GOULDS PUMPS

# Goulds LF 3196 i-FRAME®

Low Flow ANSI Process Pump with
i-ALERT® Patented Intelligent Monitoring


ITT

ENGINEERED FOR LIFE

# LF 3196 i-FRAME®

## 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)

LF 3196 i-ALERT® *STi*
(1x1½-4, 1x1½-8)

### Performance Features for Low Flow Services

Extended Pump Life

- Concentric (Circular) casing
- Radial vane impeller
- TaperBore™/ Big Bore™ Seal Chambers
- i-ALERT® Power Ends
- Optional centerline mounted casings

Ease of Maintenance

- Back pull-out design
- Parts interchangeable with Goulds 3196 i-ALERT®
- External impeller adjustment
- Easy retrofit

Safety

- ANSI B15.1 coupling guard
- Ductile iron frame adapter
- Raised face flanges
- Optional shaft guard

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

LF 3196 i-ALERT® *MTi/LTi*
(1 x 2-10 *MTi/LTi*, 1½ x 3-13 *LTi*)

### Applications

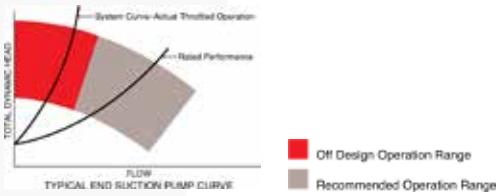
- Specialty chemicals
- Batch chemical process
- Reactor feed
- Shower service
- Boiler feed
- Condensate
- High pressure process
- Column reflux
- Column bottoms
- Hot oil
- Seal water

# LF 3196 i-FRAME®

## Designed for Low Flow Services

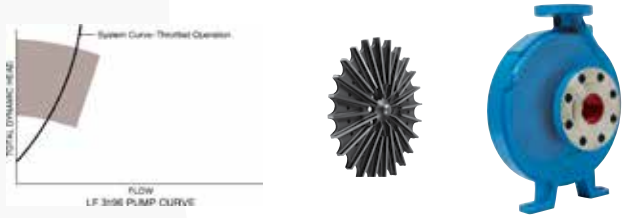
### Not All End Suction Pumps are Designed for Low Flows

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.



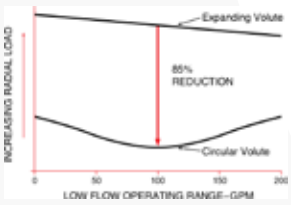

### LF 3196 i-FRAME® Designed Specifically for Trouble-Free Operation At Low Flows

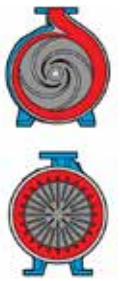
Goulds LF 3196 i-ALERT® concentric (circular volute) casing and open radial vane impeller are designed to eliminate hydraulic and mechanical problems at throttled low flows.




### 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.



EXPANDING VOLUTE PUMP



LF 3196 i-ALERT® CIRCULAR VOLUTE PUMP

## Maximum Interchangeability

### Low Flow Retrofit

#### Pump Replacement

Since the LF 3196 i-ALERT® 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 i-ALERT®.

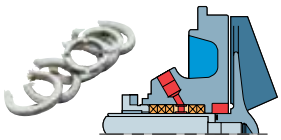
#### Pump Retrofit

Since the LF 3196 i-ALERT® 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 319 i-ALERT®.

A CV 3196 i-ALERT® retrofit kit (casing and impeller) easily converts an existing 3196.

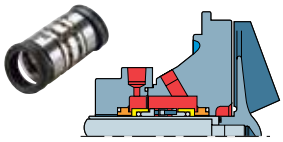
## Maximum Sealing Flexibility

To meet ANSI B73.1M specifications, Goulds provides the 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.



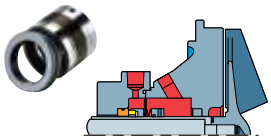
### PACKED BOX

- PTFE-Impregnated Fiber Packing
- Standard Bore Stuffing Box



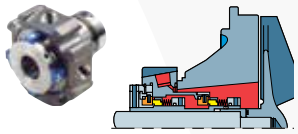
### CONVENTIONAL DOUBLE SEAL

- BigBore™ Seal Chamber



### SINGLE INSIDE SEAL

- Stuffing box design
- Flush gland
- By-pass flush



### TANDEM SEAL

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

## Goulds i-FRAME® Power Ends

### Designed for Reliability, Extended Pump Life

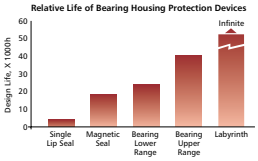
#### Condition Monitor

The heart of the i-ALERT®, the ...on monitor unit continuously ...es vibration and temperature at the thrust bearing and automatically indicates when pre-set levels of vibration and temperature have been exceeded, so that changes to the process or machine can be made before failure occurs.

