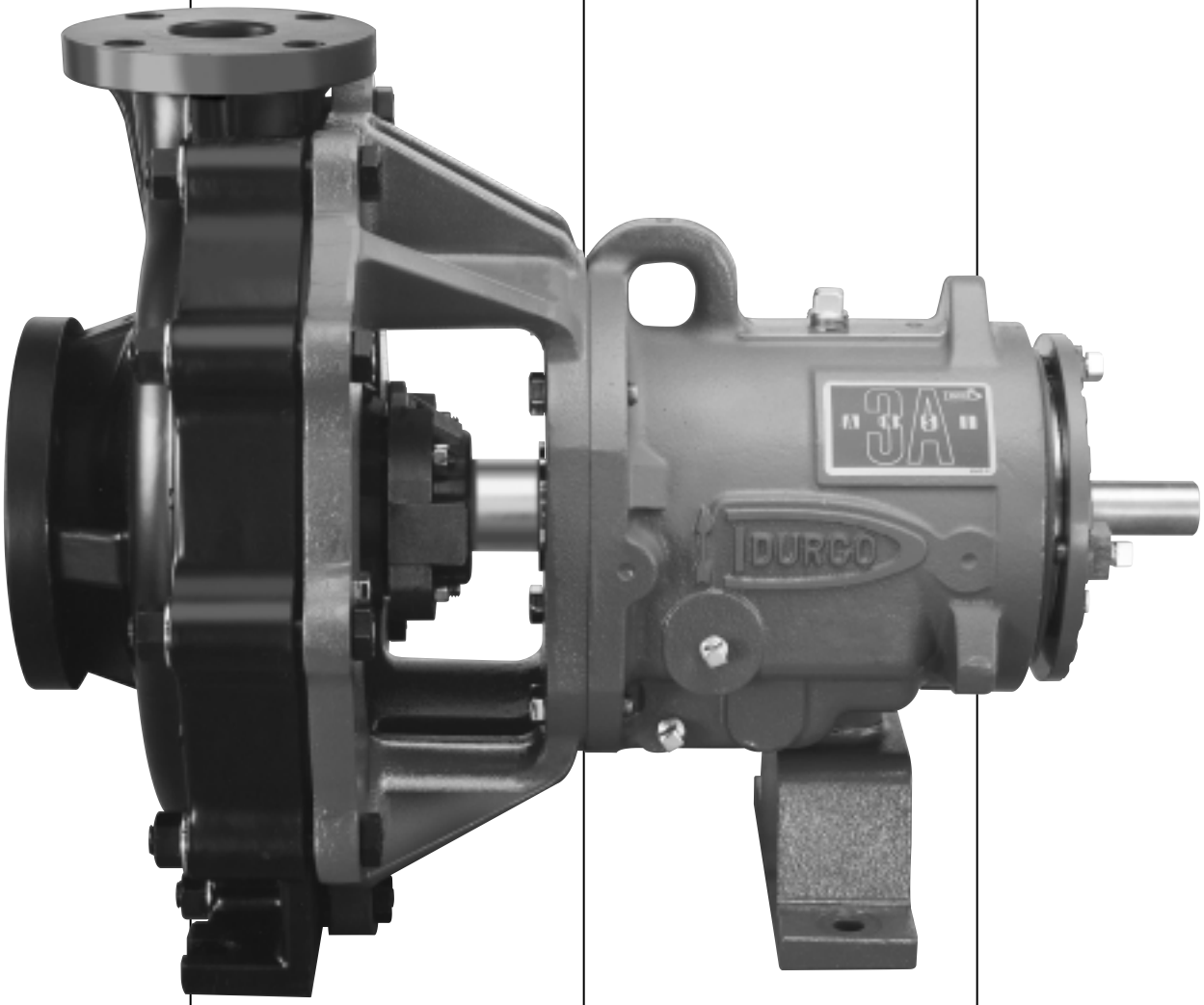
I.O.M.
Installation, Operation and Maintenance

Durco
Mark III
Process Pumps

- *F-Series Standard Pump*
- *Self-Priming Pump*



FLOWSERVE®

Bulletin P-17-300 (E)

STANDARD F-SERIES PUMPS

INSTALLATION

Refer to Bulletin P-10-502, Installation, Operation and Maintenance of Durco Mark III Standard Pumps, Section 4 for installation instructions for alignment, foundation and motor rotation.

