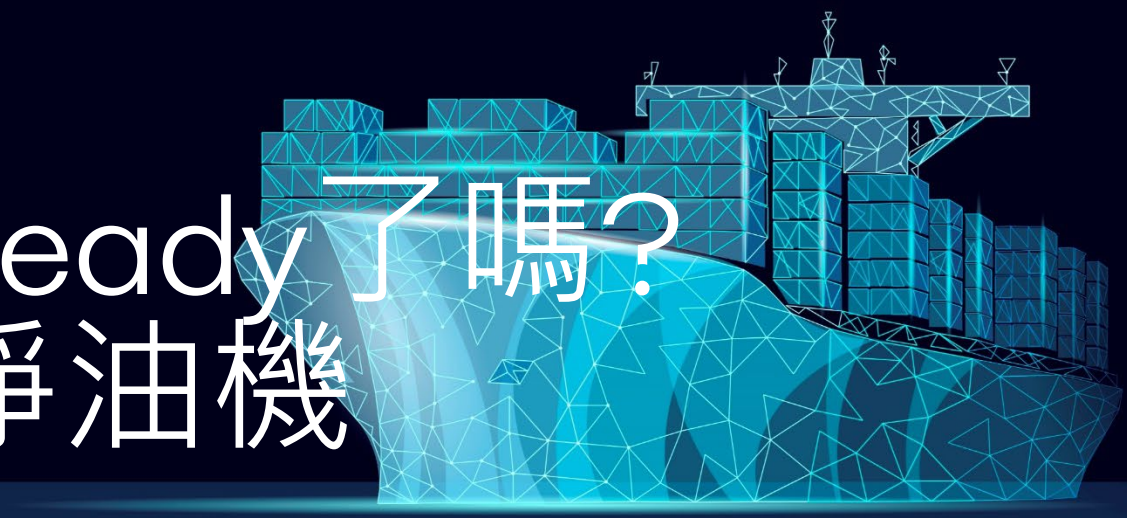
採用生質燃油，你ready了嗎?
--燃油增壓模組與淨油機



28 August 2025

Contents

- Why shall we talk about biofuel?
- What’s adaptive fuel line?
- How to we solve the challenges?

Focus on Biofuel

– Why shall we talk about biofuels?

Sustainability

- A way to reduce CO_2 emissions
- Compliance
  - IMO CII
  - Fuel EU
- Incentives
  - Reduced port state fees (Singapore)

Impact on vessel operation

- Biofuels are drop in fuels
- Biofuels use the existing bunker infrastructure
- Biofuels are becoming more available
- Biofuels do not require large investments

Operating on biofuels

- Operating procedures are similar to VLSFO procedures
- Biofuels are approved and recommended in both ISO8217:2024 and CIMAC guidelines

Sustainability and Compliance
– Why shall we talk about biofuels?

GHG emissions

- Feedstock
- Refining process

Air pollution

- SO_x
  - Sulphur content
- NO_x
  - Feedstock, engine design, combustion process & operating condition

