

**HAMMELMANN®**

**Configuration of a Hammelmann high pressure pump**



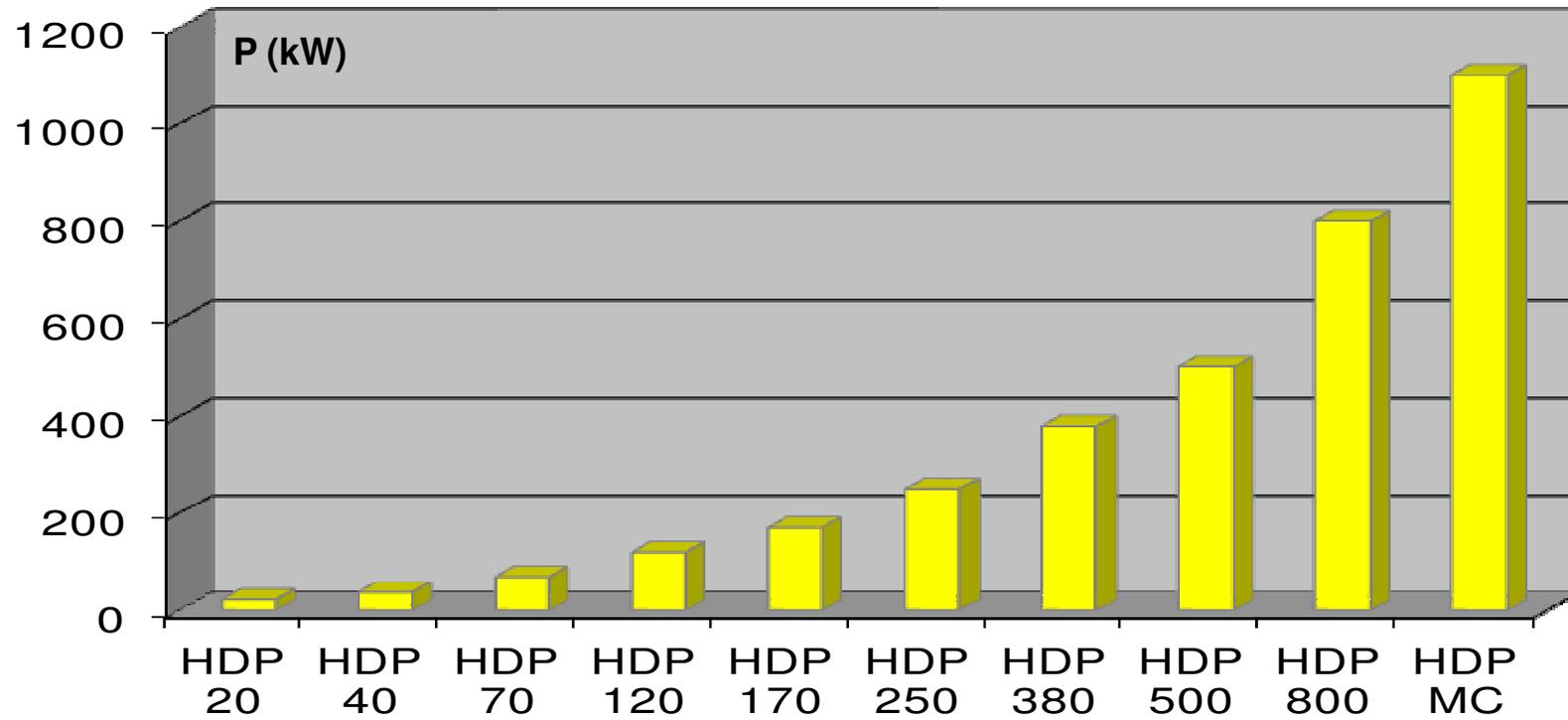
## Sizes – Power classifications

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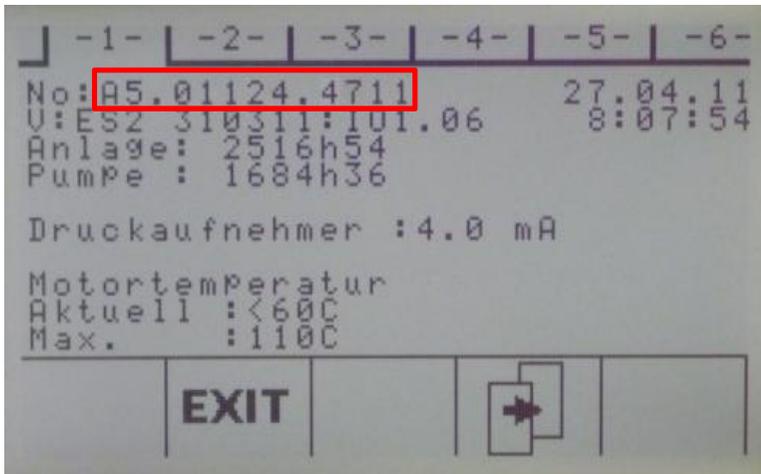
- ▶ 10 Sizes
- ▶ Over 130 variants enable selection in accordance with performance requirements
- ▶ Power ratings 20 kW – 1100 kW
- ▶ Operating pressures to 4000 bar
- ▶ Flow rates to 3000 l/min



# Power ratings available



# Machine number



MACHINE CARD

HAMMELMANN  
 Hammelmann Maschinenfabrik GmbH  
 POB 3309, D-52222 Oelde, Germany  
 mail to: mail@hammelmann.de  
 http://www.hammelmann.de

Machine no. : A5.01124.4711

Page: 1

Order no.		KA 5259x46976
Purchaser		Hammelmann Training Center
Client no.		471147114711
P. O. no./Date		20.01.2005
Machine no.		A5.01124.4711
Pump type		HDP 124 Aquajet-12
Code no.		09.63124.9034
<b>Performance data</b>		
Flow rate Ps 1	l/min	30
Operating pressure Ps 1	bar	2400
Motor speed Ps 1	1/min	1800
Crankshaft speed Ps 1	1/min	625
Piston dia. Ps 1	mm	20
Motor rating req'd Ps 1	kW	135
<b>Performance data diesel engine</b>		
Make		Deutz
Type		TCD 6.1 L06 Stufe IIb
motor no.		11264456
Voltage	V	24
Rating	kW	160
R.P.M.	1/min	1800
Battery no.		00.00190.0002 1 Satz
Battery voltage	V	12
Battery capacity	Ah	88
<b>Brief instructions</b>		
Language		englisch
<b>Paint colour</b>		
Pump		RAL 1018
Frame		RAL 7042
Motor		Lieferzustand
Sound dampening cover		RAL 7035
<b>Setting of cut-off switches</b>		
Suction pressure min.	bar	2.0
Suction temperature max.	°C	40
Oil pressure min.	bar	2.0
Oil temperature max.	°C	70
Different. pres. of filter max	bar	1.2
Air pressure min.	bar	5.5
Measuring cell conductivity		X
<b>Name plate high pressure pump</b>		
Machine no.		83.01124.1783
Type no.		09.63124.9034
Year		2013
Motor rating [kW]	kW	135
Speed [1/min]	1/min	1800
Max. liquid temp. [°C]	°C	40
Piston dia. pres. step 1 [mm]	mm	20
Max. pressure Ps 1 [bar]	bar	2400

# High pressure pumps – New model designations



## High pressure pumps

- ▶ **Series - 1** High flow pump head
- ▶ **Series - 2** Pressure range up to app.1200 bar  
Packing and labyrinth seal
- ▶ **Series - 3** Pressure range up to approx.1800 bar  
Packing and labyrinth seal
- ▶ **Series - 4** Pressure range over 1800 bar  
High pressure packing and dynamic seal
- ▶ **Series - 5** Process pumps
- ▶ **Series - 6** Sewer cleaning pumps



Example: B2.01124.1548

**B2** = year 2012 / **124** = HDP 120 KW, serial number **4** = over 1800 bar

## Hammelmann high pressure pumps



Piston pumps are displacement pumps used for conveying and compressing fluids and gases.