Note: Excessive pump noise or vibration may indicate a dangerous condition and the pump must be shut down immediately.

Piping

The general comments on piping contained in Bulletin P-10-502 also apply to the F-Series pump. Due to the non-metallic construction on the F-Series pump, care must be taken during installation and operation to avoid pipe forces and moments on the pump casing in excess of the limits set forth in Table I. See Figure A for location of forces and moments. The resultant loads on each nozzle must not exceed the values shown in Table II.

Expansion joints are not required if the piping system will not impose forces and/or moments in excess of the values listed. A piping system as shown in Figure B must be used if the piping system will impose forces and/or moments in excess of the values shown in Tables I and II.

Table I

Maximum Allowable Combined Forces and Moments

Pump	Fx	Fy	Fz	Mx	My	Mz
1K1.5x1F-6	63 (280)	157 (698)	126 (560)	316 (429)	158 (215)	158 (215)
1K3x1.5F-7	117 (520)	293 (1303)	234 (1041)	587 (798)	293 (398)	293 (398)
2K3x2F-10	126 (560)	316 (1406)	253 (1125)	630 (856)	316 (429)	316 (429)
1K3x2FS-7	60 (267)	150 (667)	120 (534)	300 (408)	150 (204)	150 (204)

Note: F in lbs (N) and M in lb_f ft (N•m)

Table II

Maximum Allowable Loading For Individual Nozzle

Nozzle Size	$F_R + M_R/3$ (English)	$F_R + M_R*1.09$ (Metric)
1 in (25 mm)	120	534
1½ in (40 mm)	175	779
2 in (50 mm)	231	1028
3 in (80 mm)	350	1557

Note: F in lbs and M in lb_f ft are resultants of component forces and moments on each nozzle. Values for 1K3 x 2FS-7 are half those listed.

Figure A
Location of forces and moments.

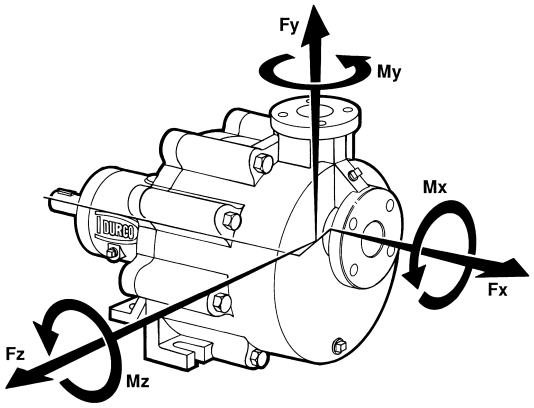
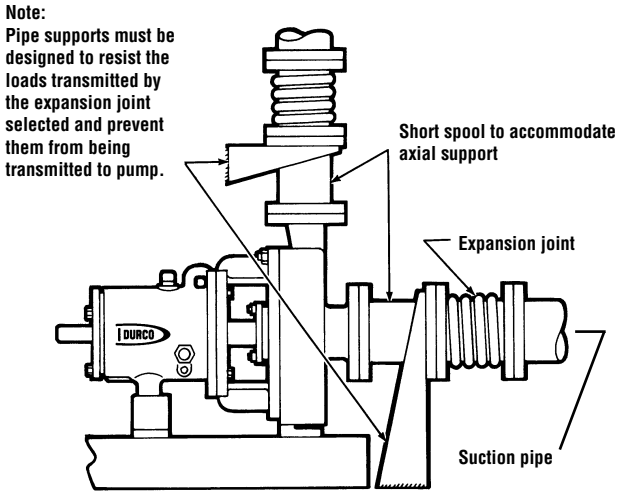


Figure B
Pump installation using expansion joints to prevent transmission of piping system loads higher than Table I and Table II to the pump.



PREPARATION FOR OPERATION

The preparation for operation of the F-Series pump is the same as that covered in Bulletin P-10-502 for Durco Mark III Standard Pumps, Section 4.

OPERATION

The operation of the F-Series pump is the same as that covered in Bulletin P-10-502 for Durco Mark III Standard Pumps, Section 4.

