



CRE/CRO
CENTRIFUGAL PUMPS

ANSI Standard/Frame Mounted
End Suction/Back Pull-out

Open and Enclosed Impellers
21 Sizes
4 Bearing Frames

General Description

The Buffalo CRE/CRO Pump is designed to ANSI B73.1 standards. It features a vertical center line discharge, foot mounted casing; with cover and frame bolted, provided with quick release bolt lugs, to facilitate back pullout disassembly without disturbing suction or discharge piping.

Engineering Assistance

Buffalo Pumps is represented by qualified Sales Engineers who know centrifugal pumps and their application. They have been trained in our product line, and liquid handling systems. In addition to their own knowledge and experience, they have the backup of Buffalo Pumps' home office engineering staff. Your Buffalo Sales Engineer is there when you need him to help you get the right pump the first time around.

Overall Specifications

Pump Sizes - 21
Number of Bearing Frames - 4
Capacities to 5000 GPM
Heads to 700 feet
Temperature to 500°F
Working Pressures to 400 psi
Higher pressures available

Materials of Construction

Ductile Iron/Cast Iron Fitted
Ductile Iron/Bronze Fitted
Ductile Iron/316 S.S. Fitted
All 316 S.S.
Other machineable alloys available

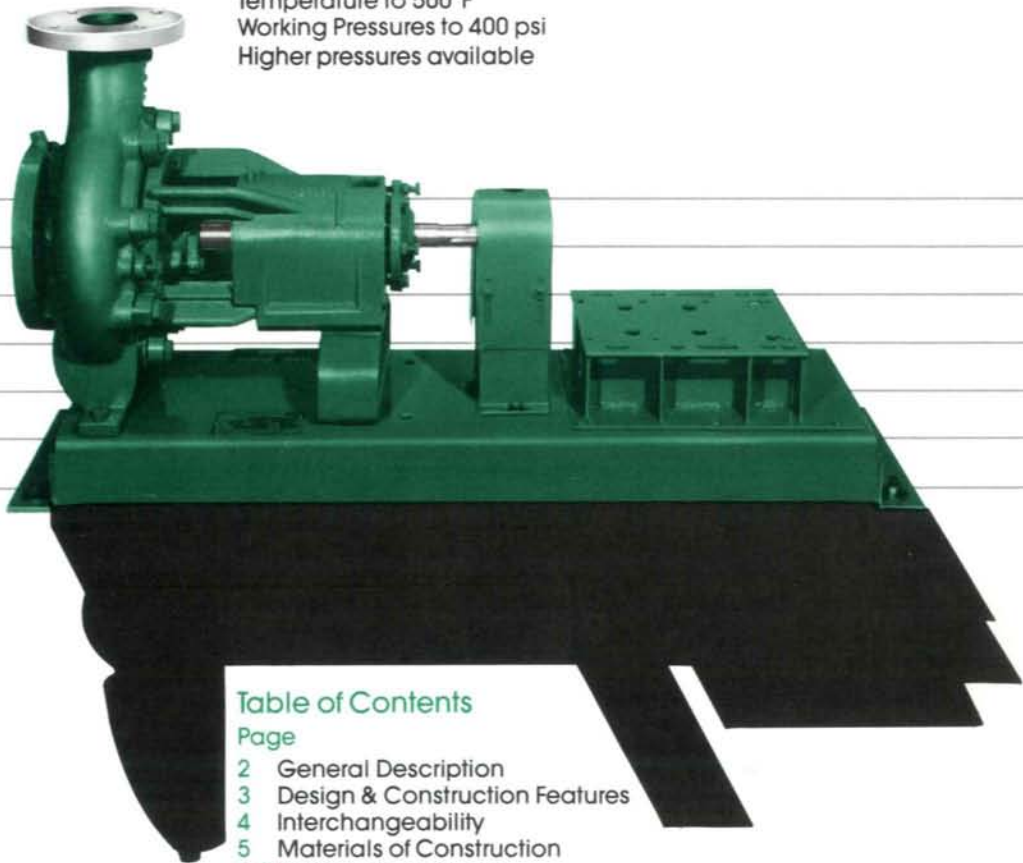


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CRE/CRO Design/Construction Features

Casing Design

Low radial hydraulic thrust - is obtained by Buffalo's unique volute design in combination with special balance chambers, and impeller treatment to stabilize axial and radial forces for optimum balance of internal thrust loads. This design allows for longer bearing life, reduced stuffing box wear, decreased shaft deflection, improved mechanical efficiency, quieter operation, minimum maintenance costs.

Low NPSH requirements - CRE/CRO Pumps are designed for the lowest NPSH requirements in the industry, allowing for more economical system design.

Back pull-out design - Buffalo's back pull-out design, coupled with quick release bolt lugs, allows for convenient maintenance without disconnecting suction and discharge piping.

Impeller Design

Buffalo Pumps offers both an open and enclosed impeller design. The open impeller provides a solids handling capability, while the enclosed impeller gives maximum efficiency when energy costs are of the utmost concern.

Interchangeability

Optimum parts interchangeability is achieved by using Buffalo Pumps' universal casing, wear rings, impeller and casing covers on several other lines. This allows for a minimum of parts inventory.



CRE/CRO Parts Interchangeability

M-1 FRAME



HP/RPM

30 @ 3500
15 @ 1750
10 @ 1150

PUMP SIZE

AA6
AB6
106

SUCT. x DIS. x IMP. DIA.

1½x1 x6
3 x1½x6
3 x2 x6

M-2 FRAME



75 @ 3500
40 @ 1750
30 @ 1150

106
058
509
609
709

3 x2 x6
2 x1 x8
3 x1½x9
3 x2 x9
4 x3 x9

M-3 FRAME



150 @ 3500
60 @ 1750
40 @ 1150

0510
5011
6011
6011
7011
8011
9011
2013
3013
4013
8013

2 x1 x10
3 x1½x11
3 x2 x11
3 x2 x11
4 x3 x11
6 x4 x11
8 x6 x11
3 x1½x13
3 x2 x13
4 x3 x13
6 x4 x13

M-4 FRAME



300 @ 1750
200 @ 1150

9014½
10014½
9016½
10017½

8 x6 x14½
10 x8 x14½
8 x6 x16½
10 x8 x17½



UNIVERSAL CASING

OPEN IMPELLER





Tapered Filler Ring Open Impeller Casing Cover (Open)

ENCLOSED IMPELLER





Straight Wearing Ring Enclosed Impeller Casing Cover (Enclosed)

