



Building a better future ———
Global Leader



HYUNDAI-JC CARTER-SNECMA

LNG MARINE PUMPS

SUBMERGED MOTOR CRYOGENIC PUMP



motralec

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HYUNDAI
HEAVY INDUSTRIES CO.,LTD.

ENGINE & MACHINERY



Introduction

As one of the leading engine builders in the world, the Engine and Machinery Division of Hyundai Heavy Industries Co., Ltd. (HHI-EMD) has been manufacturing a wide range of pumps for more than 30 years.

On 9th of May in 2007 HHI-EMD added LNG marine pumps to the HYUNDAI PUMPS Product Line in a License and Technical Assistance Agreement with CARTER CRYOGENICS COMPANY LLC (JC CARTER), the inventor of the submerged motor cryogenic pump, and SNECMA, a leading company in aero and space engine.

HYUNDAI-JC CARTER-SNECMA LNG marine pumps meet customer's design requirements as well as the applicable standards, codes, rules and regulations. Our Quality system has been evaluated and registered in accordance with ISO Standards, and is certified to ISO 9001.



Main Cargo Pump

Hyundai Heavy Industries Co., Ltd. manufactures cargo pumps developed jointly by SNECMA and CARTER CRYOGENICS COMPANY (JC CARTER). The design is based on :

- ▶ 40 years experience of JC Carter in LNG Carrier cargo pumps
- ▶ The application of proven Space Technology to LNG cargo pumps

The cargo pump is a vertical submerged motor centrifugal pump, with very low NPSH capability, designed in compliance with IGC and IEC norms, as well as with API 610.

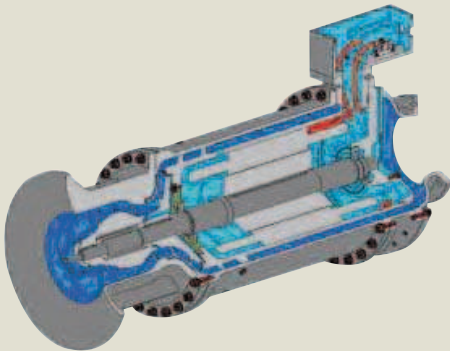


The pump rotates in the counter clockwise direction viewed from the pump inlet and is driven by the electric motor, a form wound, squirrel cage, 6,600 V, 4 pole, driver designed to operate in cryogenic fluid.



Main Features

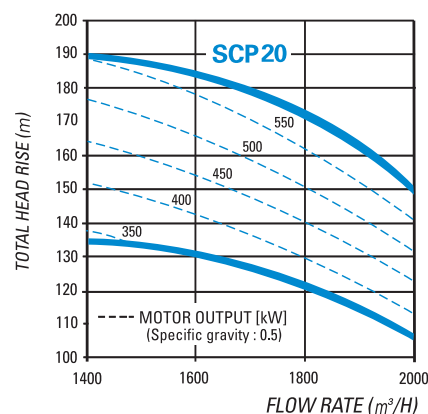
HHI - JC CARTER - SNECMA LNG Cargo pump offers the following advantages :



- Designed for utmost NPSHr performance, which provides the highest storage availability and safe ultimate stripping capability.
- Optimized hydraulic design for the best efficiency.
- Highest reliability and availability with minimum maintenance over a design life of 40 years.

Hydraulic Coverage

Flow rate and head rise nominal capabilities are shown in the chart. Applications below this domain can be met by existing JC CARTER LNG cargo pumps. HHI - JC CARTER - SNECMA can study applications above this domain to fulfill your needs. The safe continuous operating domain ranges from 30% to 120% of the reference flow rate chosen in this operating domain.



