

PROCESS PUMPS AND SYSTEMS



- OIL & GAS INDUSTRY
- OFFSHORE
- PETROCHEMISTRY
- POWER PLANT ENGINEERING

APOLO
A member of
 **HMS**
GROUP
Pumps
Pumping Systems

APOLLO was established in 1863 as Machine building Company and Foundry.
Since over 100 years APOLLO is developing and manufacturing Pumps.
1990 we have established a new company division – the System Engineering Division.

APOLLO was celebrating its 150th anniversary in 2013.

With our strategy – Manufacture of high-quality Process Pumps in connection with pump-specific Plant Systems – we provide complete solutions of high reliability and low operational cost for our Customers.



■ Heavy-duty APOLLO-process pump with two-stage according to API for Offshore application on the test field.

Modern Test Field Units ensure test conditions close to real operating conditions.

- frequency range: 50-/60-Hz
- high power ranges up to 14 MW
- tests with voltage levels of 400 V up to 13 KV with variable operation via Frequency Converter



■ Quality Assurance also in local application by means of flexible portable 3D-Coordinates Measuring Unit.

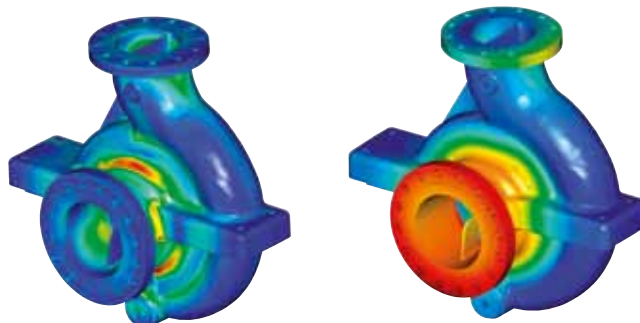
Quality Assurance in all Company Divisions is part of our central tasks.

APOLLO is certified by Lloyd's Register Quality Assurance according to ISO 9001.

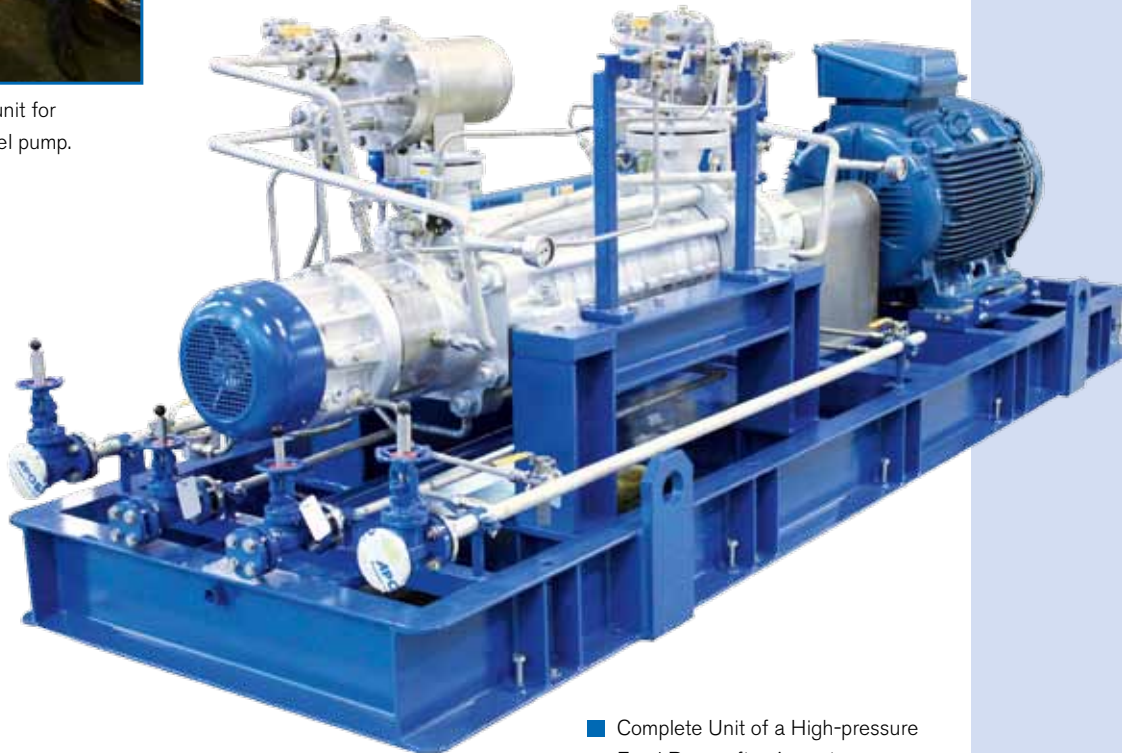


■ Assembly of an insert unit for horizontal process barrel pump.

Up-to-date development methods of Design, like continuous hydraulic design by means of CFD software, an interface 3D-CAD/CAM for fabrication of casting patterns and modern CNC manufacture ensure high Quality Safety and quick lead time.



■ FEM Analysis of volute casing of a heavy-duty process pump of type KRH.



■ Complete Unit of a High-pressure Feed Pump after Acceptance.



■ Apollo guarantees quick service worldwide.

We offer our customers a full range of service starting from commissioning of complete pump skids, repair, retrofit, maintenance and delivery of spare parts and technical support. Furthermore we consult our customers in operating our pumps and systems.

Range of Application

- Refineries
- Offshore
- High-temperature applications
- Power plant engineering
- Petrochemical plants

Operating Data

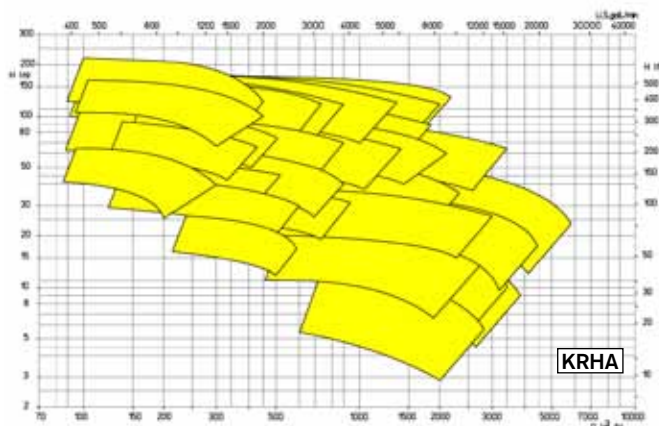
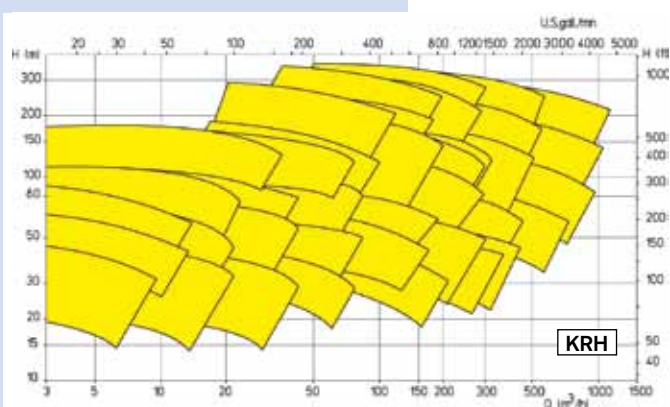
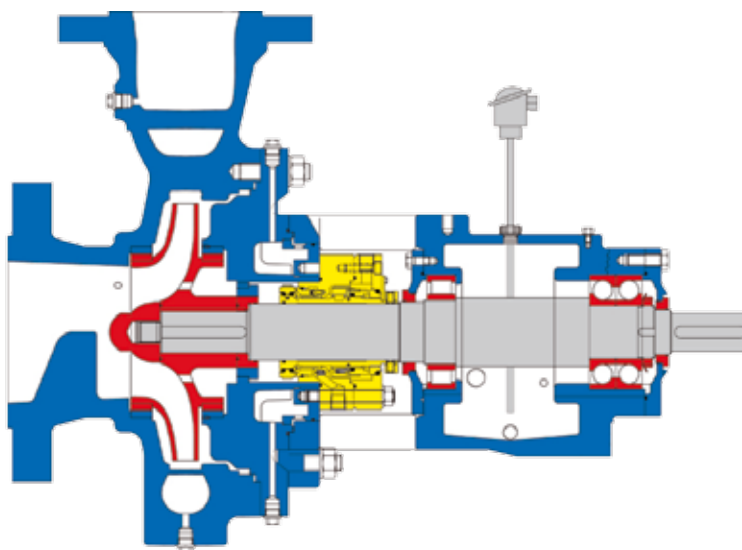
	KRH	KRHA
Q (m³/h)	1000	5000
H (m)	320	220
P (bar)	55/90	55
T (°C)	+450	+450

Design features

- pump meets all requirements of API 610
- horizontal, single-stage, radial-split, heavy-duty design
- axial suction nozzle, radial discharge nozzle
- centre-supported
- back-pull-out version
- design with inducer possible

Materials

- Cast steel
- Chrome steel
- Austenitic steel
- Duplex and super duplex steel
- Titanium
- Special alloys according to NORSOK, NACE

