



Engineering Flow Solutions

PUMPS FOR OIL & GAS UPSTREAM

ANSI/API STANDARD 610 (ISO 13709:2009)







HMS Group offers an extensive range of state-of-the-art pumps for production and primary treatment processes of oil, gas and condensate:

- High-pressure water injection pumps to maintain formation pressure
- Chemicals injection pumps for enhance hydrocarbons recovery
- Pumps for sea and produced water handling
- Process pumps for primary treatment of well fluids and gases
- Pumps for oil, gas and condensate processing at oilfield facilities
- Auxiliary process pumps and systems, including firefighting ring mains

The pumps are designed and manufactured in compliance with API 610 standard of 11th edition and other international and national industry standards as ISO, DIN, ANSI, ASME, NORSOK, NACE.

Engineering of pumps is performed by own R&D centers of HMS Group located in Russia, CIS and Europe with centralized management and application of the latest 3D design software based on SolidWorks, ANSYS CFX and other platforms.

Production of pumps and pumping systems is carried out at the major pumps manufacturing companies of HMS Group: APOLLO Goessnitz (Germany), HMS Livgidromash (Russia) and Bobruisk Machine Building Plant (Belarus).

The pumps supplied by HMS Group are successfully operated within years at large onshore and offshore production fields in Russia, Europe, Middle East, Africa, and Asia.

API 610 STANDARD

CENTRIFUGAL PUMPS FOR PETROLEUM, PETROCHEMICAL AND NATURAL GAS INDUSTRIES

API 610 standard, being identical to ISO 13709:2009 one, sets the requirements to centrifugal pumps regarding their reliability, safety, service & retrofit procedures as well as overall operation efficiency of the pumping system in general.

API 610 PUMPS BENEFITS & ADVANTAGES

- Service life: at least 20 years with at least 3 years of uninterrupted operation
- Pressure casing: minimum rated pressure of 4,000 kPa (40 bar/ 600 psi) at 38 °C (100 °F)
- Closed type cast impellers and high rigidity shaft
- Shaft seals according to API 682
- Flanges according to ASME/ANSI/DIN/EN
- Shaft run-out limited by 0.025 mm
- Replaceable wear rings to reduce wear of casing and axial running clearances
- Vibration limit below 3.0 mm/sec in the best efficiency point, below 3.9 mm/sec in the rest of the operating range
- Dynamic balancing of impellers:
 - Single-/two-stage pumps: ISO 1940-1 grade G1
 - Multistage pumps: flow part – ISO 1940-1 grade G1, rotor – ISO 1940-1 grade G2.5
- Bearings units lifetime: at least 25,000 hours with continuous operation at rated conditions
- Standard API-compliant baseplates for maximal alignment of pump and drive shafts to increase overall reliability of the pumping unit; the drain rims shall be provided to keep all leakages within the baseplate
- Stringent requirements to hydraulic test: pressure shall exceed the maximum allowed working pressure (MAWP) by 1.5
- External nozzles loads and moments in full compliance with API 610 11th edition requirements