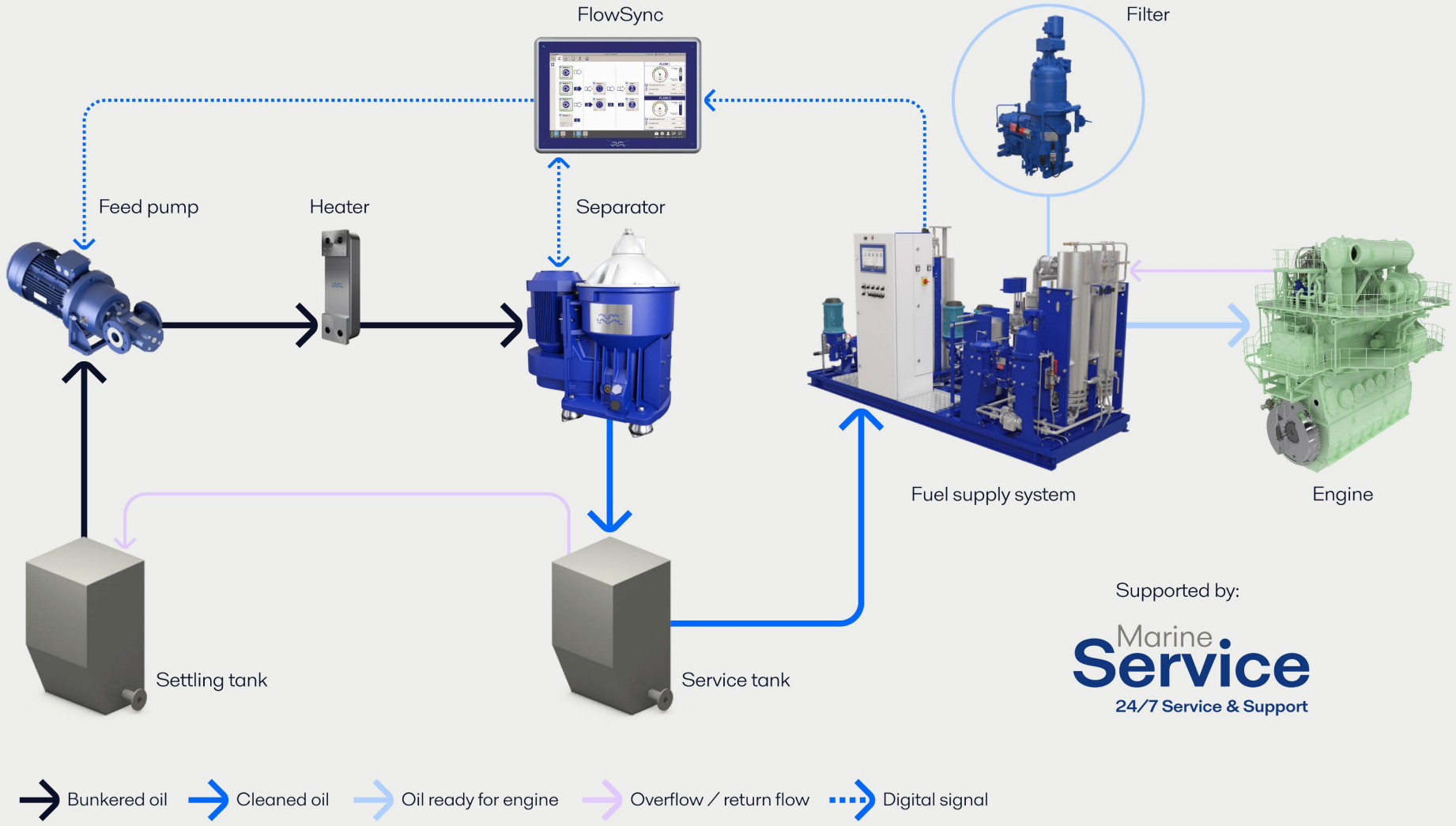
IMO

- EEDI, EEXI, CII
  - Fuel conversion factor C_F
- MEPC.1/Circ.905
  - Biofuels can reduce CII
- ECA

EU – Fit for 55

- Fuel EU Maritime
- EU ETS
- ETD
- RED II (rev. III)

