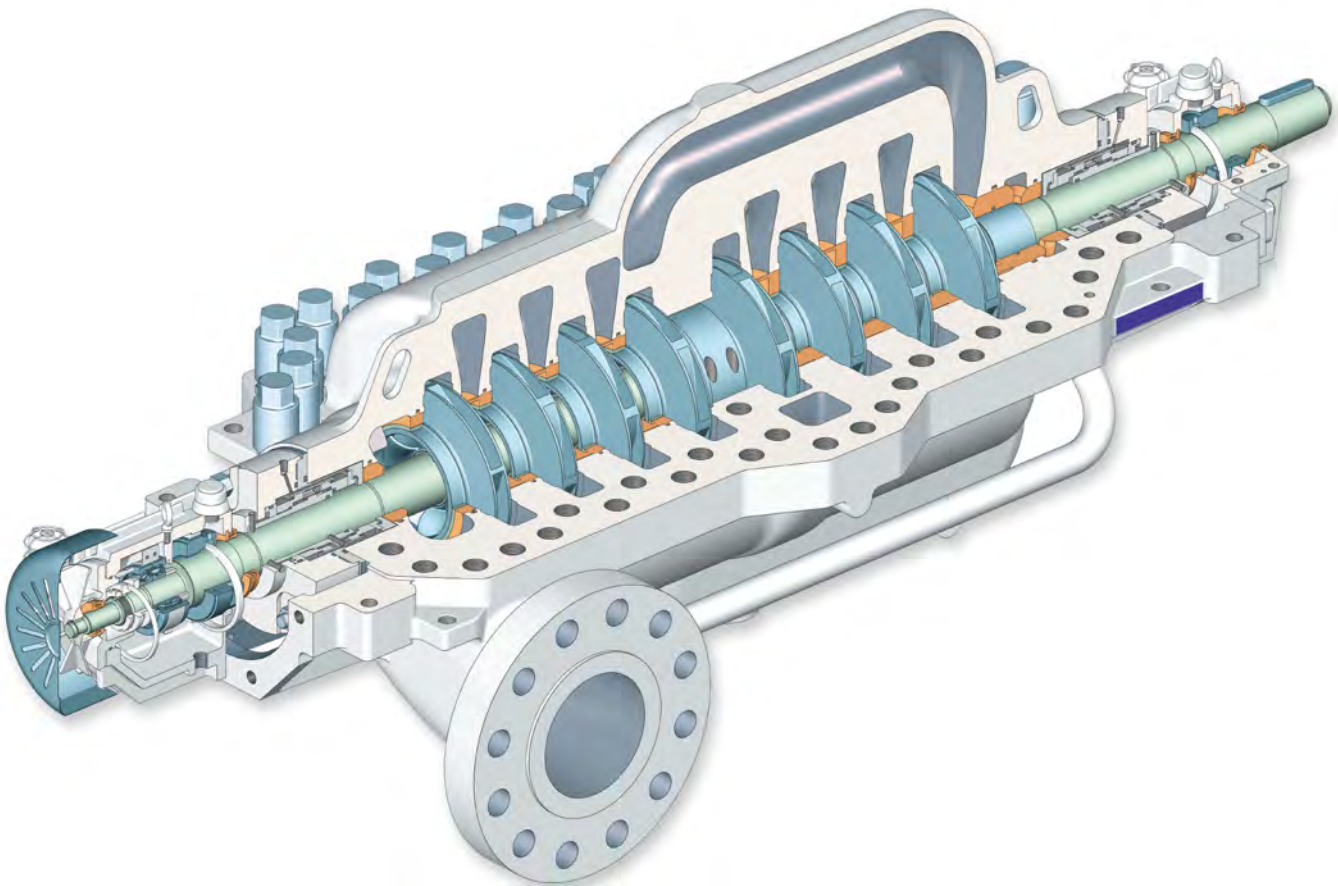


## MSD Axially Split Multistage Pump



**The Heart of Your Process**

# Sulzer Pumps

Sulzer Pumps is a world leader in reliable products and innovative pumping solutions. Our advanced research and development, detailed process and application knowledge together with a comprehensive understanding of market demands keeps us consistently at the leading edge of technical development. Our global network of modern manufacturing and packaging facilities together with sales offices, service centers and representatives located close to major markets provide fast responses to customer needs.