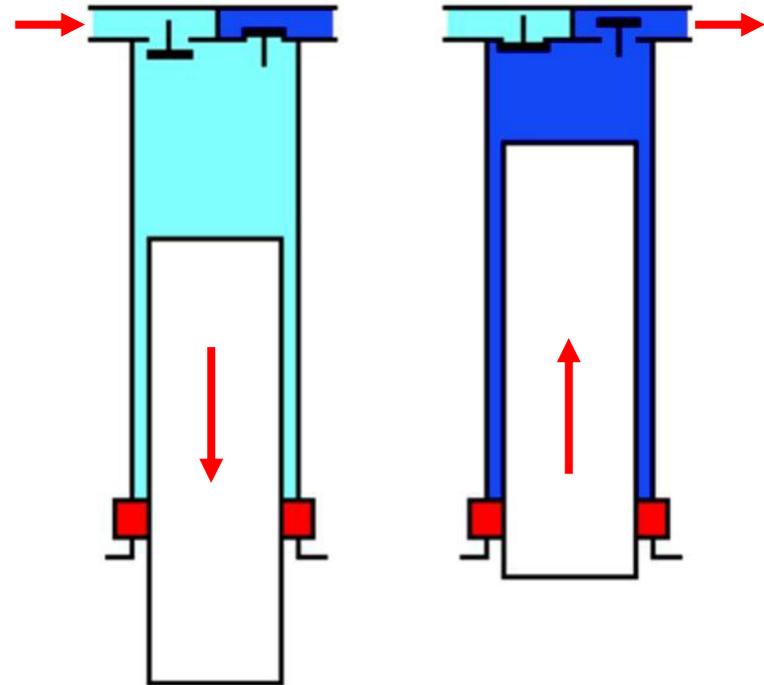
### Plunger pump design:

The piston moves within the working chamber (sleeve) and displaces the medium to be conveyed.

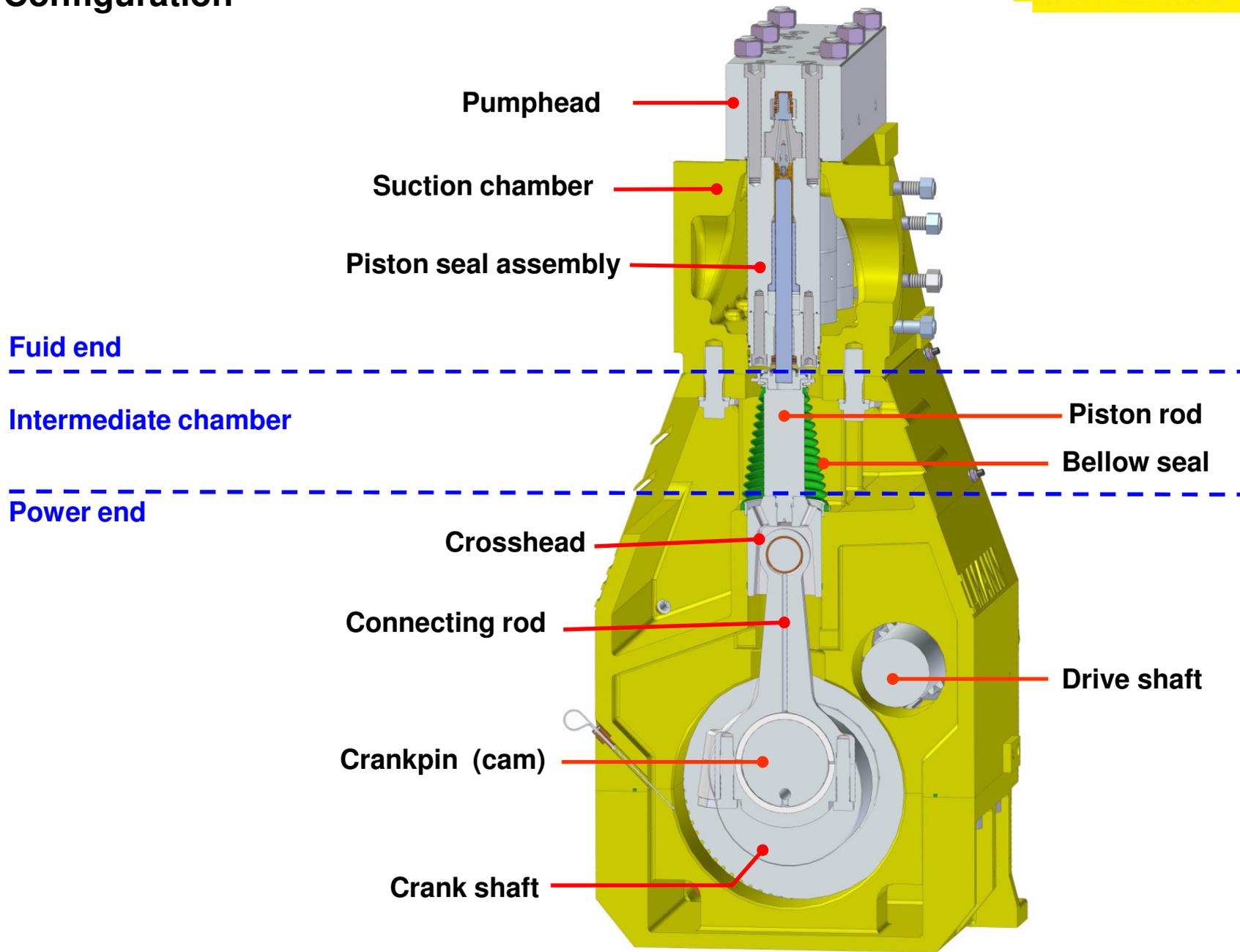
The seal is made within the sleeve and not on the piston.

The oscillating motion of the plunger (piston) is generated by a crank shaft.