MAINTENANCE

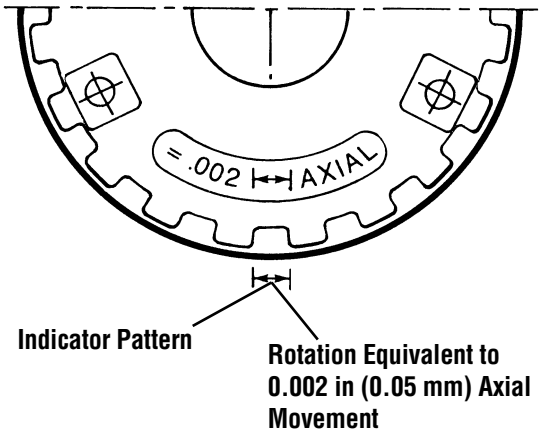
Disassembly and Assembly

The method of disassembly and assembly of the F-Series pump is very similar to the Standard Mark III pump. Refer to Bulletin P-10-502 for Durco Mark III Standard Pumps, Section 4 and observe the following differences.

Instead of casing studs, the F-Series pump is provided with through bolts, nuts and washers (#115).

The F-Series pump impeller running clearance is set off the casing. Attach the power end/rear cover plate assembly to the casing. Set the impeller clearance by loosening the set screws (#201A) and rotating the bearing carrier (#201). Turn the bearing carrier clockwise until the impeller comes into light rubbing contact with the casing. Rotating the shaft at the same time will accurately determine this zero setting. Rotate the bearing carrier counterclockwise to get the proper clearance. Rotating the bearing carrier the width of one of the indicator pattern cast into the bearing carrier moves the impeller axially 0.002 in (0.05 mm) (See Figure C).

Figure C



Rotate the bearing carrier counterclockwise the required amount to get the desired clearance to the casing. Tighten the set screws (#201A) to lock the bearing carrier in place. Tightening the set screws (#201A) will cause the impeller to move 0.002 in (0.05 mm) away from the casing because of the internal looseness in the bearing carrier threads. This must be considered when setting the impeller clearance.

The required setting clearance is 0.018 in (0.46 mm) for speeds of 1750 rpm or less. The setting clearance is 0.021 in (0.53 mm) for speeds greater than 1750 rpm. A tolerance of ±0.003 in (0.08 mm) is permissible. Add 0.001 in (0.03 mm) for each 25°F (14°C) increase over 150°F (66°C).

Gaskets

Full face gasketing materials, 1/8 in (3.2 mm) in thickness having suitable chemical resistance and a Shore durometer rating of 70, are recommended for the suction and discharge flanges. Flowserve material engineers will assist in gasket material selection upon customer request. Flat face mating flanges are recommended although raised face flanges and/or ring gaskets may be used if the recommended torque values for flange bolts and the charted values for maximum pipe loads are not exceeded.

Bolt Torques

Casing nuts (#115A) should be torqued to 15 lb_f ft (20 N-m) for Group I pumps and 25-30 lb_f ft (34-41 N-m) for Group II pumps. The follower flange (seal gland) nuts (#111A) should be torqued to 5 lb_f ft (7 N-m). The torque required to seal the casing flanges is 15 lb_f ft (20 N-m). This value was established using rubber gaskets of 70 durometer and standard 150 lb ANSI drilling.

Machining Impellers

It is possible to machine trim F-Series impellers if smaller diameter impeller is desired. Care must be taken, however, and the following procedures are recommended.

1. Maximum recommended machine surface speed is 240 (73 m) to 250 (76 m) feet (meters) per minute.
2. Depth of cut 0.010 to 0.015 in (0.2 to 0.4 mm).
3. Use tungsten carbide tool and change every 1 in (25 mm) of trim.
4. Reverse feed after each full cut.

F-SERIES SELF-PRIMING PUMPS

INSTALLATION

Installation of Durco F-Series self-priming pumps is the same as for the standard F-Series pumps except that suction pipe location will be above the pump shaft centerline.

Piping

The comments on piping for the F-Series self-priming pump are the same as for the standard F-Series pumps.

In addition, the prompt purging of all air from the suction line of any self-priming pump will be aided by keeping horizontal runs as short as possible. The horizontal run should also be sloped down slightly toward the pump for its entire length.