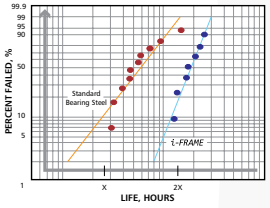
A visual indication of pump health makes walk-around inspections more efficient and accurate. The result is a more robust process to monitor and maintain all your ANSI pumps so that your plant profitability is maximized.

#### Inpro VBXX-D Hybrid Bearing Isolators

Most bearings fail before reaching their potential life. They fail for a variety of reasons, including contamination of the lubricant. INPRO VBXX-D has long been considered the industry standard in bearing lubricant protection. The i-ALERT® now improves upon that design by offering stainless steel rotors, for maximum protection against contaminants and the corrosive effects of seal leakage or environmental conditions. These seals are non-contacting and do not wear.



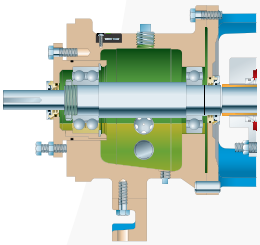

#### Shaft and Bearings Engineered for Maximum Reliability



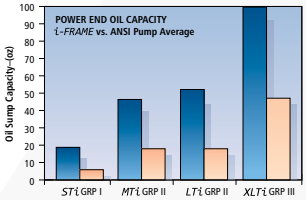

**Fatigue life *more than double* that of conventional bearing steels.**

#### Optimized Oil Sump Design

Internal sump geometry is optimized for longer bearing life. Sump size increased by 10% -20% results in better heat transfer and cooler bearings. Contoured design directs contaminants away from bearings, to the magnetic drain plug for safe removal.



**Larger** *Means Cooler*
GOULDS
Industry Average



# LF 3196 i-FRAME®

## Low Flow ANSI Process Pumps

### Featuring i-ALERT® Patented Monitoring

**i-ALERT® CONDITION MONITOR (Patent Pending)**
Constantly measures vibration and temperature at the thrust bearing. Colored LED's indicate general pump health. Provides early warning of improper operation before catastrophic failure occurs.

**INPRO VBXX-D HYBRID LABYRINTH SEALS**
Prevents premature bearing failure caused by lubricant contamination or loss of oil. Stainless steel rotors for optimal performance in corrosive environments.

**CONTINUOUS PERFORMANCE**
Original flow, pressure and efficiency are maintained by simple external adjustment resulting in long-term energy and repair parts savings.

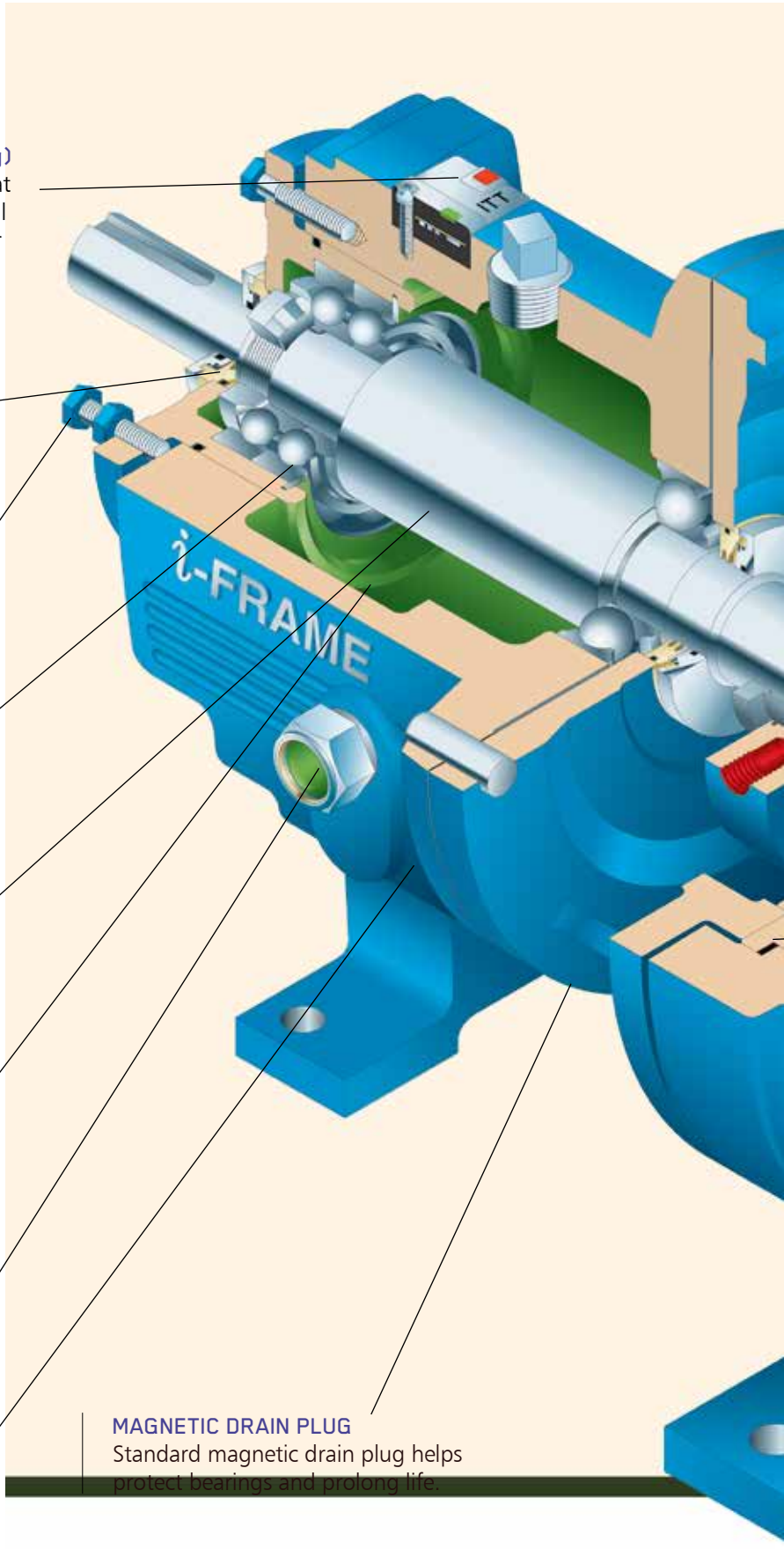
**PREMIUM SEVERE-DUTY THRUST BEARINGS**
Increase bearing fatigue life by 2-5X that of conventional bearing steels.

