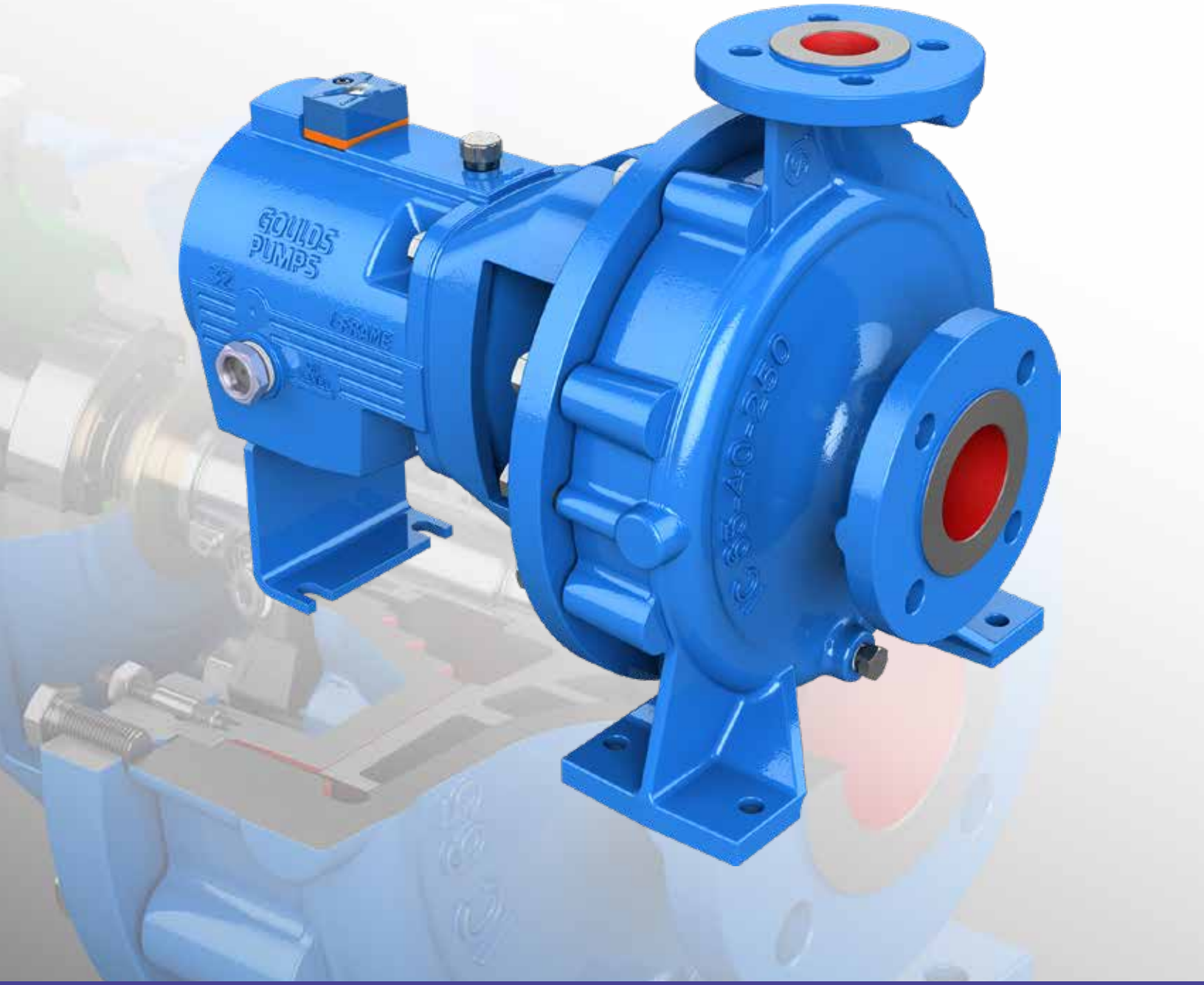
GOULDS PUMPS

An ITT Brand

Goulds ICO i-FRAME® Series

ISO process pump with i-ALERT®2 Intelligent Monitoring



ICO i-FRAME®

Worldwide Solutions for Process Pumping and Controls

Model ICO

Goulds Pumps IC family of ISO chemical process pumps is designed in accordance with ISO 5199 and ISO 2858, making it ideal for worldwide chemical or industrial process applications. The range includes the ICO pump which has the following features:

- 34 hydraulic sizes
- Flows up to 450 m^3/hr (1980 GPM)
- Heads up to 160m (514 feet)
- Temperatures from -40°C to 280°C (-40°F to 530°F)
- Pressures up to 25 Bar (360 PSI)
- Available in a comprehensive range of materials for chemical and process applications that include Carbon Steel, 316SS, Duplex SS, Alloy 20, Hastelloy, Nickel and Titanium.

Goulds IC Family

The IC Series consists of multiple pump configurations, which have been engineered by ITT hydraulic specialists from Goulds Pumps, to meet both the pumping and environmental needs of customers in the process industry.

Included in the range is:

- IC – 16 Bar, mechanically sealed version for most process fluid pumping
- ICO – 16 Bar, Semi open impeller version for solids and fiber applications
- ICP – 25 Bar, centerline mounted for high pressure and high temperature applications
- ICB – compact, close coupled design for economical, space saving service
- ICM – magnetic drive, sealless arrangement for the handling of hazardous or sensitive liquids

Ease of Maintenance

- The modular design of 4 bearing frames maximizes the interchangeability of the 34 pumps sizes
- Back pullout design for safe and simple maintenance
- Complies with ISO 2858 for retrofit capability

Features

- Semi Open Impeller for improved solids handling
- ITT Goulds patented Cyclone Seal Chamber
- Suitable for mechanical seal or gland packing
- I-FRAME optimized Bearing Frame.
- Flanges drilled to DIN/ISO or ANSI
- Robust fabricated steel baseplate

Features

Semi Open Impeller

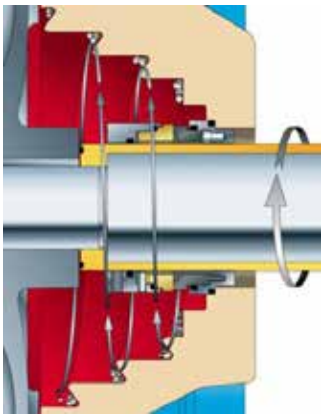
- Precision cast semi open impeller for handling liquids containing solids, fibers and dirt
- Standard back vanes or balance holes to reduce axial thrust and seal chamber pressures for extended bearing and seal life
- Key driven for maximum reliability; eliminates spinoffs due to reverse rotation during start up

