



## Alfa Laval ACS

### Automated Fuel Changeover System for marine application

#### Application

Stricter fuel oil regulations imposed by the International Maritime Organization and national and regional authorities call for ships to change over from heavy fuel oils (HFO) to low-sulphur distillate fuel oils in designated Emission Control Areas.

The changeover from HFO to light fuel poses operational challenges, especially related to fuel viscosity, lubricity and combustion quality. Onboard fuel oil systems must therefore be adapted to ensure the protection of fuel oil injection components.

Cooling units are required to reduce the temperature of low-sulphur marine gas oil, so that the fuel supplied to the engine is within the proper parameters.

#### Automated Fuel Changeover System from Alfa Laval

The Automated Fuel Changeover System (ACS) is a reliable, fully automatic fuel changeover system that facilitates fuel oil changeover while maintaining fuel viscosity within the limits set by engine manufacturers.

In the high-pressure stage of fuel conditioning, the ACS replaces the heating phase with a cooling phase, in order to keep the distillate fuel temperature low and ensure the proper viscosity.

The ACS can be integrated with the Alfa Laval Fuel Conditioning Module (FCM) or any other booster system, new or existing.

#### Features and benefits

##### ■ Compliance with new fuel regulations:

The ACS allows operators to:

- Achieve easy and fully automatic fuel changeover procedures
- Handle up to three different fuels

##### ■ Safety

The ACS provides cutting-edge control of variations in fuel temperature and viscosity. This makes it possible to achieve safe fuel changeover without any thermal shock or fuel viscosity drops.



The ACS module

##### ■ Integration

- Seamless communication between the ACS and FCM for automatic and reliable fuel changeover procedures
- Full compatibility between the ACS and any fuel booster system from any supplier

##### ■ Automation

- The ACS provides fully automatic operation
- Full process control is available from a remote panel
- Control of all process parameters allows full customization of the changeover procedure

##### ■ Versatility

- When needed, the ACS can utilize chilled water for cooling
- Tailor-made ACS versions can be developed on request

## Key components

Except for pipes and cables, the ACS scope of supply includes everything needed for a complete fuel cooling system, whether as part of a new installation or as a retrofit of an existing fuel supply system.

### ■ ACS cooler

The ACS is equipped with a heat exchanger that uses fresh water or seawater as the cooling medium. The plate heat exchanger cooler has high corrosion resistance, high efficiency and a compact design.

### ■ Mixing valve

This electrically operated three-way mixing valve regulates fuel temperature by partializing the amount of fuel flowing through the ACS cooler. The stepless flow adjustment allows exact temperature control of the light fuel, in order to provide reliable temperature ramping and the correct final injection temperature.

### ■ Temperature transmitter

The temperature transmitter supplies the ACS control unit with data about fuel temperature at the engine. It is mounted near the engine or on the booster module.

### ■ Changeover valves

The ACS incorporates one three-way changeover valve positioned before the inlet of the ACS cooler. Two more three-way changeover valves are available as an option, i.e. one fuel changeover valve at the fuel supply feed inlet and one changeover valve to handle a third fuel if applicable. These are supplied according to the dimensions of the connected pipework.

