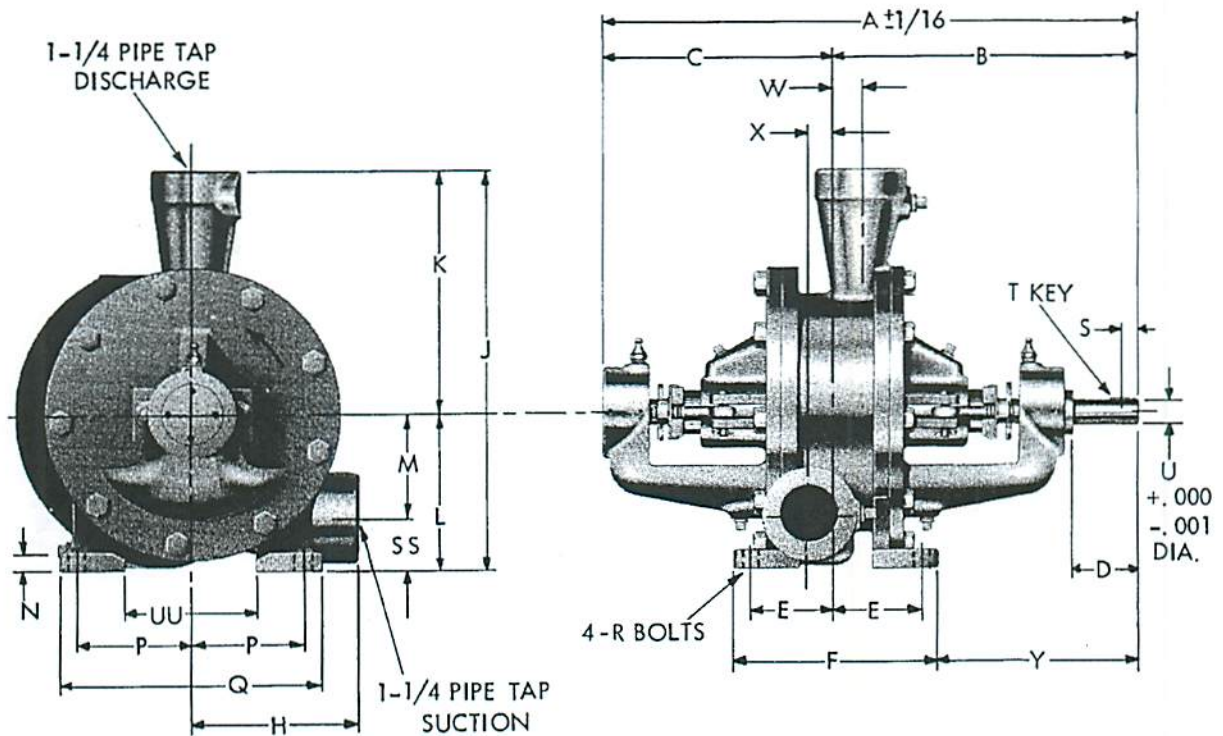


**AURORA TYPE 4RTL, 4RTLS,
5RTL, & 5RTLS SERIES**
TWO STAGE APCO PUMPS
RIGHT HAND PUMP ILLUSTRATED

SECTION 110 PAGE 203

DATED DEC 1967

SUPERSEDES PAGE 203
DATED MARCH 1967



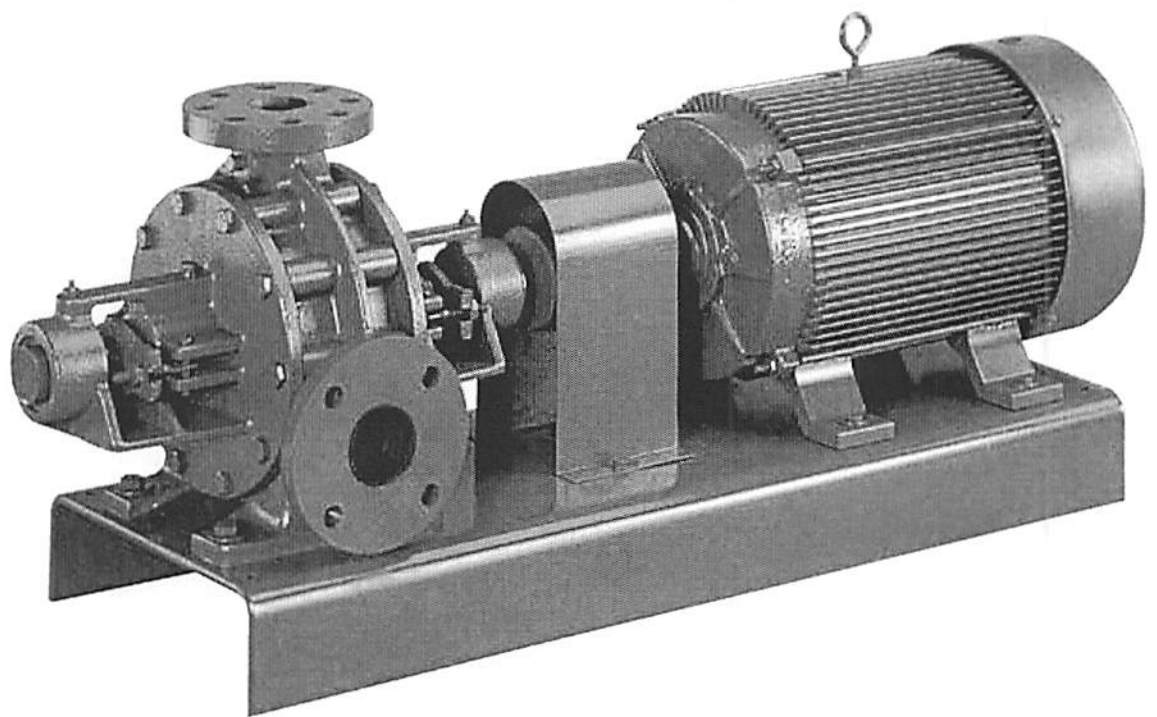
PUMP MODELS	A	B	C	D	E	F	H	J	K	L	M	N
D4T, E4T, F4T, G4T, I4T, I4TA	11-15/16	6-3/4	5-3/16	1-3/16	2-1/8	5-1/4	4-1/2	8-7/8	5-3/8	3-1/2	2	1/2
D5T, E5T, F5T, G5T, H5T, I5T	16-7/16	9-3/8	7-1/16	2	2-5/8	6-1/4	5-1/8	12-1/4	7-1/2	4-3/4	3-1/8	9/16

PUMP MODELS	P	Q	R	S	T	U	W	X	Y	SS	UU
D4T, E4T, F4T, G4T, I4T, I4TA	2-3/4	6-1/2	5/16	3/8	#3 WOODRUFF	.590	11/16	5/8	4-1/8	1-1/2	3
D5T, E5T, F5T, G5T, H5T, I5T	3-1/2	8	3/8	1/2	#6 WOODRUFF	.787	3/4	1/2	6-1/4	1-5/8	4

NOTES:

1. All dimensions in inches.
2. Dimensions may vary $\pm 1/8$.

3. Not for construction purposes unless certified.



AURORA® 110A SERIES "APCO" **ONE AND TWO STAGE TURBINE PUMPS**

AURORA® 110A SERIES "APCO" One and Two Stage Turbine Pumps

Capacities to 150 G.P.M.

Heads to 700 Feet

Temperatures to 275°F

Reliable Pumping Service.

Apco regenerative turbine pumps are field-proven throughout the world. Apco pumps are ideal for handling (1) high head/low flow requirements, (2) liquids entrained with gases and vapors (up to 20%), and (3) constant flows.

You are assured of reliable pumping service because every Apco is tested to ensure consistent performance.

Apco pumps are designed for those special applications where high head and low flow are required by the system. Boiler feed systems, for example, require high pressure to get low flows of water into the pressurized steam boiler.