**HEAVY DUTY SHAFT AND BEARINGS**
Rigid shaft designed for minimum deflection at seal faces — less than 0.002 in. (.05 mm). Bearings sized for 10-year average life under tough operating conditions. Available with or without shaft sleeve.

**OPTIMIZED OIL SUMP DESIGN**
Increased oil capacity provides better heat transfer for reduced oil temperature. Bearings run cooler and last longer. Contaminants directed away from bearings to magnetic drain plug.

**ONE-INCH BULL'S EYE SIGHT GLASS**
Assures proper oil level critical to bearing life. Can be mounted on either side of pump for installation flexibility.

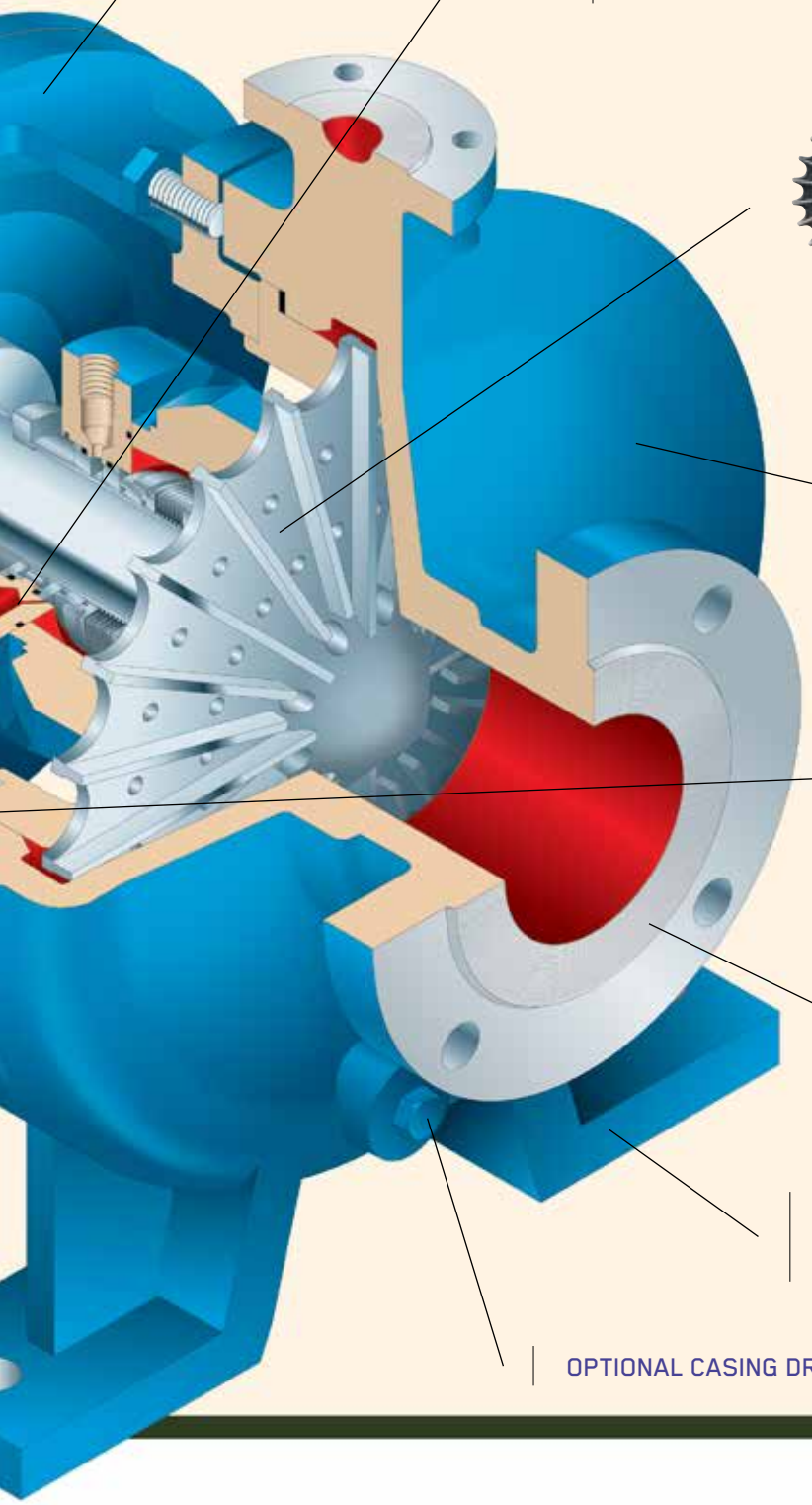
**i-FRAME® POWER END**
Designed for reliability and extended pump life, backed with a 5-year warranty.

