



# ENGINEERING MANUAL

VERTICAL LINESHAFT TURBINES

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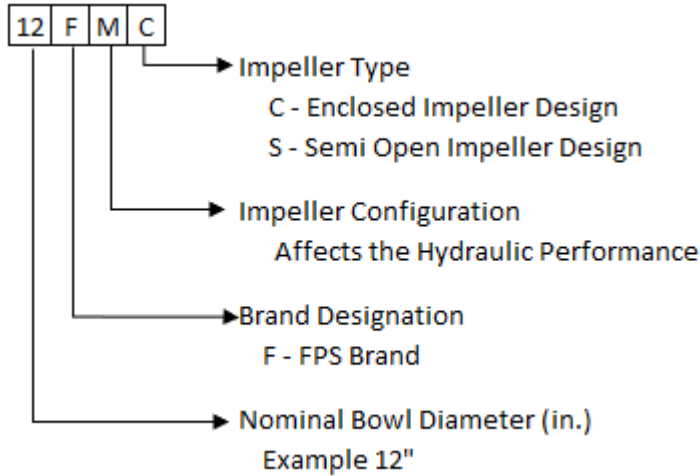
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# VERTICAL TURBINE MODEL NOMENCLATURE

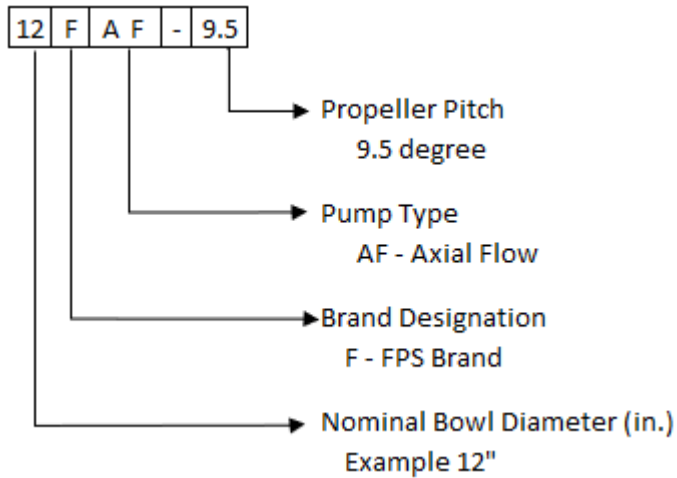
## FVT Nomenclature

FVT, or FPS vertical line shaft turbine, products are offered with semi-open and enclosed impellers.



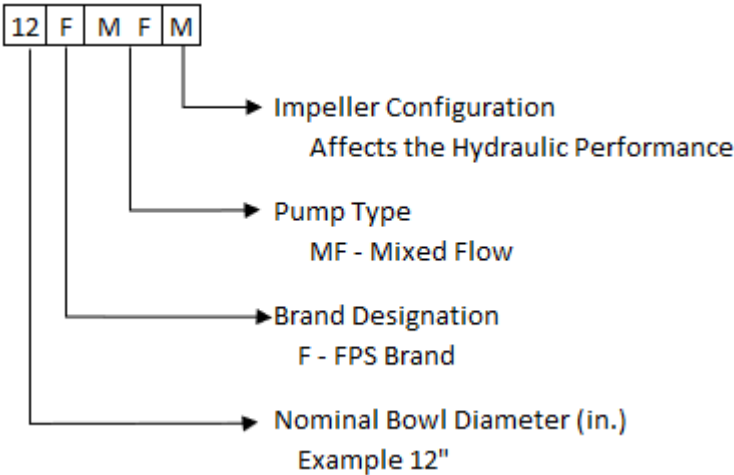
## FAF Nomenclature

FAF, or FPS vertical turbine axial flow, products are offered in 8" to 42" configurations



# FMF Nomenclature

FMF, or FPS mixed flow, products are offered 8" to 30" configurations



# VERTICAL LINE-SHAFT TURBINE REQUEST FOR QUOTATION

## CUSTOMER INFORMATION

DATE:

ACCOUNT NAME:

CONTACT NAME:

PHONE NUMBER:

EMAIL:

LOCATION:

## OPERATING CONDITIONS

LIQUID PUMPED:

TEMPERATURE OF LIQUID:

FLOW RATE:

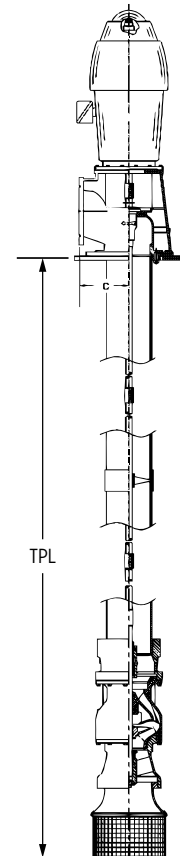
TDH/DIFF. PRESS.:

NPSH<sub>a</sub>:

TOTAL PUMP LENGTH (TPL):

WATER LEVEL:

WELL SIZE:



## MATERIALS OF CONSTRUCTION

STANDARD CONSTRUCTION:

SPECIAL REQUIREMENTS:

## ADDITIONAL INFORMATION

STRAINER TYPE:  CONE  BASKET  NONE

SEAL TYPE:  MECHANICAL SEAL  PACKED

LINE SHAFT:  WATER LUBRICATION  OIL LUBRICATION

DRIVER TYPE:  VHS  VSS  RIGHT ANGLE GEAR

DRIVER ENCLOSURE:  WPI  TEFC

AVAILABLE POWER: VOLTAGE:  PHASE:  HERTZ:

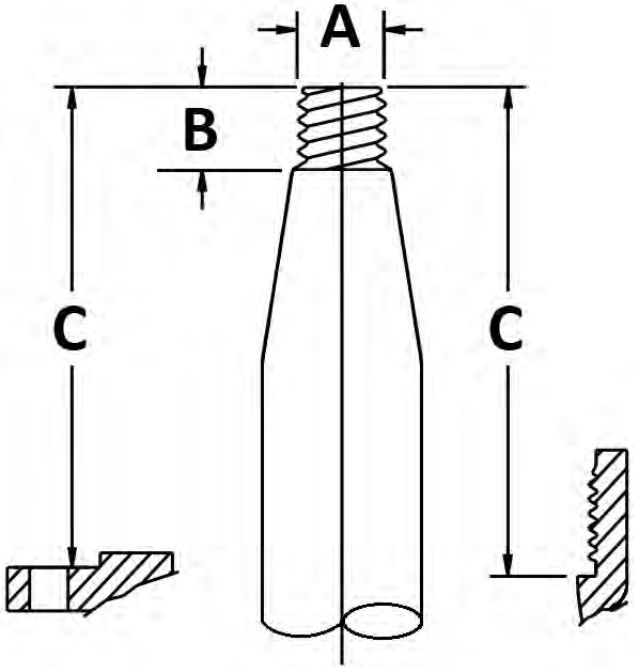
FOUNDATION PLATE NEEDED?  YES  NO



**Franklin Electric**

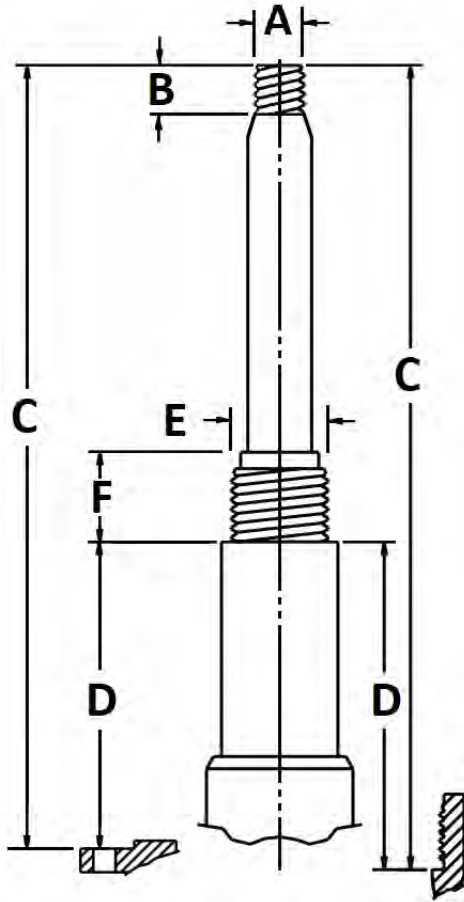
franklinwater.com

**Water Lubrication Bowl Details**



Bowl Shaft	
Diameter (A):	
Threads/Inch (LH.):	
Thread Length (B):	
Butt Column	
Shaft Projection (C) :	
Column Size:	
Threads/Inch:	
Flanged Column Shaft	
Shaft Projection (B):	
Column Size:	

**Oil Lubrication Bowl Details**

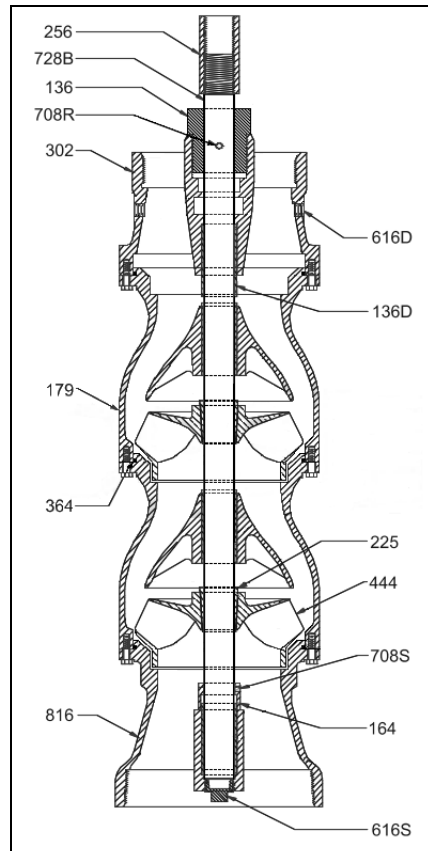


Bowl Shaft	
Diameter (A):	
Threads/Inch (LH.):	
Thread Length (B):	
Line Shaft Bearing	
Outer Diameter (E):	
Threads/Inch (LH.):	
Thread Length (F):	
Butt Column	
Shaft Projection (C):	
Tube Projection (D):	
Column Size:	
Threads/Inch:	
Flanged Column Shaft	
Shaft Projection (C):	
Tube Projection (D):	
Column Size:	



# STANDARD MATERIAL OF CONSTRUCTION

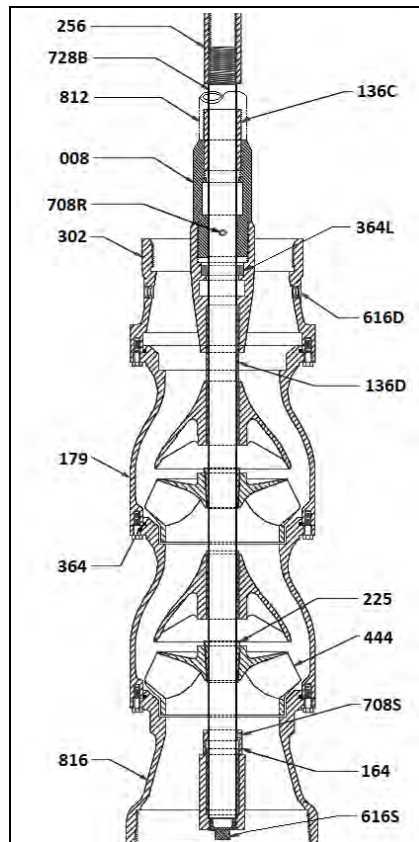
## FVT Product Lube Materials



Item	Description	Standard Material
136	Discharge Case Bearing (Upper)	Bronze
136B	Bowl Bearing	Bronze
136D	Discharge Case Bearing	Bronze
136S	Suction Case Bearing	Bronze
164	Sand Collar	Bronze
179	Bowl	Cast Iron; Vitreous enamel, glass lined*
225	Impeller Collet	Carbon Steel
256	Lineshaft Coupling	Carbon Steel
302	Discharge Case	Ductile Iron
364	Bowl O-Ring	Viton
444	Impeller	Investment Cast 304 SS
616D	Discharge Case Plug	Carbon Steel
616S	Suction Case Plug	Carbon Steel
708D	Retainer Bearing Setscrew	300 S
708S	Sand Collar Setscrew	300 S
728B	Bowl Shaft	416 SS
816	Suction Case	Cast Iron

\*NOTE: Bowls 15” and smaller are vitreous enamel and glass lined. Bowls larger than 15” are cast iron.

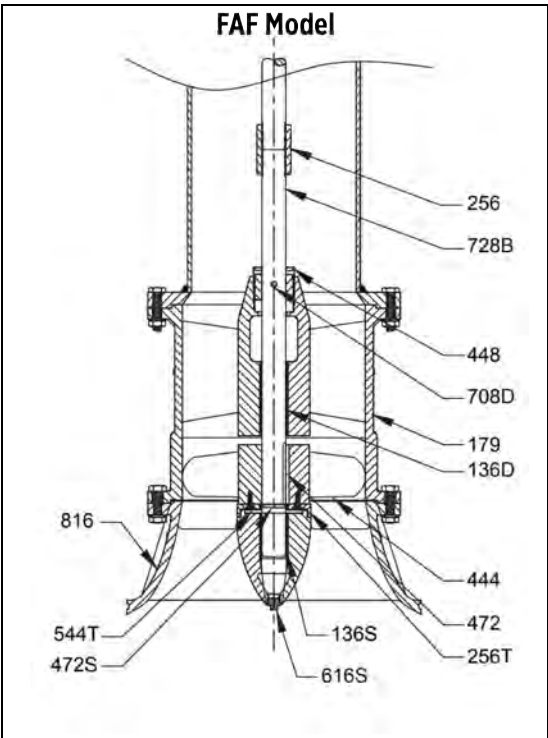
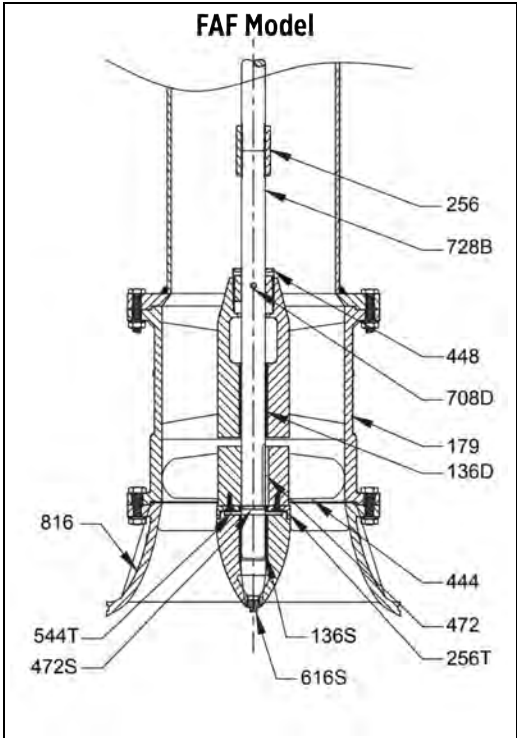
## FVT Oil Lube Materials



Item	Description	Standard Material
8	Inner Column Adapter	Cast Iron
136B	Bowl Bearing	Bronze
136C	Inner Column Bearing	Bronze
136D	Discharge Case Bearing	Bronze
136S	Suction Case Bearing	Bronze
164	Sand Collar	Bronze
179	Bowl	Cast Iron; Vitreous enamel, glass lined*
225	Impeller Collet	Carbon Steel
256	Lineshaft Coupling	Carbon Steel
302	Discharge Case	Ductile Iron
364	Bowl O-Ring	Viton
364L	Lip Seal	Rubber
444	Impeller	Investment Cast 304 SS
616D	Discharge Case Plug	Carbon Steel
616S	Suction Case Plug	Carbon Steel
708D	Retainer Bearing Setscrew	300 SS
708S	Sand Collar Setscrew	300 S
728B	Bowl Shaft	416 SS
812	Inner Column	Carbon Steel
816	Suction Case	Cast Iron

**\*NOTE:** Bowls 15" and smaller are vitreous enamel and glass lined. Bowls larger than 15" are cast iron.

**FMF & FAF Materials**



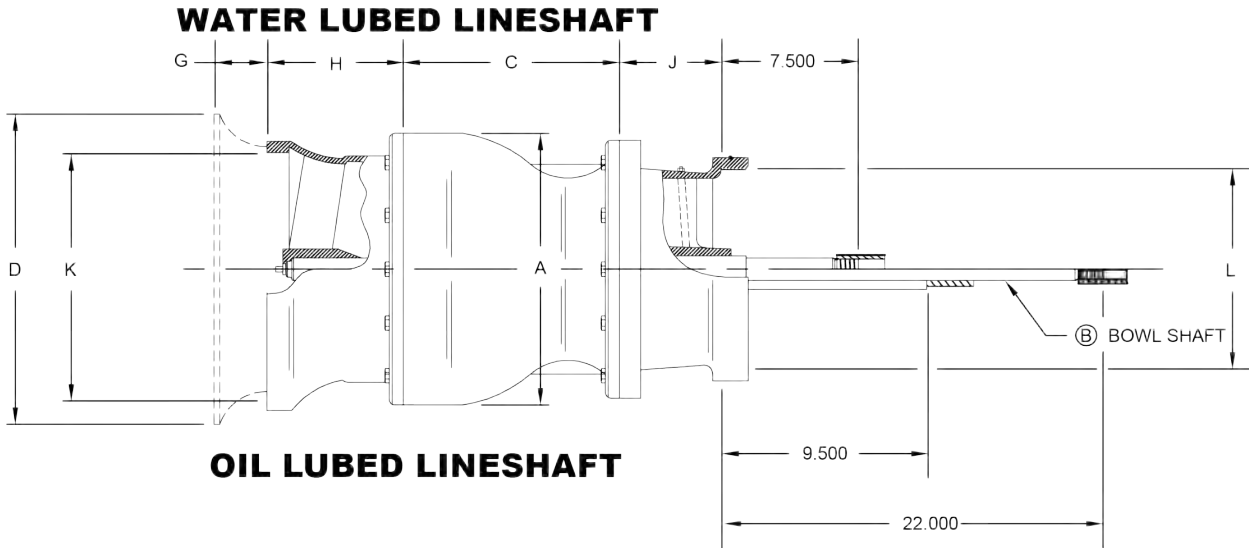
Item	Description	Standard Material
136D	Discharge Case Bearing	Bronze
136S	Suction Case Bearing	Bronze
179	Bowl	Cast Iron
225T	Upthrust Disc	Bronze
256	Lineshaft Coupling	Carbon Steel
444	Impeller (Propeller for FAF)	Bronze
472S	Propeller Split Key	300 SS
544T	Upthrust Disc Bolt	300 SS
616S	Suction Case Plug	Carbon Steel
708D	Retainer Bearing Setscrew	300 SS
728B	Bowl Shaft	416 SS
816	Suction Case	Cast Iron

**BOWL DIMENSIONS**  
**5FMC - 16FHC VFT Bowls**

**BOWL DIMENSIONS**

**NOTE:** The Min. Submergence value is from the bottom of the bell or suction case to the water level. This value is required to prevent vortices only. It may need to increase to provide adequate NPSHA.