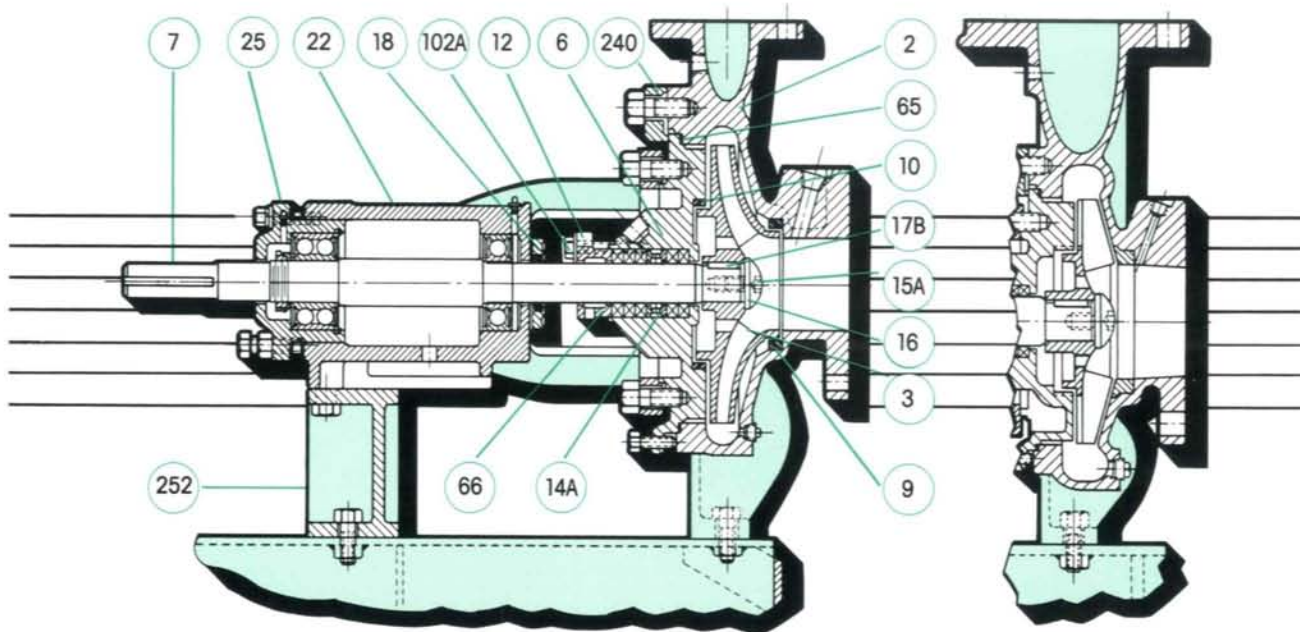
Optimum Parts Interchangeability With other Buffalo Pump lines

ENCLOSED IMPELLER Used in CRE frame mounted, CCRE close-coupled, HCR Can-O-Matic® hermetic, VCRO vertical submerged and VSC-CRE close-coupled pumps.

OPEN IMPELLER Used in CRO frame mounted, VCRO vertical submerged, VSC-CRO close-coupled pumps, VCROC cantilever, and SP self priming pumps.

UNIVERSAL CASING Fits all CRE/CRO, CCRE, HCR, VCRO, VCS-CRE/CRO pumps, VCROC cantilever, and CR-FV vortex pumps.

CRE/CRO Materials of Construction



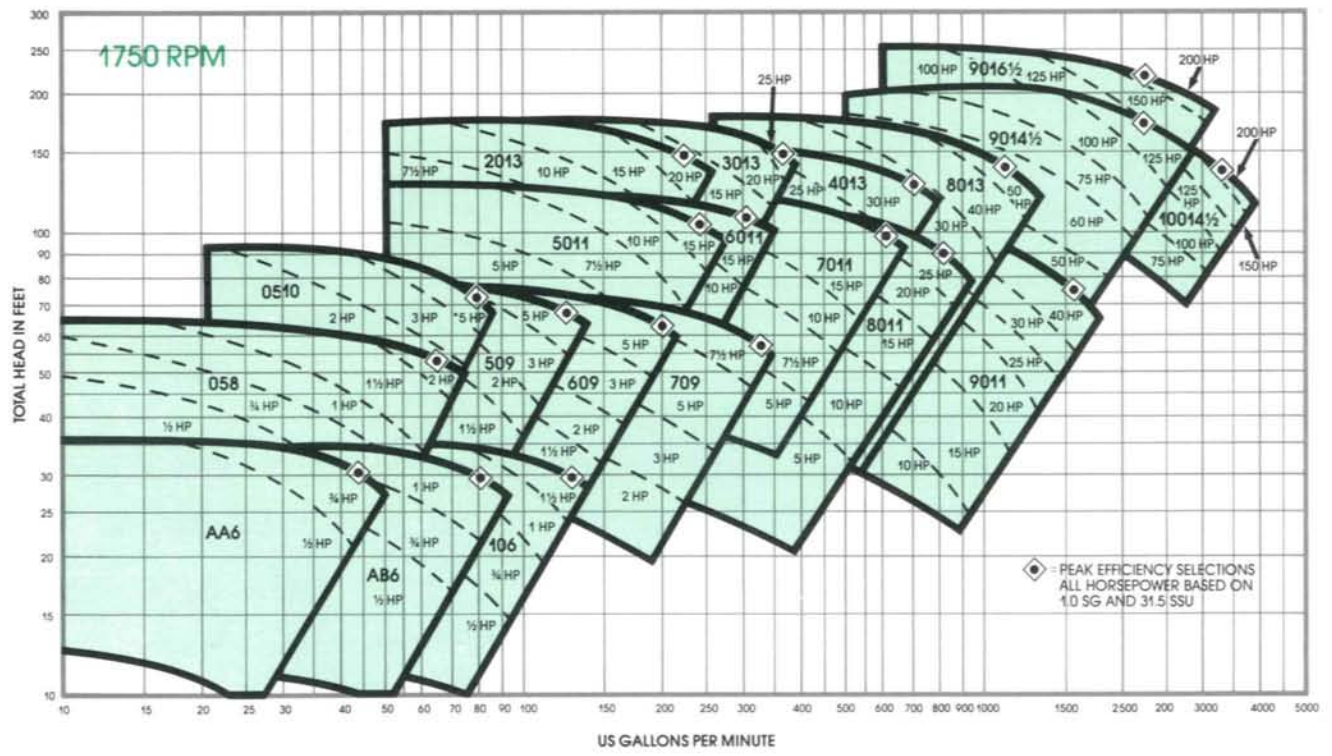
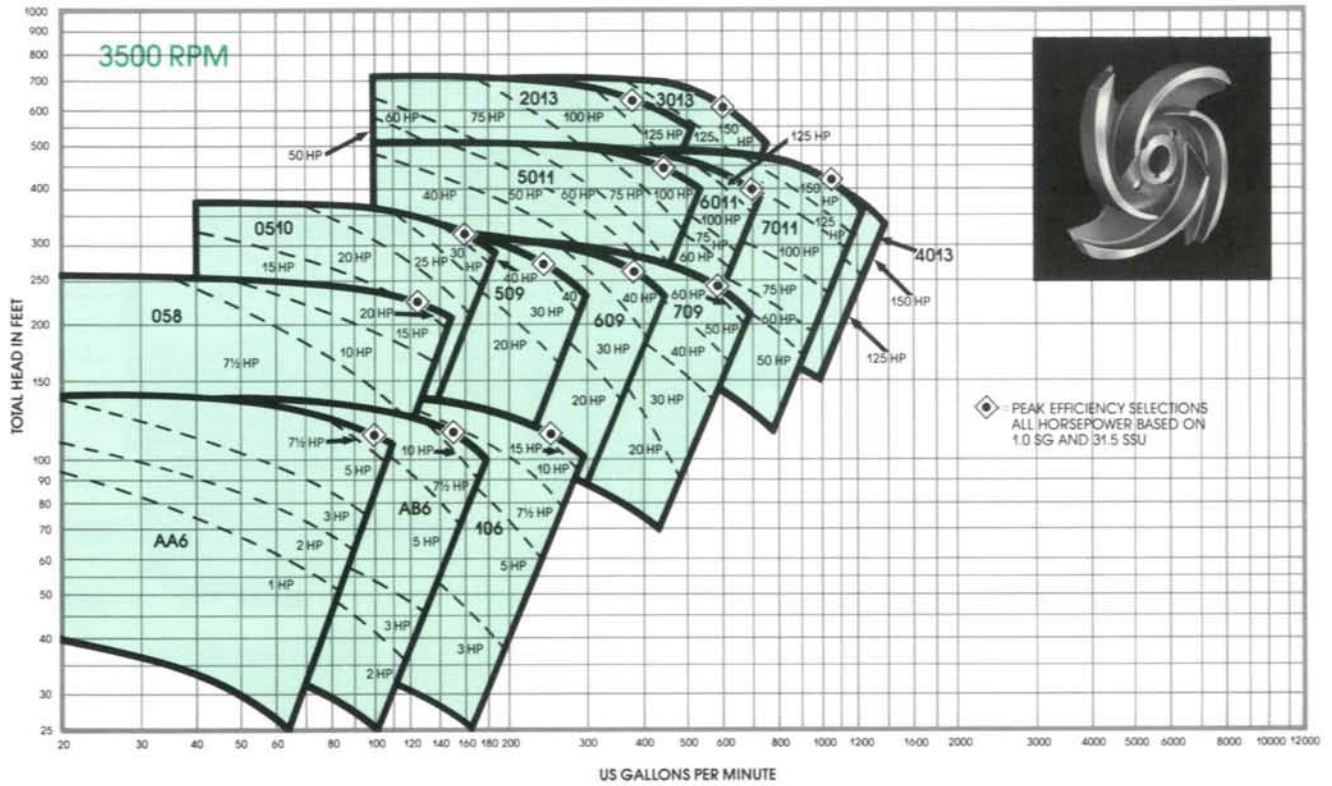
PART NUMBER	PART DESCRIPTION	DUCTILE IRON/ CAST IRON FITTED	DUCTILE IRON/ BRONZE FITTED	DUCTILE IRON/ 316 S.S. FITTED	ALL 316 S.S.
2	Casing	Ductile Iron	Ductile Iron	Ductile Iron	316 S.S.
3	Impeller	Cast Iron	Bronze+	316 S.S.	316 S.S.
6	Casing Cover	Ductile Iron	Ductile Iron	Ductile Iron	316 S.S.
7	Shaft		316 Stainless Steel		
9	Casing Ring		Carbon Graphite++		
10	Casing Cover Ring		Carbon Graphite		
12	Gland		316 Stainless Steel		
14A	Split Seal Cage		Glass Filled Teflon		
15A	Impeller Locking Device		316 Stainless Steel		
17b	Impeller Key		316 Stainless Steel		
18	Deflector		316 Stainless Steel		
22	Bearing Frame		Cast Iron		
25	Bearing Cover		Cast Iron		
65	Gasket		Non Asbestos		
66	Packing Rings		Non Asbestos		
102A	Gland Screw		316 Stainless Steel		
240	Bolt Lugs		Sintered Metal		
252	Frame Foot		Cast Iron		
	Nameplate		304 Stainless Steel		
FOR MECHANICAL SEALS					
7	Shaft		316 Stainless Steel		
12	Gland	316 S.S.	Bronze	316 S.S.	316 S.S.