If an external bypass flush is to be used with a single seal, the piping arrangement shown in Figure D should be used.

PREPARATION FOR OPERATION

Refer to Bulletin P-10-502, Section 4.

In addition, the priming chamber (#146) must be filled with fluid to at least the shaft centerline for the initial prime. Thereafter, the proper liquid level will be retained at shutdown except as noted below under "Operation." A port (3/4 in NPT) is provided directly above the suction flange for filling the priming chamber (#146). All pipe threaded plugs should be coated with pipe sealant. Several anaerobic pipe sealants are available including La-Co Slic-tite Paste with Teflon and Bakerseal Thread Sealing and Lubricating Compound. Teflon tape should ***not*** be used.

OPERATION

The operation of Durco F-Series self-priming pumps is the same as for standard F-Series pumps. The design of the self-priming pump has precluded the need for any check valves to retain priming liquid. Even without completing the priming cycle, sufficient liquid will be retained to complete a subsequent prime. However, repeated incomplete priming cycles may cause the pump to lose enough liquid back down the suction line to make priming very slow or impossible without replenishing. Provisions must be made to vent air from the pump discharge during the priming cycle.

MAINTENANCE

Disassembly and Assembly

Nearly all maintenance required on a Durco F-Series self-primer can be accomplished by removing the power end as in a standard pump. In the event that it becomes necessary to separate the casing (#100) and the priming chamber (#146) this may be done by simply tapping on the casing feet with a soft mallet after removing all the casing bolts (#115). When reassembling, a new gasket (#148) will be required between the priming chamber (#146) and casing (#100), installed the same as for the standard F-Series pump cover gasket. The casing (#100) and priming chamber (#146) may be pulled together with casing bolts (#115) but care should be taken to pull them together evenly.

Pump maintenance requiring replacement of the impeller (#103) and/or casing (#100) must assure a 0.06 in (1.6 mm) to 0.12 in (3.2 mm) clearance between the impeller outside diameter and casing cutwater.

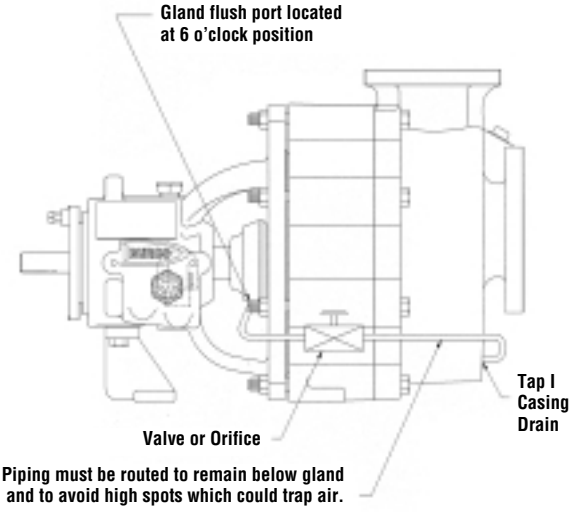
Gaskets

The comments on gaskets for the F-Series self-priming are the same as for the standard F-Series pump.

