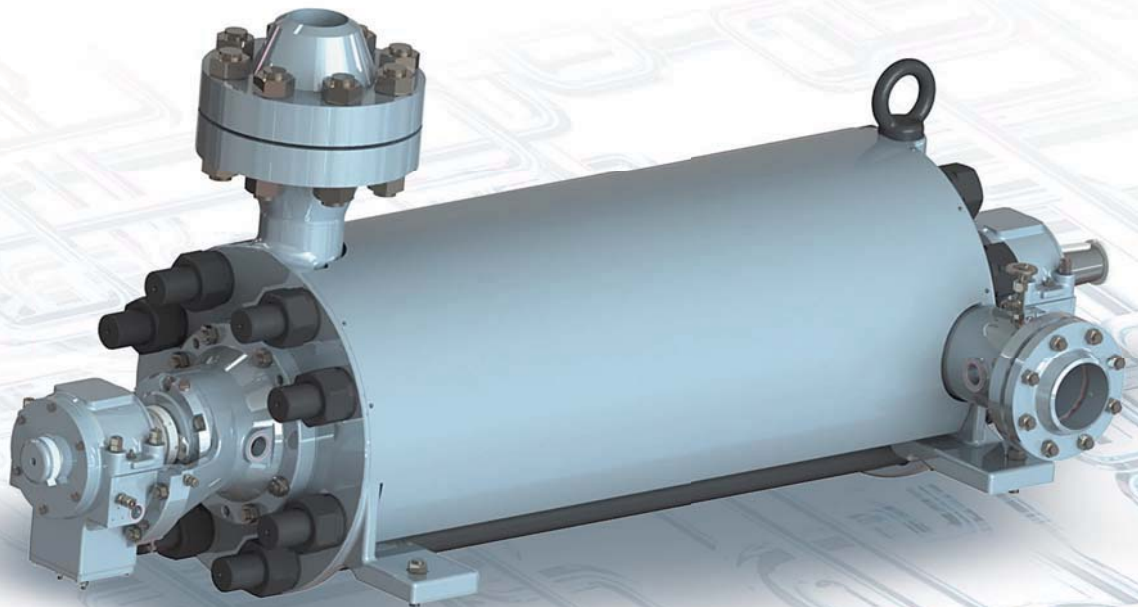




ENGINEERING FLOW SOLUTIONS

**CNS**

**BB-4 SINGLE-CASING, RADIALY SPLIT,  
MULTISTAGE, BETWEEN-BEARINGS  
PUMPS FOR WATER INJECTION**



# CNS Pumps For Water Injection Systems



## Description

The CNS series pumps are centrifugal, single-casing, radially split, multistage, between-bearings ones, a BB4 type of the API 610 standard. Due to optimized design features and construction materials have proven their high efficiency, reliability and easy maintenance. Available in extensive range of models.

The CNS pumps have been developed using advanced 3D and CFD methods for maximum efficiency and lowered vibration.

Nasosenergomash (HMS Group division in Sumy, Ukraine) is the manufacturer of the CNS pumps.

## Application

- Water injection systems at the oilfield formation pressure maintain facilities.
- Oilfield water treatment facilities.

## Materials

Casing	ASTM 352 / 352M with corrosion-resistant surfacing
Impeller and diffuser	AISI 420 and AISI 420F
Shaft	AISI 5135, AISI 5135 H, AISI 5140, AISI 5140 H
Sealing	Gland or mechanical seal

Material options	Duplex SS	Superduplex SS
Casing	Duplex SS, GX2CrNiMoCuN-25-6-3-3	Superduplex SS, GX2CrNiMoN-26-7-4
Impeller and diffuser	Duplex SS, GX2CrNiMoCuN-25-6-3-3	Superduplex SS, GX2CrNiMoN-26-7-4
Shaft	Duplex SS, X2CrNiMoN-22-5-3	Superduplex SS, X2CrNiMoCuWN-25-7-4
Seals	Duplex SS with special surfacing	Superduplex SS with special surfacing

## Parameters

- Capacity range: 30 - 1000 m<sup>3</sup>/h
- Head: up to 2400 m
- Efficiency: up to 83%

## Tests

A unique testing equipment, available at the manufacturing enterprises of the HMS Group, is used for the full load string tests with simulation of the real operating parameters including rotation speed, capacity, head, drive power:

- Capacity: up to 25 000 m<sup>3</sup>/h
- Head: up to 4000 m
- Power up to 14 MW
- Water temperature up to 350 °C

Performance tests including cavitation are carried out in automatic mode. All measuring equipment complies with ISO9906:1999. The customer receives all pumps with proven parameters.