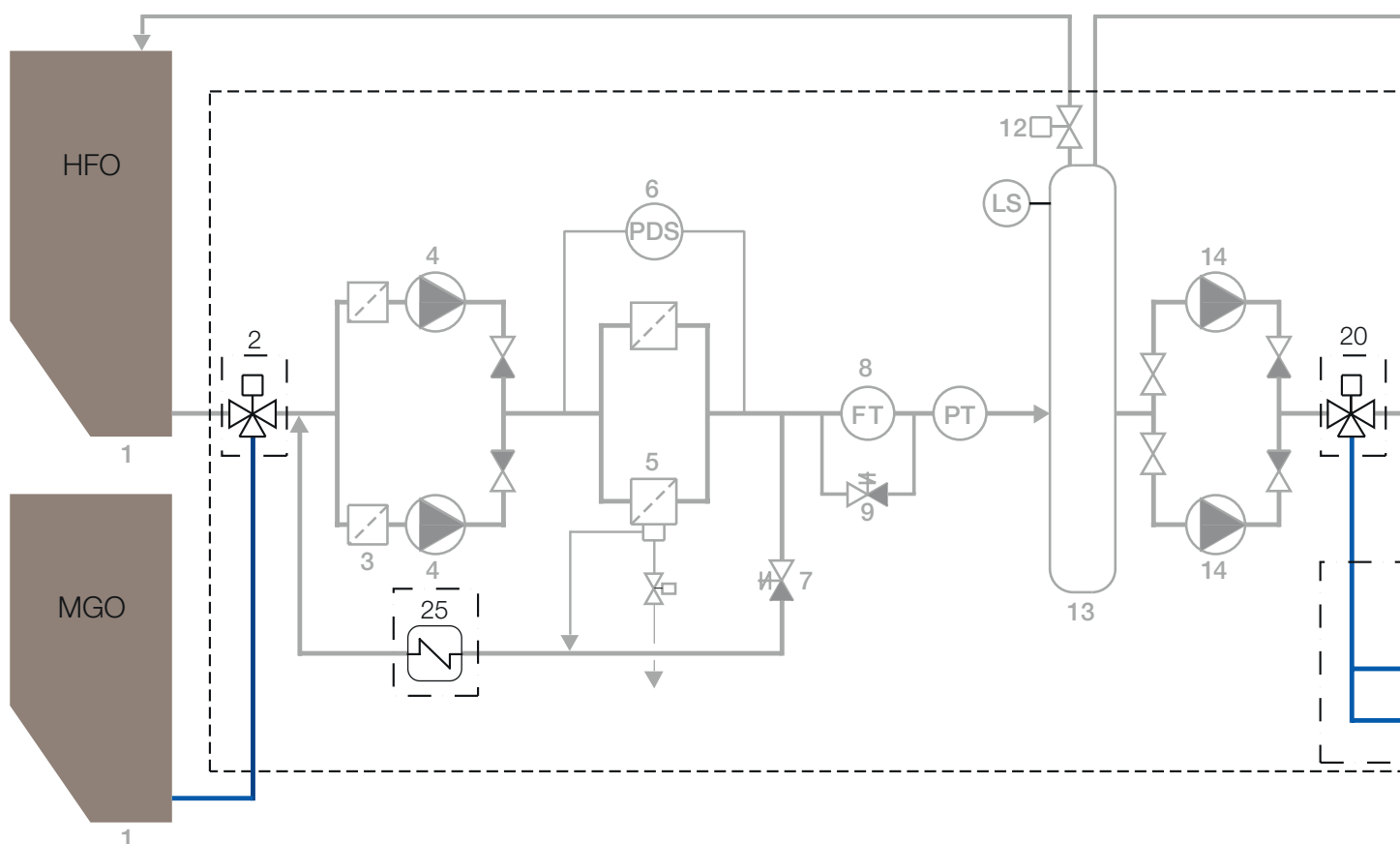
### ■ Control system

The ACS is operated and monitored via a control panel, and can be equipped for different levels of remote control:

- Basic – free contacts (only alarms and readings)
- Extended – free contacts (changeover start-up plus alarms and temperature readings)
- Modbus – full remote control through the onboard automation system

### ■ Modularized assembly

The ACS is a compact and skid-mounted unit, ready for space-saving integration with any booster system. If required, it is also possible to have the ACS delivered as a system of loose components.



## Operating principle

Operation of the ACS is based on an adjustable temperature setpoint and viscosity control determined by the FCM viscosity sensor.

### ■ Changeover from HFO to low-sulphur fuel

To initiate the switch from HFO to low-sulphur fuel, the system gradually shifts the changeover valve (V1) from HFO operation to low-sulphur operation. If the ACS is integrated with an Alfa Laval FCM, the control unit will reduce the heating power in order to control fuel viscosity. The combination of the valve setting and continuous control of heating power ensures a safe and gradual changeover without the risk of a thermal shock.

Once the programmable temperature setpoint has been reached, the ACS shifts the changeover valve (V2) from the heater position to the cooler position and begins to control the fuel temperature during the ramping phase by operating the three-way mixing valve (V3). Continuous control of this three-way mixing valve ensures the correct fuel temperature and viscosity.