Materials

• Shaft	17.4 PH Stainless steel	• Housings	Aluminum alloy
• Standard Bearings	Stainless steel	• Seal Stators	Bronze-based material
• Inducer & Impeller	Aluminum alloy		

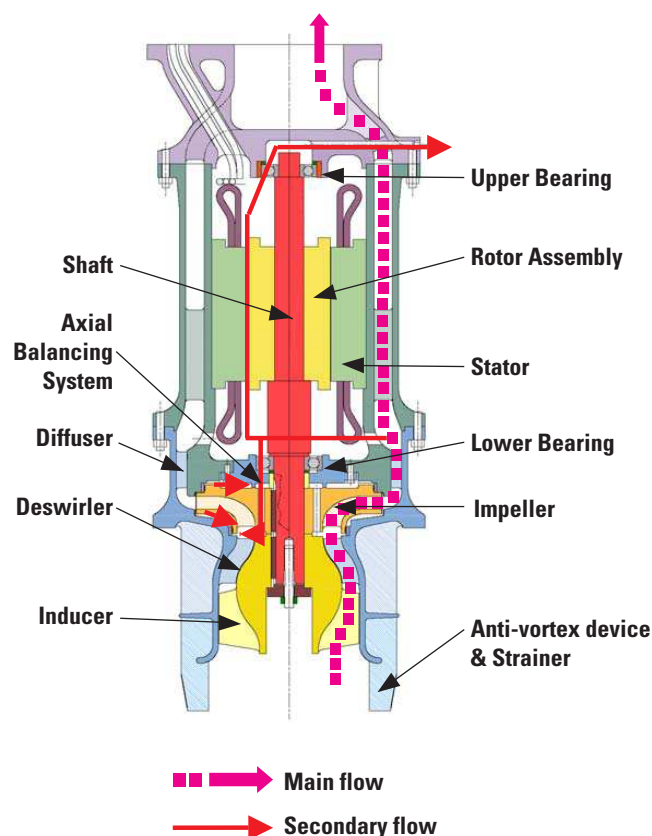
The main flow channel is comprised of :

- A suction stage, comprising successively an inducer and deswirlers
- A single-stage centrifugal stage, comprising successively the impeller and the axial diffuser

The secondary flows are designed to provide :

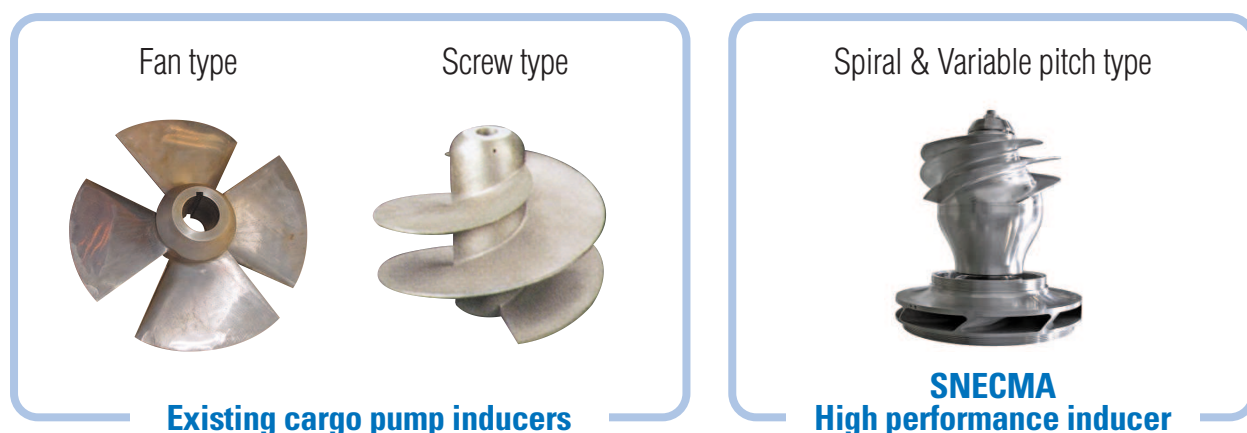
- A proper cooling of the two bearings
- A proper cooling of the electric motor
- A proper operation of the Active Axial Balancing System

The rotor is balanced thanks to an Active Axial Balancing System. It is based on the use of hydrodynamic forces that counteract the rotor weight, by means of specific gaps and volumes both on the impeller back side and in the hydraulic circuit.



