



WUC Pumps

▶ *Flowserve Main Menu*



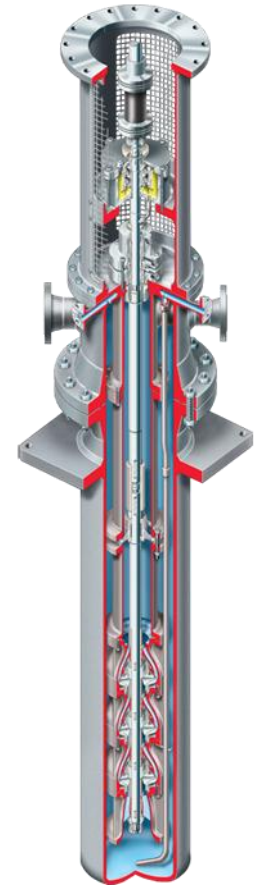
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Introduction

WUC Vertical Multistage, Double-Casing Pump ISO 13709 / API 610 VS 6

- API 610 10th Edition
- WUC: vertical multistage can pump – VS6
- Multistage diffuser
- Radially split case
- Mixed flow and radial hydraulics
- Can and discharge head designed to ASME VIII and PED (97/23/EG)



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Introduction

● Typical Application

- Refinery
- Petrochemical industry
- LPG services
- Pipeline and transfer service
- Condensate service
- Offshore crude oil loading

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Introduction

Comments to API 610 10th Edition

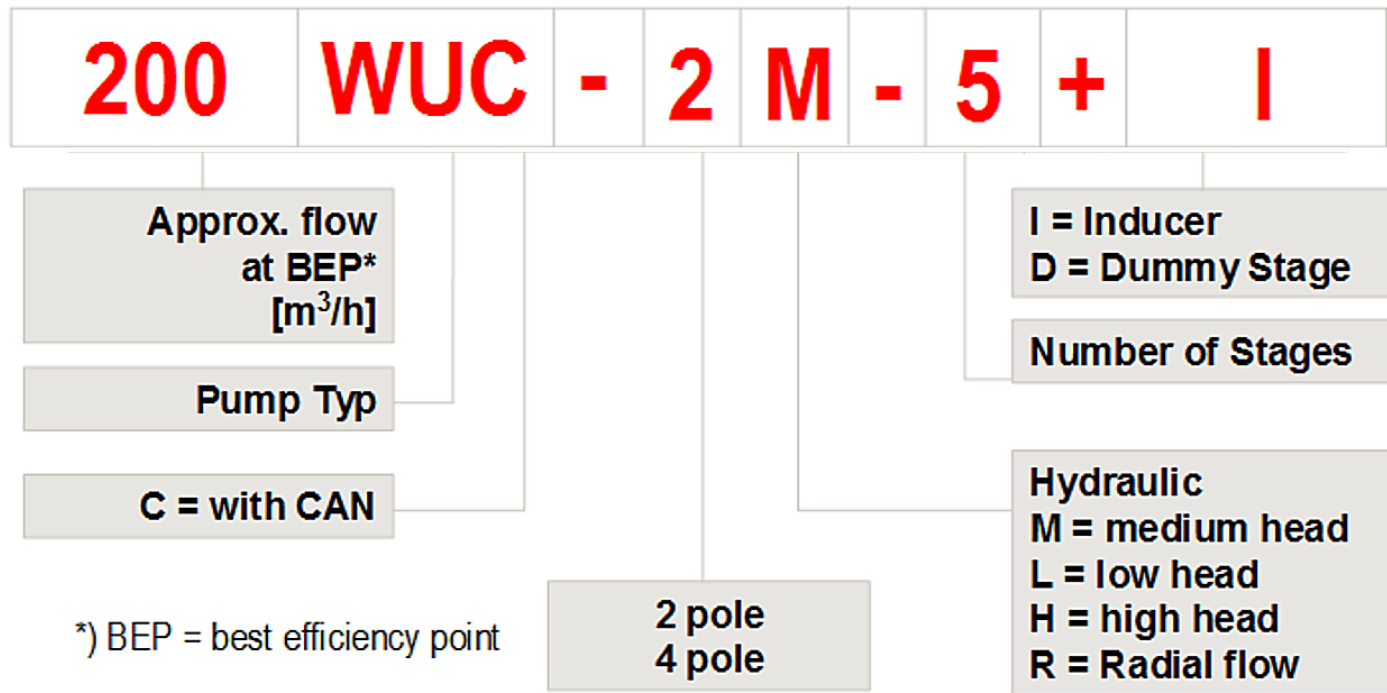
API Paragraph	API 610 Requirements 10 th Edition	Comments
5.3.6	<u>MAWP</u> If specified, suction regions ...designed for discharge pressure	As a standard, suction regions are designed for max. suction pressure. Design for discharge pressure is optional at extra price.
5.8.1	<u>Mechanical seals and sealing system in accordance with ISO 21049 (= API Standard 682)</u>	Standard cartridge seals meet par. 5.8.2 to 5.8.11. Seals and sealing systems in compliance with API 682 can be supplied at extra price.
5.10.2 5.10.2.2	<u>Bearing housing</u> The bearing... housings shall be equipped with constant level sight feed oilers ...	Oil circulation is ensured by the pumping – effect of the angular contact ball bearings. Unique design.
8.2.2 8.2.2.1	<u>Rotor</u> Impellers... shall be individually located...	Impellers are positively but not individually secured.
8.3.3.3	<u>Shaft</u> The pump shaft shall be one piece unless otherwise approved by purchaser.	Above certain pump length, a multiple shaft arrangement is used for ease of maintenance.
Table H.1	<u>Wetted fasteners</u> Shall be made of 316SS for material classes S-5 and S-6.	To avoid galvanic corrosion, wetted fasteners are made of low alloy steel.