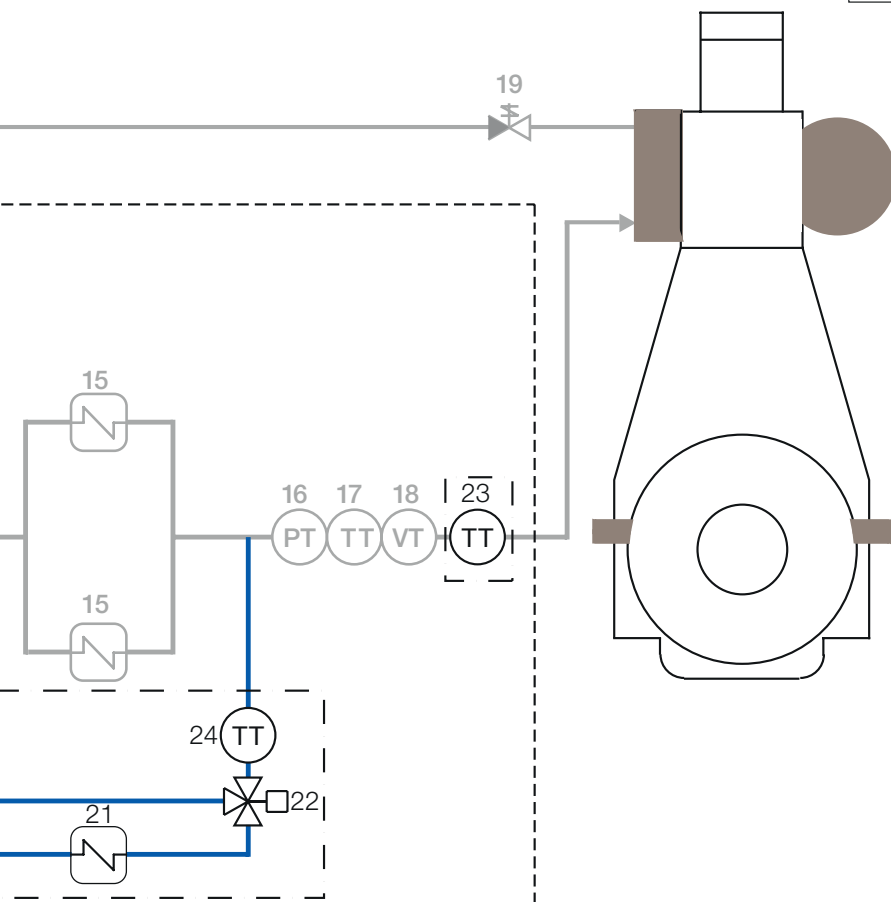
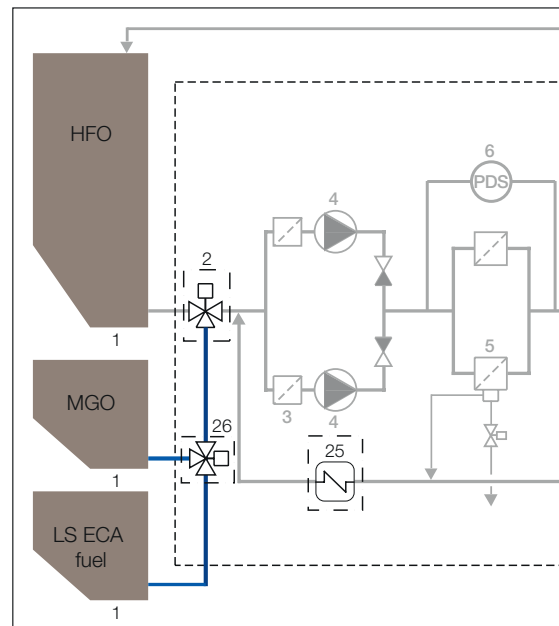
### ■ Changeover from low-sulphur fuel to HFO

To initiate the switch from low-sulphur fuel to HFO, the system gradually shifts the changeover valve (V1) from low-sulphur operation to HFO operation. If the ACS is integrated with an Alfa Laval FCM, the control unit will ramp up the fuel temperature by operating the three-way mixing valve (V3). When the programmable

temperature setpoint has been reached, the ACS gradually shifts the changeover valve (V2) from cooling position to heating position. The booster controls the temperature ramping until the HFO working viscosity has been reached.

