
AQUAMETRO
OIL & MARINE
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OUR COMPETENCE FOR YOUR PROCESS

- ✓ Fuel Measurement,
- ✓ Fuel Performance & Reporting
- ✓ Fuel Management
- ✓ Fuel Treatment

- ✓ PRODUCTS
- ✓ ENGINEERING
- ✓ SUPPORT
- ✓ SERVICE

OUR WORLDWIDE NETWORK

Your **PARTNER** for

- Burners (heating boilers, industrial furnaces, tar processing, booster)
- Shipbuilding, shipping companies
- Lorries, buses and other vehicles
- Locomotives
- Stationary power plants

With our **PRODUCTS** in

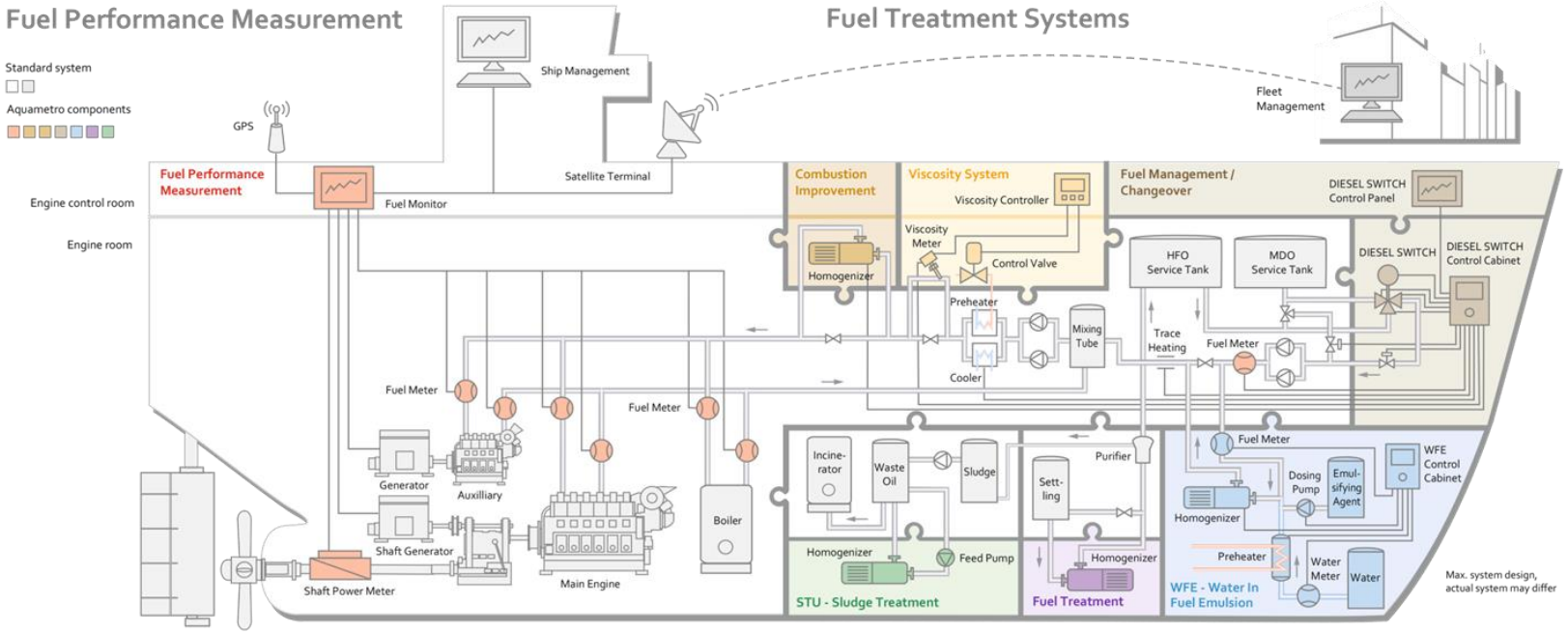
- Fuel / Oil Measurement
- Fuel Performance
- Fuel Treatment
- Fuel Management
- Service, Repair, Commissioning Engineering, Support - world wide

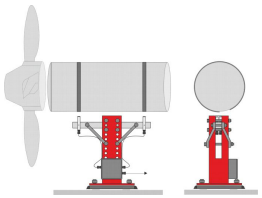
Our worldwide agencies provide you with local service and support

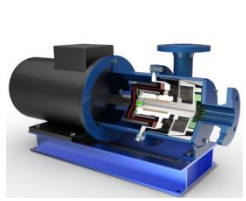
- Head office Aquametro Oil & Marine (Switzerland & Germany)
- Aquametro local offices
- Aquametro distributors

Marine Products and Applications

HFO / MDO
Treatment and performance




- FUEL Management System **DIESELSWITCH**
  Fuel Change Over / Blending System
- Fuel Treatment **HOMOGENIZER**
  Different applications (sludge, combustion improvement)
- Fuel Treatment **WFE**
  Water-in-Fuel-Emulsion System
- Fuel Measurement / Treatment **VISCOMASTER**
  Viscosity Measurement
- Fuel Measurement **CONTOIL VZF II**
  - Volume flow oil meter - measurement
  - Mass flow – calculated
  - Temperature - measurement
- Fuel Performance **FPS 2.0 / RMS**
  Monitoring System
- Fuel Measurement / Performance **SPM**
  Shaft power meter

CONTOIL
Fuel Measurement

Fuel Oil, Diesel Oil , Heavy Oil Metering

CONTOIL® family **“The better alternative”**

VZO DN 15…50

VZO -IN DN 15…50

VZF (not available anymore)

VZO DN 4 & 8

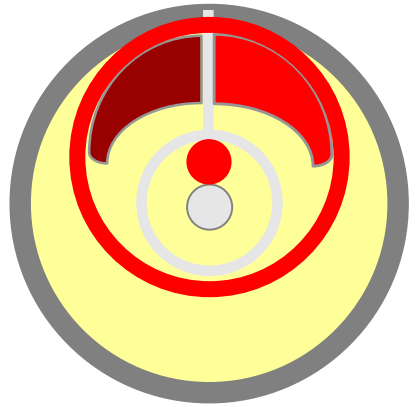
VZD/P DN 4 & 8

ECO DN 8 EDM DN 8

Calculated Massflow incl.