Sulzer Pumps has a long history of providing innovative pumping solutions to business partners in the following industries:

- Oil and Gas
- Hydrocarbon Processing
- Pulp and Paper
- Power Generation
- General Industry
- Chemical Process Industry
- Water

## MSD Global Manufacturing Facilities



Portland, USA



Leeds, UK

## Extensive Applications

### Oil and Gas

There are thousands of MSD pumps operating around the world on water flood, crude shipping, product pipeline, LPG pipeline, supercritical ethylene and supercritical CO<sub>2</sub>. Onshore or offshore, the MSD is probably the most widely used ISO 13709 (API 610) BB3 pump in the world.

### Hydrocarbon Processing

MSDs are found in crude charge, boiler feed and lean amine services in most gas plants, refineries and petrochemical plants around the globe. They are often used as power recovery turbines in hydrotreaters to save energy.

### Power Generation

The MSD is the most popular safety related auxiliary feedwater pump in North American nuclear power plants. It is also found in condensate extraction and startup boiler feed services in fossil fired combined cycle power plants.

### Water and Wastewater

MSD pumps are widely used as high pressure membrane feed pumps in reverse osmosis applications. All duplex SS construction and high efficiency make the MSD ideal for this application.



# MSD Engineered Solutions

Industry turns to Sulzer Pumps for innovative pumping solutions set apart by outstanding engineering.

- Direct drive solutions – with standardized performances at 50hz and 60hz, 2 and 4 pole, motor drive, turbine drive
- Variable speed drive solutions including variable frequency drives, fluid couplings, engines, and gas turbines
- High Speed Solutions - motor or engine with gear, steam turbine or gas turbine

- Low, medium and high capacity solutions – 45 to 2,700 m<sup>3</sup>/hr (200 USgpm to 12,000 USgpm)
- High pressure solutions – to 300 bar (4,300 psi) MAWP
- Non-lubricating fluids – proven application experience as low as 0.28 SG hydrocarbons and supercritical CO<sub>2</sub>
- Product temperatures - 50 °C to +200 °C (-50 °F to + 400 °F)



MSD pumps can be custom engineered for individual applications

## Engineered for Application Flexibility

Our standardized product range can be configured on a customized basis to match the hydraulic fit and mechanical requirements of the most exacting customer application.

### Custom Configurations

- Controlling the head rise to meet system limits in series and parallel operation
- Controlling the location of best efficiency to optimize energy efficiencies and performance reliability
- Single-suction impellers with both high and low suction specific speed characteristics in addition to double-suction impellers for low NPSHA
- Low-pressure and high-pressure intermediate take-off connections for secondary process services
- Single, dual-pressurized and dual-unpressurized mechanical seals, including dry gas seals to the latest ISO 21049 (API 682) seal standard
- Ball/Ball, Sleeve/Ball, Sleeve/Pivot Shoe bearings as required by the specification

### Standardized Materials

- API 610 material classes S-5, S-6, S-8, A-8, D-1, D-2
- Low temperature materials
- Sour service materials for compliance with NACE MR 0175 or MR0103

- Non-metallic wear parts such as PEEK, Graphalloy™, Vespel™ allow operation with reduced internal clearances for low sp.gr., low viscosity, low lubricity fluids



MSD pumps for refinery applications

# MSD Design Features and Benefits

## Impellers

- Shrink fit
- Precision cast
- Dynamically balanced
- Individually secured
- Optional integral wear ring