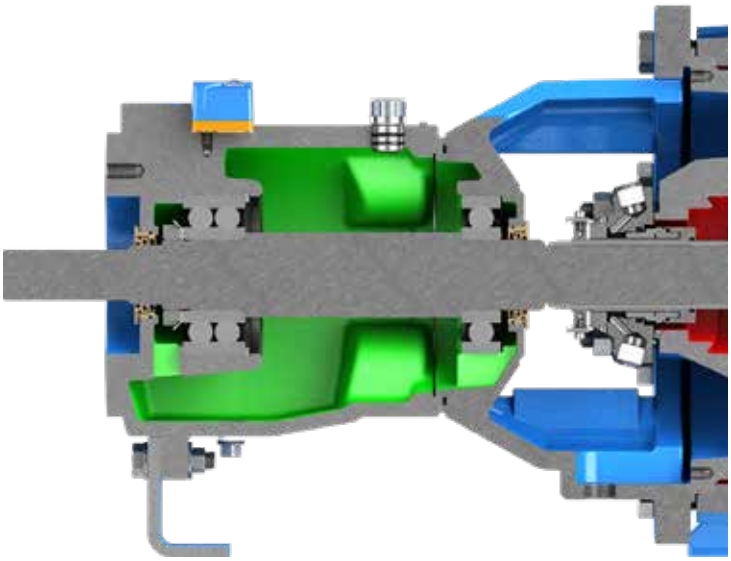
i-FRAME

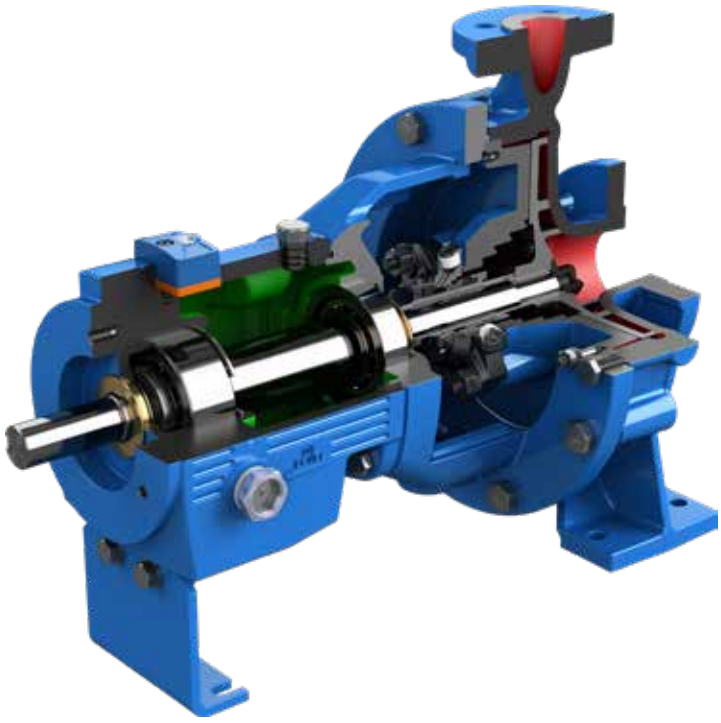
- i-ALERT® condition monitor constantly measures temperature and vibration at the thrust bearing
- INPRO VBXX-D Hybrid labyrinth seals prevent oil contamination
- Heavy duty shaft and bearings designed to minimise shaft deflection at seal faces to less than 50μm
- Premium severe duty thrust bearings
- Large Bulls Eye sight glass.
- Optimized Sump Design with increased oil capacity, and geometry

Cyclone Seal Chamber

- Self venting design eliminates vapor lock and simplifies start up
- Suitable for solids and vapors up to 10% without a flush
- Complies with ISO 3069 and can be fitted with an DIN 24960 L1K seals







Robust Baseplate Design

- Machined pump and motor pads for accurate alignment
- Suitable for grouted or ungrouted installations
- Earthing lugs
- Optional features
  - Drip pan with 1" drain connection
  - Vertical levelling screws
  - Motor adjustment screws

ICO i-FRAME® Process Pumps

i-ALERT®2 CONDITION MONITOR
Tracks vibration, temperature & run-time hours 24/7/365. Syncs data via Bluetooth® Smart phones and tablets.

See page **8** for more information

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

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.

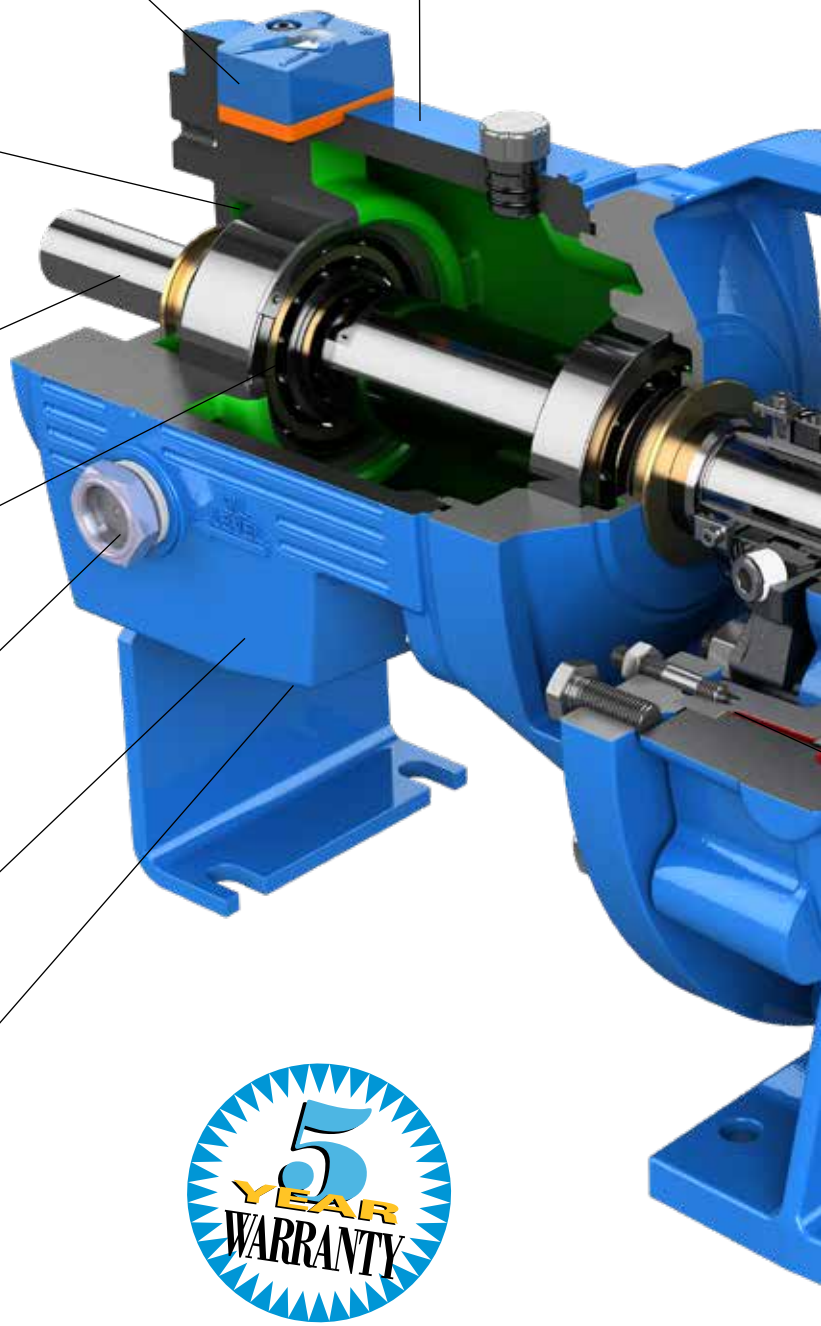
HEAVY DUTY SHAFT AND BEARINGS
Rigid shaft designed for minimum deflection at seal faces—less than 50 μm. Bearings sized for long life under tough operating conditions.