Adaptive Fuel Line



Alfa Laval high-speed separators are biofuel ready

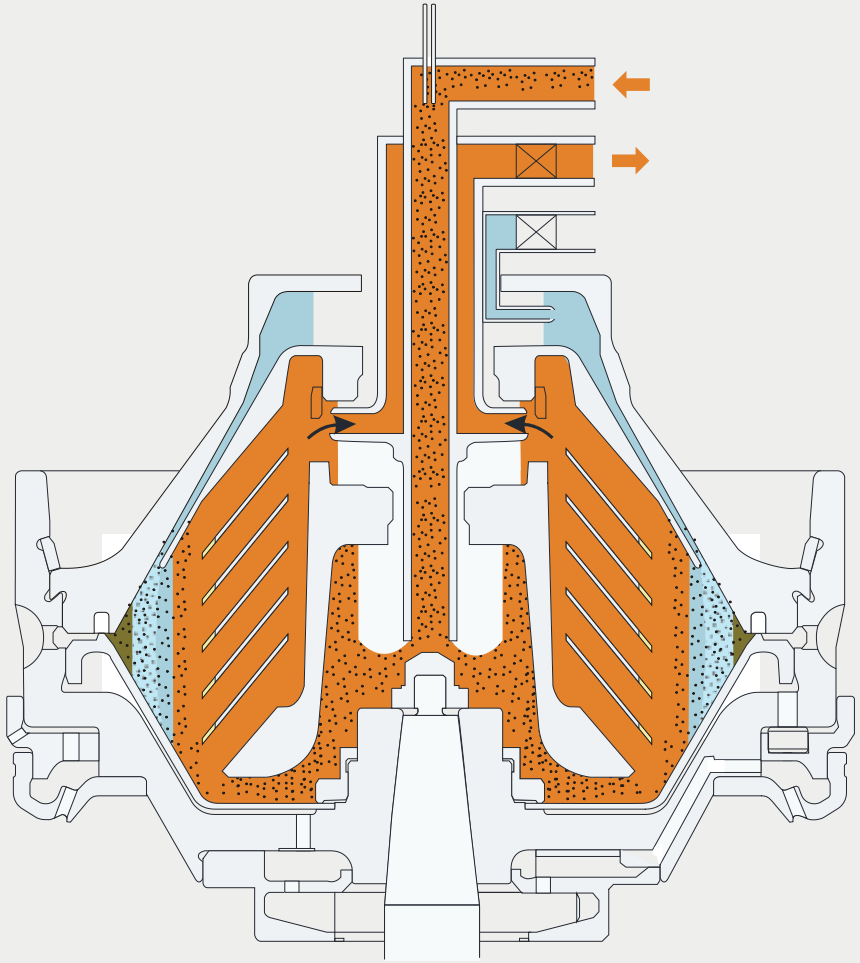
Biofuel Ready

28 August 2025

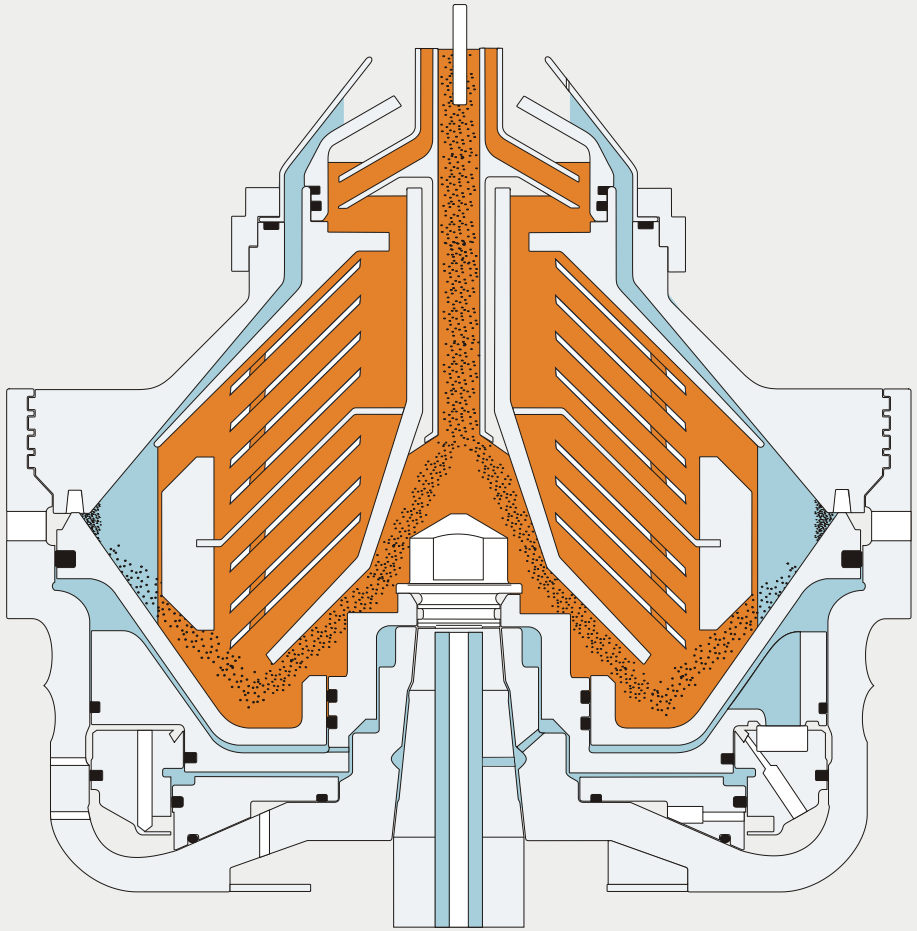
Alfa Laval

Separator Bowl Function

S – separator



P – separator



Potential for Corrosion

Poor oxygen stability can lead to acidic byproducts

- FAME is less stable than fossil fuel oil and will inevitably degrade – especially if water is present.
- Degradation of FAME results in various acids, as well as alcohols and insoluble material
- Acids can cause corrosion in fuel system equipment that comes into contact with uncombusted FAME

Solution

- Today's Alfa Laval marine separators can withstand the acidity of FAME conforming to EN14214 or ASTM D6751, the biofuels of ISO8217:2024
- For older equipment, compatibility should be verified.

ASTM INTERNATIONAL

Potential for Soapy Sludge

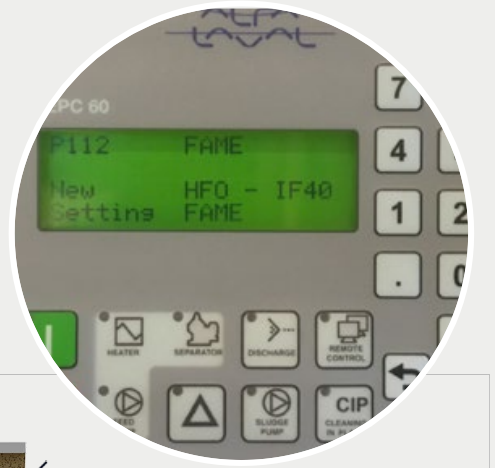
No conditioning water when processing FAME

