

# EUREKA FIRE WATER PUMP SYSTEM



Keep going. Keep safe.

# EUREKA

# ENSURE SAFETY THROUGH PROVEN **EXPERIENCE**

Fire protection for all offshore applications



STATFJORD A, STATOIL



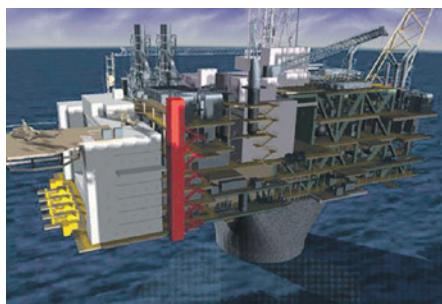
CLAIR, BP



ÅSGARD A, STATOIL



SNORRE B, STATOIL



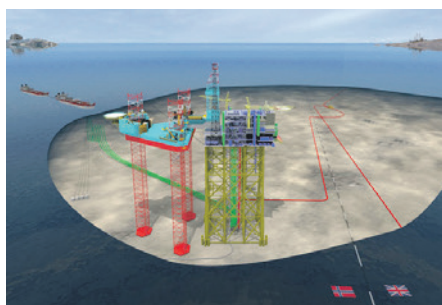
HEBRON, EXXON



KRISTIN, STATOIL



TROLL, SHELL



MARTIN LINGE, TOTAL



AGBAMI FPSO, CHEVRON



SKARV, BP



GRANE, STATOIL



GUDRUN, STATOIL

OVER 150 FIRE WATER PUMP SYSTEMS  
delivered to the offshore oil & gas industry



# THE FEATURES OF EUREKA FIRE WATER PUMP SYSTEMS

EUREKA PUMPS AS, supplies Eureka fire water pump packages with pumps powered either directly by diesel engines or by diesel electric generators. The Eureka fire water system includes a driver, a pump, and a control system with no need for utility consumption in operation mode.

The systems and pumps are in accordance with NFPA 20 regulations.

## Fire water pump system configurations:

- Diesel direct driven dry mounted pump.
- Diesel direct driven deepwell pump with angle gear (caisson mounted).
- Diesel electric driven deepwell pump (submerged electric motor).
- Diesel electric driven dry mounted pump.

– **NFPA20 designed systems:** We are following the guidelines and principles of the NFPA 20 standard. The pump is rated for for 150% capacity at 65% of the rated head output. The drivers used are either diesel electric or diesel direct driven. No external hydraulics are used.

– **Large capacities and high pressures:**

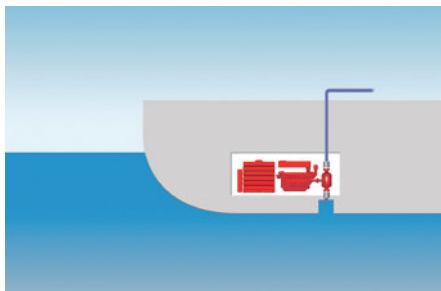
The fire water pumps are designed for high output and low energy demand. The Eureka Pumps has no limitation to capacity and pressures required for fire water pump applications on offshore units today.

– **Low System complexity:** Through simplicity we achieve higher reliability and reduced possible failure modes. The Eureka fire water system design is clean with few parts and few interfaces. Due to the high capacity output of our pumps we can do the job with only one pump.

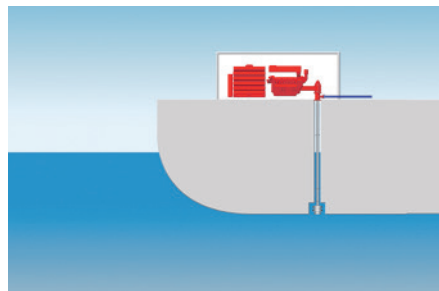
– **Complete systems:** We supply complete fire water pump packages. All types of enclosures can be delivered. Control systems may be simple NFPA 20 controllers or PLC systems with multiple functions. Extra fuel tanks and fin fan coolers can be supplied.

– **Self contained systems:** The Eureka fire water pump systems are self-contained designed to provide full operation for 24 hours with all auxiliary equipment. No external influence can stop the fire water pump in a fire emergency situation.