**5FMC - 16FHC VFT Bowls**



Model(s)		Bowl Weight		A		B	C	Lateral		Min Submergence
Enclosed Impeller	Semi-Open Impeller	First Stage	Additional Stage	Max Bowl Diameter	Min Bowl Diameter	Shaft Dia	Add Stage Length	Stand	Max	
5FMC	-	45 LBS	12 LBS	5.5	5.25	1	4.625	0.25	0.625	10
6FJC	-	75 LBS	15 LBS	5.875	5.563	0.75	3.75	0.25	0.625	10
6FMC, 6FHC, 6FWC	-	75 LBS	15 LBS	5.813	5.563	1	4.75	0.25	0.625	10
6FXC, 6FYC	-	75 LBS	15 LBS	5.813	5.563	1	4.75	0.25	0.625	20
7FMC	-	102 LBS	37 LBS	7.313	7.125	1.188	7.063	0.25	0.625	18
7FHC	-	102 LBS	37 LBS	7.313	7.125	1.188	7.063	0.625	0.75	18
8FJC, 8FLC	8FJS, 8FLS	130 LBS	30 LBS	7.875	7.5	1	5.625	0.438	0.719	18
8FKC	8FKS	130 LBS	30 LBS	7.813	7.5	1	5.625	0.438	0.688	18
8FMC	8FMS	130 LBS	30 LBS	7.813	7.5	1	5.625	0.438	0.688	22
8FEHC	8FEHS	130 LBS	30 LBS	7.688	7.5	1.188	6.25	0.375	0.625	22
8FYC	8FYS	139 LBS	39 LBS	7.875	7.5	1.188	7.5	0.375	0.625	28
9FLC, 9FHC	-	145 LBS	50 LBS	9.438	9.25	1.5	8.5	0.563	0.688	30
10FJC, 10FKC	-	230 LBS	55 LBS	9.875	9.5	1.5	7.25	0.5	.075	32
10FLC, 10FMC	10FLS, 10FMS	230 LBS	55 LBS	9.625	9.5	1.5	7	0.625	0.875	36
10FWC	10FWS	250 LBS	60 LBS	9.875	9.5	1.688	8.5	0.875	1.25	28
10FYC	10FYS	250 LBS	60 LBS	9.875	9.5	1.688	8.5	0.75	1.125	40
10FZC	10FZS	250 LBS	60 LBS	9.875	9.5	1.688	8.5	0.5	0.875	30

**BOWL DIMENSIONS**  
**5FMC - 16FHC FVT Bowls**

Model(s)		Bowl Weight		A		B	C	Lateral		Min Submergence
Enclosed Impeller	Semi-Open Impeller	First Stage	Additional Stage	Max Bowl Diameter	Min Bowl Diameter	Shaft Dia	Add Stage Length	Stand	Max	
11FLC, 11FMC, 11FHC	-	235 LBS	105 LBS	11.188	11	1.688	9.875	0.75	0.875	30
12FDC, 12FJC	-	340 LBS	100 LBS	11.688	11.563	1.688	9	0.625	0.875	24
12FIC, FKC	12FIS, FKS	340 LBS	100 LBS	12	11.5	1.688	10	0.625	0.875	30
12FNC	-	340 LBS	100 LBS	12.188	11.75	1.688	9	0.625	0.75	30
12FLC	12FLS	340 LBS	100 LBS	11.563	11.25	1.688	10.5	0.875	1.375	28
12FGC	-	340 LBS	100 LBS	11.938	11.75	1.688	11	0.625	1	28
12FMC	12FMS	340 LBS	100 LBS	11.563	11.25	1.688	10.5	0.875	1.25	24
12FHC	12FHS	340 LBS	100 LBS	11.563	11.25	1.688	10.5	0.75	1.125	26
12FXC	12FXS	340 LBS	100 LBS	11.563	11.25	1.688	10.5	0.875	1.125	28
12FWC	12FWS	415 LBS	140 LBS	12.188	11.75	1.688	11.25	0.75	1.188	30
12FYC	12FYS	415 LBS	140 LBS	12.25	11.75	1.688	11.75	0.875	1.5	36
13FMC	-	240 LBS	179 LBS	12.5	12.125	1.688	10.75	0.75	1.25	24
14FLC, 14FMC	14FLS, 14FMS	490 LBS	175 LBS	13.5	13.25	1.938	12.5	0.875	1.375	30
14FHC, 14FXC	14FHS, 14FXS	490 LBS	175 LBS	13.5	13.25	1.938	12.5	0.875	1.375	32
14FWC	14FWS	500 LBS	185 LBS	14	13.75	1.938	13.25	0.875	1.375	34
14FYC	-	500 LBS	100 LBS	14	13.75	1.938	12.313	0.875	1.375	34
14FZC	-	500 LBS	100 LBS	14	13.75	1.938	12.313	0.688	1.125	34
15FKC	15FKS	510 LBS	100 LBS	14.75	13.75	1.938	15.25	0.688	1.125	36
16FLC	-	540 LBS	188 LBS	15.5	15.5	2.188	13.188	0.563	1	32
16FMC, 16FHC	-	615LBS	220 LBS	16.188	16.188	2.188	14.938	0.563	1	36

**5FMC - 16FHC FVT Suction & Discharge Dimensions**

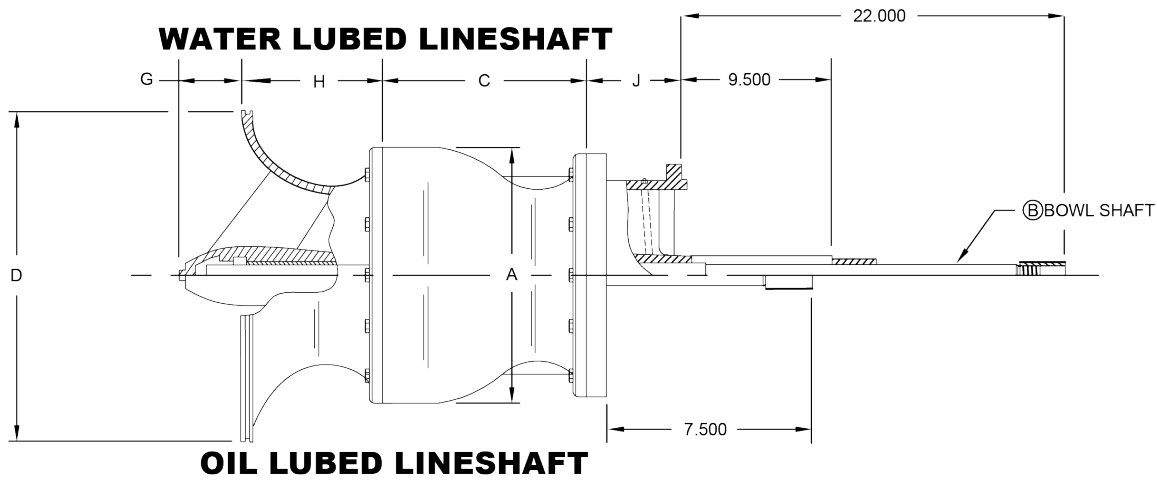
Model(s)		Suction Bell		Case Length		Connections	
Enclosed Impeller	Semi-Open Impeller	D	G	H	J	K	L
		Diameter	Length	Suction	Discharge	Suction	Discharge
5FMC	-	-	-	6.375	3.75	4	4
6FJC, 6FMC, 6FHC, 6FXC, 6FWC, 6FYC	-	-	-	6.75	3.75	4	4
7FMC, 7FHC	-	9.25	3.25	5.688	3.75	6	6
8FJC, 8FLC, 8FKC, 8FMC, 8FECH, 8FYC	8FJS, 8FLS, 8FKS, 8FMS, 8FEHS, 8FYS	7.25 9.25	2.813 3.25	5.875	3.5	5 6	5 6
9FLC, 9FHC, 10FJC, 10FKC, 10FLC, 10FMC, 10FWC	10FLS, 10FMS, 10FWS	9.25 11.25	3.25 4	9	5.5	6 8	6 8
10FZC	10FZS	11.25	4	9	5.5	8	8
11FLC, 11FMC, 11FHC	-	9.25 13.25	4 4.438	9 9.875	5.5	8 10	8 10
12FDC, 12FJC	-	9.25 11.25	3.25 4	8	4.875	6 8	8 10
12FNC	-	11.25 13.25	4 4.438	8.5 9.375	4.875	8 10	8 10
12FIC, 12FKC, 12FLC, 12FGC, 12FMC, 12FHC, 12FXC, 12FWC, 12FYC, 13FMC	12FIS, 12FKS, 12FLS, 12FMS, 12FHS, 12FXS, 12FWS, 12FYS	11.25 13.25	4 4.438	8 8.875	4.875	8 10	8 10

**BOWL DIMENSIONS**  
**5FMC - 16FHC VFT Bowls**

Model(s)		Suction Bell		Case Length		Connections	
		D	G	H	J	K	L
Enclosed Impeller	Semi-Open Impeller	Diameter	Length	Suction	Discharge	Suction	Discharge
14FLC, 14FMC, 14FHC, 14FXC, 14FWC, 14FYC, 14FZC, 15FKC	14FLS, 14FMS, 14FHS, 14FXS, 14FWS, 15FKS	13.25 15.25	4.438 6.25	9.313 10.063	5.625	10 12	10 12
16FLC, 16FMC, 16FHC	-	17.5	14.438*	-	7.75	BELL	10 12

**\*NOTE:** Deduct 4.688 inches from the effective length when using a suction strainer on models 16FLC, 16FMC, and 16FHC.

## 18FLC - 42FHC FVT Enclosed Impeller Bowls



Model(s)	Bowl Weight		A Max Bowl Diameter	B Shaft Dia	C Add Stage Length	Lateral		Min Submergence
	First Stage	Additional Stage				Stand	Max	
18FLC	750 LBS	325 LBS	17.75	2.188	14	0.5	1.375	48
18FMC, 18FHC	750 LBS	325 LBS	17.75	2.188	14	0.5	0.625	48
18FHHC	725 LBS	335 LBS	18.625	2.188	18.625	1.813	1.125	48
19FMC	950 LBS	430 LBS	18.625	2.188	16.125	0.75	13.75	42
19FHC	950 LBS	430 LBS	18.625	2.188	16.125	0.75	1	42
20FLC, 20FMC	920 LBS	425 LBS	19.875	2.438	19	0.625	1	33
20FHC	920 LBS	425 LBS	19.75	2.438	19.5	0.625	1	32
24FLC, 24FMC, 24FHC	1150 LBS	650 LBS	24	2.688	18.25	0.75	1	32
28FLC	2300 LBS	920 LBS	27	2.688	22.75	0.875	RTF	56
28FMC	2300 LBS	920 LBS	27	2.688	22.75	0.875	RTF	60
28FHC	2300 LBS	920 LBS	27	2.688	22.75	0.875	RTF	62
30FMC	2828 LBS	1245 LBS	30.063	3.25	28.5	1.375	RTF	60
30FLC	2828 LBS	1245 LBS	30.063	3.25	28.5	1.375	RTF	50
36FLC, 36FMC, 36FHC	3200 LBS	1450 LBS	36	3.25	29.25	1.25	RTF	65
42FMC	1200 LBS	550 LBS	42.375	4	36	1.125	RTF	90
42FLC	1150 LBS	650 LBS	42.375	4	36	1.125	RTF	90

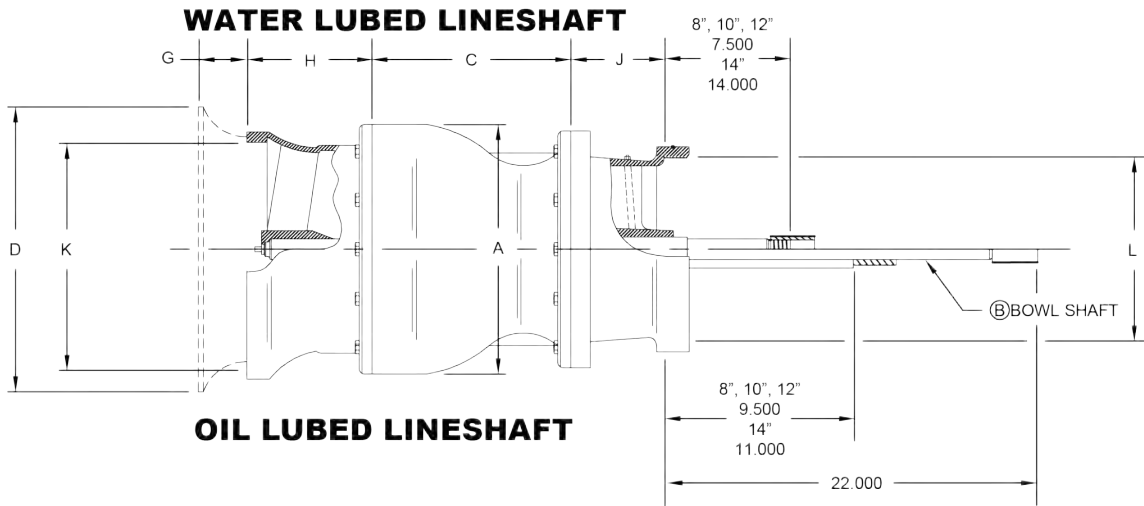
**BOWL DIMENSIONS**  
**18FLC - 42FHC FVT Enclosed Impeller Bowls**

**FVT 18FLC - 42FHC Enclosed Impeller Suction & Discharge Dimensions**

Model(s)	D	G	H	J	L
	Suction Bell Diameter	Suction Hub Length	Suction Bell Length	Discharge Case Length	Discharge Pipe Sizes
18FLC, 18FMC, 18FHC	18.5	4.438	9.688	RTF	12 14
18FHHC	18.813	7	8.5	RTF	14 18
19FMC, 19FHC, 19FMS, 19FHS	20.875	8.5	8.5	RTF	14 16
20FLC, 20FMC	20.875	5	9.5	RTF	14 16
20FHC	23.313	5.25	9.25	RTF	14 16
24FLC, 24FMC, 24FHC	24.75	6.875	9	RTF	18
28FLC, 28FMC, 28FHC	30.75	5.25	11	RTF	18 20
30FMC	33.25	7.75	15.625	RTF	18 24
36FLC, 36FMC	47	8	19.625	RTF	20 24
36FHC	47	8	19.625	RTF	24 30
42FMC, 42FLC	48	8	24.375	RTF	36



## FVT Series, FCR Enclosed Impeller Model Bowls



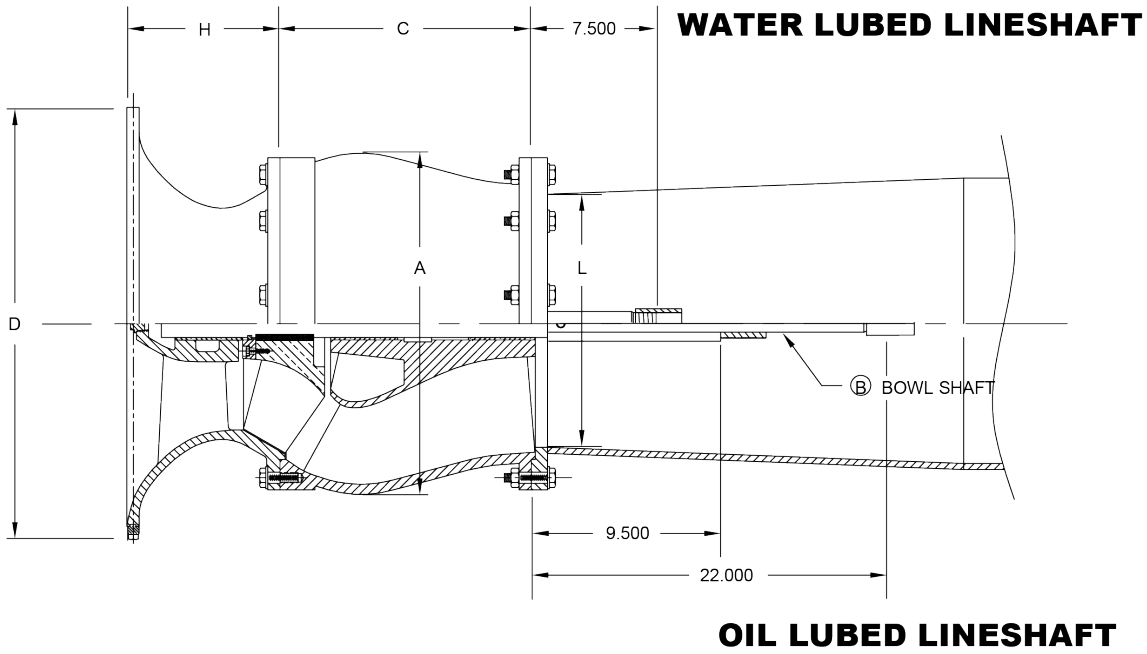
Models	Bowl Weight		A		B	C	Lateral		Min Submergence
	First Stage	Additional Stage	Max Bowl Diameter	Min Bowl Diameter	Shaft Diameter	Add Stage Length	Stand	Max	
14FLCR, 14FMCR, 14FHCR	700 LBS	265 LBS	14.25	14.125	2.188	13.375	0.813	1.125	36

