



MarFlex

Products and Services

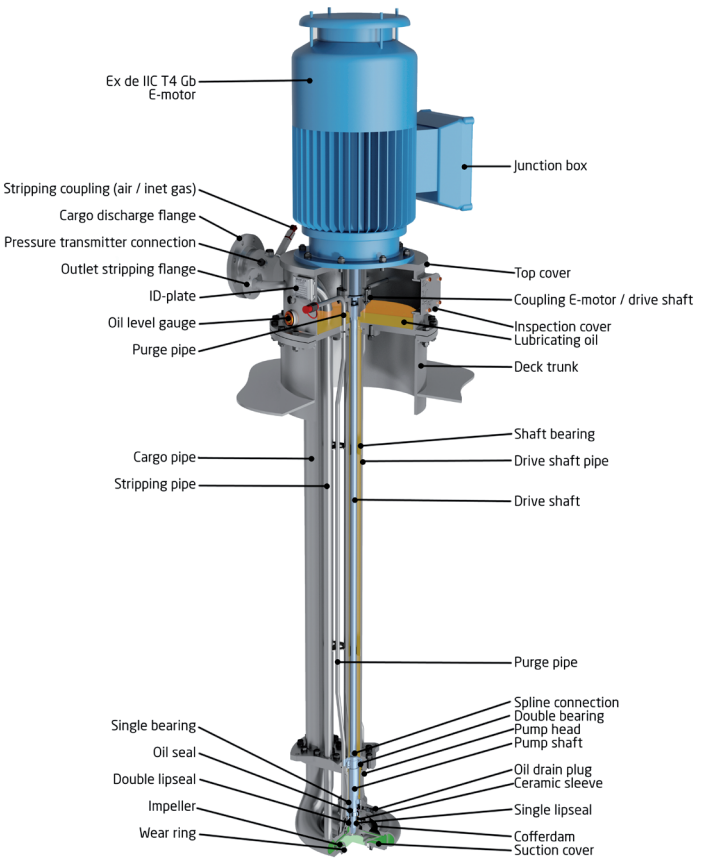
Pumping Excellence



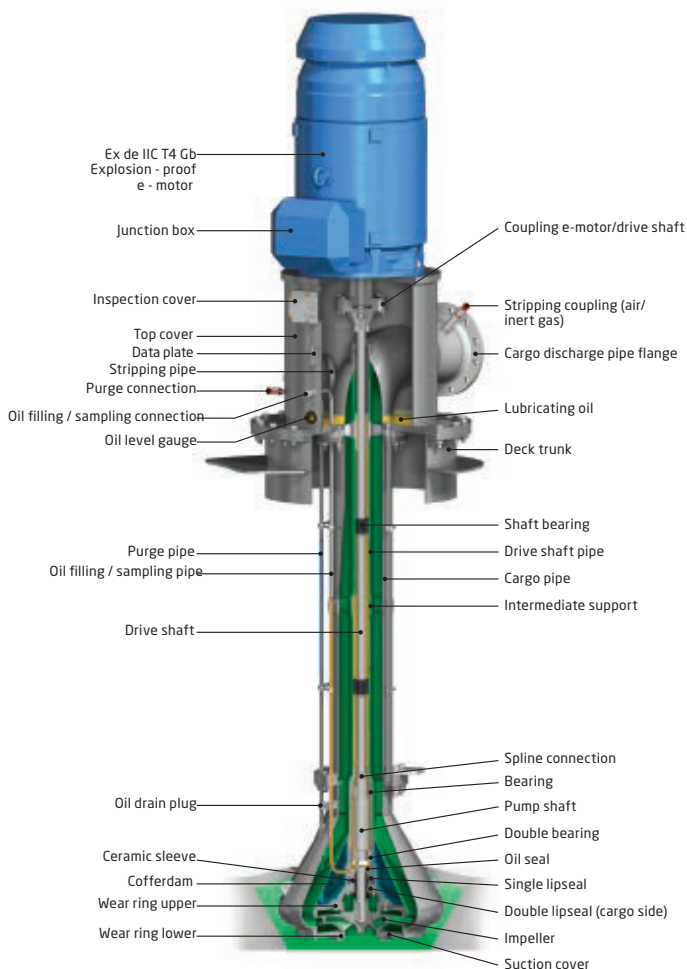
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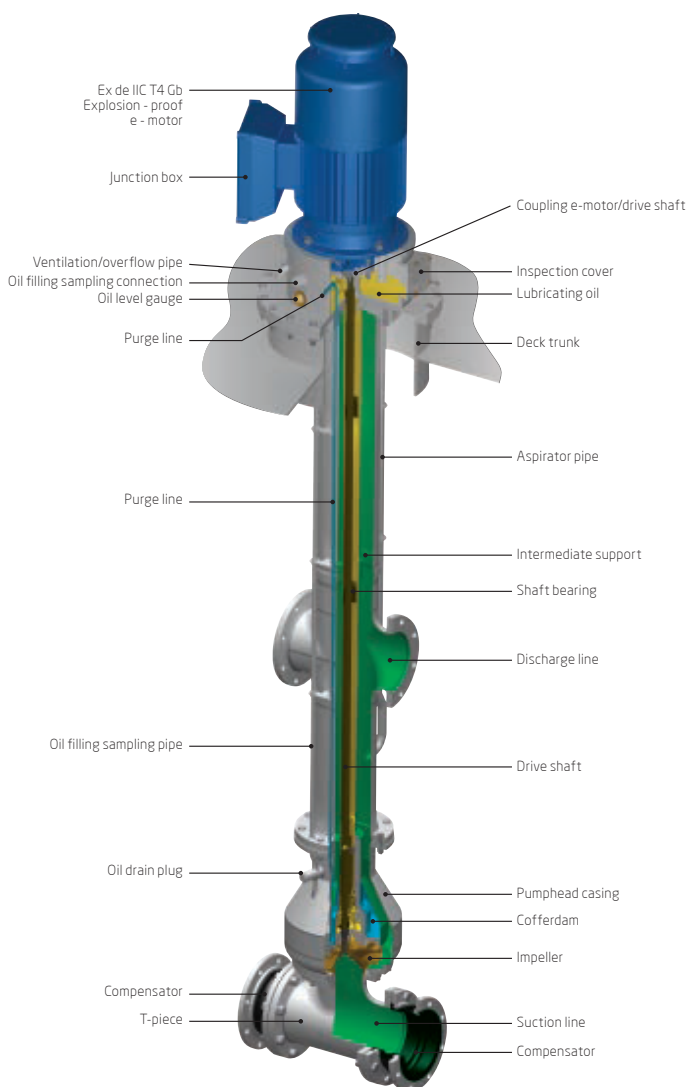
MarFlex Deepwell Pump Double (MDPD)