Pumps can also be furnished in Alloy #20, Monel, Nickel, Hastelloy and other machineable alloys

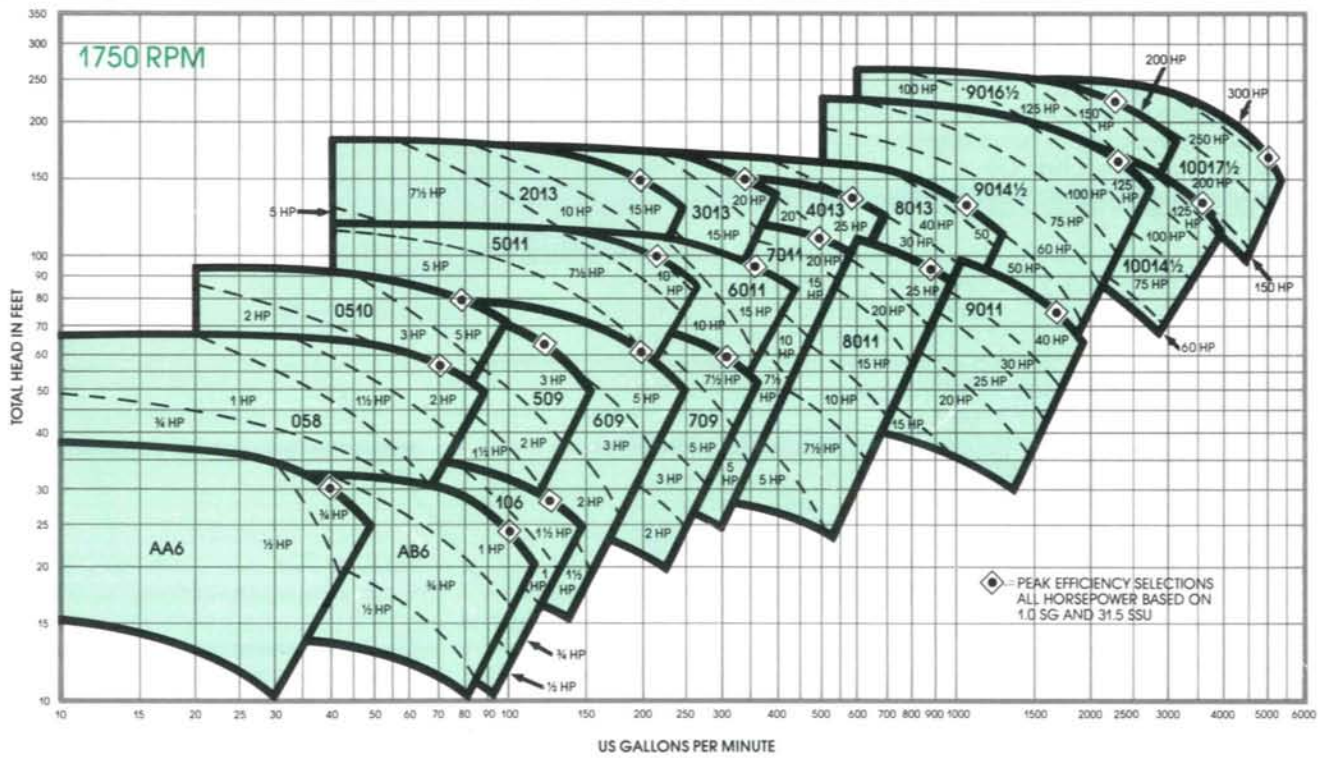
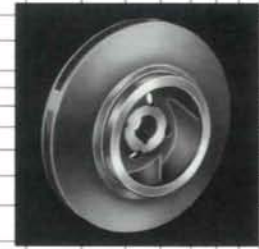
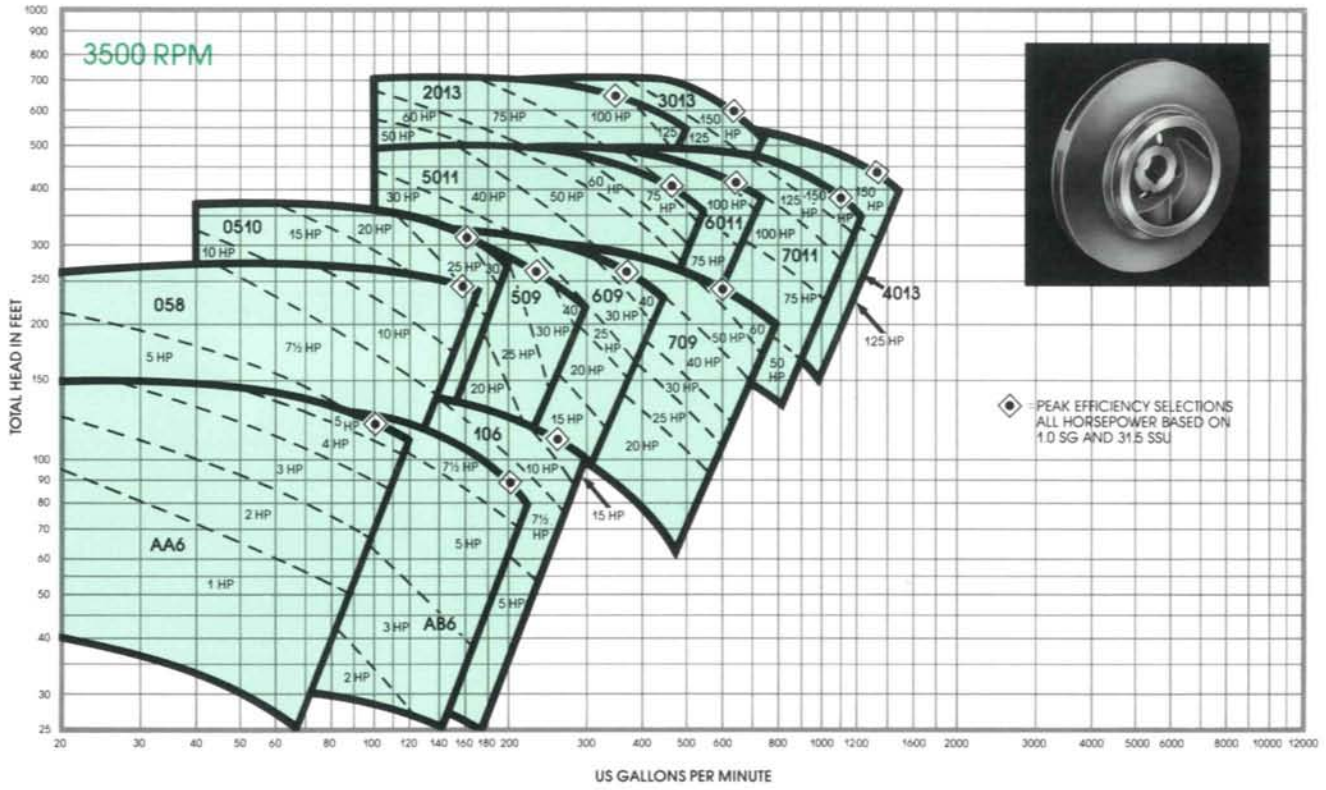
+Enclosed Impeller Pumps Only