Conventional centrifugal pumps, in contrast, must operate close to shutoff or operate at high speed to meet these high head/low flow requirements. These misapplications can cause high vibration, mechanical damage, frequent maintenance, and excessive energy use.

Apco pumps thrive in high head/low flow applications so you save on operating costs (less maintenance, downtime and energy costs).

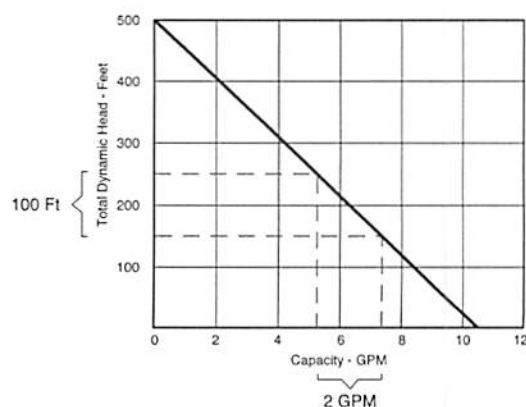
Increase System Reliability with Constant Flow

Apco pumps assure constant flow when you need it. The steep performance curve allows for minimal changes in the capacity even with large pressure variations.

The constant flow characteristics make the Apco ideal for cooling systems where it is vital that sufficient flow is maintained to dissipate heat despite changes in pressure.

Pressure variations occur for a number of reasons. The most common designed-in variations are caused by automatic pop-off valves and similar control devices.

With Apco pumps, you can always depend on the same capacity despite variations in head pressure and achieve increased system reliability.



The curve above shows that with a 100 foot change in head, the capacity varies only 2 gallons per minute. You get a virtually constant flow over wide pressure variations to ensure reliable system operation.

Features, Applications, and Benefits

Standard Features

- Bronze fitted construction
- Hydraulically balanced bronze impeller
- Right- or left-hand rotation
- Regreaseable ball bearings
- Short bearing span
- Mechanical seals or graphite impregnated acrylic packing
- 416 hardened stainless steel shaft
- Floating impellers
- Removable channel rings
- VIP Test – Every pump is given a hydrostatic test at 1½ times rated pressure along with a running test for head and capacity performance check

Optional Features

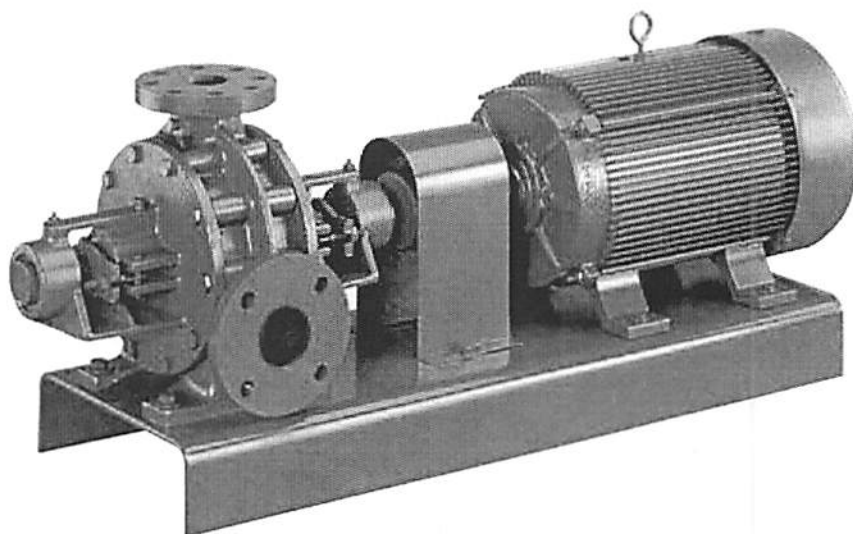
- All iron, bronze ring or all bronze construction
- 316 stainless steel or Monel® shaft
- External sealing line to stuffing box
- Lantern ring (5 & 6 series 110)
- Formed steel or drip-rim bases
- Bypass with manual shut-off valves
- Bypass with relief valve
- Self-priming features
- Certified performance test data can be supplied consisting of head, capacity and horsepower readings taken over the full operating range of the pump