new since Oct. 2015
VZF II DN 15…50

Working principal



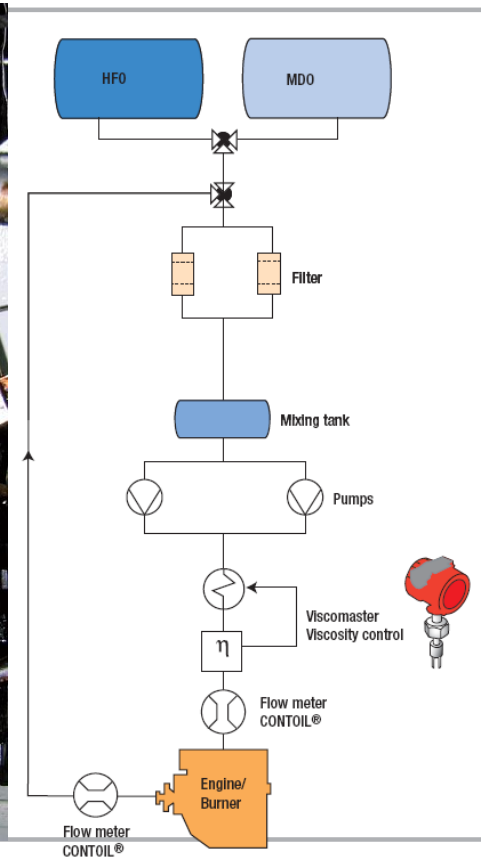
VISCOMASTER

Fuel Measurement / Treatment

Fuel Oil, Heavy Oil
Metering and fuel viscosity control

Benefit

- Optimum combustion efficiency
- Optimal fuel consumption
- Reduced maintenance required
- Prevention of engine damage
- True measurement enables the correct calculation of fuel mass consumption
- True Kinematic viscosity measurement



Requirement for running with HFO

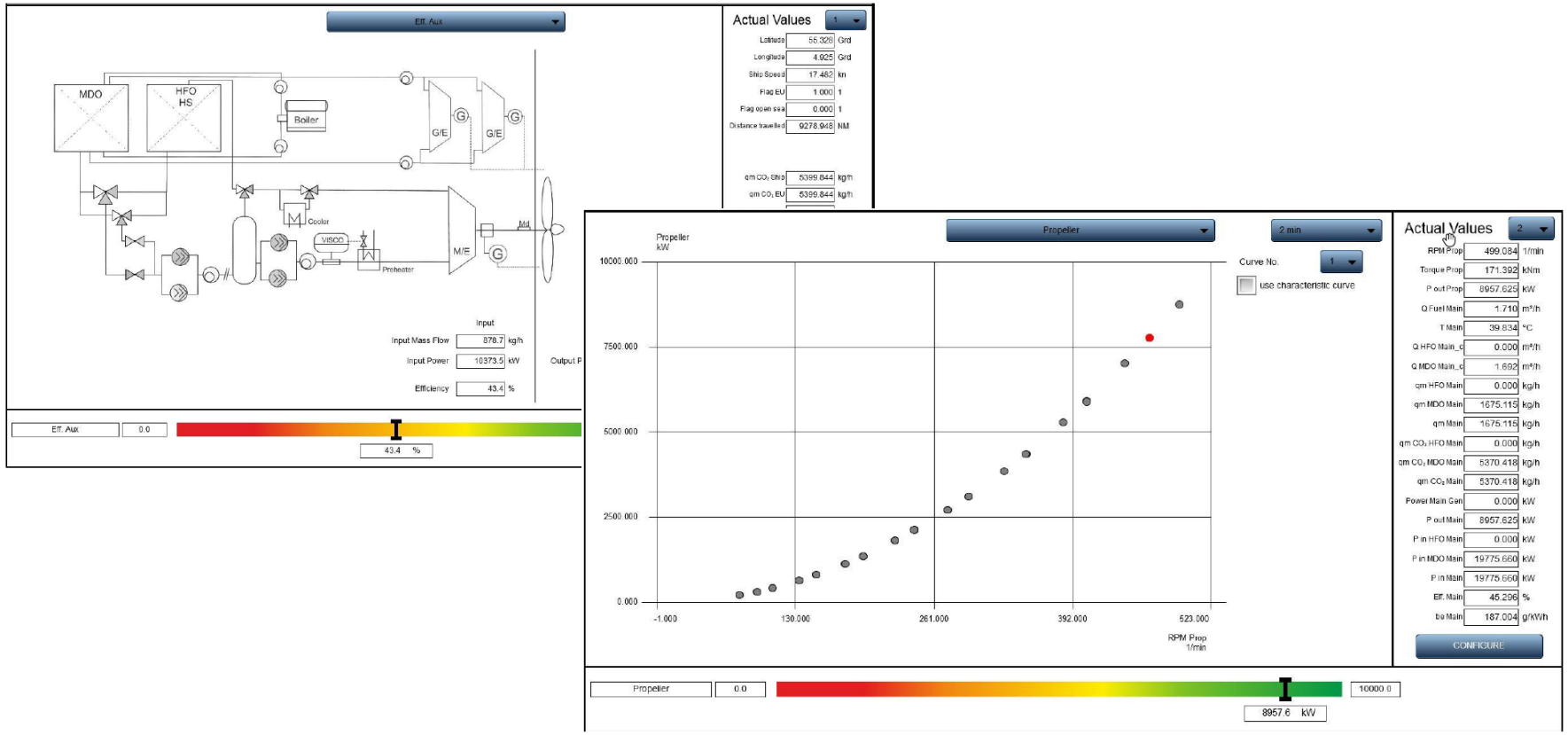
- Correct Viscosity is required for Engines running on HFO
- Fuel is heated up by Steam or Thermal-Oil and injected into the engine as droplets
- Size of the droplets is important for good combustion !!

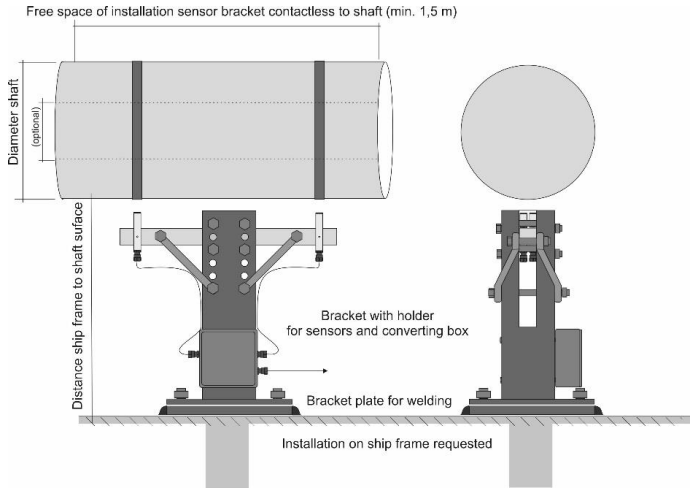
- Droplet size HFO
  - To big incomplete combustion = smoke, high maintenance and high consumption
  - To small to early combustion = high consumption and high maintenance

Shaft Power Meter SPM Measurement

Permanent power measuring system for fuel / propulsion efficiency

The Shaft Power Meter is the cost effective solution when reliable shaft power measurement is required. The system is easy to install, requires no electronic parts on the shaft and operates absolutely contact free.