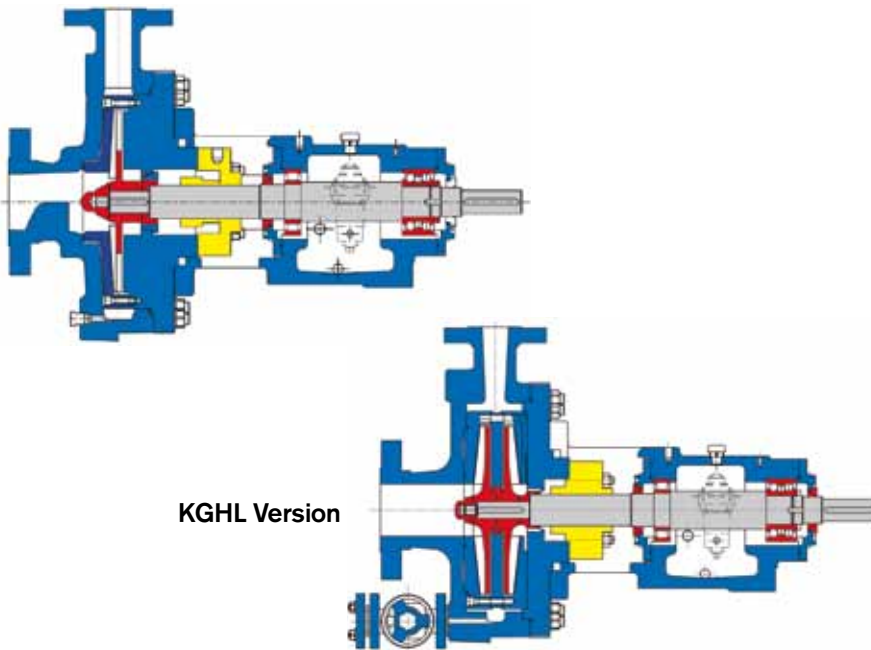
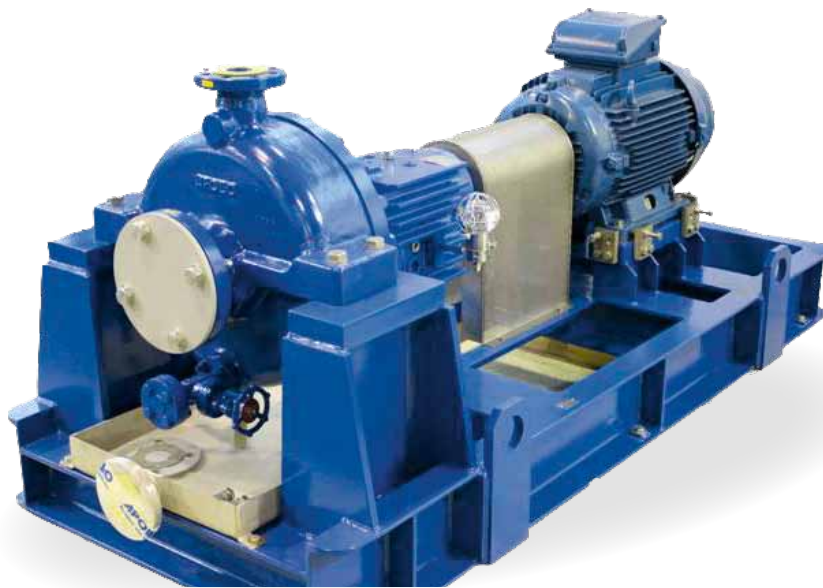


KRHL / KRPO / KGHL

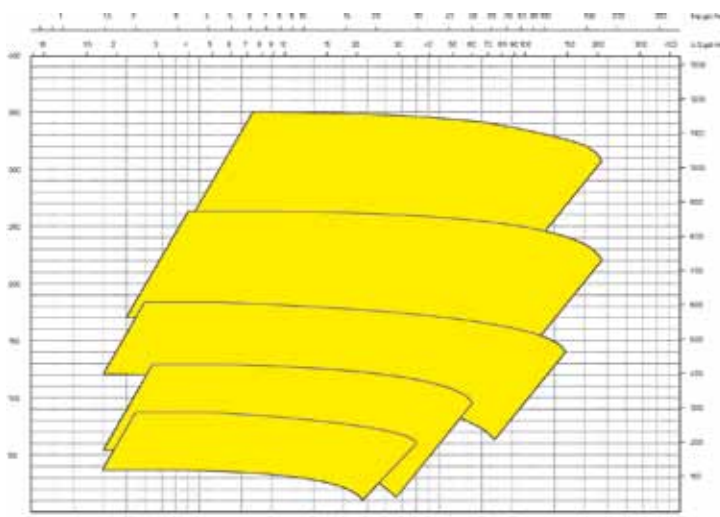
Horizontal, single-stage/two-stage process pump with semi-open impeller according API 610 – Type OH2

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KGHL Version



Range of Application

- Refineries
- Offshore
- High-temperature applications
- Power plant engineering
- Petrochemical plants

Operating Data

	KRHL	KRPO	KGHL
Q (m³/h)	45	25	45
H (m)	270	210	350
P (bar)	50	50	50
T (°C)	+450	+450	+450

Design features

- pump meets all requirements of API 610
- version for low capacity and high head
- single-stage, one-flow, normal priming ring-section pump;
- two-stage KGHL version
- semi-open impeller with straight vanes
- optionally: exchangeable wear plate and inducer
- antifriction bearings with oil lubrication

Materials

- Cast steel
- Chrome steel
- Austenitic steel
- Duplex and super duplex steel
- Titanium
- Special alloys according to NORSOK, NACE

Range of Application

- Refineries
- Offshore
- Power plants
- Gas process plants
- Petrochemical plants

Operating Data

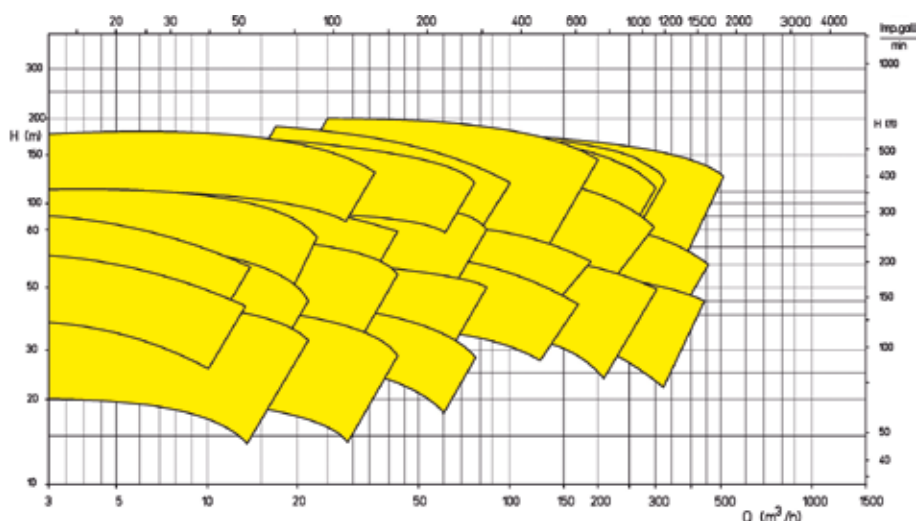
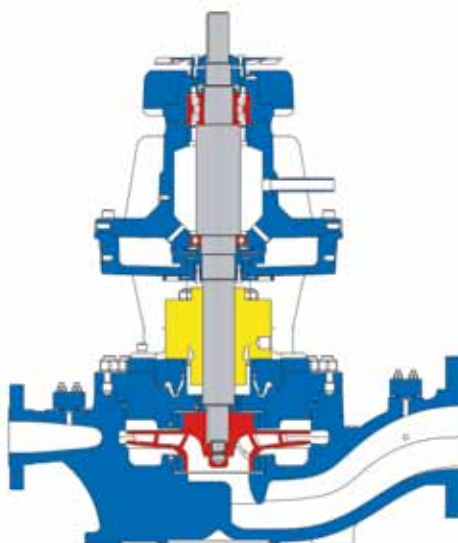
	KRI	KRIL
Q (m³/h)	600	45
H (m)	320	270
P (bar)	55	50
T (°C)	+385	+385

Design features

- pump meets all requirements of API 610
- vertical, normal priming, single-stage pump of process design
- discharge and suction nozzle are of inline arrangement
- KRIL as version for low capacity
- with grease or oil lubrication

Materials

- Cast steel
- Chrome steel
- Austenitic steel
- Duplex and super duplex steel
- Titanium
- Special alloys according to NORSOK, NACE

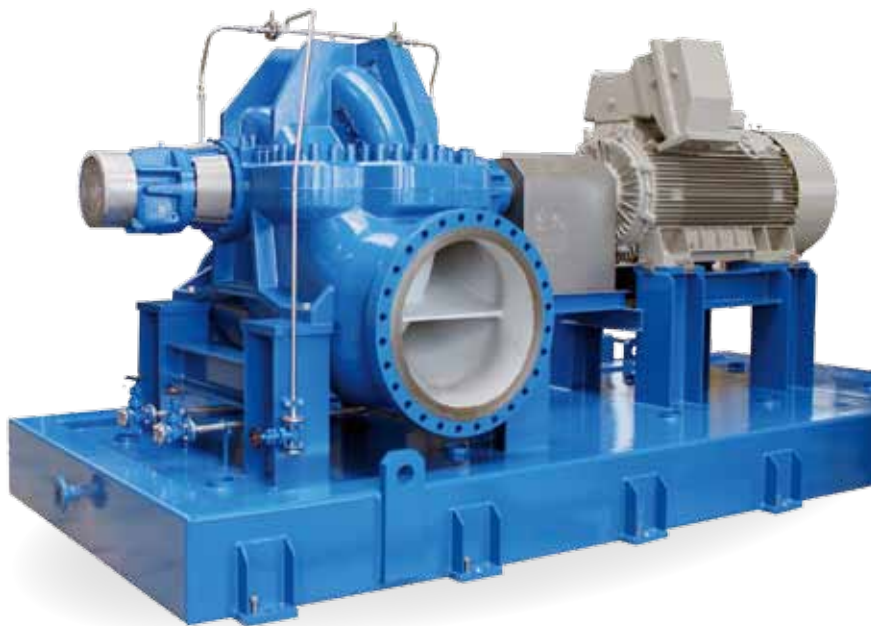


ZMK / ZMKV

Heavy-duty, axially split, single-stage process pump,
between-bearings version according to API 610 – Type BB1

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Range of Application

- Refineries
- Offshore
- Power plant engineering
- Oil and Gas Industry
- Water supply and waste water applications