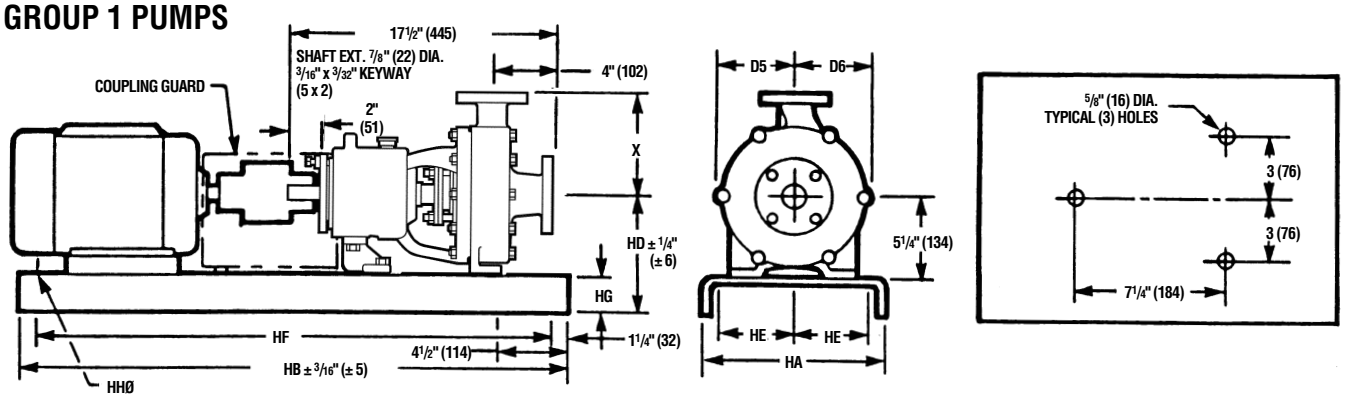
Bolt Torques

Refer to the bolt torque requirements for the standard F-Series pump. The only difference is that the casing bolts (#115) should be torqued in at least two stages to a final value of 25-30 lb_f ft (34-41 N•m). The construction of the pump demands that these values be met and that the torquing be uniform.

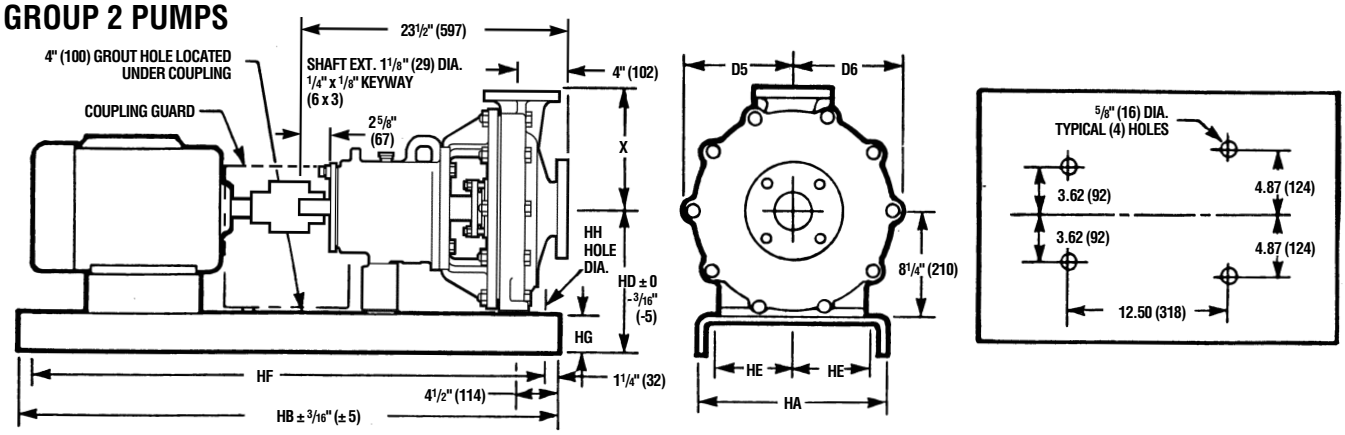
Figure D
Recommended external bypass flush arrangement for single seal on 1K3X2FS-7