Applications

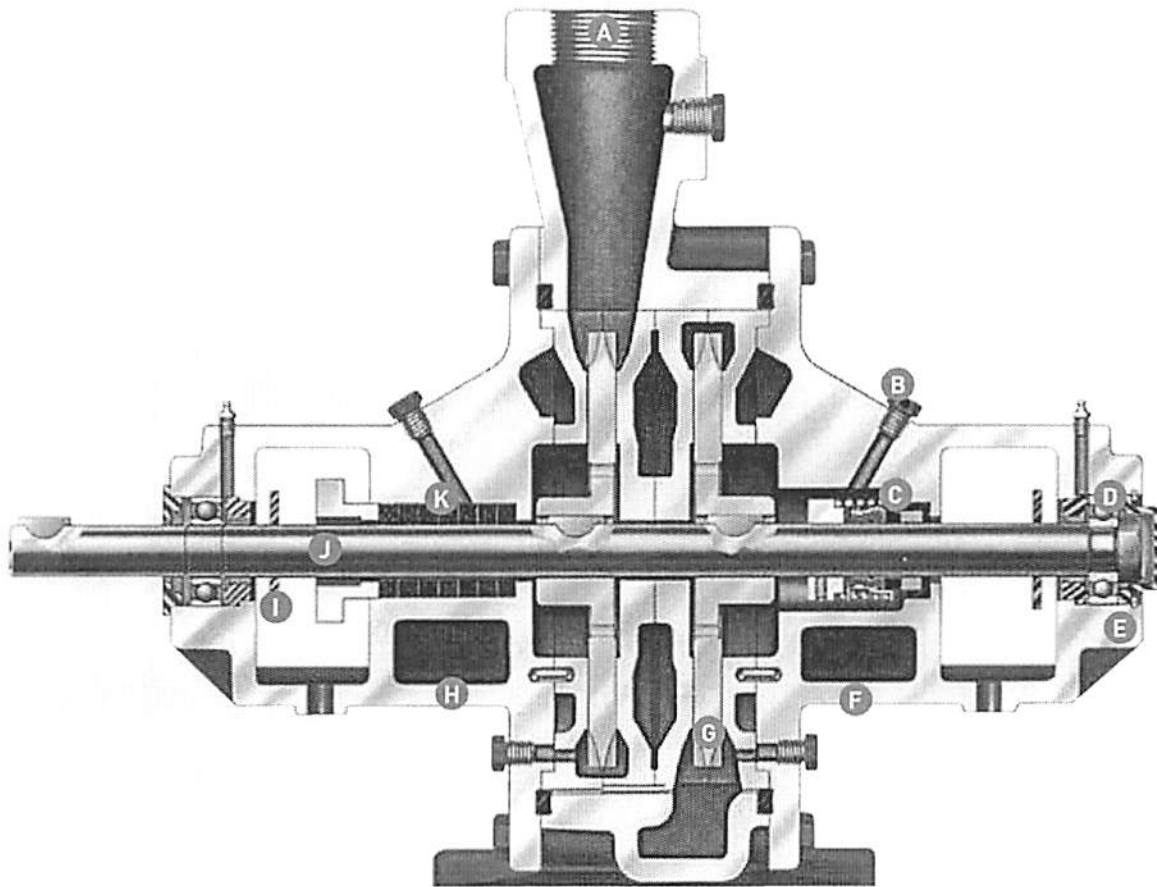
- Boiler Feed
- Condensate Return
- Cooling Systems
- High Pressure Spray
- Booster Systems
- Jockey Pumps
- Chlorine Injection
- Chemical Feed Systems
- Laundry and Dry Cleaning Systems
- Laser Cooling
- Electrostatic Discharge Machines
- TV Tube and CRT Manufacturing
- Car Washes

Benefits

- Reliability
- Years of Field-proven Service
- Reduce Energy Consumption
- Trouble-free Operation
- High Performance
- Save Space
- Versatility
- Complete Technical Support
- Low Flow/High Head Capabilities