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Introduction

Nomenclature



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Performance

● Performance

- **Capacity:** up to 3000 m³/h (13 200 gpm)
- **Head:** up to 2000 m (6600 ft)
- **Temperature:** from -200°C (-310°F)
up to 350°C (662°F)
- **Pressure:** up to 200 bar (2900 psi)

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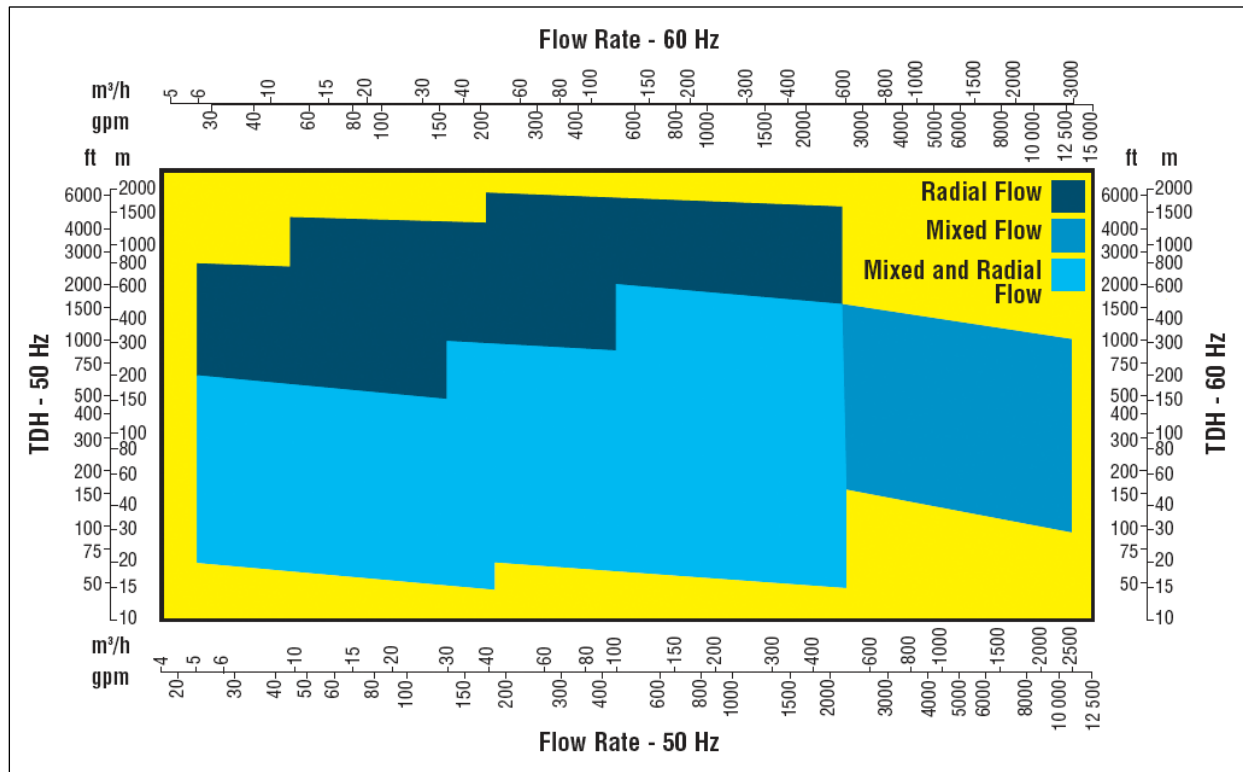
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Performance

● Coverage Range



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Features and Benefits

● Benefits

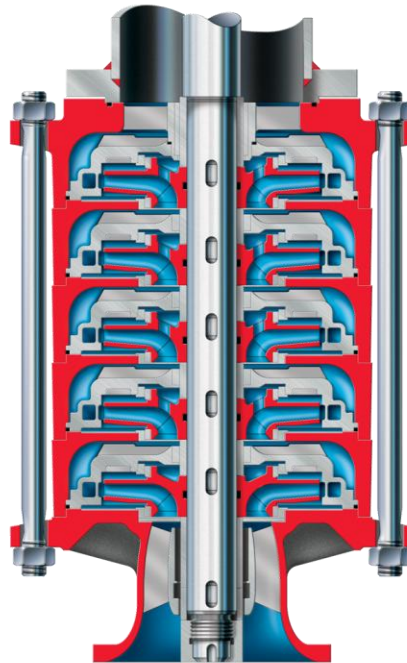
- Less space required
- Vertical pump
- Inducer available for all size of pumps
- All materials available
- Wide operating range
- Flexible design
- Interchangeability
- Under-critical rotor design
- Easy assembling and disassembling

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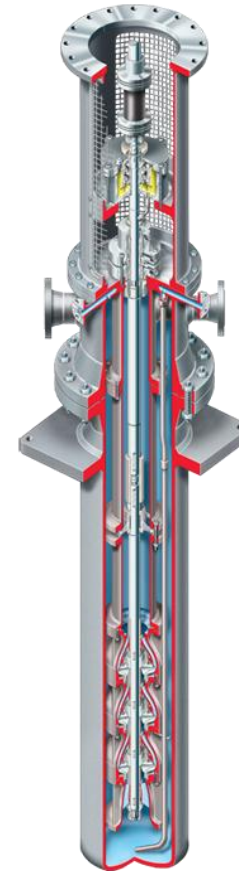


Features and Benefits

Hydraulics



Radial Flow Hydraulic



Mixed Flow Hydraulic

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Features and Benefits

● Hydraulics

- Generally, WUC hydraulics have front and back wear rings on impellers and casings
- Axial thrust is balanced by balancing holes
- For high suction pressure operation, balancing holes may be closed at an appropriate number of impellers to ensure a residual down thrust of the rotor

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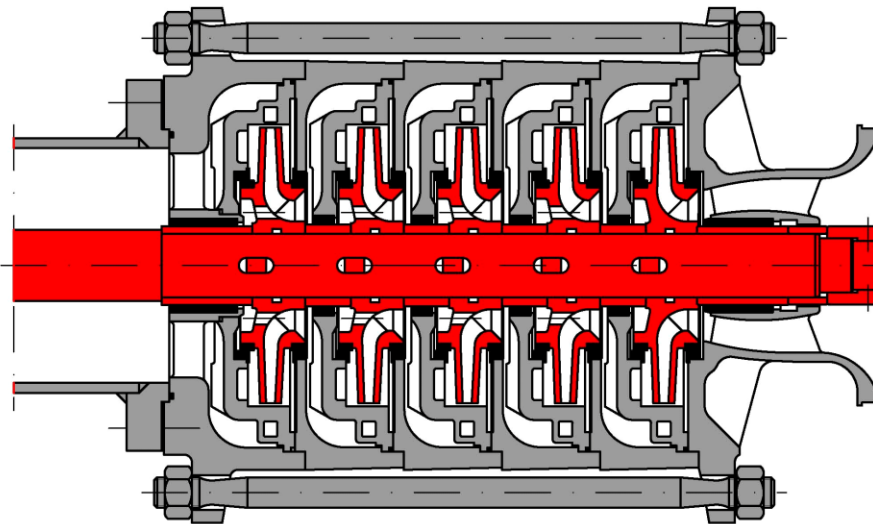


Features and Benefits

● Hydraulic Design – Radial

- O-ring sealing
- Front and back wear rings
- Bearing bushings and sleeves between each stage