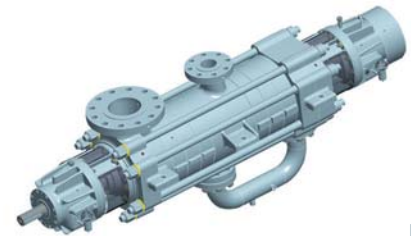
OH1
OH2
OH3



BB2



BB3



BB4



BB5



VS1
VS6

FOOT/CENTRELINE/VERTICAL-MOUNTED, SINGLE-STAGE OVERHUNG PUMPS

OH1, OH2, OH3

**PUMP SERIES: KRH/KRHV/KRHA, KRHL/KGHL/
KRZ/KRZL, KRP/KRPO, KRI/KRIL, 2NK/2NKG**

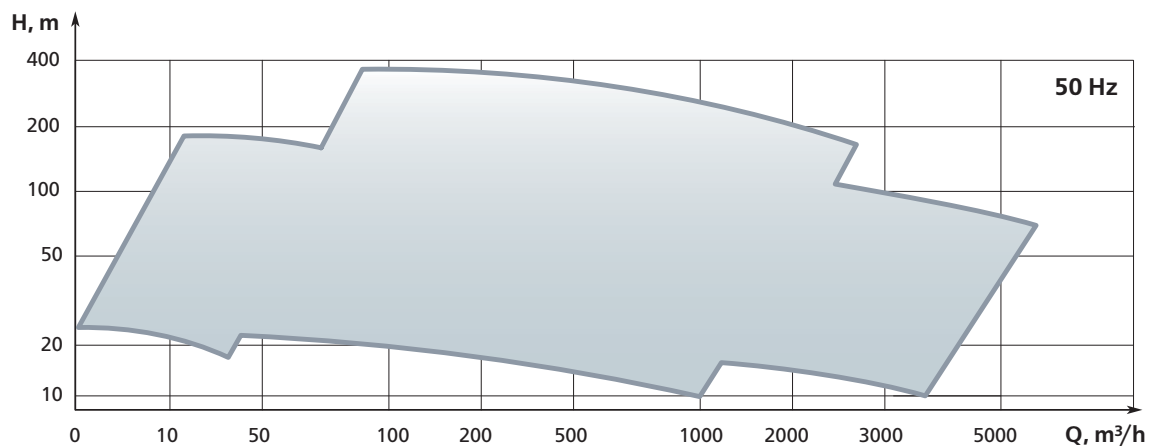
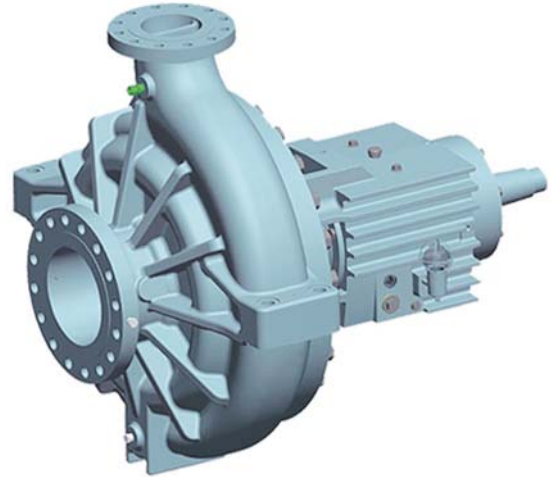
APPLICATION

- Handling crude oil, petroleum products and liquefied gases in upstream processes, including offshore
- Pressure boosting
- Water supply (sea and produced water)
- Fuel gas treatment

DESIGN FEATURES

- Flanges according to ASME/ANSI/DIN/EN
- Mechanical seals according to API 682 or hermetic pump versions with magnetic coupling by API 685
- Optional inducer for lower NPSHa
- Interchangeable impellers for different capacities

■ Q: 3 ... 5,000 m³/h ■ H: 3 ... 390 m ■ T: -80 ... + 450 °C



Selected Projects Examples	Parameters	Application & Features
Cape Three Point Oil & Gas Fields (Offshore) Customer: Delta-p/ENI/Kanfa Ghana, 2015	Q: up to 300 m ³ /h H: up to 194 m	Application: handling lean monoethylene glycol, fresh and produced water at floating production, storage and offloading vessel process systems Features: super duplex steel pumps material, NORSOK compliance
Kraken Oil Field (Offshore) Customer: Aker Solutions/EnQuest Norway, 2015	Q: 220 m ³ /h H: 35 m	Application: handling seawater at floating production, storage and offloading vessel process systems Features: super duplex steel pumps material, NORSOK compliance
Edvard Grieg Oil Field (Offshore) Customer: Delta-p/Lundin Petroleum Norway, 2013	Q: 27.8 m ³ /h H: 52 m	Application: handling water-oil mixture in flare separator Features: super duplex steel pumps material, NORSOK compliance