PREMIUM SEVERE-DUTY THRUST BEARINGS
Premium bearings using improved tolerance and cleaner steel provide reduced assembled runout and longer bearing life.

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.

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.

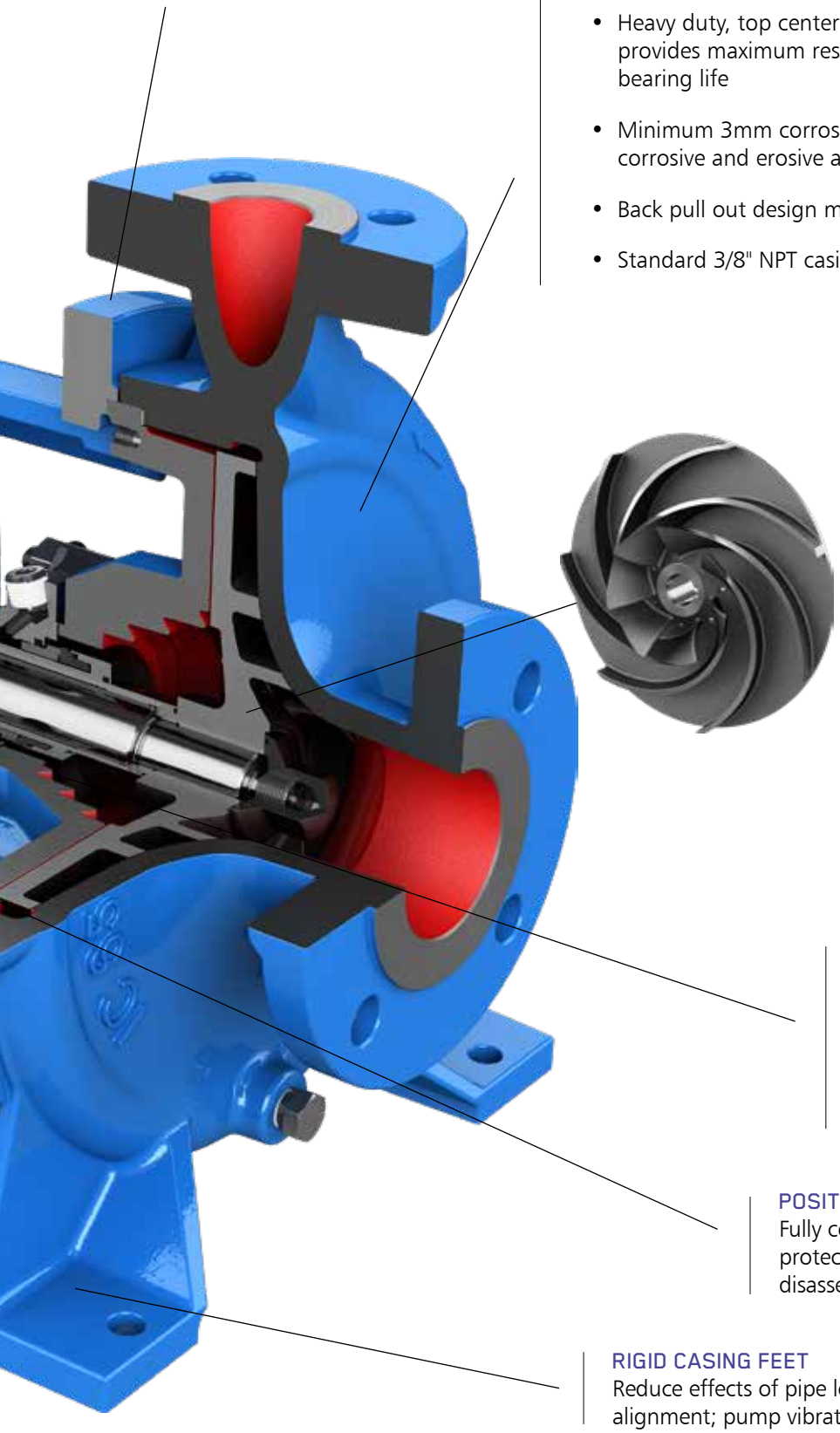
MAGNETIC DRAIN PLUG
Standard magnetic drain plug helps protect bearings and prolong life.



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

CASING

- Heavy duty, top centerline discharge casing with integral cast feet provides maximum resistance to pipe loads for improved seal and bearing life
- Minimum 3mm corrosion allowance maximizes pump life for corrosive and erosive applications
- Back pull out design makes maintenance activities safe and simple
- Standard 3/8" NPT casing drain for safe maintenance



IMPELLER

- Precision-cast semi open impeller for handling liquids containing solids, fibres and dirt
- Preferred by ISO 5199 for maximum mechanical seal life
- Standard back vanes or balance holes reduce axial thrust and seal chamber pressures for extended bearing and seal life
- Key driven for maximum reliability; eliminates spinoffs due to reverse rotation during start-up

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.

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

RIGID CASING FEET
Reduce effects of pipe loads on shaft alignment; pump vibration reduced.

Conforms to ISO 5199 and ISO 2858 for maximum reliability and ease of installation.
Superior hydraulic design for maximum performance and extended mechanical reliability.