# CNS Pumps. Pumped Liquids



## Standard

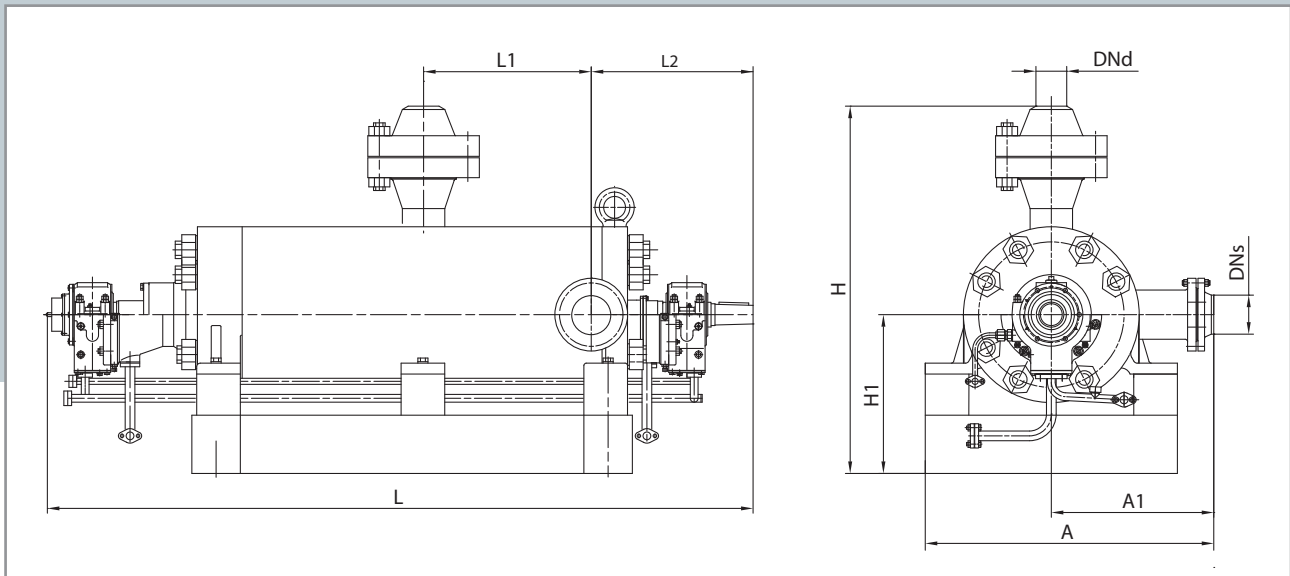
Pure and oilfield waters without no hydrogen sulfide						
Temperature, °C		0...60				
Solids size (max), mm		0.1				
Density, kg/m <sup>3</sup>		1000...1050				
ph		6.5...9				
Ion content (max), mg/l						
Cl <sup>-</sup>	SO <sub>4</sub> <sup>-</sup>	HCO <sub>3</sub> <sup>-</sup>	Ca <sup>++</sup>	Mg <sup>++</sup>	Na+K <sup>++</sup>	CO <sub>2</sub>
1500	100	50	1000	500	3000	3000
petroleum products content, mg/l, max				100		

## Wear-and-corrosion resistant

Heavy duty condition water of severe chemical composition (with hydrogen sulfide)				
Temperature, °C		0...80		
Solids size (max), mm		0.2		
Density, kg/m <sup>3</sup>		1000...1200		
ph		4...9		
Ion content (max), mg/l				
Cl <sup>-</sup>	SO <sub>4</sub> <sup>-</sup>	HCO <sub>3</sub> <sup>-</sup>	Ca <sup>++</sup>	Mg <sup>++</sup>
150000	1000	200	10000	2500
N+K <sup>++</sup>	Fe	CO <sub>2</sub>	O <sub>2</sub>	H <sub>2</sub> S
60000	200	300	5	400
petroleum products content, mg/l, max			200	

