

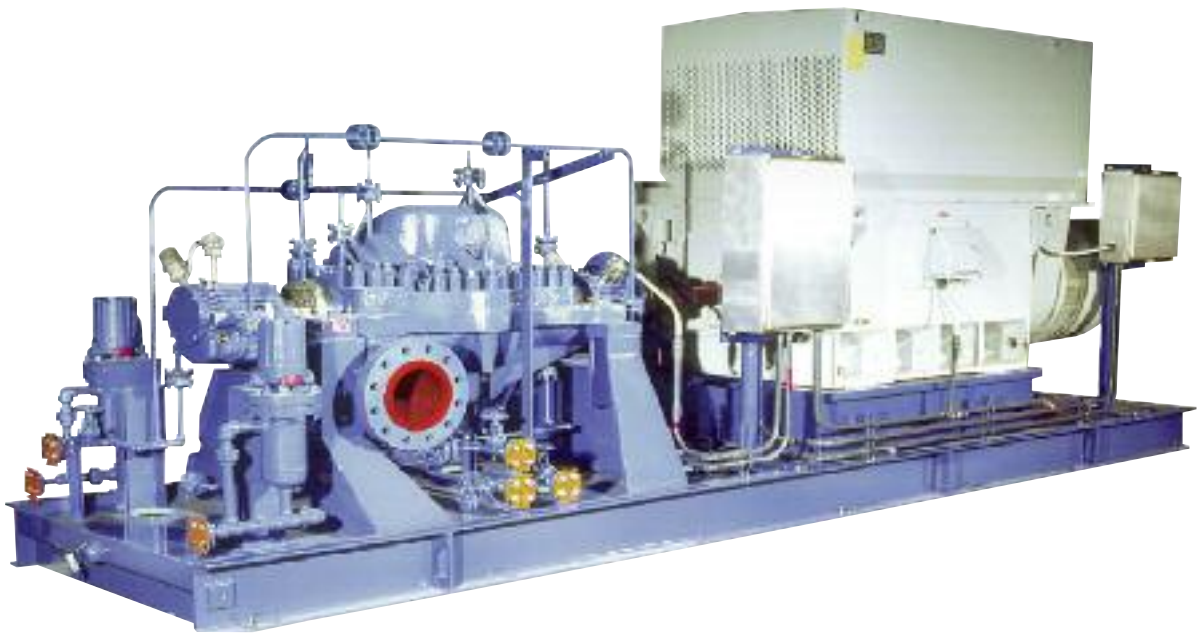


ITT

Goulds Pumps

Goulds 3600

Between-Bearing, Axially-Split,
Multistage Pumps



Engineered for life

motralec

4 rue Lavoisier . ZA Lavoisier . 95223 HERBLAY CEDEX
Tel. : 01.39.97.65.10 / Fax. : 01.39.97.68.48
Demande de prix / e-mail : service-commercial@motralec.com
www.motralec.com

A Leader in API Engineered Pump Package Solutions...

Proven API Leadership

ITT Goulds Pumps is a proven leader in API Pumps

- ◆ Over 18,000 units installed
 - Over 15,500 OH2/OH3's
 - Over 2,500 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 pumps
- ◆ Multistage between-bearing pumps
- ◆ 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 dense hydraulic coverage to meet your process needs.
- ◆ Better hydraulic fits can mean improved efficiency and long-term reliability and parts life.



4600 Horsepower Testing Capability

- ◆ Our expanded test facility can test your pump in the most demanding of 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 designs 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





Proven Leadership

ITT Goulds Pumps is a proven leader in Multistage and API Pumps with several thousand engineered multistage pumps sold and 40+ years of multistage pump expertise.



ITT Goulds Pumps offers proven engineering packaging expertise with highly complex specifications. We offer complex lube oil skids, seal flush piping plans, etc. to meet the toughest customer applications.

Goulds 3600

Heavy-Duty Multistage Pumps Designed for High-Head/ High Capacity Services

- ◆ Capacities to 8500 GPM (1930 m³/h)
- ◆ Heads to 9000 feet (2740 m)
- ◆ Temperatures to 400° F (205° C)
- ◆ Pressures to 4000 PSIG (275 kg/cm²)
- ◆ API - 610 API/ISO 13709 Latest Edition (API-BB3) Compliance is Available

Design features

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.