## Single Piece Interstage Bushing and Flow Straightener

- Tongued registration
- Pinned for anti-rotation at split line

## Lower NPSH Performance Available

- Double suction impeller option

## Bolting on Top

- No need to support a heavy hydraulic torque wrench

## Ball/ball Bearings Standard

- Standard Ball radial / Duplex Ball thrust bearings with ring oil lubrication

## Optional Sleeve/Ball Bearing Arrangement (shown)

- Often preferred by customers and required for higher power levels

## Optional Sleeve/Pivot Shoe Bearing Arrangement

- High speed, high power pumps

## Double Volute Construction

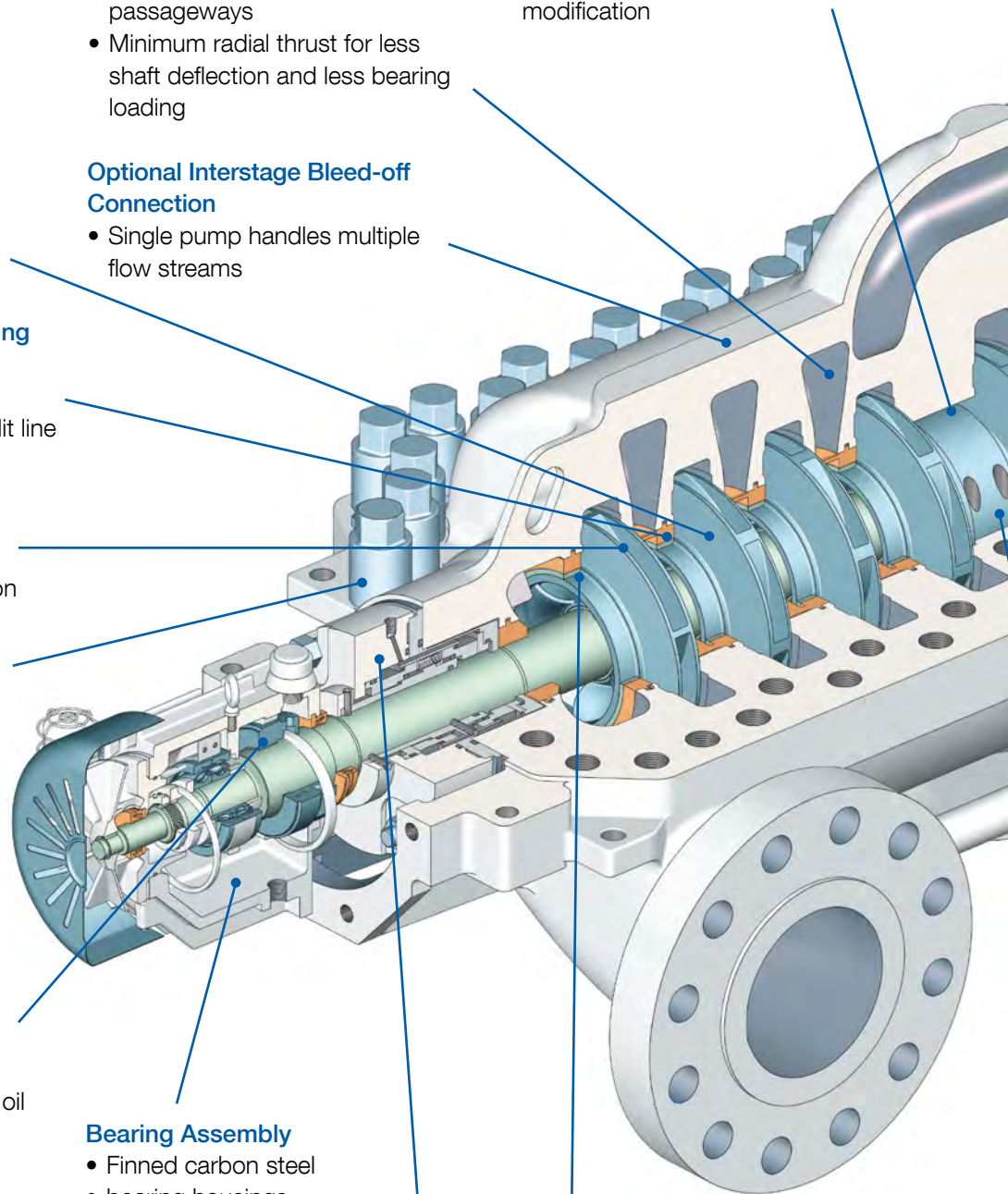
- Precision cast hydraulic passageways
- Minimum radial thrust for less shaft deflection and less bearing loading