++Not furnished in open impeller pumps

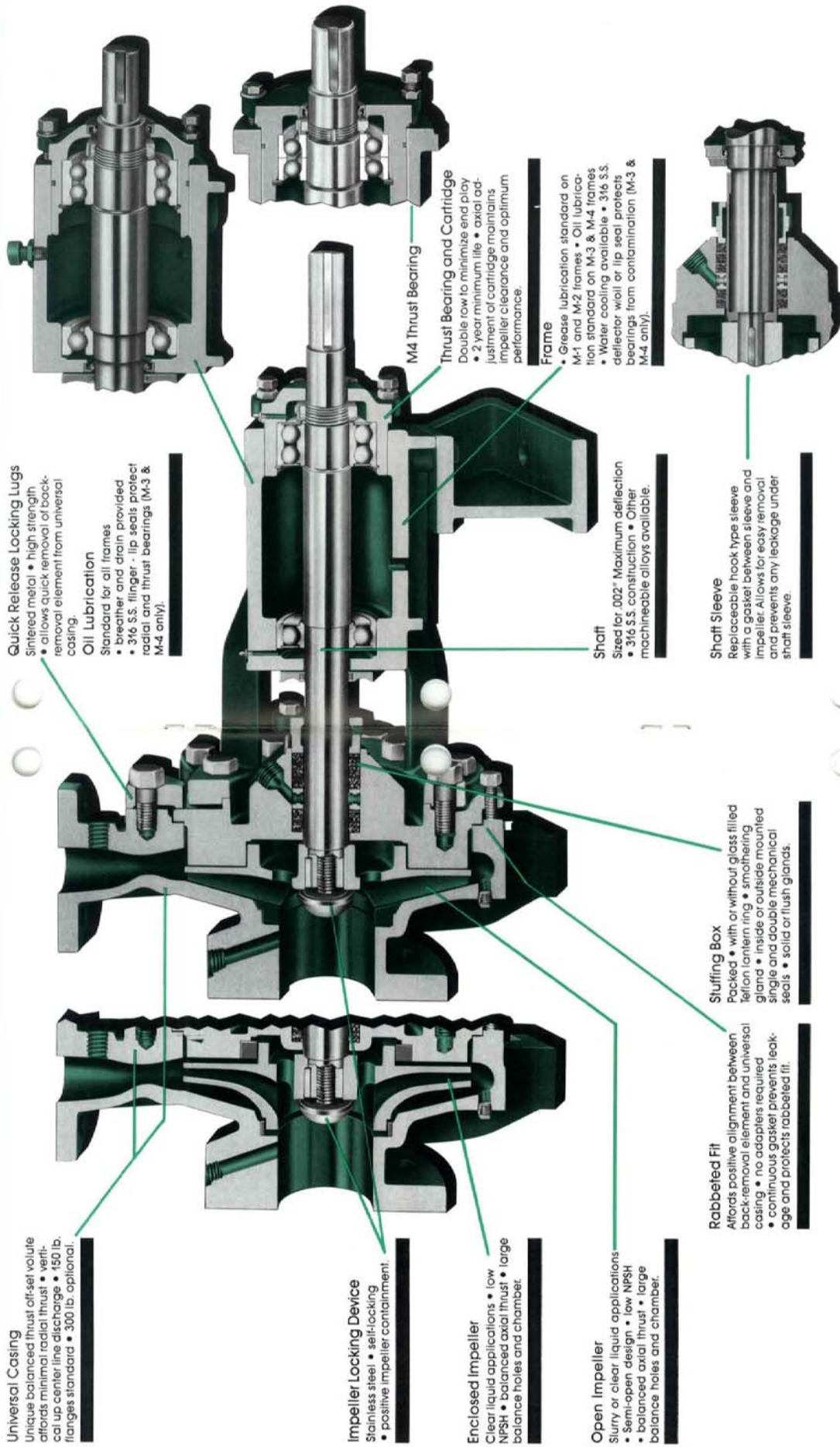
CRE/CRO Performance Curves: Open Impeller



CRE/CRO Performance Curves: Enclosed Impeller



STANDARD DIMENSIONS/INTERCHANGEABLE PARTS/BACK PULL-OUT/ENCLOSED AND OPEN IMPELLERS



Universal Casing
 Unique balanced thrust off-set volute affords minimal radial thrust • vertical up center line discharge • 450 lb. flanges standard • 300 lb. optional.

Quick Release Locking Lugs
 Sintered metal • high strength • allows quick removal of back-removal element from universal casing.

Oil Lubrication
 Standard for all frames • breather and drain provided • 3/16 S.S. flinger - lip seals protect radial and thrust bearings (M-3 & M-4 only).

Impeller Locking Device
 Stainless steel • self-locking • positive impeller containment.

Enclosed Impeller
 Clear liquid applications • low NPSH • balanced axial thrust • large balance holes and chamber.

Open Impeller
 Slurry or clear liquid applications • Semi-open design • low NPSH • balanced axial thrust • large balance holes and chamber.