Goulds Patented i-FRAME® Power Ends

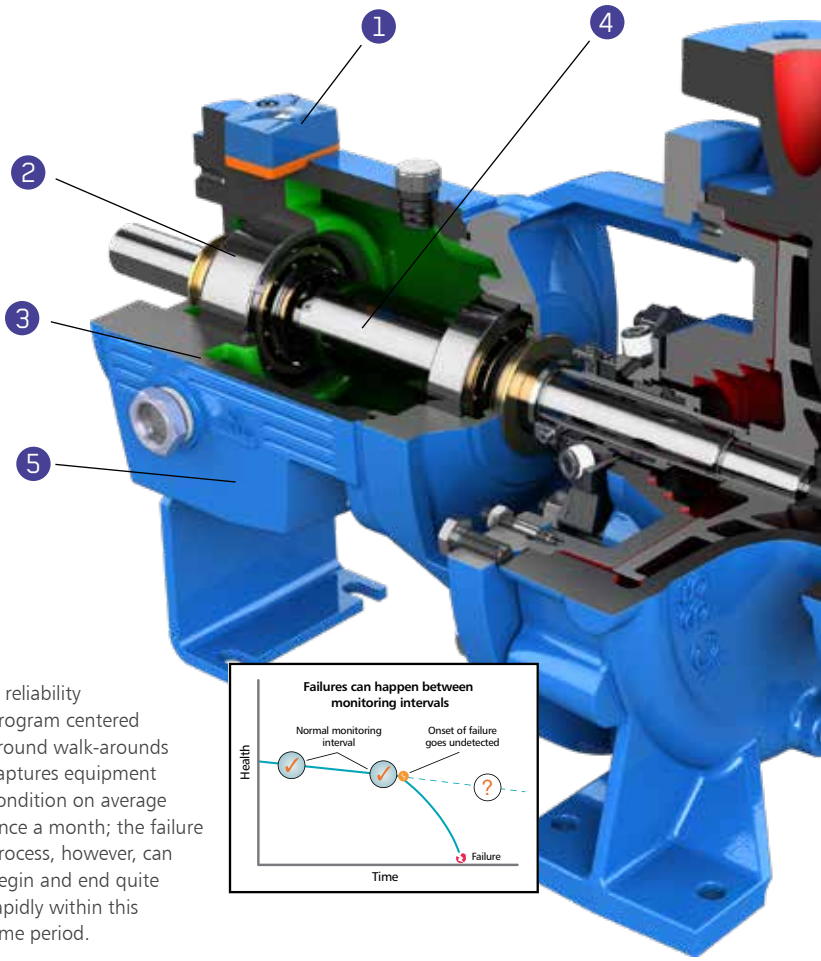
Extended Pump Life Through Intelligent Design

Goulds i-FRAME Power Ends are the result of close to 170 years of design experience, customer interaction, and continuous improvement. Customers get extended Mean Time Between Failure (MTBF) and lower life cycle costs (LCC) ... guaranteed!

1 Patented i-ALERT® Condition Monitor

The heart of the i-FRAME, the i-ALERT condition monitor unit continuously measures 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 ISO and ANSI pumps so that your plant profitability is maximized.

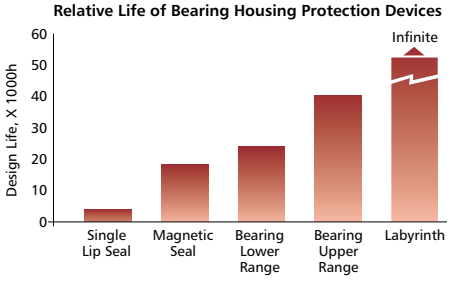
See page **8** for more information



A reliability program centered around walk-arounds captures equipment condition on average once a month; the failure process, however, can begin and end quite rapidly within this time period.

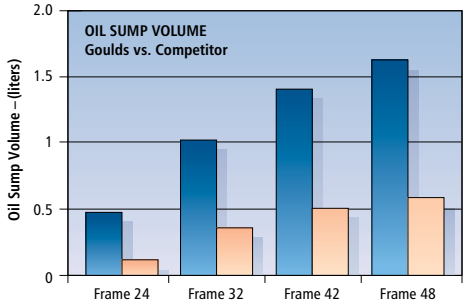
2 INPRO VBXX-D Hybrid Bearing Isolators

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-FRAME* now improves upon that design by offering stainless steel rotors and bronze stators, for maximum protection against contaminants and the corrosive effects of seal leakage or environmental conditions. These seals are non-contacting and do not wear.



3 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

4 Shaft and Bearings Engineered for Maximum Reliability

Every IC *i-FRAME* Power End is engineered and manufactured for optimal pump performance and increased MTBF.

Oversized shaft with double row thrust bearings provide increased L'10 life by 40%.

ISO 5199 Shaft Specification	Meets	Exceeds
Diameter Tolerance		✔
Surface Finish		✔
Runout	✔	
Deflection		✔

The rugged shaft and bearing combination maintains shaft deflection of less than 50 μm at all operating points. The result is longer seal and bearing life.

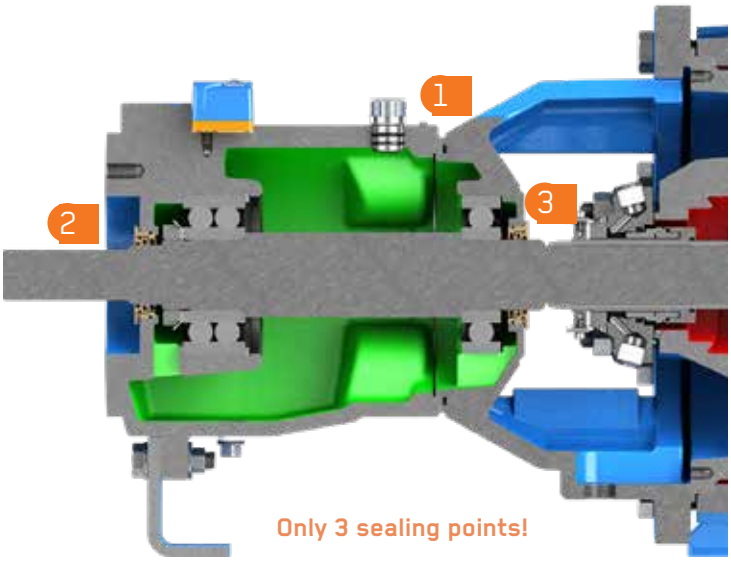
Premium severe-duty thrust bearings increase bearing life.