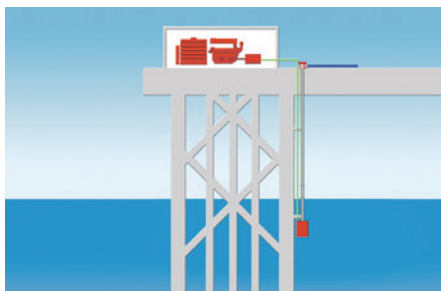
## FIRE WATER PUMP SYSTEM CONFIGURATIONS



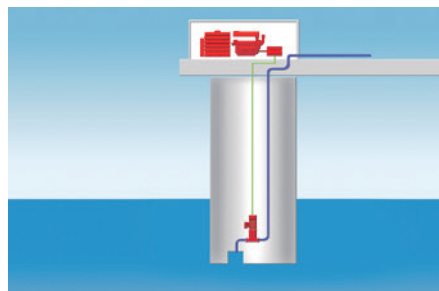
Diesel direct driven dry mounted pump



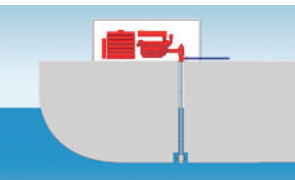
Diesel direct driven deepwell pump with angle gear (caisson mounted)



Diesel electric driven deepwell pump (submerged electric motor)

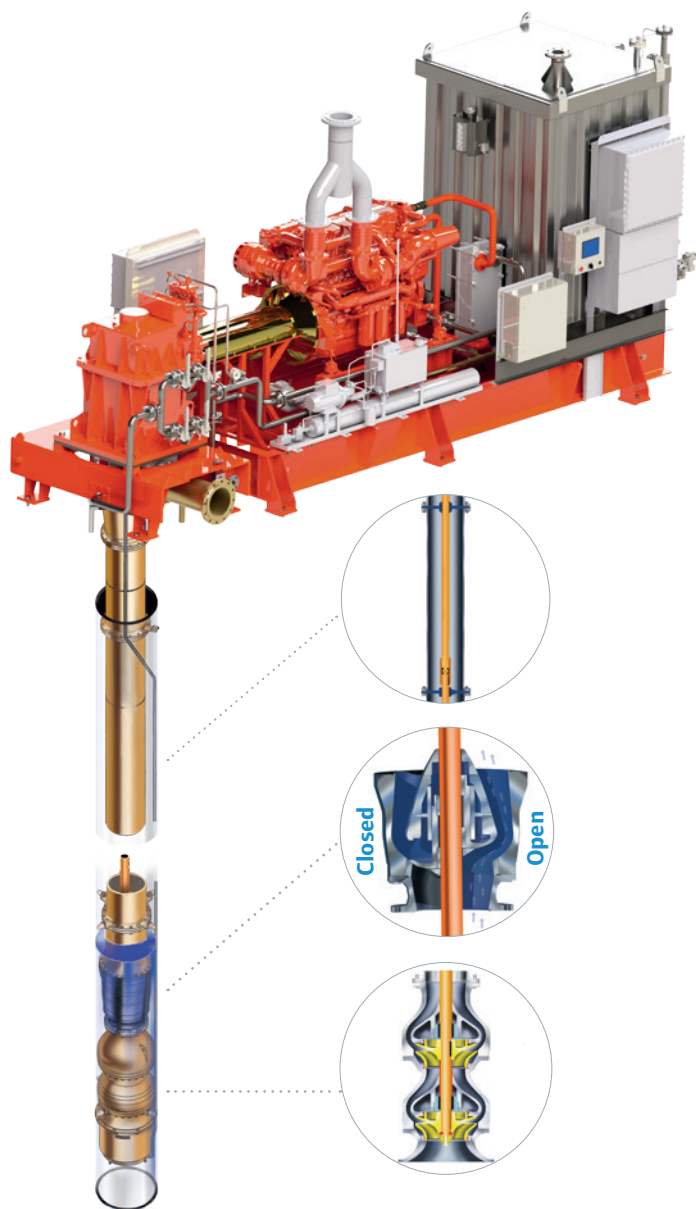


Diesel electric driven dry mounted pump



# DIRECT DIESEL DRIVEN DEEPWELL FIRE WATER PUMP WITH ANGLE GEAR

"The most reliable offshore fire water pump system today"



**PUMP DESCRIPTION:** The pump is a vertical line shaft, end suction multistage centrifugal pump driven by a high-speed direct injection turbo charged diesel engine. The cooling water taken from pump discharge and the complete system is independent of external cooling water. Pump drive is through a short cardan shaft from engine to a right angle gear.

Lineshaft pump and angle gear:

The pump is designed according to API 610 for continuous duty under all operating conditions

Journal bearing distance is according to API 610. The running speed of the pump is max. 75 % of the critical speed. This gives an under-critical tolerance of minimum 25 %.

The labyrinth seal is a non contact design with the same life time as the pump.

Experience with lineshaft pump solutions up to 50 meter in length.