Pump Features



A. Top Vertical Discharge
is self venting.

B. External Water Seal
Connection

C. Mechanical Seals

D. Regreasable Ball Bearings

E. Short Bearing Span

F. Seal Cover

G. Double Suction Impeller
(bronze) minimizes axial thrust.

H. Packing Cover

I. Water Slinger

J. Large Stainless Steel Shaft
for minimum deflections and corrosion resistance.

K. Packing

Type 4 & 5 Series

Type 6 Series

Dimensions and weights are approximate. Dimensions are in inches and may vary ± 1/8".	Notes:
1. Selections indicate pump size in upper portion and motor HP in lower portion of each block.	
2. A35, A4, B4, C4 and D4 pumps are also available for 5500 RPM operation. See table on page 4.	
3. Maximum suction pressure is based on suction flange pressure rating.	
4. All limitations are based on standard pumps constructed of standard materials and handling water.	

: SEION

Selection Charts

1750 RPM

Capacity GPM	Total Dynamic Head in Feet																								
	10	20	30	40	50	60	70	80	100	115	130	145	160	180	200	220	240	260	280	300	350	400	450	500	
2	B4 ½	B4 ½	A35 ½	A35 ½	A35 ½	A4 ½	A4 ½	A4 ½	C4 ½	D4 ½	D4 ½	D4 ½	D4 ½	D4 ¾	D4 ¾	D5 1	D5 1	D5 1	D4T 1	D4T 1½	D4T 1½	E4T 1½	G4T 3	D5T 3	
5	C4 ½	C4 ½	D4 ½	D4 ½	D4 ½	D4 ½	D4 ½	D4 ½	D4 ½	E4 ½	F4 1	F4 1	F4 1	F4 1	G4 1	G4 1½	G4 1½	F4T 1½	F4T 2	F4T 2	G4T 2	G4T 3	G4T 3	G5T 3	
10	F4 ½	F4 ½	F4 ½	F4 ½	F4 ½	G4 ¾	G4 ¾	G4 ¾	G4 1	G4 1	G4 1	G4 1	I4 1½	I4 1½	G4T 1½	G4T 2	G4T 2	I4T 2	I4T 3	H5 3	H5 5	G5T 5	G5T 5	H5T 5	
15	G4 ½	G4 ½	G4 ½	H4 ¾	H4 ¾	H4 1	H4 1	H4 1	I4 1	I4A 1½	I4A 2	I4A 2	I4T 2	I4T 2	I4TA 3	I4TA 3	I4TA 3	I4TA 3	I5 5	I5 5	I5 5	H5T 5	H5T 5	I5T 7½	
20	H4 ¾	H4 ¾	H4 ¾	H4 ¾	H4 ¾	I4 1	I4A 1½	I4A 1½	I4A 1½	I4TA 1½	I4TA 2	I4TA 3	I4TA 3	I4TA 3	I4TA 3	I5 5	I5 5	I5 5	I5 5	I5 5	L5 7½	I5T 7½	D6T 10	D6T 10	
25	I4A ¾	I4A ¾	I4A ¾	I4A 1	I4A 1	M4A 1½	M4A 1½	M4A 1½	M4 2	M4 3	R4 3	I5 3	I5 3	I5 3	J5 5	J5 5	K5 7½	L5 7½	L5 10	L5 10	L5 10	I5T 7½	D6T 10	E6T 15	
30	I4A ¾	I4A ¾	M4 1	M4 1	M4 1	M4A 1½	M4A 1½	M4A 1½	P4 3	R4 3	J5 3	J5 5	J5 5	K5 5	K5 5	L5 7½	L5 7½	L5 7½	L5 10	L5 10	E6T 10	E6T 15	E6T 15	E6T 15	
35	M4 ¾	M4 ¾	M4 1	M4 1	M4 1	M4A 1½	P4 2	P4 2	P4 3	L5 5	K5 5	K5 5	L5 5	L5 5	L5 7½	L5 7½	L5 7½	L5 7½	G6 10	G6 10	E6T 10	E6T 15	F6T 15	G6T 20	
40	M4 ½	M4 ¾	M4 1	M4 1	M4 1	P4 2	P4 2	P4 2	R4 3	L5 5	L5 5	L5 5	L5 7½	L5 7½	L5 7½	L5 ½	G6 10	G6 10	G6 10	E6T 10	F6T 15	F6T 15	G6T 20	G6T 20	
50	P4 1	P4 1½	P4 1½	P4 1½	R4 2	R4 2	R4 3	L5 3	L5 5	L5 5	L5 5	L5 5	L5 5	P5 10	P5 10	H6 10	F6T 10	F6T 10	F6T 10	G6T 15	G6T 15	G6T 15	G6T 20		
60	R4 1½	R4 1½	R4 1½	R4 2	L5 3	L5 3	L5 3	L5 5	L5 5	P5 7½	P5 7½	P5 10	P5 10	P5 10	H6 10	J6 15	G6T 15	G6T 15	G6T 15	G6T 15	G6T 15	J6T 25	J6T 25		
70	L5 2	L5 3	L5 3	L5 3	L5 3	N5 3	N5 3	N5 5	P5 7½	P5 7½	P5 7½	P5 10	P5 10	H6 10	J6 15	J6 15	G6T 15	G6T 15	H6T 15	H6T 15	J6T 20	J6T 25	K6T 30		
80	M5 1½	M5 1½	N5 2	N5 3	N5 3	N5 3	P5 5	P5 7½	P5 7½	P5 7½	P5 7½	P5 10	H6 10	J6 10	J6 15	H6T 15	H6T 15	H6T 15	H6T 15	J6T 20	J6T 20	K6T 25			
90	N5 2	N5 2	N5 2	P5 5	P5 5	P5 5	P5 5	P5 7½	P5 7½	P5 7½	P5 7½	J6 10	J6 10	J6 10	K6 15	H6T 15	H6T 15	J6T 20	J6T 20	J6T 20	K6T 25	K6T 25			
100	N5 2	P5 5	P5 5	P5 5	P5 5	P5 5	P5 5	P5 7½	P5 7½	J6 10	J6 10	J6 10	J6 10	K6 15	J6T 15	J6T 15	J6T 20	J6T 20	J6T 20	J6T 20	K6T 25				
120	P5 5	P5 5	P5 5	P5 5	P5 5	P5 5	J6 7½	J6 7½	J6 7½	J6 10	K6 10	K6 10	J6T 15	J6T 15	J6T 15	J6T 15	K6T 20	K6T 20	K6T 20						
150	J6 5	J6 5	J6 5	J6 5	J6 5	K6 7½	K6 7½	K6 7½	K6T 10	K6T 15	K6T 15														