Axially Split Casing — For ease of maintenance.

Dual Volute Design — Balances hydraulic radial thrust at each stage for extended seal/bearing life.

Heavy Duty Single Row Bolting — Prevents distortion and chance of interstage leakage.

Precision Cast Impellers — Smooth, dimensionally consistent hydraulic passages for maximum efficiency.

Compact Crossover — For streamlined fluid flow, minimum friction loss, and maximum efficiency.

Dynamically Balanced — Impellers and rotors insure smooth operation and increased reliability.

Services

The model 3600 is a robust solution for a variety of applications. This is an API pump for refineries, injection offshore platforms, remote pipeline, boiler feed in mid-range cogeneration, descaling, mine dewatering, process transfer, desalination, and CO₂ injection.

Design Features for Optimum Reliability

Low Vibration/Smooth Performance

- Individual impellers and complete rotor assembly dynamically balanced.
- Shrink fit of impellers to shaft assures precise balancing of rotating assembly.
- Precision cast impellers have equal volumes between vanes for reduced pressure pulsations.
- Impellers are mounted on shaft with vane tips staggered for reduced pressure pulsations.

Staggered impeller vane tips reduce pressure pulsations at vane passing frequency.



Serviceability

- Cartridge type mechanical seals for ease of assembly, proper installation.
- Single row bolting with stud nuts located on upper half for easy accessibility.

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



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

Single row bolting simplifies disassembly/reassembly.



Designed for API-610 11th Edition/ISO 13709 Services

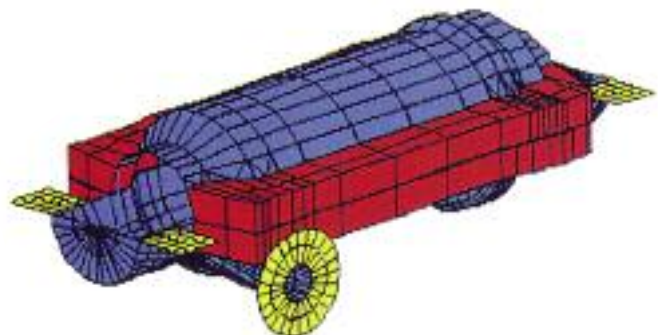


- Casing, nozzles and baseplate meet API-610/ ISO 13709 nozzle load requirements.
- Impellers are shrink fit to shaft and independently secured against axial movement.
- Seal chambers meet dimensional requirements of API-610/ISO 13709 and can be fitted with single, double, or tandem cartridge mechanical seals.
- Steel bearing frame is standard for maximum structural integrity.
- Impellers and rotating equipment element dynamically balanced to API-610/ ISO 13709 requirements.
- Separation margins between operating speeds and critical speeds meet or exceed API-610/ISO 13709 requirements.



Design/Analysis Capabilities

Casing pressure capability and structural design developed and refined using advanced finite element analysis. Goulds engineering staff is fully equipped to perform the rotor lateral response analysis and residual unbalance checks necessary to assure stable operation and low vibration levels. Thermal transient analysis using finite element models used to determine allowable casing temperature rise and assure mechanical reliability. Hydraulic designs developed using dynamic flow models assure stable performance with consistent, high efficiency levels.

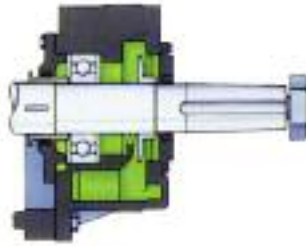


Optional Features for Application Flexibility

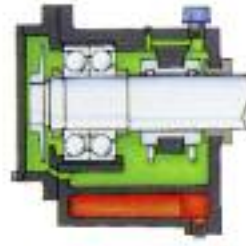
Bearing Arrangements

Oil lubricated ball radial and duplex thrust bearings are standard on the Model 3600. Ring oil lubricated sleeve radial and ball thrust or pressure lubricated sleeve radial