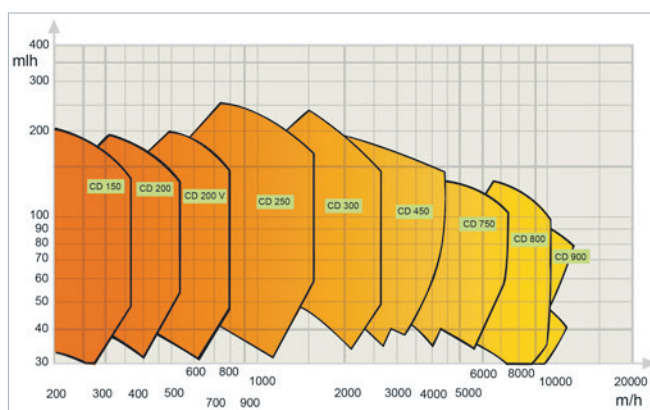
For sea water duty the pump is delivered in 25%Cr or 22%Cr Duplex, or Ni-Al Bronze material. The drive shaft is always delivered in 25%Cr Duplex.

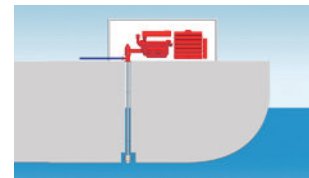
Capacity range is from 500-10000 m<sup>3</sup>/h and head up to 250 m.

Right angle gear is designed according to NFPA20 with hollow shaft to fit pump shaft with fixed coupling. The gear is equipped with non-reverse ratchet and oil lubricated pump thrust bearing. Direct driven internal lub oil system provides lubrication to all bearings and bevel gear.

Balancing of the resulting forces on the Pump rotor ensures optimum thrust bearing lifetime. The minimum thrust forces on the pump help eliminate any material fatigue.

Option: Submerged non-return valve to prevent water hammering during start up.





# DIRECT DIESEL DRIVEN DEEPWELL FIRE WATER PUMP WITH ANGLE GEAR

“The most reliable offshore fire water pump system today”

## DIESEL DRIVER UNIT WITH ACCESSORIES

**GENERAL:** The fire water package will be equipped with diesel driver and auxilliary equipment in order to be fully self sufficient during operation.

**COMMON SKID:** Pump, gear and diesel engine is mounted on a common heavy duty skid with a large capacity drip pan. Control Panel, start batteries, fuel tank and other accessories can be mounted on the base plate.

**ENCLOSURES:** Noise enclosure (85dBA standard) or combined A60/H60 and sound damping module with full width walkways around engine and pump. Access doors and removable hatches for easy installation/removal and maintenance.

**DIESEL DRIVERS:** High-speed direct injection turbocharged marine diesel engines rated for 12-24 hours (according to requirements) for continuous operation plus 10% overload capacity.

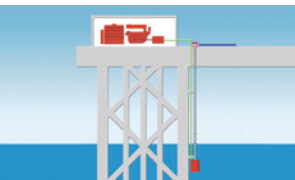
**CONTROL SYSTEM:** Control system is fully NFPA 20 controller based PLC systems with multiple functions and easy interfacing.

**ZONE 2 OPTION:** The fire water package can be designed for zone 2 installation, with modification on diesel engine, exhaust gas system, control panel and auxilliary electro/instrument equipment.



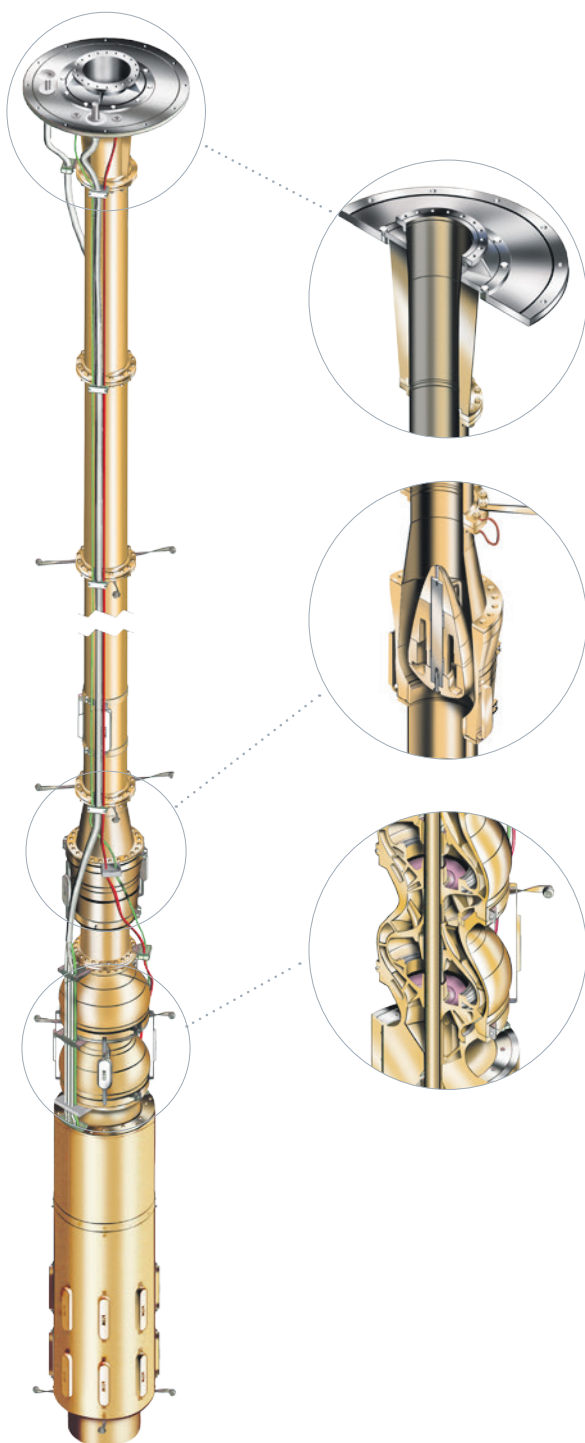
## FEATURES:

- Space, weight and cost effective due to few and simple components.
- Simple installation and easy alignment.
- Reinforced vertical bearing arrangement and non-reverse ratchet.
- Driver and control equipment is located away from flood exposed areas with solid connection to the submerged pump.
- Non-return valve.
- Robust, complete and fully mechanical NFPA 20 designed system.



# SUBMERGED DIESEL ELECTRIC DRIVEN DEEPWELL FIRE WATER PUMP

“The flexible fire water pump solution”



**DESCRIPTION:** The pump is a vertical end suction multistage centrifugal pump driven by a direct coupled submerged electric motor. The electric motor is powered by a dedicated fire water generator set. The fire water package is a self contained unit designed according to NFPA20.

**PUMP AND ELMOTOR:** The Eureka submerged electric deepwell pump is a vertical turbine product lubricated pump driven by a submerged electric motor. The pump is designed according to API 610 for continuous duty under all operating conditions.

Balancing of the resulting forces on the rotor ensures optimum thrust bearing lifetime. The minimum thrust forces on the pump help eliminate any material fatigue.

Experience with pump solutions up to 50 meter length.

For seawater duty the pump is delivered in 25%Cr or 22%Cr Duplex, or Ni-Al Bronze material. The drive shaft is always delivered in 25%Cr Duplex.

Capacity range is from 500-5000 m<sup>3</sup>/h and head up to 250 mlc.

Experience with elmotor power up to 2,5MW.

The submerged electric motor can be supplied with all voltages between 400-11.000 V.

The windings in the motors are water glycol filled with insulated windings. Any leakage of seawater inside the motor will not cause a short circuit of the motor.

Mechanical seal and thrust bearing is located inside the electric motor.

Option: Submerged non-return valve to prevent water hammer during start up.





# SUBMERGED DIESEL ELECTRIC DRIVEN DEEPWELL FIRE WATER PUMP

“The flexible fire water pump solution”

**GENERAL:** The generator set together with the pump will be equipped with auxilliary equipment in order to be fully self sufficient during operation.

**COMMON SKID:** Diesel engine and generator is mounted on a common heavy duty skid with a large capacity drip pan. Control Panel, start batteries, fuel tank and other accessories can be mounted on the base plate.

**ENCLOSURES :** Noise enclosure (85dBA standard) or combined A60/H60 and sound damping module with full width walkways around engine and pump. Access doors and removable hatches for easy installation/removal and maintenance.