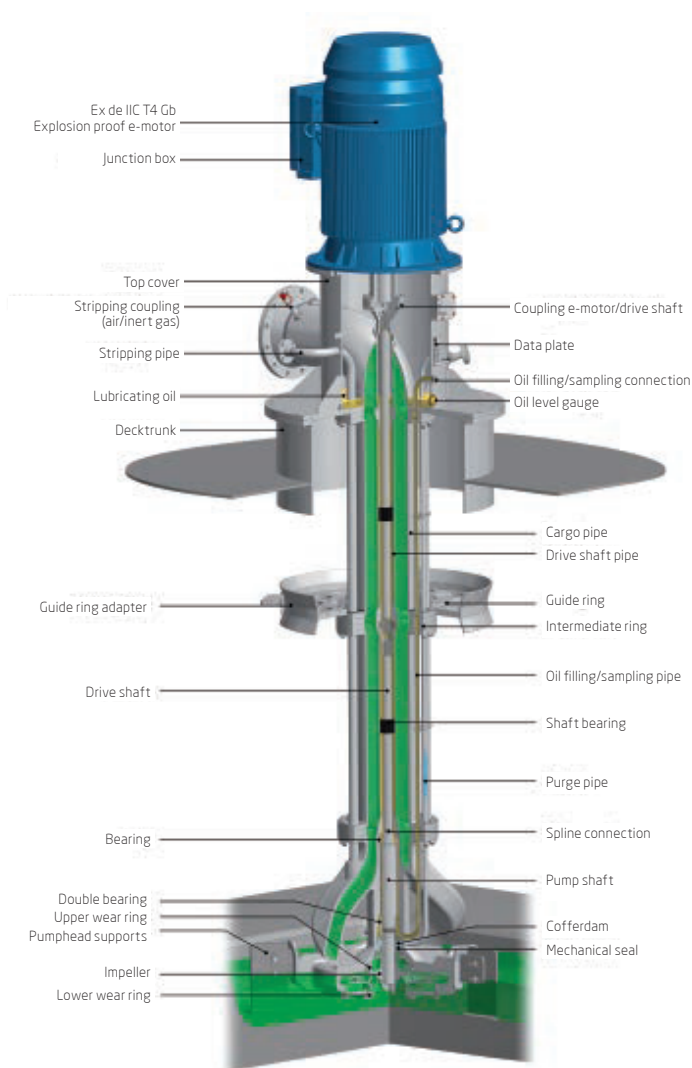
MarFlex Deepwell Pump Concentric (MDPC)