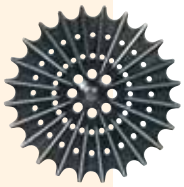



**MAGNETIC DRAIN PLUG**
Standard magnetic drain plug helps protect bearings and prolong life.

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

### SEALING FLEXIBILITY
Wide range of sealing arrangements available to meet service conditions. Engineered seal chambers improve lubrication and heat removal (cooling) of seal faces for extended seal life and pump uptime.





### 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.

### 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.

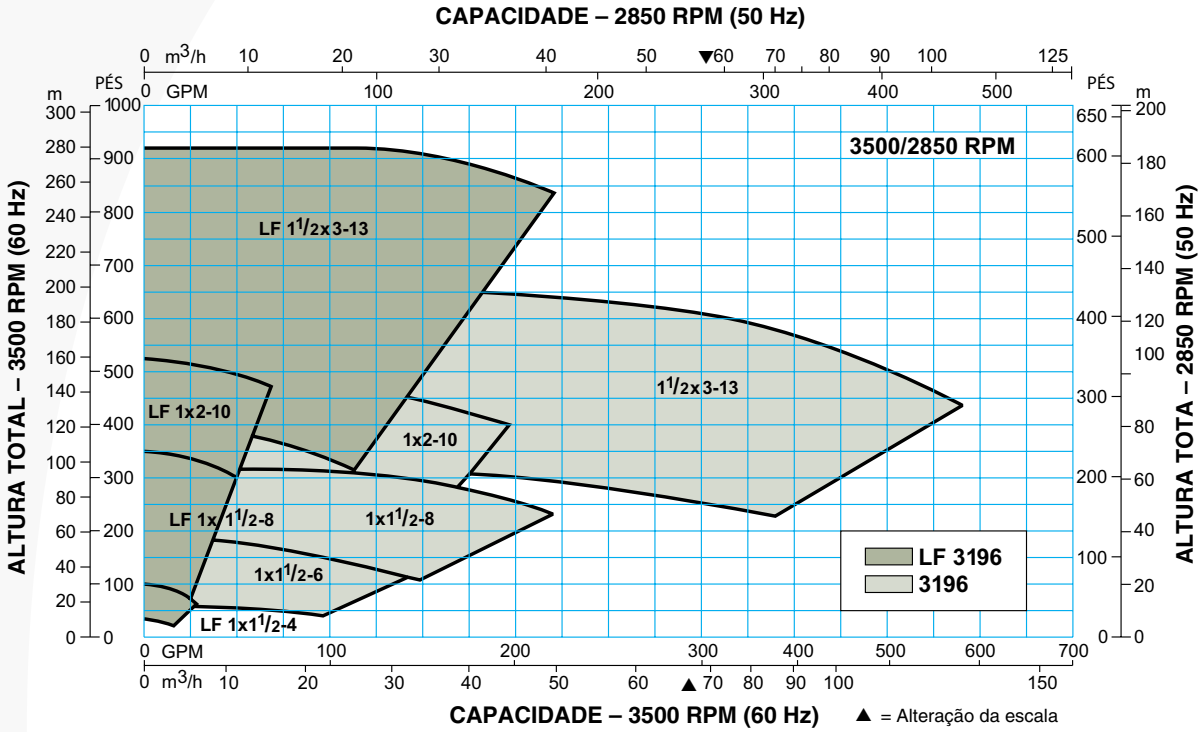
### POSITIVE SEALING
Fully confined gasket at casing joint protects alignment fit from liquid, makes disassembly easier.