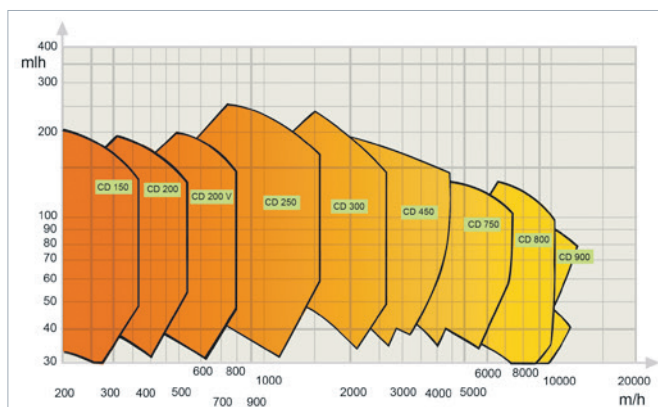
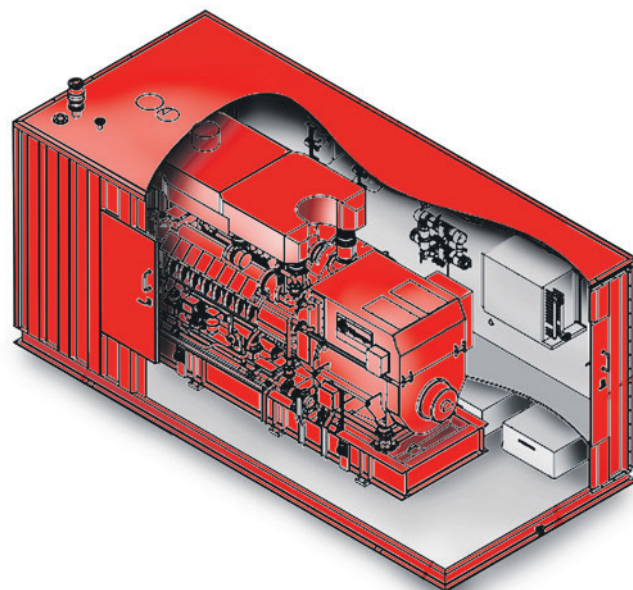
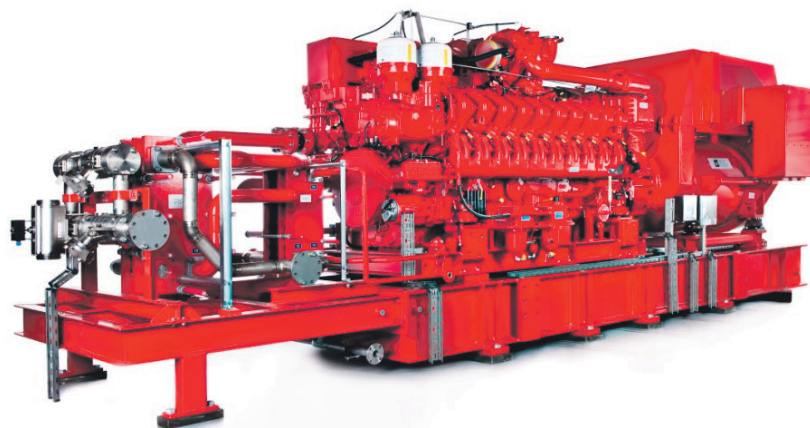
**DIESEL DRIVERS:** High-speed direct injection turbocharged marine diesel engines rated for 12-24 hours (according to requirements) for continuous operation plus 10% overload capacity.

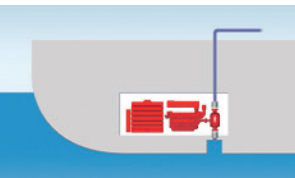
**GENERATOR:** Water cooled generator flanged onto engine fly wheel housing and supported in flexible mounts matched to engine mounts. Freshwater cooled double tube heat exchanger in CuNi complete with leakage alarm.

**CONTROL SYSTEM:** Control system is fully NFPA 20 controller based PLC systems with multiple functions and easy interfacing.

## FEATURES:

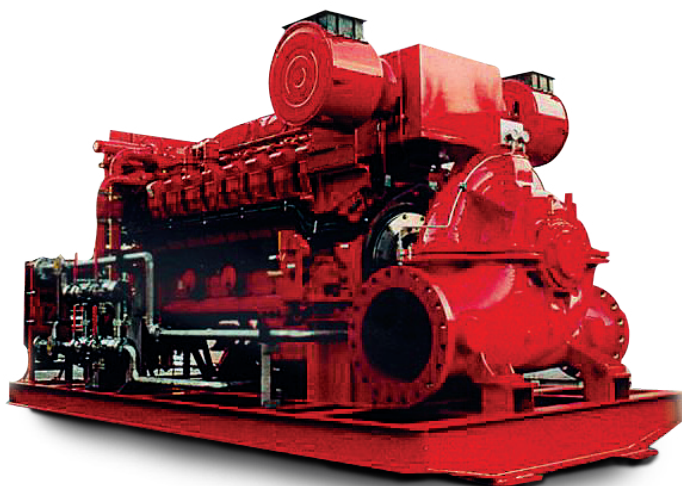
- No arrangement limitations between pump and driver unit.
- Simple interface split.
- Driver and control equipment is located away from flood exposed areas with solid connection to the submerged pump.
- Non-return valve.
- Robust, complete and fully mechanical NFPA 20 designed system.





