

Goulds API 3620 i-FRAME[®]

API 610 11th Edition / ISO 13709 2nd Edition

API BB2 Between-Bearing, Radially Split



3620 i-FRAME®

A Leader in API Engineered Pump Package Solutions...

Proven API Leadership

ITT Goulds Pumps is a proven leader in API Pumps

- Over 20,000 units installed
 - Over 17,000 OH2 / OH3s
 - Over 3,000 BB1 / BB2 / BB3 pumps
- 50+ years of API expertise
- Participating member on API 610 and API 682 committees

Family of API Pumps

ITT Goulds Pumps has a family of proven API pumps:

- Overhung pumps
- Single and two-stage between-bearing
- Multistage between-bearing pumps – axially split
- Barrel multistage - radially split
- Vertical, double casing pumps
- Specialty pumps

Global Coverage

ITT Goulds Pumps has the global coverage needed to serve multi-national companies in any region.

Industry Leading Hydraulic Coverage

- We offer extensive coverage to meet your process needs.
- Better hydraulic fits can mean improved efficiency and long-term reliability and parts life.

8000 HP / 6000 kW Testing Capability

- Our expanded test facility can test your pump in the most demanding conditions.
- Testing at rated speeds is critical to assess the impact of dynamic conditions including vibration.

API Engineering Expertise

- We are experts in packaging engineered pumps that meet your demanding applications – with true conformance to the latest API specifications.
- We have extensive experience in nearly every type of driver, bearing, seal, piping configuration, nozzle configuration, flange and baseplate design to meet your application needs.
- ITT is a world leader in technology and engineering including hydraulics, materials science, mechanical design and fluid dynamics.

Broad Applications

- Petroleum refining, production and distribution
- Petrochemical and demanding chemical processing
- High temperature applications including boiler circulation
- General industrial requiring high temperature or high pressures



3620 i-FRAME[®]

High Temperature and Pressure Process Pumps that Meet or Exceed 610 API 11th Edition / ISO 13709 2nd Edition

Safety, reliability, and versatility are the key words for our single stage, centerline mounted, between-bearing, radially split API 610 process pump (API BB2).

Safety and Reliability

We provide engineered solutions with true conformance to the latest API specifications including the stringent emissions containment per API 682. The result is a safe and rugged API process pump designed for a 20-year life.

Versatility

- Capacity to 20,000 GPM (4,540 m³/h)
- Total Dynamic Head to 1,500 feet (455 m)
- Temperature to 850° F (455° C)
- Pressure to 1,000 psig (70 bar)



Goulds Model 3620 between-bearings radially split process pumps are designed for smooth, reliable operation and fully meet the specification requirements of ISO 13709 / API-610 to assure extended service life.



Materials: Available in a wide range of materials including all API 610 constructions and custom application needs.

Engineered Hydraulics: Dense hydraulic coverage to better match your process for efficiency and reliability. Custom hydraulics are available.

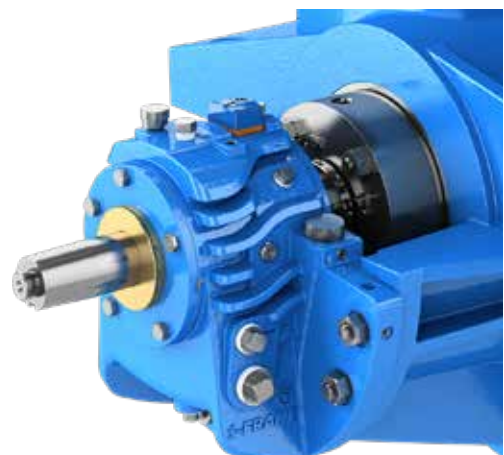
Engineered Packaging with a wide range of drivers, seals, piping, nozzle configurations, flanges, baseplates, and QC testing.

Applications

- **Refinery:** Tower bottoms, process feed, column reflux, circulation and pump around, process booster
- **Power Plant:** Boiler feed booster, boiler circulation, ash sluice

i-FRAME™ Bearing Housing Features

- This sleeve ball's modern i-FRAME™ design comes standard on all Goulds between-bearings pumps. A revolutionary oil capture and delivery system provides consistent lubrication to lower bearing temperatures and optimize bearing life.
- See the difference
 - Patent Pending Oil Filter Assembly removes debris and moisture
 - Optimized Housing Design Lowers bearing temperatures up to 6.7+ °C (20+ °F)
 - i-ALERT2 Machine Health Monitor identifies potential problems before they become costly failures
 - Instrumentation provisions as standard



3620 *i-FRAME*[®] (API BB2)

API 610 11th Edition / ISO 13709 2nd Edition

API BB2 Single-Stage, Between-Bearing, Radially Split

CLASS 300 RF FLANGES STANDARD

Other classes and facings optional.