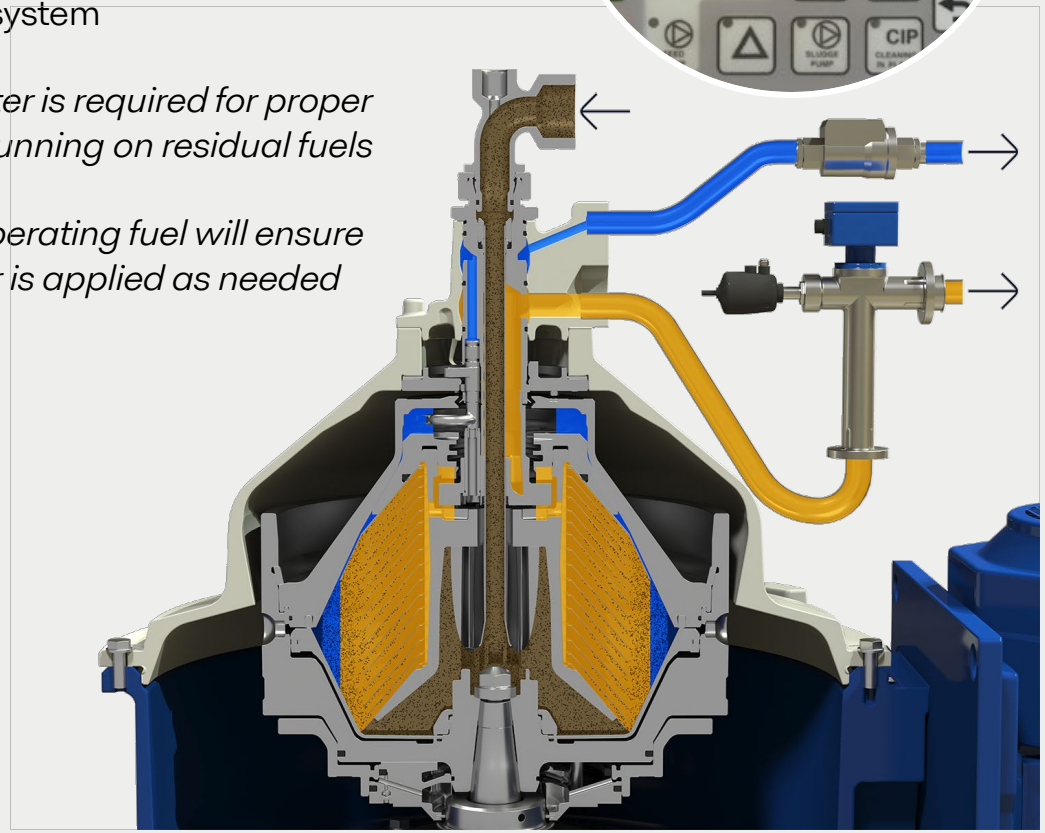
Issue

- In ALCAP systems, conditioning water is used to soften sludge from HFO & LO
- Adding conditioning water when FAME is treated can lead to soapy sludge, due to free fatty acids reacting with water and salts

Solution

- FAME sludge does not require softening – so no conditioning water is added when FAME is selected in the control system
- *Note! Conditioning water is required for proper bowl discharge when running on residual fuels*
- *Selecting the correct operating fuel will ensure that conditioning water is applied as needed*





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Different Relative Permittivity