## Optional Interstage Bleed-off Connection

- Single pump handles multiple flow streams

## Large Case Bore

- Accommodates optional non-metallic wear parts without modification



## Bearing Assembly

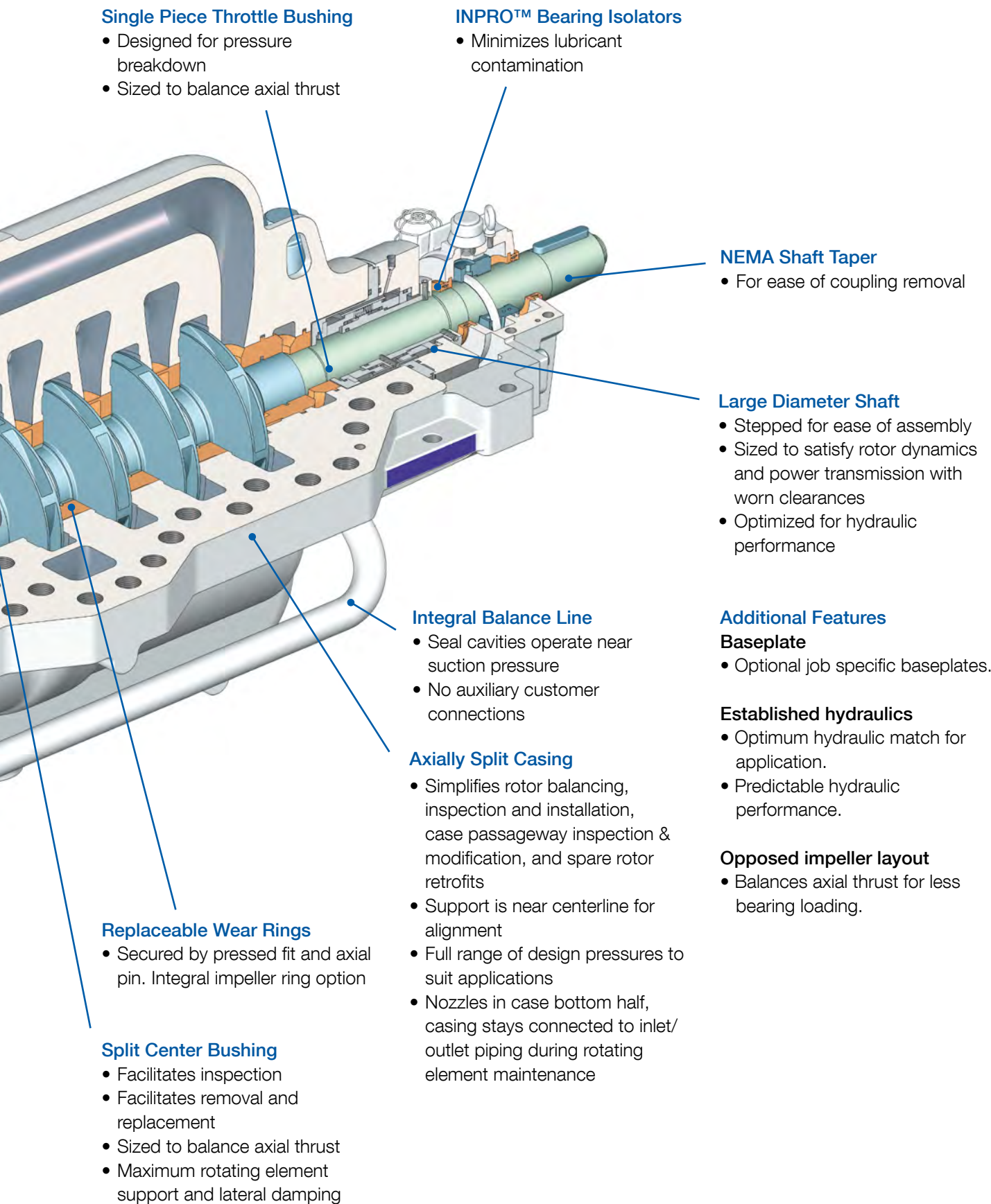
- Finned carbon steel
- bearing housings
- High capacity fan - optional
- Ring oil lubrication
- Pure (ball/ball only) or purge mist lubrication