HEAVY DUTY RADIAL BEARINGS STANDARD

HEAVY DUTY SHAFT

Minimum shaft deflection for extended seal and bearing life. Sized to meet deflection and rotordynamics requirements of API 610 / ISO 13709.

RENEWABLE WEAR RINGS

API 610 / ISO 13709 clearances. Positively locked. Standard feature.

CENTERLINE MOUNTED CASING

Heavy duty mounting extensions accept API 610 / ISO 13709 nozzle loads and maintain pump alignment under extreme service conditions.

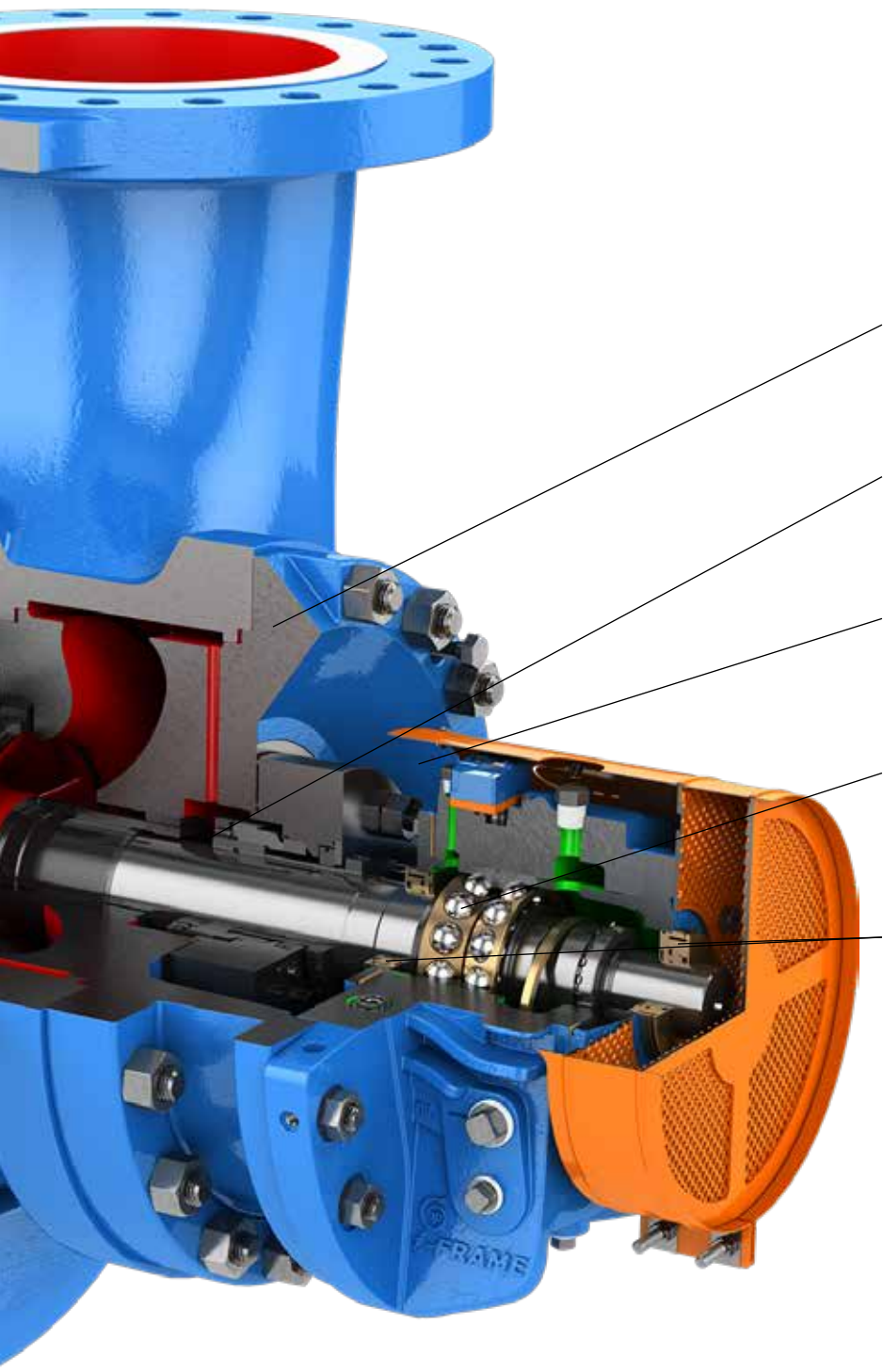
DOUBLE SUCTION IMPELLER

Designed for low NPSH services. Hydraulically designed to balance axial loads for increased bearing life. Rotor and impeller balanced to stringent ISO 1940 Grade 1.0 (exceeds API minimum).