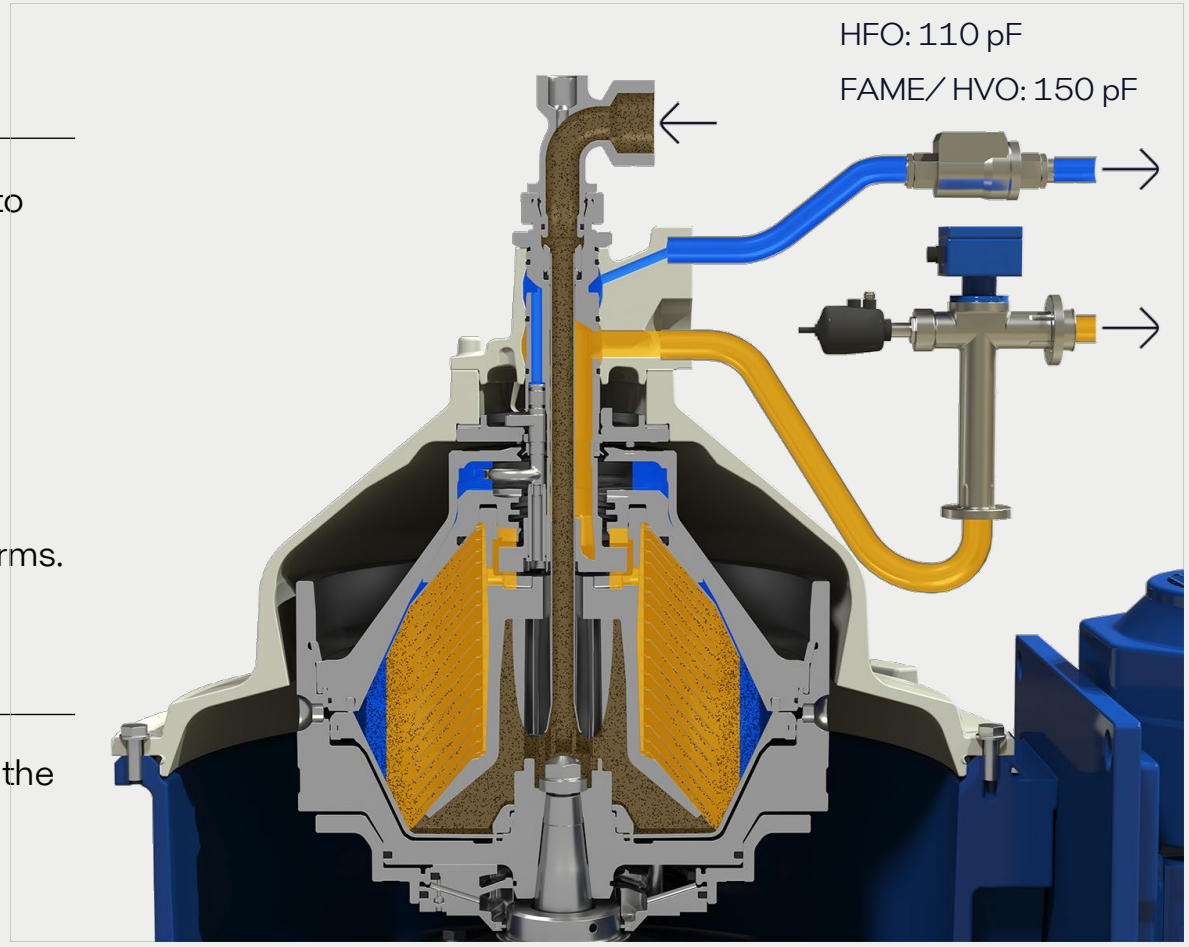
Update of water transducer control

Issue

- The water transducer in ALCAP systems monitors electrical capacitance to detect water in the clean oil
- A small capacitance deviation in the clean oil flow will trigger draining or discharge, but a larger deviation will trigger an alarm
- FAME and HVO are problematic because they have a much higher relative permittivity than diesel or HFO. Biofuel operation therefor require increasing the maximum acceptable limits on the high alarms.

Solution

- The Alfa Laval EPC 60/70 software has been updated to accommodate the relative permittivity of biofuels
- The Alfa Laval EPC 50 can be adjusted manually



Different densities

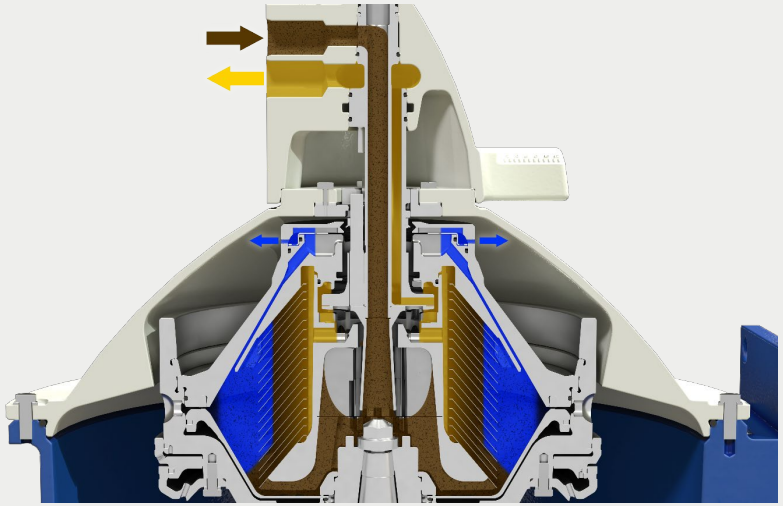
Compensation for low density – purifier-type separators

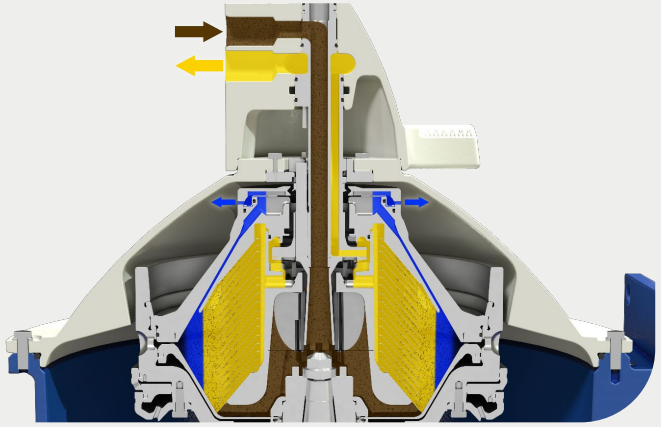
Issue

- HVO has lower density (765-800 kg/m^3), 10-24% lower than fossil fuel oil's density.
- If the gravity disc is too small, it will push the fuel–water interface towards the disc stack's centre
- The flow will only pass through the lowest discs, impeding separation

