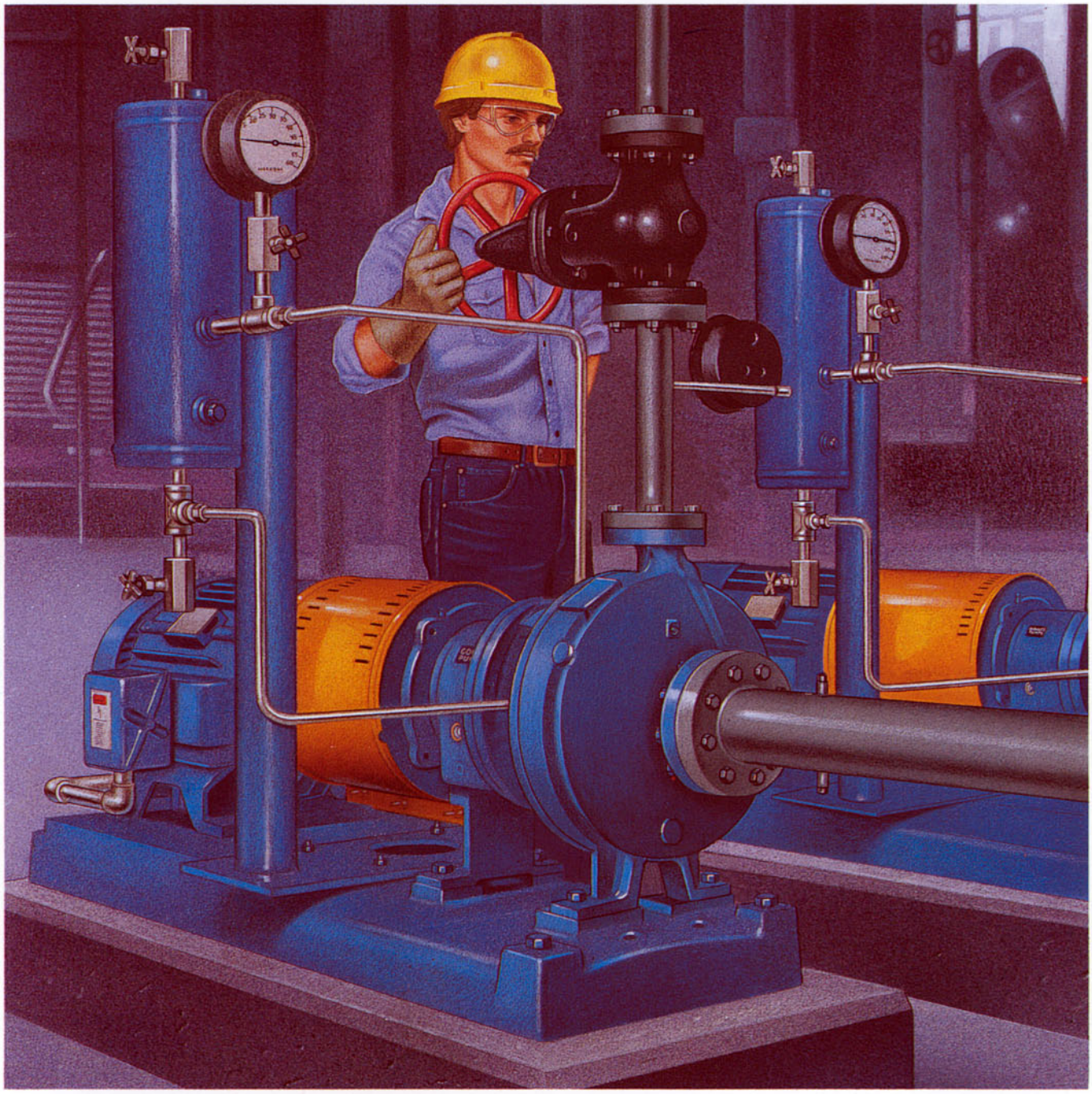
BULLETIN 725.10
April 2001

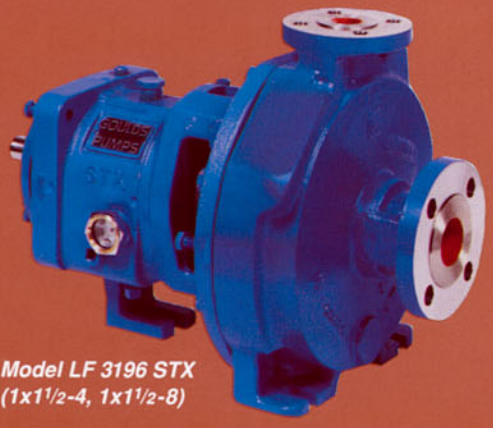
GOULDS PUMPS

Goulds Model LF 3196 *Low Flow* ANSI Process Pumps



Goulds Pumps

ITT Industries
Engineered for life



Model LF 3196 STX (1x1½-4, 1x1½-8)

The LF 3196 process pump line is specifically designed to provide superior performance for low flow services of the Chemical Process Industries.