M4 Thrust Bearing
 Thrust Bearing and Carriage
 Double row to minimize end play • 2 year minimum life • axial adjustment of carriage maintains impeller clearance and optimum performance.

Frame
 • Grease lubrication standard on M-1 and M-2 frames • Oil lubrication standard on M-3 & M-4 frames • Water cooling available • 3/16 S.S. deflector wall or lip seal protects bearings from contamination (M-3 & M-4 only).

Shaft
 Sized for .002" Maximum deflection • 3/16 S.S. construction • Other machineable alloys available.

Stuffing Box
 Packed • with or without glass filled Teflon lantern ring • smothering gland • inside or outside mounted single and double mechanical seals • solid or flush glands.

Rabbeted Fit
 Affords positive alignment between back-removal element and universal casing • no adapters required • continuous gasket prevents leakage and protects rabbeted fit.

Shaft Sleeve
 Replaceable hook type sleeve with a gasket between sleeve and impeller. Allows for easy removal and prevents any leakage under shaft sleeve.

CRE/CRO Mechanical Seals and Packing

FRAME SIZE	M-1	M-2	M-3	M-4
Seal Size	1 ¹ / ₈ "	1 ³ / ₈ "	1 ⁷ / ₈ "	2 ³ / ₄ "
Packing Ring Size	5 ⁵ / ₁₆ " sq.	3 ³ / ₈ " sq.	3 ³ / ₈ " sq.	1 ¹ / ₂ " sq.
Seal Cage Width	1 ¹ / ₂ "	5 ⁵ / ₈ "	5 ⁵ / ₈ "	5 ⁵ / ₈ "
Arrangement of Packing in stuffing box from throat to Gland	2-S-3	2-S-3	2-S-3	2-S-3
# of rings w/out seal cage	7	7	7	7
Distance to nearest obstruction	2"	2 ³ / ₈ "	2 ¹ / ₂ "	3 ³ / ₈ "

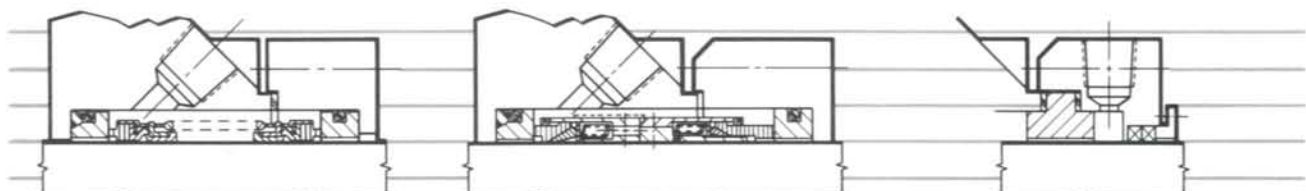
Design Features

Pump can be supplied with standard or high pressure packing. Stuffing box is also designed to facilitate standard seals from any manufacturer. Single, double, balanced or cartridge arrangements, can be offered. Solid, flush, or quench glands are also available.



Single Type 1

Single Type 9T



Double Type 1

Double Type 9T/9BT3

Quench Gland Arrangement

CRE/CRO Shaft Deflection Data

How to Use Charts

To determine the deflection at the face of stuffing box, use chart number 1 for open impellers, and chart number 2 for enclosed impellers. Enter charts 1 and 2 with total load (radial hydraulic thrust plus impeller

weight as obtained from charts 3, 4, 5 or 6) at impeller center line and read up to a bearing frame line to determine the shaft deflection for that frame size. To meet ANSI specifications, deflection at the face of the

stuffing box should not exceed .002". However, it is possible to operate the pump with more than .002" shaft deflection.