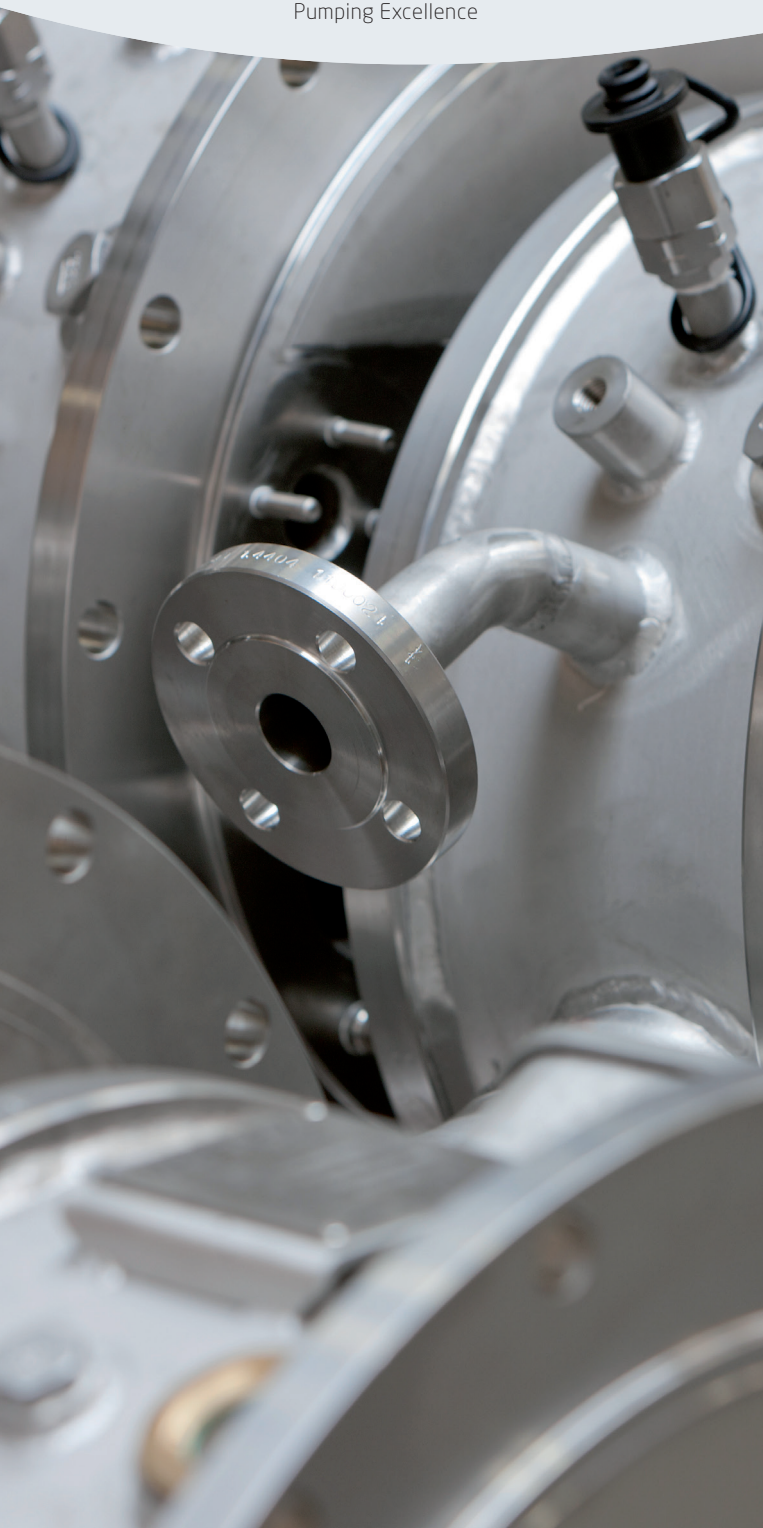
MarFlex Ballast Deepwell Pump Concentric (MBDPC)



MarFlex Offshore Deepwell Pump (MODP)



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The MarFlex Deepwell Pump

The MarFlex Deepwell Pump is a single stage centrifugal deepwell pump and uses the oil lubricated drive shaft principle. It can be driven by either an electric motor or a hydraulic motor. However, the electric drive pump system has a higher system efficiency compared to a hydraulic drive pump system. It also has a low noise level, is easy to install, and needs less maintenance because of the electrical wiring instead of the hydraulic piping system. As a result 99% of all deepwell pumps, installed by MarFlex, are electrically driven.

MarFlex produces the following pumps:

- cargo pump type MDPD 80/100/150/200
- cargo pump type MDPC 250/300
- cargo pump type MODP 150/200/300/350, built according to API-610
- ballast pump type MBDPC 150/200/300/400/500



Cargo pump type MDPD 80/100/150/200

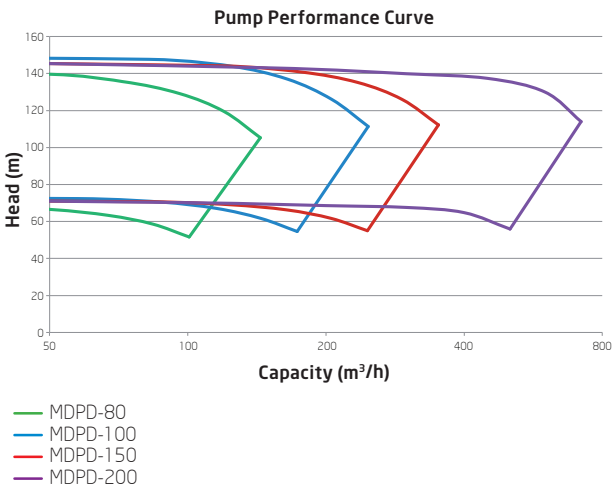
The MarFlex deepwell pump is a single stage centrifugal deepwell pump and uses the oil lubricated drive shaft principle. It can be driven by either an electric motor or a hydraulic motor. However, the electric drive pump system has a higher system efficiency compared to a hydraulic drive pump system. It also has a low noise level, is easy to install, and needs less maintenance because of the electrical wiring instead of the hydraulic piping system. As a result 99% of all deepwell pumps, installed by MarFlex, are electrically driven.