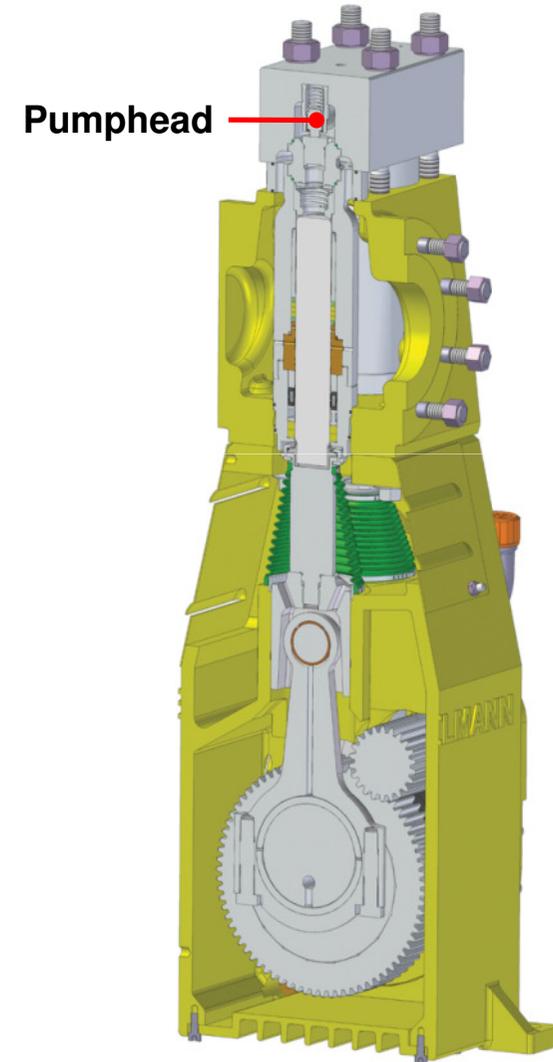
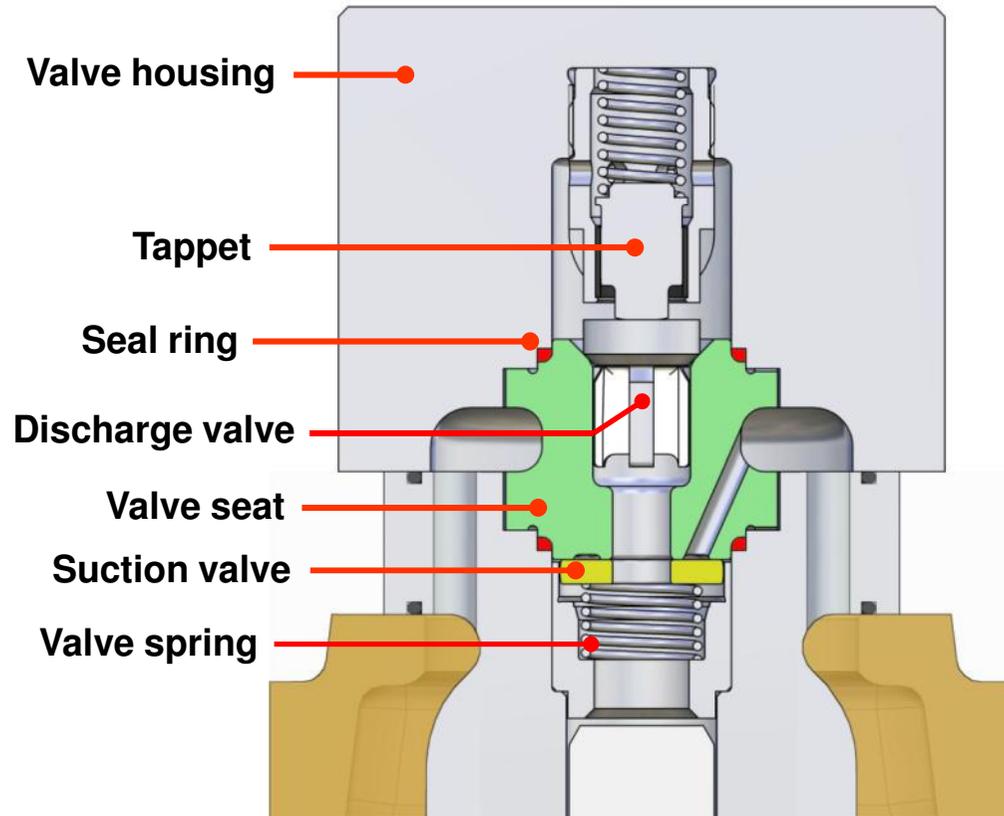
The flow motion and the differential pressure of the medium operates the valves.



# Configuration



# Pump head

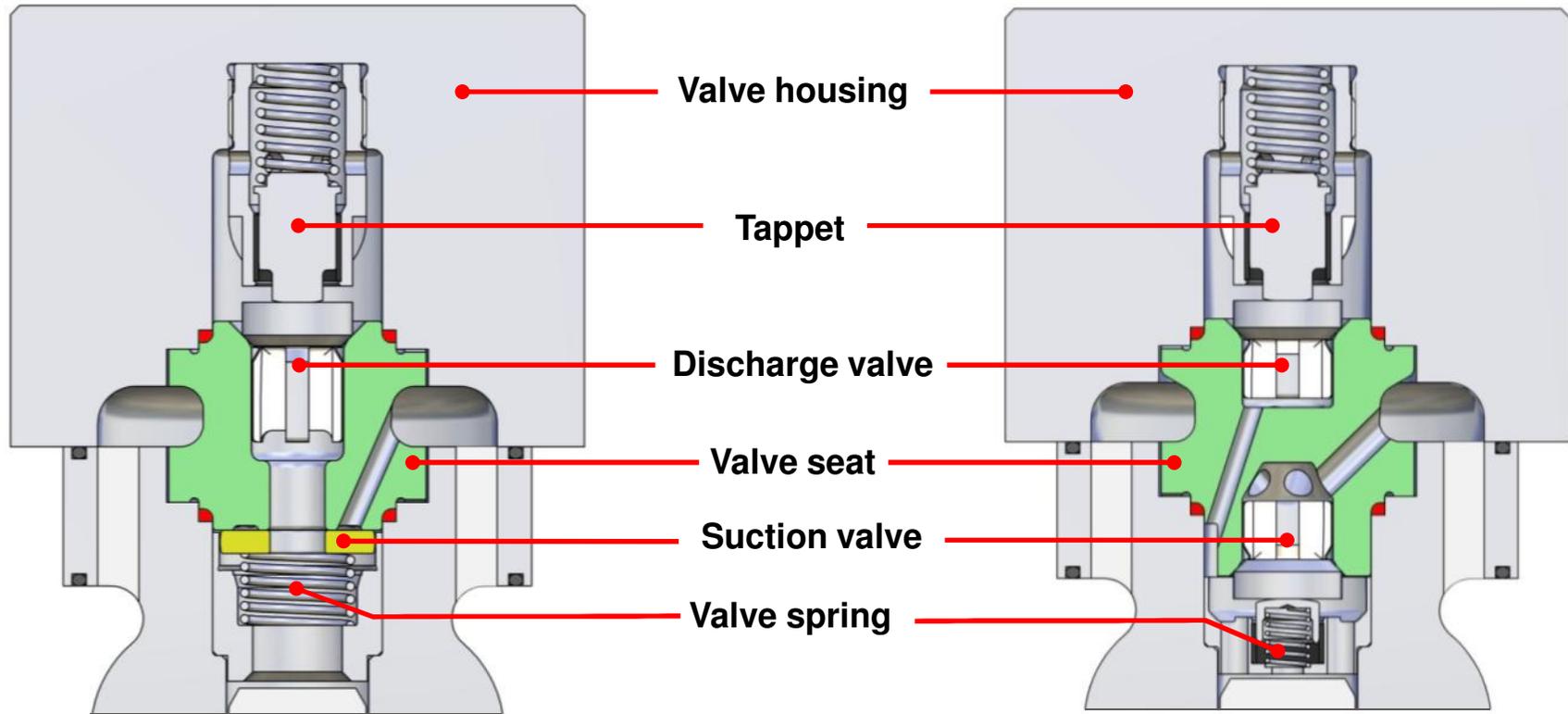


- ▶ Minimal dead space
- ▶ High volumetric efficiency
- ▶ No alternating load in the valve housing