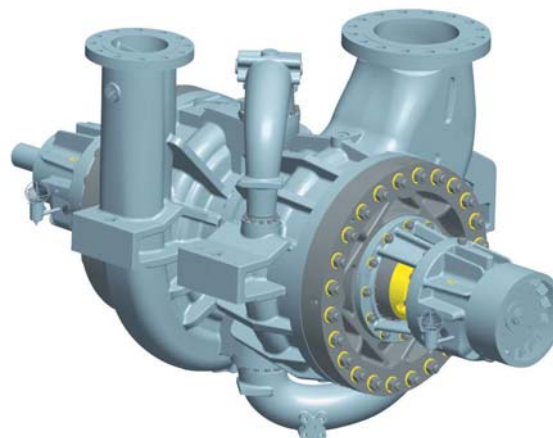
RADIALLY SPLIT, ONE- AND TWO-STAGE, BETWEEN-BEARINGS PUMPS

BB2

PUMP SERIES: ZPR/ZPRA, KGR/KGRD

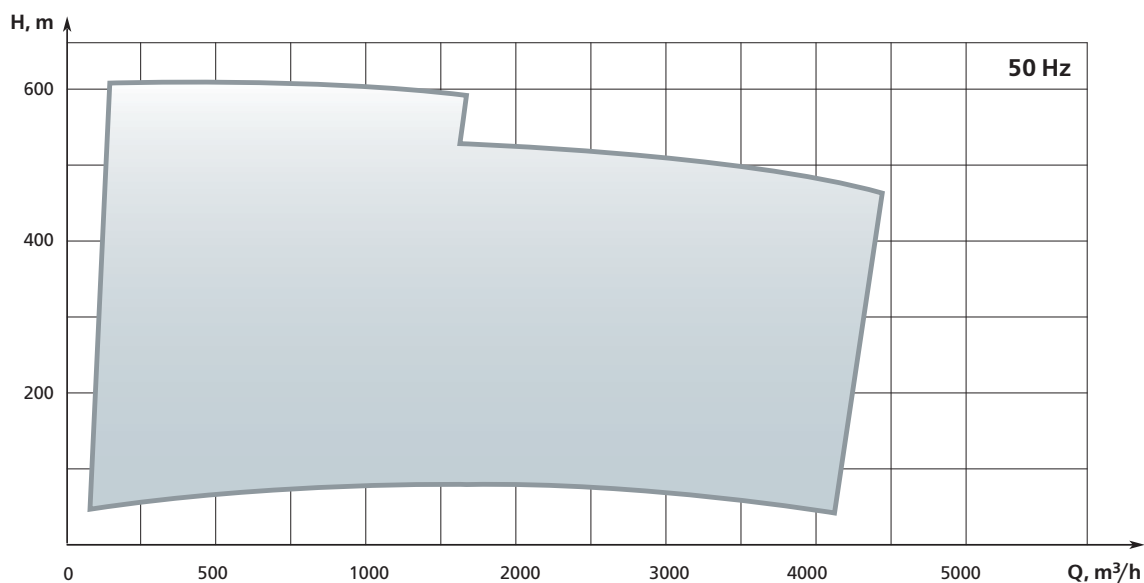
APPLICATION

- Handling crude oil, petroleum products and liquefied gases in upstream processes, including offshore
- Pressure boosting
- Gas and gas condensate treatment
- Fuel gas treatment
- Water supply (sea and produced water)



DESIGN FEATURES

- Flanges according to ASME/ANSI/DIN/EN
 - Seals according to API 682
 - Back-to-back impellers
- Q: 3 ... 4,000 m³/h ■ H: 25 ... 600 m ■ T: -80 ... +450 °C



Selected Projects Examples	Parameters	Application & Features
Kraken Oil Field (Offshore) Customer: Aker Solutions/EnQuest Norway, 2015	Q: 354 m ³ /h H: 355 m	Application: handling seawater at floating production, storage and offloading vessel process systems Features: super duplex steel pumps material, Norsok compliance
Ivar Aasen Oil Field (Offshore) Customer: Delta-p Norway, 2014	Q: 555 m ³ /h H: 341 m	Application: handling seawater in a filtration unit Features: super duplex steel pumps material, Norsok compliance
Edvard Grieg Oil Field (Offshore) Customer: Lundin Petroleum Norway, 2013	Q: 389 m ³ /h H: 337 m	Application: handling deaerated seawater Features: super duplex steel pumps material, Norsok compliance