Model LF 3196 MTX/LTX (1x2-10 MTX/LTX, 1½x3-13 LTX)

Goulds Model LF 3196

Low Flow ANSI Process Pumps Designed for Total Range of Industry Services

- Capacities to 220 GPM (50 m^3/h)
- Heads to 925 feet (282 m)
- Temperatures to 700° F (371° C)
- Pressures to 450 PSIG (3102 kPa)

Performance Features for Low Flow Services

Extended Pump Life

- Concentric (Circular) Casing
- Radial Vane Impeller
- TaperBore™/Big Bore™ Seal Chambers
- *X-Series* Power Ends
- ANSI *PLUS*™ Features
- Optional Centerline Mounted Casings

Ease of Maintenance

- Back Pull-out Design
- Parts Interchangeable with Goulds Model 3196
- External Impeller Adjustment
- Easy Retrofit

Safety

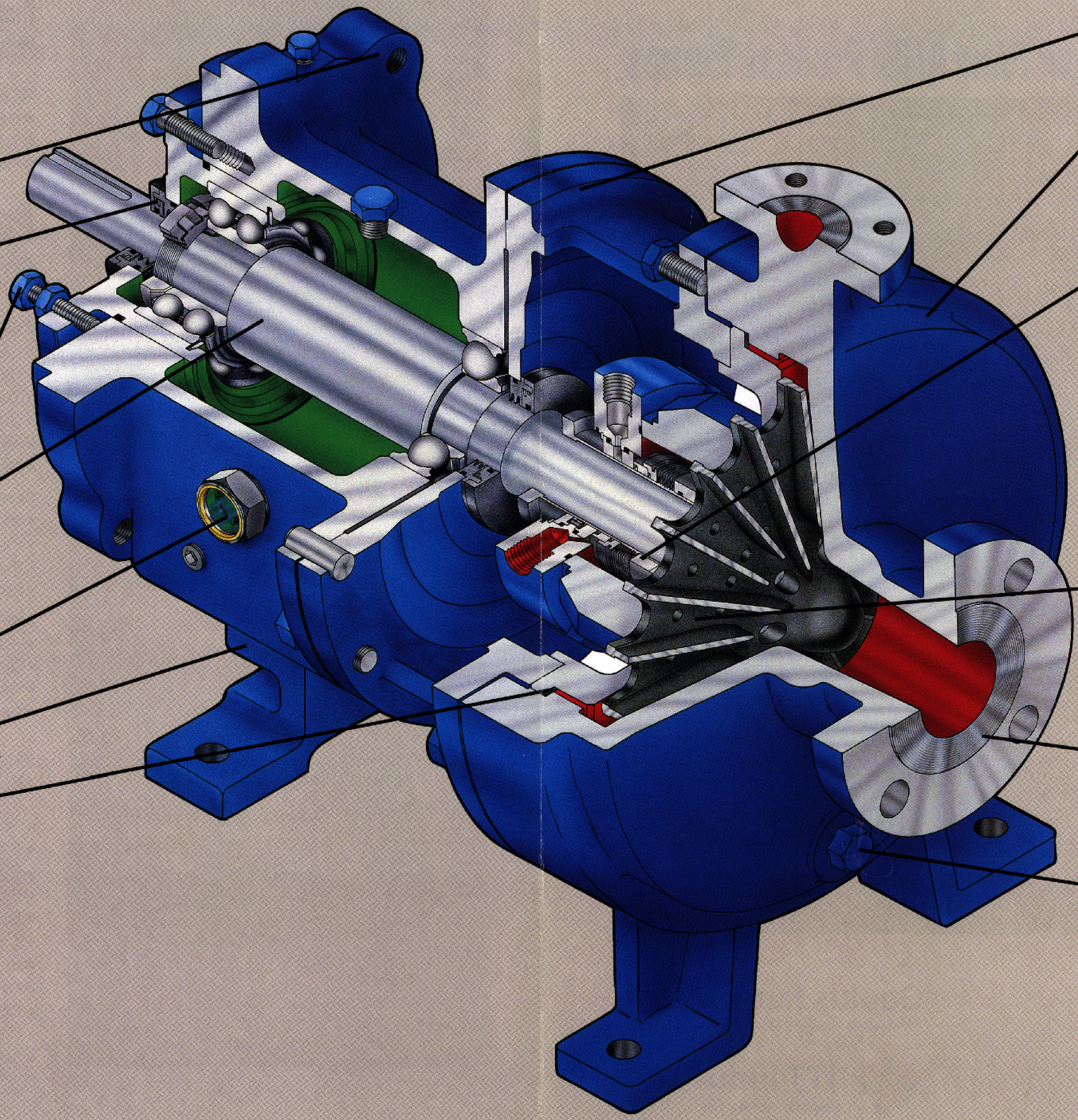
- ANSI B15.1 Coupling Guard
- Ductile Iron Frame Adapter
- Raised Face Flanges
- Optional Shaft Guard

Services

- Specialty Chemicals
- Batch Chemical Process
- Reactor Feed
- Shower Service
- Boiler Feed
- Condensate
- High Pressure Process
- Column Reflux
- Column Bottoms
- Hot Oil
- Seal Water

Model LF 3196 *Low Flow* ANSI Process Pumps

Design Features for Total Range of Industry Services



MOUNTING FLANGE
Supports ANSI coupling guard or optional C-Face motor adapter.

STANDARD LABYRINTH OIL SEALS
Carbon-filled Teflon* for chemical resistance. Prevent premature bearing failure caused by lubricant contamination and loss of oil.

CONTINUOUS HIGH PERFORMANCE
Original high efficiency maintained by simple external adjustment resulting in long-term energy savings.

HEAVY DUTY SHAFT AND BEARINGS
Shaft designed for minimum deflection— less than .002 in. (.05 mm)—at seal faces. Bearings sized for 2-year minimum and 10-year average life under tough operating conditions.

ONE-INCH OIL SIGHT GLASS
For easy monitoring of actual oil level and condition.

RIGID FRAME (AND CASING) FEET
Reduce effect of pipe loads on alignment.

POSITIVE SEALING
Fully confined gasket at casing joint protects alignment fit from liquid.

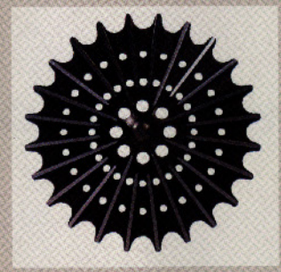
LUBRICATION FLEXIBILITY
X-Series Power Ends pre-drilled for choice of lubrication. Easy field conversion from standard flood oil to oil mist or grease.