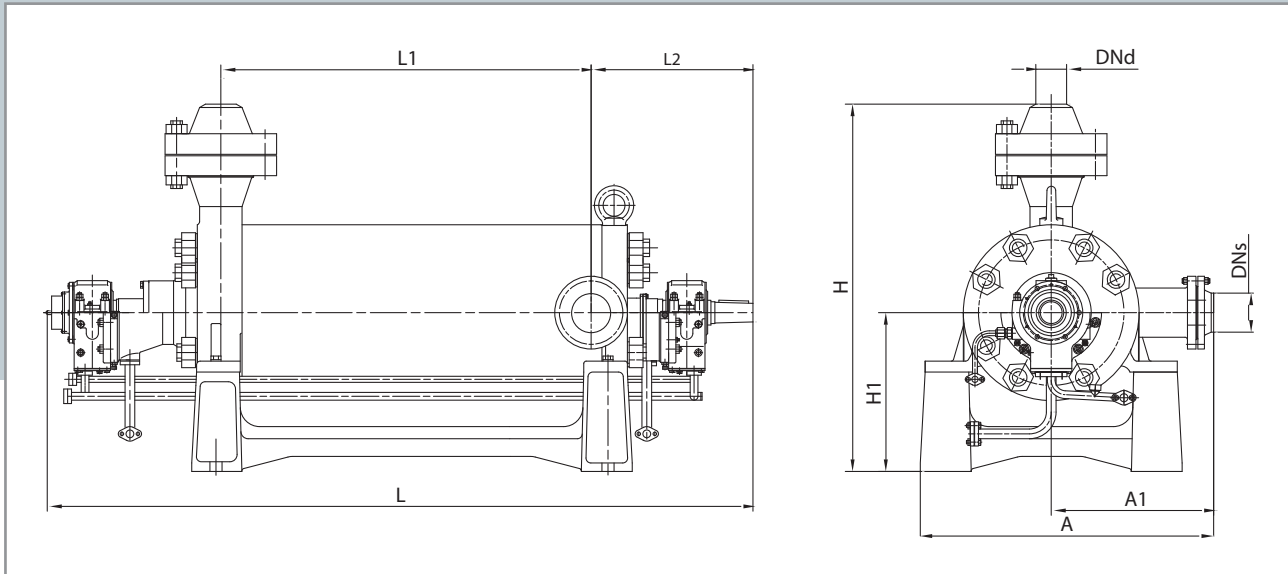
Pumps casing and diffuser material options depend on characteristics of the liquid being pumped.

# CNSp Pump Of «Back-To-Back» Design



Model	DNs	DNd	A	A1	H	H1	L	L1	L2
CNSp45-1050-2	150	125	1230	670	1425	565	2402	594	625
CNSp45-1422-2					1515	655	2782	784	
CNSp45-1900-2					3162	974			
CNSp63-1050-2					1425	565	2402	594	
CNSp63-1422-2					1515	655	2782	784	
CNSp63-1900-2					3162	974			
CNSp90-1050-2					1425	565	2402	594	
CNSp90-1422-2					1515	655	2782	784	
CNSp90-1900-2					3162	974			
CNSp120-1050-2					1425	565	2402	594	
CNSp120-1422-2					1515	655	2782	784	
CNSp120-1900-2					3162	974			
CNSp180-1050-2					1425	565	2402	594	
CNSp180-1422-2					1515	655	2782	784	
CNSp180-1900-2					3162	974			
CNSp240-1050-2					1425	565	2402	594	
CNSp240-1422-2					1515	655	2782	784	
CNSp240-1900-2					3162	974			
CNSp315-1050-2	200	150	1275	685	1635	675	2354	594	640
CNSp315-1422-2							2639	784	
CNSp315-1900-2							3019	974	