AXIALLY SPLIT, MULTISTAGE, BETWEEN-BEARINGS PUMPS

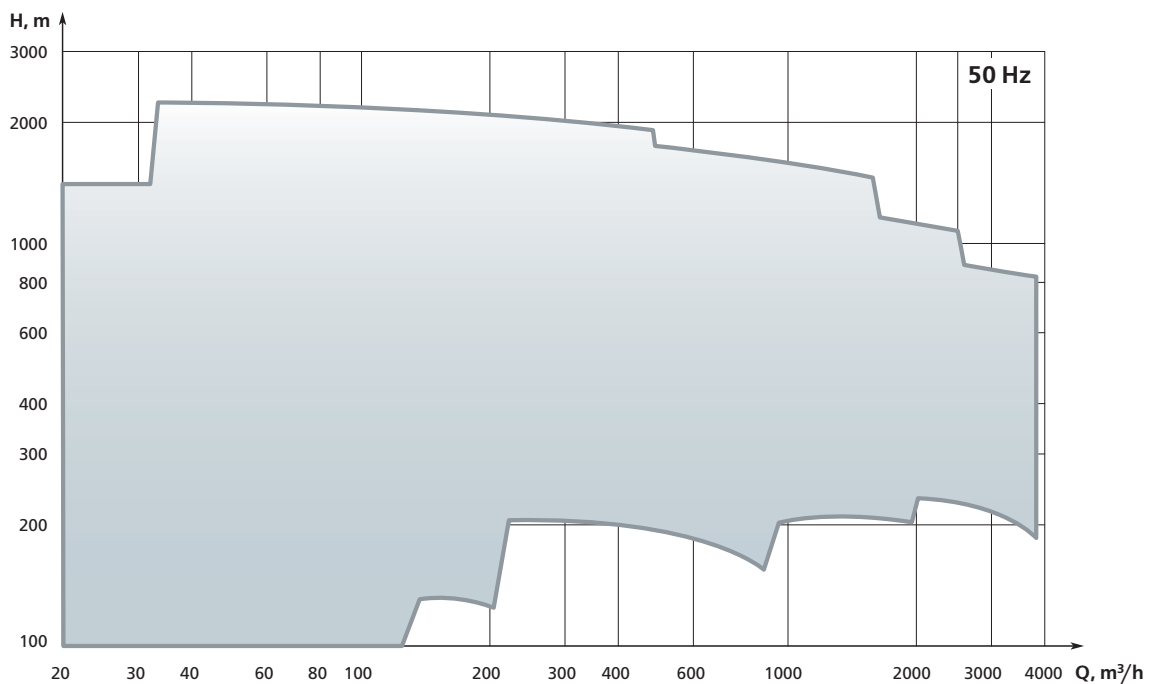
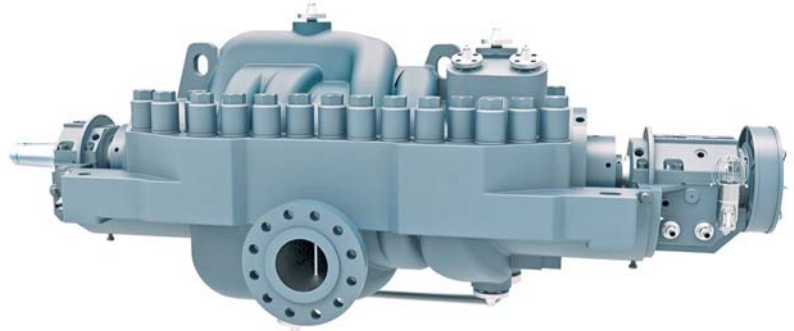
PUMP SERIES: AMG/NPS

APPLICATION

- Handling crude oil, petroleum products and liquefied gases in upstream processes, including offshore
- Water supply (sea and produced water)
- Fuel gas treatment

DESIGN FEATURES

- Flanges according to ASME/ANSI/DIN/EN
 - Seals according to API 682
 - Interchangeable rotors for different capacities
- Q: 32 ... 3,700 m³/h ■ H: 150 ... 1,900 m ■ T: -80 ... +250 °C



Selected Projects Examples	Parameters	Application & Features
Orenburg Oil, Gas & Condensate Field Customer: Gazprom Russia, 2014	Q: 200 m ³ /h H: 700 m	Application: process water injection into formation Features: carbon steel pumps material, double mechanical seals
Makariel Oil Field Customer: LUKOIL Russia, 2011	Q: 120 m ³ /h H: 750 m	Application: handling produced water at free water separation unit Features: 12% chromium steel pumps material