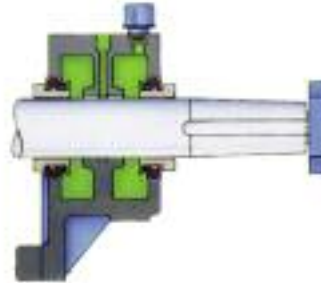
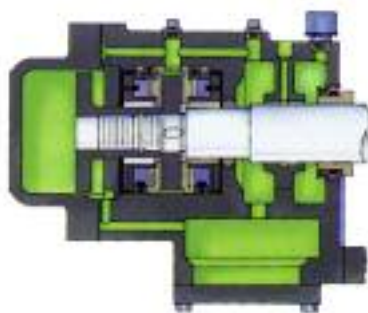
and tilting pad thrust bearings can be furnished to meet customer or operating requirements.



Duplex Ball Thrust/Ball Radial Bearings



Duplex Ball Thrust/Sleeve Radial Bearings



Tilting Pad Thrust/Sleeve Radial Bearings

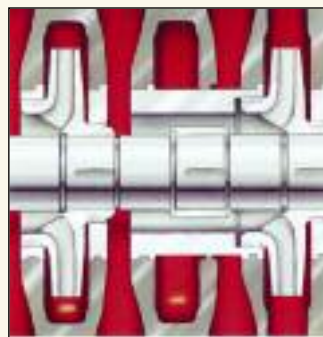
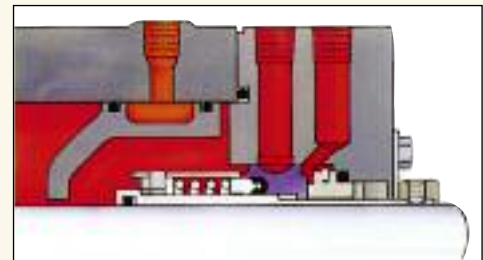


Double Suction First Stage Impeller

Available on 4-inch and larger discharge size pumps for services where $NPSH_A$ is limited.

Shaft Sealing and Seal Chambers

The Model 3600 can be sealed either by soft packing or mechanical seals. Seal chambers meet API-610/ISO 13709 dimensional requirements and accept a wide range of cartridge type mechanical seals including API 682/ ISO 21049. Both seal chambers and stuffing boxes can be furnished with cooling jackets.



Destaging

Goulds Model 3600 can be supplied with one or more blank stages to meet existing head conditions and allow for future increases. The shaft is protected by a sleeve to maintain the impeller fit. A by-pass cylinder assures smooth, even flow to the next impeller.

Instrumentation

The 3600 can be furnished with instrumentation options to measure vibration and temperature. RTD's or thermocouples can be furnished to measure bearing temperatures and to monitor temperature rise in the casing. Bearing housing vibration can be monitored on pumps furnished with ball bearings. Pumps supplied with sleeve bearings can be furnished with non-contacting vibration probes to measure actual rotor vibration.