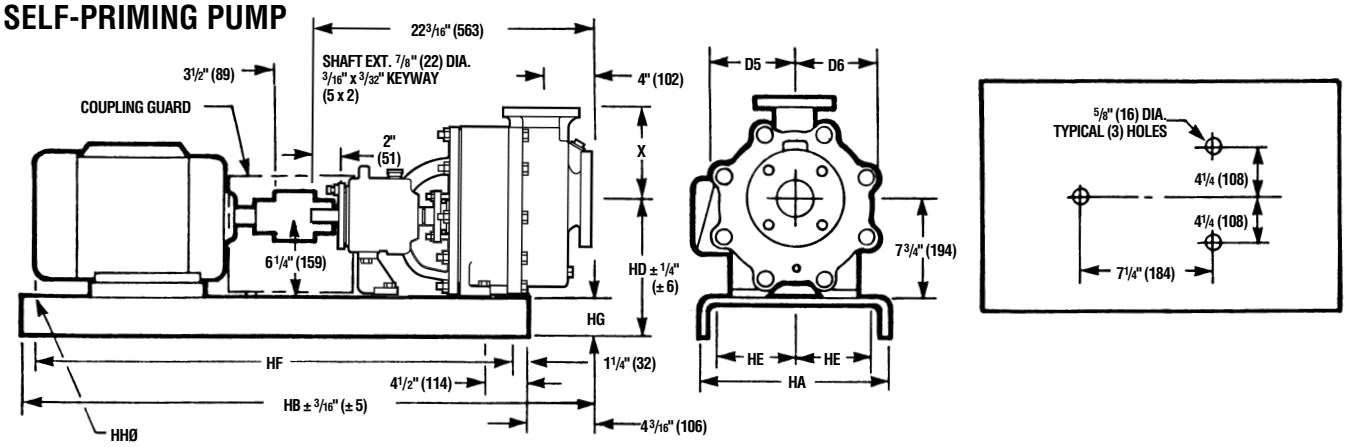
GROUP 1 PUMPS



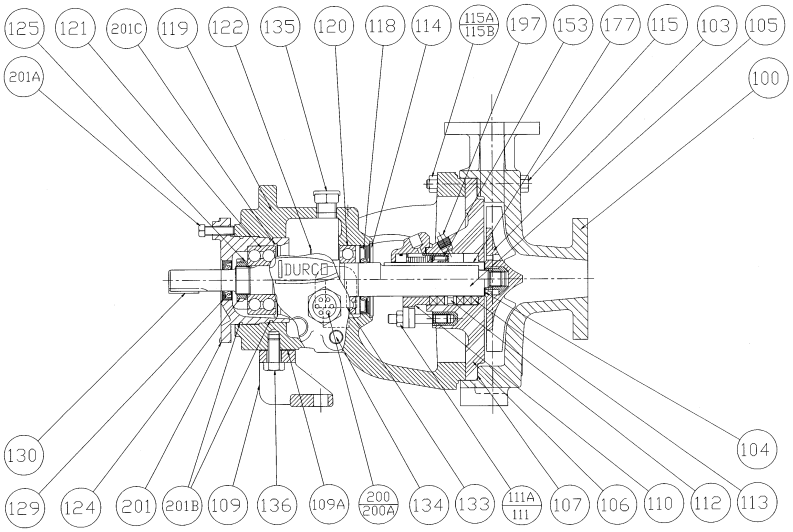
GROUP 2 PUMPS



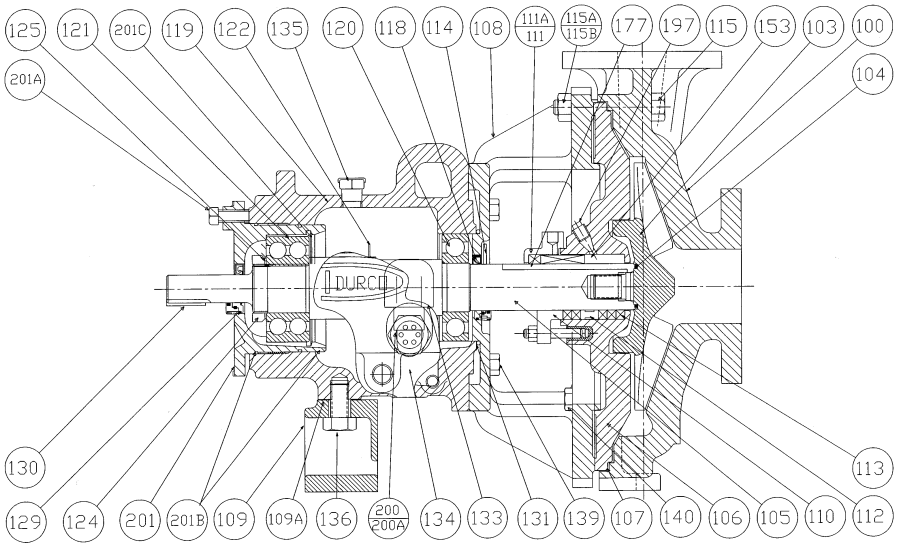
SELF-PRIMING PUMP



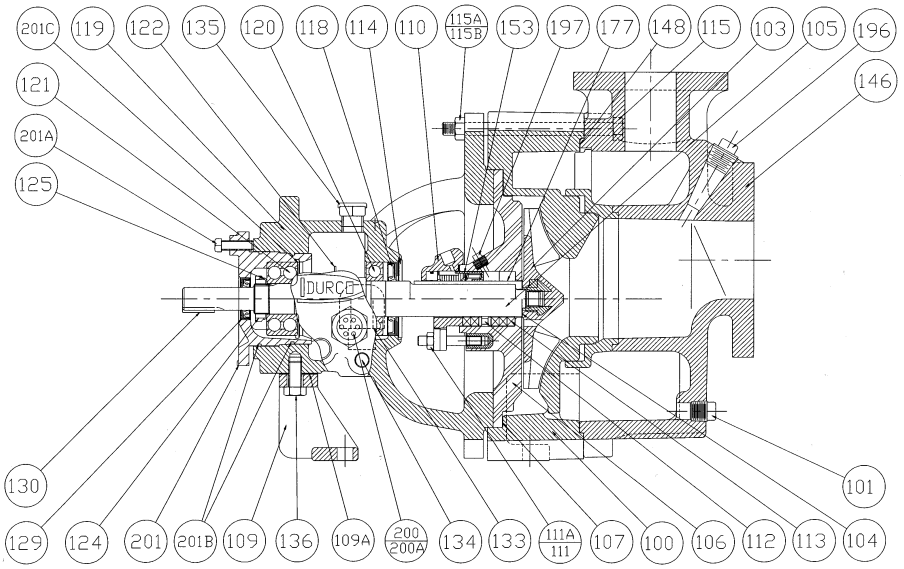
GROUP 1 PUMPS



GROUP 2 PUMPS



SELF-PRIMING PUMP



Standard and Self-Priming F-Series Parts List

ITEM	DESCRIPTION
100	CASING
101	PLUG, DRAIN (SELF-PRIMING ONLY)
103	IMPELLER
104	GASKET, IMPELLER
105	SHAFT
106	COVER PLATE
107	GASKET, COVER
108	ADAPTER, BEARING HOUSING (GROUP 2 ONLY)
109	FOOT, BEARING HOUSING
109A	SHIM
110	GLAND
111	STUD, GLAND
111A	HEXNUT, GLAND
112	SEAL CAGE HALVE
D113	PACKING
114	DEFLECTOR
115	FASTENER, CASING
115A	HEXNUT, CASING
115B	WASHER
118	OIL SEAL I.B.
119	HOUSING, BEARING