*E.I. DuPont reg. trademark

DUCTILE IRON FRAME ADAPTER
Material strength equal to carbon steel for safety.

CIRCULAR VOLUTE CASING
Reduces radial loads during low flow operation. Mechanical seal and bearings last longer. Fully machined discharge and volute provide maximum efficiency and precise control of hydraulics at low flows.

ANSI B73.1M SHAFT SEALING
Choice of large, tapered or standard bore chambers for maximum sealing flexibility to meet service conditions.

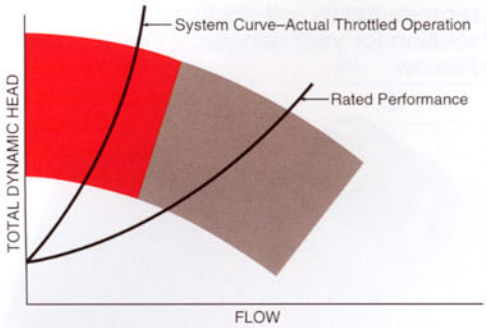


GOULDS LOW FLOW IMPELLER
Multiple open radial vanes reduce pulsations, vibration and vane stress. Full shroud for superior vane strength when operating at extreme low flows. Balance holes reduce axial thrust, minimize stuffing box/seal chamber pressure for longer bearing and seal life.

RAISED FACE FLANGES
Serrated for positive sealing against leakage. Meets ANSI B16.5 requirements. Class 150 RF standard. Class 300 RF optional. (13 in. casing—300 RF flanges standard.)

OPTIONAL CASING DRAIN

Goulds Model LF 3196 Designed for Low Flow Services



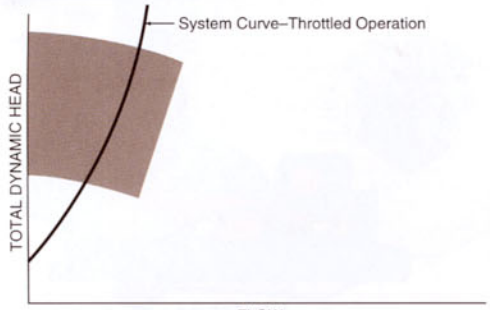
TYPICAL END SUCTION PUMP CURVE

NOT ALL END SUCTION PUMPS ARE DESIGNED FOR LOW FLOWS

Many users throttle pumps to attain desired low flow performance. Because these pumps are not designed to operate continuously in this range, the resultant higher radial loads and increased shaft deflection lead to premature bearing and mechanical seal failure. Unscheduled downtime and higher maintenance costs are the consequence.

Off Design Operation Range

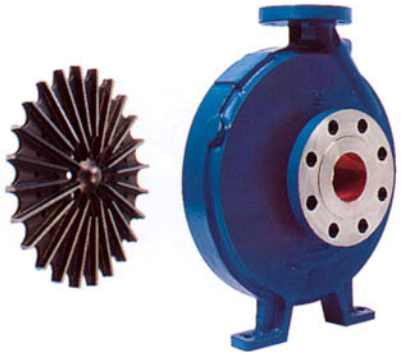
Recommended Operation Range

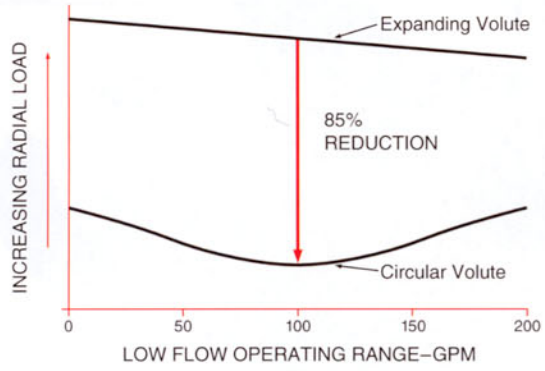


LF 3196 PUMP CURVE

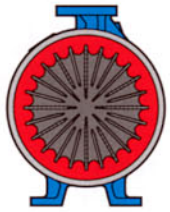
LF 3196 DESIGNED SPECIFICALLY FOR TROUBLE-FREE OPERATION AT LOW FLOWS

Goulds LF 3196 concentric (circular volute) casing and open radial vane impeller are designed to eliminate hydraulic and mechanical problems at throttled low flows.






EXPANDING VOLUTE PUMP


LF 3196 CIRCULAR VOLUTE PUMP

REDUCED RADIAL LOADS FOR OPTIMUM RELIABILITY

Radial loads are reduced by as much as 85% compared to end suction expanding volute pumps at low flows. Bearing, mechanical seal and overall pump life are optimized.

Maximum Interchangeability Low Flow Retrofit

PUMP REPLACEMENT

Since the LF 3196 meets ANSI dimensional standards, retrofitting ANSI pumps not designed for operation at low flows is easy. . . simply replace the troublesome pump with the equivalent ANSI size LF 3196.

PUMP RETROFIT

The LF 3196 uses all Goulds Model 3196 parts except casing and impeller. An LF 3196 retrofit kit easily converts a 3196 to LF 3196.


Existing 3196 is easily converted to LF 3196

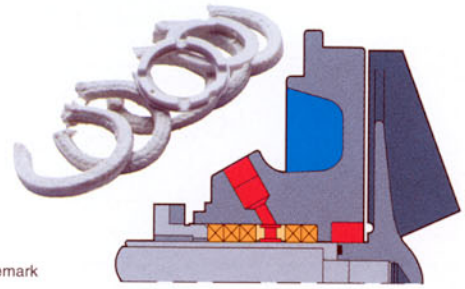
Maximum Sealing Flexibility

To meet ANSI B73.1M specifications, Goulds provides best choice of stuffing box or seal chamber and a wide range of sealing arrangements.