### FCR Enclosed Impeller Suction & Discharge Dimensions

Models	Suction Bell		Case Length		Connections	
	D	G	H	J	K	L
	Diameter	Length	Suction	Discharge	Suction	Discharge
14FLCR, 14FMCR, 14FHCR	13.25 15.25	4.438 6.25	16	5.5	10 12	10 12

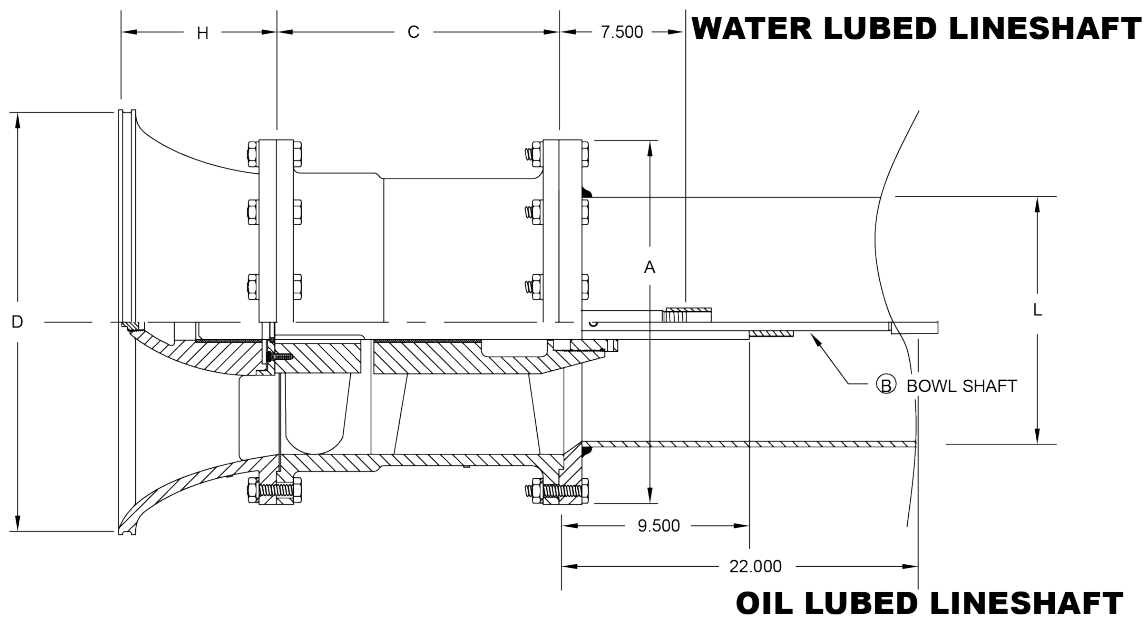
**BOWL DIMENSIONS**  
**FMF Series Bowls**

**FMF Series Bowls**



Model	Bowl Weight		A Bowl Diameter	B Shaft Diameter	C Add Stage Length	Suction Bell		L Available Connection	Min Submergence
	First Stage	Additional Stage				Diameter	Length		
	8FMF	114 LBS	64 LBS	10.125	1			8	
10FMF	195 LBS	124 LBS	12.625	1.5	10	14	6.5	12	23
12FMF	290 LBS	160 LBS	15	1.688	12	17	7.75	14	30
14FMF	415 LBS	255 LBS	17.625	1.938	14	19.875	9	16	35
16FMF	620 LBS	365 LBS	20	2.438	16	22.5	10.5	20	40
18FMF	775 LBS	465 LBS	22.5	2.438	18	25.5	10.5	24	45
20FMF	1030 LBS	640 LBS	25	2.688	20	28.5	12.5	24	50
24FMF	1780 LBS	1125 LBS	29.875	2.688	24	33.5	15.5	30	59
30FMF	2750 LBS	1810 LBS	37.125	3.438	30	42	18	30	74

## FAF Series Bowls



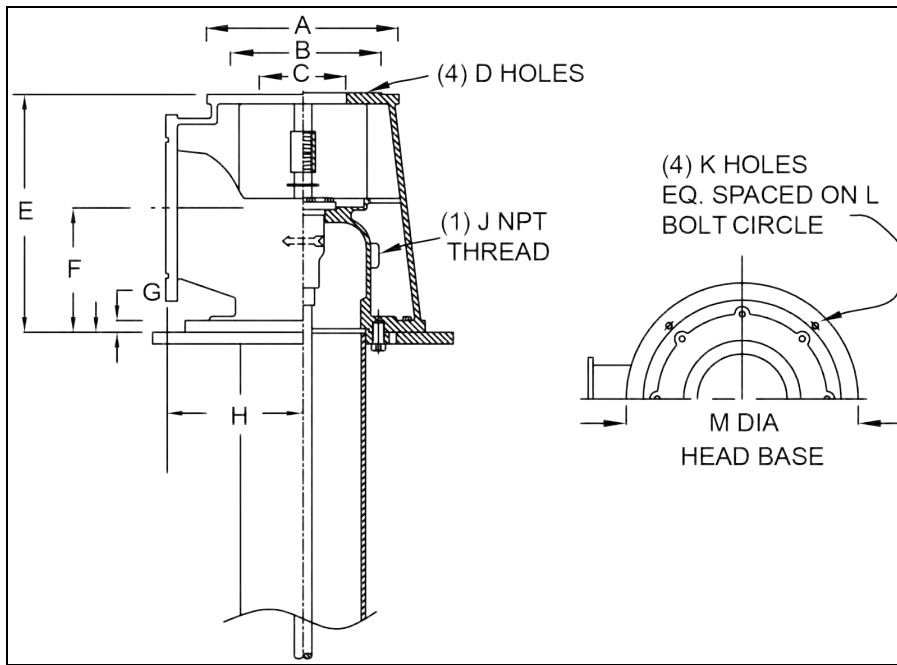
Model	Bowl Weight		A Bowl Diameter	B Shaft Diameter	C Add Stage Length	Suction Bell		L Available Connection	Min Submergence
	First Stage	Additional Stage				Diameter	Length		
10FAF	176 LBS	100 LBS	13.375	1.188	9.438	16.75	6.5	10	30
12FAF	312 LBS	173 LBS	16.375	1.5	11.75	20.5	7.75	12	36
14FAF	424 LBS	250 LBS	18.625	1.688	13.75	23.5	9	14	41
16FAF	595 LBS	355 LBS	20.75	1.688	15.75	26.625	10.5	15	46
20FAF	1610 LBS	610 LBS	25.375	1.938	19.375	33.5	12.5	20	59
24FAF	2600 LBS	975 LBS	30	2.438	23.5	42	15.5	24	64
30FAF	4420 LBS	1510 LBS	36	2.688	29.5	50	18	30	74
36FAF	6200 LBS	2670 LBS	42.625	2.938	35.5	60	24	36	105
42FAF	9000 LBS	3760 LBS	42.25	2.938	41.5	72	30	42	126

**HEAD DIMENSIONS**  
**Discharge Head Dimensions**

**HEAD DIMENSIONS**

- Refer to the owner's manual for proper pump installation.
- Do not use this drawing for construction unless certified by Franklin Electric.
- This drawing is the property of Franklin Electric and cannot be used or copied without written consent.
- Discharge heads include an integrated lifting hook and extended discharge flange for easier installations.

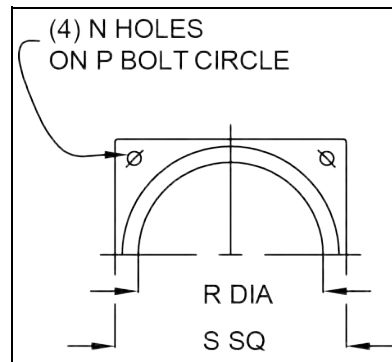
**Discharge Head Dimensions**



Model(s)	Size	Inner Column	Outer Column	A	B	C	D	E	F	G	H	J	K	L	M
TFR4A	4	2	4	10	9.125	8.25	0.438	15.875	6.750	1.125	8.750	0.75	1	14.250	16
TFR6B	6	2	6	12	9.125	8.25	0.438	16.875	8.375	1	7.875	0.75	1	17	19
TFR6B-C	6	2	6	16.5	14.75	13.5	0.688	16.875	8.375	1	7.875	0.75	1	17	19
TFR8C	8	2.5	8	16.5	14.75	13.5	0.688	20.438	10.688	1	10	0.75	1.125	18.75	21
TFR8HD, SD8HD	8	2.5	8	20	14.75	13.5	0.688	22.063	10.688	1.688	12.5	0.75	1.125	21.25	23.5
TFR10C	10	2.5	10	16.5	14.75	13.5	0.688	21.438	10.688	1	10	0.75	1.125	18.75	21
TFR10HD, SD10HD	10	3.5	10	20	14.75	13.5	0.688	22.375	11.313	1.688	10	0.75	1.125	21.25	23.5
TFR12HD, SD12HD	12	3.5	12	20	14.75	13.5	0.688	23	11.938	2.188	14	0.75	1.25	22.75	25
FR14C	14	3.5	14	20	14.75	13.5	0.688	31	14	1.5	19	0.75	1.375	29.5	32
FR16C	16	3.5	16	20	14.75	13.5	0.688	31	16	1.5	19	0.75	1.375	29.5	32

**NOTE:** Dimensions are in inches and may vary by 0.375.

## Sole Plate Dimensions



Model(s)	Sole Plate Thickness	N	P	R	S
		Holes	Bolt Circle	Plate Diameter	Square
TFR4A	1	1.125	14.813	12.5	24
TFR6B, TFR6B-C	1	1.125	14.813	13	24
TFR8C, TFR8HD, TFR10C	1	1.125	14.813	16.5	24
TFR10HD, SD10HD	1	1.125	16.25	17.5	26
SD8HD	1	1.25	14.813	16.5	24
TFR12HD, SD12HD	1.25	1.25	17.625	18.5	28
FR14C, FR16C	1.5	1.25	23.313	27.5	36

**NOTE:** Dimensions are in inches and may vary by 0.375.

**WATER LUBRICATED UNITS**  
**Open TFR Discharge Head Measurements**

**WATER LUBRICATED UNITS**

- Refer to the owner’s manual for proper pump installation.
- Do not use this drawing for construction unless certified by Franklin Electric.
- This drawing is the property of Franklin Electric and cannot be used or copied without written consent.

**Open TFR Discharge Head Measurements**

$L2 = "C" + "CD" + 2$ , where CD is supplied by the motor or gear drive manufacturer.

**Open 4 - 8 TFR Discharge Heads**

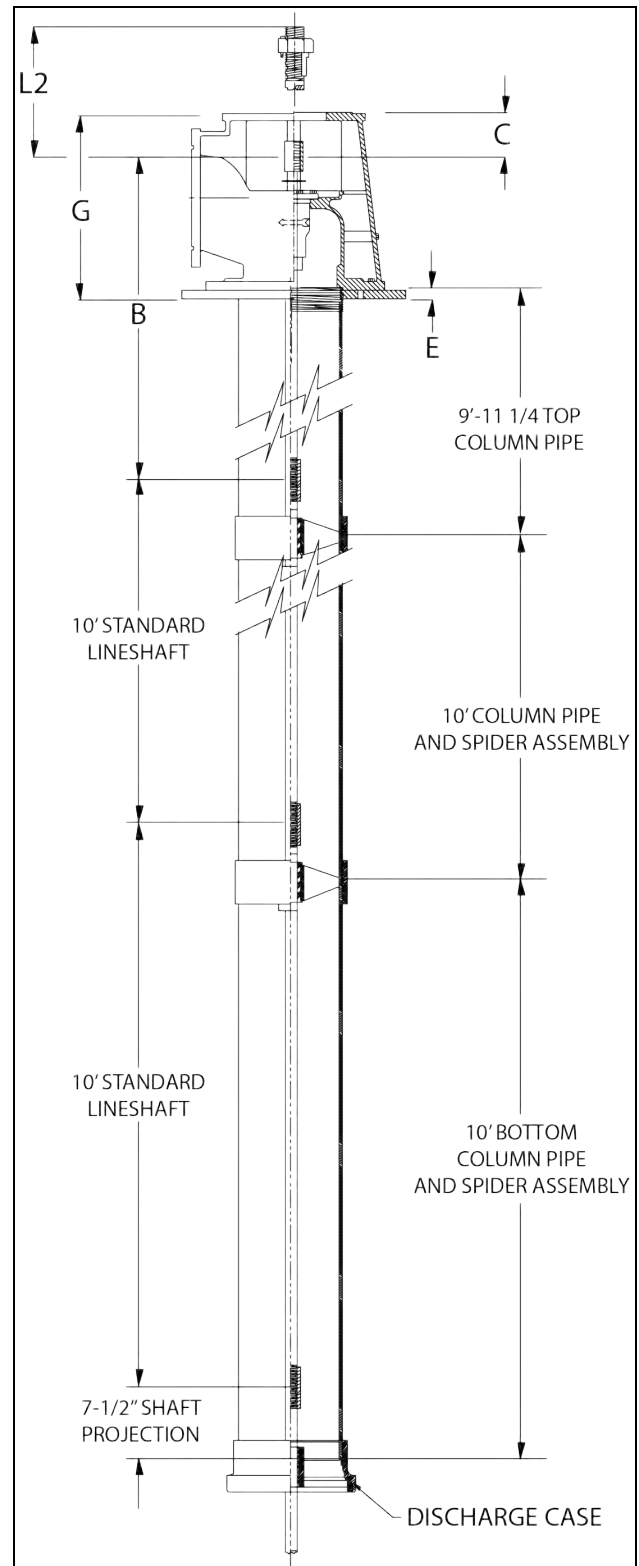
Dimension	4	6	8
B	123.50	123.50	126.00
C	2.875	3.275	4.188
E	1.625	1.750	2.000
G	15.875	16.875	20.438

**NOTE:** Dimensions are in inches and may vary by 0.375.

**Open 10 - 16 TFR Discharge Heads**

Dimension	10	10HD	12	14	16
B	126.00	127.50	128.25	136.25	136.25
C	4.688	4.125	4.000	4.000	4.000
E	2.500	2.500	2.500	2.500	2.500
G	21.438	22.375	23.000	31.000	31.000

**NOTE:** Dimensions are in inches and may vary by 0.375.



## OIL LUBRICATED UNITS

- Refer to the owner’s manual for proper pump installation
- Do not use this drawing for construction unless certified by Franklin Electric
- This drawing is the property of Franklin Electric and cannot be used or copied without written consent.

### Enclosed TFR Discharge Head Measurements

$L2 = "C" + "CD" + 2$ , where CD is supplied by the motor or gear drive manufacturer.

#### Enclosed 4 - 8 TFR Discharge Heads

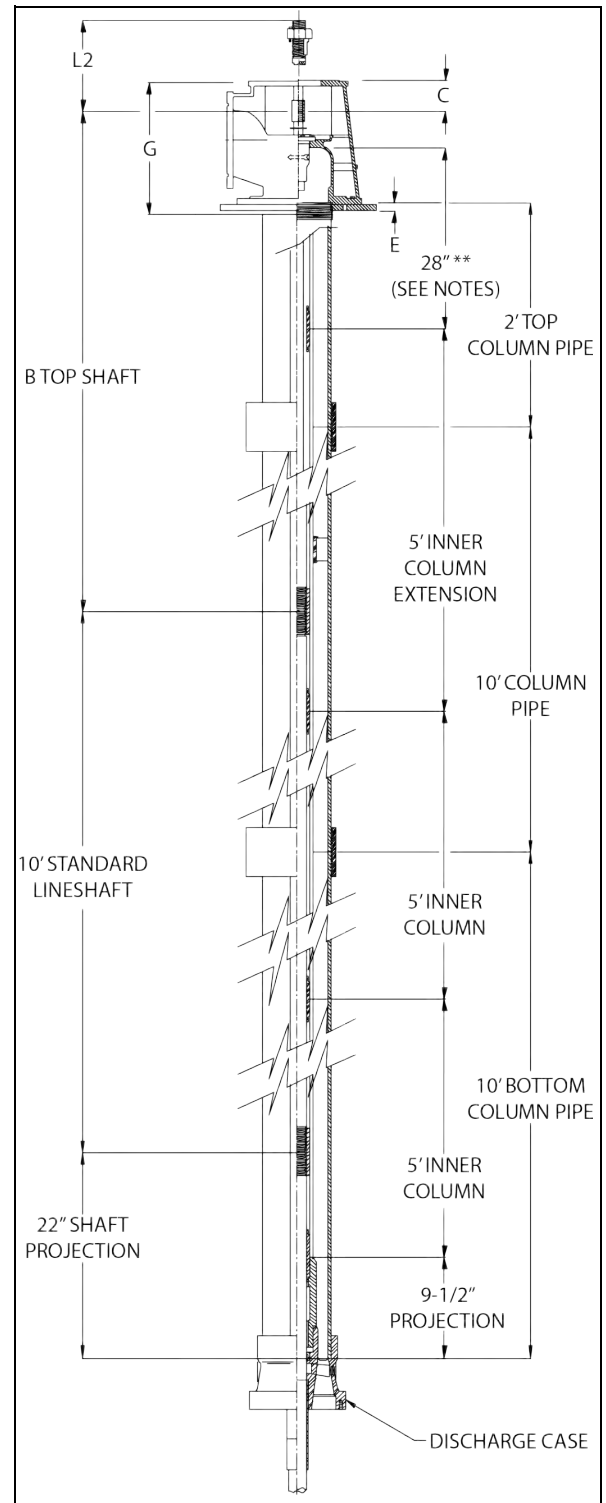
Dimension	4	6	8	8HD
B	110.00	110.00	111.43	113.00
C	2.378	3.125	5.00	5.00
E	1.625	1.750	2.000	2.000
G	15.875	16.875	20.438	22.000

**NOTE:** Measurements are in inches and may vary by 0.375.

#### Enclosed 10 - 16 TFR Discharge Heads

Dimension	10	10HD	12	14	16
B	112.25	112.25	114.50	122.50	122.50
C	4.688	5.625	4.00	4.00	4.00
E	2.500	2.500	2.500	2.500	2.500
G	21.438	22.375	23.000	31.000	31.000

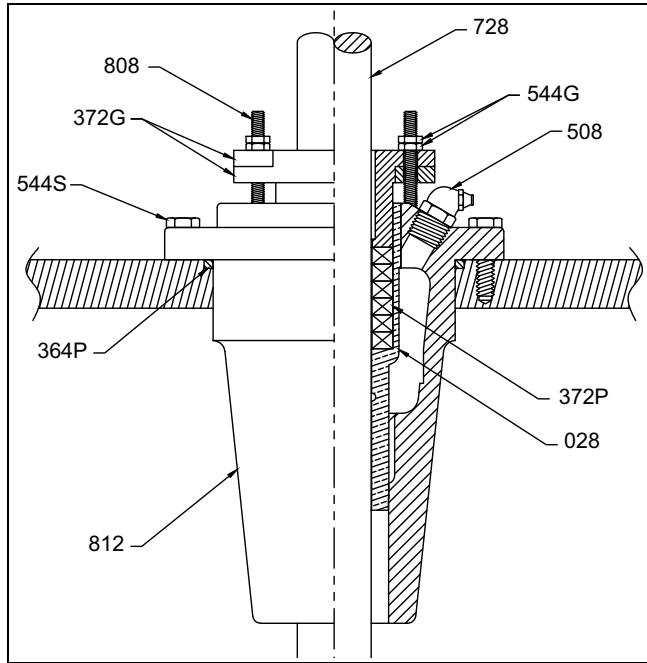
**NOTE:** Measurements are in inches and may vary by 0.375.



