housing with Bearing
15	O-Ring
16	Head Packing Housing Cap Screws
17	Oil Lubricated Headshaft
18	Water Lubricated Headshaft
18A	Top Shaft
19	Headshaft Flinger
20	Headshaft Adjusting Nut
22	Packing (Set)
23	Packing Follower
25	Head Packing Housing Grease Fittings
26	Packing Follower Studs
27	Packing Follower Retainer Nuts
28	Adapter Flange
29	Adapter Flange O-Ring
30	Adapter Flange Assembly Cap Screws
31	Oil Lubricated Headshaft Bearing
32	Water Lubricated Headshaft Bearing
33	Water Lubricated Headshaft Bearing
34	Adjusting Nut Machine Screw
40	I/C Tension Nut
41	Tension Nut Set Screw
42	I/C Seal Ring
43	I/C Seal Ring Nut
44	Headshaft Bearing Assembly Cap Screws
45	Headshaft Bearing Dust Seal
49	Solenoids Valve
53	Vented Sight Drip Valve
54	Tubing for Oil Lubrication
55	Oil Line Connector for Headshaft Bearing
59	Oil Level Sight Glass
63	2' Long O/C Adapter Nipple TBE Top Section
64	Inner Column Adapter 2' 4" Long Stretch Nipple
65	Oil Lubricated Lineshaft Bearing
66	Oil Lubricated Lineshaft Adapter Bearing
67	Shaft Coupling
68	Shaft Adapter Coupling
69	O/C Coupling

Item Number	Item Description
70	Oil Lubricated O/C Section (10' 0" long) TBE
71	I/C Section (5' 0" long)
72	Oil Lubricated L/S Section (10' 0" long)
73	Oil Lubricated O/C Section (5' 0" long) TBE
74	Oil Lubricated L/S Section (5' 0" long) TBE
75	I/C Stabilizing Spider
76	Water Lubricated O/C Section
77	Water Lubricated O/C Section
78	Water Lubricated L/S Bearing Spider
79	Water Lubricated L/S Bearing
80	Water Lubricated L/S Sleeve
81	Water Lubricated L/S Extension (3' 9-7/8" long)
82	Water Lubricated L/S Section (5' 0" long)
83	Water Lubricated L/S Section (10' 0" long)
84	Water Lubricated Bowl Shaft
85	Oil Lubricated Bowl Shaft
88	Oil Lubricated Discharge Case
89	Oil Lubricated Discharge Case Bearing
90	Water Lubricated Case Bearing
91	Water Lubricated Case Bearing
93	Water Lubricated Case Bearing
94	Sand Cap Set Screws
96	Shaft Seal
97	I/C Adapter Coupling
101	Top Bowl Assembly
102	Top Bowl Bearing
103	Bowl Assembly (Enclosed Type)
104	Bowl Bearing
105	Bowl Assembly (Semi-Open Type)
106	Impeller (Enclosed Type)
107	Impeller (Semi-Open Type)
108	Taper Lock
109	Suction Case Assembly (Enclosed Type)
110	Suction Case Bearing
111	Suction Case Assembly
113	Suction Case End Plug
114	Suction Case Sand Cap
115	Optional Set Screws for Brass Sand Cap
116	Bowl Suction Flange
117	Bowl Assembly Cap Screws
119	Suction Bell (Optional)
124	Oil Lubricated O/C Section (20' 0" long)
125	Oil Lubricated L/S Section (20' 0" long)
126	Vented Toggle Valve
149	Oil Lubricated O/C Assembly T&C (10' 0" long)
150	Oil Lubricated O/C Assembly T&C (5' 0" long)
151	Oil Lubricated O/C Assembly T&C (20' 0" long)
152	Water Lubricated O/C Assembly T&C (10' 0" long)
153	Water Lubricated O/C Assembly T&C (5' 0" long)

Recommended spare parts are in **BOLD**.