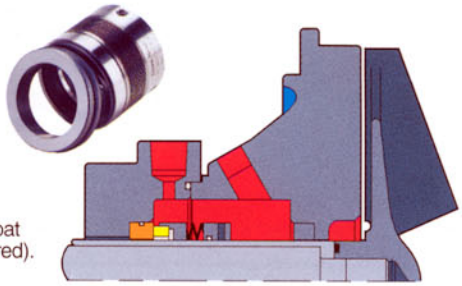
Your Goulds representative will gladly recommend the best sealing solution for your service. . .some of which are illustrated below.

PACKED BOX
- Teflon*-Impregnated Fiber Packing
- Standard Bore Stuffing Box

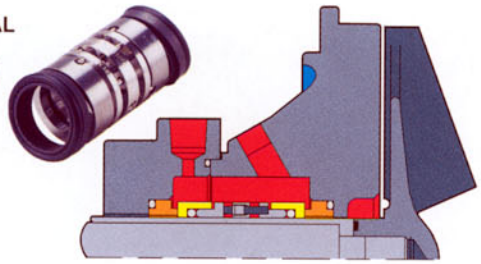
*E.I. DuPont reg. trademark



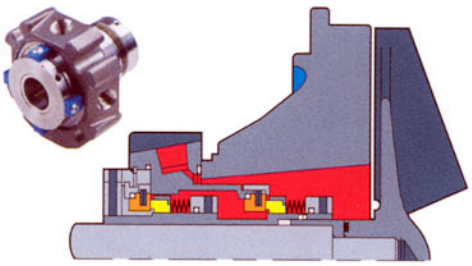
SINGLE INSIDE SEAL
- Flexibly Mounted Seat with Throat Bushing
- BigBore™ Seal Chamber (use TaperBore™ if throat bushing not required).



CONVENTIONAL DOUBLE SEAL
- BigBore™ Seal Chamber



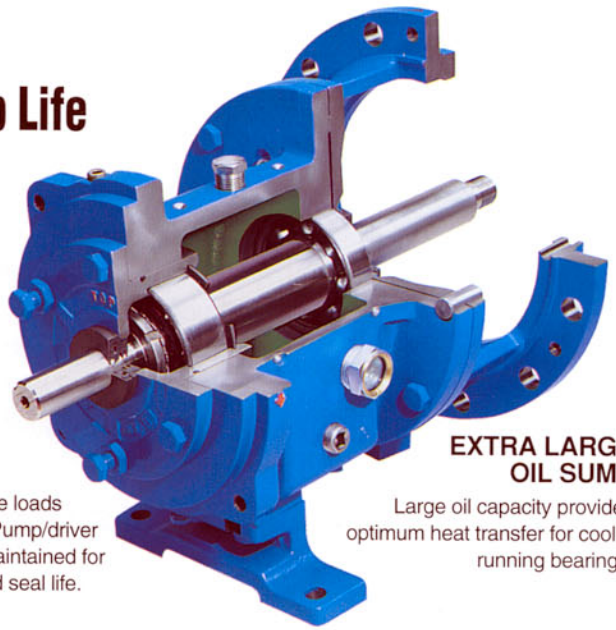
TANDEM SEAL
- TaperBore™ Seal Chamber (use BigBore™ if throat bushing required).



Goulds *X-Series* Power Ends

Designed for Reliability, Extended Pump Life

Goulds *X-Series* power ends (*STX, MTX, LTX*) are the result of users' requirement for longer pump life. *Standard* performance features extend pump life without compromising Goulds remarkable interchangeability.



CARBON-FILLED TEFLON* LABYRINTH OIL SEALS

Prevent contamination of lubricant, the primary cause of premature bearing failure.

RIGID FRAME FOOT

Reduces effect of pipe loads on shaft alignment. Pump/driver alignment is better maintained for extended bearing and seal life.

EXTRA LARGE OIL SUMP

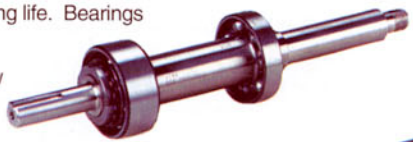
Large oil capacity provides optimum heat transfer for cooler running bearings.

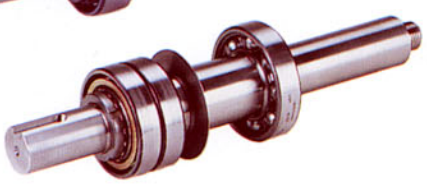
SHAFT/BEARINGS

Shaft designed for minimum deflection for long seal and bearing life. Bearings sized for optimum life.

STX/MTX. Double row angular contact thrust bearing standard, duplex bearings optional.

LTX. Oversize shaft and duplex angular contact thrust bearings extend BHP limit to 200 HP (149 kW).