Stationary Parts 
Rotating Parts 



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Features and Benefits

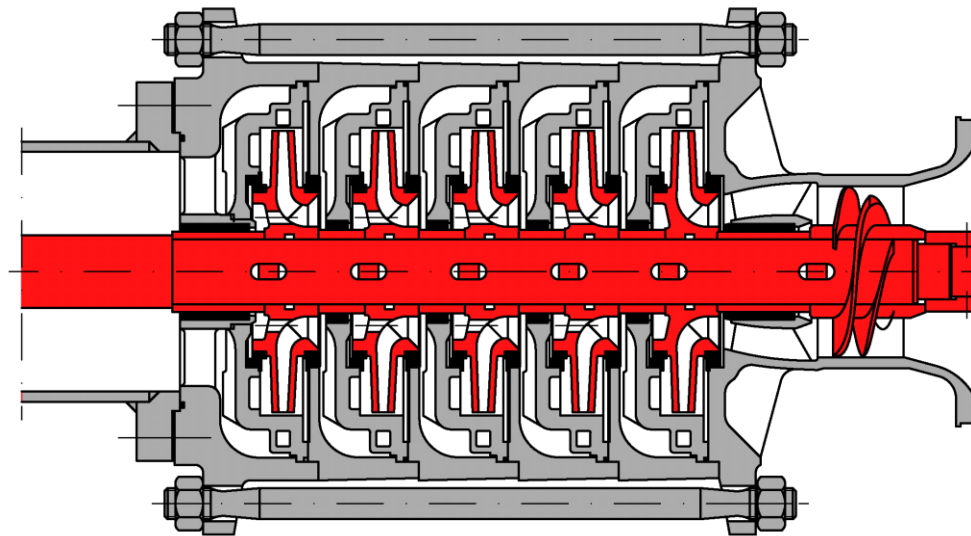
- **Hydraulic Design With Inducer – Radial**

- O-ring sealing
- Front and back wear rings
- Bearing bushings and sleeves between each stage

Stationary Parts



Rotating Parts



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Features and Benefits

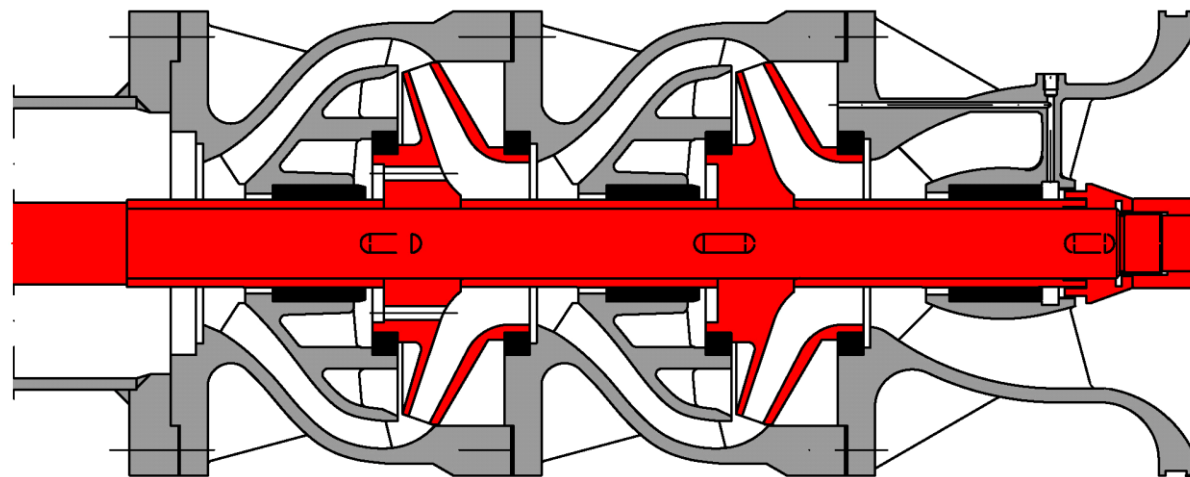
● Hydraulic Design – Mix Flow

- Flat gasket or O-ring sealing
- Front and back wear rings
- Bearing bushings and sleeves between each stage

Stationary Parts



Rotating Parts



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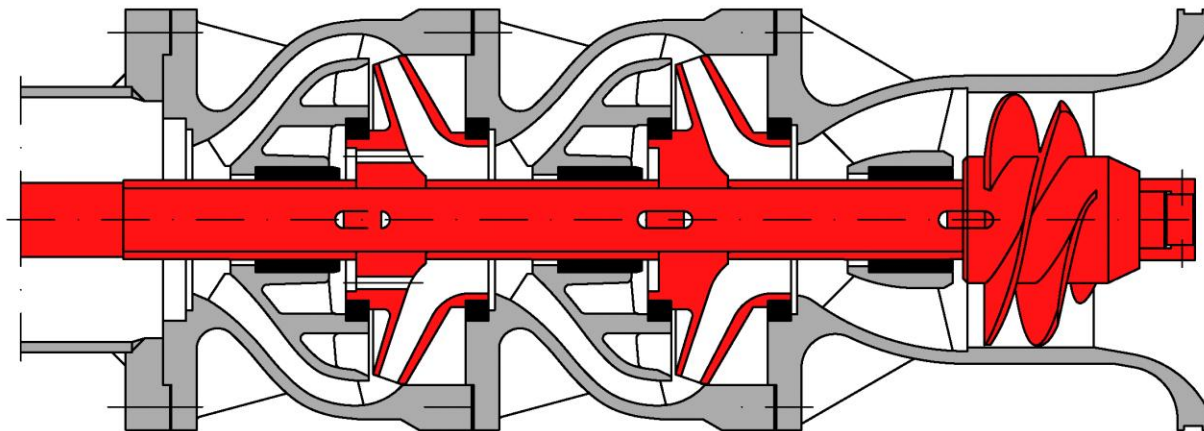


Features and Benefits

- **Hydraulic Design With Inducer – Mix Flow**

- Flat gasket or O-ring sealing
- Front and back wear rings

Stationary Parts 
Rotating Parts 



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Features and Benefits

- **Shaft Design (Hydraulic and Line Shaft)**
 - Open shaft design
 - Bearing span complies with figure 32 of API 610 10th ed
 - Dynamics comply with par. 8.3.5 of API 610 10th ed
 - Rotor dynamics comply with Annex I of API 610 10th ed

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Features and Benefits

- **Column Pipe and Shaft Coupling**
 - Flanged column pipes, molded construction
 - Bearing spiders bolted between column flanges
 - O-ring sealing between column flanges
 - Product lubricated line bearings
 - Replaceable shaft sleeves under bearing bushings