# STUFFING BOX OPTIONS

## Packing Housings

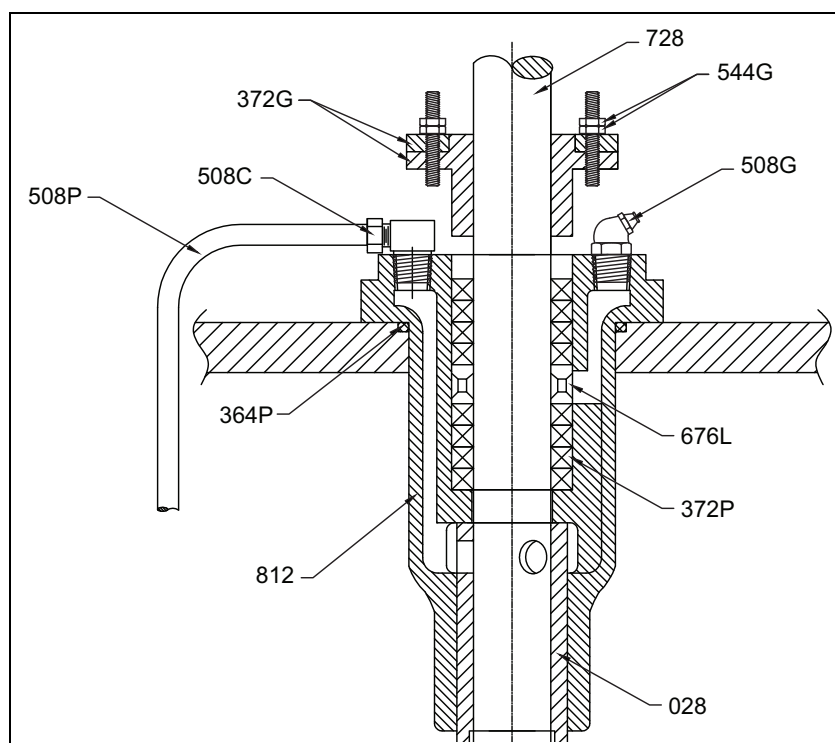
### Low Pressure Packing Housing Kit



Item	Description	Material
028	Head Shaft Bearing	Bronze
364P	Stuffing Box O-Ring	Viton
372P	Packing	Polyimide Yarn
372G	Packing Gland	304 SS
508	Grease Fitting	Carbon Steel
544G	Gland Nuts	300 SS
544S	Packing Housing Bolts	300SS
728	Shaft	Carbon Steel
808	Gland Stud	300 SS
812	Packing Housing	Cast Iron



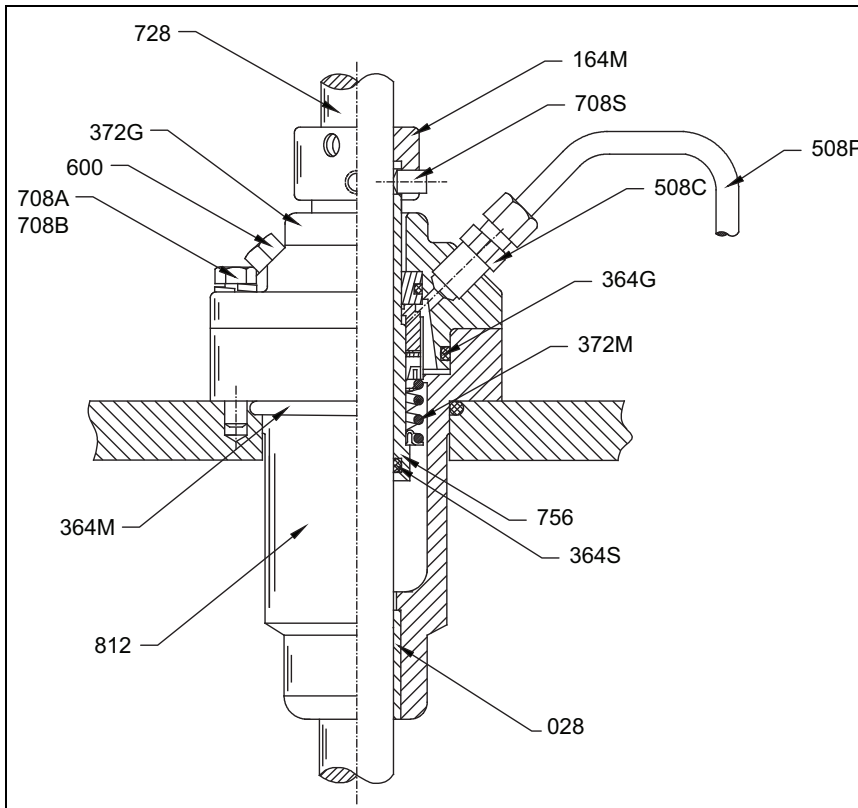
## High Pressure Packing Housing Kit



Item	Description	Material
028	Head Shaft Bearing	Bronze
364P	Stuffing Box O-Ring	Viton
372P	Packing	Polyimide Yarn
372G	Packing Gland	304 SS
508C	Compression Fitting	Bronze
508G	Grease Fitting	Carbon Steel
508P	Flush Line	Copper
544G	Gland Nuts	300 SS
544S	Packing Housing Bolts	300SS
676L	Latern Ring	Bronze
728	Shaft	Carbon Steel
808	Gland Stud	300 SS
812	Packing Housing	Cast Iron

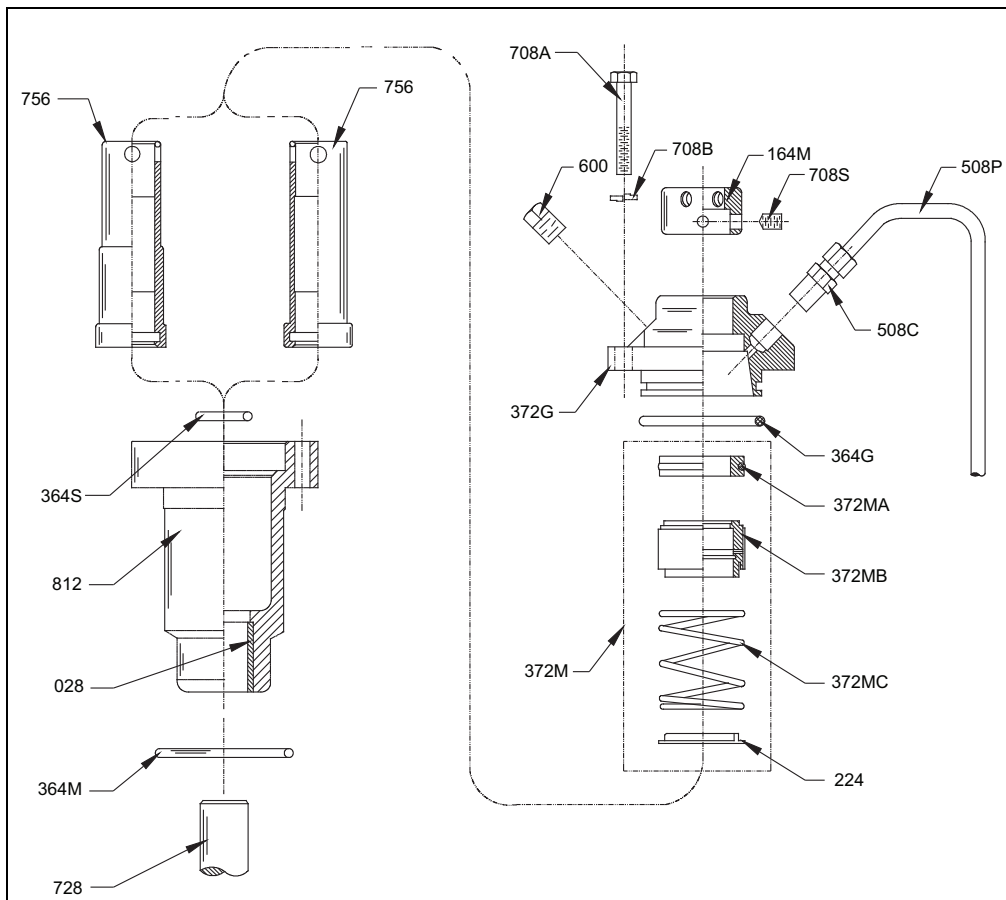
# Mechanical Seal Housing

## Assembled Housing Parts



Item	Description	Material
028	Head Shaft Bearing	Bronze
164M	Seal Collar	Bronze
364G	Seal Chamber Gland O-Ring	Viton
364M	Seal Chamber O-Ring	Viton
364S	Seal Chamber Sleeve O-Ring	Viton
372G	Seal Gland	Cast Iron
372M	Mechanical Seal	C/SI-C/304SS
508C	Compression Fitting	Bronze
508P	Flush Line	Copper
600	Flush Port Plug	Cast Iron
708A	Seal Chamber Capscrew	300 SS
708B	Seal Chamber Washer	300 SS
708S	Seal Chamber Set Screw	300 SS
728	Shaft	Carbon Steel
756	Shaft Sleeve	Bronze
812	Seal Chamber	Cast Iron

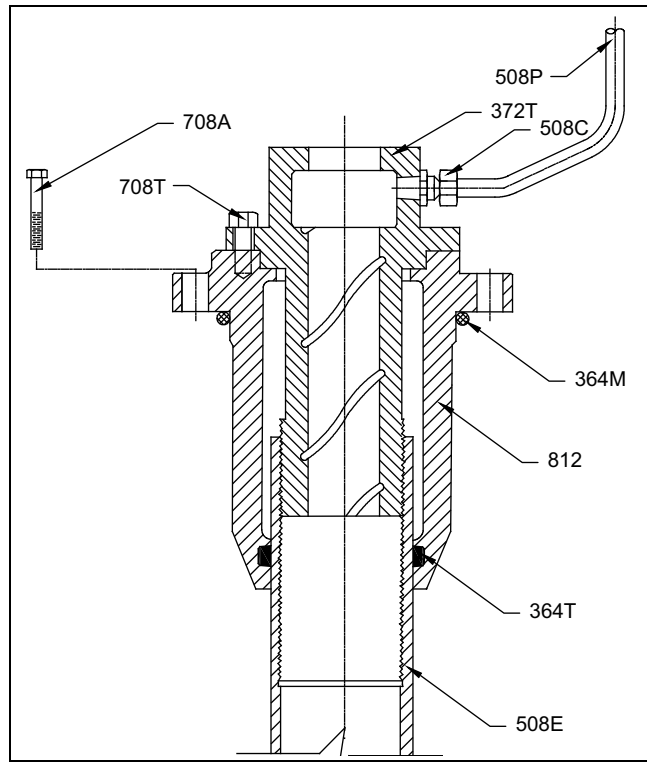
**Exploded Housing Parts**



Item	Description	Material
028	Head Shaft Bearing	Bronze
164M	Seal Collar	Bronze
224	Seal Collar	300 SS
364G	Seal Chamber Gland O-Ring	Viton
364M	Seal Chamber O-Ring	Viton
364S	Seal Chamber Sleeve O-Ring	Viton
372G	Seal Gland	Cast Iron
372M	Mechanical Seal	C/SI-C/304SS
372MA	Stationary Seat	SI-Carbide
372MB	Rotary Seal	Carbon
372MC	Seal Spring	300 SS
508C	Compression Fitting	Bronze
508P	Flush Line	Copper
600	Flush Port Plug	Cast Iron
708A	Seal Chamber Capscrew	300 SS
708B	Seal Chamber Washer	300 SS
708S	Seal Chamber Set Screw	300 SS
728	Shaft	Carbon Steel
756	Shaft Sleeve	Bronze
812	Seal Chamber	Cast Iron

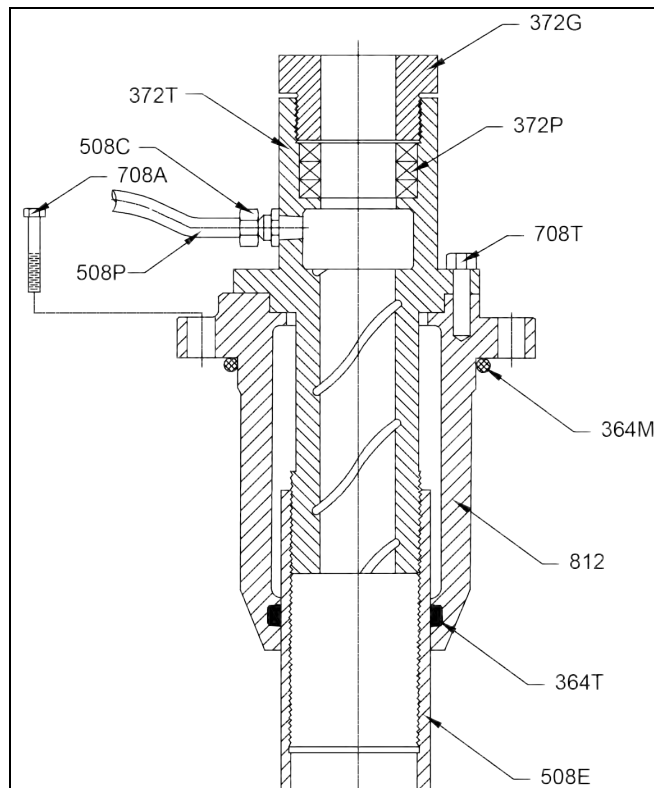
# Tension Tube Assembly

## Oil Lubrication Tension Tube Assembly



Item	Description	Material
364M	Tension Housing O-Ring	Viton
364T	Tension Tube O-Ring	Viton
372T	Tension Bearing	Bronze
508C	Compression Fitting	Bronze
508E	Enclosing Tube	Steel
508P	Flush Line	Copper
708A	Tension Housing Cap screw	300 SS
708T	Tension Bearing Cap screw	300 SS
812	Tension Bearing Housing	Cast Iron

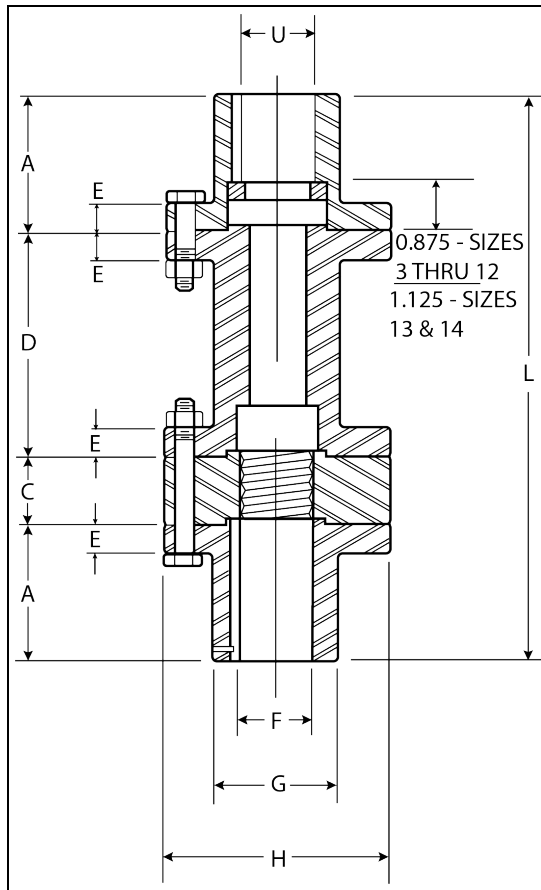
**Forced Water Flush Lubrication Tension Tube Assembly**



Item	Description	Material
364M	Tension Housing O-Ring	Viton
364T	Tension Tube O-Ring	Viton
372T	Tension Bearing	Bronze
372G	Tension Gland	Bronze
372P	Packing	Polymide Yarn
508C	Compression Fitting	Bronze
508E	Enclosing Tube	Steel
508P	Flush Line	Copper
708A	Tension Housing Cap screw	300 SS
708T	Tension Bearing Cap screw	300 SS
812	Tension Bearing Housing	Cast Iron