LARGE OIL SIGHT GLASS

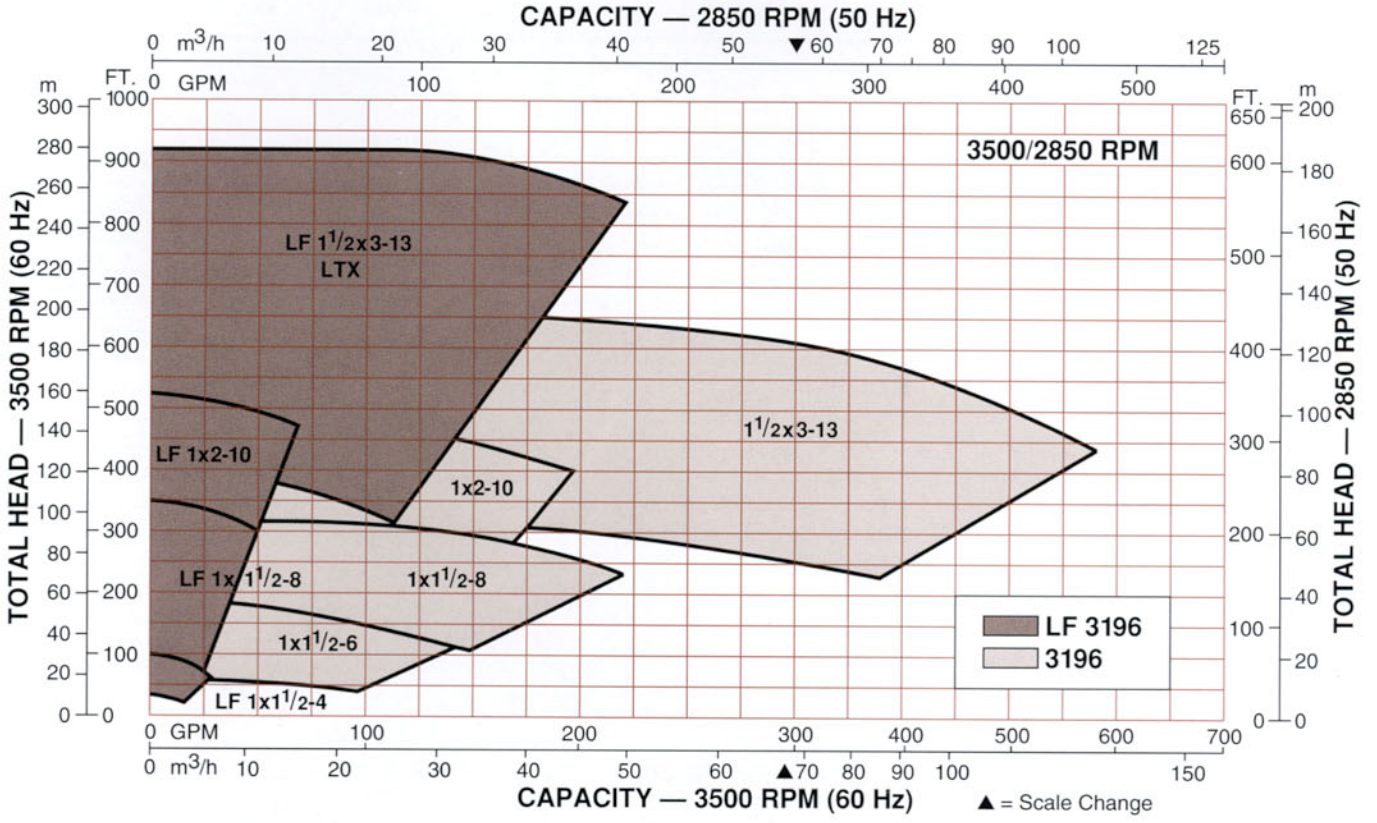
Allows viewing condition and level of oil—critical for bearing life. Frame pre-drilled for optional bottle oiler.