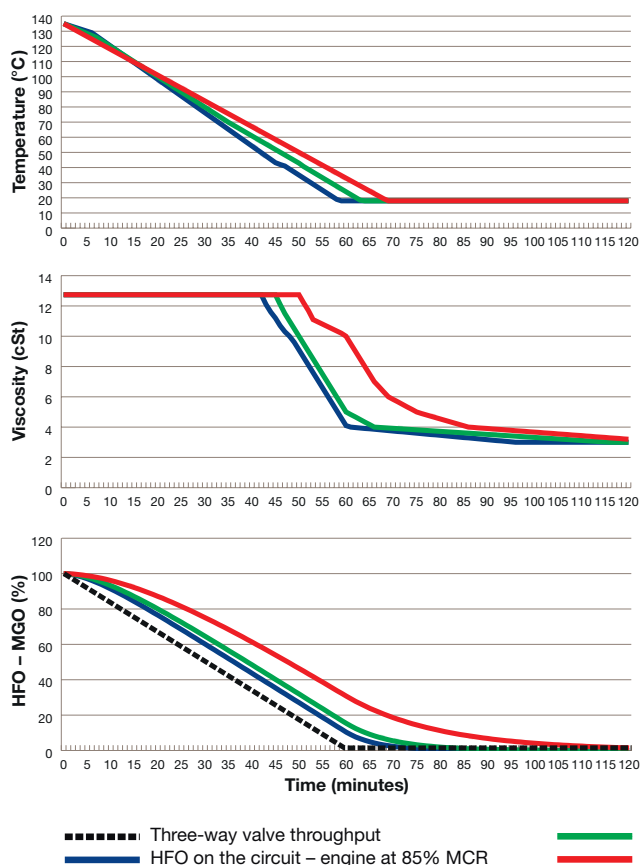
### ■ Handling of three fuels

As an option, the system can handle three different fuels when applicable. This allows money to be saved by using the most suitable fuel at any given time.

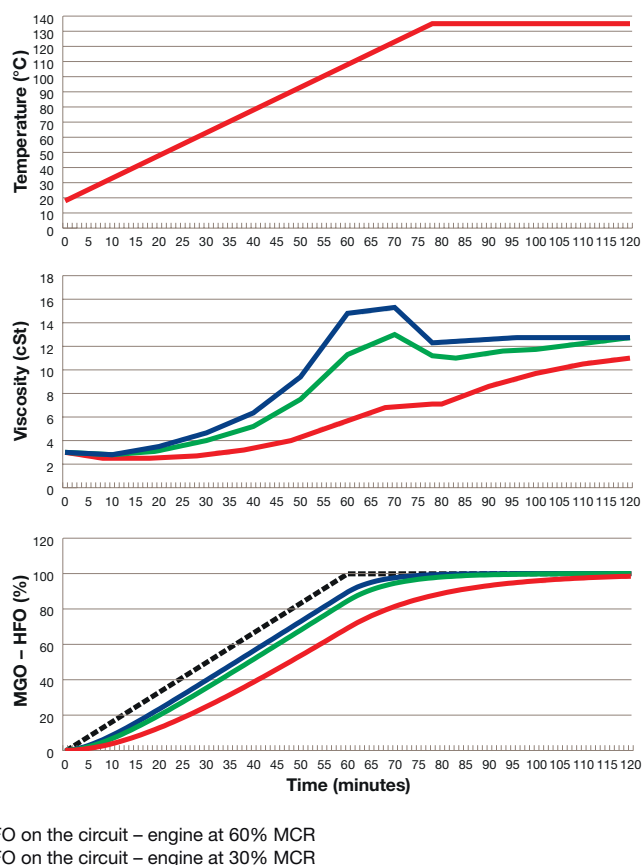


1. HFO and MGO day tank
2. Three-way changeover valve (V1)
3. Pump strainers
4. Supply pump
5. Automatic backflushing filter
6. Filter pressure drop switch
7. Supply pressure control valve
8. Flow transmitter
9. Flow transmitter bypass
10. Pressure transmitter, supply pump
11. Level switch
12. Automatic deaeration valve
13. Mixing tube
14. Circulation pump
15. Heaters
16. Pressure transmitter, circ. pump
17. Temperature sensor
18. Viscosity sensor
19. Engine pressure control valve
20. Three-way changeover valve (V2)
21. ACS cooler
22. Three-way mixing valve (V3)
23. Temperature transmitter (TT2)
24. Temperature transmitter (TT3)
25. SPV Cooler
26. Three-way changeover valve (V4)
27. Heating media valve (V6)
28. Cooling media valve (V7)

## HFO to MGO changeover



## MGO to HFO changeover



### TECHNICAL DATA

Max module size	1500 x 600 x 1800 mm
Max module weight	400 kg
Main supply voltage	1-phase, 110/230 V
Main supply frequency	50 or 60 Hz
Max oil pressure	16 bar
Max oil temperature	160°C

### CAPACITY RANGE

Custom sizing allows the ACS to accommodate a wide range of fuel supply requirements. Larger capacities can be supplied upon request.

Read more about the ACS at [www.alfalaval.com/acs](http://www.alfalaval.com/acs)

### STANDARD DELIVERY

There are predefined units for short-track delivery within the flow rates given in the table below.

Type	Circulation flow
ACS 10 F,S,C/G	1000-4000 l/t
ACS 40 F,S,C/G	4000-6000 l/t
ACS 60 F,S,C/G	6000-10000 l/t
ACS 100 F,S,C/G	10000-16000 l/t

Alfa Laval reserves the right to change specifications without prior notification.

### How to contact Alfa Laval

Up-to-date Alfa Laval contact details for all countries are always available on our website at [www.alfalaval.com](http://www.alfalaval.com)