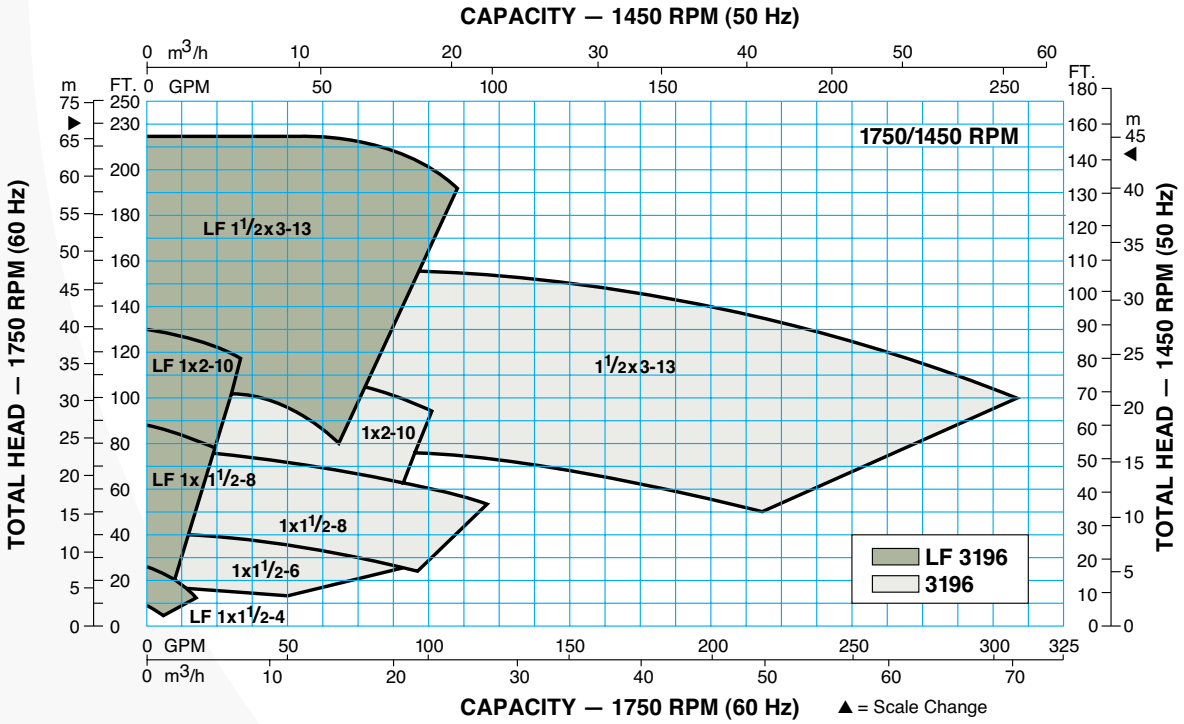
### RAISED FACE FLANGES
Serrated for positive sealing against leakage. Meets ANSI B16.5 requirements. Class 150 RF standard. Class 300 RF optional. (13" casing – 300 RF flanges standard.)

### RIGID FRAME (AND CASING) FEET
Reduce effects of pipe loads on shaft alignment; pump vibration reduced.

### OPTIONAL CASING DRAIN

# Hydraulic Coverage



## 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 PTFE | | | | |
| 106 | Stuffing Box Packing (Not Illustrated) | PTFE 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) | PTFE | | | | |
| 265A | Stud/Nut, Cover-to-Adapter | 304SS | | | | |
| 319 | Oil Sight Glass | Glass/Steel | | | | |
| 332A | Inpro® vbxx-d Labyrinth Oil Seal (Outboard) | Stainless Steel/Bronze | | | | |
| 333A | Inpro® vbxx-d Labyrinth Oil Seal (Inboard) | Stainless Steel/Bronze | | | | |
| 351 | Casing Gasket | Aramid Fiber with EPDM Rubber | | | | |
| 358A | Casing Drain Plug (Optional) | Steel | 316SS | CD4MCu | Alloy 20 | Hastelloy |
| 360 | Gasket, Frame-to-Adapter | Buna | | | | |
| 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 PTFE | | | | |
| 761B | i-*ALERT*® Condition Monitor | Stainless Steel/Epoxy | | | | |

