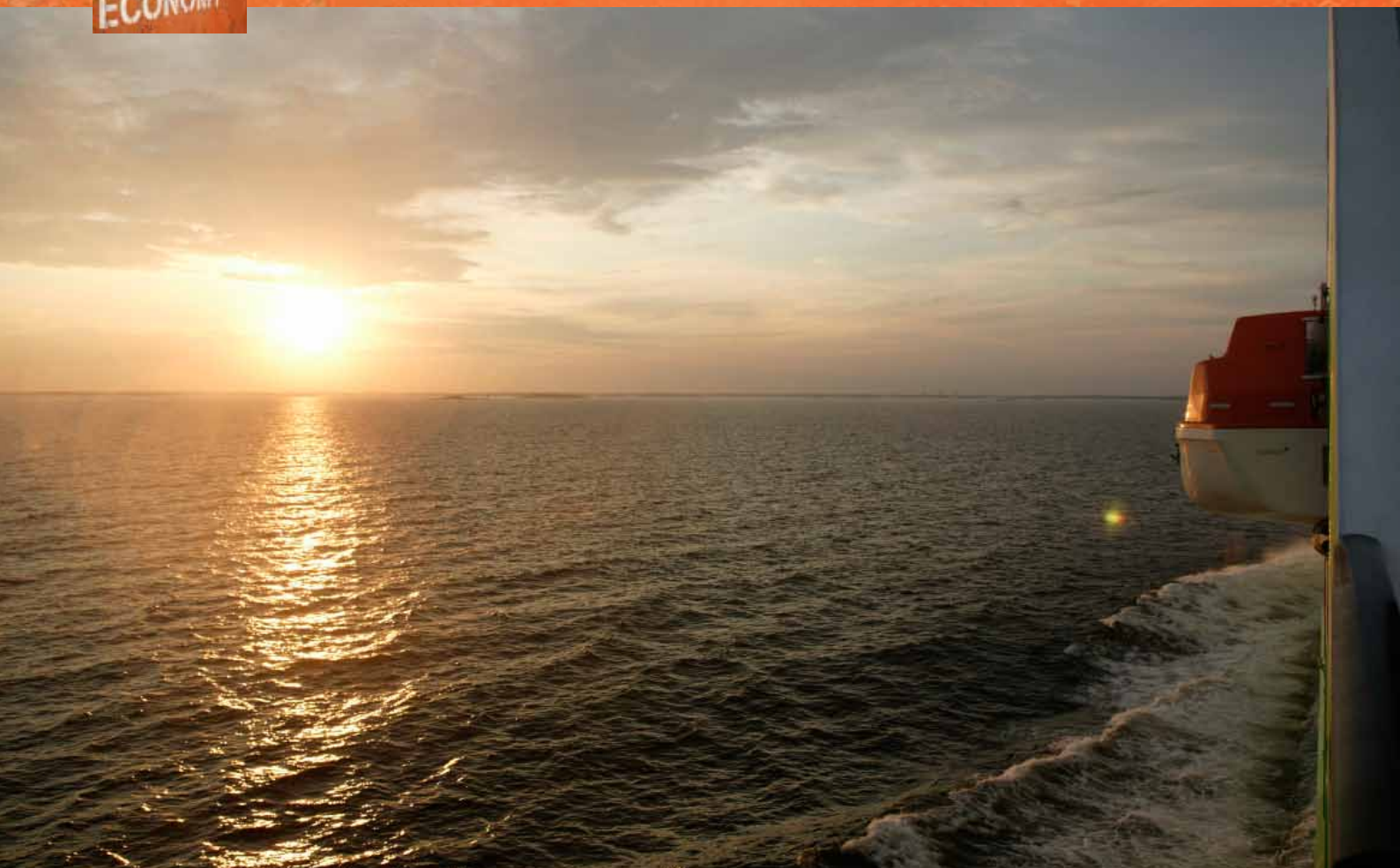


ENERGY
ENVIRONMENT
ECONOMY

WÄRTSILÄ AUTOMATIC FUEL SWITCH AND MARINE DIESEL FUEL COOLER UNIT



Vessels operating in the Sulphur Emission Control Areas (SECAs) need to cut Sulphur Oxides (SO_x) emissions according to the revised Marpol Annex VI, which contains regulation on prevention of air pollution from ships.