120	BEARING I.B.
121	BEARING O.B.
122	OIL SLINGER (OPTIONAL)
124	LOCKNUT, BEARING

ITEM	DESCRIPTION
125	LOCKWASHER, BEARING
129	OIL SEAL O.B.
130	KEY, SHAFT/COUPLING
131	O-RING, BEARING HOUSING (GROUP 2 ONLY)
133	OILER
134	DRAIN - PLUG, HOUSING
135	VENT - PLUG, HOUSING
136	CAP SCREW, FOOT
139	FASTENER, BEARING HOUSING
140	FASTENER, COVER/HOUSING (GROUP 2 ONLY)
146	CHAMBER (SELF-PRIMING ONLY)
148	CHAMBER GASKET (SELF-PRIMING ONLY)
153	SEAL, MECHANICAL
172	NIPPLE, OILER
177	SLEEVE, HOOK TYPE
190	FLANGE, FOLLOWER
190G	GASKET, FLANGE
196	PLUG, PRIMING FILL (SELF-PRIMING ONLY)
197	PLUG, SEAL CHAMBER
200	SIGHT GAGE, HOUSING
200A	TAG, OIL LEVEL
201	CARRIER, BEARING
201A	SET SCREW, CARRIER
201B	O-RING, BEARING CARRIER
201C	RETAINER RING