Shaft Power Meter SPM Measurement

Permanent power measuring system for fuel / propulsion efficiency

Features

- Easy installation
- RPM, Torque and Power signals
- Reliable data
- Fuel / propulsion efficiency
- Key component for fuel performance system FPS 2.0
- PLC based system with web based visualization via Ethernet
- Data storage on SD card

Benefits

- Cost effective
- Plug & play by crew
- No installation on shaft
- Maintenance free
- Expandable to fuel performance system

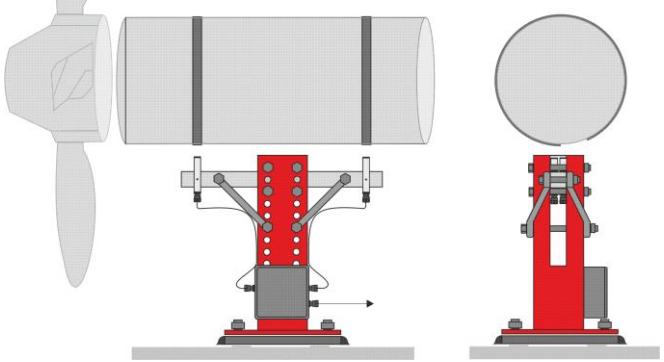
Key features

- No electronic parts on the shaft
- No wear and tear
- Easy to install system
- Incl. 0 / 4-20 mA output for

- rpm, torque & power
- Optional display
- Easy expandable to a Fuel

- Performance System (FPS)
- Optional LCD remote display
- Web based configuration /

- visualization via Ethernet connection



FPS 2.0 / RMS
Fuel Performance

CONCEPT OF NEW MONITORING SYSTEMS FPS 2.0

Office Web access for Fleet Management

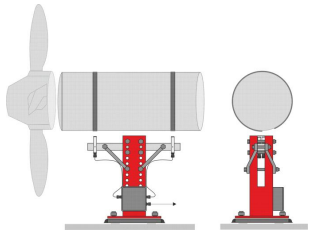
Bridge Performance and monitoring Management

ECR Web based visualization and reporting
Data collection,
- Trend curves
- KPI analysis
- Plausibility check
- Monitoring & reporting

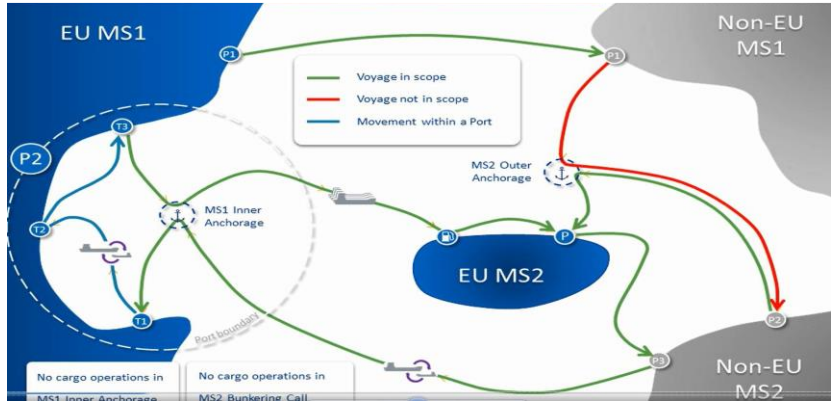
Reporting data according engine log book

ER Performance sensors

Depth of information



FUEL MONITORING, FUEL EFFICIENCY, CO_2 REPORTING (MRV Regulation)



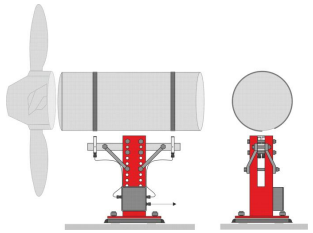
CO_2 emission reporting in EU

- **ATA / ATD Date and time**
- **Time at sea**
- **Distance travelled**
- **Cargo carried**
- **Transport work**
- **Fuel consumption**
- **CO_2 emission**
- **Port**

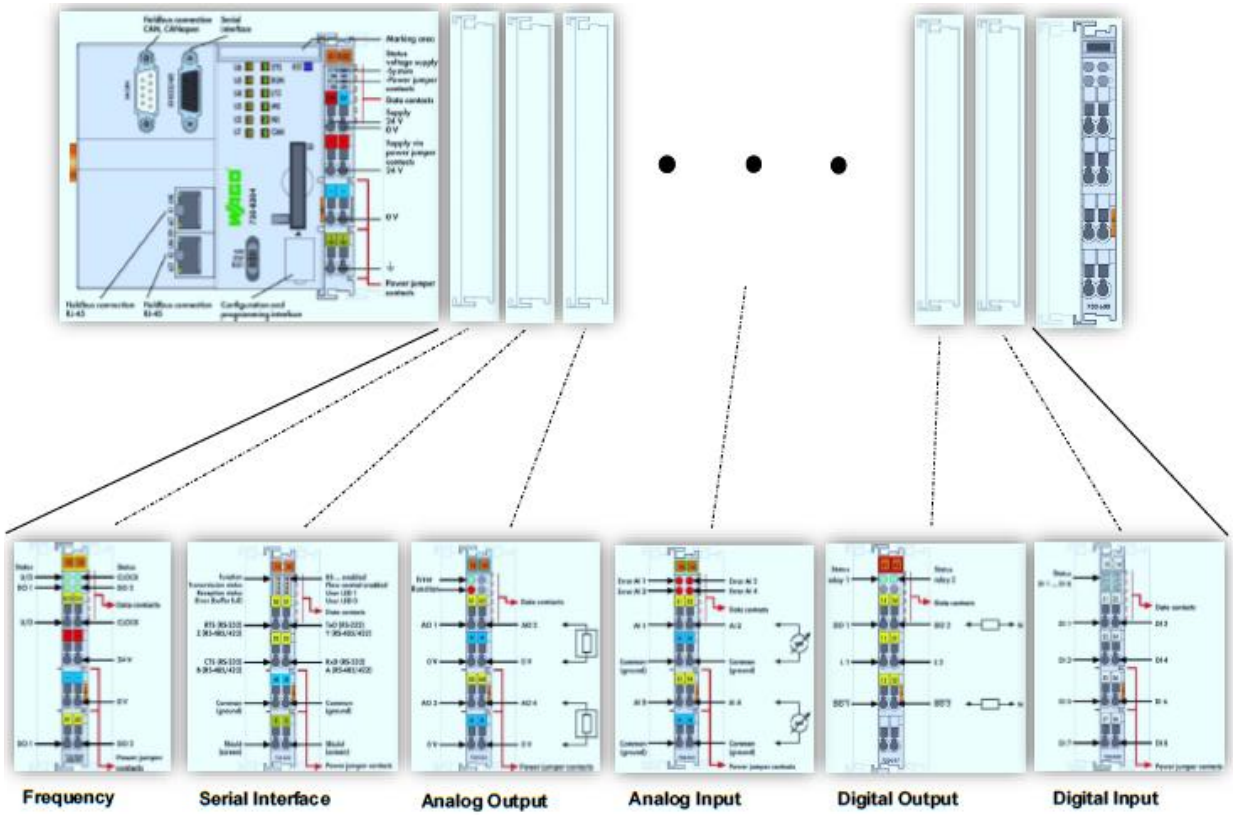
FPS 2.0 / RMS
Fuel Performance

HARDWARE CONCEPT OF NEW MONITORING SYSTEMS FPS 2.0

- Simple standard PLC system with class type approval certificate ,
- Web based open configuration and data visualization
- 2nd screen in ECR to display main values with status (red / yellow / green)
- Data history on board & data export on shore
- Standard data interface (open structure) to communicate with other systems on board to collect and send data
- Reporting open configuration, CO_2 Reporting
- Modular design to configure acc. costumer request
- Synergy effects to use same hardware of different processes