Pumps are made of

Material description	Material code
AISI 316L/Stainless Steel (standard)	1.4404
Duplex/22Cr Duplex (optional)	1.4462
Super Duplex/25Cr Duplex (optional)	1.4410

General

Cargo temperature	: -15/ +100°C
Maximum viscosity	: 4000 cSt
Maximum specific gravity	: 2,11



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Cargo pump type MDPC 250/300

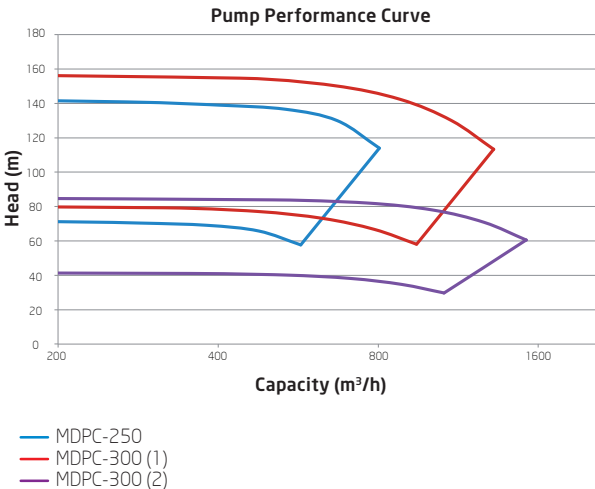
The MarFlex deepwell pump is a single stage centrifugal deepwell pump and uses the oil lubricated drive shaft principle. It can be driven by either an electric motor or a hydraulic motor. However, the electric drive pump system has a higher system efficiency compared to a hydraulic drive pump system. It also has a low noise level, is easy to install, and needs less maintenance because of the electrical wiring instead of the hydraulic piping system. As a result 99% of all deepwell pumps, installed by MarFlex, are electrically driven.

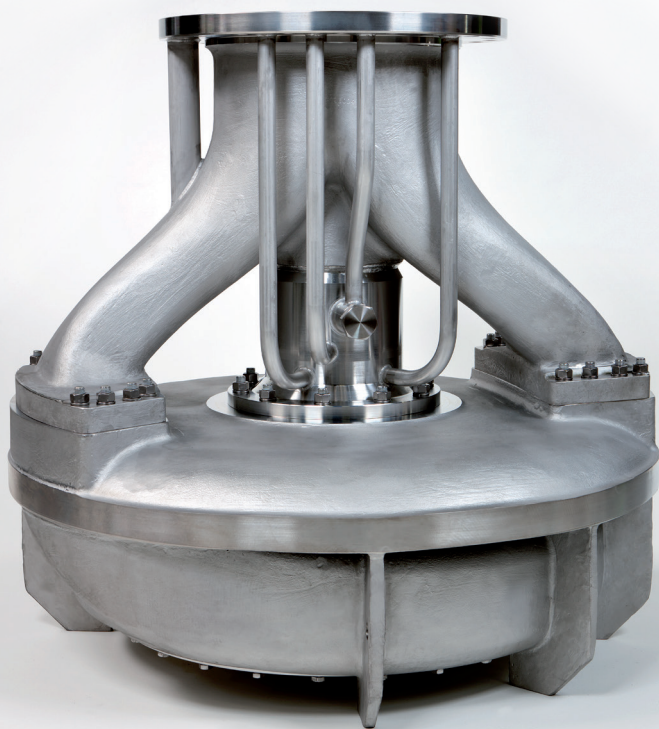
Pumps are made of

Material description	Material code
AISI 316L/Stainless Steel (standard)	1.4404
Duplex/22Cr Duplex (optional)	1.4462
Super Duplex/25Cr Duplex (optional)	1.4410

General

Cargo temperature	: -15/ +100°C
Maximum viscosity	: 4000 cSt
Maximum specific gravity	: 2,11





Cargo pump type MODP 150/200/300/350 built according to API-610

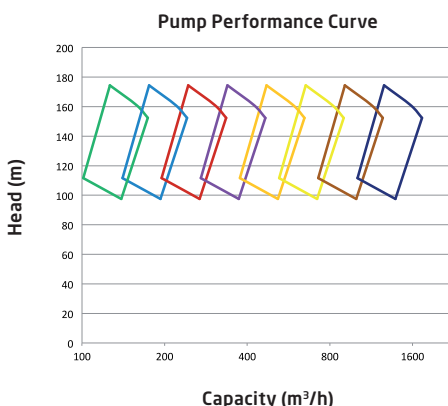
The MarFlex MODP series is a single stage centrifugal deepwell pump and uses the oil lubricated drive shaft principle. These pumps are designed according to API 610 and are intended for offshore service. Stack lengths up to 30 meters are possible.