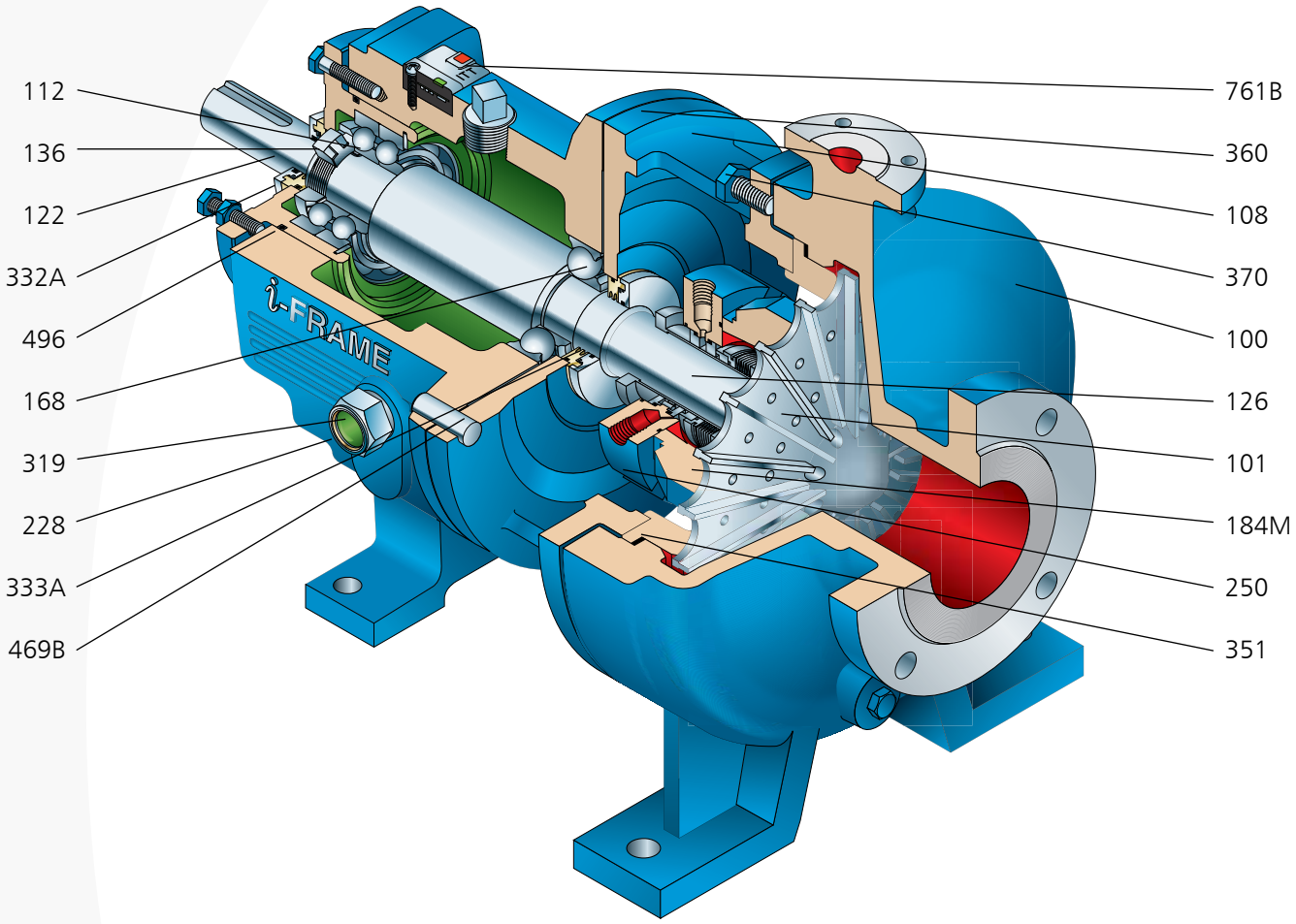
**LTX Power End features Duplex Angular Contact

All dimensions in inches and (mm).