Solution

- A new gravity disc design for Alfa Laval P separators and a new bowl bottom design for Alfa Laval MIB 503 separators are available to ensure the correct separation interface for HVO operation





Different densities

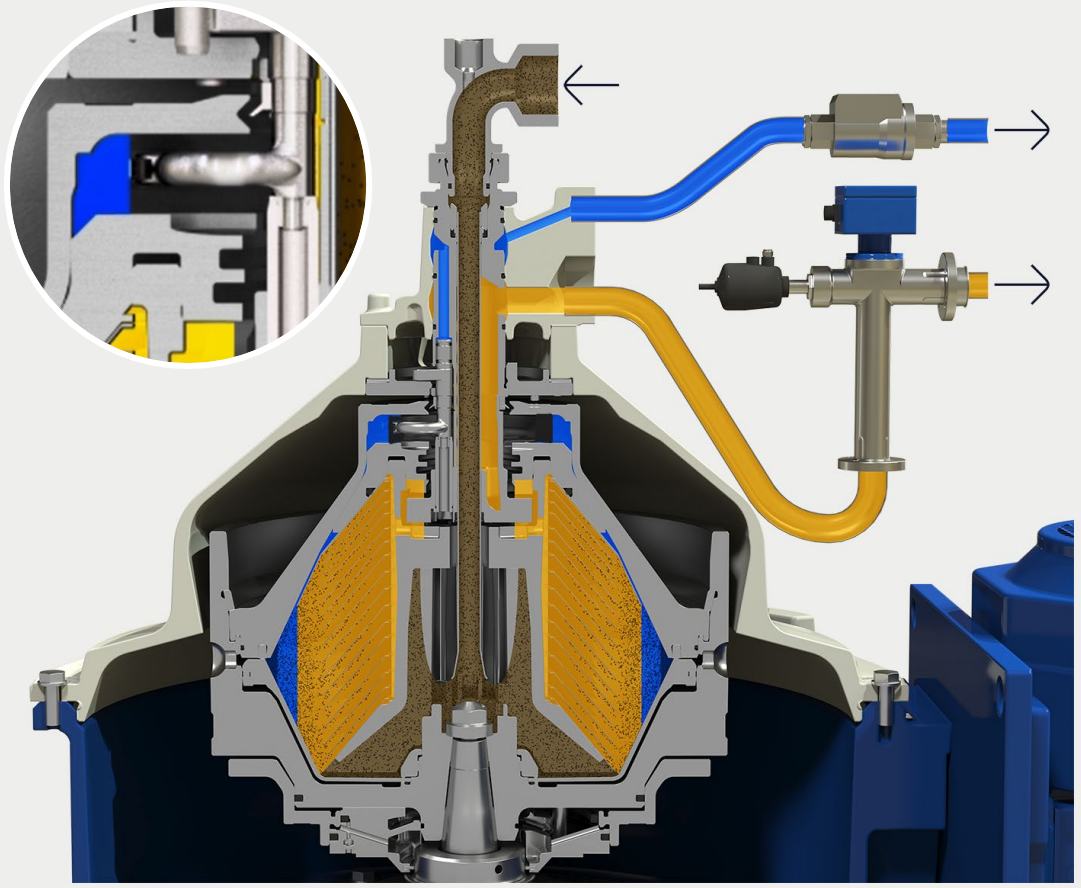
Compensation for low density – ALCAP separators

Issue

- HVO has a lower density compared to fossil fuel oil
- In ALCAP systems, the light phase (1) may not produce enough pressure to push the heavy phase of water (2) towards the paring tube
- This can keep water from being removed, allowing it to escape via the light phase outlet
- In addition, the low pressure will trigger an alarm

Solution

- An update of the Alfa Laval EPC 60 software is available to ensure proper water removal and alarm function during HVO operation