Design Details

110-Series Pump Model						
Area	Dimensions	A35-I4A D4T-I4TA	M4-R4	D5-I5 D5T-I5T	J5-P5	G6-K6 D6T-K6T
Stuffing Box	Packing Rings Per Box	4	5	7	7	8
	Packing Size (Square)	¼"	½"	¾"	¾"	¾"
Shaft	Outside Diameter of Shaft	.590	.787	.787	.984	1.181
Ball Bearings	Inboard Radial	202	204	204	205	206
	Outboard Thrust	300K	303K	303K	304K	305K

3500 RPM

Capacity GPM	Total Dynamic Head in Feet								
	50	100	150	200	250	300	350	400	450
2	B4 ½	B4 ½	B4 ¾	B4 ¾	A35 1	A35 1	A4 1½	A4 1½	A4 2
4	B4 ½	A35 ¾	A35 ¾	A35 1	A4 1	A4 1½	D4 3	D4 5	D4 5
6	A35 ½	A4 ¾	A4 ¾	C4 1½	D4 3	D4 3	D4 3	D4 5	D4 5
8	C4 ¾	C4 ¾	C4 1	D4 3	D4 3	D4 3	D4 3	D4 5	D4 5
10	C4 ¾	D4 2	D4 2	D4 3	D4 3	D4 3	D4 3		
12	D4 1½	D4 2	D4 2	D4 3	D4 3				
14	D4 1½	D4 2	D4 2						
15	D4 1½	D4 2							