# CNS Pump Of «In-Line» Design



Model	DNs	DNd	A	A1	H	H1	L	L1	L2
CNS30-800-2	80	65	730	345	1060	490	2120 (2420)*	1059	510
CNS30-1050-2			700	440**	1290	650	2490 (2790)*	1237	635
CNS30-1422-2							2595 (2895)*	1342	
CNS45-1050-2	150	125	1210	670	1425	565	2220 (2520)*	902	625
CNS45-1422-2					1515	655	2505 (2805)*	1187	
CNS45-1900-2					2885	3185)*	1567		
CNS63-1050-2					1425	565	2220 (2520)*	902	
CNS63-1422-2					1515	655	2505 (2805)*	1187	
CNS63-1900-2					2885	3185)*	1567		
CNS90-1050-2					1425	565	2220 (2520)*	902	
CNS90-1422-2					1515	655	2505 (2805)*	1187	
CNS90-1900-2					2885	3185)*	1567		
CNS120-1050-2					1425	565	2220 (2520)*	902	
CNS120-1422-2					1515	655	2505 (2805)*	1187	
CNS120-1900-2					2885	3185)*	1567		
CNS180-1050-2					1425	565	2220 (2520)*	902	
CNS180-1422-2					1515	655	2505 (2805)*	1187	
CNS180-1900-2					2885	3185)*	1567		
CNS240-1050-2					1425	565	2220 (2520)*	902	
CNS240-1422-2					1515	655	2505 (2805)*	1187	
CNS240-1900-2					2885	3185)*	1567		
CNS315-1050-2	200	150	1275	685	1635	675	2407 (2707)*	955	640
CNS315-1422-2							2715 (3015)*	1261	
CNS315-1900-2							3020 (3320)*	1567	
CNS500-1050-2	300	200	1330	685**	1727	790	2209 (2509)*	832	730
CNS500-1422-2							2346 (2646)*	969	
CNS500-1900-2							2620 (2920)*	1243	
CNS630-1050-2							2209 (2509)*	832	
CNS630-1422-2							2346 (2646)*	969	
CNS630-1700-2							2620 (2920)*	1243	
CNS630-1900-2							2620 (2920)*	1243	
CNS720-1050-2							2209 (2509)*	832	
CNS720-1422-2							2346 (2646)*	969	
CNS720-1900-2	2620 (2920)*	1243							