Chart 1 Shaft Deflection Chart/Open Impeller

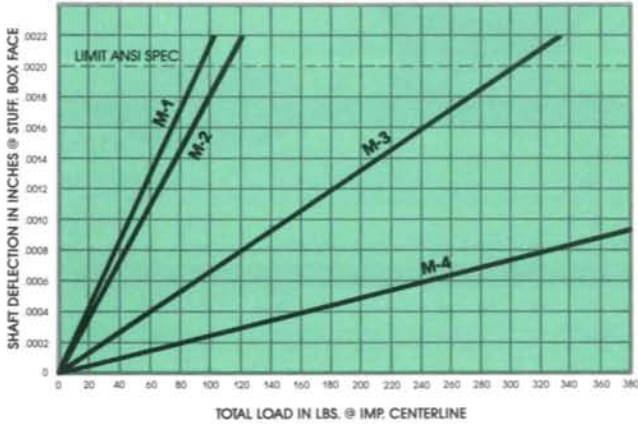


Chart 2 Shaft Deflection Chart/Enclosed Impeller

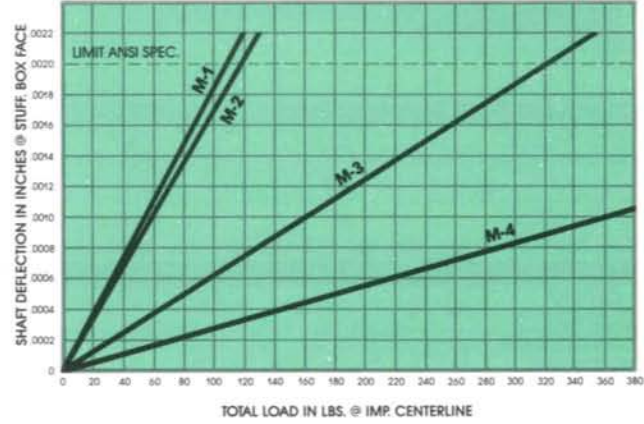


Chart 3 Open Impeller/1750 RPM

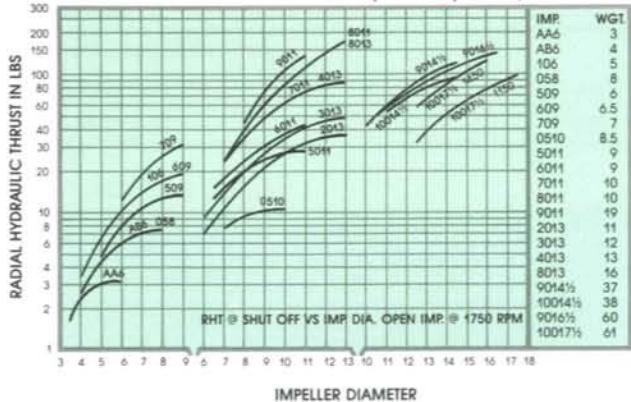


Chart 4 Enclosed Impeller/1750 RPM

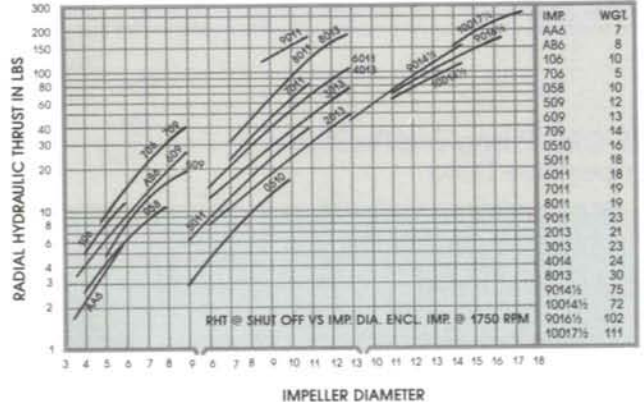


Chart 5 Open Impeller/3500 RPM

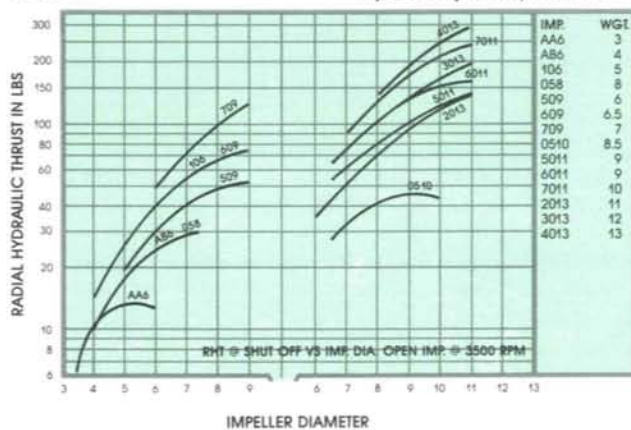
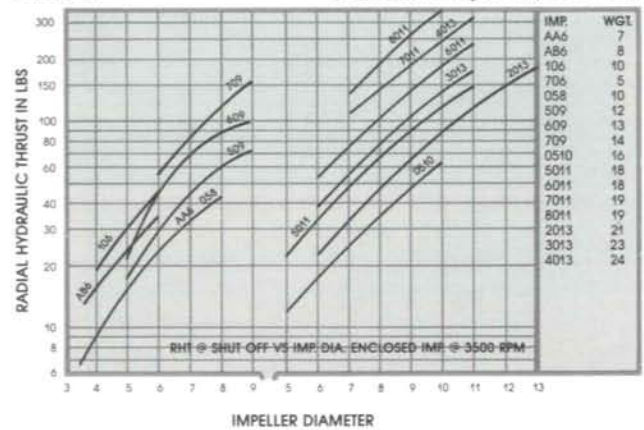


Chart 6 Enclosed Impeller/3500 RPM



CRE/CRO Pump End Data

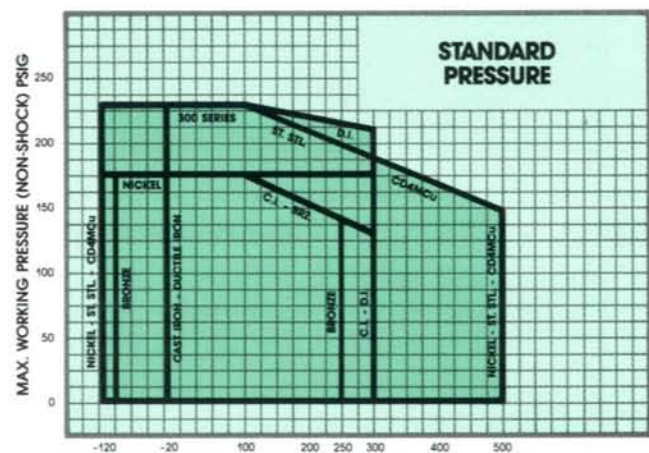
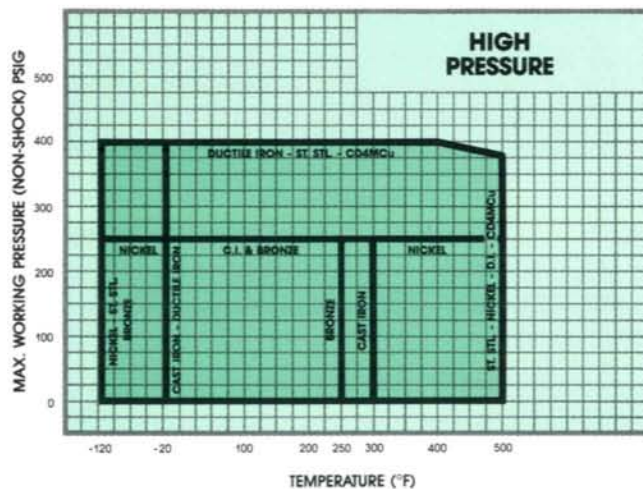
Design Features

Standard pressure pump end available with 150# nominal flange rating and capable of applications up to 225 psi. High pressure pump end is available with 300# flange rating and capable of pressures up to 400 psi. Raised face flanges are also available.



SIZE	AA6	AB6	106	058	509	609	709	0510	5011	6011	7011	8011	9011	2013	3013	4013	8013	9014½	10014½	9016½	10017½
MIN. CASING THICKNESS (Inch)	5/16	5/16	5/16	5/16	5/16	5/16	5/16	3/8	3/8	3/8	3/8	3/8	1/2	3/8	3/8	3/8	3/8	1/2	1/2	1/2	5/8
MAX. SPHERE DIAM. Open Impeller (Inch)	5/16	1/2	5/8	3/8	7/16	17/32	3/8	3/8	1/2	5/8	13/16	19/32	11/16	1/2	9/16	3/4	11/4	113/16	111/16	19/16	115/16
Enclosed Impeller (Inch)	3/16	3/8	1/2	1/4	1/4	11/32	9/16	3/16	5/16	7/16	21/32	11/8	11/2	5/16	3/8	9/16	1	19/16	13/8	11/4	115/16
IMPELLER CLEARANCE Total Eye Area	2.95	7.07	7.07	3.97	7.07	8.29	14.17	4.0	7.6	12.6	16.8	28.3	45.7	7.07	12.56	20.62	28.3	47.1	60.1	51.8	88.6
Corrosion Allowance	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8

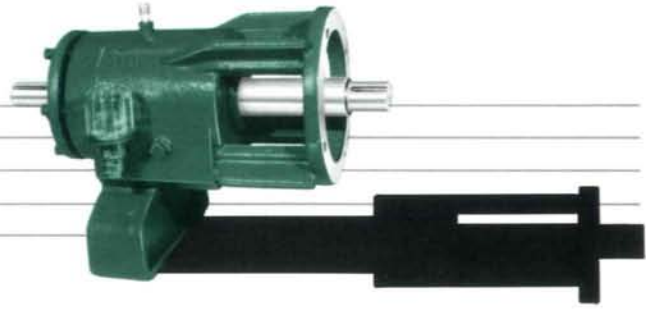
CRE/CRO Pump End Pressure/Temperature Data