Engineering Specifications

The contractor shall furnish (and install as shown on the plans) an Apco regenerative turbine type pump model _____ size _____ (Bronze Fitted) (Bronze Ring) (All Iron) (All Bronze). Each pump shall have a capacity of _____ GPM when operating at a total head of _____ feet at the specified temperature, viscosity, specific gravity, and NPSH. The speed of the pump shall not exceed 1750 RPM. (Models A35, A4, B4, C4 and D4 can also be operated at 3500 RPM.) The pump is to be furnished with (mechanical seals) (packing). The pump shall be of vertically split case design with removable bearing housings, and the channel rings shall be replaceable without replacing the bearing housings. The suction and discharge connections shall be cast integral with the casing. The discharge shall be in a vertical position and the pump shall be self-venting. The casing and bearing housings shall be cast of 30,000 pound tensile strength cast iron. The impeller(s) shall be located on the stainless steel shaft between grease lubricated ball bearings. The impeller shall be hydraulically self-centering and no external adjustment shall be necessary. Each pump shall be tested prior to shipment. The pump shall be mounted on a (steel drip rim) (steel) baseplate and flexibly coupled to a _____ HP _____ phase, _____ hertz, _____ voltage, _____ RPM, horizontal (dripproof) (totally enclosed) (explosion proof) motor. The motor shall be sized to prevent overloading at the highest head condition listed in the specifications.

Maximum Differential Pressure

Pump Sizes	psi
R4	90
J6, K6	100
P4	110
I4A, M4, I4TA, P5, H6	125
I4, I4T, H5, I5, M5, N5, G6	150
L5	175
A35, A4, B4, C4, D4, E4, F4, G4, H4, G4T	200
K5	220
G5	225
J5	230
F4T, D5, E5, F5, H5T, I5T, J6T, K6T	250
D4T, E4T, D5T, E5T, F5T, G5T, D6T, E6T, F6T, G6T, H6T	300

* NOTE: Maximum differential pressure based on allowable shaft deflection for standard shafts.

Materials of Construction

Description	Material of Construction
Retainer	Nylon
Bearing Covers	Cast Iron – ASTM A48
Casing	Cast Iron – ASTM A48
Channel Rings	Cast Iron – ASTM A48
Glands	Cast Iron – ASTM A48
Impellers	Bronze – ASTM B62
Packing	Graphited Teflon® Fiber
Shaft	Stainless Steel – AISI 416

Maximum Horsepower

Pump Sizes	HP
E4, F4, G4, H4, I4, I4A, D4T, E4T, F4T, G4T, I4T, I4TA	4
A35, A4, B4, C4, D4	7½
M4, P4, R4, D5, E5, F5, G5, H5, I5, D5T, E5T, F5T, G5T, H5T, I5T	10
J5, K5, L5, M5, N5, P5	20
G6, H6, J6, K6, D6T, E6T, F6T, G6T, H6T, J6T, K6T	40

Limitations

Max. hydrostatic test pressure	450 psi
except G6-H6-J6-K6	265 psi
Max. case working pressure	300 psi
except G6-H6-J6-K6	175 psi
Max. suction pressure	175 psi
except two stage 116 Series with optional 250 lb. suction flange	300 psi
Max. recommended packing box pressure	100 psi
Max. recommended mechanical seal chamber pressure	250 psi
except 114A, 4R, 4RTL	150 psi
Box or seal chamber pressure equals –	
One stage:	Suction pressure plus 60% differential pressure.
Two stage:	1st stage equals – suction pressure plus 30% differential. 2nd stage equals – suction pressure plus 80% differential.
Max. temperatures	
*Packing	275°F
Std. mechanical seal	225°F
Hi-temp mechanical seal	275°F

* Packing: Suction lift requires lantern ring, 115 and 116 Series only.



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