\* Dimensions in brackets are for CNS Pumps with thrust bearing

\*\* Suction nozzle is directed upwards

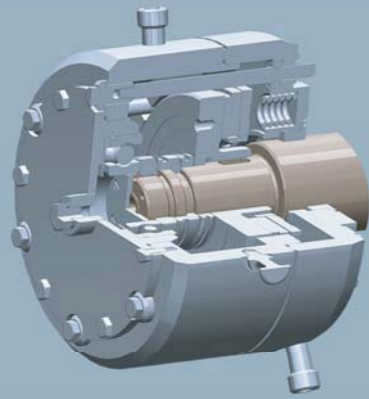


Fig.1

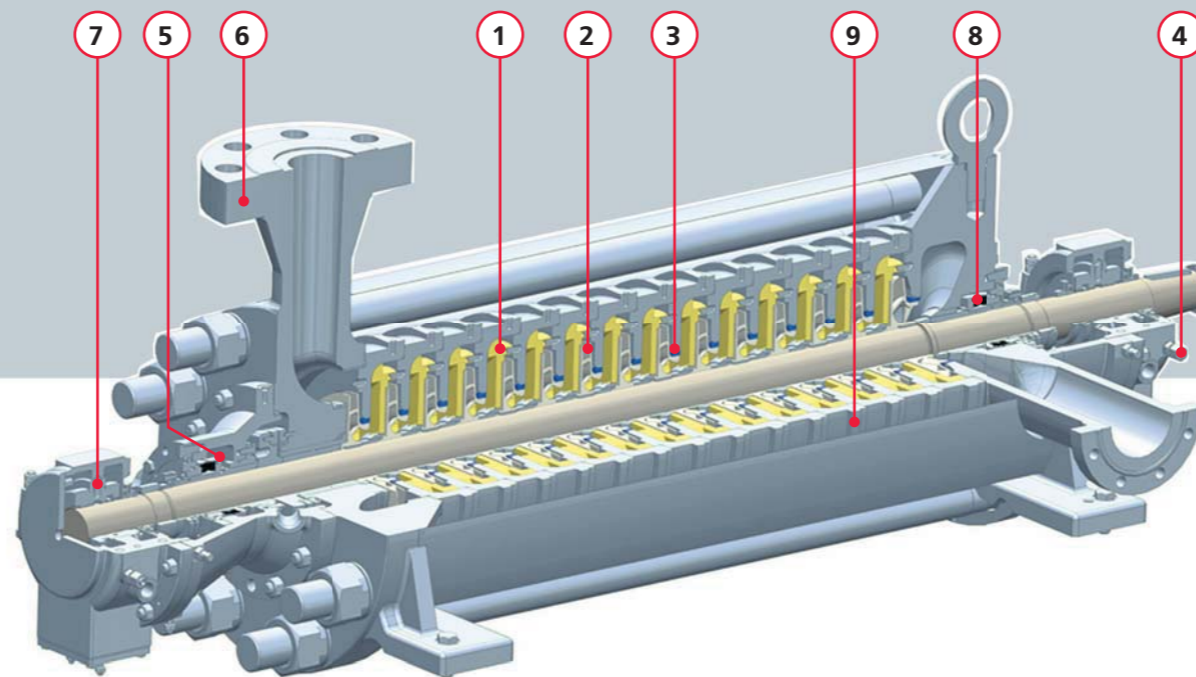
## Reliability

- 1 - Pumps have been designed with 3D modeling methods. Flow part has been designed with the help of advanced CFD methods to achieve the maximum efficiency and performance.
- 2 - Wear-resistant replaceable wearing rings made of new special materials.
- 3 - Special corrosion-resistant surfacing for efficiency increase and to slow wearing.
- 4 - Bearings vibration and temperature sensors installation spots provided in the bearings housings.

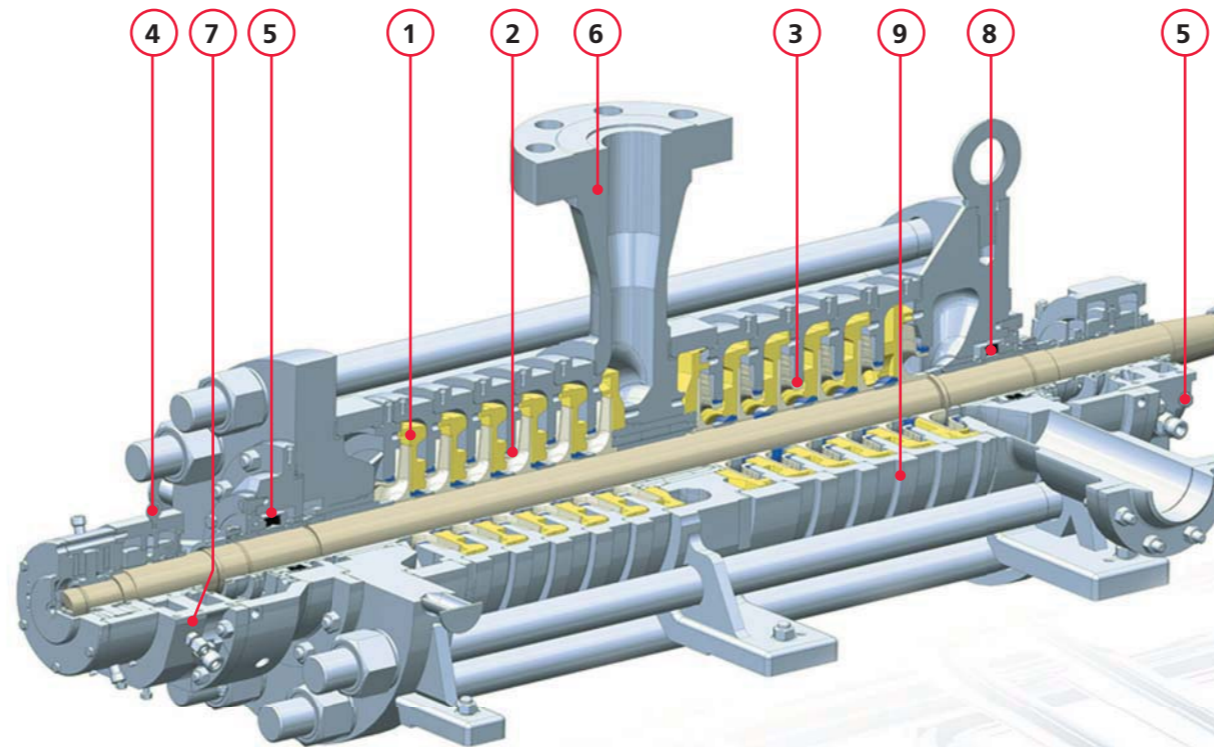
Pull-off device for hydraulic balancing disc (Fig. 1) for guaranteed clearance between rotor and stator parts in off-loading unit at the pump starts / stop for longer life of hydraulic balancing disc device.