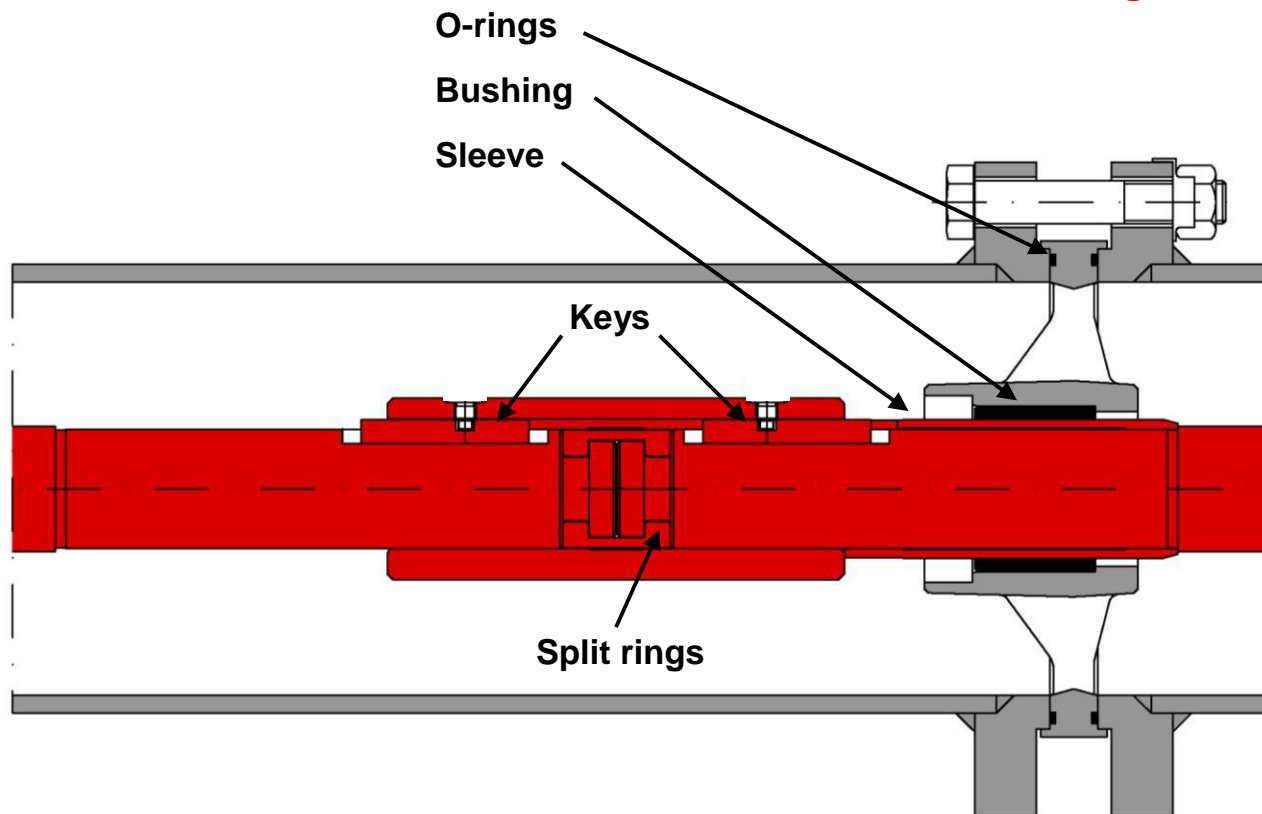
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Features and Benefits

Column Pipe and Shaft Coupling

Stationary Parts 
Rotating Parts 

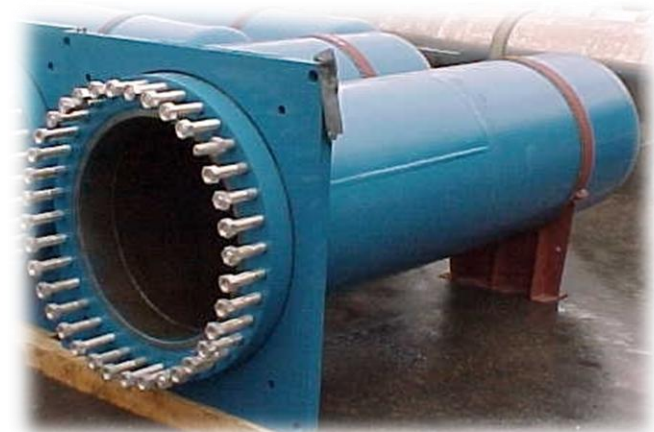
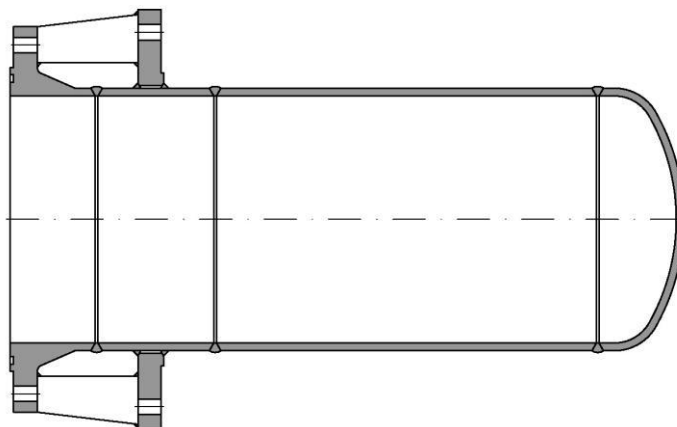


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Features and Benefits

- **Can**
 - Design acc. to ASME VIII design and PED (97/23/EG)
 - Underground suction flange available
 - Internal drain pipe as standard