Pumps are made of

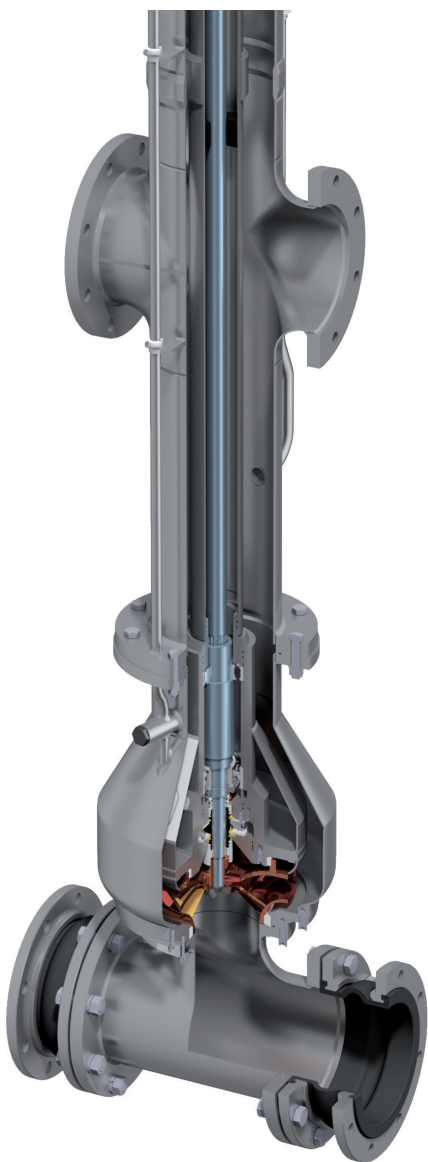
Material description	Material code
AISI 316L/Stainless Steel (standard)	1.4404
Duplex/22Cr Duplex (optional)	1.4462
Super Duplex/25Cr Duplex (optional)	1.4410

General

Cargo temperature	: -15/ +100°C
Maximum viscosity	: 4000 cSt
Maximum specific gravity	: 2,11



- MODP-150 (1)
- MODP-150 (2)
- MODP-200 (1)
- MODP-200 (2)
- MODP-300 (1)
- MODP-300 (2)
- MODP-350 (1)
- MODP-350 (2)



Ballast pump type MBDPC 150/200/300/400/500

The MarFlex deepwell pump is a single stage centrifugal deepwell pump and uses the oil lubricated drive shaft principle. It can be driven by either an electric motor or a hydraulic motor. However, the electric drive pump system has a higher system efficiency compared to a hydraulic drive pump system. It also has a low noise level, is easy to install, and needs less maintenance because of the electrical wiring instead of the hydraulic piping system. As a result 99% of all deepwell pumps, installed by MarFlex, are electrically driven.

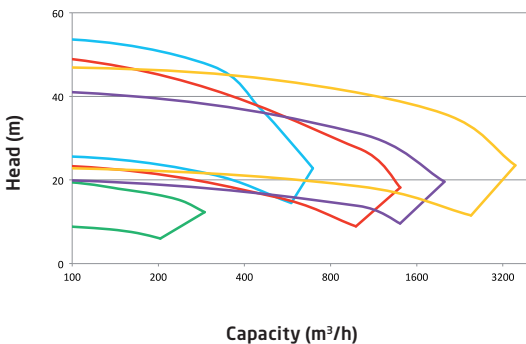
Pumps are made of

Material description	Material code
AISI 316L/Stainless Steel (standard)	1.4404
Duplex/22Cr Duplex (optional)	1.4462
Super Duplex/25Cr Duplex (optional)	1.4410

Sea water resistance

Material	: 316L
Liquid	: sea water
Temperature	: 0-30°C
Duty	: continuous
Precautions	: flush with fresh water after pump operation

Pump Performance Curve



- MBDPC-150
- MBDPC-200
- MBDPC-300
- MBDPC-400
- MBDPC-500



Draining pump

Draining pumps are designed to completely drain the tank, until the very last drop!

Design	: double acting
Capacity/pressure	: max. 7 m ³ /h – max. 7 bar
Strokes	: max. 13 strokes/min
Air consumption	: max. 0.7 nm ³ /min
Max. air pressure	: 10 bar

Materials in contact with cargo	: AISI 316L
Plunger rod	: AISI 316L
Plunger rings	: PTFE compound
Sealing	: PTFE compound
Discharge connection	: ¾" BSP
Blow through/strip connection	: ¾" BSP
Drain	: ¾" BSP ball valve - AISI 316L

Each pump consists of the following sub-assemblies:

- draining pump assembly
- foundation in tank
- suction filter
- deck trunk (stainless steel, 270 mm)

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Variable Speed Drive System (VSDS)

The MarFlex Variable Speed Drive System (VSDS) is designed to be the perfect companion to the MarFlex electric deepwell pumps.

Tailor-made software in the VSDS's PLC and frequency converters ensure precise and individual speed control of the pumps enabling them to perform any discharge scenario for a wide range of liquid cargos with different viscosities and densities.

The VSDS has been designed giving the highest priority to safety, system efficiency and flexibility. The frequency converters deliver the actual power needed without any inrush currents, thereby reducing the mechanical wear and cavitation to a minimum. Depending on specific requirements, MarFlex can deliver either an air or a water cooled VSDS.

In its most basic form the VSDS is designed for remote and local pump control via one or more touch panels, together with an optional pump control desk, PLC, frequency converters and a custom-built contactor matrix to drive pumps. The system interacts and communicates with other third party systems onboard to provide a reliable and safe means of complete cargo loading and unloading operations.

The optional Remote Access function allows MarFlex service engineers to remotely monitor the VSDS components individually, to measure performance parameters, and to analyse any malfunctions.