CRE/CRO Bearing Frame Data

Bearing Frame Features

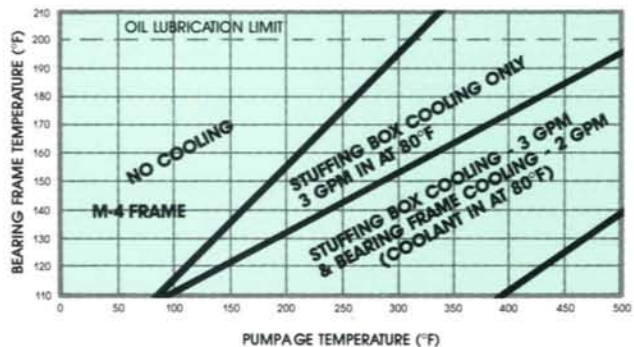
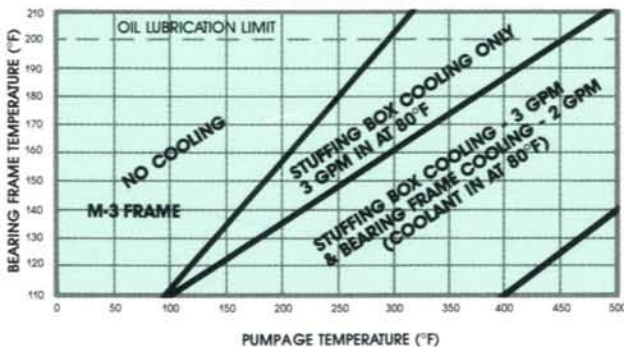
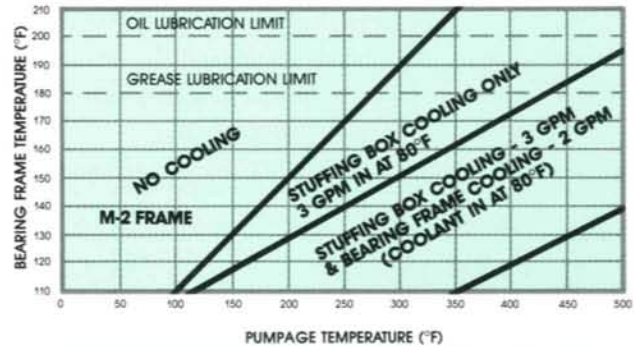
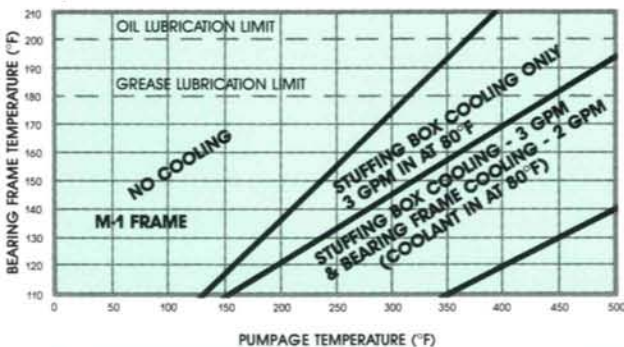
Features include double roll thrust bearing, external impeller adjustment, cast iron frame foot and housing (M-1 has formed steel foot), and water cooling of the bearing frame, if required. Grease lubrication standard for M-1 and M-2, oil lubrication standard on M-3 and M-4.



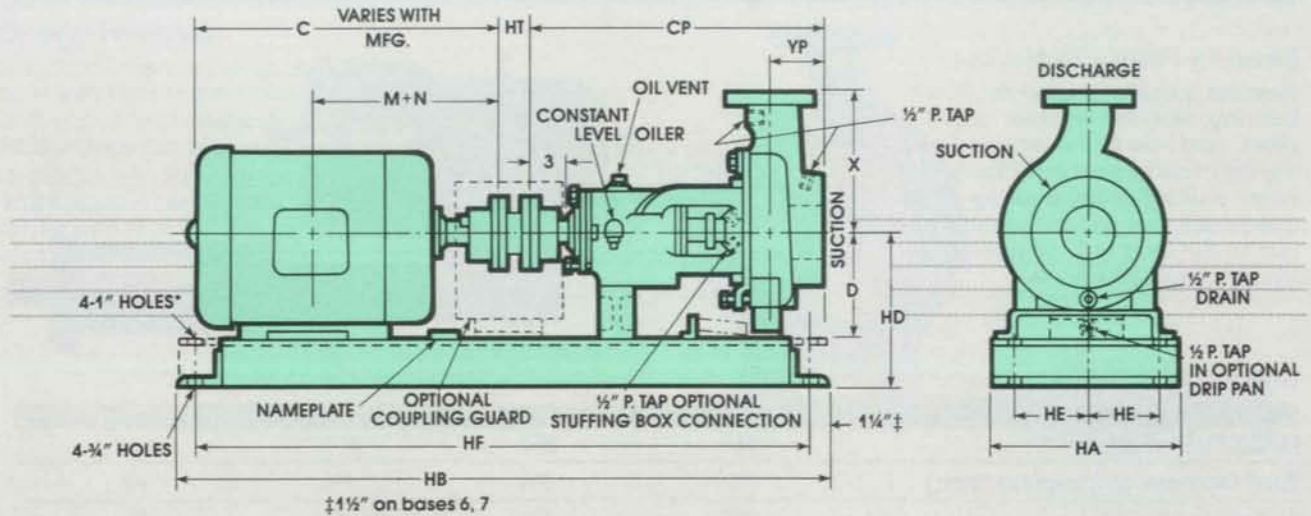
Bearing Frame/Shaft Specifications

FRAME SIZE	M-1	M-2	M-3	M-4
Shaft Diameter at Coupling (inch)	7/8	1 1/8	1 3/8	2 3/8
Stuffing (inch) Box	1 1/8	1 3/8	1 7/8	2 3/4
Impeller (inch)	7/8	1 1/8	1 3/8	2
Between (inch) Bearings	1 1/4	1 1/2	2 1/8	3 3/8
Shaft End Play	+ .00075 - max	+ .00075 - max	+ .00075 - max	+ .000 - .000
HP Limits				
3500 RPM	30	75	125	—
1750 RPM	15	40	60	300
1150 RPM	10	30	40	200
Maximum Liquid Temp.				
w/out cooling (F°)	350	300	300	300
w/cooling (F°)	500	500	500	500

Temperature Limits



CRE/CRO Outline Dimensions



Pump Data

Pump Size	Suction x Discharge x Imp. Diam.	Bearing Frame	CP	YP	D	X	Pump Wgt.
AA6	1 1/2 x 1 x 6	M1	17 1/2	4	5 1/4	6 1/2	65
AB6	3 x 1 1/2 x 6	M1	17 1/2	4	5 1/4	6 1/2	73
106X	3 x 2 x 6	M1	17 1/2	4	5 1/4	8 1/4	82
106	3 x 2 x 6	M2	23 1/2	4	8 1/4	8 1/4	108
058	2 x 1 x 8	M2/M3	23 1/2	4	8 1/4	8 1/2	111/119
509	3 x 1 1/2 x 9	M2/M3	23 1/2	4	8 1/4	8 1/2	114/122
609	3 x 2 x 9	M2/M3	23 1/2	4	8 1/4	9 1/2	123/128
709	4 x 3 x 9	M2/M3	23 1/2	4	8 1/4	11	137/145
0510	2 x 1 x 10	M2/M3	23 1/2	4	8 1/4	8 1/2	121/129
5011	3 x 1 1/2 x 11	M2/M3	23 1/2	4	10	10 1/2	128/137
6011	3 x 2 x 11	M2/M3	23 1/2	4	10	11 1/2	138/146
7011	4 x 3 x 11	M2/M3	23 1/2	4	10	12 1/2	151/160
8011	6 x 4 x 11	M2/M3	23 1/2	4	10	13 1/2	167/175
9011	8 x 6 x 11	M2/M3	25 1/2	6	10	13 1/2	179/187
2013	3 x 1 1/2 x 13	M2/M3	23 1/2	4	10	10 1/2	178/186
3013	3 x 2 x 13	M2/M3	23 1/2	4	10	11 1/2	190/199
4013	4 x 3 x 13	M2/M3	23 1/2	4	10	12 1/2	198/208
8013	6 x 4 x 13	M2/M3	23 1/2	4	10	13 1/2	207/215
9014 1/2	8 x 6 x 14 1/2	M4	33 3/8	6	14 1/2	16	667
10014 1/2	10 x 8 x 14 1/2	M4	33 3/8	6	14 1/2	18	794
9016 1/2	8 x 6 x 16 1/2	M4	33 3/8	6	14 1/2	18	867
10017 1/2	10 x 8 x 17 1/2	M4	33 3/8	6	16 1/2	23	1009