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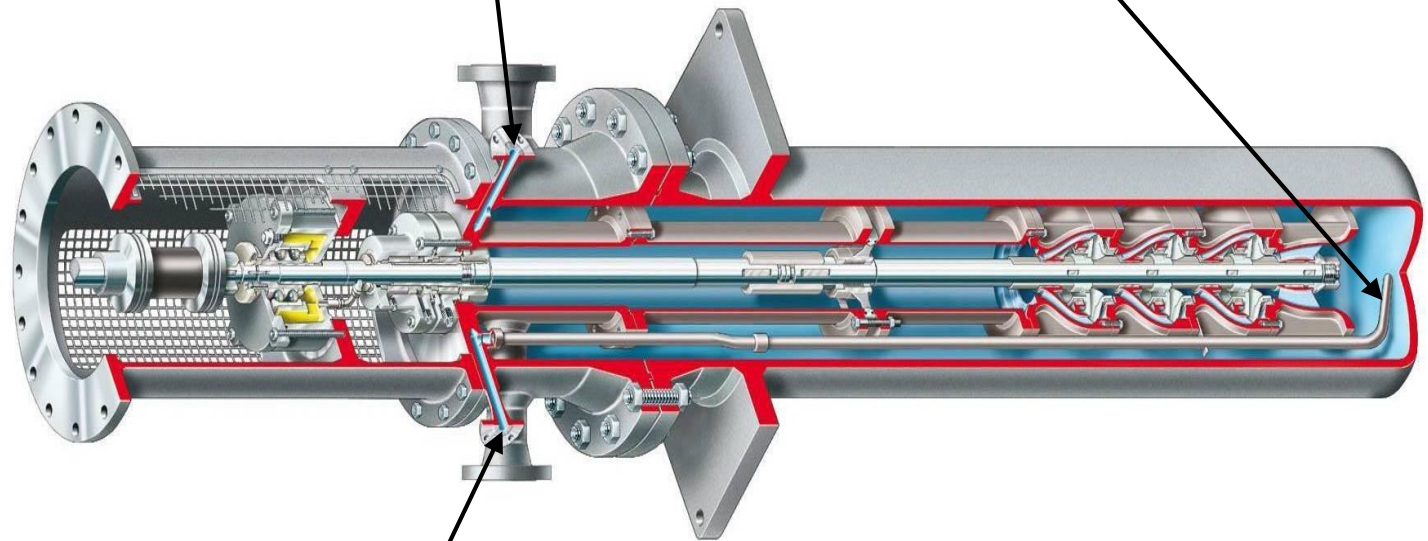


Features and Benefits

- **Standard Internal Drain**

Can pressurised via vent

Internal drain pipe



Drain Connection

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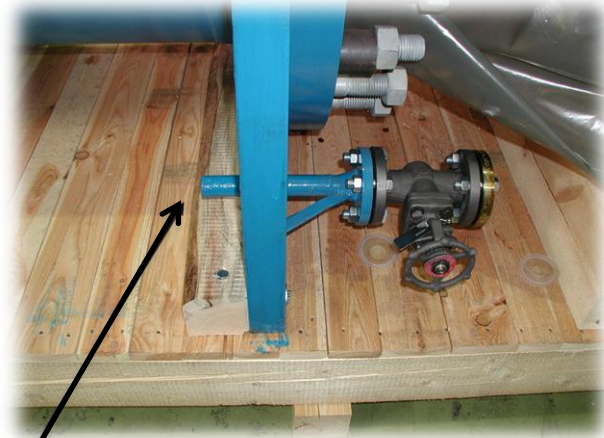


Features and Benefits

- **Can-External Drain**



External drain line



Sniffer connection on mounting plate

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Features and Benefits

Mounting Plate Options

- **API 610 10th Edition, Par. 8.3.8.3.1**
 - The mounting plate for double-casing pumps shall be separate from the main body flange and located sufficiently below it to permit the use of *through bolting* on the body flange

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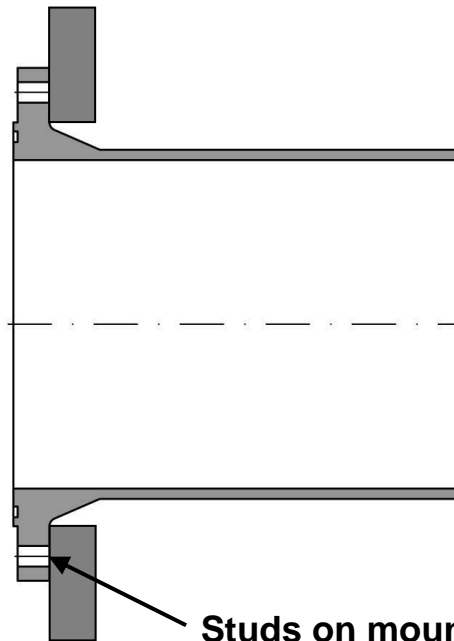
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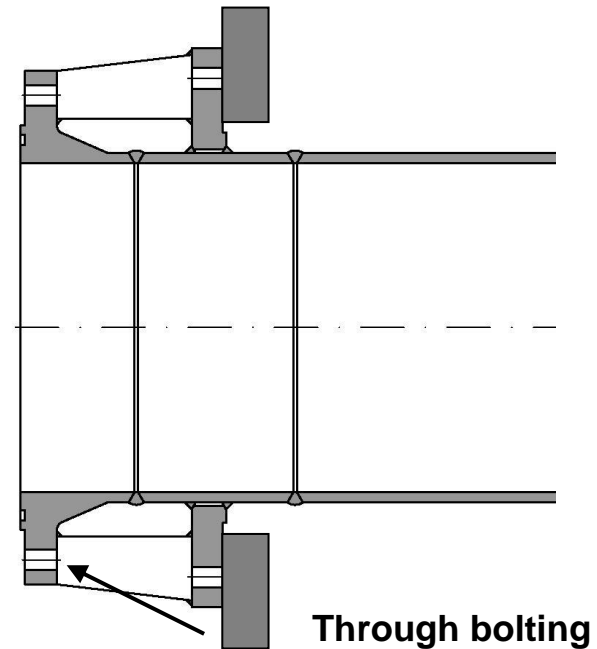
Features and Benefits

● Mounting Plate Options

Standard mounting plate



Optional mounting plate, if specified



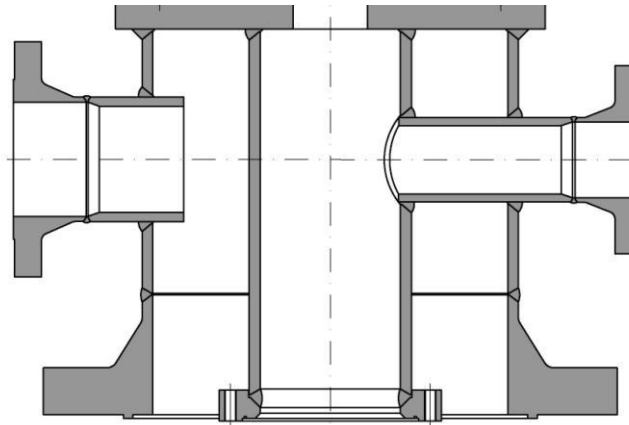
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Features and Benefits

● Discharge Head

- WUC design
- Fabricated construction, acc. ASME VIII and PED (97/23/EG)
- In-line flange connection
- Flanged connections for vent / drain / gauges
- NDE tests comply to applicable pressure vessel codes



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Features and Benefits

- **Motor Stool (0N – 8N)**
 - Cartridge – type thrust bearing assembly (“thrust pot”) for easy maintenance
 - Ball bearings are standard, optional tilting pad bearing (Mitchell, Waukesha)
 - Motor stand selection (depends on power rating and axial thrust)
 - Product lubricated line bearings
 - Flood oil lubrication with sight glass for thrust bearings
 - Balanced constant level oiler or oil mist lubrication on request