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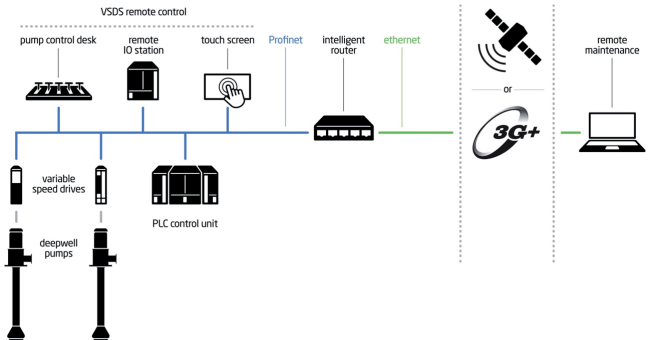
Pump control desk

The pump control desk consists of a custom designed front panel with dedicated control modules for each separate pump. The number of control panels equals the number of pumps.

Variable speed control is available by means of a smooth fader panel. At the moment a start button is pressed, the pump control desk automatically selects an available frequency converter. The maximum number of simultaneously controlled pumps is limited by the available frequency converters. The basic indications are displayed via LEDs and the detailed pump information is displayed on the touch screen.

For pumps that are driven via star-delta or soft-starters, the control modules are available with start/stop functionality.

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Remote access

The remote access system provides remote diagnostics of the pump system. On request, and only with the permission of the responsible officer on board, the system allows MarFlex Services to remotely analyse the pump system. Remote access will drastically reduce the average downtime and lower costs for field service both during and after the warranty period. An internet connection on board is required for this. When an internet connection is not available, the 3G+ and/or UMTS/HSUPA/GPRS/EDGE module is offered as an option.

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Electric Hydraulic Powerpack (EHP)

The EHP is a skid mounted unit, including hydraulic oil tank, cooling, valves, and gauges, suitable for driving portable pumps.

Specifications	EHP-45	EHP-45	EHP-75	EHP-112
Location of operation	safe area	safe area	safe area	safe area
Ambient temperature	max. 45°C	max. 45°C	max. 45°C	max. 45°C
Length	1350	1350	1700	1700
Width	650	650	860	860
Height	1250	1250	1680	1720
Weight empty (kg)	500	500	1000	1370

Hydraulic system

Capacity (l/min)	60	72	125	130
Working pressure (bar)	280	280	320	320
System	open	open	open	open
Displacement (cm ³)	45	45	74	112
Hydraulic oil tank capacity (l)	125	125	300	300

Electric system

Auxiliary voltage (V)	230	230	230	230
Auxiliary current (A)	1	2	5	5
Frequency (Hz)	50	60	60	50

Electric motor

Rated power (kW)	37	34,5	90	90
Rated (rpm)	1500	1800	1800	1500
Current at 400 V	69	57	144	154
Insulation Class	F	F	F	F
Protection	IP56, tropical	IP56, tropical	IP56, tropical	IP56, tropical

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Portable submersible pump type MSP-80

The MSP-80 is a light and compact, high capacity hydraulic drive, centrifugal pump and designed for a wide range of products such as:

- chemicals
- acids
- solvents
- petroleum products
- crude oil
- edible oils

The pump impeller is keyed directly to the hydraulic motor shaft enabling a very compact design. Between the hydraulic motor and the pump impeller is a double mechanical seal arrangement to ensure a proper segregation between the hydraulic and product side.

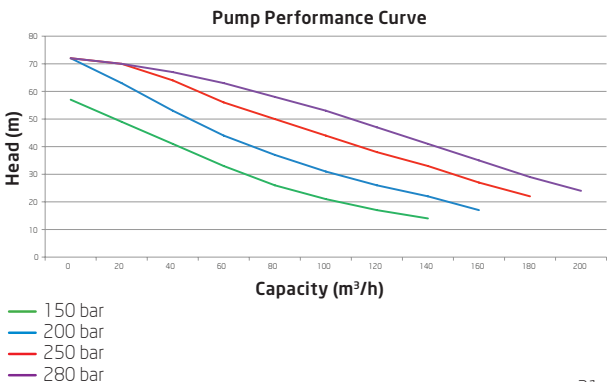
All parts exposed to the cargo are made of AISI 316L or PTFE. The pump has a maximum diameter of 250 mm and can be utilised via a standard 12" tank cleaning hatch. The pump can be driven by a ship's hydraulic system or by means of a portable powerpack. As standard the pump is delivered with an 18 m concentric hydraulic hose with a start-stop valve at the other end. A flow control can be delivered as an option.

MSP-80

Discharge connection	: 4" coupling or 4" flange
Max. pressure	: 320 bar
Max. return pressure	: 10 bar
Max. oil flow	: 75 (l/min)
Pressure connection	: ½" quick coupling
Return connection	: ¾" quick coupling

Dimensions

Max. diameter	: 250 mm
Height excluded stand pipe	: 558 mm
Stand pipe height	: 415-400-405-395 mm
Weight excluded hoses	: 38 kg



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Portable submersible pump type MSP-100

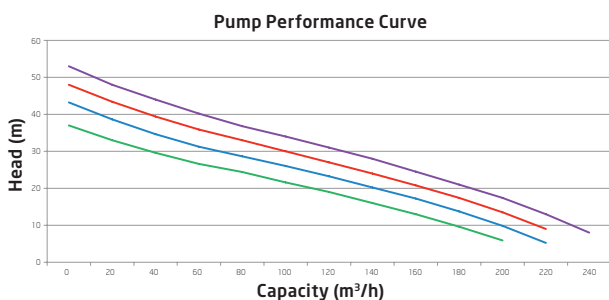
The MSP-100 portable pump is based around a Hydrostal Screwcentrifugal impeller. This type of impeller combines the properties of a screw pump with those of a centrifugal pump. The low liquid velocities in the pump result in low shear forces. This makes the pump suitable for liquids which have to be treated carefully and without too much motion and turbulence, in order to avoid emulsification such as water-oil mixtures. The last property makes the pump perfect for oil-recovery operations and it is for this reason that several coast guards have standardized on this type of pump. The pump can be delivered in an aluminium version. A bronze version is optional.

