



# Trasfor Marine

🇨🇭 Made in Switzerland







# Introduction

The first electric propulsion applications were introduced in the late 1980s and subsequently developed with the implementation of static converters which helped to promote the concept.

The speed of electric motor is controlled by varying the voltage and frequency of electric supply to them. A Frequency converter converts the constant frequency electric supply into variable frequency output. The frequency converter drive provides smooth control of three-phase AC currents from zero to maximum output frequency, corresponding to a desired shaft speed both ahead and astern. Thus the system offers smooth speed control, resulting in less equipment stress.

Nowadays electric propulsion with gas turbine or

diesel engine driven power generation is used in hundreds of ships of various types and in a large variety of configurations.

By introduction of azimuthing thrusters and podded thrust units, propulsion configurations for transit, maneuvering and station keeping have in several types of vessels merged in order to utilize installed thrust units optimally for transit, maneuvering and dynamically positioning. The advantages of diesel electric propulsion systems include reduced noise, increased efficiency, greater reliability due to fewer moving parts, less space, lighter.

In a diesel electric propulsion ship, electric power generated by diesel generators can drive a propulsion motor and cover all required electric power at the same time.

## Trasfor typical products for marine application are:



Cast resin, medium voltage transformers and reactors up to 25 MVA and 36 kV (typical voltages in marine application are 6,6 or 11 kV) with or without enclosure and protection degree from IP00 to IP66. Cooling from AN up to AFWF. Possibilities of different accessories including PreMag transformers, anti vibration devices and IR temperature control.

Dry type impregnated transformers and reactors up to 15 MVA and 24 kV with or without enclosure and protection degree from IP00 to IP66. Cooling from AN up to AFWF.

Water cooled and special design transformers and reactors.

# Cruise ships

A cruise ship or cruise liner is a passenger ship used for pleasure voyages, where the voyage itself and the ship's amenities are part of the experience, as well as the different destinations along the way. Transportation is not the prime purpose, as cruise ships operate mostly on routes that return passengers to their originating port.

Cruising has become a major part of the tourism industry with over 18 million estimated passengers carried worldwide in 2010.



## Main propulsion transformer

- » Power 8,8 MVA
- » Primary Voltage 11 kV 60 Hz
- » Secondary Voltage 2 x 1,8 kV
- » Protection IP44
- » Cooling AFWF
- » Weight 17.900 Kg
- » 2 x 2 units for a quasi 24 pulse





# Container ships

Container ships are designed in a manner that optimizes space. Capacity is measured in Twenty-foot equivalent unit (TEU). Informally known as “box boats,” they carry the majority of the world’s dry cargo, meaning manufactured goods. Cargoes like metal ores or coal or wheat are carried in bulk carriers. Economies of scale have dictated an upward trend in sizes of container ships in order to reduce costs. One limit on ship size is the “Suezmax” standard, or the largest theoretical ship capable of passing through the Suez Canal, which measures 14,000 TEU. Such a vessel would displace 137,000 metric tons deadweight (DWT), be 400 meters long, more than 50 meters wide, have a draft of nearly 15 metres, and use more than 85 MW to achieve 25.5 knots. Similar vessels in size and power as the oil tankers and the LNG carriers which use gas turbine generators instead of diesel.

## Main propulsion converter filter

- » Water Cooled MV Reactor
- » Inductance  $L = 3,8 \text{ mH}$
- » Effective Current  $I_{\text{eff}} = 2800 \text{ A DC}$
- » Insulation Class H
- » Weight = 4400 kg

## Propulsion transformer

- » IP44-AFWF equipped with IR windows





# Military vessels

A naval ship is a ship used for combat purposes, commonly by a navy. Naval ships are differentiated from civilian ships by construction and purpose. Generally, naval ships are damage resilient and armed with various weapon systems, though armament on troop transports is light or non-existent. Usually the technical specs for the on board equipment are very tight and severe. The term “warship” is usually used to identify the subclass of naval ships designed primarily as combatants, as opposed to support or yard operations.

## Distribution Transformer

- » Power 3,4 MVA
- » Primary Voltage 6,6 kV 60 Hz
- » Secondary Voltage 0,45 kV
- » Protection IP44
- » Cooling AFWF Sea Water
- » Weight 9.000 Kg
- » Premag transformer included
- » Side and Bottom Antivibration Dampers

## Typical MV transformer for marine application IP44-AFWF





# Dredgers

Dredging is an excavation activity or operation usually carried out at least partly underwater, in shallow seas or fresh water areas with the purpose of gathering up bottom sediments and disposing of them at a different location. A Hopper dredge is a propelled floating plant which is capable of dredging material, storing it onboard, transporting it to the disposal area, and dumping it. Hopper dredges perform the largest and most dangerous jobs – clearing channels and offshore sandbars from the mouths of major rivers. Hopper dredges move like a ship. When dredging, they move very slowly. The presence of relevant and prolonged vibration means that all the operating components must be designed properly and Trasfor uses dedicated FEA software to carry out the best solution.



## Thruster Drive Transformer

- » Power 5,7 MVA
- » Primary Voltage 6,6 kV 60 Hz
- » Secondary Voltage 1711-1694 V
- » Protection IP44
- » Cooling AFWF
- » Weight 10.600 Kg
- » Premag transformer included

## Typical IP23 distribution Transformer





# Quality

- » Quality as ISO certification 9001:2000
- » Quality as total respect of environment with ISO 14001-2004
- » Quality for the railway industry as IRIS - International Railways Industry Standard
- » Quality of products and person through ISO EN 3834-2, EN 15085, UL File E172880 and UL File E216928 certification
- » Certificate of conformity to GOST R

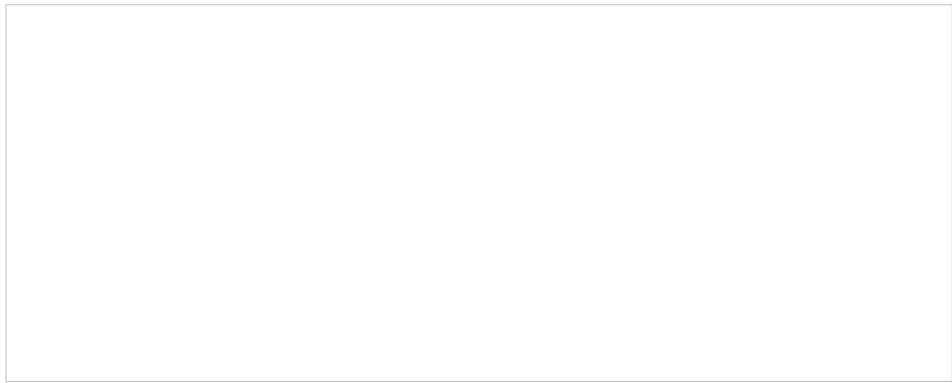
Quality through entrustment by the following certifying bodies:

**ABS** - American bureau of shipping

**DNV** - Det norske veritas

**GL** - Germanischer Lloyd

**Standards:** all int. standards such as IEC, BS, CSA, UL, VDE/DIN, ABS, BV, ANSI, DNV, LRS, etc.



Trasfor SA  
6995 Molinazzo di Monteggio  
Ticino - Switzerland

[www.trasfor.com](http://www.trasfor.com)

Tel. +41 (0)91 611 30 11  
Fax +41 (0)91 608 24 60

Head office: [infotrasfor@trasfor.ch](mailto:infotrasfor@trasfor.ch)  
Trasfor consulting: [service@trasfor.ch](mailto:service@trasfor.ch)