# Pump head variations

## Standard

## Twin conical valves



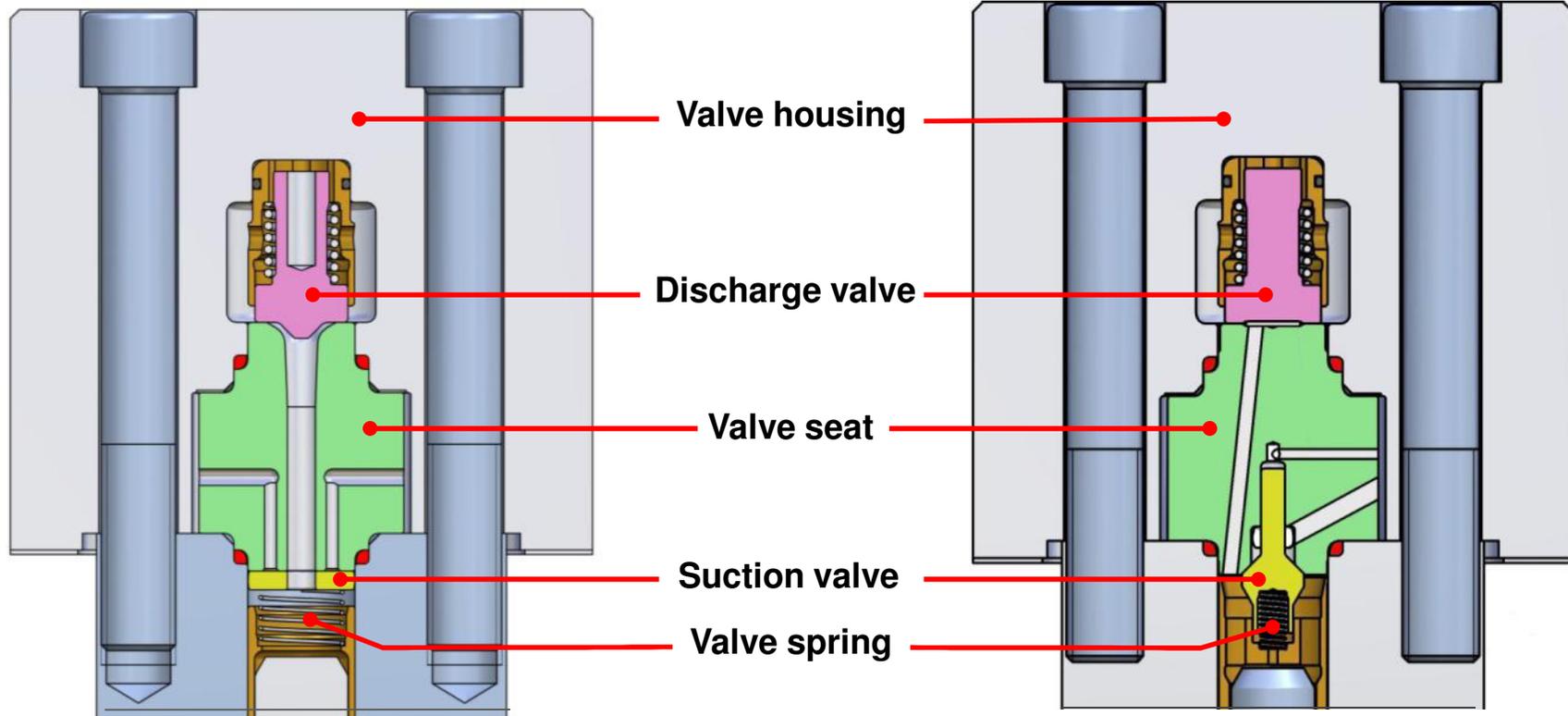
**Considerably longer component life with polluted mediums**

# Pump head variation for ultra high pressure



## Disc suction valve

## Twin conical valves



Longer component life

## Piston sealing

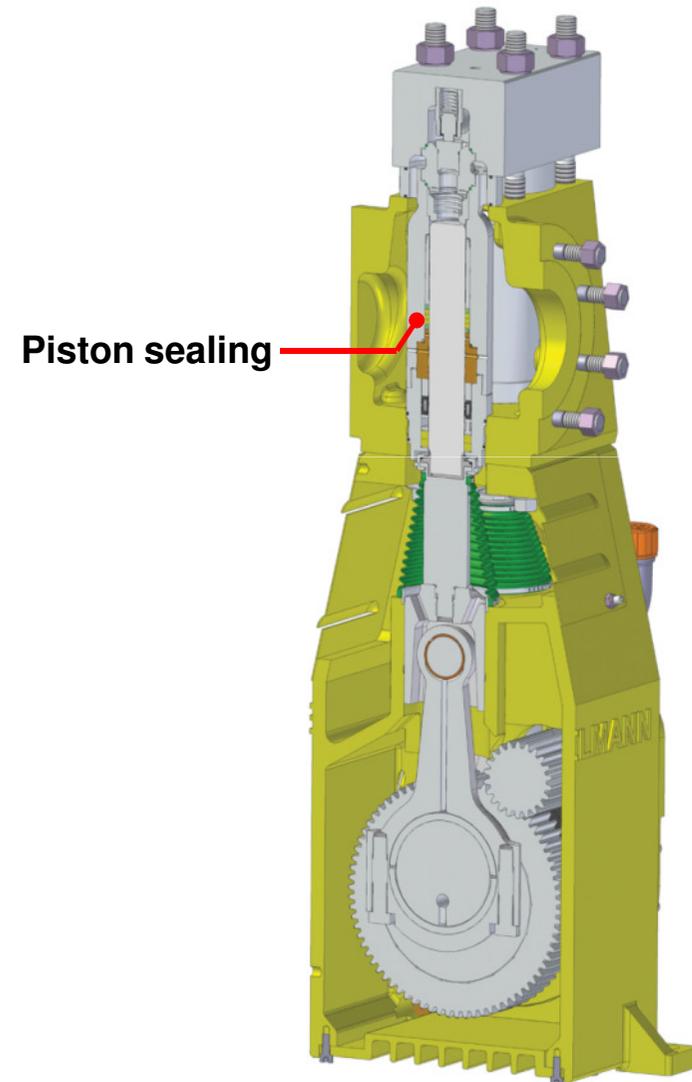
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### Metallic sealing

- ▶ No packing or sealing elements on the high pressure side
- ▶ „Non contacting“ sealing
- ▶ Low wear → long component life
- ▶ Friction free
- ▶ Hammelmann Patent

### Packed sealing

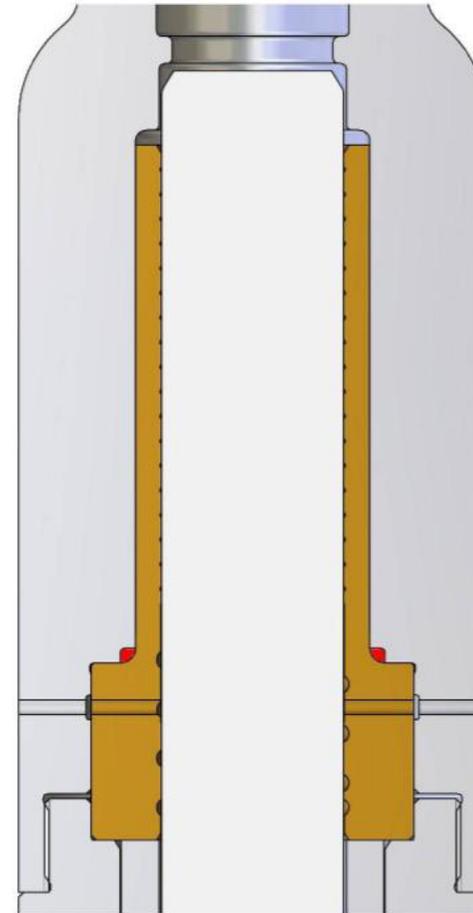
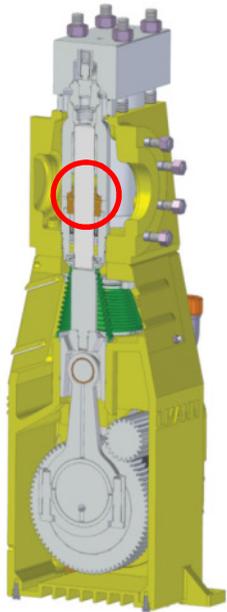
- ▶ Resistant to dirt in the medium
- ▶ Long life
- ▶ Choice of seal materials