MSP-100

Discharge connection	: 4" coupling or 4" flange
Max. pressure	: 250 bar
Max. return pressure	: 6 bar
Max. oil flow	: 48 (l/min)
Pressure connection	: ½" quick coupling
Return connection	: ¾" quick coupling

Dimensions

Max. diameter	: 305 mm
Height	: 373 mm
Weight excluded hoses	: 28 kg



- 175 bar
- 200 bar
- 225 bar
- 250 bar



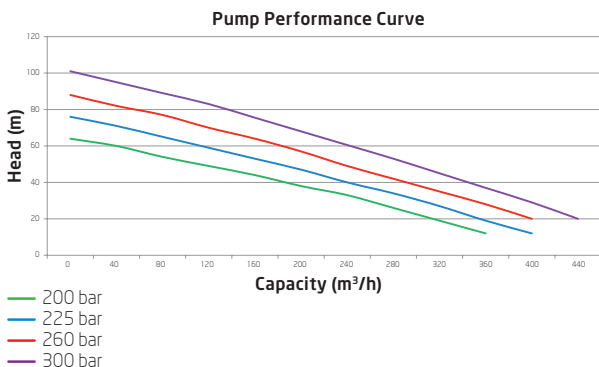
Portable submersible pump type MSP-150

The MSP-150 portable pump is based around a screw centrifugal impeller. This type of impeller combines the properties of a screw pump with those of a centrifugal pump. The low liquid velocities in the pump result in low shear forces. This makes the pump suitable for delicate liquids (which must be handled carefully and without too much motion and turbulence) and so problems such as coagulation of natural latex and emulsification, such as in water-oil mixtures, are avoided. The last property makes the pump perfect for oil-recovery operations and it is for this reason that several coast guards have standardized on this type of pump. For very viscous products, like molasses and heavy fuel oil, the pump can be delivered with a different hydraulic motor.

	MSP-150-63	MSP-150-90
Discharge connection	6" coupling or 6" flange	6" coupling or 6" flange
Max. pressure	320 bar	320 bar
Max. return pressure	6 bar	6 bar
Max. oil flow	130 (l/min)	180 (l/min)
Pressure connection	1" quick coupling	1" quick coupling
Return connection	1½" quick coupling	1½" quick coupling

Dimensions

Max. diameter	490 mm	490 mm
Height	610 mm	610 mm
Weight excluded hoses	83 kg	92 kg



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Portable submersible pump type MSP-200

The MSP-200 is a light and compact, high capacity, hydraulic drive, centrifugal pump and designed for a wide range of products such as:

- chemicals
- acids
- solvents
- petroleum products
- crude oil
- edible oils

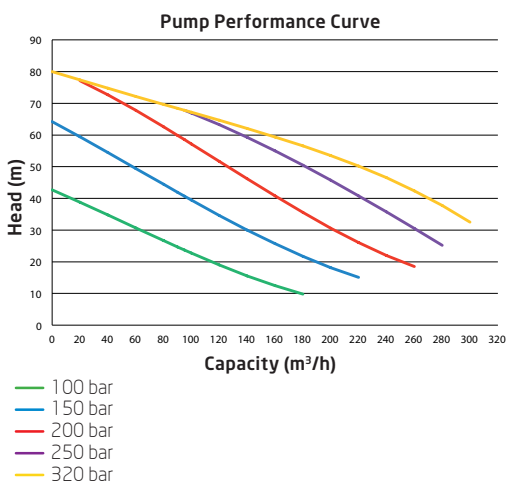
The pump impeller is keyed directly to the hydraulic motor shaft enabling a very compact design. Between the hydraulic motor and the pump impeller is a double mechanical seal arrangement to ensure a proper segregation between the hydraulic and product side. All parts exposed to the cargo are made of AISI 316L or PTFE. The pump has a maximum diameter of 300 mm and can be utilised via a standard 12" tank cleaning hatch. The pump can be driven by a ship's hydraulic system or by means of a portable powerpack. As standard, the pump is delivered with an 18 m concentric hydraulic hose with a start-stop valve at the other end. A flow control can be delivered as an option.