Operating Data

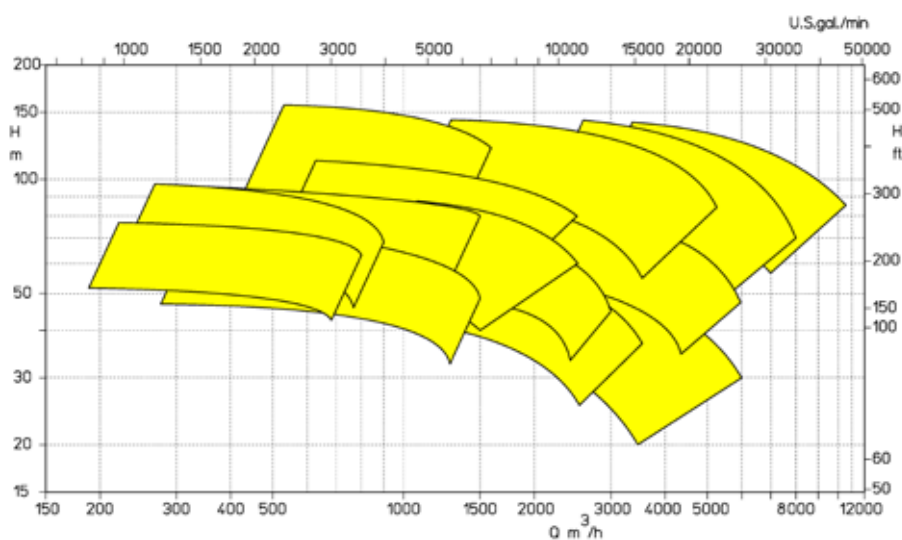
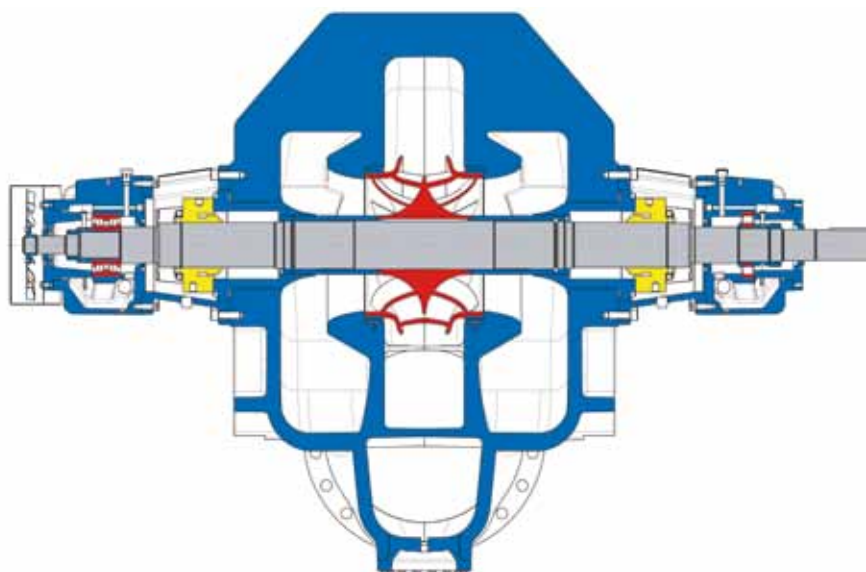
	ZMK	ZMKV
Q (m³/h)	10000	5500
H (m)	140	140
P (bar)	25/40	25/40
T (°C)	150	150

Design features

- pump meets all requirements of API 610
- thrust compensation by double suction impeller design
- double-volute design
- replaceable wear and split rings ensure maximum maintainability and high operating safety

Materials

- Cast steel
- Chrome steel
- Austenitic steel
- Duplex and super duplex steel
- Special alloys according to NORSOK, NACE



Range of Application

- Refineries
- Offshore
- Power plants
- Petrochemical plants

Operating Data

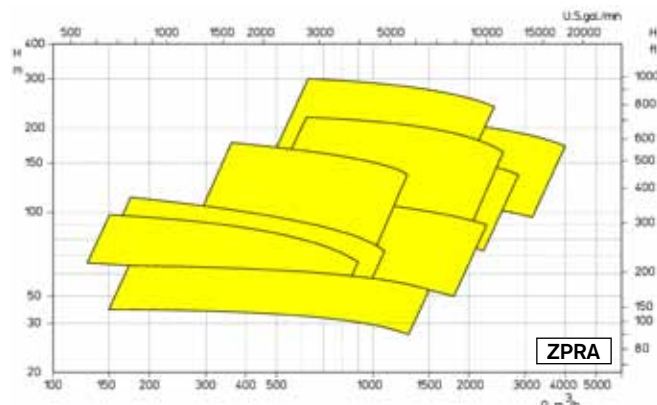
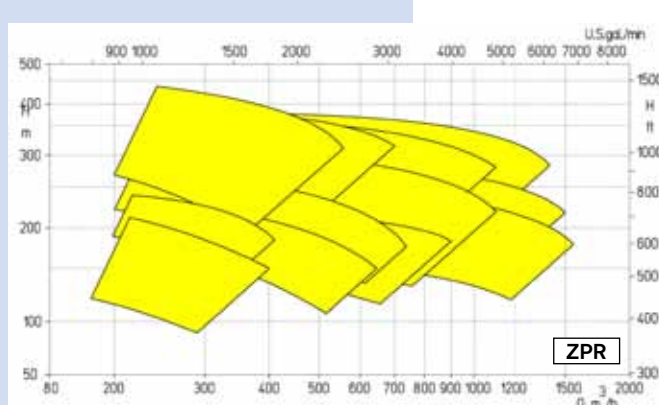
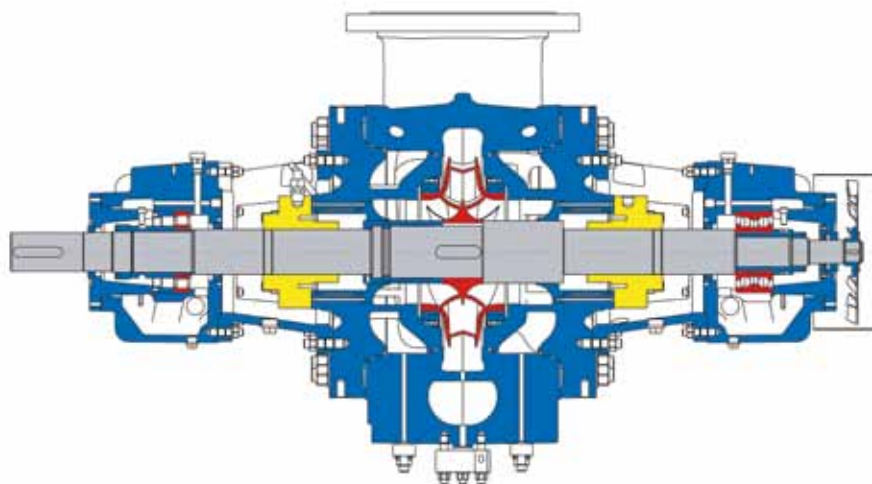
	ZPR	ZPRA
Q (m³/h)	1500	4000
H (m)	400	300
P (bar)	160	55
T (°C)	+450	+450

Design features

- pump meets all requirements of API 610
- double suction impeller
- bearings on both sides
- radially split casing
- centre-supported
- bearing design: antifriction or slide bearings

Materials

- Cast steel
- Chrome steel
- Austenitic steel
- Duplex and super duplex steel
- Titanium
- Special alloys according to NORSOK, NACE

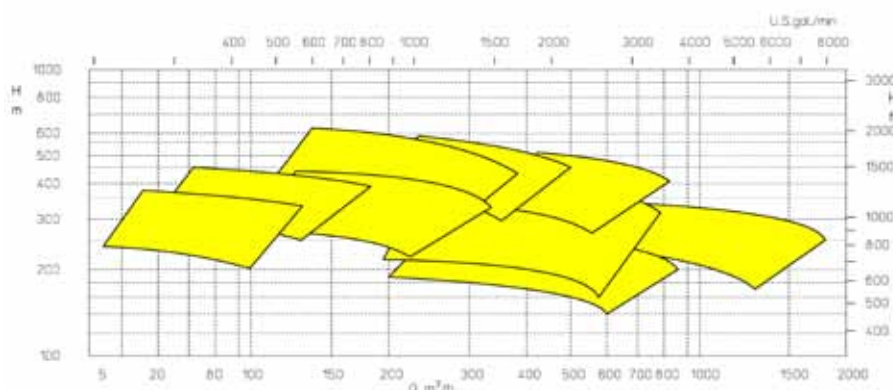
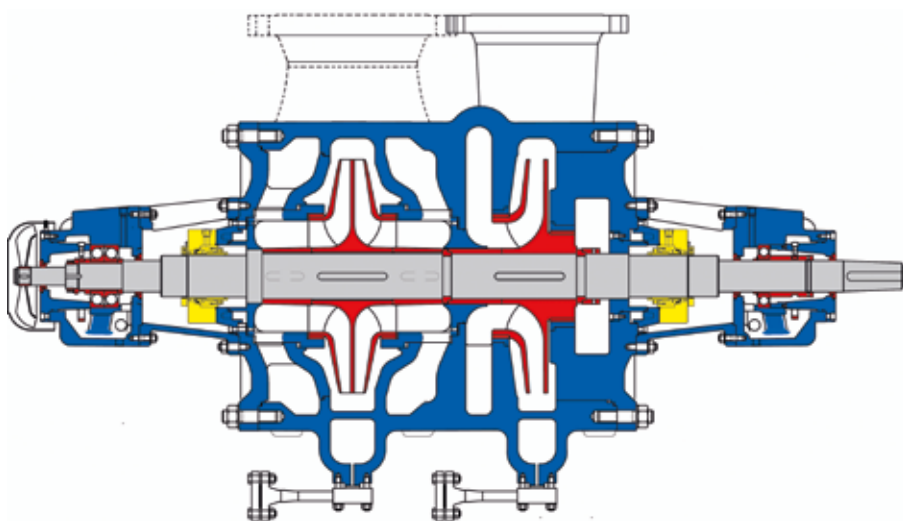


KGR / KGRD

Heavy-duty, radially split, two-stage process pump
between-bearings version according API 610 – Type BB2

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Range of Application

- Refineries
- Offshore
- Power plants
- Petrochemical plants

Operating Data

	KGR / KGRD
Q (m³/h)	1600
H (m)	600
P (bar)	80
T (°C)	+400

Design features

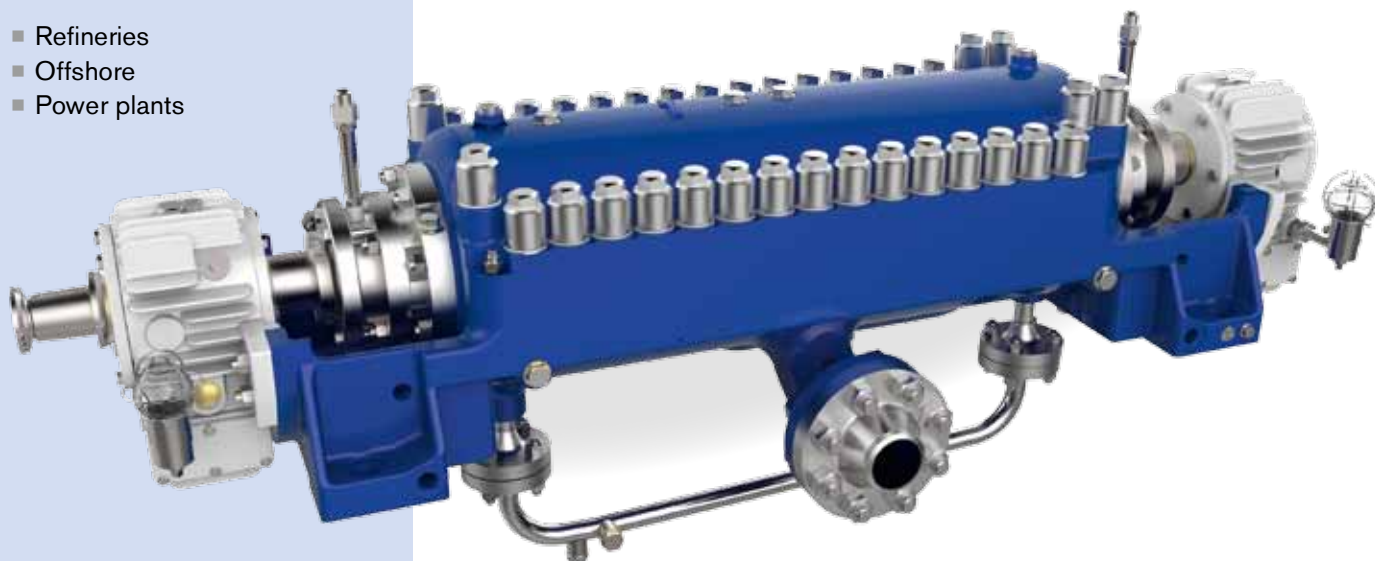
- pump meets all requirements of API 610
- axial thrust compensation due to back-to-back arrangement of impellers
- radially split casing and centre supported
- first impeller as single-flow or double-flow version
- between-bearings version
- bearing design: antifriction or slide bearings