## Case Wear Rings

- Tongued registration
- Pinned for anti-rotation at split line

## Seal Chamber

- Compliance with ISO 13709 (API 610) dimensions
- Space for tandem and double mechanical seals
- Easy access for maintenance



**Single Piece Throttle Bushing**

- Designed for pressure breakdown
- Sized to balance axial thrust

**INPRO™ Bearing Isolators**

- Minimizes lubricant contamination

**NEMA Shaft Taper**

- For ease of coupling removal

**Large Diameter Shaft**

- Stepped for ease of assembly
- Sized to satisfy rotor dynamics and power transmission with worn clearances
- Optimized for hydraulic performance

**Integral Balance Line**

- Seal cavities operate near suction pressure
- No auxiliary customer connections

**Axially Split Casing**

- Simplifies rotor balancing, inspection and installation, case passageway inspection & modification, and spare rotor retrofits
- Support is near centerline for alignment
- Full range of design pressures to suit applications
- Nozzles in case bottom half, casing stays connected to inlet/outlet piping during rotating element maintenance

**Replaceable Wear Rings**

- Secured by pressed fit and axial pin. Integral impeller ring option

**Split Center Bushing**

- Facilitates inspection
- Facilitates removal and replacement
- Sized to balance axial thrust
- Maximum rotating element support and lateral damping

**Additional Features**

**Baseplate**

- Optional job specific baseplates.

**Established hydraulics**

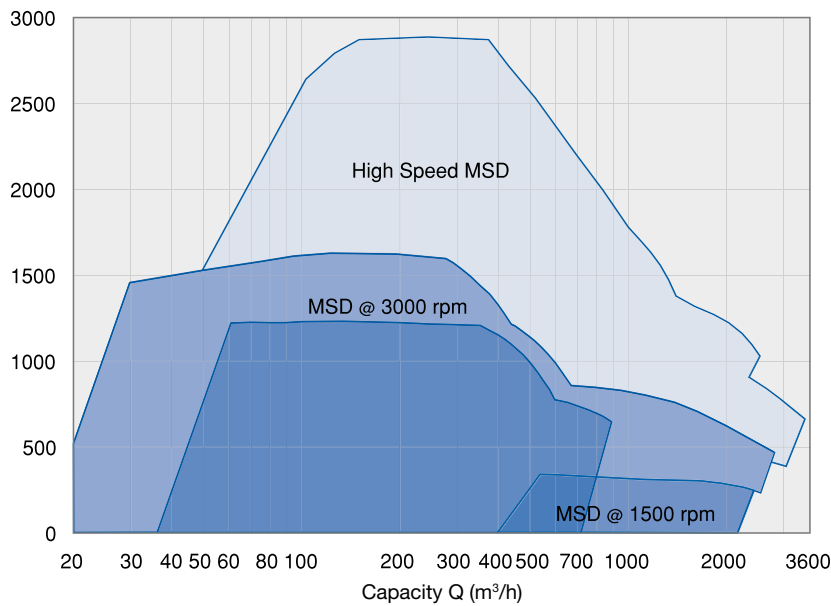
- Optimum hydraulic match for application.
- Predictable hydraulic performance.