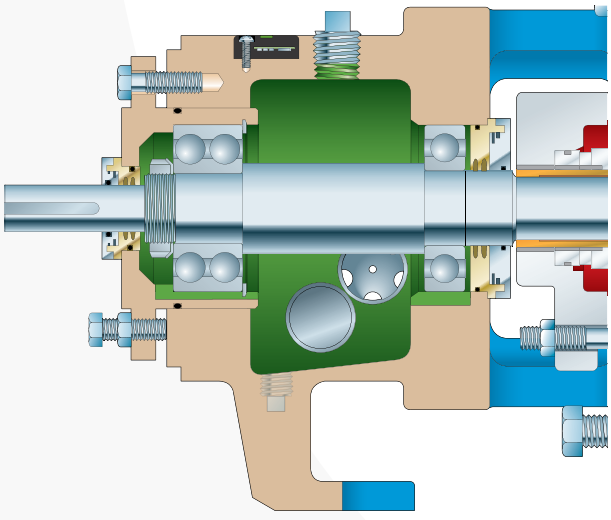
## Construction Details

| | | *STi* | *MTi* | *LTi* |
|---|---|---|---|---|
| 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 | 3306 | 3309 | 7310 |
| | Bearing Span | 4.125 (105) | 6.75 (171) | 6.875 (164) |
| 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) | | |

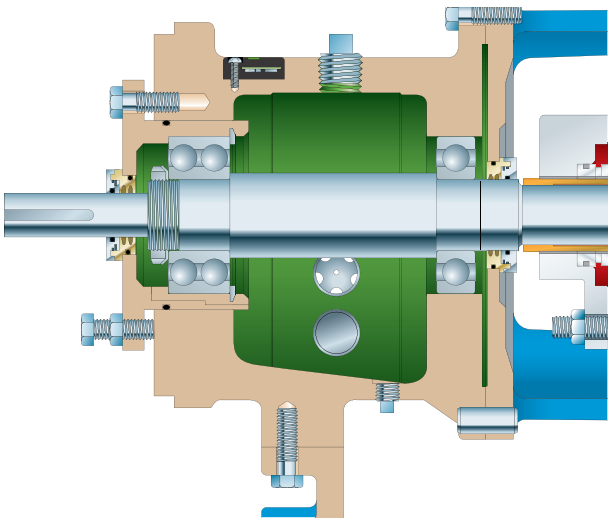
# Sectional View



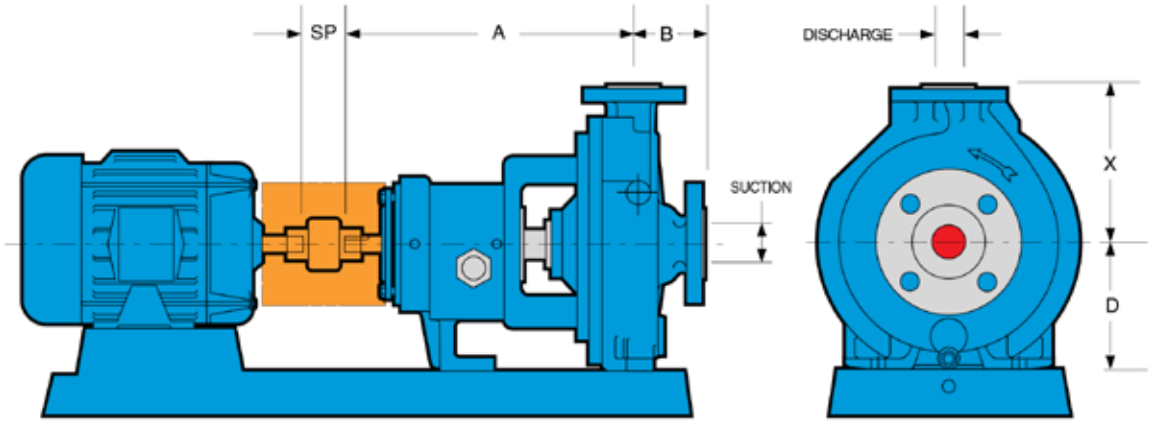

## STi



## MTi



## Dimensions




| DIMENSIONS | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Group | Pump Size | ANSI Designation | Discharge Size | Suction Size | X | A | B | D | SP | Bare Pump Weight Lbs. (kg) |
| STi | 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) |
| MTi | 1x2-10 | A05 | 1 | 2 | 8.5 (216) | 19.5 (495) | 4.0 (102) | 8.25 (210) | 3.75 (95) | 200 (91)-MTX<br>245 (111)-LTX |
| LTi | 1½x3-13 | A20 | 1½ | 3 | 10.5 (267) | 19.5 (495) | 4.0 (102) | 10.0 (254) | 3.75 (95) | 285 (129) |