Materials

- Cast steel
- Chrome steel
- Austenitic steel
- Duplex and super duplex steel
- Titanium
- Special alloys according to NORSOK, NACE

Range of Application

- Refineries
- Offshore
- Power plants



Operating Data

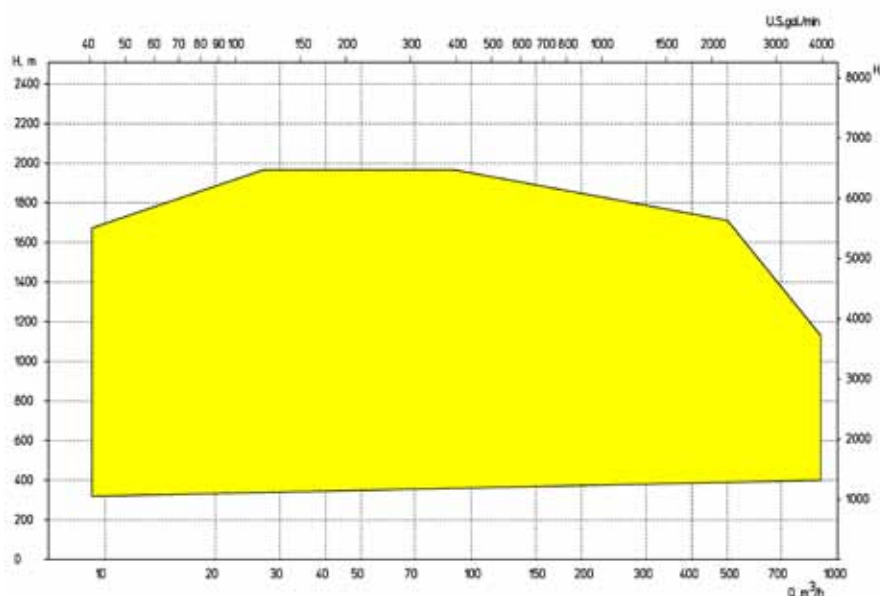
	AMG
Q (m³/h)	800
H (m)	1600
P (bar)	160
T (°C)	+200

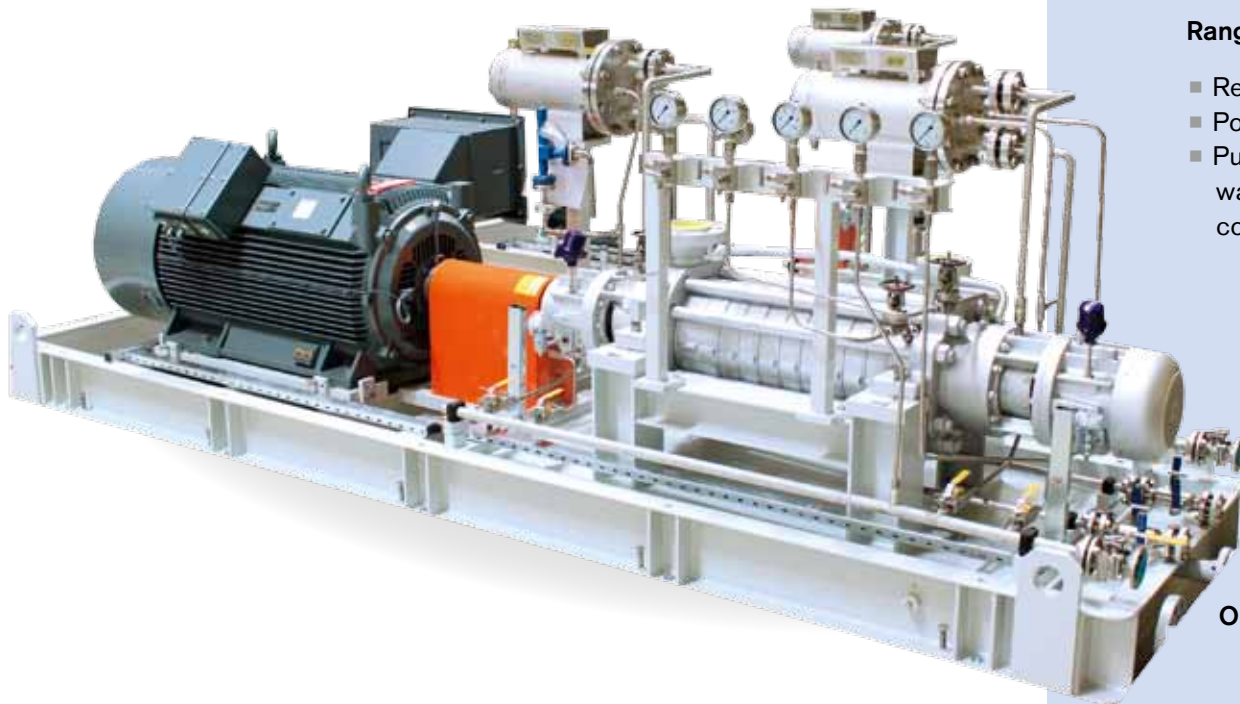
Design features

- pump meets all requirements of API 610
- axially split casing and centre supported
- axial thrust compensation due to back-to-back arrangement of impellers
- special NPSH impeller in first stage
- bearing design: antifriction or slide bearings

Materials

- Cast steel
- Chrome steel
- Austenitic steel
- Duplex and super duplex steel
- Special alloys according to NORSOK, NACE



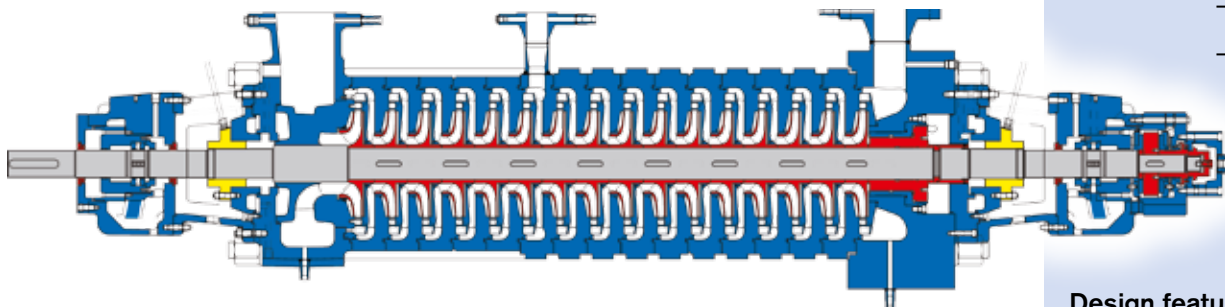


Range of Application

- Refineries
- Power plants
- Pumping of feed water and condensate

Operating Data

	HP
Q (m³/h)	900
H (m)	2800
P (bar)	300
T (°C)	+200

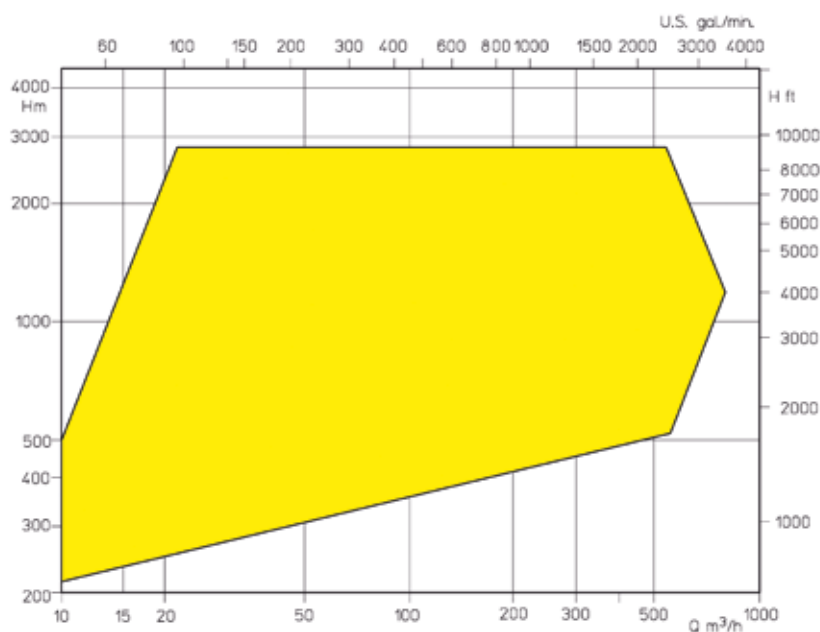


Design features

- pump meets all requirements of API 610
- designed with intermediate take-off and optimized pressure design within the pump
- version with NPSH impeller
- axial thrust compensation via balance piston, double piston or balance disk
- low vibration values
- bearing design: antifriction or slide bearings

Material

- Cast steel
- Chrome steel
- Ductile iron / ADI-material
- Austenitic steel
- Duplex and super duplex steel
- Special alloys according to NORSOK, NACE