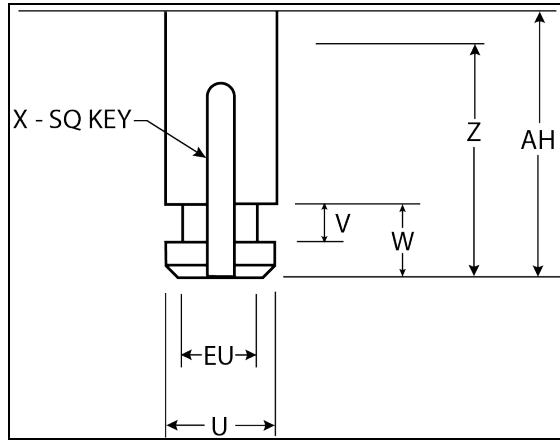
## Adjustable Coupling Parts

### Spacer Adjustable Coupling



Size	HP 1760 RPM	Thrust LBS	A	C	D	E	F		G	H	Cap Screws		Length	
							Min.	Max			No.	Size	STD	Spacer
3	125	20,000	2	1.5	4.313	0.5	0.938	1.25	2.5	4.25	4	0.375	5.5	9.813
7	300	30,000	2.688	1.5	4.313	0.625	1.188	1.75	2.875	5	6	0.375	6.875	11.188
10	700	75,000	2.688	2.25	4.313	0.75	1.438	2.25	3.625	6	6	0.5	7.625	11.938
11	900	85,000	3	2.5	5.25	0.75	1.938	2.625	4.25	6.875	6	0.625	8.5	13.75
12	900	85,000	3	2.5	5.25	0.75	1.938	2.625	4.25	6.875	6	0.625	8.5	13.75
13	1100	90,000	3.438	3	5.25	0.875	2.125	2.875	4.875	8	8	0.625	9.875	15.125
14	1500	100,000	4.375	3.5	5.25	1	3	3.875	6.25	9.75	8	0.75	12.25	17.5
14A	1500	100,000	4.375	3.5	5.25	1	1.938	3.875	6.25	9.75	8	0.75	12.25	17.5
15	2500	200,000	5	4	5.25	1	1.938	4.25	6.75	10.375	10	0.875	14	19.25

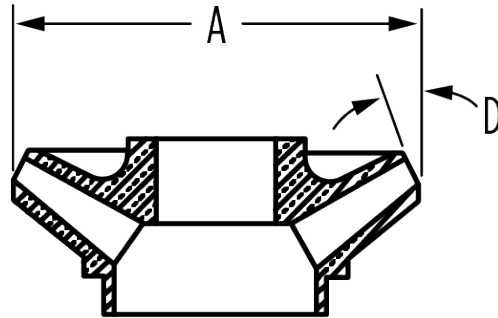
**Non-Spacer Adjustable Coupling**



Size	AH	U	EU	V	W	X	Z
3	2.75	1.125	0.875	0.375	0.75	0.25	2.75
7	4.5	1.625	1.125	0.375	0.75	0.375	3.875
10	4.5	2.125	1.75	0.375	0.75	0.5	3.875
11	5	2.375	2	0.375	0.75	0.625	3.875
12	5	2.625	2.25	0.375	0.75	0.625	3.875
13	7	2.875	2.375	0.5	1	0.75	4.313
14	7.5	3.875	2.625	0.5	1	1	5.25
14A	7.5	3.125	2.625	0.5	1	0.75	5.25
15	10	4.25	3.688	0.5	1	1	3.875

# IMPELLER ENGINEERING DATA

## FVT Turbine Impeller Mechanical Data



Model (s)	Diameter (A)		Standard Lateral (in.)	MAX Sphere (in.)	Eye Area (in. ^ 2)	Weight (lb)	Trim Angle (D) (degree)
	Maximum (in.)	Minimum (in.)					
5FMC	4.125	3.875	0.25	0.375	3.03	1.7	20
6FJC	4.688	3.688	0.375	0.125	2.41	1.8	0
6FMC	4.688	3.750	0.438	0.188	3.2	2.15	27
6FHC	4.688	3.750	0.375	0.188	3.65	2.38	20
6FXC	4.625	4.25	0.625	0.188	5.02	2.15	30
6FWC	4.688	4.313	0.438	0.5	6.88	2.65	35
6FYC	4.688	4.313	0.25	0.5	7.51	2.35	30
7FMC	5.688	5.125	0.625	0.75	11.3	5	18
7FHC	5.668	5.375	0.625	0.75	11.3	5.25	18
8FJC	6.313	5.250	0.438	0.25	3.65	5.75	0
8FJS	6.313	5.625	0.438	0.25	3.18	3.55	0
8FLC	6.313	4.875	0.438	0.25	4.64	5.75	0
8FLS	6.313	5.625	0.438	0.25	4.64	4.25	0
8FKC	6.313	5.500	0.438	0.375	5.72	5.5	18
8FKS	6.313	5.500	0.438	0.375	6.6	3.75	18
8FMC	6.313	5.500	0.438	0.375	6.5	5	27.5
8FMS	6.313	5.500	0.438	0.375	6.6	4.125	27.5
8FEHC	6.313	5.750	0.375	0.625	8.33	5	29.5
8FEHS	6.313	5.750	0.375	0.625	8.48	3.25	29.5
8FYC	6.365	5.500	0.375	1.125	15.9	5.25	37
8FYS	6.344	5.750	0.375	1.125	15.9	5	37
9FHC	7.415	6.938	0.875	0.75	12.4	8.2	17
10FJC	7.725	6.797	0.5	0.438	7.89	9.25	25.5
10FKC	7.725	6.797	0.5	0.438	7.89	9.5	25.5
10FLC	7.688	6.875	0.563	0.5	10.2	9.75	20
10FLS	7.688	6.875	0.5	0.5	11.7	6.25	20
10FMC	7.688	6.875	0.625	0.625	11.7	8.5	26
10FMS	7.688	6.875	0.625	0.625	11.7	5.75	26
10FHC	8.250	6.750	0.625	0.875	19.4	11	33.25
10FWC	8.250	6.750	0.875	0.875	19.4	11.5	33.25
10FWS	8.250	6.750	0.875	0.875	19.4	7.25	33.25



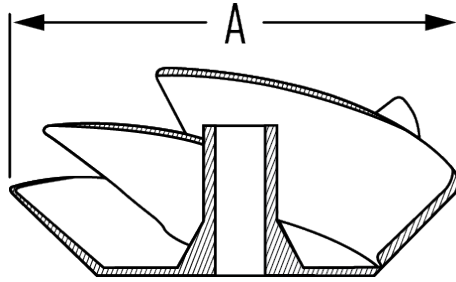
**IMPELLER ENGINEERING DATA**  
**FVT Turbine Impeller Mechanical Data**

Model (s)	Diameter (A)		Standard Lateral (in.)	MAX Sphere (in.)	Eye Area (in. ^ 2)	Weight (lb)	Trim Angle (D) (degree)
	Maximum (in.)	Minimum (in.)					
10FYC	8.250	6.750	0.75	0.875	19.4	11	33.25
10FYS	8.250	6.750	0.75	0.875	19.4	7.25	33.25
10FZC	8.250	7.125	0.5	1.438	26.7	9.75	42
10FZS	8.250	7.125	0.5	1.438	26.7	5.75	42
11FLC, 11FMC, 11FHC	8.813	8.188	0.75	0.75	17.7	13.3	23
12FDC	9.313	8.375	0.625	0.625	15.9	14.25	25
12FJC	9.500	8.00	0.625	0.5	15.9	14.5	25
12FIC	9.313	8.500	0.625	0.625	19.1	15	23
12FIS	9.313	8.250	0.625	0.625	18.1	9.5	23
12FKC	9.313	7.938	0.625	0.625	18.1	16	23
12FKS	9.313	7.938	0.5	0.625	20.4	9	23
12FNC	9.703	8.250	0.625	0.75	14.1	12.5	26
12FLC	9.375	7.750	0.875	0.625	20.1	15.5	21.5
12FLS	9.375	7.750	0.875	0.625	20.1	8.13	21.5
12FGC	9.500	8.750	1	0.625	20.1	17.5	24
12FMC	9.375	8.000	0.75	0.625	20.1	15	21.5
12FMS	9.375	8.000	0.75	0.625	20.1	10	21.5
12FHC, 12FHS	9.563	8.875	0.75	0.75	32.4	11.5	30
12FXC	9.563	8.875	8.875	1	36.6	15.25	26.5
12FXS	9.563	8.875	8.875	8.875	35.6	11.5	26.5
12FWC	10.063	9.063	0.75	1.375	27.9	21	30.5
12FWS	10.063	9.375	0.75	1.375	27.9	14.5	30.5
12FYC	9.797	8.634	0.875	1.5	38	19	35
12FYS	9.500	8.625	0.875	1.5	38	19	35
13FMC	9.938	8.625	0.813	0.75	23.4	14.7	30
14FLC	11.313	10.313	0.875	0.75	31.5	28	23
14FLS	11.313	10.313	0.875	0.75	31.5	18.5	23
14FMC	11.313	10.688	0.875	1.25	40.9	28	30
14FMS	11.313	10.688	0.875	1.25	40.9	20.25	30
14FHC	11.313	10.500	0.875	1.25	40.9	30.25	32.5
14FHS	11.313	10.500	0.875	1.25	43.9	21.25	32.5
14FXC	11.313	10.625	0.875	1.25	40.9	29.25	32.5
14FXS	11.313	10.625	0.875	1.25	40.9	20.25	32.5
14GWC	11.813	10.500	0.875	1.5	47.4	31.75	35
14FWS	11.813	10.500	0.875	1.5	47.3	23.25	35
14FYC	11.250	10.625	0.635	1.25	57	28	35
14FZC	11.250	10.750	0.625	1.25	58.5	28	35
14FLCR	11.500	10.875	0.812	1.25	37.8	26	31
14FMCR	11.500	10.500	0.813	1.25	37.8	26	31
14FHCR	11.500	10.406	0.813	1.25	37.6	26	31
15FKC	11.850	11.000	0.688	2.25	63.6	30	34
15FKS	11.850	10.500	0.688	2.25	63.6	21	34
16FLC	10.925	9.900	0.563	1.375	51.3	32.3	14

**IMPELLER ENGINEERING DATA**  
**FVT Turbine Impeller Mechanical Data**

Model (s)	Diameter (A)		Standard Lateral (in.)	MAX Sphere (in.)	Eye Area (in. ^ 2)	Weight (lb)	Trim Angle (D) (degree)
	Maximum (in.)	Minimum (in.)					
16FMC	11.032	9.750	0.75	1.688	58.4	42	27
16FHC	11.032	9.750	0.75	1.688	54.4	52	27
18FLC	13.188	12.250	0.5	1.25	46	42	20
18FMC	13.188	12.250	0.5	1.25	50.3	42	20
18FHC	13.188	12.250	0.5	1.375	67.5	42	20
18FHHC	14.00	13.188	0.75	1.25	97.9	49	30
19FMC, 19FMS, 19FHC, 19FHS, 19FHS	12.600	10.750	0.75	1	74.5	54	26
20FLC, 20FMC	13.810	12.630	0.75	2	72.6	69	27
20FHC	16.750	16.00	0.625	2	113	94	27.5
24FLC, 24FMC, 24FHC	17.500	16.520	0.938	2	93	82	18
28FLC	20.875	17.875	0.875	1.75	133	255	22.5
28FMC	20.875	16.875	2.688	1.75	133	255	22.5
28FHC	20.875	18.875	0.875	1.75	133	255	22.5
30FLC, 30FMC	21.687	20.000	1.375	2.5	175	440	27.5
36FLC	27.625	24.250	1.25	2.5	215	550	20
36FMC, 36FHC	27.625	25.500	1.25	2.5	215	500	20
42FMC, 42FHC	33.000	28.500	1.125	3.5	390	730	25

## FMF Turbine Impeller Mechanical Data



Model (s)	Diameter (A)		MAX Sphere (in.)	WR2 (lbs - ft ^ 2)	Weight (lb)
	Maximum (in.)	Minimum (in.)			
8FMFL, 8FMFM, 8FMFP	5.44	4.69	0.875	0.32	12
10FMFL, 10FMFM, 10FMFP	6.81	5.94	1.25	0.96	31
12FMFL	8.19	7.38	1.625	2.3	44
12FMFM, 12FMP	8.19	7.19	1.625	2.3	44
14FMFL, 14FMFM, 14FMFP	9.56	8.31	1.875	4.8	70
16FMFL, 16FMFM, 16FMFP	10.88	9.5	2.625	10.6	120
18FMFL, 18FMFM, 18FMFP	12.25	10.75	2.375	17	135
20FMFL, 20FMFM, 20FMFP	13.63	11.88	2.75	18	185
24FMFL, 24FMFM, 24FMFP	16.38	14.25	3.25	76	290
30FMFL	20.44	17.81	2.5	222	550
30FMFH	30	28.63	2.5	222	550

**SHAFT SIZE SPECIFICATION**  
**Material Multiplier**

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## SHAFT SIZE SPECIFICATION

For shafts made of standard C1045 Carbon Steels, refer to [“Maximum Recommended BHP for Threaded & Keyway Shaft” on page 37](#) or [“Maximum Recommended BHP for Threaded Shafts” on page 40](#) for threaded shaft and threaded with keyway shaft.

**NOTE:** The motor drive-shaft will always be threaded with keyway.

For special materials, refer to [“Material Multiplier” on page 36](#).

### Material Multiplier

Material	Specifications	UTS PSI	Yield Strength (PSI)	Maximum Allow AWWA (PSI)	Multiplier
C1045	A108 TYPE S104500	100,000	80,000	15,300	1.00
316	A276 TYPE 316 COLD FINISH	90,000	45,000	13,500	0.88
410	A276 TYPE S41000	100,000	80,000	18,000	1.18
416	A572 TYPE S41600	100,000	70,000	18,000	1.18
17-4PH (H1150)	A564 TYPE 630 COND. H1150	135,000	105,000	24,300	1.59
17-4PH (H1025)	A564 TYPE 630 COND. H1025	155,000	145,000	27,900	1.82
17-4PH (H900)	A564 TYPE 630 COND. H900	190,000	170,000	34,200	2.24
18-18	A276 TYPE S28200	110,000	60,000	18,000	1.18
Nitronic 50	A276 TYPE XM-19 CONDITION A	100,000	55,000	16,500	1.15
Nitronic 50 (HS)	A276 TYPE XM-19 HIGH STRENGTH	135,000	105,000	20,600	1.60

## Maximum Recommended BHP for Threaded & Keyway Shaft

### BHP for 0.750 - 3.438 Nominal Diameters

Nominal Diameter (in.)	RPM (N)	Thrust (1000 lbs)											
		2	4	6	8	10	15	20	25	30	40	60	
0.750	1	0.017	0.016	0.015	0.013	-	-	-	-	-	-	-	-
	980	17	16	15	13	-	-	-	-	-	-	-	-
	1180	20	19	18	15	-	-	-	-	-	-	-	-
	1450	25	23	22	19	-	-	-	-	-	-	-	-
	1760	30	28	26	23	-	-	-	-	-	-	-	-
	2900	49	46	44	38	-	-	-	-	-	-	-	-
	3500	60	56	53	46	-	-	-	-	-	-	-	-
1.00	1	0.027	0.027	0.026	0.024	-	-	-	-	-	-	-	-
	980	26	26	25	24	-	-	-	-	-	-	-	-
	1180	32	32	31	28	-	-	-	-	-	-	-	-
	1450	39	39	38	35	-	-	-	-	-	-	-	-
	1760	48	48	46	42	-	-	-	-	-	-	-	-
	2900	78	78	75	70	-	-	-	-	-	-	-	-
	3500	95	95	91	84	-	-	-	-	-	-	-	-
1.188	1	0.049	0.049	0.048	0.047	-	-	-	-	-	-	-	-
	980	48	48	47	46	-	-	-	-	-	-	-	-
	1180	58	58	57	55	-	-	-	-	-	-	-	-
	1450	71	71	70	68	-	-	-	-	-	-	-	-
	1760	86	86	84	83	-	-	-	-	-	-	-	-
	2900	142	142	139	136	-	-	-	-	-	-	-	-
	3500	172	172	168	165	-	-	-	-	-	-	-	-
1.500	1	0.093	0.093	0.092	0.091	0.090	0.086	-	-	-	-	-	-
	980	91	91	90	89	88	84	-	-	-	-	-	-
	1180	110	110	109	107	106	101	-	-	-	-	-	-
	1450	135	135	133	132	131	125	-	-	-	-	-	-
	1760	164	164	162	160	158	151	-	-	-	-	-	-
	2900	270	270	267	264	261	249	-	-	-	-	-	-
	3500	326	326	322	319	315	301	-	-	-	-	-	-
1.688	1	0.143	0.142	0.142	0.141	0.140	0.136	-	-	-	-	-	-
	980	140	139	139	138	137	133	-	-	-	-	-	-
	1180	169	168	168	166	165	160	-	-	-	-	-	-
	1450	207	206	206	204	203	197	-	-	-	-	-	-
	1760	252	250	250	248	246	239	-	-	-	-	-	-
	2900	415	412	412	409	406	394	-	-	-	-	-	-
	3500	501	497	497	494	490	476	-	-	-	-	-	-
1.938	1	0.201	0.201	0.210	0.200	0.199	0.196	-	-	-	-	-	-
	980	206	206	206	196	195	192	-	-	-	-	-	-
	1180	248	248	248	236	235	231	-	-	-	-	-	-
	1450	305	305	305	290	289	284	-	-	-	-	-	-
	1760	370	370	370	352	350	345	-	-	-	-	-	-
	2900	609	609	609	580	577	568	-	-	-	-	-	-
	3500	735	735	735	700	697	686	-	-	-	-	-	-