Motor Data		
Motor Frame	C	M + N
56	12 1/2	6 5/8
66	15 3/8	7 7/8
143T	13 3/8	6 1/2
145T	13 3/8	7
182T	14 3/8	7 3/4
184T	15 3/8	8 1/4
213T	18	9 5/8
215T	19 1/2	10 3/8
254T	22 7/8	12 3/8
256T	24 3/8	13 1/4
284T	26 3/8	14 1/8
284TS	25 1/4	12 3/4
286T	28 1/8	14 7/8
286TS	26 3/4	13 1/2
324T	29 3/8	15 3/4
324TS	28 1/8	14 1/4
326T	31 1/8	16 1/2
326TS	29 3/8	15
364T	32 7/8	17 3/8
364TS	30 3/4	15 1/4
365T	34 1/2	17 7/8
365TS	31 3/4	15 3/4
404T	37 3/4	20
405T	38 1/4	20 3/4
405TS	35 3/4	17 3/4
444T	43 1/8	23 1/4
444TS	39 3/8	19 1/2
445T	45 1/8	24 1/4
445TS	41 3/8	20 1/2
447T	48 1/8	26
447TS	46 7/8	22 1/4
449T	48 5/16	28 1/2
449TS	44 7/16	24 3/4

Base Plate Data

Bearing Frame	Base		Motor Frames	HA	HB	HE	HF	HD				
	No.	Wgt.						D = 5 1/4	D = 8 1/4	D = 10	D = 14 1/2	D = 16 1/2
M-1	AA	41	56-184T	10	35	4	32 1/2	8 1/4	—	—	—	—
	AB	52	213T-215T	12	39	4 1/2	36 1/2	8 1/2	—	—	—	—
M-2	1	81	143T-215T	12	45	4 1/2	42 1/2	—	12	13 3/4	—	—
	2	109	254T-286T	15	52	6	49 1/2	—	12 3/8	14 1/8	—	—
M-3	3	110	324T • TS-326T • TS 364T • TS-365T • TS	18	58	7 1/2	55 1/2	—	13	14 3/4	—	—
	4	182	404T-405T 444TS	18	60	7 1/2	57 1/2	—	15	16	—	—
M-4	5	200	444T, 445T, TS, 447TS	22	62 3/4	9	60 1/4	—	—	15	—	—
	6	360	254T-405T, TS	22	69 1/2	8 1/2	66 1/2	—	—	—	19 1/2	21 1/2
	7	439	444T, TS-449T, TS	22	83	8 1/2	80	—	—	—	19 1/2	21 1/2

Flange Data

Pressure Series	150 POUND SERIES							300 POUND SERIES							
	1	1 1/2	2	3	4	6	8	1	1 1/2	2	3	4	6	8	10
Nominal Pipe Size	1	1 1/2	2	3	4	6	8	1	1 1/2	2	3	4	6	8	10
Outside Diameter	4 1/4	5	6	7 1/2	9	11	13 1/2	4 7/8	6 1/8	6 1/2	8 1/4	10	12 1/2	15	17 1/2
Bolt Circle	3 3/8	3 7/8	4 3/4	6	7 1/2	9 1/2	11 3/4	3 1/2	4 1/2	5	6 5/8	7 7/8	10 3/8	13	15 1/4
Bolts (Straddling)	4 1/2	4 1/2	4 5/8	4 5/8	8 5/8	8 3/4	8 3/4	4 5/8	4 3/4	8 5/8	8 3/4	8 3/4	12 3/4	12 7/8	16-1
Thickness	7/16	1 1/16	3/4	15/16	1 5/16	1	1 1/8	1 1/16	1 3/16	7/8	1 1/8	1 1/4	1 7/16	1 5/8	1 7/8

Typical Pump Specification (ANSI B73.1)

CASING Vertical, center-line discharge, self-venting, foot mounted casing with cover and frame bolted, provided with quick release bolt lugs to facilitate back pull-out disassembly without disturbing suction or discharge piping. Casting must also have minimum $\frac{1}{8}$ " corrosion allowance.

IMPELLER Open or enclosed impeller, keyed and through-bolted to the shaft to prevent spinning-off in case of reverse rotation. Impeller diameter not to exceed 90% of the maximum. Capable of being installed in casing to insure quiet operation.

CASING WEAR RINGS Carbon graphite, renewable type, secured to casing. Clearance with impeller can be adjustable from back of bearing frame, allowing for minimum NPSH requirements and maximum efficiency.

SHAFT Material to be 316 S.S. for packing or mechanical seal. Sized for .002" maximum deflection.

BASEPLATES Structured steel, ribbed for rigidity with grout holes. Drip collection chamber is available.

BEARINGS Grease or oil lubricated, designed for 150,000 hours average life. Housings to be enclosed and protected to prevent contamination by dirt or liquids during operation or storage. Double row thrust bearing to be held in place with a lock nut and lock washer. Guide bearing is to be single row.

STUFFING BOX Stuffing box should be tapped for in and out connections. Should also facilitate packing and most any type of seal. Gland should be either solid, flush, or quench type.

■ M-1 and M-2 Bearing Frames - oil or grease lubrication. M-3 and M-4 Bearing Frames - oil lubrication only.

■ Construction available: Ductile Iron, Bronze fitted, 316 S.S. fitted, all 316 S.S.

■ Impellers: available in both enclosed and semi-open design.

■ Mechanical seals or packed - both John Crane type 1 or type 9 seals are available with bronze or 316 stainless steel gland.

■ Available complete with structural formed ribbed steel baseplate, Lovejoy or Falk coupling, steel adjustable coupling guard, and stainless drip catches.

EMERGENCY STOCK PARTS

SHIPMENTS Parts can be shipped the very next day from our completed parts inventory.

PD "Q" - QUICK SHIPMENT/ COMPLETE PUMPS WITH BASEPLATE & MOTOR

■ Seventeen different sizes - up to 6" discharge.



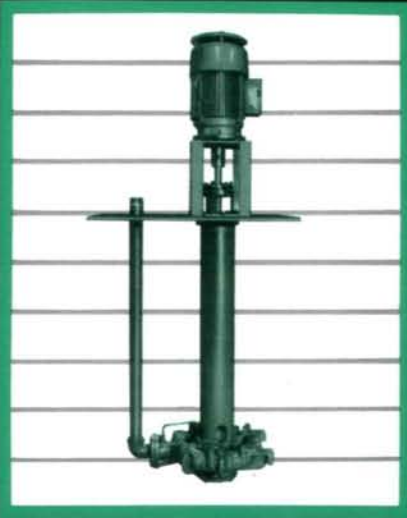
Leakproof Can-O-Matic pumps

The reliable hermetically sealed pump designed to handle toxic, volatile and corrosive liquids, refrigerants and high temperature water. 17 sizes. Capacities up to 1200 gpm. Heads to 480 ft. Temperature from -150°F to +400°F. Pressures to 400 psi. Bulletin 929.



Self-Priming Pumps

Diffuser type for high efficiency and designed for maximum interchangeability. Available in 7 sizes with open impellers. This self-primer uses standard CRE/CRO parts with unique diffusers and casings. Corrosive/abrasive liquids, suspensions and slurries are handled. Capacities to 1,400 gpm. Heads to 450 ft. Bulletin 918.



Vertical Submerged Pumps

A reliable, heavy duty industrial pump for a wide range of pit and tank applications including pumping slurries, chemicals, condensate, waste water, etc. 21 sizes from 1" to 8" discharge. Capacities to 4800 gpm. Heads to 250 ft. Bulletin 905.



buffalo pumps



An Ampco-Pittsburgh Company

N. TONAWANDA, NEW YORK 14120-0156

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