CNS pumps are optionally available with Back-to-Back impellers and thrust bearing for axial load compensation.

Duplex and Super Duplex steel as a pump construction materials (option) are available for corrosive liquids.



CNS pump of «in-line» design



CNSp pump of «back-to-back» design

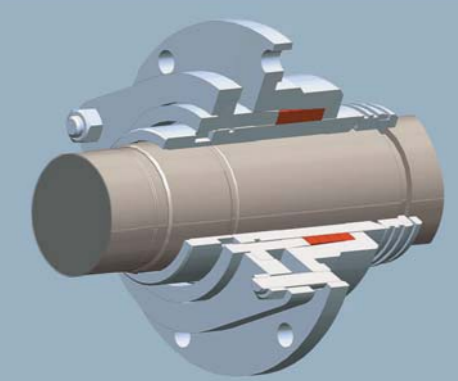


Fig.2

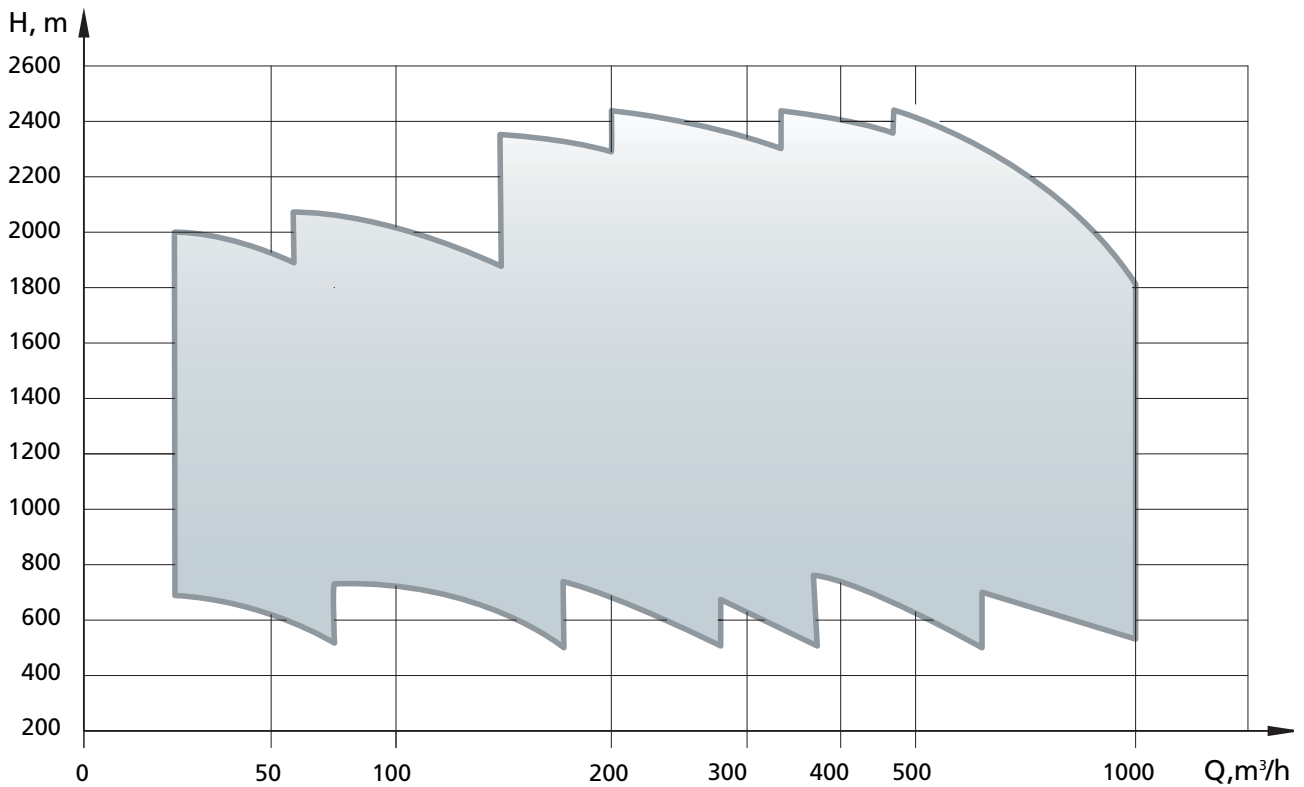
## Easy Installation / Maintenance

- 5 - Mechanical seals complied with API 682 to ensure application of seals from various manufacturers.
  - 6 - Flanges according to DIN / ANSI / ISO (option).
- The pump is typically supplied on a separate baseplate or on a general baseplate with motor (option).
- Maintenance-free elastic diaphragm coupling to reduce vibration.

## Low cost of operation

- 7 - Bearings come with grease or oil bath lubrication.
- 8 - Stuffing box or mechanical seals application (Fig. 2). Cyclone separators (option) for solids-contaminated liquids.
- 9 - Highly unified main parts between pumps of different sizes for low installation and start-up costs, reduced parts inventories, decreased maintenance cost, shorter downtime and enhanced operability.

# CNS Pumps For Water Injection Systems



## Scope Of Supply\*

- Pump (assembled) with shaft sealing and flanges