CERTIFIED OPEN MODULAR DESIGN



FPS 2.0 / RMS
Fuel Performance

SOFTWARE CONCEPT OF NEW MONITORING SYSTEMS FPS 2.0

Free configurable in & outputs, reporting:

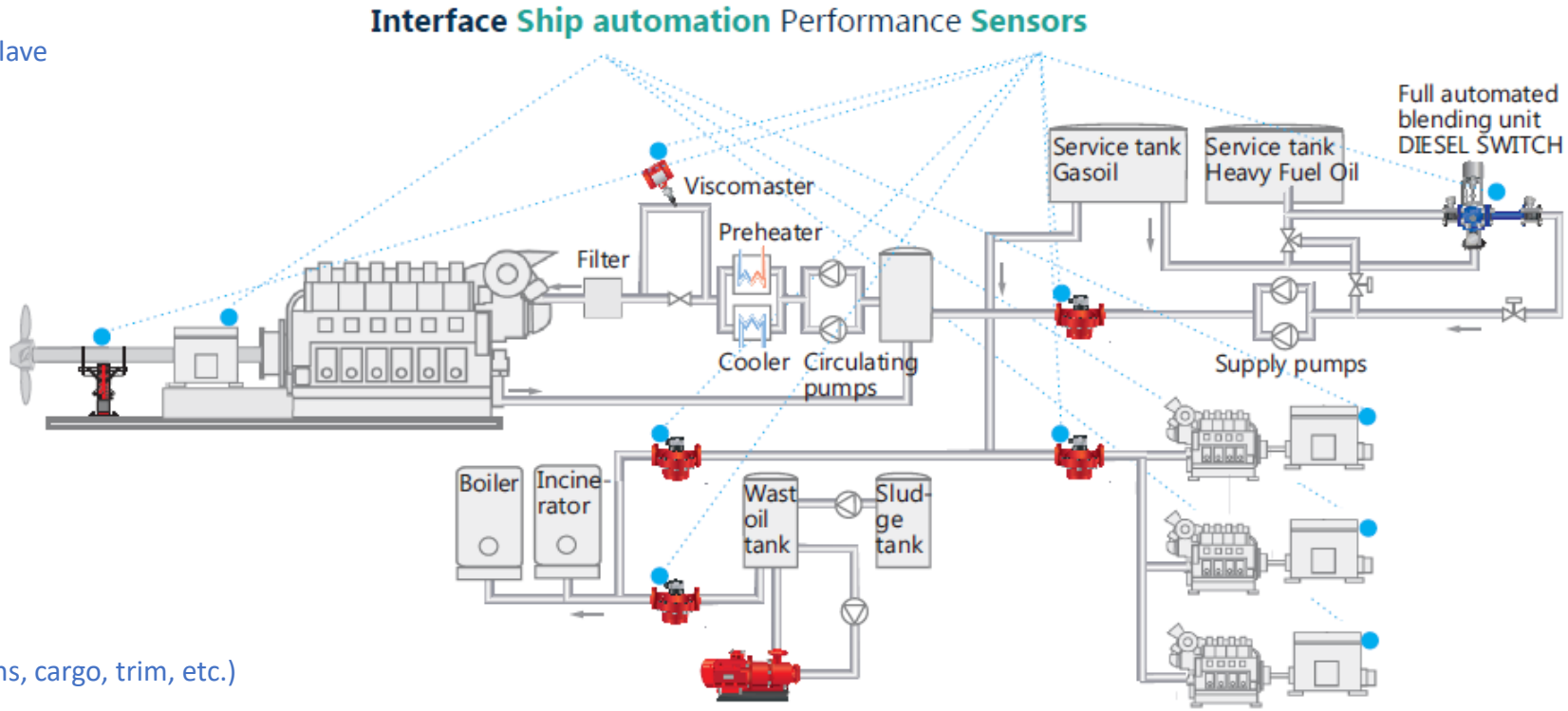
- 0-20 mA, 4 – 20 mA, 0-10V, pulse, NMEA, Modbus Slave
- Engine performance or report of all available data

KPI – Fuel efficiency / EEOI / emission reporting

- Fuel efficiency for propulsion system
  - Trend curves
  - Specific fuel consumption
  - Propeller curve
  - Specific fuel consumption
  - Engine performance
  - Data reporting
- EEOI operating Index
- Emission reporting (CO_2 – monitoring / reporting)
- Engine performance reporting

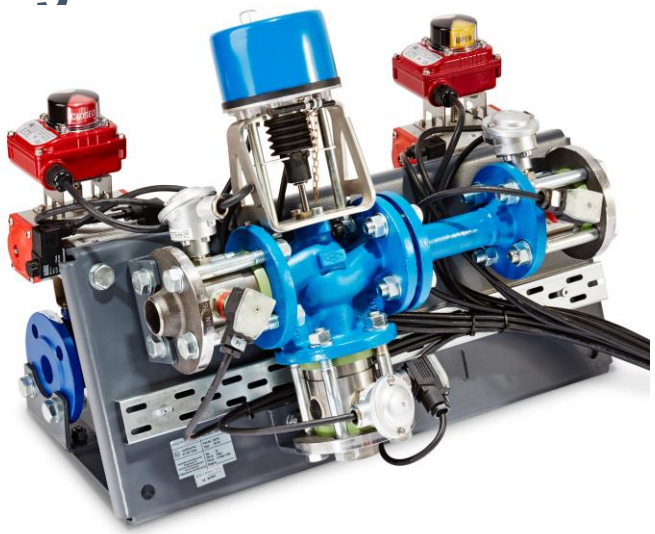
Based on:
- Fuel specification acc. BDN (bunker delivery note)
- Nautical information (ship speed, weather conditions, cargo, trim, etc.)