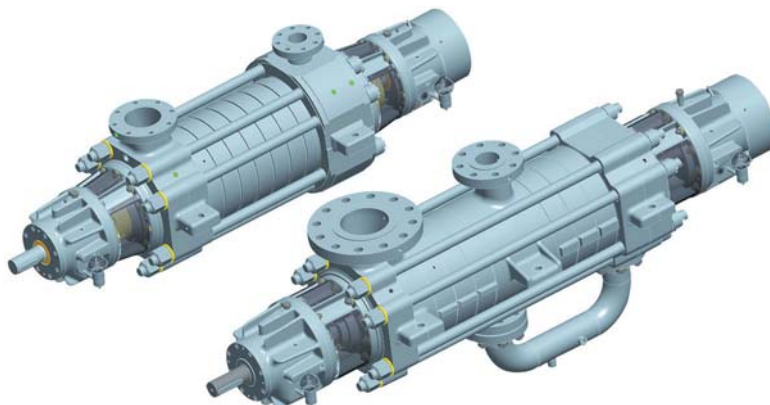
SINGLE-CASING, RADIALLY SPLIT, MULTISTAGE, BETWEEN-BEARINGS PUMPS

BB4

PUMP SERIES: HP/GP, GH, GMHD, NM, CNSn

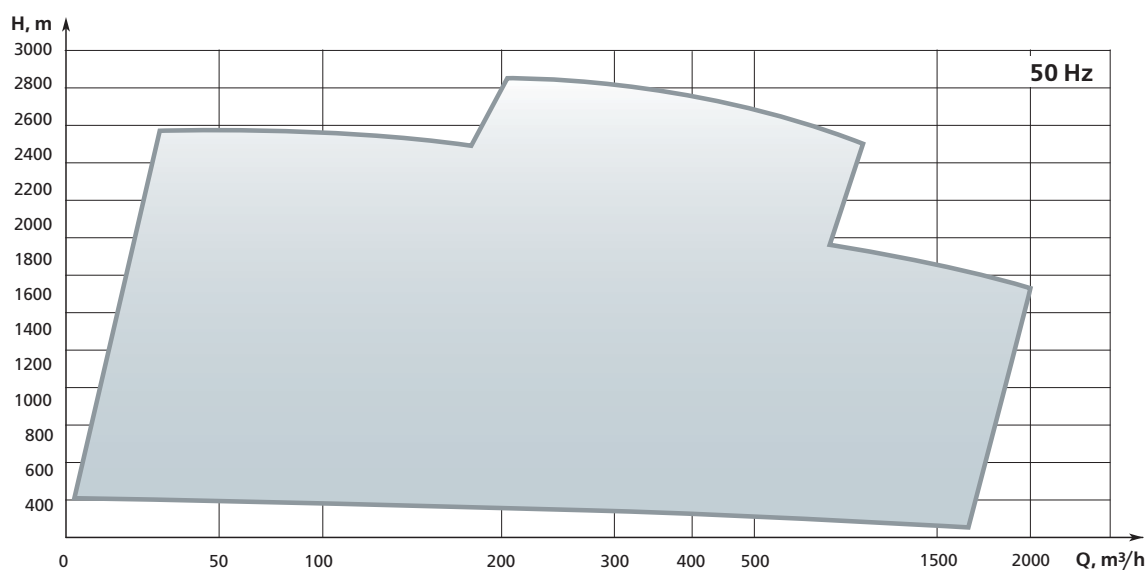
APPLICATION

- Handling crude oil, petroleum products and liquefied gases in upstream processes, including offshore
- Crude oil, gas, and condensate treatment
- Hot oil injection systems
- Water injection systems (produced & sea water)
- Fuel gas treatment



DESIGN FEATURES

- Flanges according to ASME/ANSI/DIN/EN
 - Seals according to API 682
 - Interchangeable impellers for different capacities
 - Back-to-back or inline impellers
 - Double suction impellers or inducer at the first stage (optional) for lower NPSHa
- Q: 10 ... 1,400 m³/h
 ■ H: 80 ... 2,800 m
 ■ T: -80 ... +200 °C