- Electric motor
- Coupling with guard
- Auxiliary pipelines
- Baseplate with supports
- Lubrication system
- Instruments
- Spare parts, tools and accessories
- Manual and documentation

\* Scope of supply is the subject of a specific supply conditions

## Options

- Bearings with forced or oil bath lubrication
- Hydrocyclones
- Elastic diaphragm coupling
- Oil cooler (air or water), oil lubrication system with gear or centrifugal oil pump
- Single baseplate for pump with motor
- Welded or cast baseplate (frame)
- Explosion-proof version
- DIN / ANSI / ISO flanges

# Integrated Client Support



## Integrated Client Support Approach

### I. Project Audit

- Technical audit
- Scope of works definition
- Project scheduling and budgeting

### II. Engineering, Procurement, Manufacture, Testing

- Design and engineering dossier
- Manufacturing of main process equipment (pumps, compressors, pressure vessels, heat exchangers)
- Outsourcing of auxiliaries
- Factory assembly
- Factory Acceptance Test

### III. Supply and Site Services

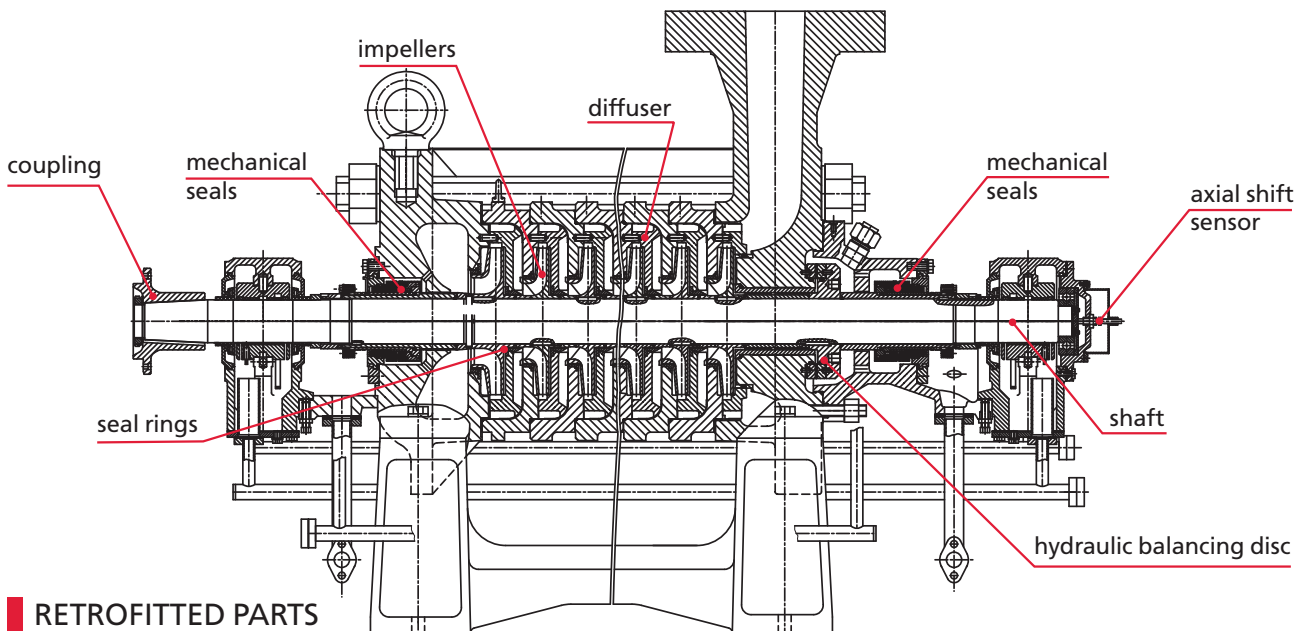
- Shipment
- Site installation
- Pre-commissioning
- Site Performance Tests
- Site Supervision and on-the-job training
- After sales servicing and counseling