Model 3600 (ISO 13709/API BB3) Heavy Duty Multistage Pumps

SINGLE ROW BOLTING

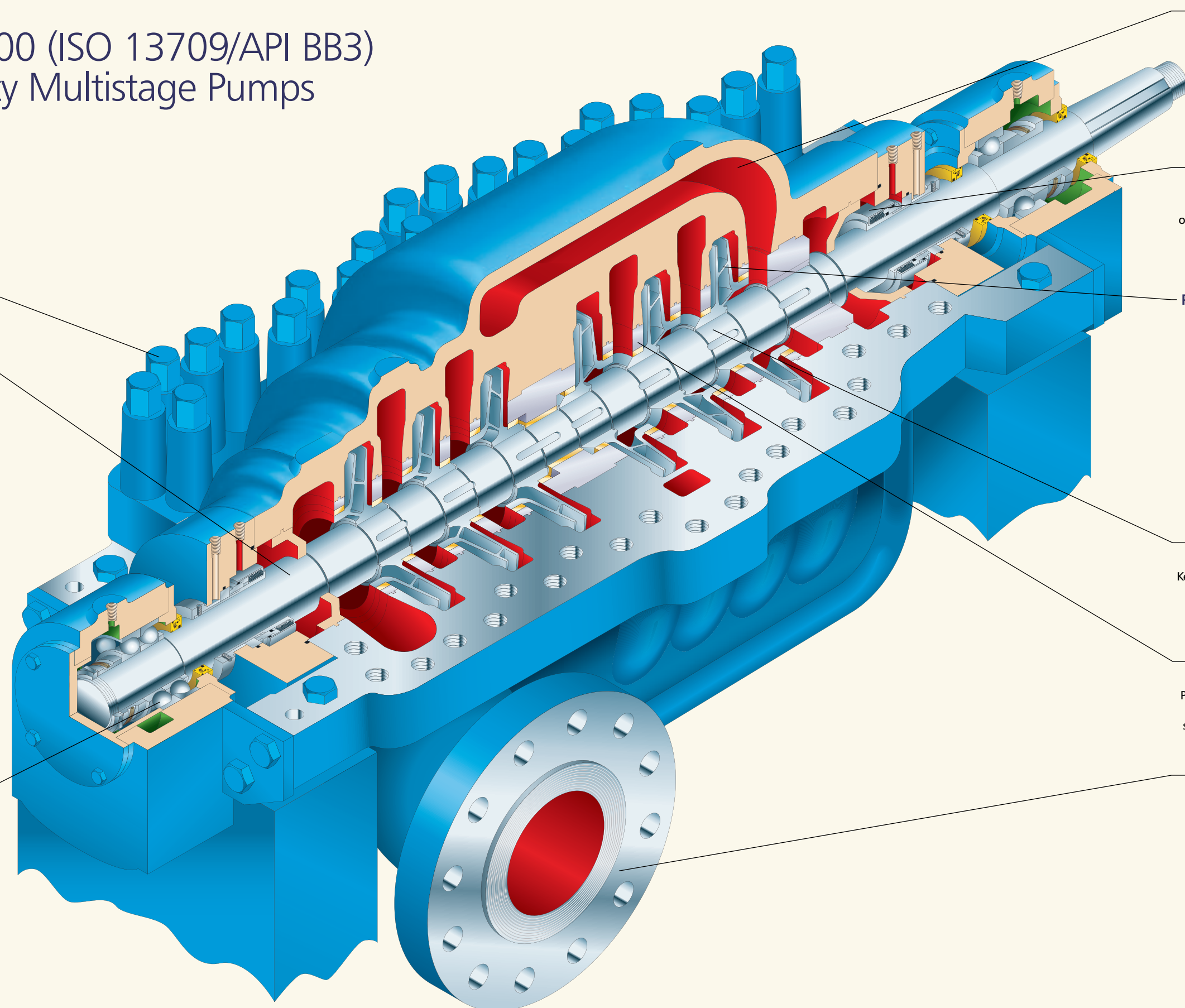
All nuts located on top for ease of maintenance.

DYNAMICALLY BALANCED IMPELLERS AND ASSEMBLED ROTATING ELEMENT

For smooth vibration-free operation. Impellers staggered on shaft to minimize vane-pass vibration.

HEAVY DUTY BEARINGS

Oil lubricated ball radial and duplex thrust standard; sleeve radial/ball thrust also available, or pressure lubricated sleeve radial and tilt pad thrust.



COMPACT CROSSOVERS

For streamlined fluid flow — minimum friction loss, maximum efficiency.

ISO 13709/API-610 SEAL CHAMBERS

Accept wide range of sealing options including seals conforming to ISO 13709/API-610, packing, cartridge, and conventional mechanical seals.

PRECISION CAST IMPELLERS

Investment cast impellers yield smooth, dimensionally consistent hydraulic passages which maximize efficiency; double suction first stage available for low NPSH applications.

POSITIVELY DRIVEN IMPELLERS

Key driven with shrink fit and secured against axial movement in both directions. Allows precise balancing of rotating element.