F-SERIES PUMP DIMENSIONS & WEIGHTS

PUMP	SUC. SIZE in (mm)	DISC. SIZE in (mm)	WT. lbs (kg)	X in (mm)	D in (mm)	D5 in (mm)	D6 in (mm)	FLANGE DRILLING					
								SUCTION			DISCHARGE		
								BOLT NO.	SIZE in (mm)	BC in (mm)	BOLT NO.	SIZE in (mm)	BC in (mm)
1K1.5 x 1F-6	1 1/2 (40)	1 (25)	45 (20)	6 1/2 (165)	5 1/4 (133)	5 1/32 (128)	5 1/32 (128)	4	5/8 (16)	3 7/8 (98)	4	5/8 (16)	3 1/8 (79)
1K3 x 1.5F-7	3 (80)	1 1/2 (40)	78 (35)	6 1/2 (165)	5 1/4 (133)	5 11/32 (136)	5 11/32 (136)	4	3/4 (19)	6 (152)	4	5/8 (16)	3 7/8 (98)
2K3 x 2F-10	3 (80)	2 (50)	175 (79)	9 1/2 (241)	8 1/4 (210)	8 11/16 (221)	8 11/16 (221)	4	3/4 (19)	6 (152)	4	3/4 (19)	4 3/4 (119)
1K3 x 2FS-7	3 (80)	2 (50)	90 (41)	7 1/4 (184)	6 1/4 (159)	6 3/4 (171)	6 3/4 (171)	4	3/4 (19)	6 (152)	4	3/4 (19)	4 3/4 (119)

F-SERIES PUMPS – GROUP 1
BASEPLATE DIMENSIONS & WEIGHTS (ANSI B73.1M-1991)

BASE	MAX. MOTOR FRAME	HA in (mm)	HB in (mm)	HD in (mm)	HE in (mm)	HF in (mm)	HG in (mm)	HHØ in (mm)	WT lbs (kg)
139	184T	15 (381)	39 (991)	9 (228)	4 1/2 (114)	36 1/2 (927)	3 3/4 (95)	3/4 (19)	111 (50)
148	215T	18 (457)	48 (1219)	9 1/2 (241)	6 (152)	45 1/2 (1156)	4 1/8 (105)		163 (74)
	256T			10 1/2 (267)					
153	286T	21 (533)	53 (1346)	11 7/8 (302)	7 1/2 (191)	50 1/2 (1283)	4 3/4 (121)		212 (96)
	326TS			12 7/8 (327)					

F-SERIES SELF-PRIMING PUMPS – GROUP 1
BASEPLATE DIMENSIONS & WEIGHTS (ANSI B73.1M-1991)

BASE	MAX. MOTOR FRAME	HA in (mm)	HB in (mm)	HD in (mm)	HE in (mm)	HF in (mm)	HG in (mm)	HHØ in (mm)	WT lbs (kg)
139	184T	15 (381)	39 (991)	9 (228)	4 1/2 (114)	36 1/2 (927)	3 3/4 (95)	3/4 (19)	111 (50)
148	215T	18 (457)	48 (1219)	9 1/2 (241)	6 (152)	45 1/2 (1156)	4 1/8 (105)		163 (74)
	256T			10 1/2 (267)					
153	286T	21 (533)	53 (1346)	11 7/8 (302)	7 1/2 (191)	50 1/2 (1283)	4 3/4 (121)		212 (96)
	326TS			12 7/8 (327)					

F-SERIES PUMPS – GROUP 2
BASEPLATE DIMENSIONS & WEIGHTS (ANSI B73.1M-1991)

BASE	MAX. MOTOR FRAME	HA in (mm)	HB in (mm)	HD in (mm)	HE in (mm)	HF in (mm)	HG in (mm)	HHØ in (mm)	WT lbs (kg)
245	184T	15 (381)	45 (1143)	12 (305)	4 1/2 (114)	42 1/2 (1080)	3 3/4 (95)	3/4 (19)	129 (59)
252	215T	18 (457)	52 (1321)	12 3/8 (314)	6 (152)	49 1/2 (1257)	4 1/8 (105)		177 (80)
258	286T	21 (533)	58 (1473)	13 (330)	7 1/2 (191)	55 1/2 (1410)	4 3/4 (121)	1 (25)	234 (106)
264	326T	22 (559)	64 (1626)	13 (330)		61 1/2 (1562)			328 (149)
	365T			13 7/8 (352)					
268	405TS	26 (660)	68 (1727)	14 7/8 (378)	9 1/2 (241)	65 1/2 (1664)			409 (186)
280	449TS		80 (2032)	15 7/8 (403)		77 1/2 (1969)			481 (218)

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