# DIRECT DIESEL DRIVEN DRY MOUNTED FIRE WATER PUMP SYSTEM

"Simple mechanical pump room solution"



**DESCRIPTION:** The fire water pump is a dry mounted single or double suction single stage centrifugal pump in horizontal version for standby operation. Driven by high-speed direct injection turbo charged and after cooled diesel engine. The cooling water taken from pump discharge and the complete system is independent of external cooling water.

Pump drive is through a flexible cardan coupling arrangement to simplify installation/alignment and to permit the diesel engine to move freely on its flexible supports. A heavy duty, lightweight base frame fitted with drip pan with drain connection.

A 4-point standard skid mounting arrangement with spherical rubber bushings and weld pad supports.

## FEATURES:

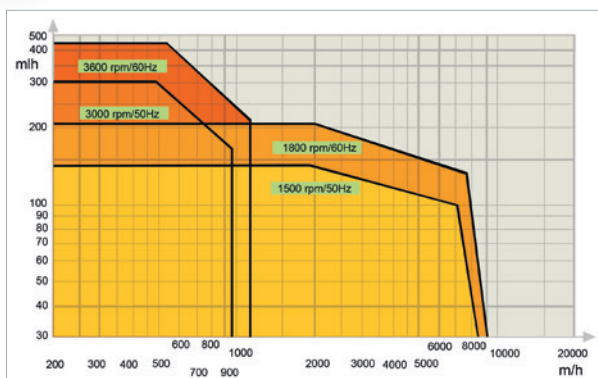
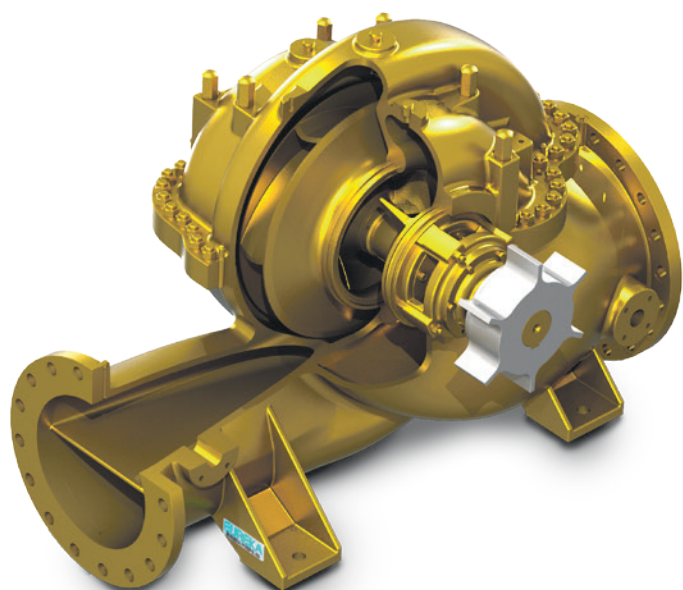
- Low system complexity with few components and direct drive.
- Easy accessible for maintenance.
- Large capacity range.
- Straight forward NFPA 20 design.

## FIRE WATER PUMP - MARINE

Type	: Single or double suction, single stage centrifugal
Standard	: Marine class
Capacity	: up to 4000m <sup>3</sup> /h
Total head	: up to 200mlc
Shaft seal	: Single mechanical
Material	: Ni-Al Br (recommended)
Driver	: High speed turbocharged diesel engine

## FIRE WATER PUMP - API610

Type	: Double suction single stage radial split centrifugal
Standard	: API 610
Capacity	: up to 10.000 m <sup>3</sup> /h
Total head	: up to - 400mlc
Shaft seal	: Single mechanical
Material	: Ni-Al-Br, Duplex, or SuperDuplex
Driver	: High speed turbocharged diesel engine







# DIESEL ELECTRIC DRIVEN DRY MOUNTED FIRE WATER PUMP SYSTEM

“The flexible pump room fire water solution”

## DRY MOUNTED MARINE TYPE:

Electrical or diesel driven single or double stage, double suction, double volute, radial split pump. It is available both in vertical and horizontal execution. From a performance point of view, the pump is designed with high efficiency in mind.

### FIRE WATER PUMP - MARINE

Type	: Single or double suction, single stage centrifugal
Standard	: Marine class
Capacity	: up to 4000m <sup>3</sup> /h
Total head	: up to 200mlc
Shaft seal	: Single mechanical
Material	: Ni-Al Br (recommended)
Driver	: High speed turbocharged diesel engine

## DRY MOUNTED API 610 TYPE:

Direct electric or direct diesel driven API 610 vertical or horizontal skid mounted fire water pump. The pump is a single stage, double suction, double volute, radial split centrifugal pump. The pump can be delivered in a wide range of capacity and head specification.