Selected Projects Examples	Parameters	Application & Features
Yarudeiskoye Oil, Gas & Condensate Field Customer: NOVATEK Russia, 2016	Q: 180 m ³ /h H: 1,050 m	Application: handling crude oil and gas condensate at the oil field processes Features: corrosion-resistant steel pumps material, back-to-back impellers, double mechanical seals
Srednebotuobinskoye Oil, Gas & Condensate Field Customer: Rosneft Russia, 2012	Q: 240 m ³ /h H: 1,422 m	Application: water injection into formation at cluster pump station Features: supplied as ready-to-use modules with auxiliaries, control and automation systems
Vankor Oil, Gas & Condensate Field Customer: Rosneft Russia, 2012	Q: 164 m ³ /h H: 256 m	Application: handling producer water at central production facility Features: 12% chromium steel pumps material

DOUBLE-CASING, RADIALLY SPLIT, MULTISTAGE, BETWEEN-BEARINGS PUMPS

BB5

PUMP SERIES: TL/TG, NM, TGX/TGDX, CNSDp

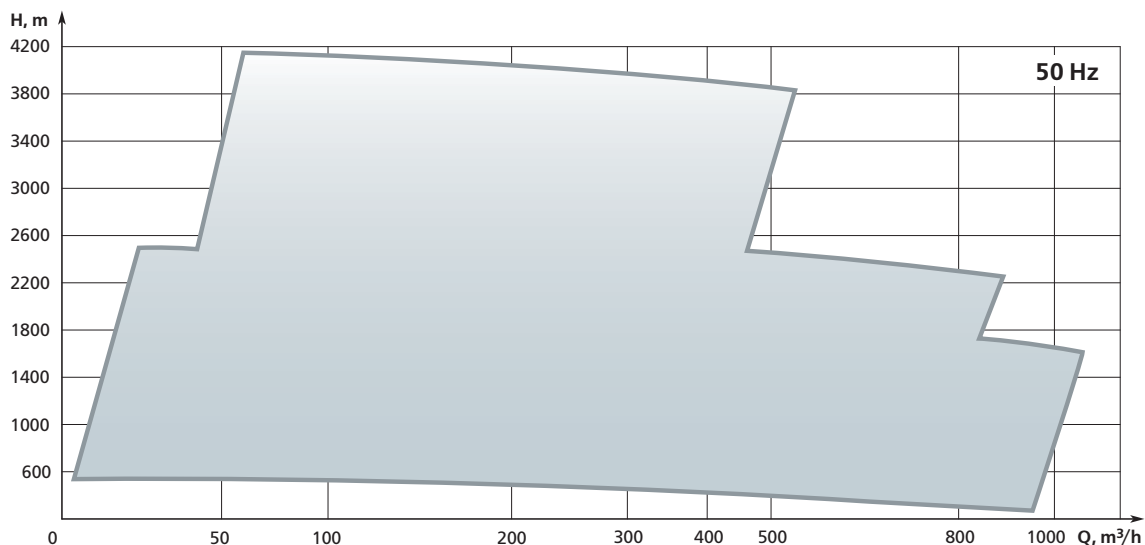
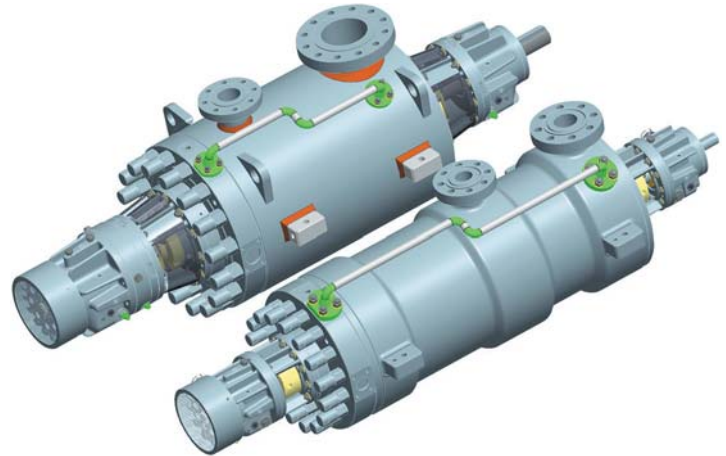
APPLICATION