FUEL MONITORING, FUEL EFFICIENCY, CO_2 REPORTING



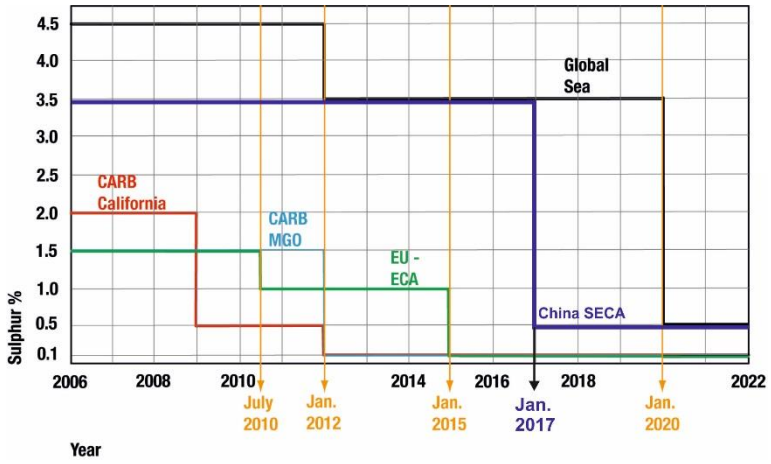
Diesel Switch
Fuel Management

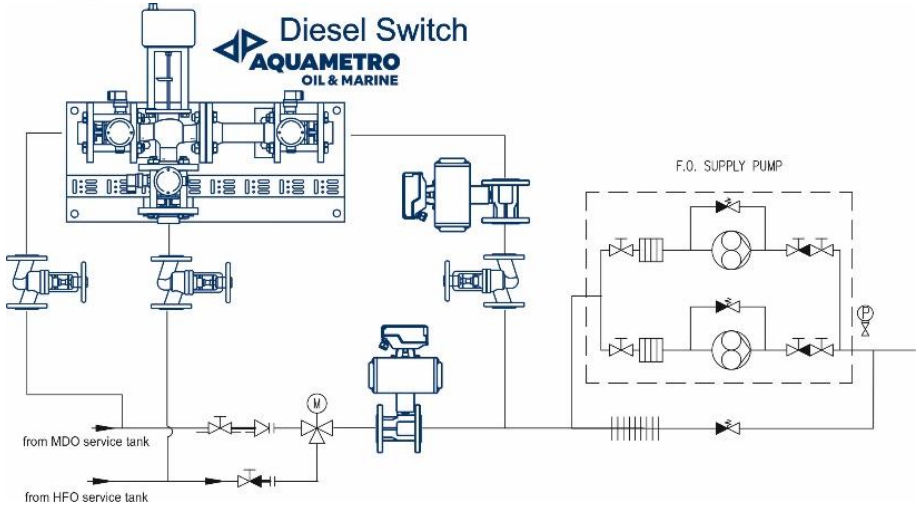
Automatic control of fuel change over with blending process



Features

- Automatic fuel changeover or blending
- Management of processes (Trace heating, Cooler, Homogenizer) in fuel systems
- Prevents thermal load or damage on engine
- Fuel saving potential considering fuel blending
- Certified by class -> unique feature worldwide!
- Accepted by state control





ECA / SECA world wide limitations

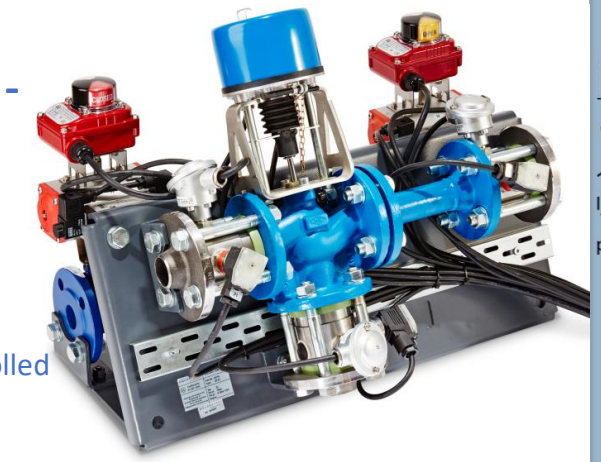
Complies with

- MARPOL Annex VI
- EU Directive 1999
- CARB California Air Resources Board Regulation 13

Diesel Switch
Fuel Management

TRADITIONAL CHANGEOVER BY RULES - HIGH HUMAN RISK! -

OUR SOLUTION - No HUMAN RISK! -



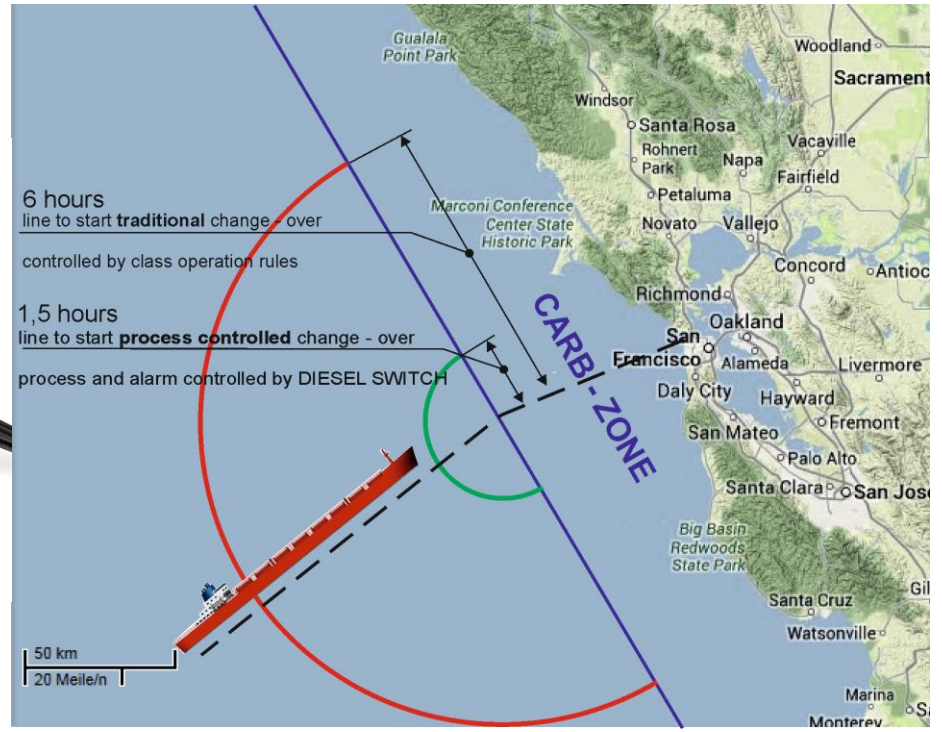
DIESELSWITCH

Change over time **1,5 hours** fully process & alarm controled

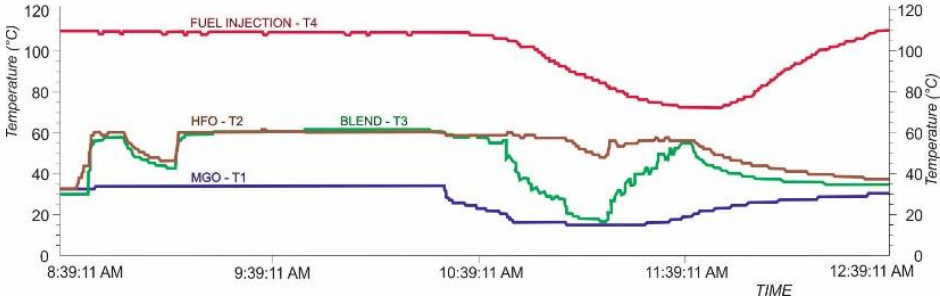
Without:

- Long change over time approx. up to **6 hours** without automatic controlled process
- Lot of Manual steps in atuomated processes to:
  - Increase fuel viscosity up to 18 cSt target - reduce the fuel temperature
  - Reduce engine load up to 25 – 40% target - low fuel consumption slowly change over process
  - Stop trace heating fuel line fuel target - no addition termal load in
  - Stop preheating fuel fuel target - no addition termal load in
  - Start fuel MDO cooler target - cooling down MDO increase viscosity, reduse termal stress

Fuel cost saving potential 10 - 15 %



Full automated Diesel Switch process contoll



Diesel Switch
Fuel Management

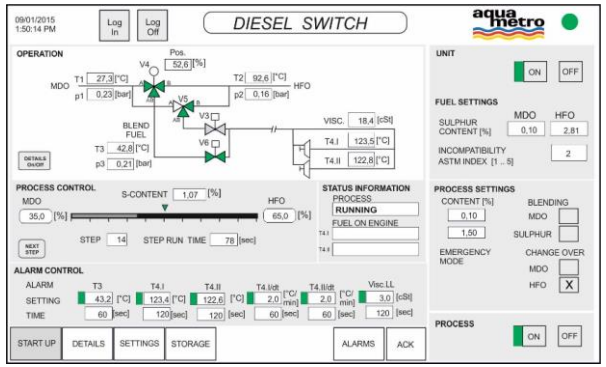
Fuel cost saving potential 10 - 15 %

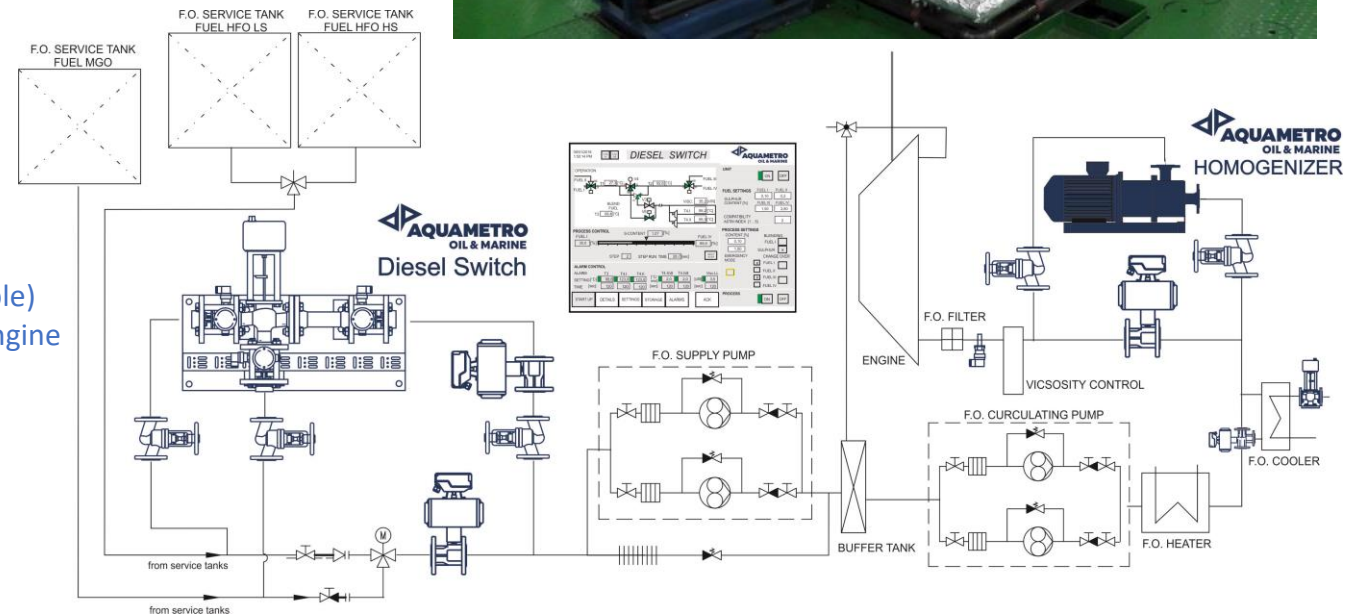
Permanent fully automated control of:
- Diesel Switch and fuel system
- Type of fuel on engine
- Time control of changeover process
- Sulphur content control

Start / stop function controlled by:
- Fuel temperature outlet DIESEL SWITCH
- Fuel temperature inlet engine
- Fuel viscosity (external signal)

External control of components in booster system:
- Automatic control - MDO / MGO COOLER / process
- Start/Stop control - HEATER / TRACE - HEATING
- HOMOGENIZER
- Additional components free configurable

Optional:
- 2nd display in ECR (complete wired to connect to control cabinet with ethernet cable)
- Temperature transmitter FUEL ON ENGINE *T4.2* to alarm control more than one engine
- GPS module
- Viscosity measurement on request
- Fuel Compatibility Kit acc. ASTM test (D 4740)