## Metallic sealing

## Labyrinth seal

- ▶ Operating pressures up to approx. 1200 bar
- ▶ Low wear
- ▶ Friction free



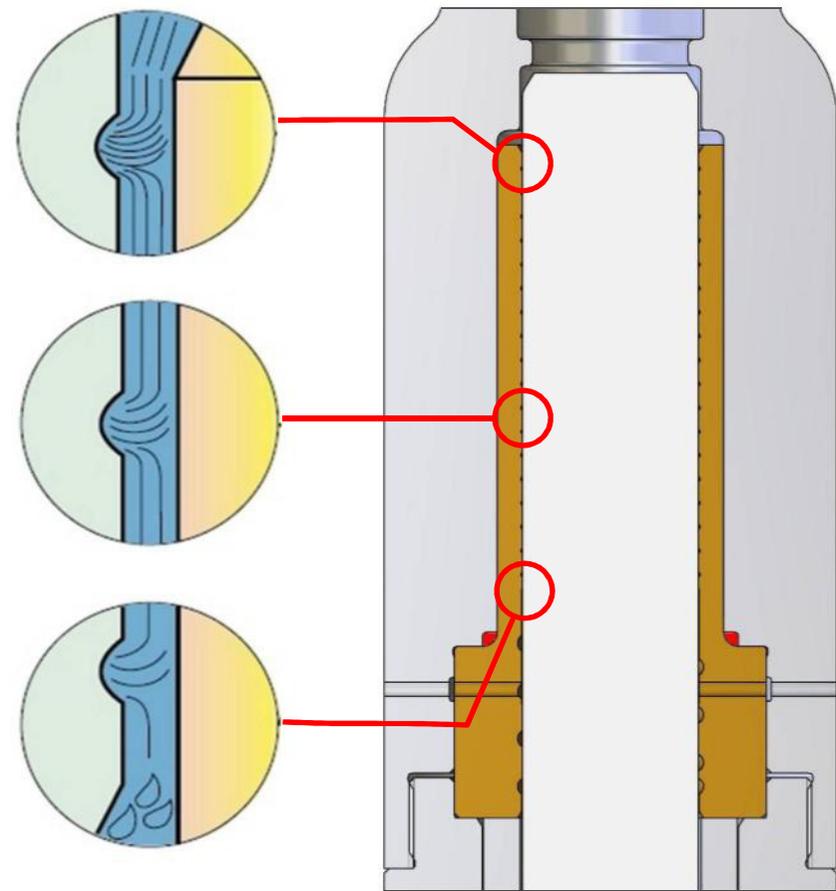
## Function description of a non contacting seal

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During the pressure (upward) stroke a tiny amount of medium is forced into the very fine cylindrical gap between the plunger and the labyrinth insert.

There are grooves in the insert all along its length into which some of the medium flows. The resultant turbulence reduces the flow velocity in the gap and therefore the pressure as it travels downwards. The medium in the gap also keeps the plunger centralised.

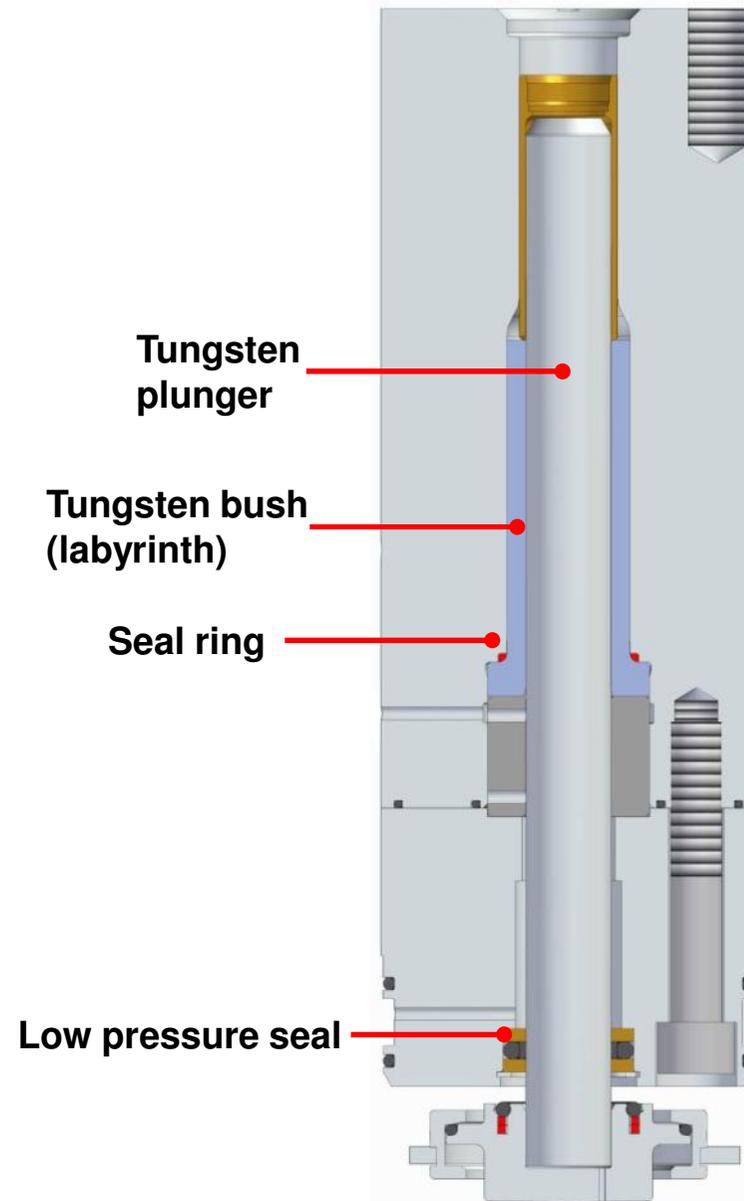
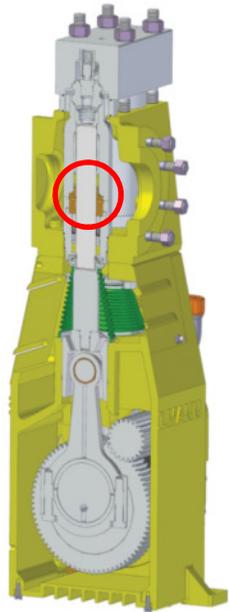
This tiny amount of medium also acts as a lubricant for the components before returning to the suction chamber.