- High purity steels have fewer inclusions than standard steel – better grain structure and wear resistance.
- Heat treatment of bearing elements to SO stabilization levels provides superior thermal stability for increased service life.
- Bearing Balls are manufactured to at least one ISO grade above standard (ISO P5 for ring running accuracy and ISO P6 for dimensions). The result is reduced vibration and noise for improved shaft guidance.

5 Unique Two-Piece Power End Design

The IC power end is designed like no other pump power end in the market today. The unique two-piece design provides a more reliable sealing of the frame, better alignment of key components and reduced maintenance time and effort.

- Only one static o-ring is needed to seal the entire frame. No gaskets.
- No additional components such as separate bearing housings or bearing covers. Fewer parts means less stack-up tolerance issues. Maintenance and repair procedures are much easier compared to other process pumps.
- One precision machined fit pilots the two power end halves together. More reliable and repeatable alignment between the bearings, shaft, seal, impeller and casing.
- No dynamic elastomeric seals! Only non-contacting labyrinth oils seals with static o-rings. No dynamic seal components that could wear out and leak. Provides more reliable lubrication retention and a cleaner environment for the high performance bearings.



Only 3 sealing points!

Our Guarantee

We are so confident that the *i*-FRAME is the most reliable Power End in the industry, that we are proud to offer a standard 5-year warranty on every ISO and ANSI *i-FRAME* Process Pump.

i-ALERT® Monitoring Solution

Sensor | App | Ai Platform

www.i-alert.com

Bluetooth®

What it Does:

Monitor
Tracks vibration, temperature & run-time hours 24/7/365.

Alarm
Takes high resolution data when an alarm condition occurs and stores it for later analysis.

Trend
Captures data every 1-60 minutes and has up to 170 days of hourly on-board storage.

Analyze
Diagnose machine faults with vibration tools
Fast Fourier Transform (FFT) & Time Wave Form Analysis.

Environment
Rated for any industrial environment. water & dust resistant.
Intrinsically Safe with a 3-year battery life (use dependent).
- ATEX Zone 0 AEx ia IIB Ga (Groups C & D)

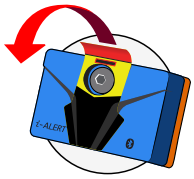
Wireless
Sync data via Bluetooth Smart enabled smartphones and tablets.

Online Monitoring
Monitor and manage all of your i-ALERT enabled machines in one place - i-ALERT Ai Online Platform. This subscription service requires no software to download or dedicated hardware to run.

Spend less time collecting data and more time fixing problems. The i-ALERT mobile app has the ability to scan multiple i-ALERT2 sensors within range to quickly and safely inspect multiple machines.

How it Works:

1. ACTIVATE
The i-ALERT2 devices are light activated by removing the sticker. The sensor begins wirelessly broadcasting once activated.



2. AUTO CONFIGURATION
The i-ALERT device averages the vibration over 25 hours of run-time and sets the alarm levels to 2 x average (0.1-1.5ips minimum). Temperature alarm default to 80°C (176°F)

OR

2. MANUAL CONFIGURATION
User manually sets the alarm thresholds via the i-ALERT mobile application.

3. Monitor
The i-ALERT2 sensor is configurable to check every 1-5 minutes. If two consecutive readings are above alarm threshold the i-ALERT device will go into alarm.

Dashboard
Simple, intuitive dashboard to track vibration, temperature, run-time & battery life.

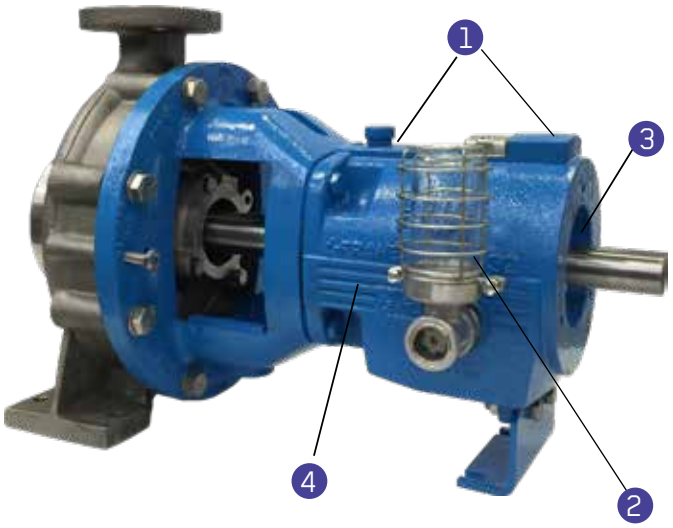
Trending
Trend vibration, temperature, & kurtosis to monitor any changes in the equipment operation.

BOM
Load the as built of materials based on the pump serial number.

Construction Details/Standard Options

		24	32	42	48
Shaft	Diameter at Impeller	19	28	38	48
	Diameter in stuffing box/Seal Chamber	33	43	53	65
	Diameter between Bearings	44	54	68	78
	Diameter at Coupling	24	32	42	48
	Maximum shaft Deflection	0.05			
Bearings	Radial	6307 C3	6309 C3	6311 C3	6313 C3
	Thrust	3307A C3	3309A C3	3311A C3	3313A C3
	Bearing span	105	170	143	246
Power Limit	KW per 100 RPM	0.75	2.2	4.4	9.8
Temperature	Maximum Liquid Temperature Oil/Grease Lubrication without Cooling	160°C			
	Maximum Liquid Temperature Oil/Grease Lubrication with High Temp. Option	280°C			
Casing	Corrosion Allowance	3 mm			

Designed for Flexibility to Meet Customer Needs



Bearing Frame Options

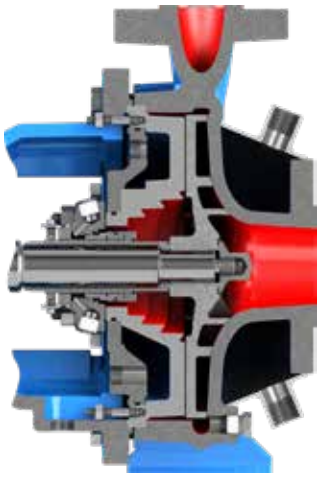
1. **GREASE LUBRICATION**
   Fitted with grease fitting for regreasable bearings or sealed for grease for life bearings.
2. **CONSTANT LEVEL OILER**
   Preset for correct oil level. Oil reservoir decreases maintenance intervals.
3. **MAGNETIC OIL SEAL**
   Optional Magnetic oil seals provide a sealed bearing housing for special applications. Requires addition of frame breather fitting.
4. **PROVISIONS FOR BEARING MONITORS**
   Tapped connections for thermocouple and vibration sensing monitoring.