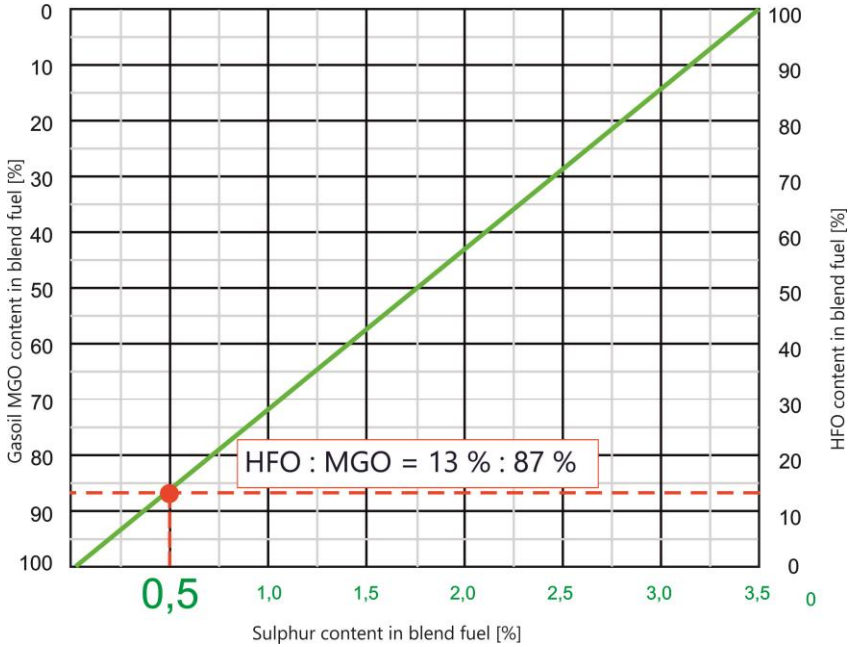


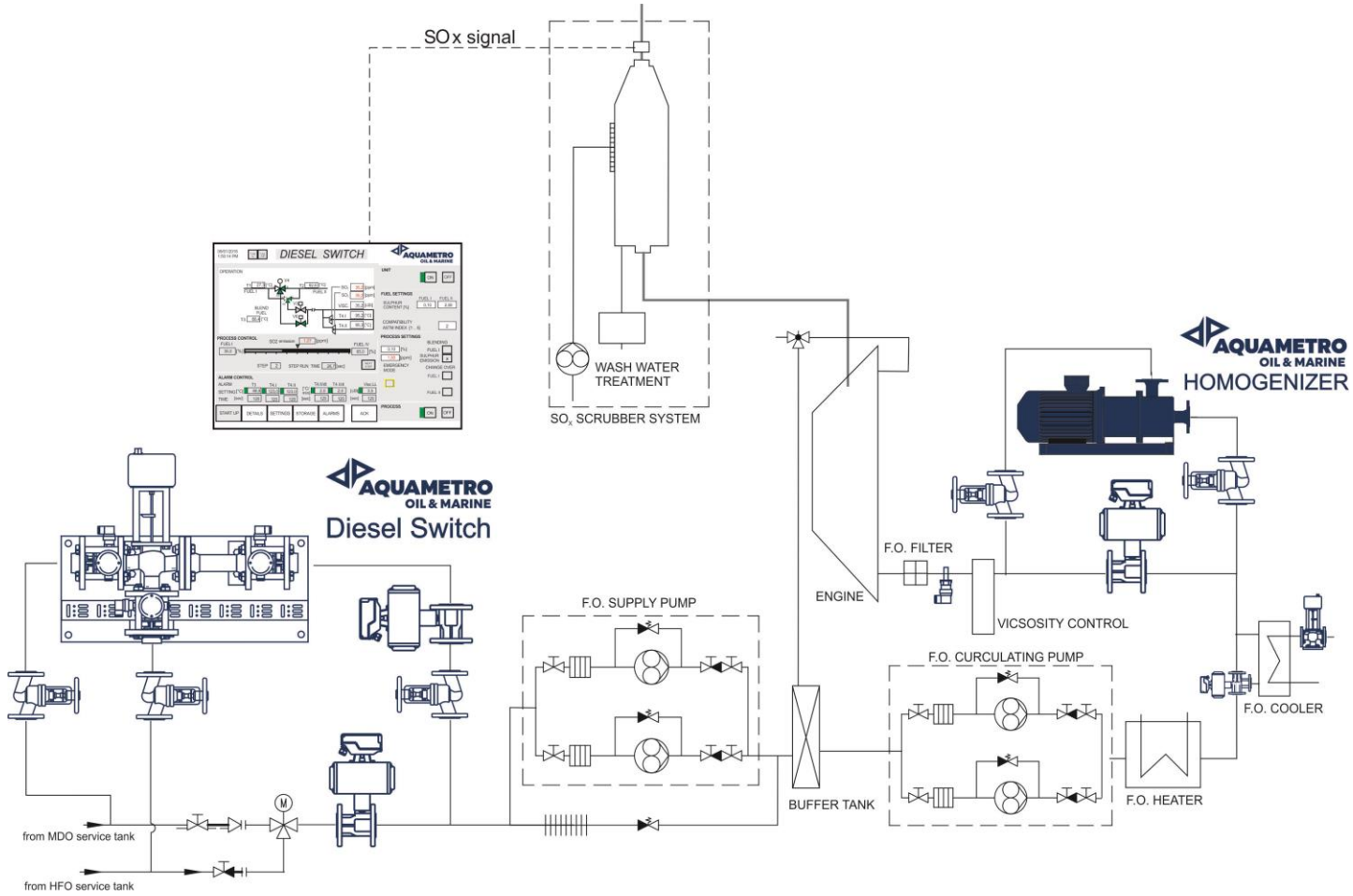
Diesel Switch
Fuel Management

Blending process
Fuel cost saving potential up to 10 %

0,5% Sulphur – limit - fuel blending on board

- **no extra bunkering / tank** of several fuel qualities
- **no extra fuel type** for bunkering
- **saving fuel costs up to 10 %**
- Blending confirmed by MARPOL Annex IV





HOMOGENIZER
Fuel Treatment

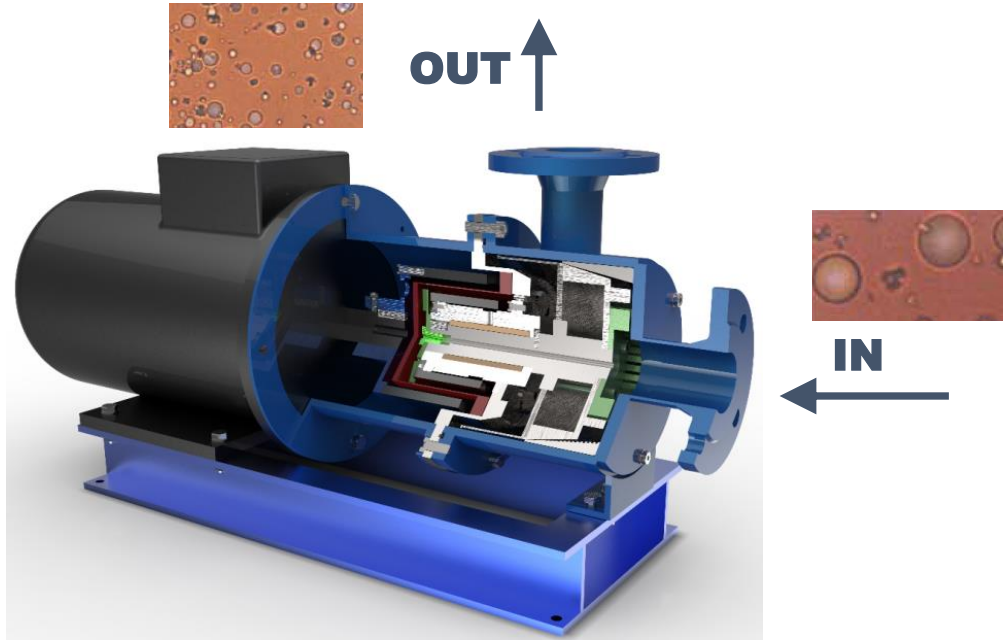
Ready for operating on board!