Range of Application

- Offshore
- Refineries
- Brine feed
- Water injection
- Industrial application

Operating Data

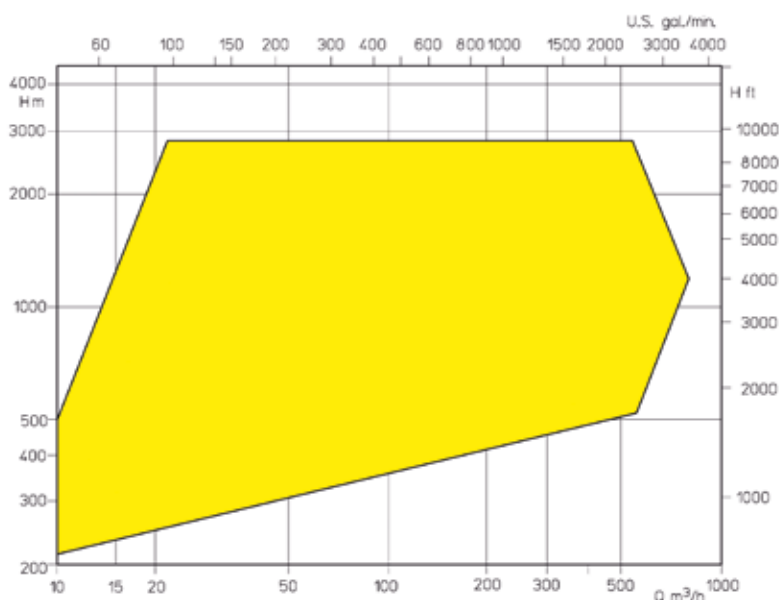
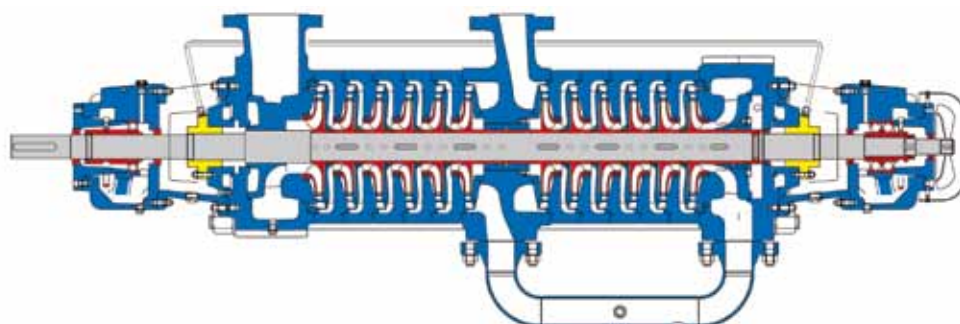
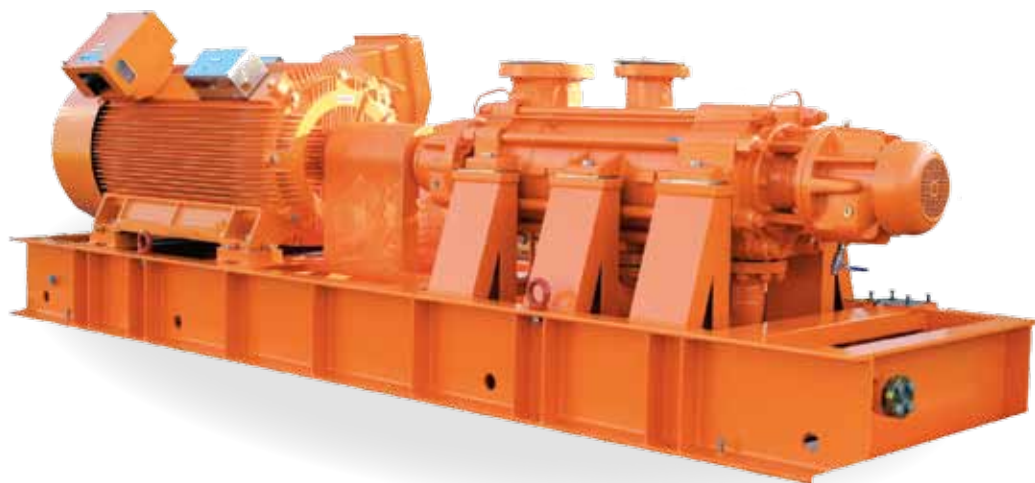
	GP
Q (m³/h)	600
H (m)	2800
P (bar)	250
T (°C)	+180

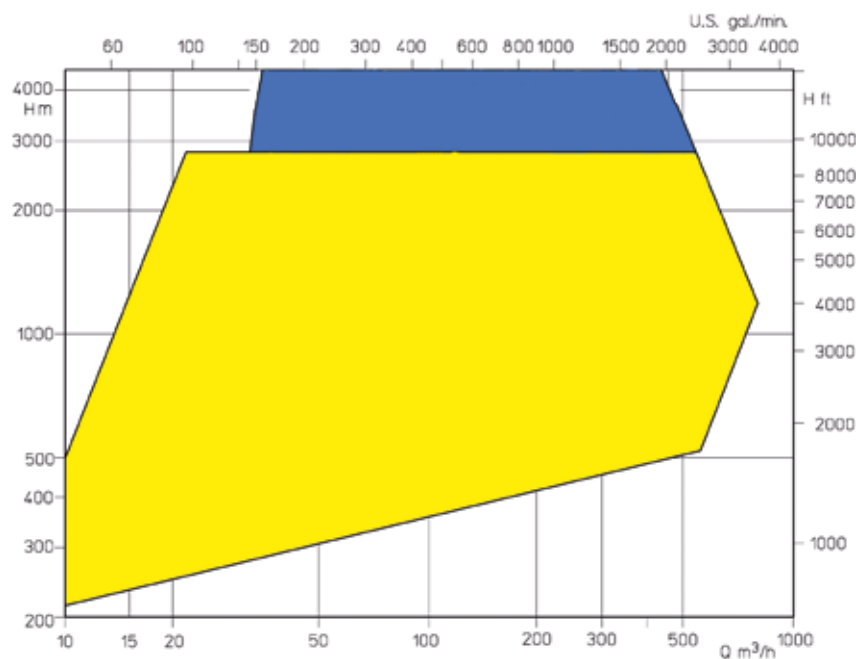
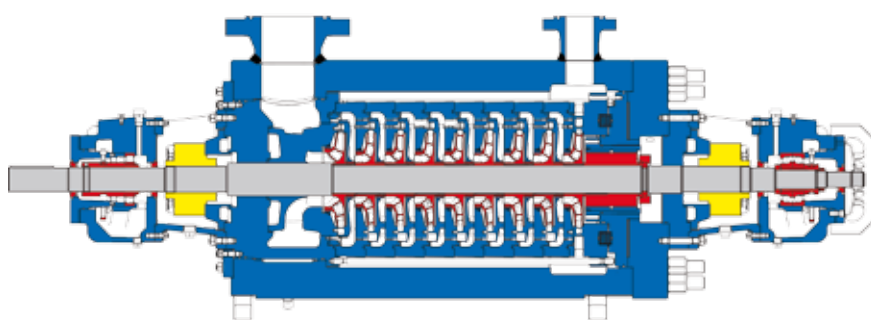
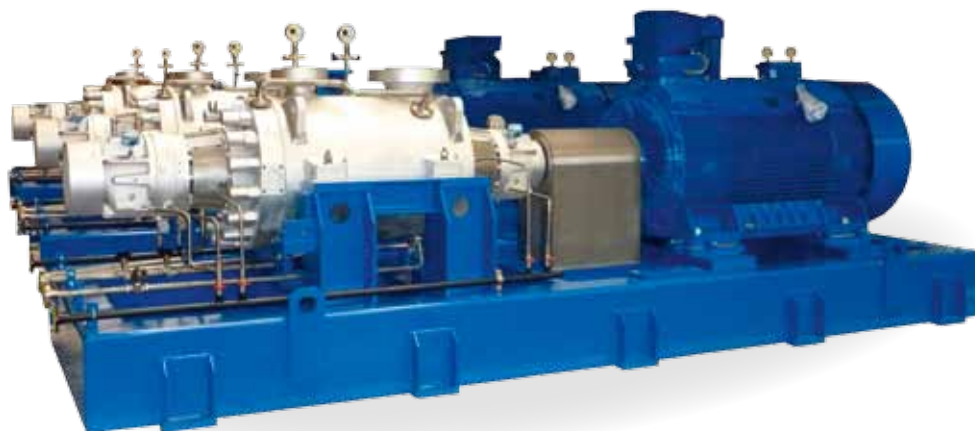
Design features

- pump meets all requirements of API 610
- multistage radial-split high pressure pump
- first stage designed as NPSH impeller
- centre-line supported
- bearing design: antifricition or slide bearings

Materials

- Cast steel
- Chrome steel
- Austenitic steel
- Duplex and super duplex steel
- Special alloys according to NORSOK, NACE





Range of Application

- Refineries
- Water injection
- Hydrocarbons
- Brine feed
- Gas-washing Systems
- Boiler feed water application

Operating Data

	TL
Q (m³/h)	900
H (m)	2800
P (bar)	250
T (°C)	+400

Design features

- pump meets all requirements of API 610
- construction in pull-out version
- inline arrangement of impellers
- axial thrust compensation via balance piston, double piston or compensation disk
- first stage designed with NPSH impeller
- centre-supported
- bearing design: antifriction or slide bearings

Materials

- Cast steel
- Chrome steel
- Austenitic steel
- Duplex and super duplex steel
- Special alloys according to NORSOK, NACE

Range of Application

- Refineries
- Water injection
- Hydrocarbons application
- Gas-washing Systems
- Boiler feed water application
- Brine feed pump

Operating Data

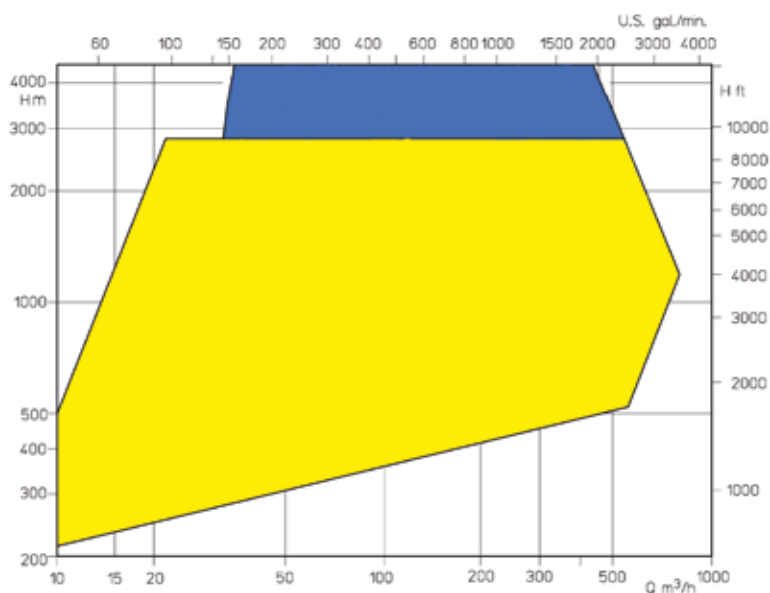
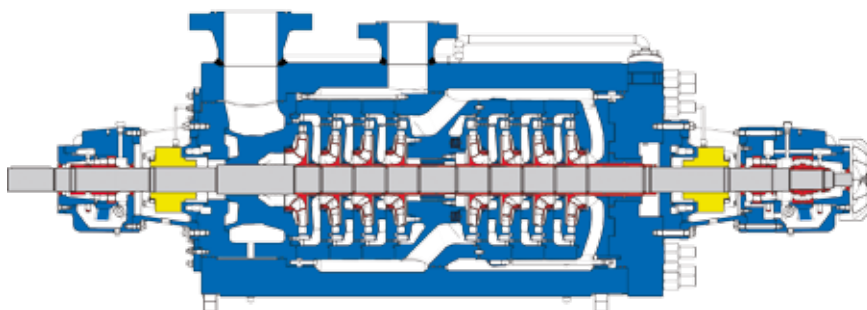
	TG	TGDX
Q (m³/h)	900	700
H (m)	2800	4200
P (bar)	250	450
T (°C)	+420	+360