## SHAFT SIZE SPECIFICATION

### Maximum Recommended BHP for Threaded & Keyway Shaft

Nominal Diameter (in.)	RPM (N)	Thrust (1000 lbs)										
		2	4	6	8	10	15	20	25	30	40	60
2.188	1	0.312	0.312	0.311	0.311	0.310	0.307	-	-	-	-	-
	980	306	306	305	305	304	301	-	-	-	-	-
	1180	368	368	367	367	366	362	-	-	-	-	-
	1450	452	452	451	451	450	445	-	-	-	-	-
	1760	549	549	547	547	546	540	-	-	-	-	-
	2900	904	904	902	902	899	890	-	-	-	-	-
	3500	1092	1092	1089	1089	1085	1075	-	-	-	-	-
2.438	1	0.409	0.409	0.408	0.408	0.407	0.404	0.401	0.396	-	-	-
	980	401	401	400	400	399	396	393	388	-	-	-
	1180	483	483	481	481	480	477	473	467	-	-	-
	1450	593	593	592	592	590	586	581	574	-	-	-
	1760	720	720	718	718	716	711	706	697	-	-	-
2.688	1	0.580	0.580	0.579	0.578	0.576	0.573	0.569	0.564	-	-	-
	980	568	568	567	566	564	562	558	553	-	-	-
	1180	684	684	683	682	680	676	671	666	-	-	-
	1450	841	841	840	838	835	831	825	818	-	-	-
	1760	1020	1020	1019	1017	1014	1008	1001	993	-	-	-
2.938	1	0.723	0.723	0.723	0.722	0.722	0.720	0.717	0.713	0.708	0.696	-
	980	709	709	709	708	708	706	703	699	694	682	-
	1180	853	853	853	852	852	850	846	841	835	821	-
	1450	1048	1048	1048	1047	1047	1044	1040	1034	1027	1009	-
	1760	1272	1272	1272	1271	1271	1267	1262	1255	1246	1225	-
3.188	1	0.970	0.970	0.969	0.969	0.968	0.966	0.964	0.960	0.956	0.945	-
	980	951	951	950	950	949	947	945	941	937	926	-
	1180	1145	1145	1143	1143	1142	1140	1138	1133	1128	1115	-
	1450	1407	1407	1045	1405	1404	1401	1398	1392	1386	1370	-
	1760	1707	1707	1705	1705	1704	1700	1697	1690	1683	1663	-
3.438	1	-	-	-	-	1.167	1.165	1.163	1.160	1.156	1.146	1.116
	980	-	-	-	-	1144	1142	1140	1137	1133	1123	1094
	1180	-	-	-	-	1377	1375	1372	1369	1364	1352	1317
	1450	-	-	-	-	1692	1689	1686	1682	1676	1662	1618
	1760	-	-	-	-	2054	2050	2047	2042	2035	2017	1965

**SHAFT SIZE SPECIFICATION**  
**Maximum Recommended BHP for Threaded & Keyway Shaft**

**BPH for 3.688 - 5.00 Nominal Diameters**

Nominal Diameter (in.)	RPM (N)	Thrust (1000 lbs)						
		10	20	30	50	65	85	105
3.688	1	1.685	1.681	1.673	1.647	-	-	-
	440	741	740	736	725	-	-	-
	505	851	849	845	832	-	-	-
	585	986	983	979	963	-	-	-
	705	1188	1185	1179	1161	-	-	-
	880	1483	1479	1472	1449	-	-	-
	980	1651	1647	1639	1614	-	-	-
	1180	1988	1984	1974	1943	-	-	-
3.938	1	1.767	1.763	1.757	1.748	1.723	-	-
	440	777	776	773	769	758	-	-
	505	892	890	887	883	870	-	-
	585	1034	1031	1028	1023	1008	-	-
	705	1246	1243	1239	1232	1214	-	-
	880	1555	1551	1546	1538	1516	-	-
	980	1732	1728	1722	1713	1689	-	-
	1180	2085	2080	2073	2062	2033	-	-
4.500	1	-	2.457	2.451	2.433	2.412	2.377	-
	440	-	1089	1078	1071	1061	1046	-
	505	-	1250	1238	1229	1218	1200	-
	585	-	1448	1434	1423	1411	1391	-
	705	-	1745	1728	1715	1700	1676	-
	880	-	2178	2157	2141	2123	2092	-
	980	-	2426	2402	2384	2364	2329	-
	1180	-	2921	2892	2870	2846	2805	-
5.000	1	-	-	3.362	3.345	3.327	3.295	3.255
	440	-	-	1479	1472	1464	1450	1432
	505	-	-	1698	1689	1680	1664	1644
	585	-	-	1967	1957	1946	1928	1904
	705	-	-	2370	2358	2346	2323	2295
	880	-	-	2959	2944	2928	2900	2864
	980	-	-	3295	3278	3260	3229	3190
	1180	-	-	3967	3947	3926	3888	3841

**SHAFT SIZE SPECIFICATION**

**Maximum Recommended BHP for Threaded Shafts**

**Maximum Recommended BHP for Threaded Shafts**

Nominal Diameter (in.)	RPM (N)	Thrust (1000 lbs)										
		2	4	6	8	10	15	20	25	30	40	60
0.750	1	0.026	0.026	0.025	0.023	-	-	-	-	-	-	-
	980	25	25	25	23	-	-	-	-	-	-	-
	1180	31	31	30	27	-	-	-	-	-	-	-
	1450	38	38	36	33	-	-	-	-	-	-	-
	1760	46	46	44	40	-	-	-	-	-	-	-
	2900	75	75	73	67	-	-	-	-	-	-	-
	3500	91	91	88	81	-	-	-	-	-	-	-
1.00	1	0.041	0.040	0.039	0.038	-	-	-	-	-	-	-
	980	40	39	38	37	-	-	-	-	-	-	-
	1180	48	47	46	45	-	-	-	-	-	-	-
	1450	59	58	57	55	-	-	-	-	-	-	-
	1760	72	70	69	67	-	-	-	-	-	-	-
	2900	119	16	113	110	-	-	-	-	-	-	-
	3500	144	140	137	133	-	-	-	-	-	-	-
1.188	1	0.065	0.065	0.064	0.063	-	-	-	-	-	-	-
	980	64	64	63	62	-	-	-	-	-	-	-
	1180	77	77	76	74	-	-	-	-	-	-	-
	1450	94	94	93	91	-	-	-	-	-	-	-
	1760	114	114	113	111	-	-	-	-	-	-	-
	2900	189	189	186	183	-	-	-	-	-	-	-
	3500	228	228	224	221	-	-	-	-	-	-	-
1.500	1	0.138	0.137	0.137	0.136	0.135	0.131	-	-	-	-	-
	980	135	134	134	133	132	128	-	-	-	-	-
	1180	163	162	162	160	159	155	-	-	-	-	-
	1450	200	199	199	197	196	190	-	-	-	-	-
	1760	243	241	241	239	238	231	-	-	-	-	-
	2900	400	397	397	394	392	380	-	-	-	-	-
	3500	483	480	480	476	473	459	-	-	-	-	-
1.688	1	0.200	0.199	0.199	0.198	0.197	0.194	-	-	-	-	-
	980	196	195	195	194	193	190	-	-	-	-	-
	1180	236	235	235	234	232	229	-	-	-	-	-
	1450	290	289	289	287	286	281	-	-	-	-	-
	1760	352	350	350	348	347	341	-	-	-	-	-
	2900	580	577	577	574	571	563	-	-	-	-	-
	3500	700	697	697	693	690	679	-	-	-	-	-
1.938	1	0.308	0.307	0.307	0.306	0.305	0.303	-	-	-	-	-
	980	302	301	301	300	299	297	-	-	-	-	-
	1180	363	362	362	361	360	358	-	-	-	-	-
	1450	447	445	445	444	442	439	-	-	-	-	-
	1760	542	540	540	539	537	533	-	-	-	-	-
	2900	893	890	890	887	885	878	-	-	-	-	-
	3500	1078	1075	1075	1071	1068	1061	-	-	-	-	-



**SHAFT SIZE SPECIFICATION**  
**Maximum Recommended BHP for Threaded Shafts**

Nominal Diameter (in.)	RPM (N)	Thrust (1000 lbs)										
		2	4	6	8	10	15	20	25	30	40	60
2.188	1	0.449	0.449	0.448	0.448	0.447	0.445	-	-	-	-	-
	980	440	440	439	439	438	436	-	-	-	-	-
	1180	530	530	529	529	527	525	-	-	-	-	-
	1450	651	651	650	650	649	645	-	-	-	-	-
	1760	790	790	788	788	787	783	-	-	-	-	-
	2900	1302	1302	1299	1299	1296	1291	-	-	-	-	-
	3500	1572	1572	1568	1568	1565	1558	-	-	-	-	-
2.438	1	0.628	0.628	0.627	0.627	0.626	0.624	0.621	0.617	-	-	-
	980	615	615	614	614	613	612	609	605	-	-	-
	1180	741	741	740	740	739	736	733	728	-	-	-
	1450	911	911	909	909	908	905	900	895	-	-	-
	1760	1105	1105	1104	1104	1102	1098	1093	1086	-	-	-
2.688	1	0.849	0.849	0.849	0.848	0.848	0.846	0.843	0.839	0.835	-	-
	980	832	832	832	831	831	829	826	822	818	-	-
	1180	1002	1002	1002	1001	1001	998	995	990	985	-	-
	1450	1231	1231	1231	1230	1230	1227	1222	1217	1212	-	-
	1760	1494	1494	1494	1492	1492	1498	1484	1477	1470	-	-
2.938	1	1.117	1.117	1.117	1.116	1.116	1.114	1.112	1.108	1.104	1.094	-
	980	1095	1095	1095	1094	1094	1092	1090	1086	1082	1072	-
	1180	1318	1318	1318	1317	1317	1314	1312	1307	1303	1291	-
	1450	1620	1620	1620	1618	1618	1615	1612	1607	1601	1586	-
	1760	1966	1966	1966	1964	1964	1961	1957	1950	1943	1925	-
3.188	1	1.436	1.436	1.436	1.436	1.435	1.434	1.431	1.428	1.425	1.415	-
	980	1407	1407	1407	1407	1406	1405	1402	1399	1397	1387	-
	1180	1694	1694	1694	1694	1693	1692	1689	1685	1682	1670	-
	1450	2082	2082	2082	2082	2081	2079	2075	2071	2066	2051	-
	1760	2527	2527	2527	2527	2526	2523	2519	2513	2508	2490	-
3.438	1	-	-	-	-	1.810	1.808	1.806	1.804	1.800	1.792	1767
	980	-	-	-	-	1774	1772	1770	1768	1764	1756	1732
	1180	-	-	-	-	2136	2133	2131	2129	2124	2115	2085
	1450	-	-	-	-	2625	2622	2619	2616	2610	2598	2562
	1760	-	-	-	-	3186	3182	3179	3175	3168	3154	3110
3.688	1	-	-	-	-	2.245	2.244	2.242	2.239	2.236	2.228	2.205
	440	-	-	-	-	998	987	986	985	984	980	970
	505	-	-	-	-	1134	1133	1132	1131	1129	1125	1114
	585	-	-	-	-	1313	1313	1312	1310	1308	1303	1290
	705	-	-	-	-	1583	1582	1581	1579	1576	1571	1555
	880	-	-	-	-	1976	1975	1973	1970	1968	1961	1940
	980	-	-	-	-	2200	2199	2197	2194	2191	2183	2161
	1180	-	-	-	-	2649	2648	2646	2642	2638	2629	2602

**SHAFT SIZE SPECIFICATION****Maximum Recommended BHP for Threaded Shafts**

Nominal Diameter (in.)	RPM (N)	Thrust (1000 lbs)										
		2	4	6	8	10	15	20	25	30	40	60
3.938	1	-	-	-	-	2.744	2.743	2.741	2.739	2.736	2.728	2.707
	440	-	-	-	-	1207	1207	1206	1205	1204	1200	1191
	505	-	-	-	-	1386	1385	1384	1383	1382	1378	1367
	585	-	-	-	-	1605	1605	1603	1602	1601	1596	1584
	705	-	-	-	-	1935	1934	1932	1931	1929	1923	1908
	880	-	-	-	-	2415	2414	2412	2410	2408	2401	2382
	980	-	-	-	-	2689	2688	2686	2687	2681	2673	2653
	1180	-	-	-	-	3238	3237	3234	3232	3228	3219	3194

## SHAFT WEIGHTS & MECHANICAL FRICTION

Shaft Diameter (in.)	Wt. (lbs) / Ft *		Mechanical Friction (HP) / 100 Ft							
	Enclosed Line shaft	Open Line shaft	3500	2900	1760	1460	1175	975	875	730
3/4	1.50	1.3	0.60	0.51	0.31	0.26	0.20	0.17	0.15	0.13
1	2.60	2.3	1.10	0.87	0.53	0.44	0.35	0.29	0.26	0.22
1-3/16	3.80	3.3	1.40	1.20	0.72	0.60	0.47	0.40	0.36	0.27
1-1/2	6.00	5.3	2.20	1.90	1.10	0.96	0.74	0.63	0.56	0.47
1-11/16	7.60	6.3	2.70	2.30	1.40	1.20	0.91	0.78	0.70	0.59
1-15/16	10.00	8.8	3.90	3.10	1.80	1.60	1.20	1.00	0.90	0.76
2-3/16	12.80	11.2	-	-	2.30	1.90	1.50	1.30	1.10	0.95
2-7/16	15.78	13.9	-	-	2.90	2.40	1.90	1.60	1.40	1.20
2-11/16	19.30	7.0	-	-	3.40	2.90	2.20	1.90	1.70	1.40
2-15/16	23.00	20.2	-	-	-	3.20	2.60	2.20	2.00	1.70
3-3/16	27.10	23.8	-	-	-	-	3.20	2.70	2.40	2.00
3-7/16	31.60	27.8	-	-	-	-	3.50	3.00	2.70	2.40
3-11/16	36.30	31.9	-	-	-	-	4.10	3.40	3.00	2.70
4	42.70	37.6	-	-	-	-	4.80	4.10	3.60	3.10
4-1/4	48.20	42.4	-	-	-	-	5.15	4.60	4.10	3.40

**\*NOTE:** Oil lube shaft does not displace liquid above the pumping water level and therefore has a greater net weight.

### Allowable Bearing Spacing

- For inverter duty motors and variable frequency drives, consult factory.
- Contact factory when specifications require calculations or values of critical speed.

### Open Line Shaft Construction

**NOTE:** Column Section Lengths are equal to applicable spacing shown in the tables.

#### Open Line Shaft with Rubber Bearings Construction

Shaft Diameter (in.)	60Hz RPM					50 Hz RPM			
	3600	1800	1200	900	720	3000	1500	1000	750
1.00 - 1.50	5	10	10	10	10	5	10	10	10
1.68 - 2.19	5	10	10	10	10	5	10	10	10
2.44 - 2.69	-	10	10	10	10	-	10	10	10
2.94 - 3.19	-	10	10	10	10	-	10	10	10
3.44 - 3.68	-	10	10	10	10	-	10	10	10

**SHAFT WEIGHTS & MECHANICAL FRICTION**  
**Allowable Bearing Spacing**

**Open Line Shaft with Non-Rubber Bearings Construction**

Shaft Diameter (in.)	60Hz RPM					50 Hz RPM			
	3600	1800	1200	900	720	3000	1500	1000	750
1.00	2.5	3.3	3.3	5	5	2.5 (5)	3.3 (5)	5	5
1.19	2.5	3.3	5	5	5	3.3 (5)	3.3 (5)	5	5
1.50 - 2.19	3.3	5	5	5	5	3.3 (5)	5	5	5
2.44 - 2.69	-	5	5	5	5	-	5	5	5
2.94 - 3.19	-	5	5	5	10	-	5	5	10
3.44 - 3.68	-	5	5	10	10	-	5	5	10

**NOTE:** Lengths shown in ( ) should be used for 50 feet or greater settings.

**Enclosed Line Shaft Construction**

- Column Section Lengths are 10 feet for all bearing spacing shown in the table.
- Tube Section Lengths are equal to applicable bearing spacing shown in the table.
- Shaft Section Lengths are 10 feet for all bearing spacing shown in the table.