Effect

- Dynamic stator-rotor milling machine
- Best chemical-free approach for treating residual fuels

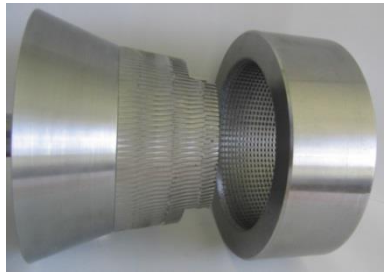
Features

- Solves problems when running HFO with large size of asphaltenes
- Creates fine, even fuel structure with limited risk of sludge forming
- Prevents fuel instabilities or incompatibilities
- Extended life time of filters and injection parts
- Uniform and fine spray pattern at injection



STATOR-ROTOR ARRANGEMENT

- Conical shaped layout - Concentrically mounted
- Slightly decreasing clearance - inlet gap (2mm)
- outlet gap (~ 20µm)

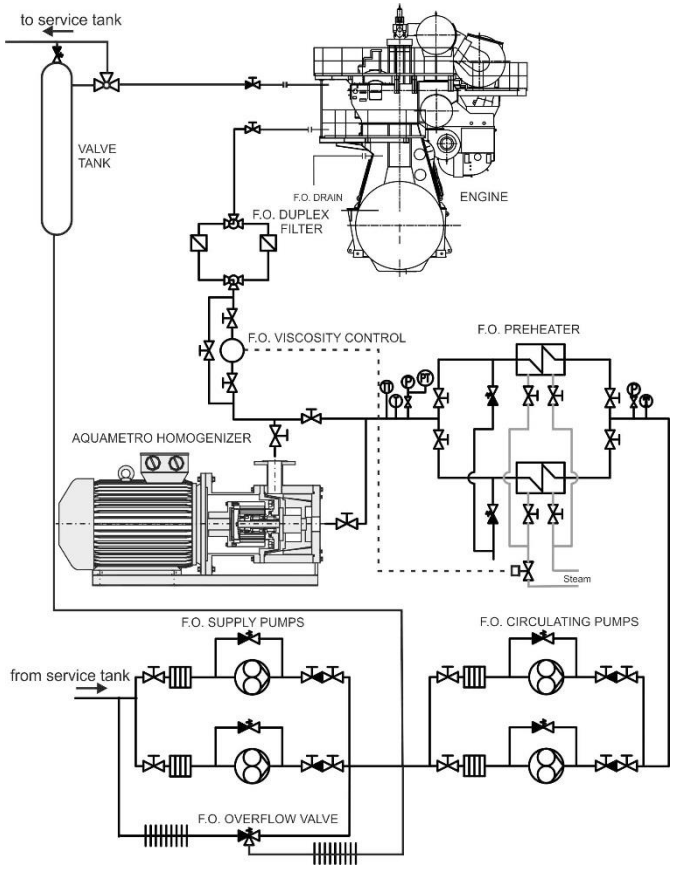


HOMOGENIZER
Fuel Treatment

Fuel circulating system
Combustion Improvement

BENEFITS:

- ***Asphaltenes clusters***, which are forming under high pressure and temperature, will be ***shared down to smaller droplets*** of appr. 5µm
- ***No risk of instabilities or incompatibilities*** when switching between different fuel qualities (HFO and MGO)
- ***No clogging effect*** at filters, injection and combustion elements
- ***Uniform and fine spray pattern*** during injection results in more complete burning with ***reduced harmful exhaust emissions***
- **R*educed soot and deposits*** at engine parts and turbo-charger



HOMOGENIZER
Fuel Treatment

WATER-In-FUEL-EMULSION

Improved Combustion Process – effects

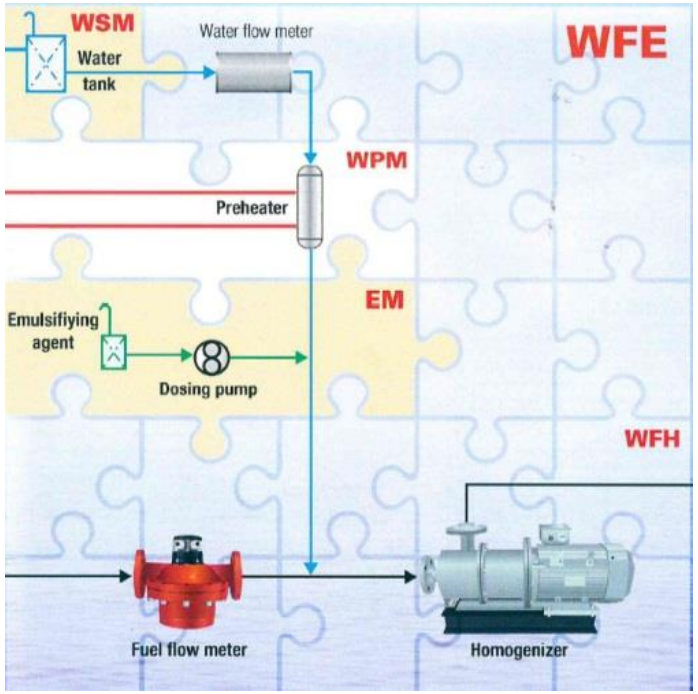
- **Injection of Water** in fuel emulsion
  Lot of small water droplets (< 5µm) coated with oil
- **Water evaporates** due to high temperature
  Creates micro explosion – fuel cloud – smaller droplets
- **Create more reacting surface** for fuel and oxygen
  Optimized combustion – reduce PM emissions
- **Cooling combustion process**
  Lower combustion temperature – reduce NOx emissions

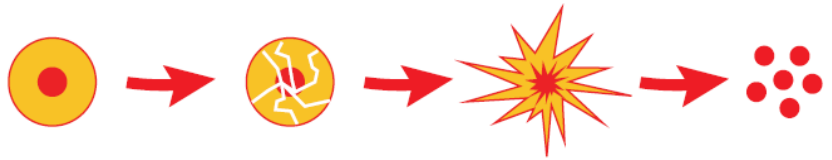
Operating principle

The WFE/WFH operates on the principles of mechanical shearing and ultrasonic forces.

It utilizes a special conical shaped milling gear, to generate high hydrodynamic power consisting of shearing, friction and acceleration forces with pressure waves of high frequency.

- **Water Supply** Module **WSM**
  - With or without water tank
  - Full automated tank control
- **Water Preheating** Module **WPM**
  - Steam or electrical preheater
  - Full automated control
- **Stabilizer** Module **SM**
  - Add Stabilizer (for light fuels)
  - Full automated control
- **Water-Fuel-Homogizer** **WFH**
  - Homogenizing water in fuel
  - Full monitoring control
- **WFE Control Cabinet** **WFECC**
  - PLC/touch screen/ monitoring system/ data record & transfer





HOMOGENIZER
Fuel Treatment

WATER-In-FUEL-EMULSION

Features

- Creates stable Water-Fuel-Emulsion with HFO/MDO
- Improved combustion process
- Full automatic controlled emulsification
- Compact and modular design
- Small footprint

Benefits

- Reduce NOx/PM emissions
- Creates invisible smoke
- Reduce surface layers on parts of combustion exhaust gas system
- Economical solution for optimized emission reduction

Improved Combustion Process – effects

- **Injection of Water** in fuel emulsion
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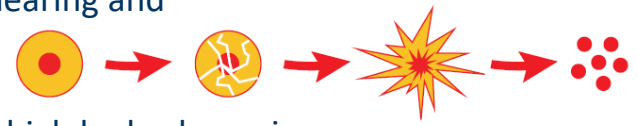

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