## Integrated Client Support Advantages

- Single source responsibility
- Effective project management
- Less project costs



# CNS Pumps Retrofit



HMS Group offers the retrofit program for the earlier generation CNS pumps, which constitute a significant amount of the pumping equipment in the water injection systems used at the oil fields.

The retrofit program results in improved performance, reliability and maintainability of CNS pumps, as well as reduced energy consumption and significant durability increase.

## Scope of Work

- Audit
  - current status – defining and confirmation with a client
  - current energy consumption
- Defining optimal parameters
- Retrofit kit manufacturing
- Stand testing and trial running in the client presence with registration of results

- Pump overhaul with retrofit kits
- On-site installation, alignment, commissioning
- On-site testing to confirm stand results
- Monitoring and service maintenance

The HMS Group takes appropriate warranty liability in respect of supplied parts and components quality and implemented works under the CNS pumps retrofit.

# HMS Group for Oil & Gas



## Key Facts And Figures

The HMS Group is one of the leading manufacturers and flow control solution providers for oil & gas, power generation, water & utilities, steel & mining, and other industries in Russia and the CIS countries. The HMS Group considers the complex supplies of equipment for various industries as its strategic business direction.

The HMS Group incorporates 19 engineering and manufacturing affiliate companies located in Russia, Ukraine, Belarus and Germany currently employing over 17 000 people.

## R&D And Standards

The R&D infrastructure is represented by the six centrally managed R&D centers in Russia and CIS countries where the latest versions of engineering software and simulation methods are used including 3D modeling. Following the Quality Management System complied with ISO 9001:2008 the pumps for oil & gas applications are manufactured in accordance with international and national industrial standards as API, DIN, ANSI, ISO, GOST and can be tailored to the customer specification.

## Worldwide Sales And Projects

HMS Group's international branches and representative offices of the are located in Italy, UAE, Iraq, Turkmenistan and Uzbekistan.

The HMS Group has international experience in supply, commissioning and after sales service of the equipment in Western and Eastern Europe, Iraq, Indonesia, India, China, USA and other countries as well as EPC projects in Russia and in republics of the former USSR.

## Competences In Oil & Gas

### Pumps Engineering, Manufacture And Service

#### Upstream

- water injection pumps
- multiphase pumps
- pumps for oil transportation within oilfields
- pumps for primary oil processing
- auxiliary pumps

#### Midstream

- trunk pipeline pumps
- booster pumps
- leakages removal pumps

#### Downstream

- process & auxiliary pumps

### Compressors Engineering, Manufacture And Service

- centrifugal compressors
- gas-pumping units
- complete gas pumping stations

### Oil & Gas Equipment Engineering, Manufacture And Service

- modularized Cluster Pump Stations
- oil and water treatment units
- associated gas cleaning units
- oil, gas, and water metering units
- tanks and vessels



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