**Opposed impeller layout**

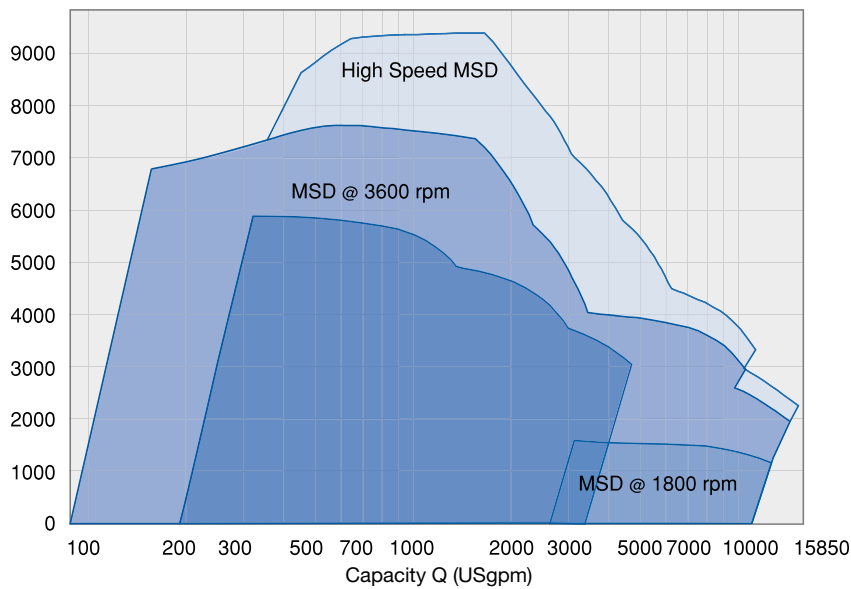
- Balances axial thrust for less bearing loading.

# MSD Performance Range

Head H (m)



Head H (ft)



## Operating Data

	50 Hz	60 Hz
<b>Pump sizes</b>	75 to 400 mm	3 to 16 inches
<b>Capacities</b>	up to 3,200 m <sup>3</sup> /h	up to 14,000 USgpm
<b>Heads</b>	up to 2,900 m	up to 9,500 feet
<b>Pressures</b>	up to 300 bar	up to 4,300 psi
<b>Temperatures</b>	up to 200 °C	up to 400 °F