- Handling crude oil, petroleum products and liquefied gases in upstream processes, including offshore
- Water injection systems (produced & sea water)
- Hot oil injection systems

DESIGN FEATURES

- Flanges according to ASME/ANSI/DIN/EN
- Pump dismantling without separation off the pipeline
- Seals according to API 682
- Back-to-back or inline impellers
- Double suction impeller or inducer at the first stage (optional) for lower NPSHa

- Q: 8 ... 1,000 m³/h
- H: 180 ... 4,200 m
- T: -80 ... +450 °C



Selected Projects Examples	Parameters	Application & Features
Cape Three Point Oil & Gas Fields (Offshore) Customer: Delta-p/ENI/Kanfa Ghana, 2016	Q: 300 m ³ /h H: 695 m	Application: handling diesel fuel at floating production, storage and offloading vessel Features: back-to-back impellers arrangement
Permas Oil Field (Offshore) Customer: Murphy Oil Corporation Malaysia, 2014	Q: 58 m ³ /h H: 1,506 m	Application: handling deaerated seawater Features: back-to-back impellers arrangement
Gudrun Oil & Gas Field (Offshore) Customer: Delta-p/AIBEL Norway, 2012	Q: 40 m ³ /h H: 1,315 m	Application: handling fresh and produced water at floating production, storage and offloading vessel Features: back-to-back impellers arrangement, duplex steel pumps material, NORSOK compliance

SINGLE- AND DOUBLE-CASING, DIFFUSER, VERTICALLY SUSPENDED PUMPS

VS1, VS6

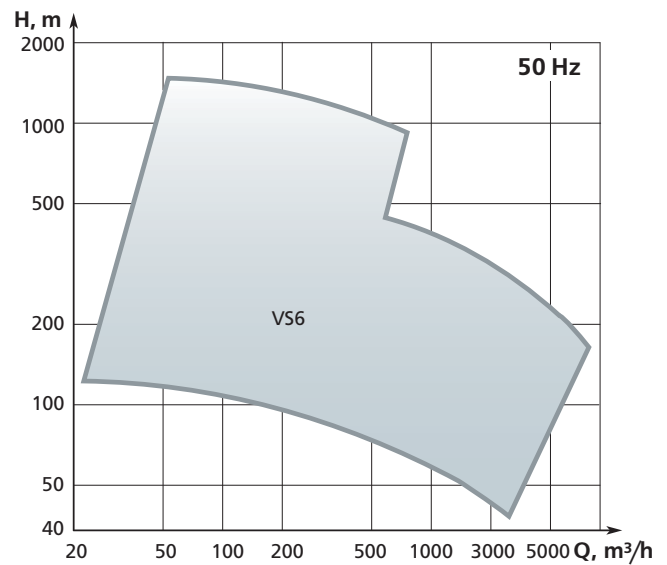
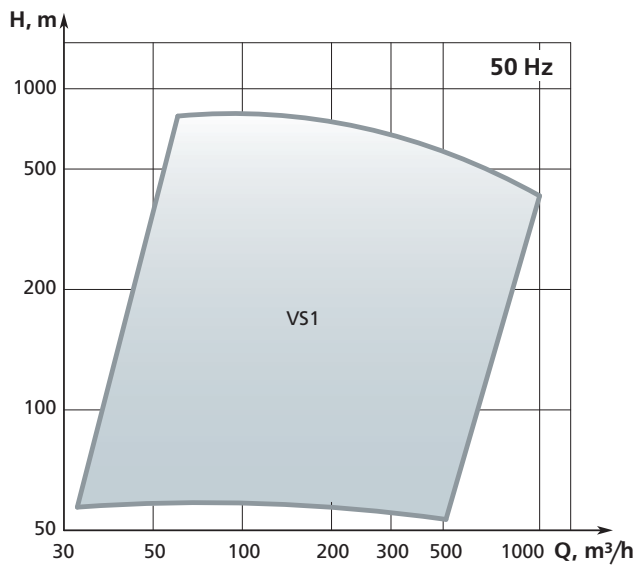
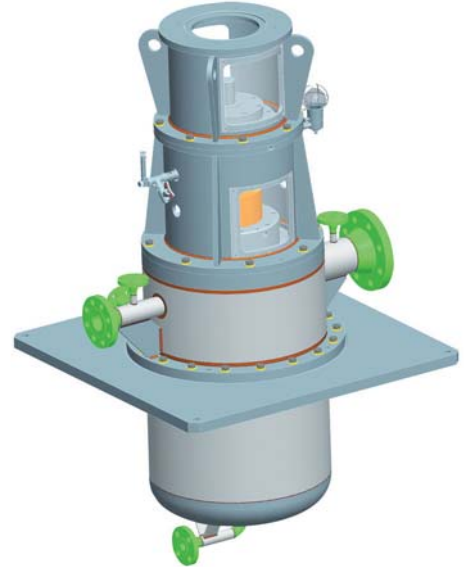
PUMP SERIES: HPV/HPTV/HPVX, GSTV/GLKV, GDV/GDTV, NOU, NPV/NPV-M, NMV