Alfa Laval

Summary

Biofuel Ready

P615/617/626/636/646

FAME

- No modifications

HVO

- New gravity disc

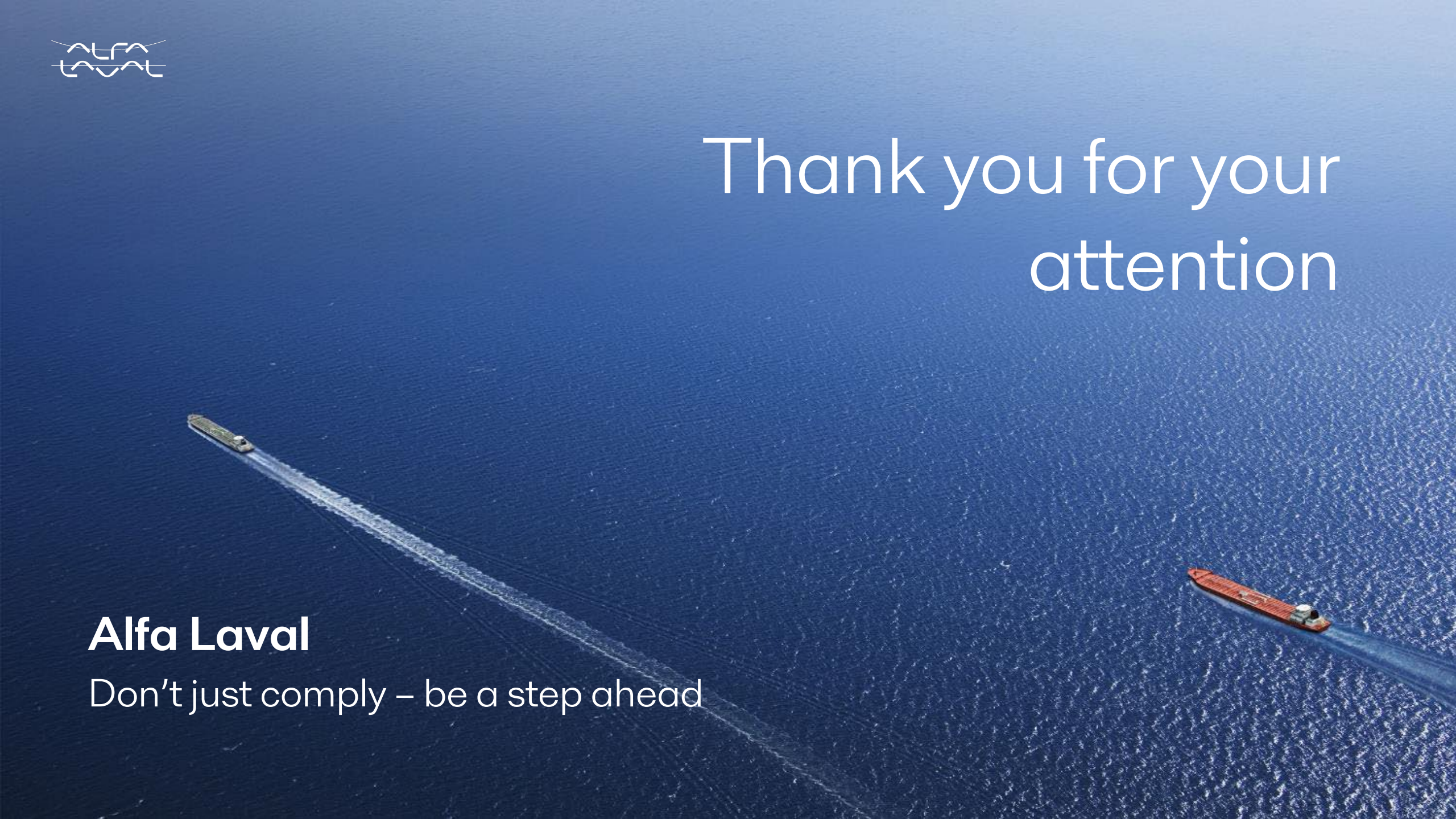
S921-987, S928-988, S949-S9610

FAME

- EPC60 - software update required
- EPC50 - change of settings required

HVO

- EPC60 - software update required
- All EPC EPC50 - cannot process


Thank you for your attention
Alfa Laval
Don’t just comply – be a step ahead

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Pioneering Positive Impact