Shaft Diameter (in.)	60Hz RPM					50 Hz RPM			
	3600	1800	1200	900	720	3000	1500	1000	750
1.00	2.5 (5)	3.3 (5)	3.3 (5)	5	5	2.5 (5)	3.3 (5)	5	5
1.19	2.5 (5)	3.3 (5)	5	5	5	3.3 (5)	3.3 (5)	5	5
1.50 - 2.19	3.3 (5)	5	5	5	5	3.3 (5)	5	5	5
2.44 - 2.69	-	5	5	5	5	-	5	5	5
2.94 - 3.19	-	5	5	5	10	-	5	5	10
3.44 - 3.68	-	5	5	10	10	-	5	5	10

**NOTE:** Lengths shown in ( ) should be used for 50 feet or greater settings.

## COLUMN FRICTION LOSS CALCULATION

**NOTE:** Hydraulic Institute recommends no more than 5.0 ft per 100 ft.

### Column 0 - 2,700 GPM Loss in Feet per 100 ft

#### 3 inch - 5 inch Columns

Shaft Size GPM	Column Size									Shaft Size GPM
	3 inch			4 inch			5 inch			
	3/4	1	1-3/16	3/4	1	1-3/16	3/4	1	1-3/16	
30	1.9	2.6	5.2	-	-	0.7	-	-	-	30
40	3.1	4.2	8.4	-	-	1.1	-	-	-	40
50	4.4	6.1	12.1	-	-	1.6	-	-	-	50
60	6.0	8.3	16.2	-	1.2	2.2	-	-	-	60
70	7.8	11.0	20.8	1.2	1.6	2.9	-	-	-	70
80	9.8	14.2	25.9	1.5	1.9	3.6	-	-	-	80
90	11.5	17.0	31.6	1.8	2.4	4.4	-	-	-	90
100	20.0	20.1	37.5	2.2	2.9	5.3	-	-	-	100
125	28.0	29.0	54.2	3.3	4.3	7.6	-	1.0	1.4	125
150	-	-	-	4.4	5.7	10.4	1.1	1.3	1.9	150
175	-	-	-	5.9	7.6	13.5	1.5	1.8	2.5	175
200	-	-	-	7.3	9.5	16.8	1.9	2.2	3.2	200
225	-	-	-	9.0	11.8	20.2	2.3	2.7	3.8	225
250	-	-	-	10.7	13.9	24.3	2.7	3.3	4.7	250
275	-	-	-	12.8	16.3	29.0	3.2	3.9	5.5	275
300	-	-	-	14.8	18.8	32.5	3.8	4.5	6.4	300
325	-	-	-	17.3	21.4	37.0	4.3	5.2	7.4	325
350	-	-	-	19.5	24.1	42.0	4.9	5.9	8.4	350
375	-	-	-	21.8	27.7	47.2	5.5	6.6	9.3	375
400	-	-	-	24.0	30.4	52.5	6.2	7.5	10.6	400
425	-	-	-	-	-	-	7.0	8.4	13.0	425
450	-	-	-	-	-	-	7.7	9.3	13.0	450
475	-	-	-	-	-	-	8.5	10.2	14.3	475
500	-	-	-	-	-	-	9.3	11.1	15.6	500
550	-	-	-	-	-	-	11.0	13.3	18.4	550
600	-	-	-	-	-	-	12.8	15.5	21.1	600

**COLUMN FRICTION LOSS CALCULATION**  
**Column 0 - 2,700 GPM Loss in Feet per 100 ft**

**6 inch & 8 inch Columns**

	Column Size							
Shaft Size	6 inch				8 inch			Shaft Size
GPM	1	1-3/16	1-1/2	1-15/16	1-3/16	1-1/2	1-15/16	GPM
			1-11/16			1-11/16		
125	-	-	-	0.9	-	-	-	125
150	-	-	-	1.3	-	-	-	150
175	-	-	1.2	1.7	-	-	-	175
200	-	1.0	1.4	2.2	-	-	-	200
225	-	1.2	1.7	2.7	-	-	-	225
250	1.1	1.4	2.0	3.3	-	-	-	250
275	1.3	1.7	2.4	3.9	-	-	-	275
300	1.5	2.0	2.8	4.5	-	-	-	300
325	1.7	2.2	3.1	5.2	-	-	-	325
350	2	2.6	3.7	6.0	-	-	-	350
375	2.2	3.0	4.2	6.7	-	-	-	375
400	2.5	3.3	4.6	7.5	-	-	1.0	400
425	2.8	3.7	5.2	8.3	-	-	1.1	425
450	3.1	4.1	5.8	9.2	-	-	1.3	450
475	3.4	4.5	6.3	10.3	-	1.0	1.4	475
500	3.8	5.0	6.9	11.3	-	1.1	1.5	500
550	4.5	5.9	8.2	13.0	1.1	1.3	1.8	550
600	5.2	6.9	9.5	15.0	1.3	1.5	2.1	600
650	6.0	8.0	11.0	17.6	1.4	1.8	2.4	650
700	6.9	9.1	12.5	20.3	1.7	2.1	2.8	700
750	7.8	10.0	14.0	22.8	1.9	2.3	3.2	750
800	8.7	11.3	15.5	25.0	2.2	2.6	3.6	800
850	9.8	12.5	17.6	28.0	2.3	2.8	4.0	850
900	10.6	14.0	19.1	31.0	2.7	3.2	4.5	900
950	11.8	15.7	21.3	34.0	2.8	3.4	4.8	950
1000	12.8	17.1	22.9	37.4	3.3	3.9	5.4	1000
1100	15.2	20.5	27.4	-	4.0	4.8	5.8	1100
1200	18.0	24.0	32.0	-	4.5	5.4	7.5	1200
1300	-	-	-	-	5.3	6.3	8.7	1300
1400	-	-	-	-	6.0	7.2	10.1	1400
1500	-	-	-	-	6.8	8.1	11.3	1500
1600	-	-	-	-	7.6	9.1	12.7	1600
1700	-	-	-	-	8.4	10.0	14.3	1700
1800	-	-	-	-	9.4	11.2	15.9	1800
1900	-	-	-	-	10.2	12.4	17.5	1900
2000	-	-	-	-	11.3	13.6	19.1	2000

**COLUMN FRICTION LOSS CALCULATION**  
**Column 0 - 2,700 GPM Loss in Feet per 100 ft**

**10 inch & 12 inch Columns**

		Column Size								
		10 inch				12 inch				
Shaft Size		1-3/16	1-1/2	1-15/16	2-3/16	1-3/16	1-1/2	1-15/16	2-3/16	Shaft Size
GPM			1-11/16		2-7/16		1-11/16		2-7/16	GPM
800	-	-	-	-	0.9	-	-	-	-	800
850	-	-	-	-	1.1	-	-	-	-	850
900	-	-	-	1	1.2	-	-	-	-	900
950	-	-	-	1.1	1.3	-	-	-	-	950
1000	-	1	-	1.2	1.4	-	-	-	-	1000
1100	1	1.2	-	1.4	1.7	-	-	-	-	1100
1200	1.2	1.4	-	1.6	2	-	-	-	-	1200
1300	1.3	1.6	-	1.9	2.3	-	-	-	-	1300
1400	1.6	1.8	-	2.2	2.6	-	-	-	1	1400
1500	1.8	2.0	-	2.4	3.0	-	-	-	1.1	1500
1600	2.0	2.3	-	2.8	3.4	-	-	-	1.2	1600
1700	2.2	2.5	-	3.1	3.8	-	1.0	1.1	1.4	1700
1800	2.5	2.9	-	3.5	4.2	1.0	1.1	1.3	1.5	1800
1900	2.8	3.1	-	3.7	4.6	1.1	1.2	1.4	1.6	1900
2000	3.1	3.5	-	4.2	5.1	1.2	1.4	1.6	1.8	2000
2100	3.3	3.8	-	4.6	5.6	1.3	1.5	1.7	2.0	2100
2200	3.6	4.2	-	5.0	6.0	1.5	1.7	1.9	2.2	2200
2300	3.8	4.5	-	5.4	6.6	1.8	1.8	2.0	2.4	2300
2400	4.3	4.9	-	5.8	7.1	1.7	1.9	2.2	2.5	2400
2500	4.7	5.2	-	6.2	7.7	1.9	2.1	2.4	2.8	2500
2600	4.9	5.6	-	6.8	8.3	2.0	2.2	2.7	3.0	2600
2700	5.2	6.0	-	7.2	9.0	2.1	2.4	2.8	3.2	2700
2800	-	-	-	-	-	2.3	2.5	3.0	3.4	2800
2900	-	-	-	-	-	2.4	2.7	3.2	3.6	2900
3000	-	-	-	-	-	2.6	2.9	3.4	3.9	3000

**COLUMN FRICTION LOSS CALCULATION**

Column 2,000 - 30,000 GPM Loss in Feet per 100 ft

**Column 2,000 - 30,000 GPM Loss in Feet per 100 ft****12 inch & 14 inch Columns**

	Column Size							
	12 inch				14 inch			
Shaft Size	1-3/16	1-1/2	1-15/16	2-3/16	1-1/2	1-15/16	2-3/16	Shaft Size
GPM		1-11/16		2-7/16	1-11/16		2-7/16	GPM
2000	1.2	1.4	1.6	1.8	-	-	-	2000
2100	1.3	1.5	1.7	2.0	-	-	-	2100
2200	1.5	1.7	1.9	2.2	-	1.0	1.1	2200
2300	1.8	1.8	2.0	2.4	-	1.1	1.2	2300
2400	1.7	1.9	2.2	2.5	1.0	1.1	1.3	2400
2500	1.9	2.1	2.4	2.8	1.1	1.2	1.4	2500
2600	2.0	2.2	2.7	3.0	1.2	1.3	1.5	2600
2700	2.1	2.4	2.8	3.2	1.3	1.4	1.7	2700
2800	2.3	2.5	3.0	3.4	1.4	1.5	1.7	2800
2900	2.4	2.7	3.2	3.6	1.5	1.6	1.8	2900
3000	2.6	2.9	3.4	3.9	1.5	1.7	1.9	3000
3200	2.9	3.0	3.6	4.1	1.7	1.9	2.2	3200
3400	3.3	3.7	4.2	4.8	1.9	2.1	2.4	3400
3600	3.6	3.8	4.4	5.0	2.1	2.4	2.6	3600
3800	4.0	4.5	5.1	5.9	2.3	2.6	2.9	3800
4000	4.4	4.9	5.7	6.5	2.6	2.9	3.2	4000
4200	4.9	5.4	6.2	7.1	2.8	3.1	3.5	4200
4400	5.3	5.8	6.7	7.7	3.1	3.4	3.8	4400
4600	5.8	6.3	7.3	8.3	3.3	3.7	4.1	4600
4800	6.2	6.8	7.9	9.0	3.6	4.0	4.5	4800
5000	6.8	7.4	8.5	9.7	3.9	4.3	4.8	5000
5500	8.1	8.9	10.2	11.6	4.7	5.2	5.8	5500
6000	9.5	10.3	11.9	13.6	5.4	6.0	6.7	6000
6500	11.0	11.7	13.7	15.7	6.3	7.0	7.3	6500
7000	-	13.6	15.5	17.9	7.2	8.0	8.9	7000
7500	-	-	-	-	8.2	9.2	10.2	7500
8000	-	-	-	-	9.3	10.5	-	8000
8500	-	-	-	-	10.6	-	-	8500



**COLUMN FRICTION LOSS CALCULATION**  
**Column 2,000 - 30,000 GPM Loss in Feet per 100 ft**

**16 inch & 18 inch Columns**

Shaft Size GPM	Column Size								Shaft Size GPM
	16 inch				18 inch				
	1-1/2 1-11/16	1-15/16	2-3/16 2-7/16	2-11/16	1-15/16	2-3/16 2-7/16	2-11/16	2-15/16 3-3/16	
3000	-	-	-	1.0	-	-	-	-	3000
3200	-	-	1.0	1.1	-	-	-	-	3200
3400	-	1.0	1.1	1.2	-	-	-	-	3400
3600	1.0	1.1	1.2	1.4	-	-	-	-	3600
3800	1.1	1.2	1.4	1.5	-	-	-	-	3800
4000	1.2	1.4	1.5	1.6	-	-	-	-	4000
4200	1.3	1.5	1.6	1.8	-	-	-	1.0	4200
4400	1.4	1.6	1.8	1.9	-	-	1.0	1.1	4400
4600	1.6	1.8	2.0	2.1	-	1.0	1.1	1.2	4600
4800	1.7	1.9	2.1	2.3	1.0	1.1	1.2	1.3	4800
5000	1.8	2.1	2.3	2.5	1.1	1.2	1.3	1.4	5000
5500	2.2	2.5	2.7	3.0	1.3	1.4	1.5	1.7	5500
6000	2.6	2.9	3.2	3.5	1.4	1.5	1.8	2.0	6000
6500	3.0	3.4	3.8	4.1	1.5	1.6	2.1	2.3	6500
7000	3.5	3.9	4.3	4.7	1.7	1.8	2.4	2.6	7000
7500	4.0	4.5	5.0	5.4	1.8	1.9	2.8	2.9	7500
8000	4.5	5.1	5.6	6.1	2.0	2.1	3.1	3.3	8000
8500	5.1	5.6	6.3	6.8	2.1	2.3	3.4	3.7	8500
9000	5.7	6.4	7.0	7.6	2.3	2.5	3.9	4.1	9000
9500	6.3	7.0	7.8	8.5	2.7	3.0	4.2	4.5	9500
10000	7.0	7.8	8.6	9.4	3.2	3.4	4.7	5.0	10000
10500	7.6	8.5	9.4	10.0	3.7	4.0	5.1	5.5	10500
11000	8.3	9.3	10.2	-	4.2	4.6	5.5	6.0	11000
11500	9.1	10.1	-	-	4.9	5.3	6.0	6.5	11500
12000	10.0	-	-	-	5.6	6.0	6.6	7.0	12000
12500	-	-	-	-	6.3	6.7	7.1	7.5	12500
13000	-	-	-	-	7.0	7.4	7.6	8.2	13000
13500	-	-	-	-	7.7	8.1	8.2	8.8	13500
14000	-	-	-	-	8.4	8.9	8.8	9.5	14000
15000	-	-	-	-	9.1	9.8	-	-	15000
16000	-	-	-	-	9.9	10.7	-	-	16000
18000	-	-	-	-	10.7	11.7	-	-	18000
20000	-	-	-	-	11.6	12.8	-	-	20000

**COLUMN FRICTION LOSS CALCULATION**

Column 2,000 - 30,000 GPM Loss in Feet per 100 ft

**20 inch & 24 inch Columns**

Shaft Size GPM	Column Size							Shaft Size GPM
	20 inch				24 inch			
	1-15/16	2-3/16	2-11/16	2-15/16	2-3/16	2-11/16	2-15/16	
	2-7/16		3-3/16	2-7/16		3-3/16		
5500	-	-	-	1.0	-	-	-	5500
6000	-	-	1.0	1.2	-	-	-	6000
6500	-	1.1	1.2	1.4	-	-	-	6500
7000	1.1	1.3	1.4	1.6	-	-	-	7000
7500	1.3	1.4	1.6	1.8	-	-	-	7500
8000	1.5	1.6	1.8	2.0	-	-	-	8000
8500	1.7	1.8	2.0	2.3	-	-	-	8500
9000	1.9	2.0	2.2	2.5	-	-	-	9000
9500	2.1	2.2	2.5	2.8	-	-	1.0	9500
10000	2.3	2.5	2.7	3.1	-	1.0	1.1	10000
10500	2.5	2.7	3.0	3.4	1.0	1.1	1.2	10500
11000	2.7	3.0	3.3	3.7	1.1	1.2	1.4	11000
11500	3.0	3.2	3.6	4.0	1.2	1.3	1.5	11500
12000	3.2	3.5	3.8	4.3	1.3	1.4	1.6	12000
12500	3.5	3.8	4.2	4.7	1.4	1.5	1.7	12500
13000	3.7	4.1	4.5	5.1	1.5	1.6	1.8	13000
13500	4.0	4.4	4.8	5.5	1.8	1.9	2.1	13500
14000	4.3	4.7	5.2	5.8	1.8	1.9	2.1	14000
15000	4.9	5.4	5.9	6.6	2.0	2.2	2.4	15000
16000	5.5	6.0	6.6	7.5	2.3	2.4	2.7	16000
18000	6.9	7.6	8.3	9.4	2.8	3.0	3.4	18000
20000	8.5	9.3	10.5	-	3.4	3.7	4.1	20000
22000	10.5	-	-	-	4.1	4.4	4.9	22000
24000	-	-	-	-	4.8	5.2	5.8	24000
26000	-	-	-	-	5.6	6.0	6.7	26000
28000	-	-	-	-	6.4	6.9	7.4	28000
30000	-	-	-	-	7.3	7.8	8.8	30000

# SHAFT LENGTH DATA

## Vertical Turbine Shaft Length

Model	Shaft	Discharge Size	First Stage			Additional Stage	Setup Tool
			Water Lubricated	Water Lubricated w/Delta Discharge	Oil Lubricated		
5FMC	1 in.	4 in.	20.5	-	35	4.625	1
6FJC	3/4 in.	4 in.	20	-	34.5	3.75	1
6FM, H, X, W, Y / C	1 in.	4 in.	21	-	35.5	4.75	1
7FM, H / C	1-3/16 in.	6 in.	22.75	-	37.125	7.063	1.25
8FJ, L, K, M / C & S	1 in.	4 in.	-	21.25	-	5.625	1.25
8FJ, L, K, M / C & S	1 in.	5 in. & 6 in.	21.25	20.125	35.75	5.625	1.25
8FEH / C & S	1-3/16 in.	4 in.	-	21.875	-	6.25	1.25
8FEH / C & S	1-3/16 in.	5 in. & 6 in.	21.875	20.75	36.375	6.25	1.25
8FY / C & S	1-3/16 in.	6 in.	23.125	-	37.625	7.5	1.25
9FL, H / C	1-1/2 in.	6 in. & 8 in.	29.25	-	43.75	8.5	1.25
10FJ, K / C	1-1/2 in.	6 in. & 8 in.	28	-	42.5	7.25	1.25
10FL, M, H / C & S	1-1/2 in.	6 in. & 8 in.	27.75	-	42.25	7	1.25
10FW, Y, Z / C & S	1-11/16 in.	6 in. & 8 in.	29.25	27.25	43.75	8.5	1.25
11FL, M, H / C	1-11/16 in.	8 in.	30.625	-	45.125	9.875	1.25
12FD, J / C	1-11/16 in.	6 in., 8 in., & 10 in.	28.125	26.625	42.625	9	1.25
12FI, K / C & S	1-11/16 in.	6 in., 8 in., & 10 in.	29.125	27.625	43.625	10	1.25
12FGC	1-11/16 in.	6 in., 8 in., & 10 in.	30.125	-	44.625	11	1.25
12FNC	1-11/16 in.	8 in. & 10 in.	28.625	-	43.125	9	1.25
12FL, M, H, X / C & S	1-11/16 in.	6 in., 8 in., & 10 in.	29.625	28.125	44.125	10.5	1.25
12FW / C & S	1-11/16 in.	8 in. & 10 in.	30.375	28.875	44.875	11.25	1.25
12FYC	1-11/16 in.	8 in. & 10 in.	30.875	29.375	45.375	11.75	1.25
12FYS	1-11/16 in.	8 in. & 10 in.	29.938	28.438	44.438	10.813	1.25
13FMC	1-11/16 in.	8 in. & 10 in.	29.875	28.375	44.375	10.75	1.25
14FL, M, H, X / C & S	1-15/16 in.	10 in. & 12 in.	33.688	31.813	48.188	12.5	1.25
14FW / C & S	1-15/16 in.	10 in. & 12 in.	34.438	32.563	48.938	13.25	1.25
14FLCR, MCR, HCR	2-3/16 in.	10 in. & 12 in.	51.125	-	59.125	13.375	1.25
14FY, Z / C	1-15/16 in.	10 in. & 12 in.	33.5	-	48	12.313	1.25
15FK / C & S	1-15/16 in.	10 in. & 12 in.	36.438	34.563	50.938	15.25	1.25