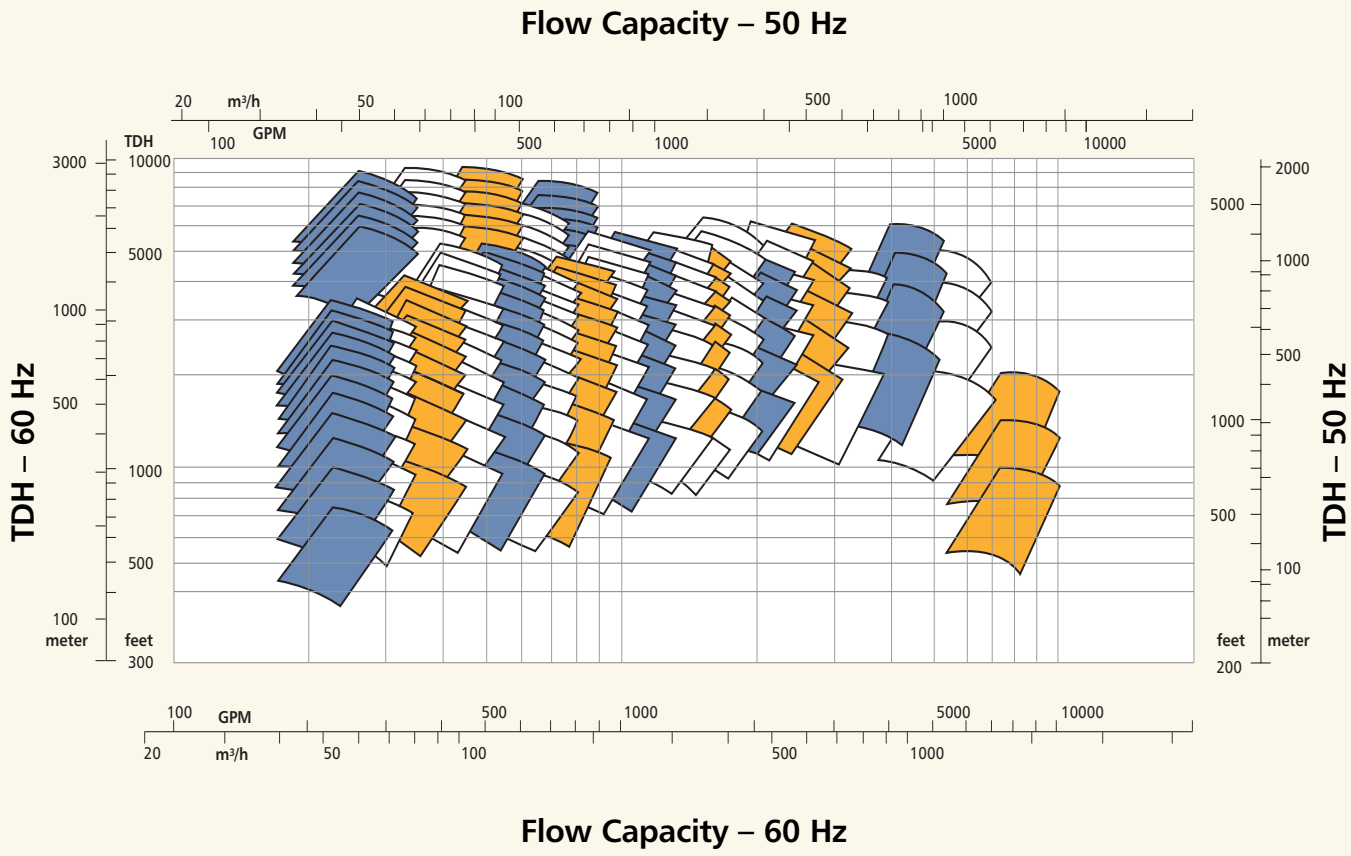
OPPOSED IMPELLER ARRANGEMENT

Provides permanent hydraulic axial balance, impellers staggered on shaft to minimize vibration due to vane pass.

HEAVY DUTY ANSI B16.5 FLANGES

Class 900 RF standard on suction and discharge; other classes available as options.