DUAL VOLUTE CASING

Evenly balances radial forces for minimum shaft deflection, increased bearing and seal life.





RADIALLY SPLIT CASING

Designed specifically for high pressure / high temperature services. Fully confined controlled compression gasket assures leak-proof sealing.

ENLARGED SEAL CHAMBERS

Conform to API 610 / ISO 13709 dimensional requirements. Allows use of wide range of API 682 / ISO 21049 cartridge mechanical seals to meet specific service conditions.

CASING HEAD ON OUTBOARD END

Allows removal of rotor without disturbing driver or suction and discharge piping. Single head standard. Double head design optional.

HEAVY DUTY THRUST BEARING

Duplex 40° angular contact thrust bearings and deep-groove (Conrad) radial bearings sized for minimum three (3) year bearing life under most severe operating conditions. Exceeds API 610 / ISO 13709 requirements.

LABYRINTH OIL SEALS

Labyrinth seal design prevents oil from leaking out and contaminants from intruding. Made from non-sparking metal.

3620 *i*-FRAME®

Design Features for Optimum Reliability

Low Vibration / Smooth Performance

- Individual impellers and complete rotor assembly dynamically balanced.
- Precision cast impellers have equal volumes between vanes for reduced pressure pulsations.

Serviceability

- Cartridge type mechanical seals for ease of assembly, proper installation.

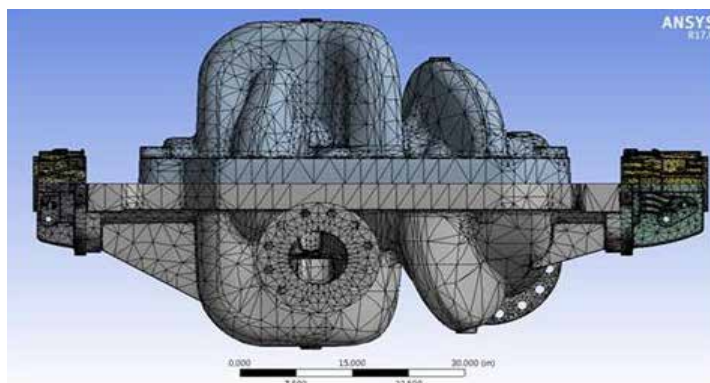
Entire rotating assembly can be removed for maintenance without disturbing suction/discharge piping.



Split stage pieces and center case bushing can be removed for inspection of wear surfaces without disassembling rotor assembly.

Design / Analysis Capabilities

Goulds utilizes FEA and CFD analysis to check the pressure capability, structure integrity of the casings and flow pattern in the pump. Goulds Engineering staff is fully equipped to perform the Rotor Lateral response analysis, Torsional analysis and Rotor residual unbalance checks to ensure stable operation, low vibration level and trouble free operation of the pumps.



Designed for API 610 11th Edition / ISO 13709 Services

- Casing, nozzles and baseplate meet API 610 / ISO 13709 nozzle load requirements.
- Impellers are secured against axial movement by impeller locknuts.
- Seal chambers meet dimensional requirements of API 610 / ISO 13709 and can be fitted with single, double or tandem cartridge mechanical seals.
- Non metallic rings available for applications with low specific gravity, or for increased efficiency or ability to withstand short periods of dry running
- Impellers and rotating equipment element dynamically balanced to API 610 / ISO 13709 requirements.



Optional Features for Application Flexibility

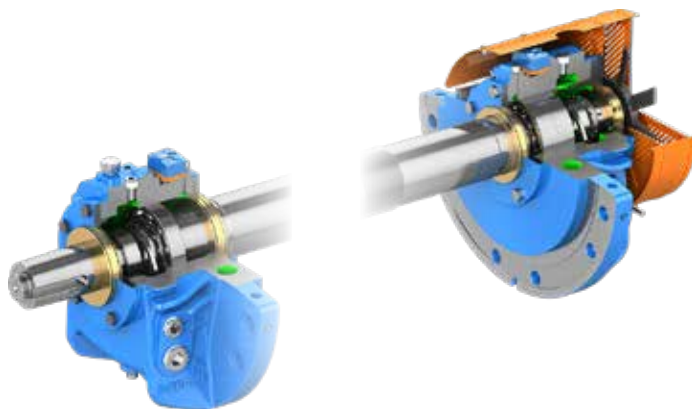
Bearing Arrangements

Oil lubricated Ball/Ball bearings are standard on the Model 3620. Ring oil lubricated Sleeve/Ball or pressure lubricated Sleeve/Tilt bearings can be furnished to meet customer or operating requirements.