Bearing Frame Finned Cooler

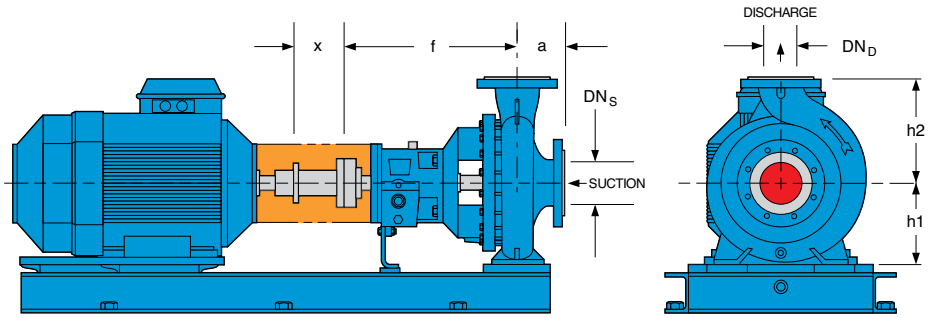
Directly cools oil for lower bearing operating temperature. Requires minimal cooling water. Corrosion resistant construction. Recommended for temperatures over 180° C when using conventional oil.

Jacketed Casing and Seal Chamber

For heating and cooling of product.



Dimensions



DIMENSIONS

		Flanges						Bare pump	
Pump size	Frame	Dns	DNd	a	f	h1	h2	X	weights
40-25-160	24	40	25	80	385	132	160	100	42
40-25-200	24	40	25	80	385	160	180	100	50
40-25-250	32	40	25	100	500	180	225	100	79
50-32-160	24	50	32	80	385	132	160	100	43
50-32-200	24	50	32	80	385	160	180	100	53
50-32-250	32	50	32	100	500	180	225	100	83
50-32-315	32	50(1)	32(1)	125	500	200	250	100	111
65-40-160	24	65	40	80	385	132	160	100	44
65-40-200	24	65	40	100	385	160	180	100	54
65-40-250	32	65	40	100	500	180	225	100	85
65-40-315	32	65(1)	40(1)	125	500	200	250	100	121
80-50-160	24	80	50	100	385	160	180	100	50
80-50-200	24	80	50	100	385	160	200	100	57
80-50-250	32	80	50	125	500	180	225	100	88
80-50-315	32	80(1)	50(1)	125	500	225	280	100	126
100-65-160	32	100	65	100	500	160	200	100	74
100-65-200	32	100	65	100	500	180	225	140	79
100-65-250	32	100	65	125	500	200	250	140	98
100-65-315	42	100(1)	65(1)	125	530	225	280	140	155
125-80-160	32	125	80	125	500	180	225	140	81
125-80-200	32	125	80	125	500	180	250	140	87
125-80-250	32	125	80	125	500	225	280	140	109
125-80-315	42	125(1)	80(1)	125	530	250	315	140	165
125-80-400	42	125	80	125	530	280	355	140	210
125-100-200	32	125	100	125	530	200	280	140	93
125-100-250	42	125	100	140	530	225	280	140	134
125-100-315	42	125(1)	100(1)	140	530	250	315	140	180
125-100-400	42	125	100	140	530	280	355	140	218
150-125-250	42	150	125	140	530	250	355	140	151
150-125-315	42	150	125	140	530	280	355	140	180
150-125-400	42	150	125	140	530	315	400	140	252
200-150-250	42	200	150	160	530	280	375	180	195
200-150-315	48	200	150	160	670	315	400	180	257
200-150-400	48	200	150	160	670	315	450	180	305

Cast Material Standards

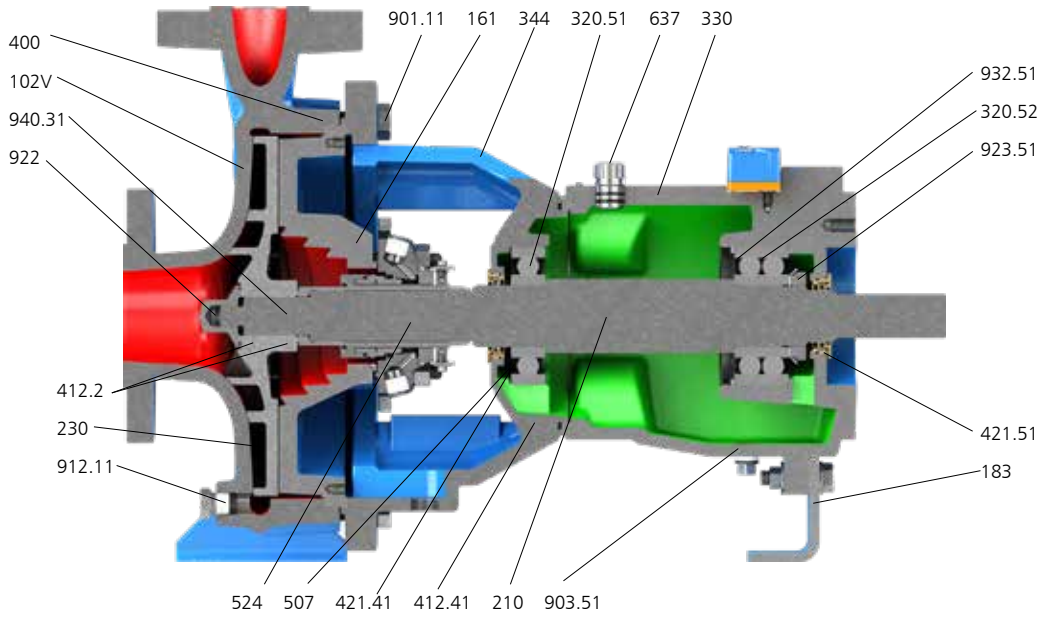
	Standards	
	DIN	ASTM
Cast Iron	0.6025	A48, Class 35
Ductile	0.7043	A3695, Grade 60-40-18
Carbon Steel	1.0619	A216 WCB
Stainless Steel	1.4408	A744 CF-8M
	1.4404	A744 CF-3M
Duplex SS	1.4517	Duplex SS - A995 CD4-McuN
Super Duplex	1.4469	A995 CD3MWCuN
Alloy 20	1.4527	A744 CN-7M
Hastelloy C	2.4686	A 494 CW-2M
Hastelloy B	2.481	A 494N-1 2MV
Titanium	3.7031	B367 Grade 2

Dimension in mm
Dimensions subjected to change without notice
Note: Flange drilling in accordance with ISO 7005 PN 16
except where noted