### FIRE WATER PUMP - API610

Type	: Double suction single stage radial split centrifugal
Standard	: API 610
Capacity	: up to 10.000 m <sup>3</sup> /h
Total head	: up to - 400mlc
Shaft seal	: Single mechanical
Material	: Ni-Al-Br, Duplex or SuperDuplex
Driver	: High speed turbocharged diesel engine

## FEATURES:

- Straight NFPA 20 system design.
- Flexibility in installation arrangement.
- Possibility for combined fire water and sea water lift pump duty, and combined power supply.

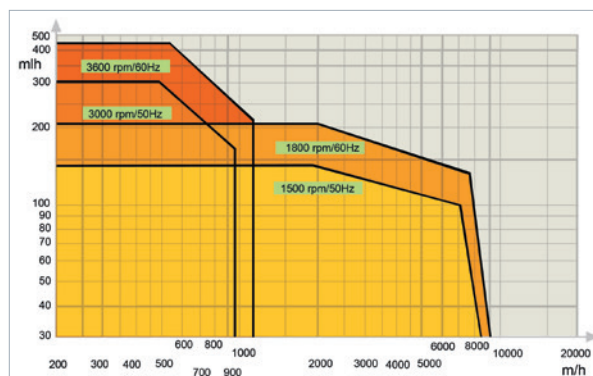
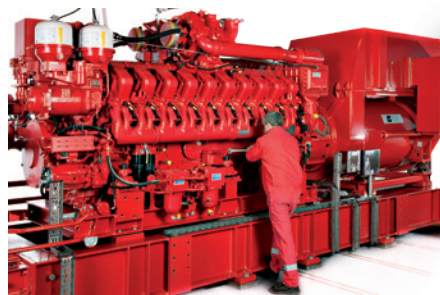
**DESCRIPTION:** Dry mounted fire water pump diesel electric drive unit for standby or marine duty. Diesel engine drive through a close coupled flange on generator.

Driven by high speed direct injection turbocharged and after cooled diesel engine. The cooling water taken from pump discharge and the complete system is independent of external cooling water.

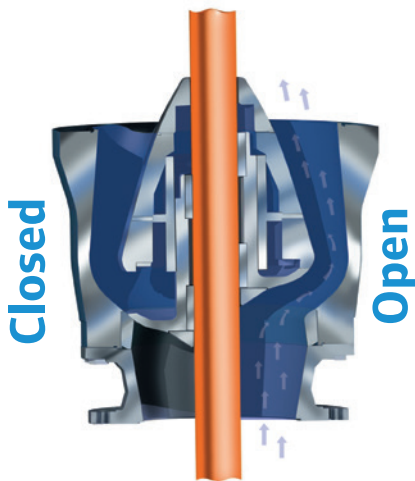
Water cooled generator flanged onto engine fly wheel housing and supported in flexible mounts matched to engine mounts. Freshwater cooled double tube heat exchanger in CuNi complete with leakage alarm.

Heavy duty frame fabricated in carbon steel. Fitted with large capacity drip pan with drain connection.

Skid mounted NFPA20 type controller, microprocessor based, with built in instrument battery. Full generator instrumentation.



# PUMP NON-RETURN VALVE FOR DEEP WELL **FIRE WATER PUMP** SOLUTIONS



The fire water pump application require the pump to start up as fast as possible during a fire emergency, which can result in water hammer damaging the equipment. The problem normally starts at a capacity above 1000m<sup>3</sup>/h. In order to minimize the water hammering at the pump bend during start up, a check valve arrangement can be installed at the bottom of the riser column on the pump end discharge.

The riser must continuously be refilled with water from deck level to compensate for the small leakage through the valve. The FW ring main is normally isolated from the pump by a NRV in front of the pump discharge. A bypass with orifice (approx. 10mm) around this NRV ensures refill of the riser.

The NRV is available in both submerged electrical and lineshaft pump solution.

Hypochlorite can be injected from the top unit due to the small leakage through the valve, which eliminates the need for a separate hypochlorite line.

During start up the increase in pump medium pressure will push the valve piston spring and open the valve.

During shut down of the pump a narrow clearance between the anti stationary piston sleeve and the valve piston throttles the water and creates a vacuum behind the piston. The piston closing speed is radically reduced down resulting in a controlled closing of the piston and slow retardation of the pump medium.

The NRV principle has been in successful service for more than 10 years.



## CONDITION MONITORING

Detail knowledge of NFPA20 fire water pump system configurations:

- Required Power consumption and efficiency.
- Dynamic considerations of total system.
- Control and instrumentation according to NFPA20.
- System HSE requirements.
- SIL/PED/ATEX requirements.
- Maintenance philosophy.
- Detail knowledge of all components in fire water pump system train for all NFPA20 configurations. – Pump, Diesel engine, Generator, Elmotor, Angle gear, Control unit, Auxiliaries.
- Fire water pump upgrading for increased capacity and head according to new requirements.