## Metallic sealing

### Dynamic plunger seal

- ▶ Operating pressures up to 4000 bar
- ▶ High volumetric efficiency
- ▶ Very long life



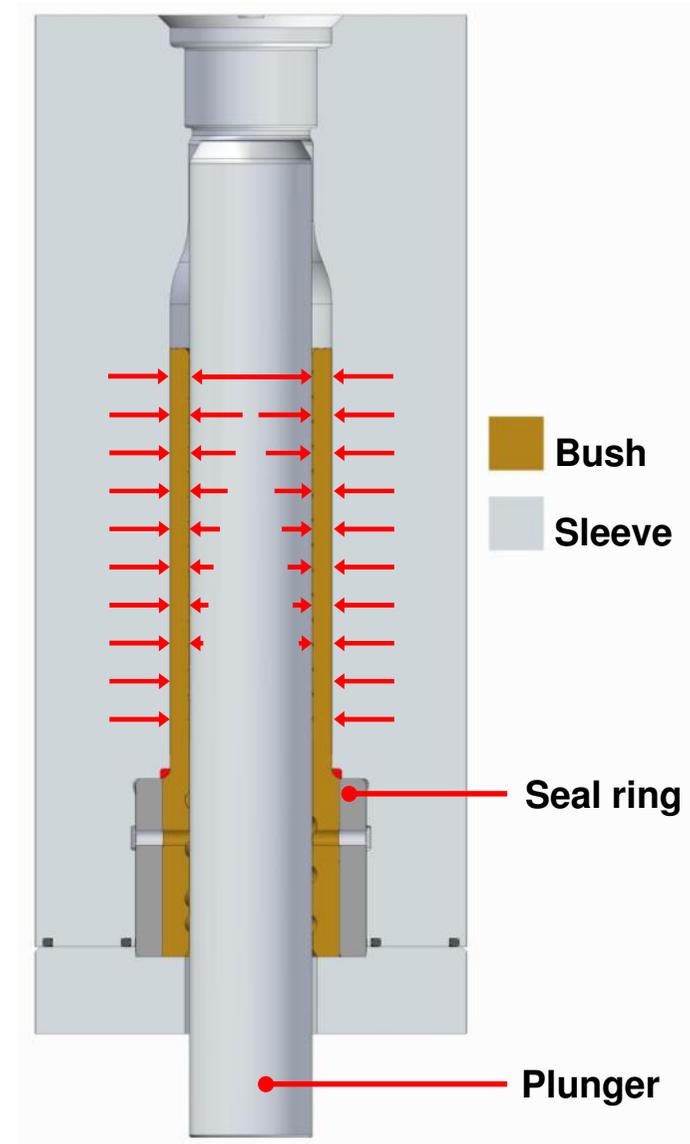
## Metallic sealing

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### Function description of the dynamic plunger seal

On the pressure stroke this further development of the labyrinth seal forcibly reduces the gap between the plunger and the labyrinth bush by dynamic distortion.

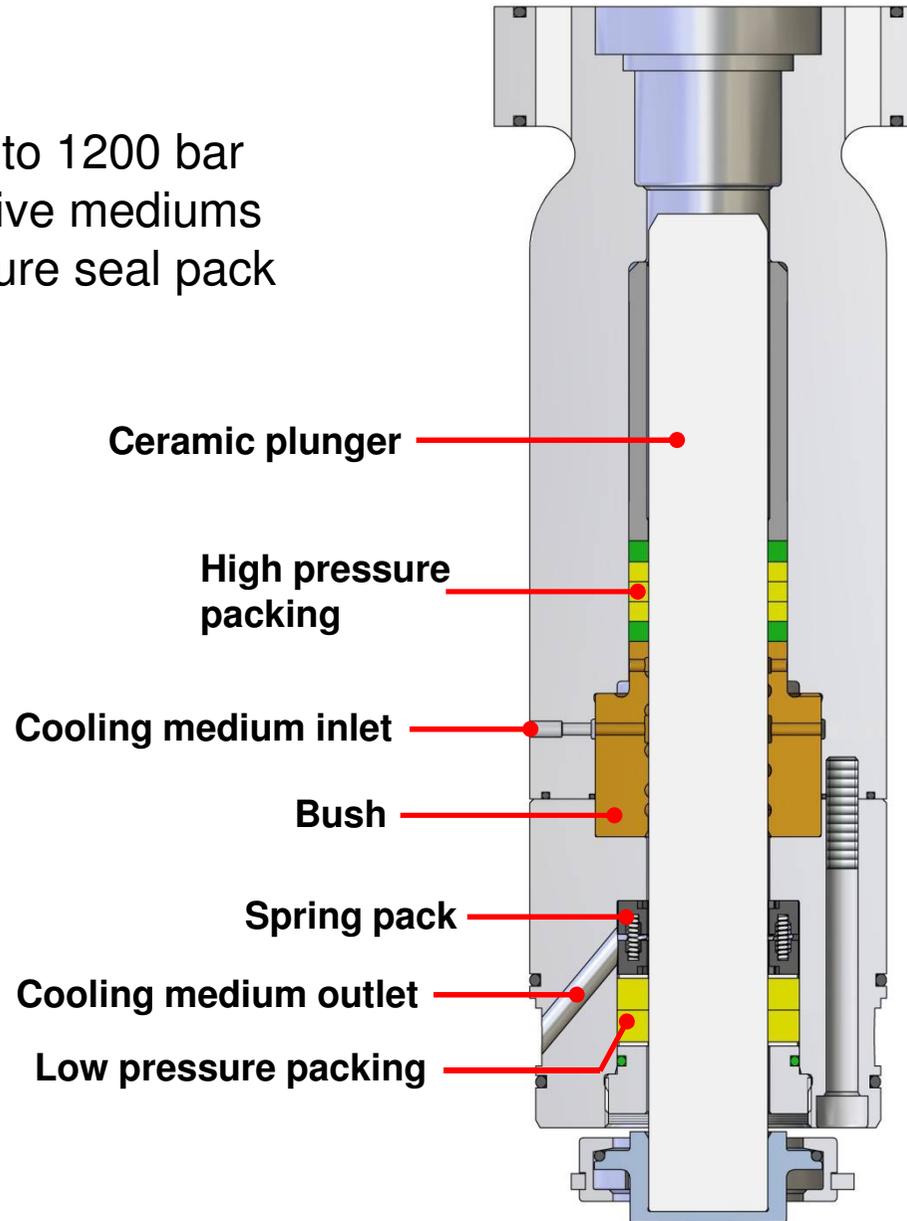
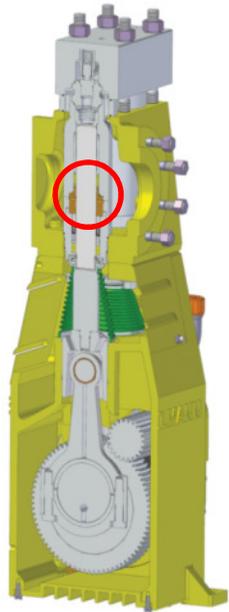
The distortion is achieved by forcing ultra high pressure medium between the sleeve and the outer diameter of the labyrinth bush.