Design features

- pump meets all requirements of API 610
- construction in pull-out version
- back-to-back arrangement of impellers, provides the smallest axial forces and very smooth running
- first stage designed as NPSH impeller
- centre-supported
- bearing design: antifriction or slide bearings

Materials

- Cast steel
- Chrome steel
- Austenitic steel
- Duplex and super duplex steel
- Special alloys according to NORSOK, NACE



Range of Application

- Refineries
- Power plant
- Booster application
- Sea water desalination

Operating Data

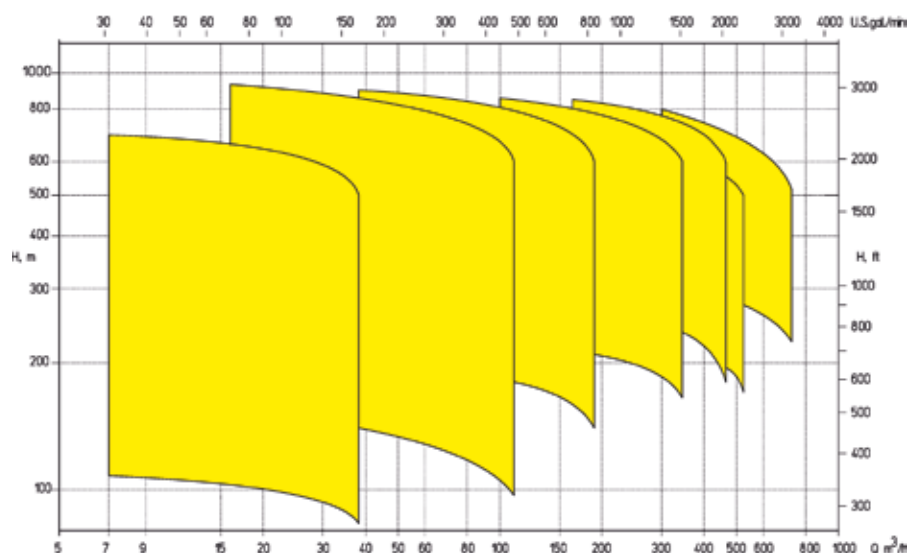
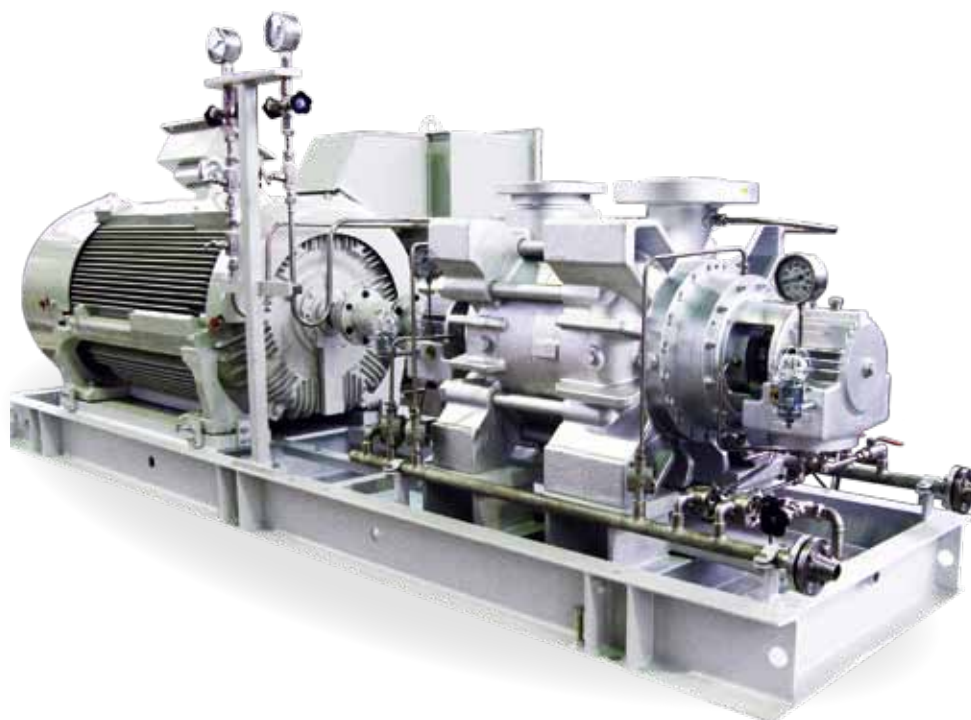
	GH
Q (m³/h)	720
H (m)	900
P (bar)	100
T (°C)	180

Design features

- variable arrangement of nozzles
- compact design with short bearing span
- ring-section type of modular design
- first stage designed with NPSH Impeller
- version with axial inlet
- bearings on both sides – antifriction bearings with oil sump lubrication

Materials

- Cast steel
- Chrome steel
- Austenitic steel
- Duplex and super duplex steel
- Special alloys according to NORSOK, NACE



Range of Application

- Offshore
- Power plants
- Pumping of condensate
- Oil and gas industry

Operating Data

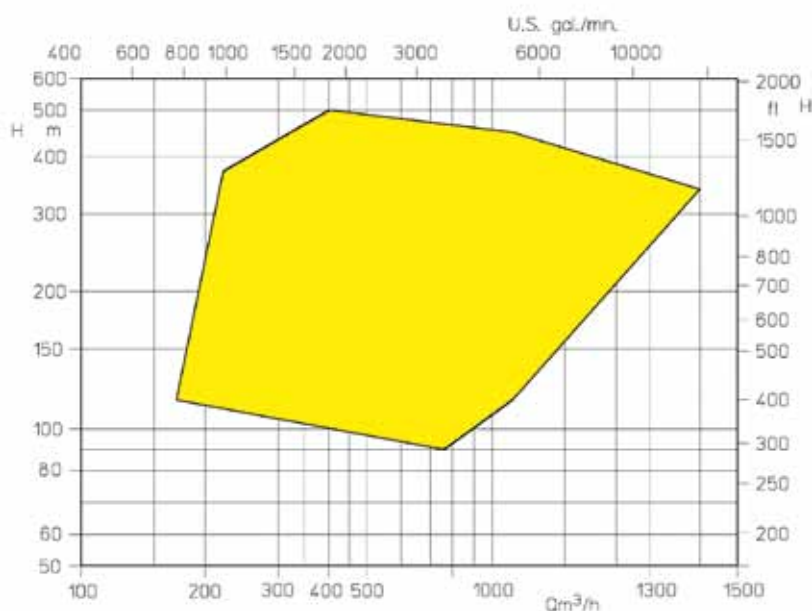
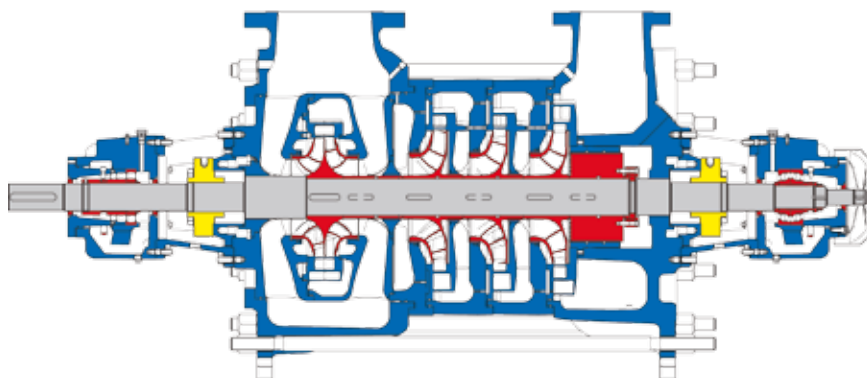
	GMHD
Q (m³/h)	1100
H (m)	320
P (bar)	63
T (°C)	+180

Design features

- pump meets all requirements of API 610
- first stage designed as NPSH impeller
- axial thrust compensation by means of balance piston
- centre-line supported
- low vibration values
- bearing design: antifriction or slide bearings

Materials

- Cast steel
- Chrome steel
- Austenitic steel
- Duplex and super duplex steel
- Special alloys according to NORSOK, NACE

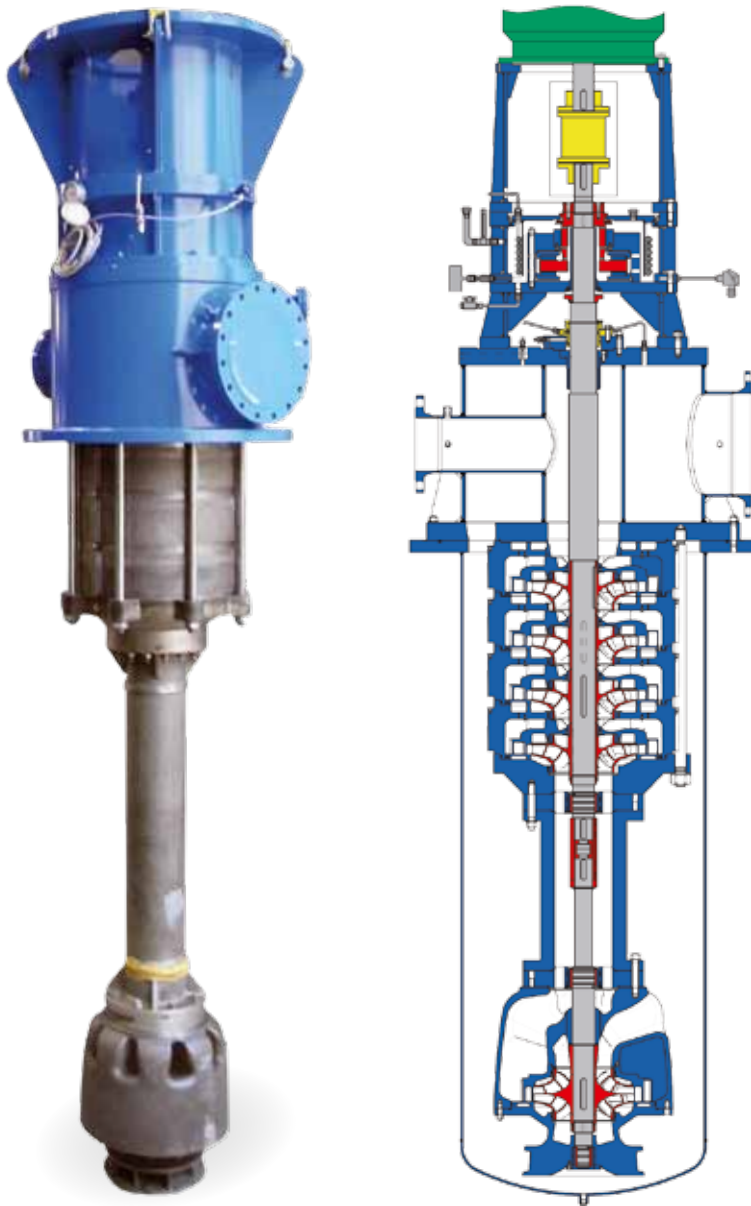


GSTV / GLKV

Vertical, multistage high-pressure pump of
can-type design according API 610 – Type VS6