Hydraulic Coverage 60 Hz and 50 Hz



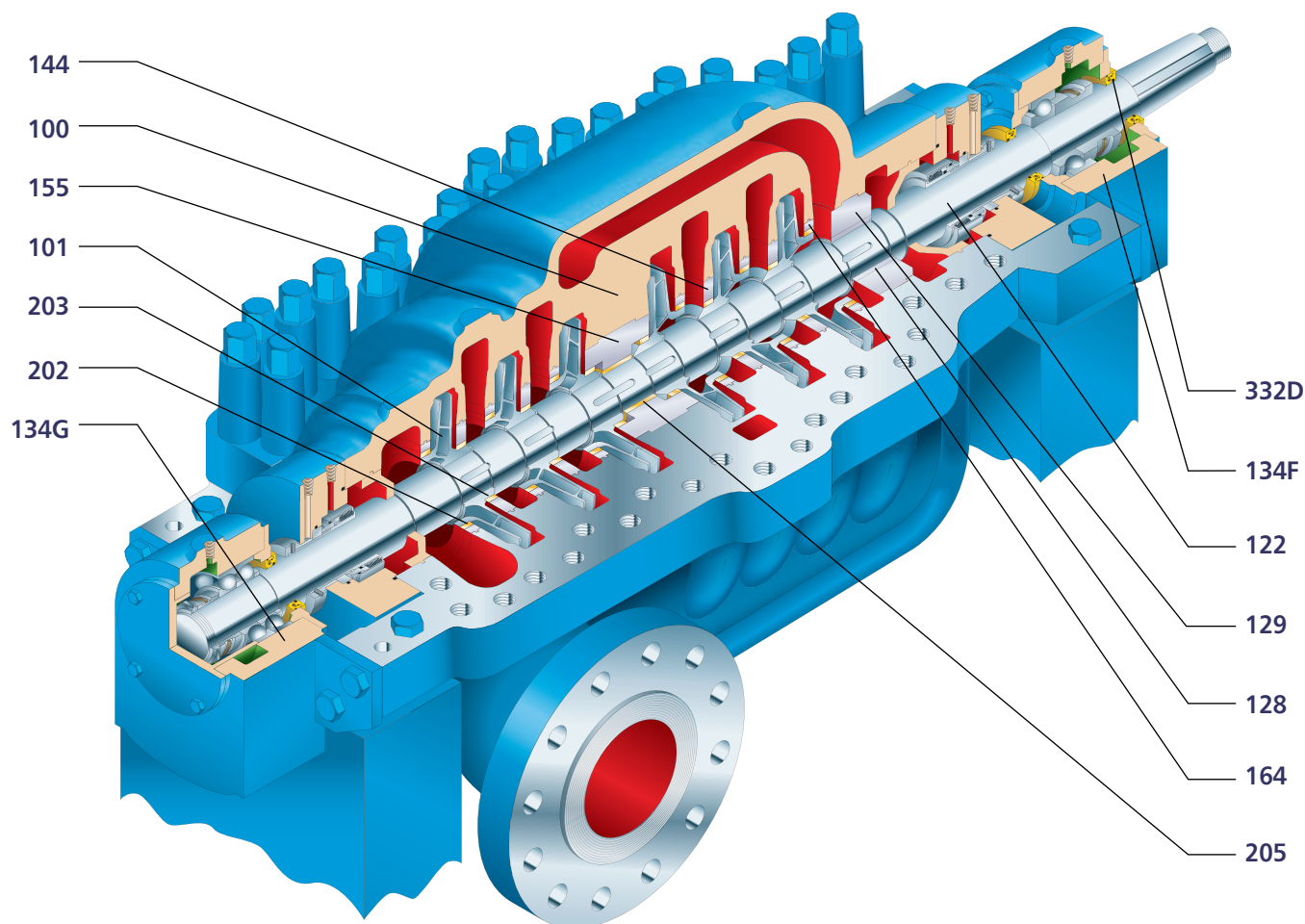
Note: Hydraulics above represent 80% to 110% of best efficiency point (BEP).

Pump Installations

The Goulds Model 3600 is built to handle the toughest services in harsh environments. These pictures show demanding installations in the deserts of the Middle East and Australia.