APPLICATION

- Handling crude oil, petroleum products and liquefied gases
- Pressure boosting

DESIGN FEATURES

- Flanges according to ASME/ANSI/DIN/EN
 - Seals according to API 682
 - Single/double suction impellers
 - Double suction impeller or inducer in the first stage (optional) for lower NPSHa
- Q: up to 5,000 m³/h ■ H: up to 1,400 m ■ T: up to 300 °C



Selected Projects Examples	Parameters	Application & Features
Troll Oil, Gas & Condensate Field (Offshore) Customer: Statoil Norway, 2013	Q: 374 m ³ /h H: 190 m	Application: handling chlorinated sweater at offshore production platform utility processes Features: VS6 pumps design of super duplex steel by NORSOK standard
Ekofisk Oil & Gas Field (Offshore) Customer: Conoco Phillips Norway, 2012	Q: 50 m ³ /h H: 201 m	Application: handling mixture of hydrocarbon liquids with water and solid particles at offshore production platform Features: VS6 pumps design of duplex steel by NORSOK standard
Valemon Gas & Condensate Field (Offshore) Customer: Statoil Norway, 2012	Q: 15 m ³ /h H: 40.5 m	Application: handling oily water open drains at offshore production platform Features: VS1 pumps design of duplex steel by NORSOK standard

MATERIAL CLASSES FOR PUMP PARTS ACCORDING TO API 610 11TH EDITION

Pump Parts	Materials Classes						
	I-1	I-2	S-1	S-3	S-4	S-5	S-6
Casing	Cast iron	Cast iron	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Carbon steel
Inner Casing Parts	Cast iron	Bronze	Cast iron	Ni-Resist	Cast iron	Carbon steel	12 % CR
Shaft	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Carbon steel	4140 alloy steel	4140 alloy steel
Impeller	Cast iron	Bronze	Cast iron	Ni-Resist	Carbon steel	Carbon steel	12 % CR

Pump Parts	Materials Classes						
	S-8	S-9	C-6	A-7	A-8	D-1	D-2
Casing	Carbon steel	Carbon steel	12 % CR	AUS	316 AUS	Duplex	Super Duplex
Inner Casing Parts	316 AUS	Ni-Cu alloy	12 % CR	AUS	316 AUS	Duplex	Super Duplex
Shaft	316 AUS	Ni-Cu alloy	12 % CR	AUS	316 AUS	Duplex	Super Duplex
Impeller	316 AUS	Ni-Cu alloy	12 % CR	AUS	316 AUS	Duplex	Super Duplex

SCOPE OF SUPPLY*

- Pump according to API 610 with coupling and counter flanges
- Drive: electric motor by SIEMENS, ABB or customer-approved manufacturer
- API 682 compliant shaft seals with specified flushing plans
- Sensors, automation and instrumentation as required
- First fill lubrication, grease, etc.
- Spare parts & tools for installation, commissioning, operation, and maintenance
- Auxiliary piping, bolts, nuts, washers, gaskets

* The scope of supply is the subject to specific supply conditions

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