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Range of Application

- Refineries
- Oil and gas industry
- Pumping condensate in power stations and industrial plants

Operating Data

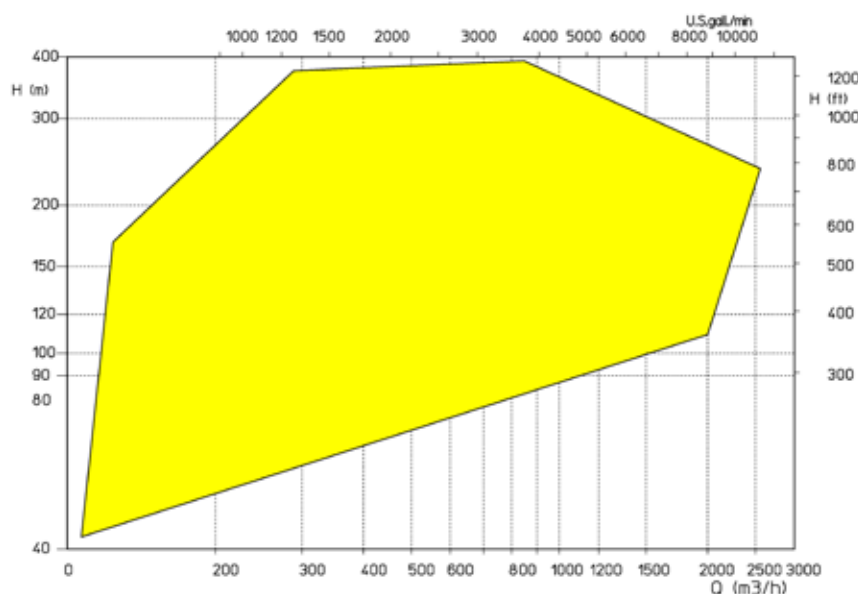
	GSTV	GLKV
Q (m³/h)	3000	400
H (m)	360	250
P (bar)	40/63	40
T (°C)	+160	+160

Design features

- pump meets all requirements of API 610
- axial thrust compensation by means of balancing piston
- NPSH impeller as single-flow and double-flow version
- version with diagonal impeller hydraulics for high capacity
- bearing design: antifriction bearings or combined axial-radial slide bearings

Materials

- Cast steel
- Chrome steel
- Austenitic steel
- Duplex and super duplex steel
- Special alloys according to NORSOK, NACE



Range of Application

- Refineries
- Offshore
- Condensate applications
- Liquid gas / hydrocarbons
- Booster and transfer pumps

Operating Data

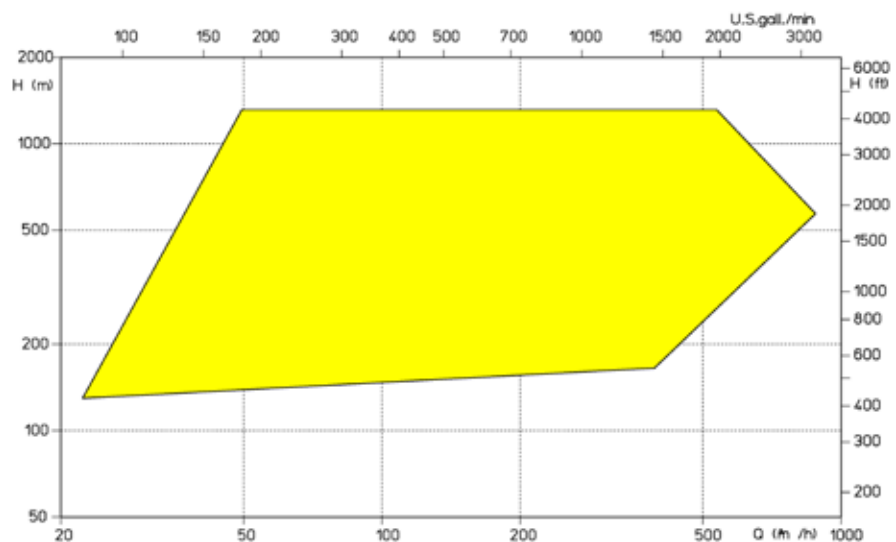
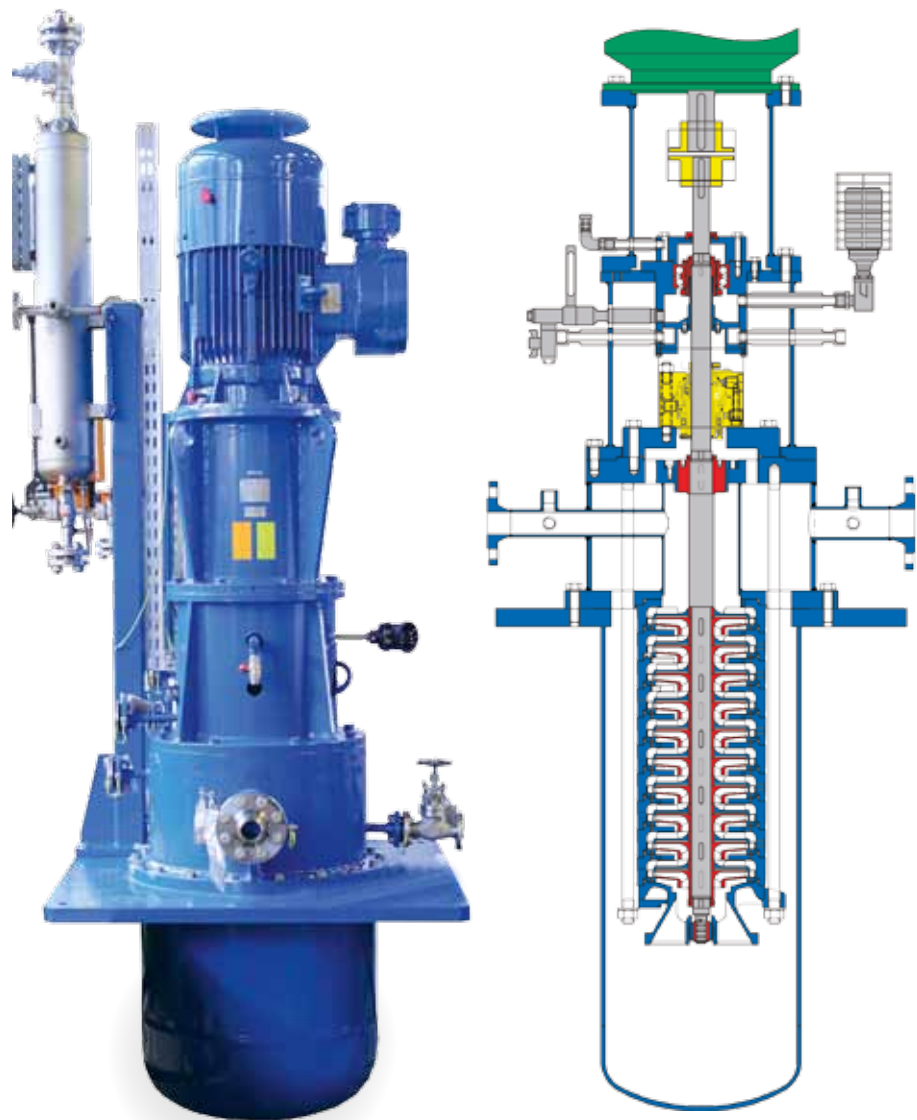
	HPTV
Q (m³/h)	550
H (m)	1400
P (bar)	140
T (°C)	-180/+260

Design features

- pump meets all requirements of API 610
- axial thrust compensation due to balance piston
- NPSH impeller as single-flow or double-flow version
- version with suspended suction impeller possible
- bearing design:
antifriction bearing or
combined axial-radial slide
bearings

Materials

- Cast steel
- Chrome steel
- Austenitic steel
- Duplex and super duplex steel
- Special alloys according to
NORSOK, NACE

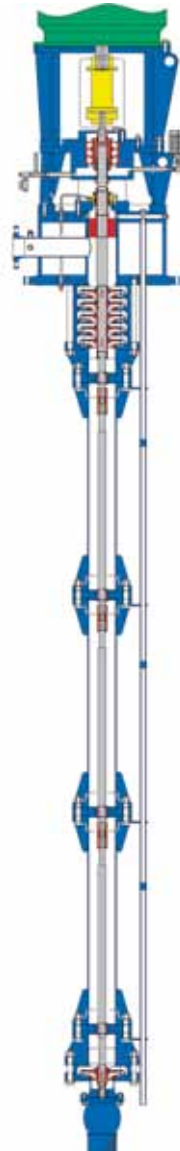


HPV / HPVX

Vertical, multistage high-pressure pump as submerged pump according API 610 – Type VS1

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Range of Application

- Refineries
- Fuels
- High-temperature applications
- for crude oil as booster and transfer pumps
- Tank installations