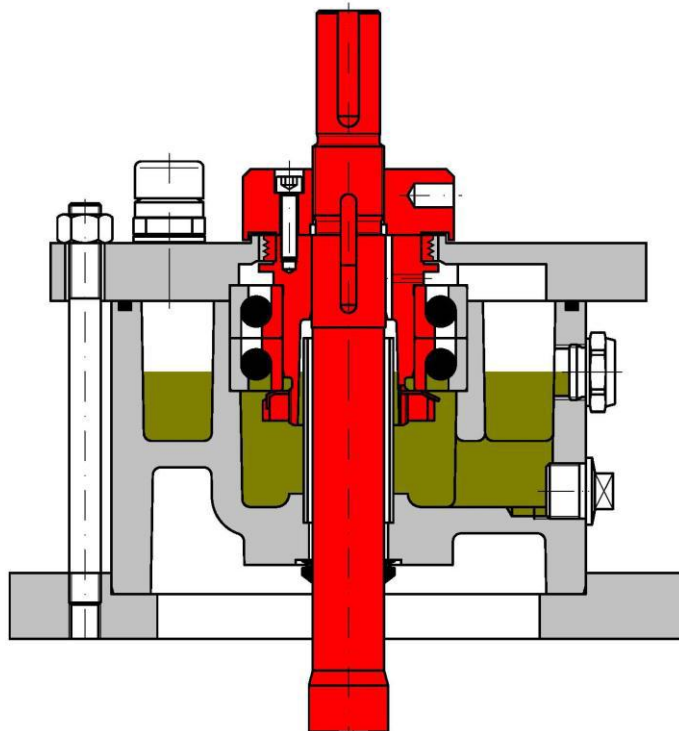
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Features and Benefits

- Motorstand Size 0N and 1N

Stationary Parts
 Rotating Parts
 Lube Oil



FRAME	THRUST-BEARING
0N	7210
1N	7313

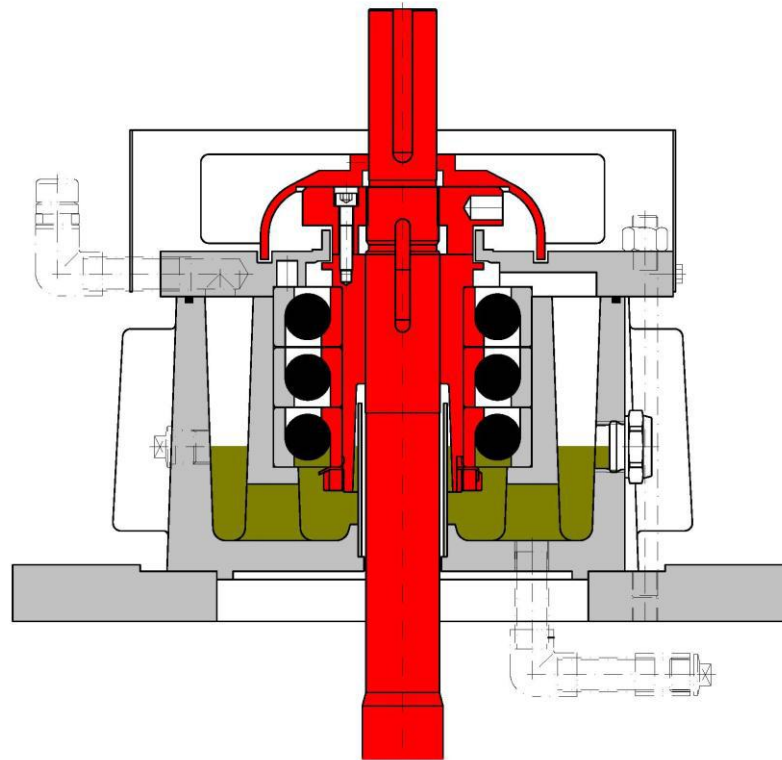
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Features and Benefits

- **Motorstand Size 3N and 7N**

Stationary Parts
Rotating Parts
Lube Oil



FRAME	THRUST-BEARING
3N	7315
4N	7317
5N	7318
6N	7322
7N	7326


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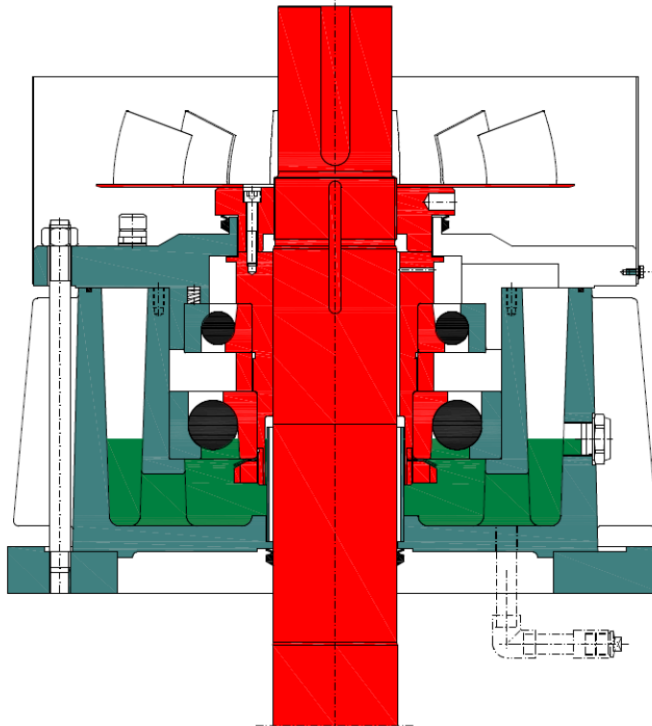
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Features and Benefits

