

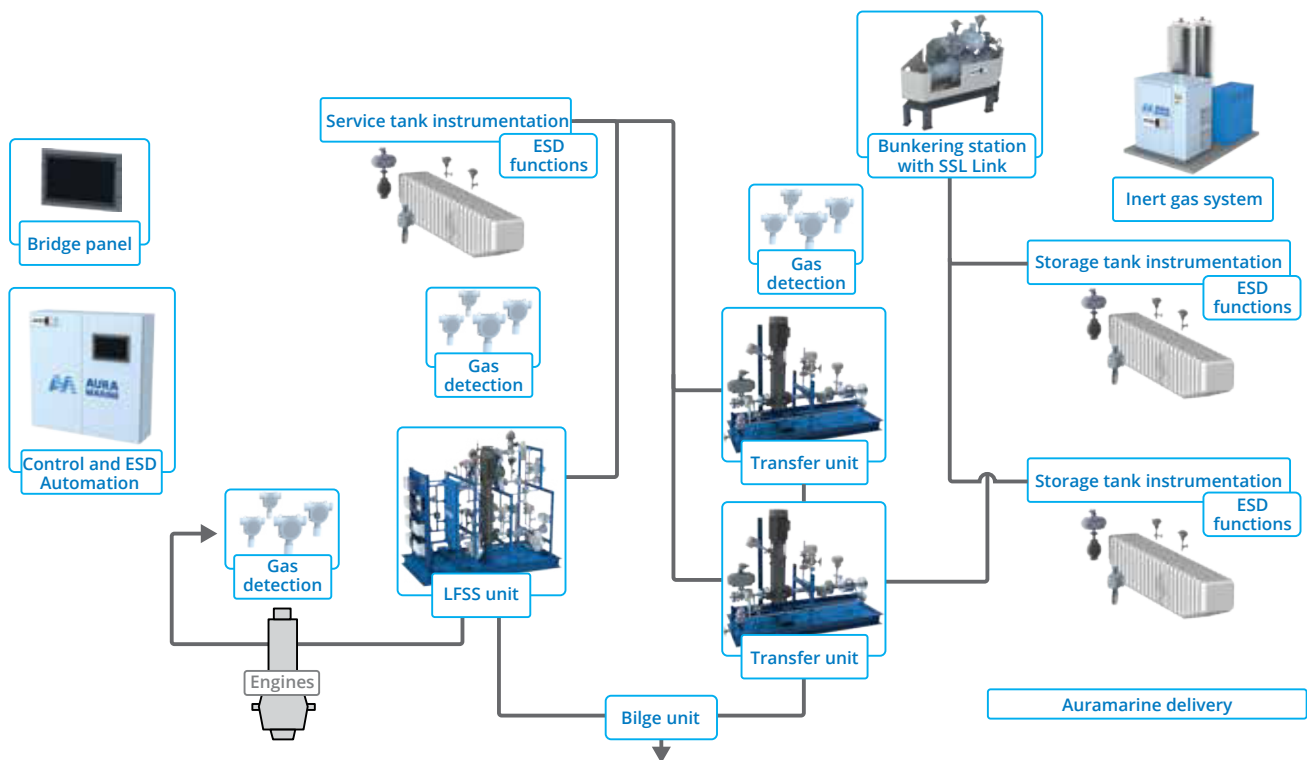
Methanol Fuel Supply System



**MODULAR, INSTALLATION-FRIENDLY FUEL SUPPLY SYSTEM
FOR ENGINES AND OTHER METHANOL CONSUMERS**

Auramarine

Methanol supply system



Example of an arrangement

Suitable for both two-stroke and four-stroke engines

The methanol fuel supply system is designed based on the technical capabilities of our advanced fuel supply management systems. On this solid foundation, we have built expert knowledge about methanol fuel system requirements in dialogue with leading engine makers and ship owners.

Auramarine's methanol fuel supply system is suitable for both two-stroke and four-stroke engines.

Our system supplies methanol all the way from bunkering station to the engines and other methanol consumers. It regulates fuel pressure and actively maintains the supply pressure within the specified tolerances during load changes. It also regulates the fuel temperature and filtrates the fuel to prevent any impurities from entering the fuel consumer.

The system is equipped with complete automation and safety features that are essential for methanol operations.



Benefits for shipyard and installation

- A holistic approach to the system means less equipment interfaces and less coordination work to the shipyard
- Clear, modular and installation-friendly designs
- Auramarine can provide support in the system design phase
- Experienced project management, clear responsibilities and interfaces
- Pre-tested units and automation system shorten installation and commissioning times
- Classification certificate is delivered for all parts of the system where a certificate is needed
- Flexibility: The design can be optimised for the exact space available

Benefits in operation

- Reliability; Auramarine is an established fuel supply system supplier providing spare parts, service and maintenance globally and throughout the vessel's lifetime
- Safety: ESD Emergency shutdown automation and control automation can be integrated to onboard systems
- Design: Consistent, high-quality design, built-in redundancy and carefully chosen components ensure functionality and serviceability of the installation
- Optimal system operation: We offer inspections and proactive maintenance to maintain your operational risks and costs at the lowest possible levels. Such offering comprises e.g. annual health checks and pre-docking inspections

LFSS Functions



1. Pumping

- Fuel pump function is to maintain the set pressure using pressure from unit outlet as feedback for variable frequency drive
- Pump has a magnetic coupling to prevent leakage

2. Fuel consumption measurement

- Consumption data can be transferred to ship automation system

3. Heat exchange

- Keeps the fuel temperature within the specified range at the unit outlet by cooling or heating depending on service tank temperature

4. Filtration

- Removes impurities from methanol that could damage the components and engine
- Duplicated for redundancy and thus ensuring uninterrupted operation during filter maintenance

5. N2 inert gas purging

- Automatic draining and inerting of the unit

6. Chiller unit (optional)

- An alternative to LT water cooling
- Located in safety area

7. Fuel valve train (optional)

Solutions according to the engine manufacturers' requirements

2-stroke engines:

- one methanol supply pump
- ~ 13 bar supply pressure

4-stroke engines:

- one or two methanol supply pumps
- ~ 4-50 bar supply pressure
- a separate high pressure pump unit

Seamless backup for methanol operation

Critically, for dual fuel engines operating on methanol there is always a backup system that kicks in immediately if there is any interruption in methanol operation.