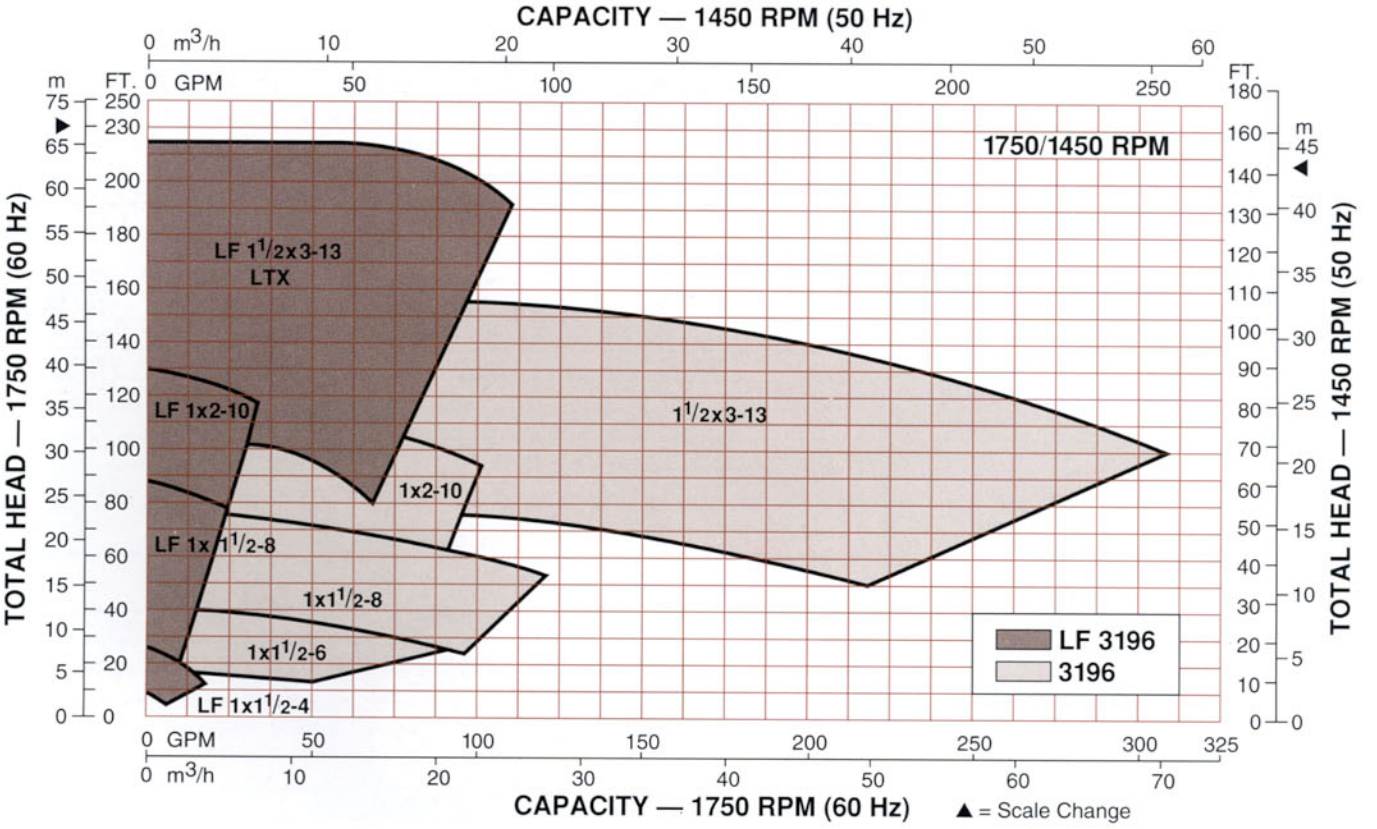
CONDITION MONITORING SITES

Allow easy and consistent monitoring of temperature and vibration for preventive maintenance. Optional installation of sensors.

*E.I. DuPont reg. trademark

Hydraulic Coverage Model LF 3196





Parts List and Materials of Construction

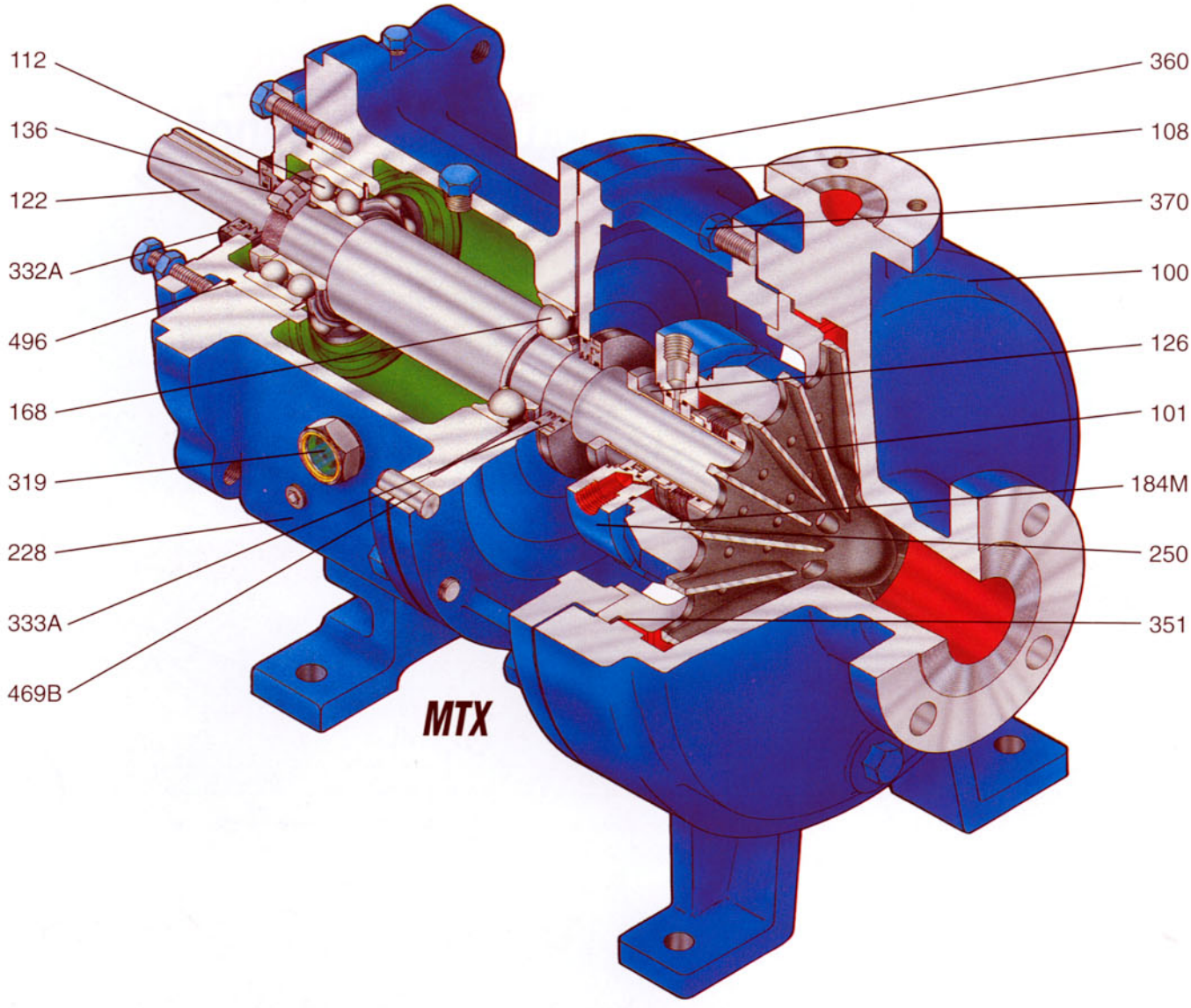
Item Number	Part Name	Material				
		Ductile Iron/ 316SS Trim	316SS	CD4MCu	Alloy 20	Hastelloy B & C
100	Casing	Ductile Iron	316SS	CD4MCu	Alloy 20	Hastelloy
101	Impeller	316SS	316SS	CD4MCu	Alloy 20	Hastelloy
105	Lantern Ring (Not Illustrated)	Glass-Filled Teflon*				
106	Stuffing Box Packing (Not Illustrated)	Teflon* Impregnated Fibers				
108	Frame Adapter	Ductile Iron				
112	Thrust Bearing	Double Row Angular Contact Conrad**				
122	Shaft—Less Sleeve (Optional)	SAE4140	316SS		Alloy 20	Hastelloy
122	Shaft—With Sleeve	SAE4140				316SS
126	Shaft Sleeve	316SS		Alloy 20		Hastelloy
136	Bearing Locknut and Lockwasher	Steel				
168	Radial Bearing	Single Row Deep Groove				
184	Stuffing Box Cover (Packed Box)	Ductile Iron	316SS	CD4MCu	Alloy 20	Hastelloy
184M	Seal Chamber (Mechanical Seal)	Ductile Iron	316SS	CD4MCu	Alloy 20	Hastelloy
228	Bearing Frame	Cast Iron (Ductile Iron for STX Group)				
250	Gland	316SS		CD4MCu	Alloy 20	Hastelloy
262	Repeller/Sleeve (Dynamic Seal Option)	CD4MCu			Alloy 20	Hastelloy
264	Gasket, Cover-to-Backplate (Dynamic Seal)	Teflon*				
265A	Stud/Nut, Cover-to-Adapter	304SS				
319	Oil Sight Glass	Glass/Steel				
332A	Labyrinth Oil Seal (Outboard)	Carbon-Filled Teflon* with Viton O-ring				
333A	Labyrinth Oil Seal (Inboard)	Carbon-Filled Teflon* with Viton O-ring				
351	Casing Gasket	Aramid Fiber with EPDM Rubber				
358A	Casing Drain Plug (Optional)	Steel	316SS	CD4MCu	Alloy 20	Hastelloy
360	Gasket, Frame-to-Adapter	Manila Paper				
370	Cap Screw, Adapter-to-Casing	Steel	304SS			
418	Jacking Bolt	304SS				
444	Backplate (Dynamic Seal Option)	Ductile Iron	316SS	CD4MCu	Alloy 20	Hastelloy
469B	Dowel Pin	Steel				
496	O-ring, Bearing Housing	Buna Rubber				
496A	O-ring, Impeller	Glass-Filled Teflon*				