The Wärtsilä Automatic Fuel Switch and Marine Diesel Fuel (MDF) Cooler Unit is a solution for low sulphur fuel adaptation for vessels operating in the SECA, changing from Heavy Fuel Oil (HFO) operation to continuous or temporary operation on Light Fuel Oil (LFO).

The Automatic Fuel Switch, which controls the temperature change before the fuel injection equipment is together with the MDF Cooler Unit a solution for fuel switching from HFO to LFO and vice versa. The MDF Cooler Unit, which ensures controlled cooling, correct fuel oil injection viscosity and temperature, is a solution for continuous LFO operation.

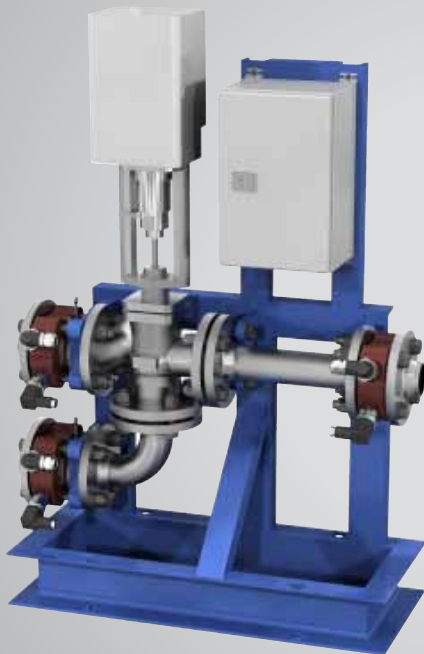
AUTOMATIC FUEL SWITCH

HFO has to be kept hot and MDF cool, changing from one to another, is more

complicated than just turning a valve.

Too fast fuel temperature change may cause uncontrolled clearance adaptation in the injection pumps, a thermal shock. Furthermore, an uncontrolled changeover may cause severe damage on the injection equipment and increase in maintenance and spare part costs. In worst scenarios it may cause complete lack of propulsion power.

The Wärtsilä Automatic Fuel Switch has integrated safety systems, data logger and trends. Those provide a real time bar graph of



Automatic Fuel Switch Module



MDF Cooler Unit

- the HFO and Marine Fuel Oil (MFO) ratio (based on user input) consumed by the engine. This enables following up the fuels ratio and sulphur content consumed by the engine, and thus optimizing the start of changeover process. Also the Fuel Switch has an emergency start in case of starting problems with MDF.

With the Automatic Fuel Switch the fuel changeover can be started at the correct time, bringing also fuel cost savings as less MDF is burnt.

MDF COOLER UNIT

Too low fuel viscosity may, in severe cases, result in loss of capability to produce full power or cause starting problems. Also running on high MDF temperature and too low viscosity may cause wear of the injection equipment (accelerated cavitation), leading to a delayed and prolonged injection causing a fuel oil consumption (FOC) increase of 1-3%. The MDF Cooler Unit ensures controlled cooling, correct fuel oil viscosity and temperature.

The integrated Cooler Unit includes all the required components bringing the following benefits:

- Less installation work is required (pipe modifications and electrical)
- Possible assembly errors can be avoided
- Quality of the installation is ensured (welding and installation)
- Complete delivery at the required time is ensured

APPLICATION FIELD

The Automatic Fuel Switch & MDF Cooler Unit solution is applicable for all 2- and 4-stroke engine types.

SCOPE OF SUPPLY

Equipment level

- Fuel oil and cooling water system design
- Equipment and parts
- Commissioning

Advanced level

- Site survey to determine unit location
- Fuel oil and cooling water system design
- Equipment and parts
- Installation supervision
- Commissioning

The mode of operation (continuous MDF operation or fuel switching) together with the installation configuration determine what parts and equipments are to be installed and what changes are needed for the fuel and cooling water system design.

SOLUTION AT A GLANCE

The MDF Cooler Unit is a solution for continuous LFO operation and the Automatic Fuel Switch together with the MDF Cooler Unit is a solution for fuel switching.

The solutions are available for all 2- and 4-stroke engine types.

The scope of supply is divided into equipment and advanced level delivery.