(1)-Flanges drilled PN25

Detailed pump dimensions in accordance with ISO 2858/EN22858
Detailed baseplate dimensions in accordance with ISO 3661/EN23661

Parts List & Materials of Construction



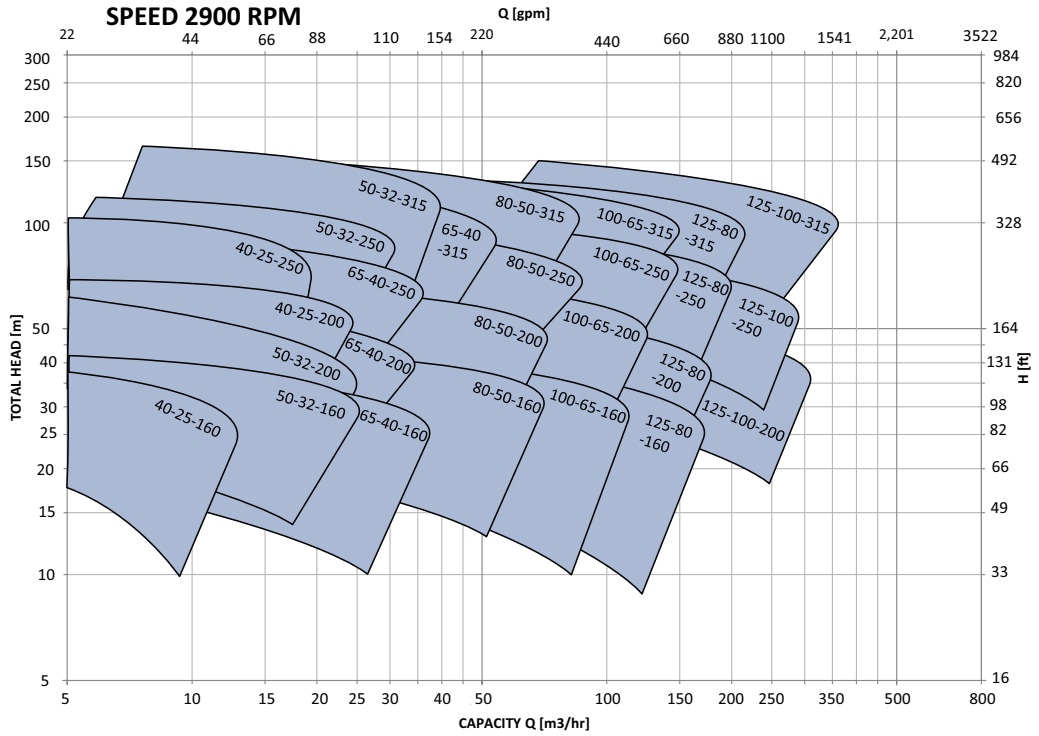
Material									
Item Number	Part Name	CS/316SS	316ss	Duplex	Alloy 20	Hastelloy	Titanium	Nickel	Inconel
102V	Casing	Carbon Steel	316ss	Duplex	Alloy 20	Hastelloy	Titanium	Nickel	Inconel
161	Seal Chamber Stuffing Box Cover	Ductile Iron	316ss	Duplex	Alloy 20	Hastelloy	Titanium	Nickel	Inconel
183	Support Foot	Carbon Steel							
210	Shaft	Stainless Steel							
230	Impeller	316ss	316ss	Duplex	Alloy 20	Hastelloy	Titanium	Nickel	Inconel
320.51	Radial Bearing	Single Row, Ball Bearing							
320.52	Thrust Bearing	Double Row Angular Contact Ball Bearing							
330	Bearing Bracket	Cast Iron							
344	Lantern	Ductile Iron							
400	Case Gasket	Non Asbestos Aramid Fiber							
412.21	O-ring, Shaft Sleeve & Impeller Nut	PTFE							
412.41	O-ring, Bearing Bracket	NBR							
421.41	Oil Seal, Inboard	Bi-Metallic Labyrinth Seal (Steel & Bronze)							
421.51	Oil Seal, Outboard	Bi-Metallic Labyrinth Seal (Steel & Bronze)							
524	Shaft Sleeve	316LSS		Duplex	Alloy 20	Hastelloy	Titanium	Nickel	Inconel
637	Oil Vent / Filler Plug	Steel							
642	Oil Level Sight Glass	Glass\Plastic							
901.11	Casing Bolts, Hex Cap Screw	Stainless Steel							
901.12	Support Foot Bolt Hex Cap Screw	Carbon Steel							
901.31	Lantern-Cover, Hex Cap Screw	Stainless Steel							
901.41	Brg Bracket-to-Lantern Bolts Hex Cap Screw	Carbon Steel							
901.42	Jacket Bolt	Stainless Steel							
903.51	Drain Plug	Carbon Steel							
912.11	Case Drain Plug	316SS			Alloy 20	Hastelloy	Titanium	Nickel	Inconel
922	Impeller Nut	Duplex			Alloy 20	Hastelloy	Titanium	Nickel	Inconel
923.51	Bearing Lock Nut	Steel\Nylon							
932.51	Snap Ring	Carbon Steel							
940.31	Impeller Key	Carbon Steel							

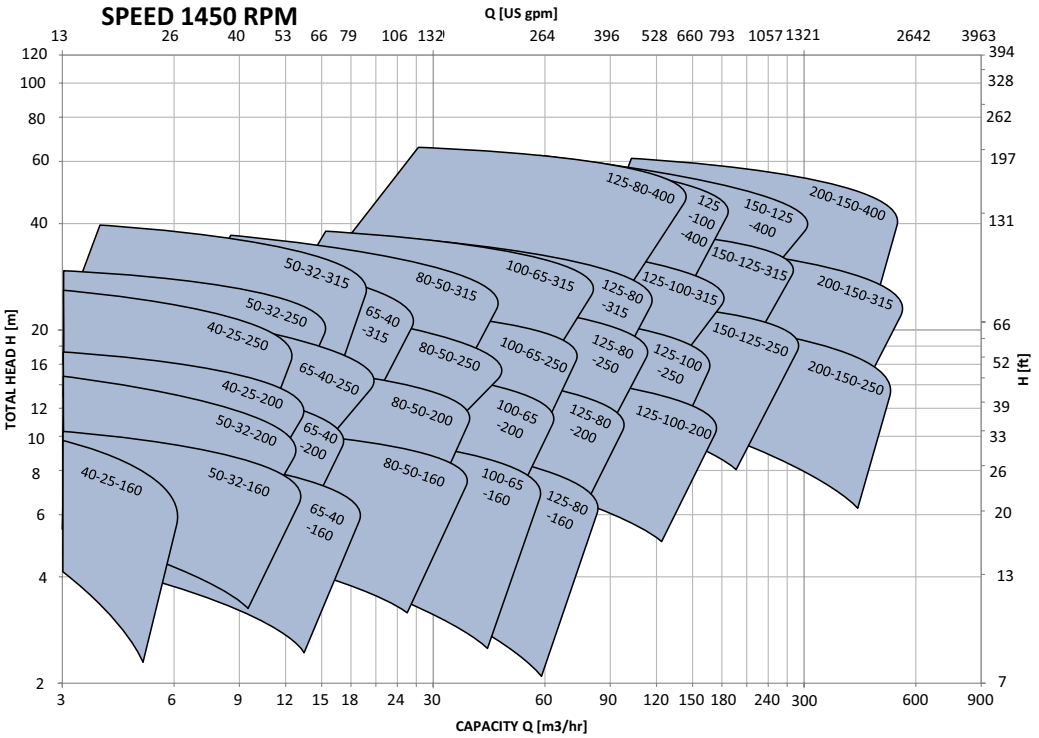
Other Parts Not Shown		
452	Packing Gland	316SS
458	Lantern Ring	Glass Filled PTFE
461	Packing	PTFE Impregnated