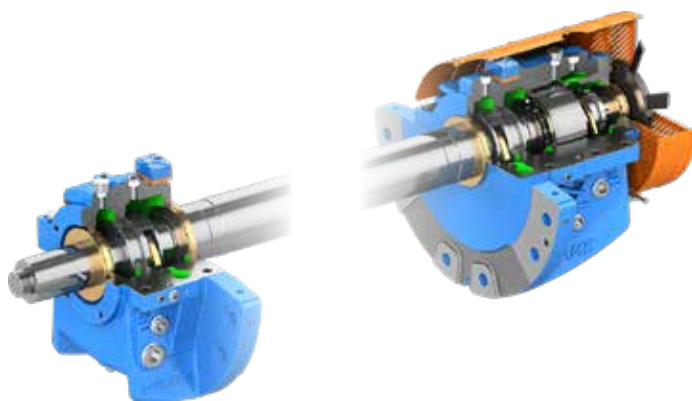
Hydrodynamic bearings are offered with pressurized oil lube system.

Instrumentation

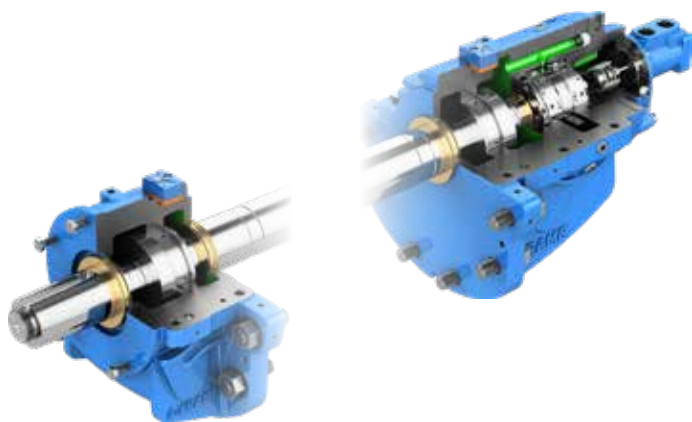
The 3600 can be furnished with instrumentation options to measure vibration and temperature. RTDs can be furnished to measure bearing temperatures and to monitor temperature rise in the casing. Bearing housing vibration can be monitored on pumps. Pumps supplied with Hydrodynamic bearings can be furnished with non contacting vibration probes to measure rotor vibration.



Ball / Ball



Sleeve / Ball



Sleeve / Tilt

Bearings & Bearing Housings

To get superior MTBF you need two things: Optimum pump hydraulics and a robust pump structure. The new i-FRAME housings delivers on the second point by providing a premium robust housing with unique new and improved features that raises the bar on what you can expect from your pump's long term performance. These i-FRAME bearing housings include the new patented one piece design bearing housing for the ball/ball bearing arrangement, as well as the patent pending split bearing housing for the sleeve/ball and sleeve/tilt pad bearing arrangement.

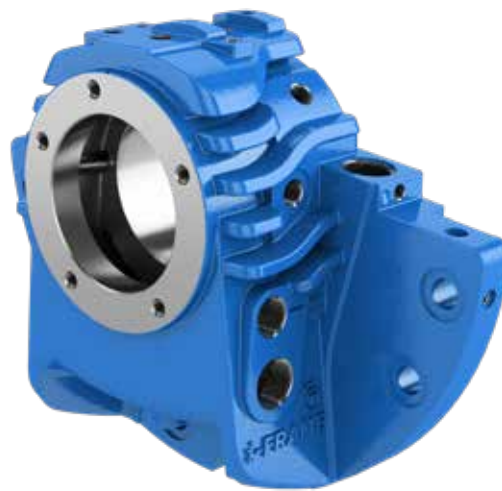
Bearing housings constructed in ASTM A216 Grade WCB carbon steel. Three bearing arrangements available:

- Ball/Ball bearings
 - Duplex 40° Angular Contact Bearing Set on the Non-Drive End (NDE) to handle radial and axial loads. Bearing set is supplied with a light clearance
 - Deep Groove Ball Bearing on the Drive End (DE) to handle radial loads
- Sleeve/Ball bearings
 - Duplex 40° Angular contact Bearing Set on the Non-Drive End (NDE) handle axial loads. Bearing set is supplied with a light clearance.
 - Babbitt lined Sleeve Bearings handle radial loads on NDE and DE (Non Drive End and Drive End)
- Sleeve/Tilt pad bearings
 - Babbitt lined Sleeve Bearings handle radial loads and are installed on NDE and DE (Non Drive End and Drive End).
 - Tilting pad Bearings are installed on NDE to handle axial load.
 - This bearing configuration utilizes an external pressurized LOS to lubricate and cool the bearings. Both API, standard and custom designed systems can be offered.

All bearing housings feature a 180° bearing saddle bolted to the casing positioned with precision dowels for accurate, repeatable alignment. The 180° bearing saddle is optimized for stiffness and rigidity of connection between the pump casing and housing along with increased bolt diameters. This provides significantly increased stiffness compared to the previous design housings, resulting in reduced vibration.

The bearing housing exterior includes distinctive cooling fins optimized by CFD/FEA analysis to aid in heat dissipation.

The Ball/Ball and Sleeve/Ball i-FRAME bearing housings have enhanced air cooling with axial fans and achieves metal and oil temperature reductions of up to 30° F from previous design without the need for cooling water. The NDE side comes standard with a guarded extension to accept a fan for ease of field retrofit, so if your process needs change the fan can be fitted without the need for expensive pump disassembly and installation.



Bearing housing put through rigorous testing.

Patented Filters

Bearing oil contamination often discussed as black oil, caused by wind-blown sand and dust together with atmospheric moisture are major contributors to bearings failing well before their design life. In an industry first, all self-contained bearing housings include a cartridge filter assembly that will help safeguard the bearing oil from debris contamination.

The patent pending filter cartridge will also continuously work to scrub water from the bearing oil utilizing specifically engineered moisture absorbing materials built into the filter.

Oil with Particulate**



Run time = 72 hrs*	Run time = 314 hrs*
Black Oil	Result: Clean Oil

Oil with Water



Run time = 0 hrs*	Run time = 72 hrs*
Cloudy Oil	Result: Clean Oil

*Continuous operation at 3100RPM

**Test dust used is ISO 12103-1, A3 Medium test dust

The design allows for easy changeover of filter cartridges even while the pump is operating – no need to stop your process. All this additional reliability is achieved *without* the need for additional oil pumps or piping – no additional system complexity, monitoring or control overhead.



You change the oil and filter in your car, and it doesn't have a sight glass

- Black oil caused by debris and moisture contaminating the oil.
- Multi-functional filter assembly captures oil and circulates down through filter and liquid absorbing beads.
- Filter captures debris and beads absorb any water that may be present.
- Moisture absorbing beads are non-toxic and biodegradable.
- New bearing housings designed so oil is thrown by oil ring to trough that leads to the oil filter assembly.

Typical oil change interval was every 3 months. That is extended to every 6 months with the filter. Pump doesn't need to be stopped in order to change the filter.



i-ALERT[®] Monitoring Solution

Sensor | App | Ai Platform

www.i-alert.com



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.

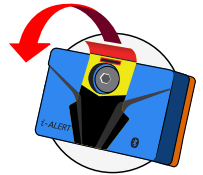


Spend less time collecting data and more time fixing problems. The i-ALERT mobile app has the ability to scan multiple i-ALERT2 sensors within range to quickly and safely inspect multiple machines.

How it Works:

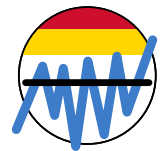
1. ACTIVATE

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.