# Maintaining and Improving Pump Performance

## Sulzer Pumps – Customer Support Services

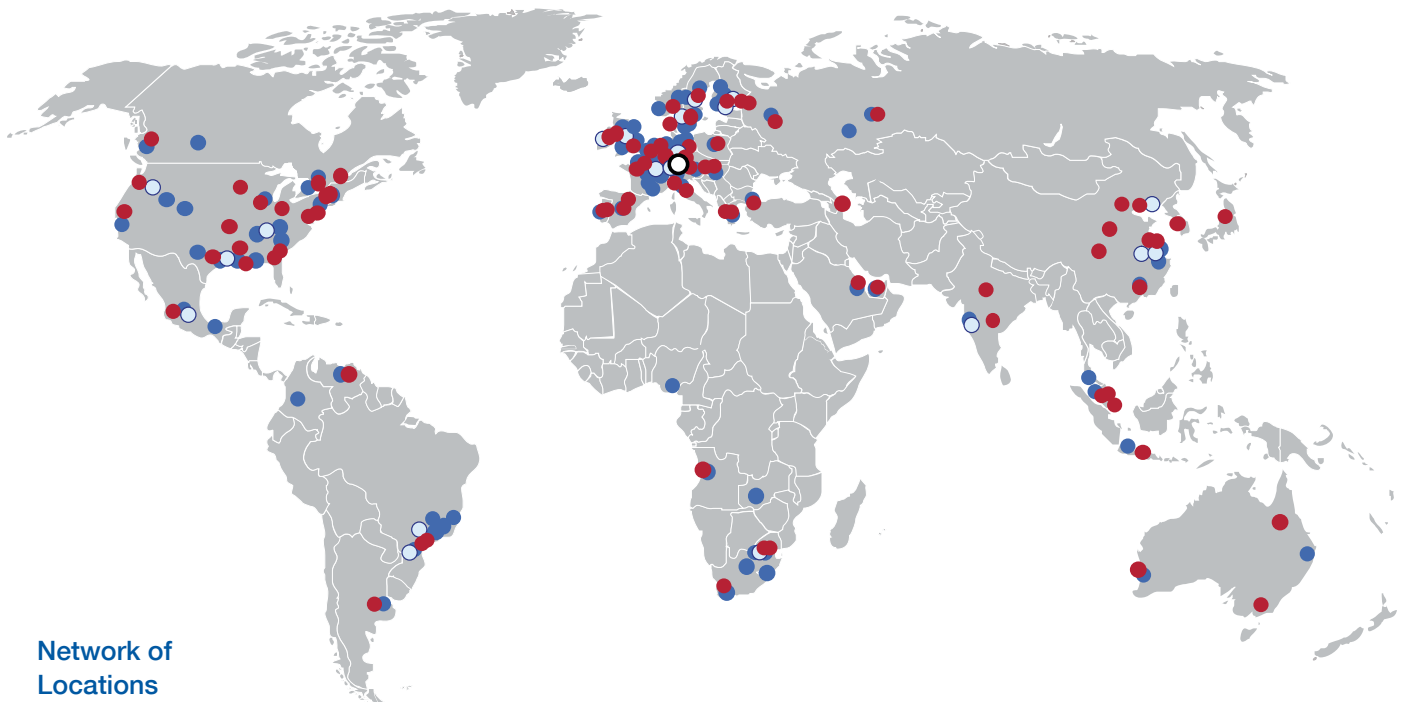
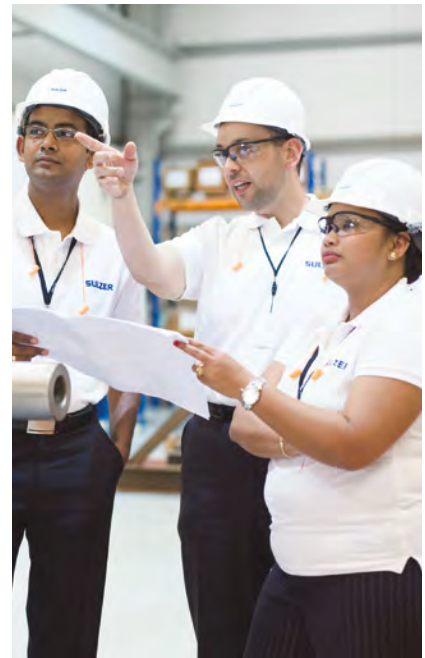
The continuous availability and high operating performance of pumps is the key target for our customer support service organization.

Through our highly experienced personnel and application knowledge, we provide a full range of innovative service solutions to our customers to keep their pumps running including:

- Spare Parts
- Field Services
- Repair Services
- Retrofits
- Maintenance Agreements
- Operation Agreements

## Flexibility

With services ranging in scope from supplying a spare part to operating the pump under contract, we are uniquely placed to make your process run smoother. A dedicated team of our service specialists based at either our manufacturing facilities or one of over 60 service centers located around the world is dedicated to maintaining the performance of our customers' pumps and associated equipment. This service is not just limited to Sulzer products, all the pumps our customers operate can benefit from the support of Sulzer Pumps.



## Network of Locations

- Divisional Headquarters
- Manufacturing Facility
- Customer Support Service Center (CSS)
- Sales Office