## Piston sealing

## Packed sealing

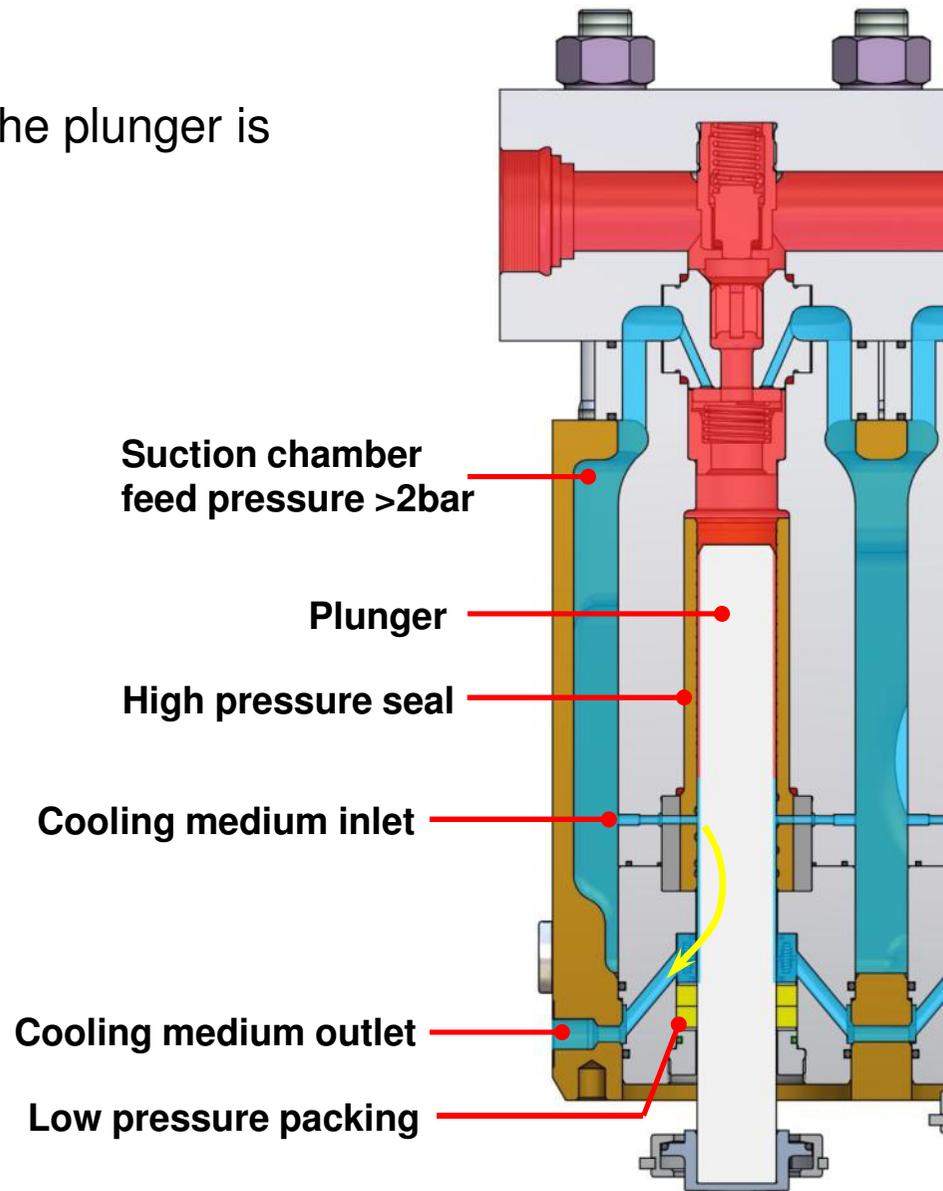
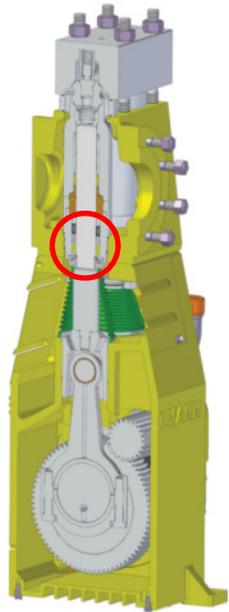
- ▶ Operating pressures up to 1200 bar
- ▶ For abrasive and corrosive mediums
- ▶ Self adjusting low pressure seal pack



# Plunger cooling



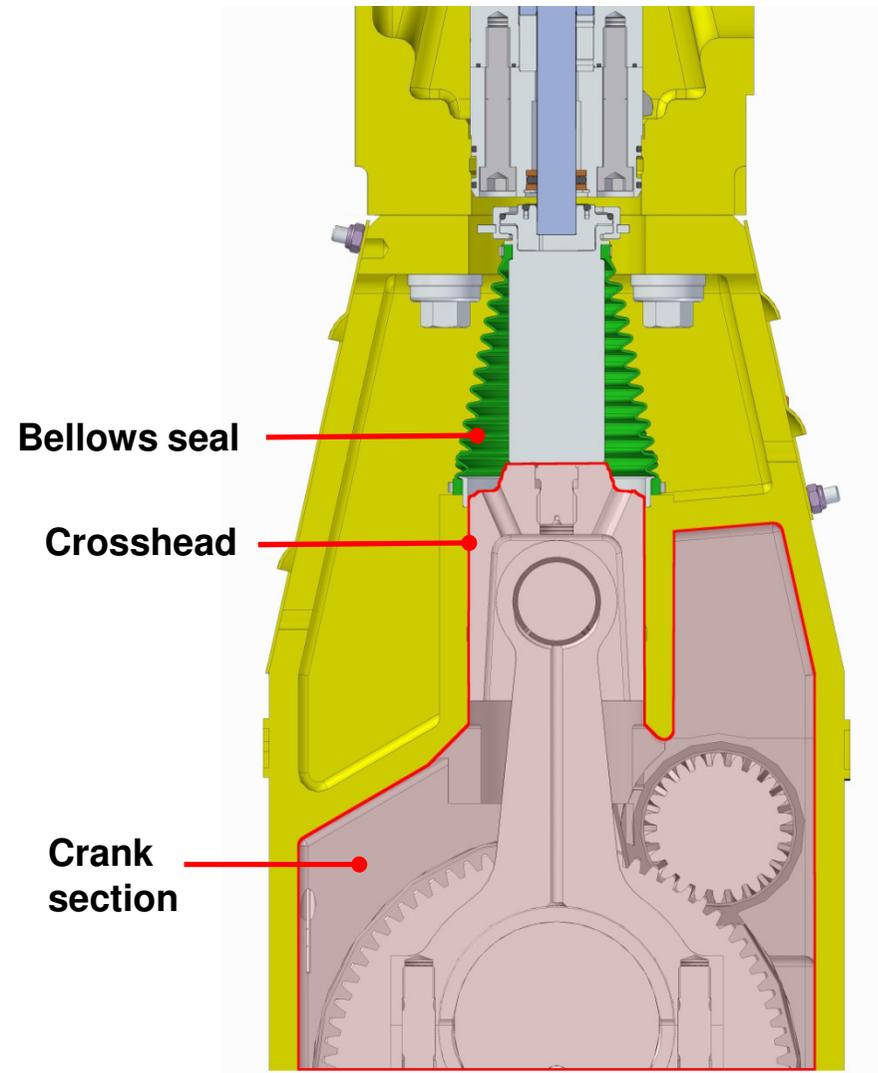
The low pressure side of the plunger is cooled by the medium.



## Bellows seal

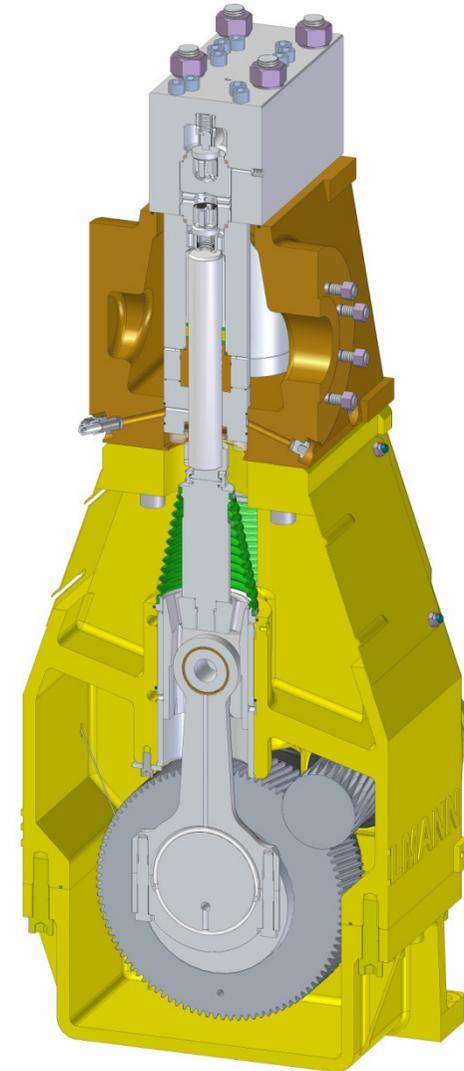
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- ▶ Hermetically separates medium end from power end
- ▶ Prevents oil from emitting the power end
- ▶ Prevents medium and dirt entering the power end
- ▶ Standard material: FKM (Viton®) optional NBR oder PTFE (Teflon®)