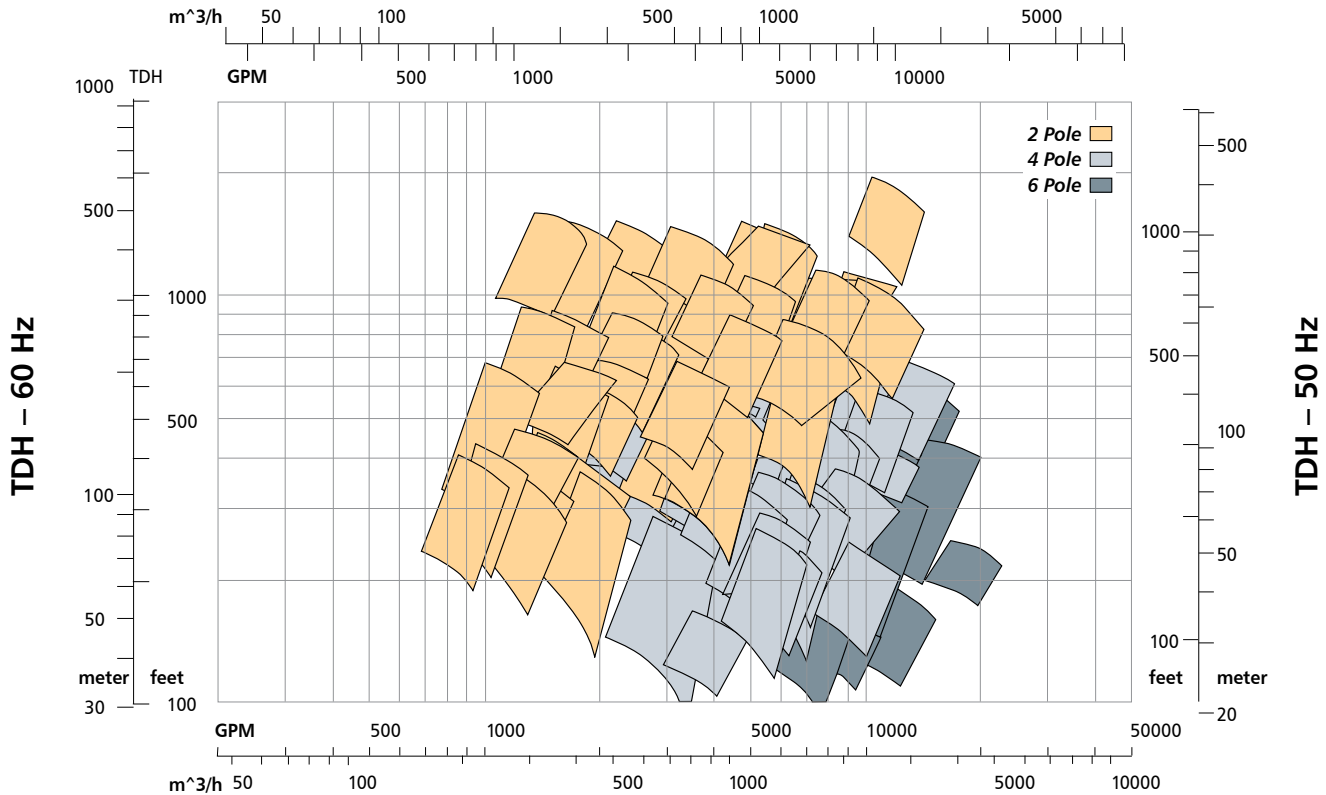


BOM

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

Hydraulic Coverage

Flow Capacity – 50 Hz



Flow Capacity – 60 Hz

Note: Hydraulics above represent 80% to 110% of best efficiency point (BEP).



Custom Solutions

Model 3620 6 × 10-13 custom designed with side-top nozzles for fuel oil service in Saudi Arabia.

A Leader in API Engineered Pump Package Solutions

API Family of Pumps

Model 3700
OH-2



Model 3910
OH-3

Model 3620
3640
BB-2



Model 3610
BB-1



API Type	Goulds Model	Capacity GPM (M ³ /Hour)	TDH Feet (Meters)	Temperature °F (°C)	Pressure PSIG (kg/cm ²)
OH-2	3700	8500 (1930)	1200 (360)	800 (425)	870 (60)
OH-3	3910	6000 (1360)	750 (230)	650 (340)	600 (42)
BB-1	3610	50000 (11355)	700 (215)	300 (150)	300 (21)
BB-2	3640	7500 (1700)	2500 (760)	850 (455)	1130 (75)
BB-2	3620	20000 (4540)	1500 (455)	850 (455)	1000 (70)
BB-3	3600	8500 (1930)	9000 (2740)	400 (205)	4000 (275)
BB-5	7200CB	4000 (910)	9000 (2740)	800 (425)	4000 (275)
VS4	API 3171	3180 (720)	525 (160)	450 (232)	750 (50)
VS1	VIT	70000 (14760)	3500 (1060)	500 (260)	2500 (175)
VS6	VIC	70000 (14760)	3500 (1060)	500 (260)	2500 (175)



Model 3600
BB-3



Model 7200CB
BB-5



— An ITT Brand

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