Sectional View



Parts List and Materials of Construction

Item Number	Part Name	MATERIAL	
		S - 6	C - 6
100	Casing	Carbon Steel	12% Chrome
101	Impeller	12% Chrome	
107	Gland (Packing)	Carbon Steel	12% Chrome
122	Shaft	17-4 PH	
126A	Shaft Sleeves (Packing)	12% Chrome	
126B	Shaft Sleeves (Mechanical Seals)	316SS or 12% Chrome	
128	Throttle Sleeve	Nitronic 60	
129	Throttle Bushing	12% Chrome Hardened	
134F	Bearing Housing (Inboard)	Carbon Steel	
134G	Bearing Housing (Outboard)	Carbon Steel	
144	Stage Pieces (Back)	12% Chrome	
155	Center Bushing	12% Chrome Hardened	
164	Casing Wear Rings (Front)	12% Chrome Hardened	
202	Impeller Wear Rings (Front)	17-4 PH	
203	Impeller Wear Rings (Back)	17-4 PH	
205	Center Sleeve	Nitronic 60	
250	Gland (Mechanical Seal)	316 Stainless Steel	
332D	Bearing Seals	Bronze	

Other materials available such as Duplex, Super-Duplex etc.



PRO Services®
 Extending
 Equipment Life...

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PROSMART

Predictive Monitoring Saves Money and Down Time

The ProSmart predictive condition monitoring system enables you to IDENTIFY and SOLVE problems before they impact production.

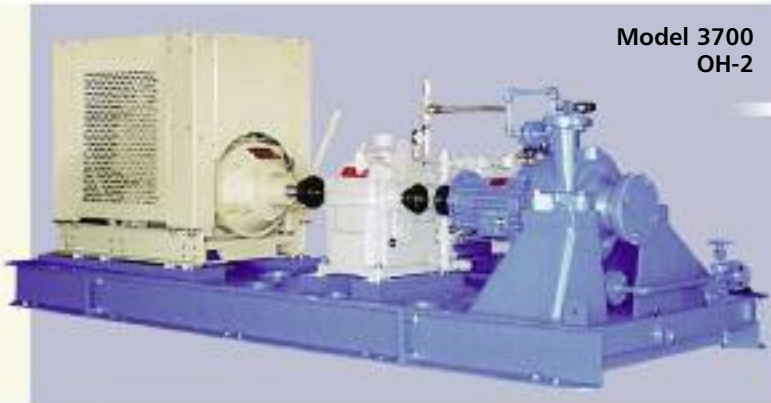
ProSmart collects and analyzes machine health every 5 seconds, automatically notifying you of changing conditions. Resources are optimized and maintenance activities are PLANNED — not REACTIVE.

A wireless architecture reduces installation costs and complexity. A web-based client eliminates software installation and maintenance costs and also enables multi-site management.

Approved for Class I, Division 2 hazardous areas.



A Leader in API Engineered Pump Package Solutions



**Model 3700
OH-2**



**Model 3910
OH-3**



**Model 3620
3640
BB-2**



**Model
3610
BB-1**



**Model 3600
BB-3**

API Type	Goulds Model	Capacity GPM (M ³ /Hour)	TDH Feet (Meters)	Temperature °F (°C)	Pressure PSIG (kg/cm ²)
OH-2	3700	6500 (1475)	1200 (360)	800 (425)	870 (60)
OH-3	3910	7500 (1700)	750 (230)	650 (340)	600 (40)
BB-3	3600	8500 (1930)	9000 (2740)	400 (205)	4000 (275)
BB-2	3620	20000 (4540)	1500 (455)	850 (455)	1000 (70)
BB-2	3640	7500 (1700)	2500 (760)	850 (455)	1130 (75)
BB-1	3610	50000 (11355)	700 (215)	300 (150)	300 (20)
VS6	VIC	70000 (14760)	3500 (1060)	500 (260)	2500 (175)
VS1	VIT	70000 (14760)	3500 (1060)	500 (260)	2500 (175)
VS4	API 3171	3180 (720)	525 (160)	450 (232)	750 (50)