- Upgrade of existing control system or replacement with new control system to meet new requirements.
- Upgrading of diesel engine to improve reliability and increased power output.
- Tailor made maintenance systems of diesel engine, generator, gear, elmotor and pump according to manufacturer requirements.
- Evaluation of optimum system or component selection for modification of existing fire water equipment. Cooperation with manufacturers for key components.
- Condition monitoring to evaluate optimal working conditions.
- Performance monitoring.

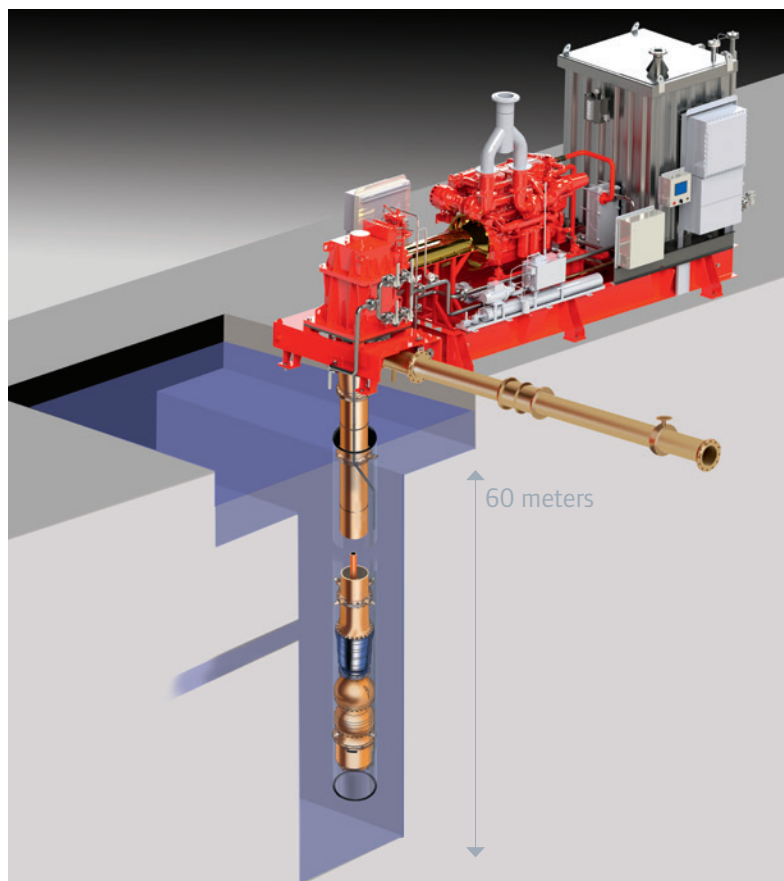


# ASSEMBLY & TESTING FACILITIES

Eureka Pumps manufactures and packages complete fire water pump sets at its workshop facility, outside Oslo in Norway. This is a purpose built, temperature regulated building comprising 3600 m<sup>2</sup> assembly area, 1000m<sup>2</sup> storage space and 800 m<sup>2</sup> goods receipt area. Hydro testing of pump components is performed at this facility along with balancing of rotating components.

Pump testing is performed in various test basins including a full size test centre for pump & diesel engine genset load testing.

Our standard testing includes performance test of pumps according to API610 (ISO13709) in short execution for vertical turbine pumps. We also have the capability to conduct comprehensive string testing of complete fire water pump packages with pump lengths up to 60 metres maximum utilizing our deep well test pit.





EUREKA PUMPS AS is a Norwegian pump supplier with more than 40 years of experience in the oil & gas and marine industry, offering a range of pumps and generator sets that covers a majority of applications. EUREKA PUMPS supplies to new builds and offers services for upgrading, modification, equipment testing, installation and commissioning.

EUREKA PUMPS is a market leader among companies operating on the Norwegian Continental shelf, and it is also present in International markets with selected applications, based on own technology. EUREKA PUMPS main office is in Oslo (Lysaker), Norway, and has offices and advanced service facilities along the Norwegian coast. EUREKA PUMPS also has offices in Houston St. Johns, Busan and Kuala Lumpur.

EUREKA PUMPS is one of five companies in the ALIGN group, a leading supplier of production equipment and safety critical products and solutions. ALIGN offers services ensuring continuous production, a perspective that safeguards optimal operations and lower life-cycle costs. The ALIGN group is owned by Converto Capital and HitecVision.

■ EUREKA PUMPS AS

■ Agent