**NOTE:** The 12YC and 12YS models have different bowl lengths.

**SHAFT LENGTH DATA**  
**Vertical Turbine Shaft Length**

**Water Lube Stage Vertical Shaft Stage Lengths**

Model	Shaft	Number of Stages										Add Stage	Setup Tool
		1	2	3	4	5	6	7	8	9	10		
T-5MC	1 in.	20.5	25.125	29.750	34.375	39	43.625	48.25	52.875	57.5	62.125	4.625	1
F-6J,L	3/4 in.	20	23.75	27.5	31.25	35	38.75	42.5	46.25	50	53.75	3.75	1
F-6M, H,X,W,Y	1 in.	21	25.75	30.5	35.25	40	44.75	49.5	54.25	59	63.75	4.75	1
7M,H	1-3/16 in.	22.75	29.813	36.875	43.938	51	58.063	65.125	72.188	79.25	86.313	7.063	1.25
8J,L,K,M	1 in.	21.25	26.875	32.5	38.125	43.75	49.375	55	60.625	66.25	71.875	5.625	1.25
8EH	1-3/16 in.	21.875	28.125	34.375	40.625	46.875	53.125	59.375	65.625	71.875	78.125	6.25	1.25
T-8W	1-3/16 in.	23.313	30.813	38.313	45.813	53.313	60.813	68.313	75.313	83.313	90.313	7.5	1.25
8Y	1-3/16 in.	23.125	30.625	38.125	45.625	53.125	60.625	68.125	75.625	83.125	90.625	7.5	1.25
9L,H	1-1/2 in.	29.25	37.75	46.25	54.75	63.25	71.75	80.25	88.75	97.25	105.75	8.5	1.25
10J,K	1-1/2 in.	28	35.25	42.5	49.75	57	64.25	71.5	78.75	86	93.25	7.25	1.25
10L,M,H	1-1/2 in.	27.75	34.75	41.75	48.75	55.75	62.75	69.75	76.75	83.75	90.75	7	1.25
10W,Y,Z	1-11/16 in.	29.25	37.75	46.25	54.75	63.25	71.75	80.25	88.75	97.25	105.75	8.5	1.25
11L,M,H	1-11/16 in.	30.625	40.5	50.375	60.25	70.125	80	89.875	99.75	109.625	119.5	9.875	1.25
12D,J	1-11/16 in.	28.125	37.125	46.125	55.125	64.125	73.125	82.125	91.125	100.125	109.125	9	1.25
12I,K	1-11/16 in.	29.125	39.125	49.125	59.125	69.125	79.125	89.125	99.125	109.125	119.125	10	1.25
12G	1-11/16 in.	30.125	41.125	52.125	63.125	74.125	85.125	96.125	107.125	118.125	129.125	11	1.25
12N	1-11/16 in.	28.625	37.625	46.625	55.625	64.625	73.625	82.625	91.625	100.625	109.625	9	1.25
12L,M,H, X	1-11/16 in.	29.625	40.125	50.625	61.125	71.625	82.125	92.625	103.125	113.625	124.125	10.5	1.25
12W	1-11/16 in.	30.375	41.625	52.875	64.125	75.375	86.625	97.875	109.125	120.375	131.625	11.25	1.25
12YC	1-11/16 in.	30.875	42.625	54.375	66.124	77.875	89.625	101.375	113.125	124.875	136.625	11.75	1.25
12YS	1-11/16 in.	29.938	40.75	51.563	62.375	73.188	84	94.813	105.625	116.438	127.25	10.813	1.25
13M	1-11/16 in.	29.875	40.625	51.375	62.125	72.875	83.625	94.375	105.125	115.875	126.625	10.75	1.25
14L,M,H, X	1-15/16 in.	33.688	46.188	58.688	71.188	83.688	96.188	108.688	121.188	133.688	146.188	12.5	1.25
14W	1-15/16 in.	34.438	47.688	60.938	74.188	87.438	100.688	113.938	127.188	140.438	153.688	13.25	1.25
14LCR,M CR,HCR	2-3/16 in.	51.125	64.5	77.875	91.25	104.625	118	131.375	144.75	158.125	171.5	13.375	1.25
14Y,Z	1-15/16 in.	33.5	45.813	58.125	70.438	82.75	95.063	107.375	119.688	132	144.313	12.313	1.25
15K	1-15/16 in.	36.438	51.688	66.938	82.188	97.438	112.688	127.938	143.188	158.438	173.688	15.25	1.25
18L,M,H	2-3/16 in.	32	46	60	74	88	102	116	130	144	158	14	-
20L,M	2-17/16 in.	38	57	76	95	114	133	152	171	190	209	19	-
20H	2-17/16 in.	40.5	60	79.5	99	118.5	138	157.5	177	196.5	216	19.5	-
24L,M,H	2-11/16 in.	38.25	56.5	74.75	93	111.25	129.5	147.75	166	184.25	202.5	18.25	-
28M,H,Y	2-11/16 in.	43.125	65.875	88.625	111.375	134.125	156.875	179.625	202.375	225.125	247.875	22.75	-

### Water Lube Delta Discharge Stage Lengths

Model	Shaft	Number of Stages										Add Stage	Setup Tool
		1	2	3	4	5	6	7	8	9	10		
6JL x 4	3/4 in.	18.5	22.25	26	29.75	33.5	37.25	41	44.75	48.5	52.25	3.75	1
6M,H,X, W,Y x 4	1 in.	19.5	24.25	29	33.75	38.5	43.25	48	52.75	57.5	62.25	4.75	1
8J,L,K,M x 4	1 in.	21.25	26.875	32.5	38.125	43.75	49.375	55	60.625	66.25	71.875	5.625	1.25
8J,L,K,M x 5	1 in.	20.125	25.75	31.375	37	42.625	48.25	53.875	59.5	65.125	70.75	5.625	1.25
8J,L,K,M x 6	1 in.	20.125	25.75	31.375	37	42.625	48.25	53.875	59.5	65.125	70.75	5.625	1.25
8EH x 4	1 in.	21.875	28.125	34.375	40.625	46.875	53.125	59.375	65.625	71.875	78.125	6.25	1.25
8EH x 5	1 in.	20.75	27	33.25	39.5	45.75	52	58.25	64.5	70.75	77	6.25	1.25
8EH x 6	1 in.	20.75	27	33.25	39.5	45.75	52	58.25	64.5	70.75	77	6.25	1.25
8W x 6	1-3/16 in.	22.938	30.438	37.938	45.438	52.938	60.438	67.938	75.438	82.938	90.438	7.5	1.25
10JK x 6\8	1-1/2 in.	26	33.25	40.5	47.75	55	62.25	69.5	76.75	84	91.25	7.25	1.25
10L,M,H x 6\8	1-1/2 in.	25.75	32.75	39.75	46.75	53.75	60.75	67.75	74.75	81.75	88.75	7	1.25
10W,Y,Z x 6\8	1-11/16 in.	27.25	35.75	44.25	52.75	61.25	69.75	78.25	86.75	95.25	103.75	8.5	1.25
12J x 8\10	1-11/16 in.	26.625	35.625	44.625	53.625	62.625	71.625	80.625	89.625	98.625	107.625	9	1.25
12I,K x 8\10	1-11/16 in.	27.625	37.625	47.625	57.625	67.625	77.625	87.625	97.625	107.625	117.625	10	1.25
12L,M,H, X x 8\10	1-11/16 in.	28.125	38.625	49.125	59.625	70.125	80.625	91.125	101.625	112.125	122.625	10.5	1.25
12W x 8\10	1-11/16 in.	28.875	40.125	51.375	62.625	73.875	85.125	96.375	107.625	118.875	130.125	11.25	1.25
12YC x 8\10	1-11/16 in.	29.375	41.125	52.875	64.625	76.675	88.125	99.875	111.625	123.375	135.125	11.75	1.25
12YS x 8\10	1-11/16 in.	28.438	39.251	50.063	60.876	71.688	82.501	93.313	104.126	114.938	125.751	10.813	1.25
13M x 8\10	1-11/16 in.	28.375	39.125	49.875	60.625	71.375	82.125	92.875	103.625	114.375	125.125	10.75	1.25
14L,M,H, X x 10\12	1-15/16 in.	31.813	44.313	56.813	69.313	81.813	94.313	106.813	119.313	131.813	144.313	12.5	1.25
14W x 10\12	1-15/16 in.	32.563	45.813	59.063	72.313	85.563	98.813	112.063	125.313	138.563	151.813	13.25	1.25
14Y,Z x 10\12	1-15/16 in.	31.625	43.938	56.25	68.563	80.875	93.188	105.5	117.813	130.125	142.438	12.313	1.25
15K x 10\12	1-15/16 in.	34.563	49.813	65.063	80.313	95.563	110.813	126.063	141.313	156.563	171.813	15.25	1.25

**SHAFT LENGTH DATA**  
**Vertical Turbine Shaft Length**

**Oil Lube Vertical Stage Lengths**

Model	Shaft	Number of Stages										Add Stage	Setup Tool
		1	2	3	4	5	6	7	8	9	10		
T-5M	1 in.	35	39.625	44.25	48.875	53.5	58.125	62.75	67.375	72	76.625	4.625	1
F-6J,L	3/4 in.	34.5	38.25	42	45.75	49.5	53.25	57	60.75	64.5	68.25	3.75	1
F-6M, H,X,W,Y	1 in.	35.5	40.25	45	49.75	54.5	59.25	64	68.75	73.5	78.25	4.75	1
7M,H	1-3/16 in.	37.125	44.188	51.25	58.313	65.375	72.438	79.5	86.563	93.625	100.688	7.063	1.25
8J,L,K,M	1 in.	35.75	41.375	47	52.625	58.25	63.875	69.5	75.125	80.75	86.375	5.625	1.25
8EH	1-3/16 in.	36.375	42.625	48.875	55.125	61.375	67.625	73.875	80.125	86.375	92.625	6.25	1.25
T-8W	1-3/16 in.	37.813	45.313	52.813	60.313	67.813	75.313	82.813	90.313	97.813	105.313	7.5	1.25
8Y	1-3/16 in.	37.625	45.125	52.625	60.125	67.625	75.125	82.625	90.125	97.625	105.125	7.5	1.25
9L,H	1-1/2 in.	43.75	52.25	60.75	69.25	77.75	86.25	94.75	103.25	111.75	120.25	8.5	1.25
10J,K	1-1/2 in.	42.5	49.75	57	64.25	71.5	78.75	86	93.25	100.5	107.75	7.25	1.25
10L,M,H	1-1/2 in.	42.25	49.25	56.25	63.25	70.25	77.25	84.25	91.25	98.25	105.25	7	1.25
10W,Y,Z	1-11/16 in.	43.75	52.25	60.75	69.25	77.50	86.25	94.75	103.25	111.75	120.25	8.5	1.25
11L,M,H	1-11/16 in.	45.125	55	64.875	74.75	84.625	94.5	104.375	114.25	124.125	134	9.875	1.25
12D,J	1-11/16 in.	42.625	51.625	60.625	69.625	78.625	87.625	96.625	105.625	114.625	123.625	9	1.25
12I,K	1-11/16 in.	43.625	53.625	63.625	73.625	83.625	93.625	103.625	113.625	123.625	133.625	10	1.25
12G	1-11/16 in.	44.625	55.625	66.625	77.625	88.625	99.625	110.625	121.625	132.625	143.625	11	1.25
12N	1-11/16 in.	43.125	52.125	61.125	70.125	79.125	88.125	97.125	106.125	115.125	124.125	9	1.25
12L,M,H, X	1-11/16 in.	44.125	54.625	65.125	75.625	86.125	96.625	107.125	117.625	128.125	138.625	10.5	1.25
12W	1-11/16 in.	44.875	56.125	67.375	78.625	89.875	101.125	112.375	123.625	134.875	146.125	11.25	1.25
12YC	1-11/16 in.	45.375	57.125	68.875	80.625	92.375	104.125	115.875	127.625	139.375	151.125	11.75	1.25
12YS	1-11/16 in.	44.438	55.25	66.063	76.875	87.688	98.5	109.313	120.125	130.938	141.75	10.813	1.25
13M	1-11/16 in.	44.375	55.125	65.875	76.625	87.375	98.125	108.875	119.625	130.375	141.125	10.75	1.25
14L,M,H, X	1-15/16 in.	48.188	60.688	73.188	85.688	98.188	110.688	123.188	135.688	148.188	160.688	12.5	1.25
14W	1-15/16 in.	48.938	62.188	75.438	88.688	101.938	115.188	128.438	141.688	154.938	168.188	13.25	1.25
14LCR, MCR, HCR	2-3/16 in.	59.125	72.5	85.875	99.25	112.625	126	139.375	152.75	166.125	179.5	13.375	1.25
14Y,Z	1-15/16 in.	48	60.313	72.625	84.938	97.25	109.563	121.875	134.188	146.5	158.813	12.313	1.25
15K	1-15/16 in.	50.938	66.188	81.438	96.688	111.938	127.188	142.438	157.688	172.938	188.188	15.25	1.25
18L,M,H	2-3/16 in.	46.5	60.5	74.5	88.5	102.5	116.5	130.5	144.5	158.5	172.5	14	-
20L,M	2-7/16 in.	52.5	71.5	90.5	109.5	128.5	147.5	166.5	185.5	204.5	223.5	19	-
20H	2-7/16 in.	55	74.5	94	113.5	133	152.5	172	191.5	211	230.5	19.5	-
24L,M,H	2-11/16 in.	52.75	71	89.25	107.5	125.75	144	162.25	180.5	198.75	217	18.25	-
28M,H,Y	2-11/16 in.	67.625	90.375	113.125	135.875	158.625	181.375	204.125	226.875	249.625	272.375	22.75	-

## Propeller Shaft Length

**NOTE:** Standard construction for all propeller pumps is flanged column. Consult Engineering prior to selling multi-stage propeller pumps.

Model	Shaft	Discharge Connection	First Stage	2nd Stage	Add Stage	Projection
AJ10	1-3/16	Flanged column	23.063	33.313	10.25	10
		10 in. threaded	23.5	33.75		
		12 in. threaded	24.313	34.563		
AJ12	1-1/2	Flanged column	25.688	38.001	12.313	
		12 in. threaded	26.938	39.251		
AJ14	1-11/16	Flanged column	27.75	41.5	13.75	
		12 in. threaded	31	44.75		
		14 in. threaded	30.5	44.25		
AJ16		Flanged column	28.906	43.937	15.031	
		16 in. threaded	30.781	45.812		

## DOWN THRUST CALCULATION

Down Thrust is the axial force applied to the pump during operation.

$$\text{Down Thrust} = (K \times H \times SG) + (Ws \times Ls) + (Wi \times S)$$

Variable	Definition	Reference
K	Thrust factor for the pump (different for each model)	Refer to the additional data quote documents within FE Select or the families performance curves available for download on <a href="http://www.FranklinWater.com">www.FranklinWater.com</a> .
H	Total head in feet	Total head is based on selected pump and is found within FE Select.
SG	Specific gravity of liquid (water = 1)	Dependent on the fluid selected.
Ws	Weight per foot of the shaft in lbs	Refer to <a href="#">“Shaft Weights &amp; Mechanical Friction” on page 43</a> .
Ls	Length of the shaft in feet	Sum of the head shaft, column shaft length and the bowl shaft length. Calculated within FE Select or manually calculated using bowl shaft lengths and head shaft calculations for cast discharge heads. Refer to <a href="#">“Shaft Length Data” on page 51</a> for bowl shaft lengths. Refer to <a href="#">“Water Lubricated Units” on page 22</a> and <a href="#">“Oil Lubricated Units” on page 23</a> for head shaft calculations.
Wi	Weight of the impeller	Refer to the additional data quote documents within FE Select or the families performance curves available for download on <a href="http://www.FranklinWater.com">www.FranklinWater.com</a> .
S	Number of stages	Calculated based on application inputs within FE Select.

**SUCTION CAN SELECTION DATA**  
**Bowl & Barrel Diameters**

# SUCTION CAN SELECTION DATA

## Bowl & Barrel Diameters

Nominal Bowl Diameter	Barrel Diameter									
	8	10	12	14	16	18	20	24	30	36
5	448	892	-	-	-	-	-	-	-	-
6	337	767	-	-	-	-	-	-	-	-
7	-	603	1120	1486	-	-	-	-	-	-
8	-	450	765	1372	-	-	-	-	-	-
9	-	-	753	1115	1761	2490	-	-	-	-
10	-	-	315	922	1620	2407	-	-	-	-
11	-	-	-	625	1272	2001	2849	-	-	-
12	-	-	-	382	1080	1867	2767	-	-	-
1314	-	-	-	-	450	1237	2137	4230	-	-
15	-	-	-	-	-	877	1777	3870	7717	-
16	-	-	-	-	-	-	1395	3487	7335	-
18	-	-	-	-	-	-	-	2655	6502	-
20	-	-	-	-	-	-	-	1732	5580	10327

**NOTE:** Recommended capacity based on a fluid velocity of 5 ft./sec. For different fluid velocity ft./sec., contact factory. For larger can size, contact factory.

## Can Weights

Can Diameter	First 5 Feet	Additional Feet
8	275	30
10	325	40
12	425	50
14	500	55
16	600	65
18	650	75
20	750	80
24	1000	95
30	1600	120
36	2100	145
42	2850	170
48	4000	200



For technical assistance, parts, or repair, please contact:

**901.850.5115 | franklinwater.com**

Form 10000005065 Rev. 000 10/20



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