Other Alloys available: 316L, 317, 317L, Super Duplex etc...

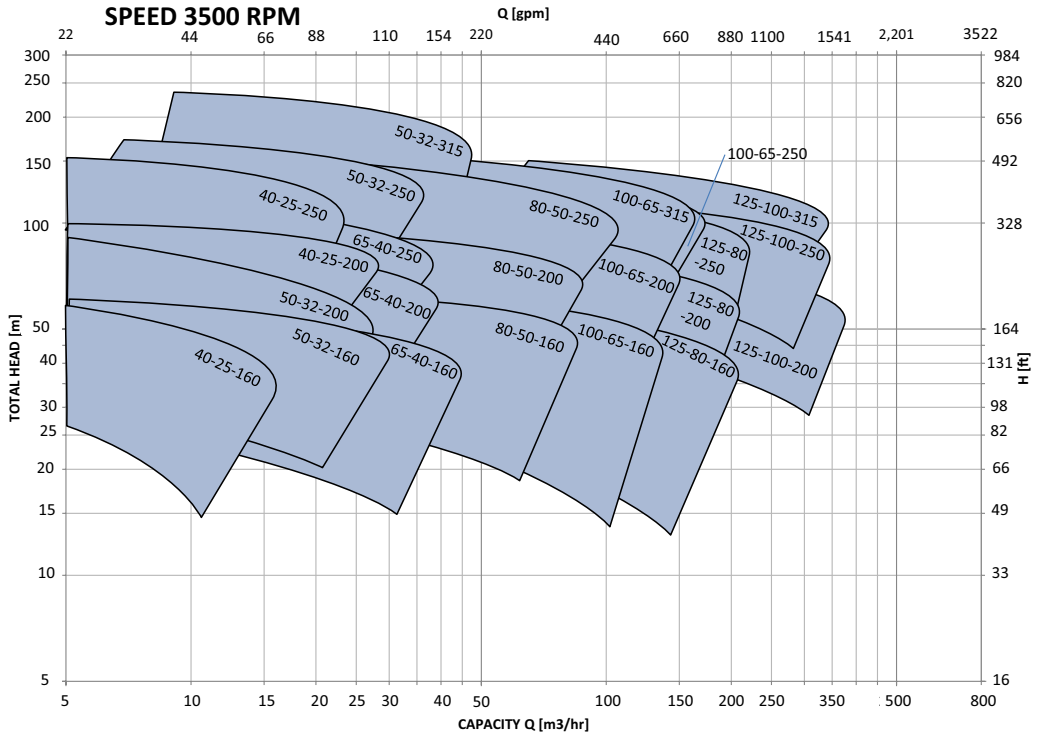
Hydraulic Coverage

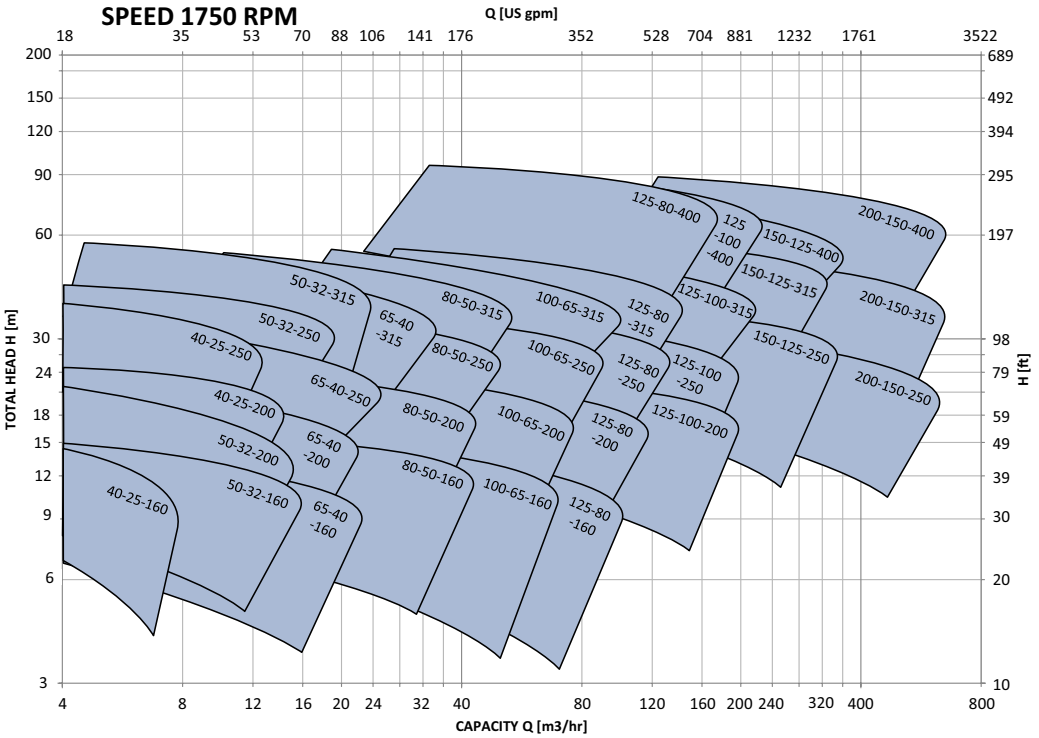
50Hz Performance





60Hz Performance





Notes

Notes

An ITT Brand

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