● Motorstand Size 8N

Stationary Parts 
Rotating Parts 
Lube Oil 



FRAME	THRUST-BEARING
8N	7232 / 7330

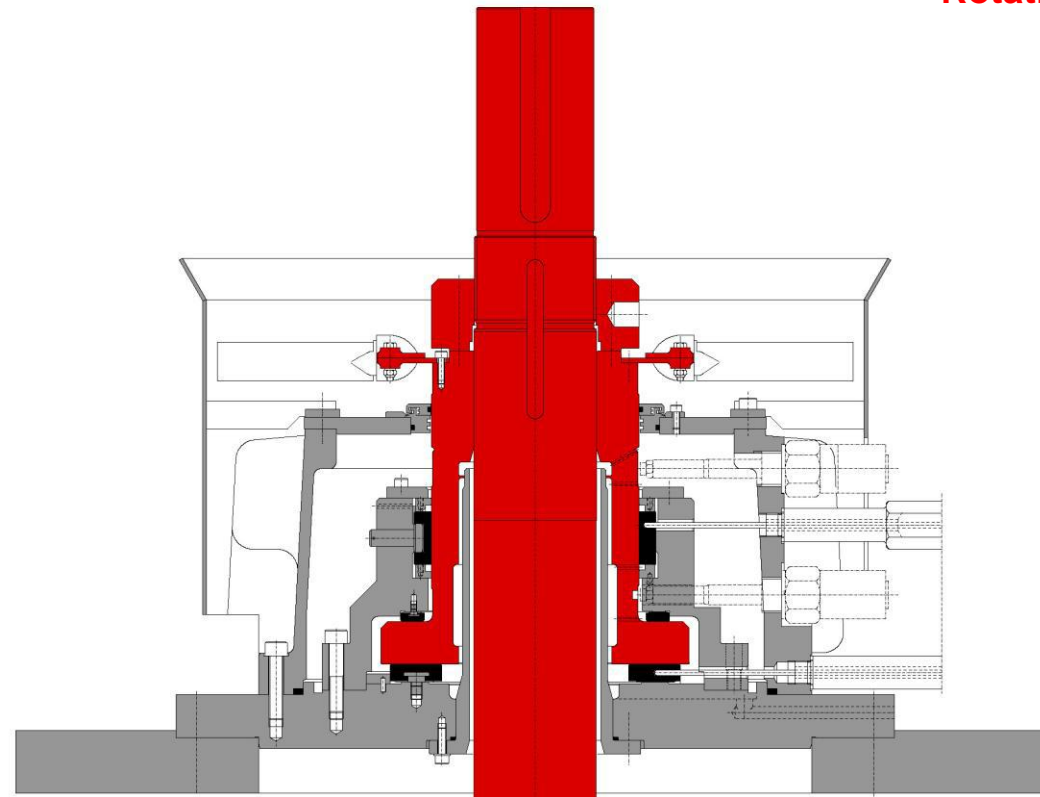
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Features and Benefits

● Motorstand With Tilting Pad Bearing

Stationary Parts 
Rotating Parts 



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Features and Benefits

● Coupling

– Standard Design

- Flexible, all metal spacer type coupling between pump and motor

– Optionally Available (but not suggested)

- Flexible, all metal spacer type coupling between pump and motor, additional rigid spacer coupling between stuffing box and thrust bearing - allows mechanical seal change without removing thrust pot

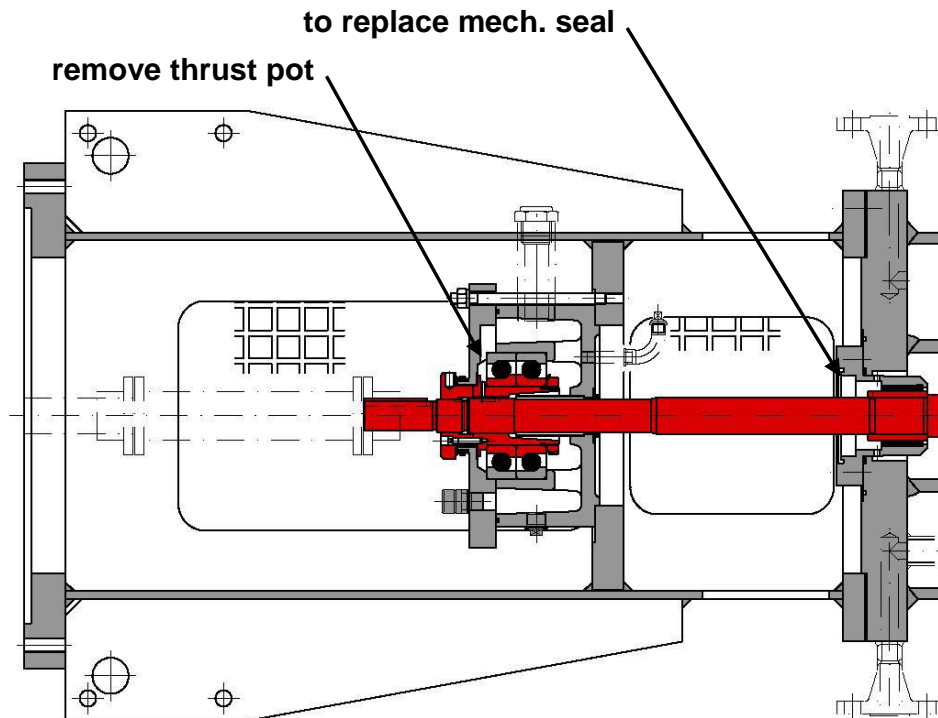
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Features and Benefits

- **Motor Coupling Standard**
Flexible Spacer

Stationary Parts 
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Features and Benefits

● Sealing

– Shaft Sealing Options

- Single mechanical seal
- Double mechanical seal, unpressurized
- Double mechanical seal, pressurized
- Gas seal

– Special Features

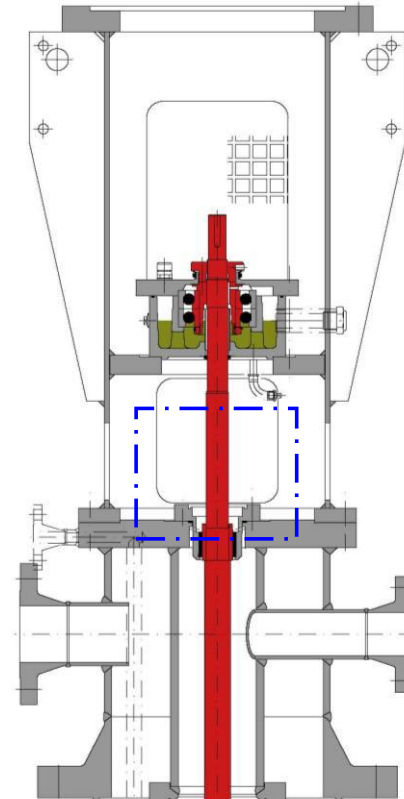
- Gas coffer dam with pressurized double mechanical seal

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Features and Benefits

- **Seal chamber**
 - API 682 dimensions
 - Mechanical seal exposed to discharge pressure