*E.I. DuPont reg. trademark **_LTX_ Power End features Duplex Angular Contact

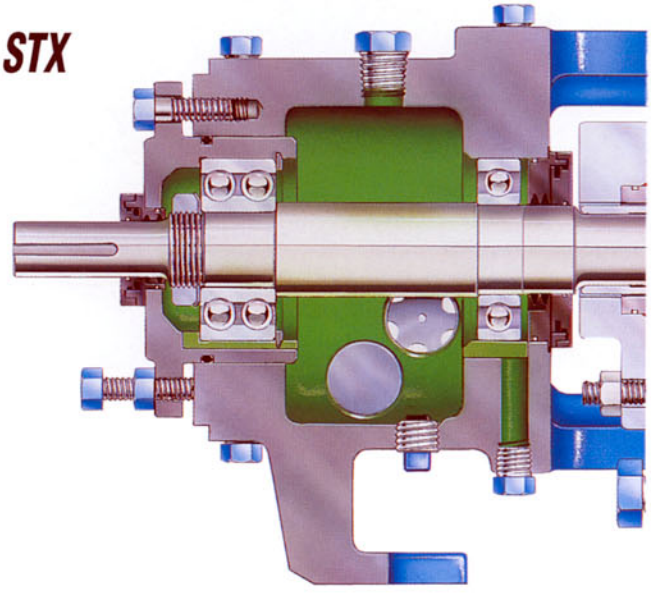
Construction Details All dimensions in inches and (mm).

		STX	_MTX_	_LTX_
Shaft	Diameter at Impeller	.75 (19)	1 (25)	1.25 (32)
	Diameter in Stuffing Box/Seal Chamber (Less Sleeve)	1.375 (35)	1.75 (45)	2.125 (54)
	(With Sleeve)	1.125 (29)	1.5 (38)	1.875 (48)
	Diameter Between Bearings	1.5 (38)	2.125 (54)	2.5 (64)
	Diameter at Coupling	.875 (22)	1.125 (29)	1.875 (48)
	Overhang	6.125 (156)	8.375 (213)	8.375 (213)
	Maximum Shaft Deflection	0.002 (0.05)		
Sleeve	O.D. thru Stuffing Box/Seal Chamber	1.375 (35)	1.75 (45)	2.125 (54)
Bearings	Radial	SKF 6207	SKF 6309	SKF 6311
	Thrust	SKF 5306 A/C3	SKF 5309 A/C3	SKF 7310 BECBM
	Bearing Span	4.125 (105)	6.75 (171)	6.875 (164)
	Average L'_{10} Bearing Life	87,600 hours		
BigBore™ Seal Chamber	Bore	2.875 (73)	3.5 (89)	3.875 (98)
Stuffing Box	Bore	2 (51)	2.5 (64)	2.875 (73)
Power Limits	HP (kW) per 100 RPM	1.1 (.82)	3.4 (2.6)	5.6 (4.2)
Maximum Liquid Temperature	Oil/Grease Lubrication without Cooling	350° F (177° C)		
	Oil Lubrication with Finned Cooler	500° F (260° C)		
	Oil Lubrication with High Temperature Option	700° F (371° C)		
Casing	Corrosion Allowance	.125 (3)		