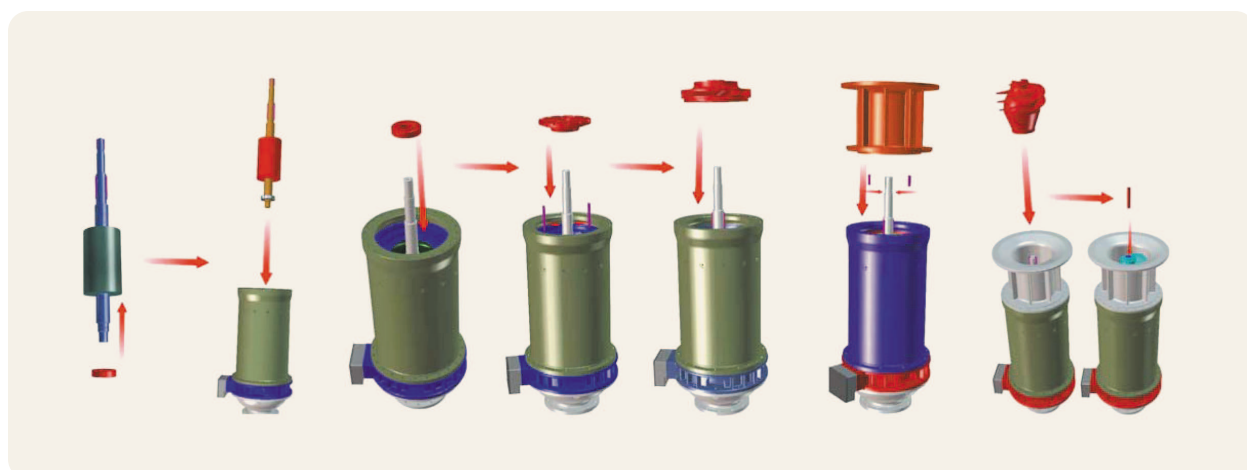
Axial stage design choice

Spiral & variable pitch increases the impeller inlet pressure and improves the suction performance. Inducer is derived from space turbo-machineries. The combination of the suction stage and the centrifugal stage insures optimized performance over a wide range of flow rates and tank liquid levels. HHI-JC CARTER-SNECMA Cargo pumps bring benefits to customers with excellent tank stripping, less BOG and considerable power reduction.



Maintenance

Optimized maintenance has been achieved due to the strong emphasis on maintenance aspects at design stage. All maintenance can be performed with pump facing in its normal orientation. Straightforward access to rotating parts and bearing : both bearings can be changed without any tilting once the pump inlet is facing upward.

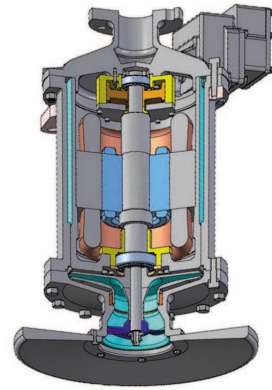


SPRAY, EMERGENCY AND FUEL PUMP

Spray Pump

A vertical, 3560 rpm centrifugal pump, with integral 440 V, 3 Phase, 60 Hz, 2 Pole, submersible 35 kW electrical motor.

The pump is configured, with a balance drum, as a fixed, in-tank, stripping and spray pump. JC CARTER has supplied more than 160 of these pumps for LNG carriers.



Emergency Pump

A vertical, 3560 rpm centrifugal pump, with integral 440 V, 3 Phase, 60 Hz, 2 Pole, submersible 200 kW electrical motor. The pump is configured, with a balance drum, as a removable, in-tank emergency pump.

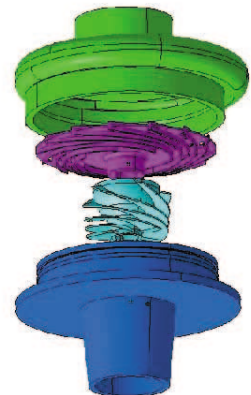
- Optimized design for 16" diameter and can be installed in 24" or 16" pump columns.
- Benefits :
 - ▶ **Reduced column cost if adapted to pump diameter 16"**
 - ▶ **Reduced size and weight, easier to handle**

Fuel Pump

A vertical, centrifugal pump, with integral 440 V, 3 Phase, 60 Hz, 2 Pole, submersible 10 kW electrical motor.

- The pump is configured, as a fixed, in-tank, gas fuel supply pump

A dedicated fuel pump (15 m³/h at 140 to 230 m) with latest inducer design to ensure good pump behavior with lowest LNG level despite wave induced motion during sea voyages.



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