Operating Data

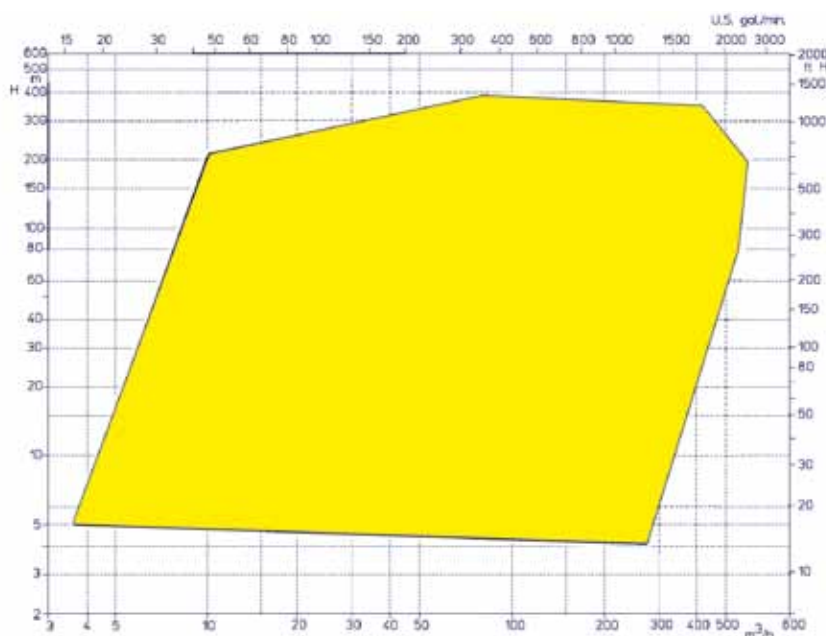
	HPV / HPVX
Q (m³/h)	600
H (m)	600
P (bar)	63
T (°C)	+180

Design features

- pump meets all requirements of API 610
- ATEX version
- radial centrifugal pump with suspended NPSH impeller, depending on design length
- axial thrust compensation by means of balance piston
- liquid lubricated slide bearings in the pump
- upper bearing: antifriction bearing or combination of axial-radial slide bearings

Materials

- Cast steel
- Chrome steel
- Austenitic steel
- Duplex and super duplex steel
- Special alloys according to NORSOK, NACE





APOLLO pump type: TGD-80C/12-308/CN

- Multistage high pressure barrel process pump with gear box, motor and lube oil system
- Liquid: paraffin products
- $Q = 98,5 \text{ m}^3/\text{h}$
- $H = 2620 \text{ m}$
- Speed: 4400 rpm
- Material: acc. to API S-6
- Skid weight: 25000 kg



APOLLO pump type: TGD-100/12-508/CN

- 12-stage BB5 process pump with a special heating jacket
- Liquid: Carbamate
- $Q = 150 \text{ m}^3/\text{h}$
- $H = 1576 \text{ m}$
- Suction pressure: 5 bar up to 73 bar
- Design pressure: 242 bar at 130°C
- Speed: 2980 rpm
- Skid weight: 19200 kg



APOLLO pump type: KGRZ-150/450-399/CN

- Double-stage process pump with axial inlet and open impellers
- Liquid: shale oil
- $Q = 210 \text{ m}^3/\text{h}$
- $H = 215 \text{ m}$
- Design pressure: 30 bar at 375°C
- Design temperature: 375°C
- solid content: up to 15 % rock ash
- Material: special wear-resistant cast iron

Heavy Fuel Oil Pumping Station

- Complete prefabricated stations for supply of burners with heavy fuel oil including auxiliary steam and condensate processes.



Injection Pump Module

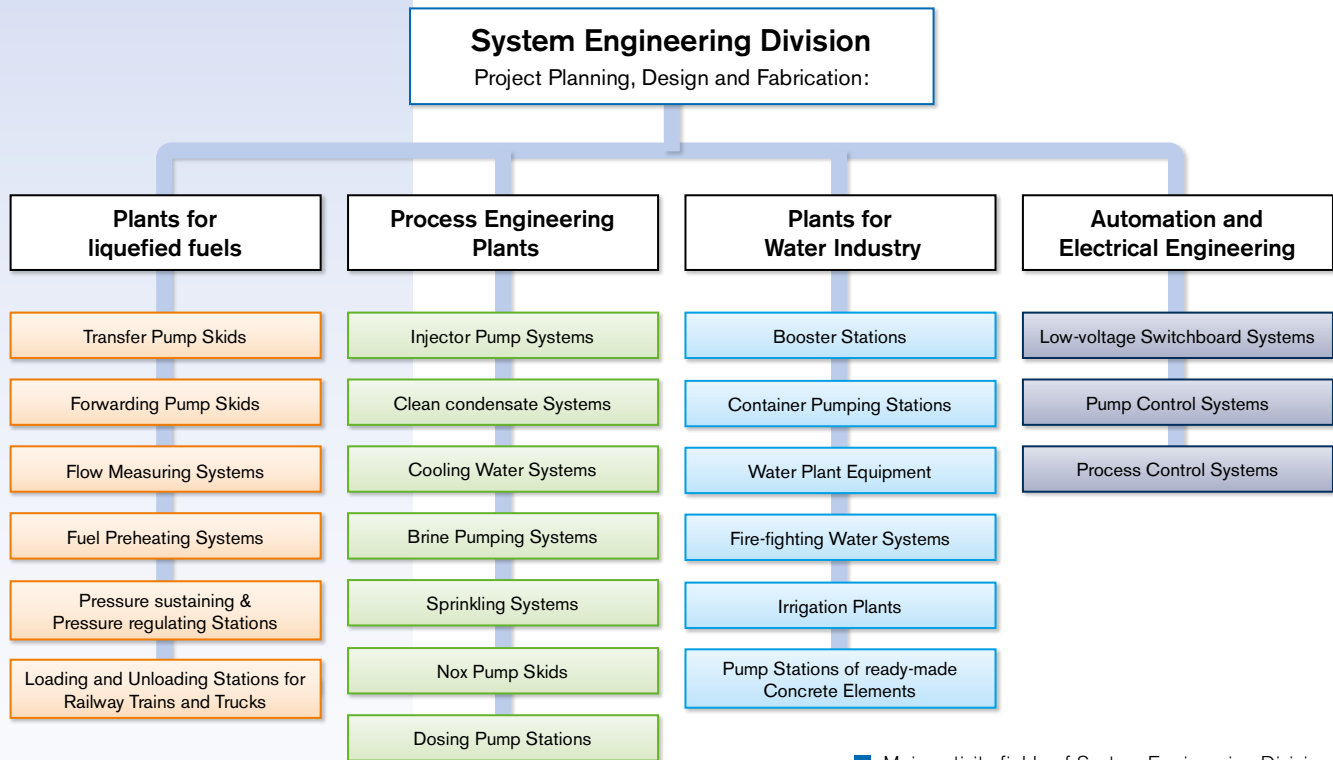
- Complete prefabricated pump modules for high-pressure fuel supply of gas turbines with various fuels and high operation pressure.



Circulation Pump Systems

- Complete prefabricated pumping systems for circulation of heat transfer liquids, for example air preheating of gas turbines.





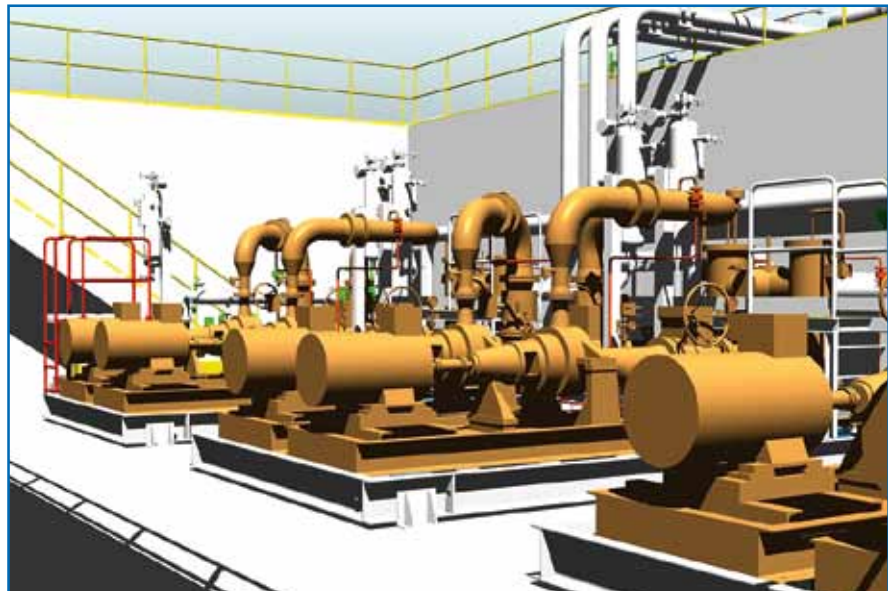
■ Main activity fields of System Engineering Division

In more than 20 years Apollo has developed as Manufacturer of System Engineering Plants. The System Engineering Division combines high-quality welding standards with knowledge of fluid components functionality in complete plants.

Our Range of Services

- Hydraulic and process consultancy, design and fabrication of Systems for many Branches of Industry, Water Supply, Energy Sector, Environmental Technology, Raw Materials Industry etc.
- Customer specific planning, design and application programming of Control and Process Control Systems
- reliable Skid Manufacturer for leading Plant Engineering Companies

Additionally we offer our own electric design, software development and customer-specific manufacture of control cabinets. That means competence from single source.



■ Pumping systems for supply of light crude oil to Burner

Transfer Pump Skids

- They are used for circulation and transfer of all kinds of liquids.
- High operating safety is ensured by applying of Apollo's own pump series.



■ Transfer Pump Skid

Injector Pump Skids

- These systems are designed especially for supply of liquid fuel to gas turbines.
- The pumps are usually designed as redundant pumps in order to provide high operating safety.
- Apollo high-pressure pumps ensure high operating safety.



■ Apollo high-pressure Pump Skid with vertical can-type pump



■ Apollo high-pressure injector pump skid with horizontal multistage pump



■ Apollo Lube Oil Skid of type ACS according to API 614

ADDITIONAL APOLLO STANDARD PRODUCT TYPES

Type series	Pump designation	Design Data		
		Q (m ³ /h)	H (m)	Pressure (bar)
KRC KRP/H	Single-stage centrifugal pumps			
	Chemical process pumps and additional type size	1.200	170	16/25
	Average heavy-duty process pumps acc. to API 610	2.800	250	25/35
GL/GLZ	Multistage horizontal high-pressure pumps	600	250	16/25
	Multistage centrifugal pumps with and without NPSH impeller (optionally with axial inlet)			
GM/GMZ	Multistage horizontal high-pressure pumps	800	600	64
	Multistage centrifugal pumps with and without NPSH impeller (optionally with axial inlet)			
GLV/X	Multistage vertical high-pressure pumps	500	420	25/40
GLVB	Multistage vertical high-pressure pumps	600	250	16/25
	Vertical tank-installation pump			
	Vertical multistage centrifugal pumps with and without NPSH impeller			
ZMLK	Centrifugal double-flow split-casing pumps with bearings on both ends			
	horizontal design	6.000	330	to 40
	vertical design	5.000	320	to 40
KSD/KCD	Self-priming centrifugal pumps	30	300	25/40
	Self-priming side-channel pumps			
KRE/S	Self-priming centrifugal pumps	100	60	16
	Self-priming air volute-casing pumps			