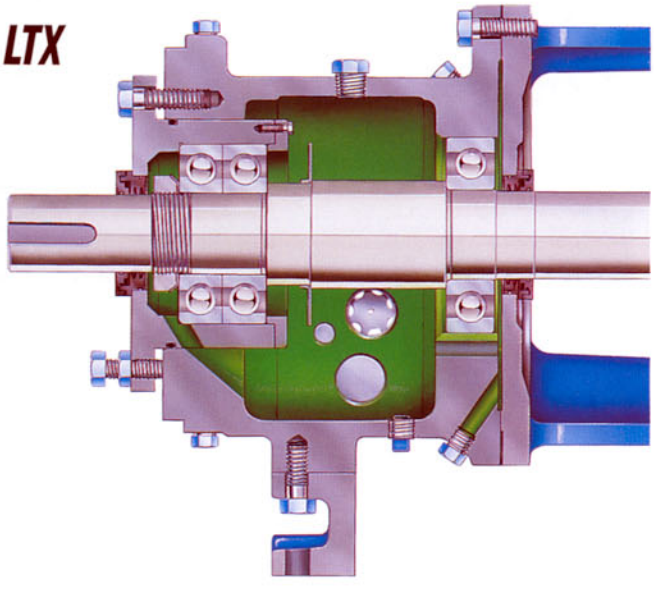
Sectional View Model LF 3196



STX

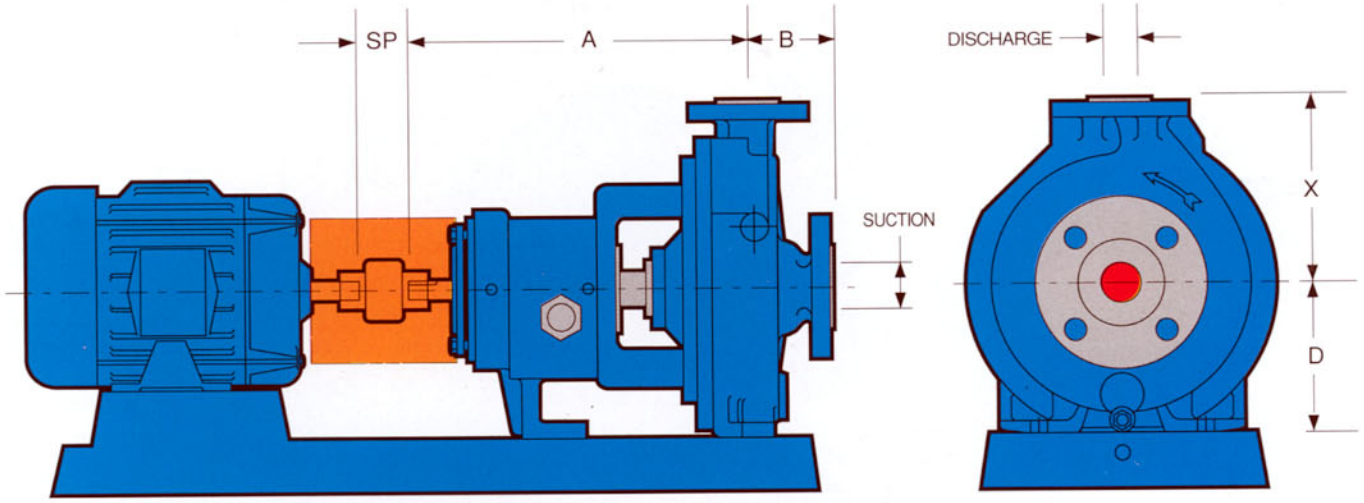


LTX



Dimensions Model LF 3196

All dimensions in inches and (mm). Not to be used for construction.

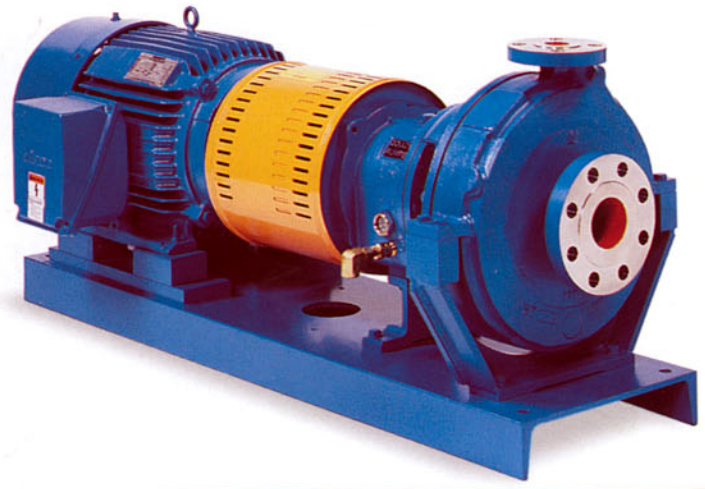


DIMENSIONS										
Group	Pump Size	ANSI Designation	Discharge Size	Suction Size	X	A	B	D	SP	Bare Pump Weight Lbs. (kg)
STX	1x1½-4	AA	1	1½	6.5 (165)	13.5 (343)	4.0 (102)	5.25 (133)	3.75 (95)	84 (38)
	1x1½-8	AA	1	1½	6.5 (165)	13.5 (343)	4.0 (102)	5.25 (133)	3.75 (95)	100 (45)
MTX/LTX	1x2-10	A05	1	2	8.5 (216)	19.5 (495)	4.0 (102)	8.25 (210)	3.75 (95)	200 (91)-MTX 245 (111)-LTX
LTX	1½x3-13	A20	1½	3	10.5 (267)	19.5 (495)	4.0 (102)	10.0 (254)	3.75 (95)	285 (129)

High Temperature LF 3196

For high temperature services (500°-700°F/ 260°-370°C), the LF 3196 is furnished with the following standard features:

- Centerline-mounted casing
- Graphite casing gasket
- Graphite impeller O-ring
- High temperature bolting
- Stainless steel shaft
- Finned oil cooler
- ANSI class 300 RF flanges



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Goulds Pumps

ITT Industries

Engineered for life

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Form B725-10 4/01