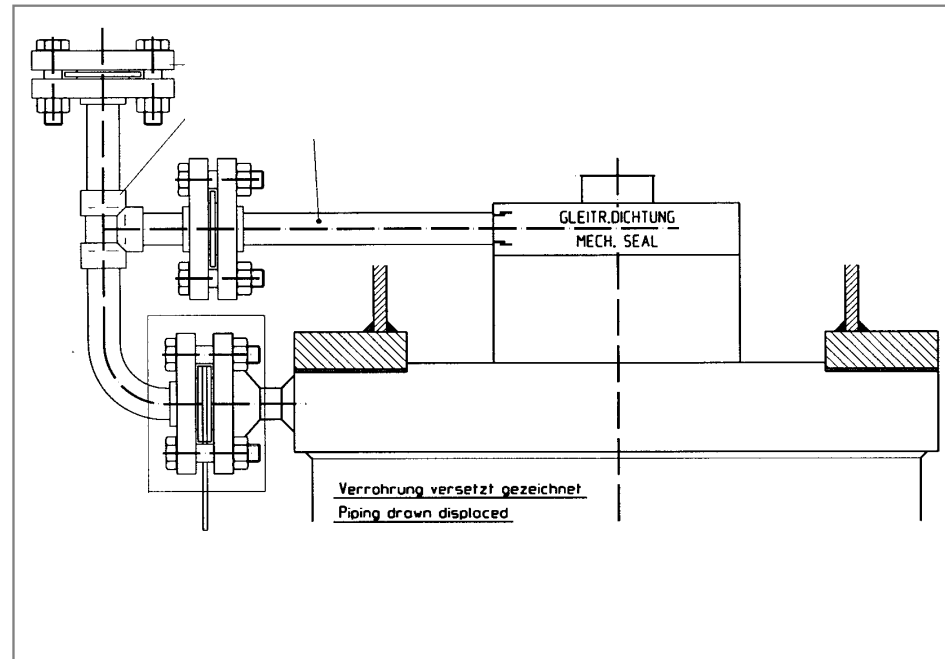


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Features and Benefits

- **API Plan 13 (Internal Piping)**
 - Flushing fluid back to suction

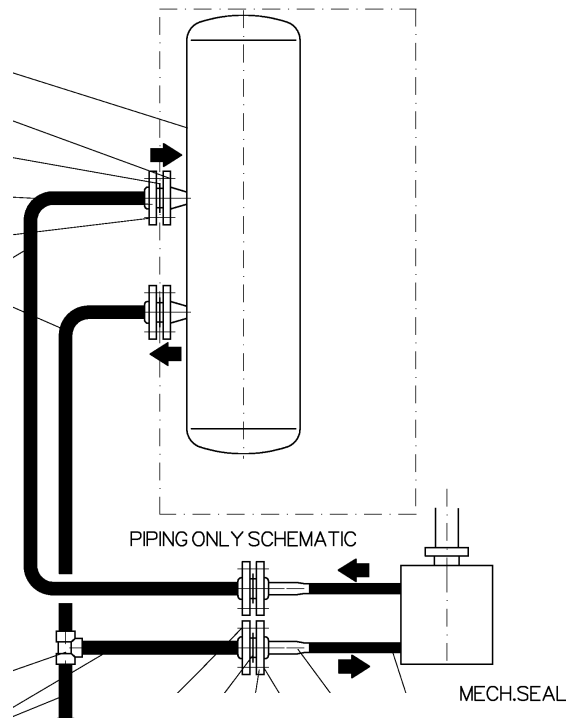


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Features and Benefits

- **API Plan 52 (External Piping)**



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Features and Benefits

● Low Temperature Services

- A “Gas Cofferdam” is always supplied for service $< -50^{\circ}\text{C}$ ($< -58^{\circ}\text{F}$)
 - It provides these benefits:
 - No icing in seal area
 - No fluid at seal – gas only
 - Pressure at seal = suction pressure + back pressure of balancing line (approx. 2 bar [29 psi])
 - In the event of seal damage, barrier fluid will not contaminate pumped liquid
 - Allows use of inexpensive seals

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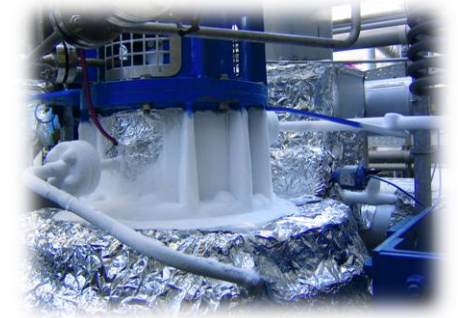
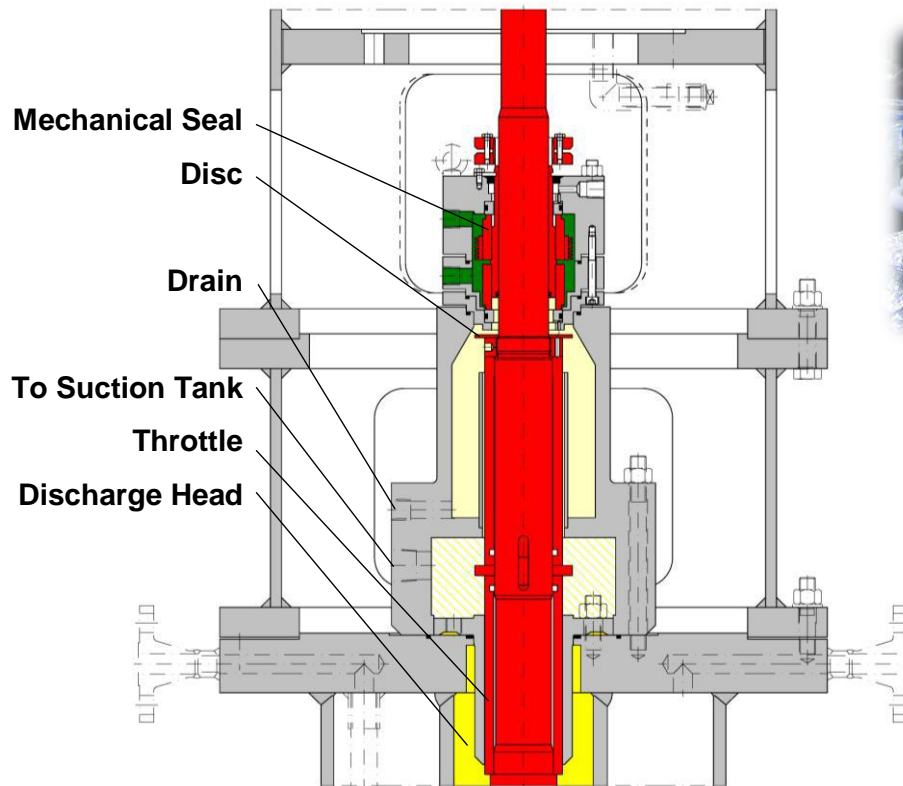
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Features and Benefits

● Low Temperature Services



Rotating Parts	
Stationary Parts	
Buffer Fluid	
Liquid	
Liquid / gas	
Gas	

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Installations



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Installations



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