## Drive end (crank section)

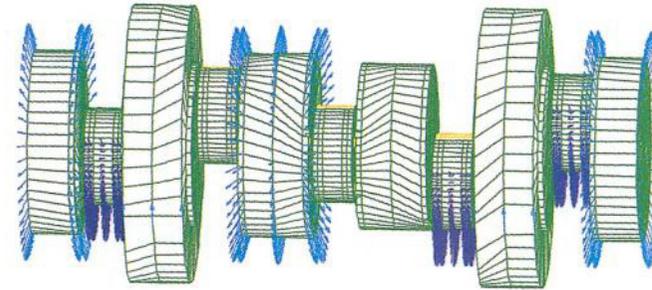
- ▶ Designed for a minimum of 25000 operating hours
- ▶ All models from the HDP70 and upwards have an integral reduction gearbox
- ▶ The various gear ratios allow a wide range of drivers (motors, engines)
- ▶ > 95% mechanical efficiency
- ▶ Pressurised lubrication system
- ▶ Compact construction
- ▶ Low maintenance  
Service interval: 4000 hrs or yearly



## Drive end (crank section)

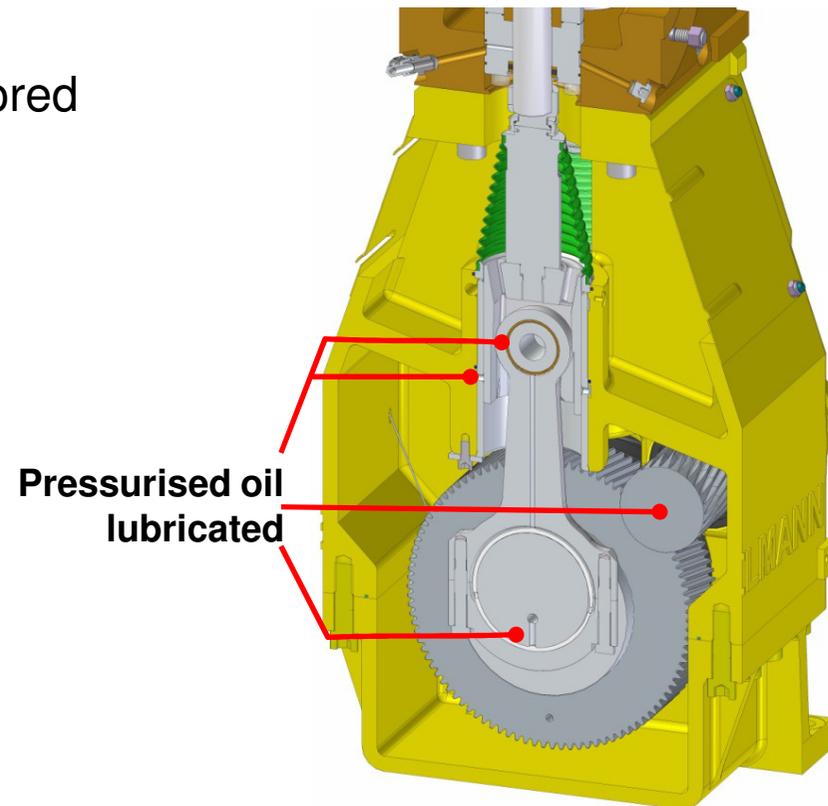
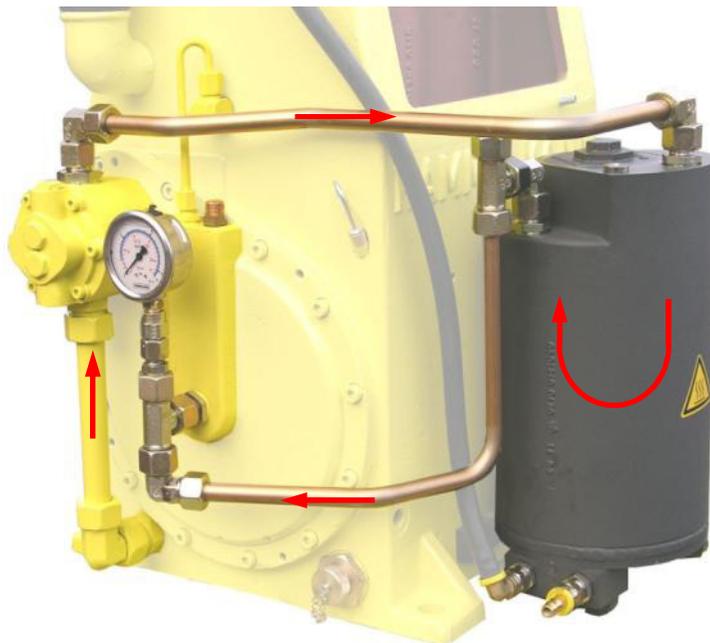
### Crank shaft – gear drive

- ▶ FEM employed for designing the crank shaft
- ▶ Centrally located helical gear wheels
  - ▶ Equal load transmission
  - ▶ Self centring
  - ▶ Quiet operation
  - ▶ Compact
- ▶ Crank shaft supported by roller bearings
- ▶ Conrods with slide bearings
- ▶ With pressurised oil lubrication (Pump, Filter, Cooler)



## Pressurised oil lubrication system

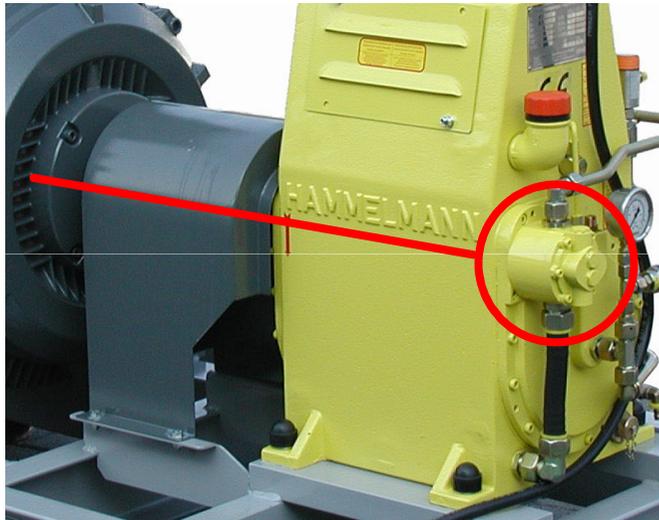
- ▶ Forced lubrication of all rotating and sliding parts
- ▶ Maximum operating safety
- ▶ Constant temperature level
- ▶ Cooled and filtered oil
- ▶ Oil pressure and temperature monitored



# Pressurised oil lubrication system



## Lubrication system variants



**Flange mounted oil pump,  
Driven with engine speed**



**External oil pump**

# Pressurised oil lubrication system



## Lubrication system variants



series 40,70



series 120,140,170,250



series 380,500,800,MC

## Vertical pump configuration

- ▶ The crosshead and plunger weights are neutralised within the sealing system reducing wear on all oscillating components
- ▶ Automatic air venting of wetted parts decreases risk of cavitation
- ▶ The pump is completely within the base frame resulting in compact units
- ▶ Oscillating forces are vertically absorbed by the base frame



**Many thanks for your attention!**