MSP-200

Discharge connection	: 4" coupling or 4" flange
Max. pressure	: 320 bar
Max. return pressure	: 10 bar
Max. oil flow	: 112 (l/min)
Pressure connection	: 1" quick coupling
Return connection	: 1½" quick coupling

Dimensions

Max. diameter	: 300 mm
Height excluded stand pipe	: 575 mm
Stand pipe height	: 1000-945 mm
Weight excluded hoses	: 52 kg



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Portable submersible pump type MSP-500

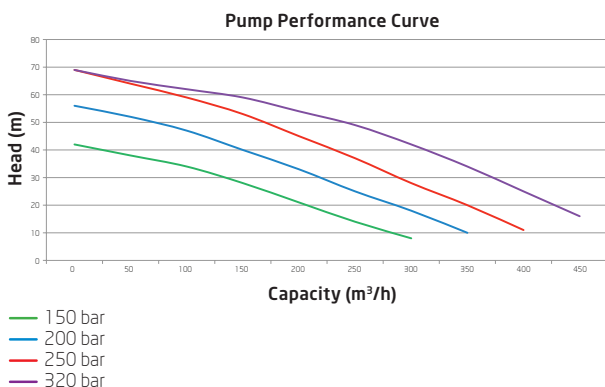
The MSP-500 is a light and compact, hydraulic drive, centrifugal salvage pump specially designed for those situations where high capacities are required. The pump impeller is keyed directly to the hydraulic motor shaft enabling a very compact design. Between the hydraulic motor and the pump impeller is a double mechanical seal arrangement to ensure a proper segregation between the hydraulic and product side. All parts exposed to the cargo are made of AISI 316L or PTFE. The pump can be used via a standard 12 1/2 tank cleaning hatch and can be driven by a ship's hydraulic system or by means of a portable powerpack.

MSP-500

Discharge connection	: 6" coupling or 6" flange
Max. pressure	: 320 bar
Max. return pressure	: 10 bar
Max. oil flow	: 130 (l/min)
Pressure connection	: 1" quick coupling
Return connection	: 1 1/2" quick coupling

Dimensions

Max. diameter	: 306 mm
Height excluded stand pipe	: 590 mm
Stand pipe height	: 790-750-700 mm
Weight excluded hoses	: 75 kg





Tripod

The tripod is a compact and sturdy hoisting device, designed to handle portable pumps, cargo, and hydraulic hoses during overtop off-loading. The tripod has two fixed legs and one hinged leg for easy storage. Two wheels enable one man to carry the tripod across a deck.

Safe working load	: 500 kg
Leg materials	: aluminum
Wheel material	: NBR rubber
Length and wire material	: 35 m, stainless steel
Wire diameter	: 8 mm
Operation	: manual
	: electrical
	: pneumatic
Dimensions	: 2250 x 1170 x 490/1400 mm (height x width x depth)
Weight	: 62 kg manual winch
	: 85 kg electrical winch
	: 78 kg pneumatic winch

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Cargo hoses

The cargo hose connects the MarFlex submersible pump to the ship's cargo discharge system. A wide range of connection types is available. Depending on the cargo type that is being handled, a cargo hose of polypropylene or stainless steel is used.

Polypropylene cargo hose

Sizes	: 4" or 6"
Lengths	: 10 m, 15 m or 20 m, or on demand
Material inside	: polypropylene liner with 316 Stainless steel inner wire
Material outside	: nylon/PVC over with galvanized steel outer wire
Temperature range	: -30/+80°C
Max. working pressure	: 10-14 bar (depending on the size)
Discharge connection	: FCL 4" ASA, DIN or JIS flange

Stainless steel cargo hose

Sizes	: 4", 5" or 6"
Lengths	: 10 m, 15 m or 20 m, or on demand
Material hose	: stainless steel 304 or 316
Material braid	: single or double braided layer 304 or 316
Temperature range	: -200/+600°C
Max. working pressure	: 10-23 bar (depending on the size)
Discharge connection	: FCL 4" ASA, DIN or JIS flange

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Hose reel

MarFlex made a special storage and transport reel for hydraulic hoses. This overcomes the problems of physically handling such hydraulic hoses that are inherently relatively heavy and stiff and inflexible.

The reel can accommodate

3 x 18 m 1" high pressure hose

3 x 18 m 1½" return hose

Alternative

5 x 18 m ½" high pressure hose

5 x 18 m ¾" return hose

Dimensions

Length : 1000 mm

Width : 1000 mm

Height : 1540 mm

Weight

With 3 sets hoses : 334 kg

With 5 sets hoses : 341 kg

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MarFlex Training

MarFlex Training is an intrinsic part of our endeavours to maintain safe operations and to keep your equipment performing to your satisfaction. We now have even more training centers in operation and our training courses are always well received. Taking part in our training courses will enable you to:

- get to know the system better
- need less maintenance because of better treatment/operation of the system
- achieve safer working
- achieve better stripping results and therefore less residue after offloading

Objective: to improve system (cost) operational performance

Global strategic training centers are located in India, Russia and the Netherlands.

Standard and customised training is available:

- on board
- at the customer's office
- at global MarFlex' training centers
- during annual seminars

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MarFlex Services

In order to keep your MarFlex deepwell pump installation always up and running, MarFlex Services focuses on preventive maintenance. Furthermore, MarFlex's service desk is available 24/7 to help you and, if necessary, provide you with a service engineer and the spare parts required for your MarFlex deepwell pump. You can always rely on MarFlex Services.

MarFlex Services can help you to prevent failures by:

- evaluation of purge results
- pre docking inspections
- annual inspections
- dry docking
- preventive maintenance

MarFlex Services features include:

- 24/7 service desk
 - a team of highly skilled service engineers available 24/7
 - global, short delivery times
 - service locations worldwide
 - remote monitoring & assistance
- +31 (0)186 890 999 24/7 emergency only
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MarFlex



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