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

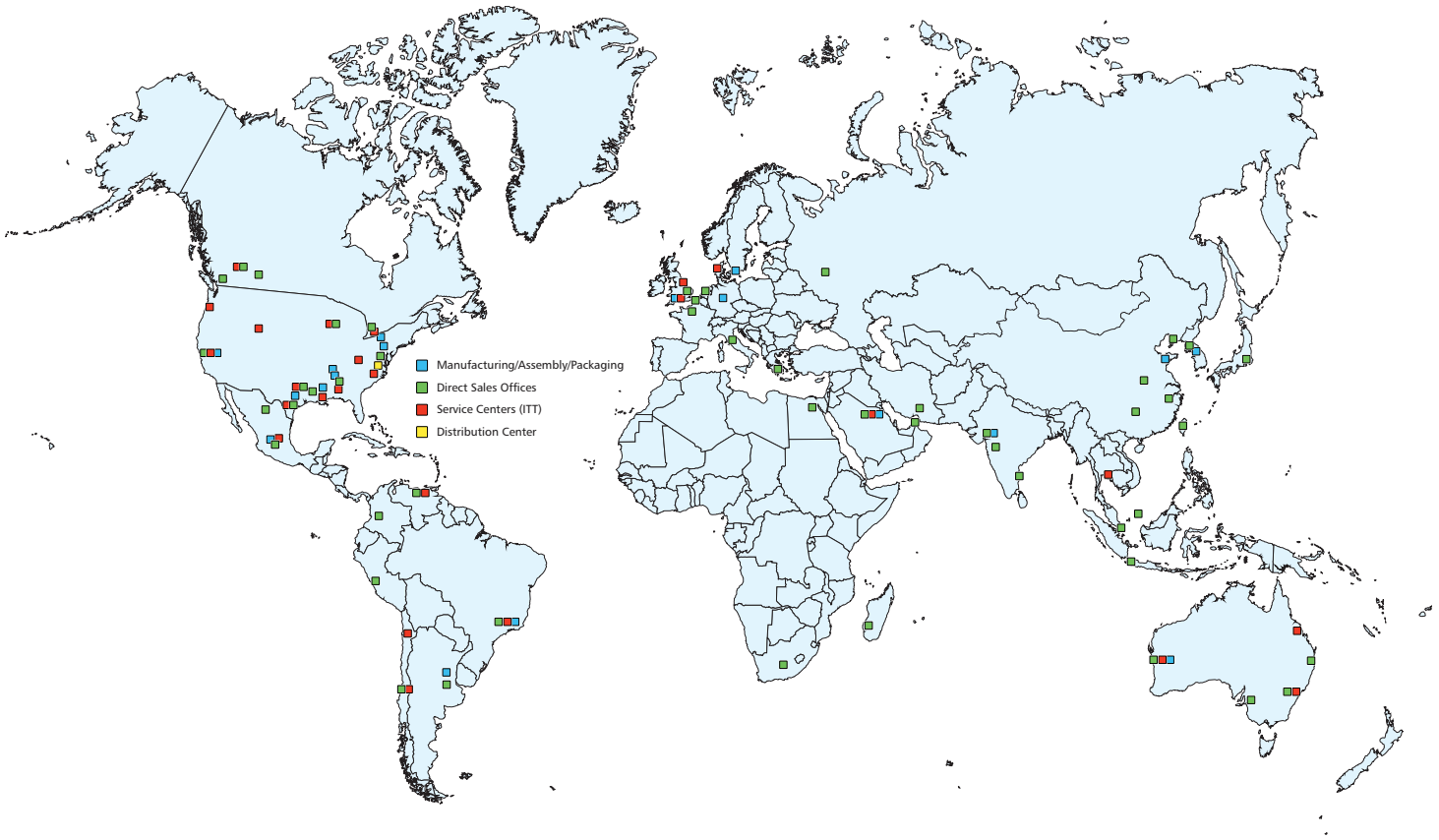
## High Temperature LF 3196 i-FRAME®

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

- Centerline-mounted casing
- Graphite casing gasket
- Graphite impeller O-ring
- Jacketed stuffing box
- High temperature bolting
- Stainless steel shaft
- Finned oil cooler

**Visit our website at**
www.gouldspumps.com

# Wherever you are, we're there too.

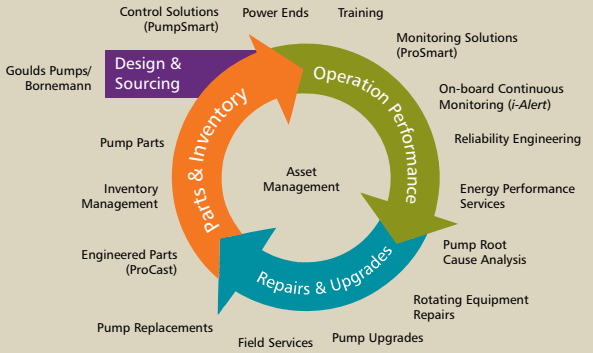



PRO services

## Reliability has no quitting time.

Building on over 160 years of Goulds Pumps experience, PRO Services provides an array of services focused on reducing equipment total cost of ownership (TCO) and increasing plant output, including predictive monitoring, maintenance contracts, field service, engineered upgrades, inventory management, and overhauls for pumps and other rotating equipment.

Your Total Solution For Equipment Life Cycle Optimization

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