Auramarine's **HFO and MGO units** are suitable for backup purposes, which are already trusted and proven in current LNG-operated vessels. These units are built to always maintain the engine-specific fuel temperatures and other requirements.

Auramarine's MGO supply units can be tailored independently to the existing booster(s) to supply one or several engines depending on their configuration.

A dedicated design option for constrained spaces allows the unit to be split into parts for smooth transport and installation, as well as for placing the unit in an optimal location onboard.



Auramarine MGO unit

Pilot fuel supply

It is also important to remember that the engine will need a pilot fuel system for methanol operations. Auramarine has extensive experience of pilot fuel systems for LNG, and extends this knowledge to methanol supply.

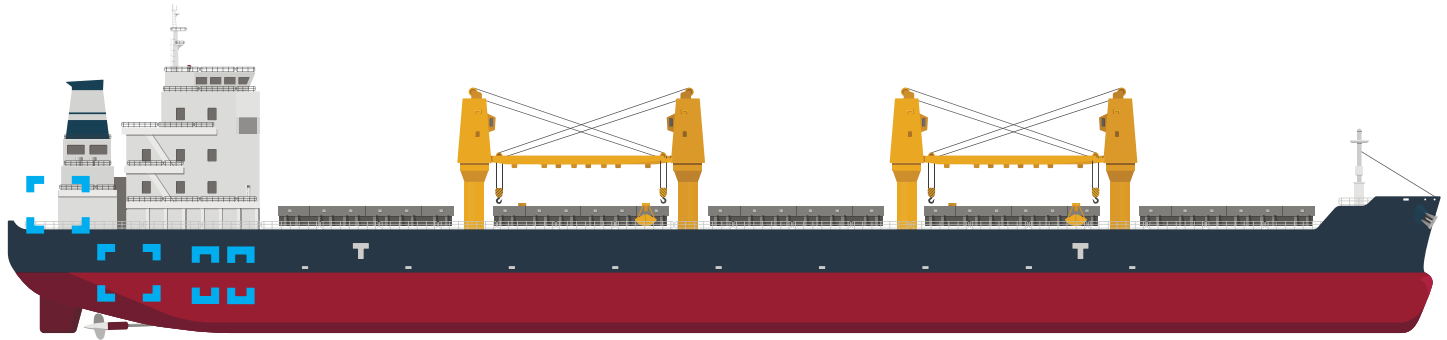
If you already have an existing pilot fuel system, the methanol retrofit is a good opportunity for us to check and overhaul that system, so please contact us whenever you plan to add methanol to your existing ship's fuel options.

Safety

Methanol is toxic and a low flashpoint fuel. Therefore, the fuel supply system must be designed to meet the strict safety requirements for materials, components, assembly, operation and maintenance:

- All fuel supply system materials and manufacturing procedures are designed suitable for methanol service and for the specifications of a particular application.
- The system, its components and electrical equipment is designed to be installed in closed and Ex rated hazardous areas. All IECEx and Health and Safety Guidelines (HSE) have been taken into account.
- The system has a self-draining mechanical design, nitrogen inerting, and double block and bleed arrangement for all serviceable methanol line segments.
- The electrical cabinets, control panels and variable frequency drives are designed to be placed separately to safe area.

Methanol supply system as retrofit



 A one-piece modular unit on or below deck

 A modular unit in two or more parts below deck

Introducing methanol as a marine fuel requires careful consideration and planning. When considering a fuel supply solution for methanol, Auramarine's goal is to make the supply system as easy, quick and space-saving to install as possible, while being trouble-free and safe when in operation.

Delivery options

The most straightforward solution is to install the Auramarine methanol supply system into an Ex-compliant container, which would be placed on the ship's deck in a viable location. For such containers, the required ventilation is feasible without any complicated solutions.

The fuel supply system can also be installed below deck - in Ex-space - depending on the space available.

Auramarine's fuel supply systems are always optimised for the available footprint, and the modular structures support navigation through constrained spaces under deck to the final installation location.

Design based on your requirements

The key items from a fuel supply system point of view is to consider the footprint and the Ex-protection of the retrofit system. The double-wall piping for methanol requires a unique design expertise. In addition to the fuel supply system design, we can support you by carrying out the design of the whole piping system related to the fuel supply system retrofit.

All this is done in collaboration with the engine maker as necessary, and in connection with the engine modifications. Therefore, it pays to have a fuel supply systems partner at an early stage of the project. This will ensure the best structures from both a design and technology point of view, as well as a fluent project workflow and optimised downtime.

Synergies and benefits from choosing the methanol system and its backup from Auramarine



- The purchasing process is straightforward, less administration work from a shipyard perspective at the shipbuilding stage
- The design can be optimised for the exact space available
- All documentation is from one supplier, which brings benefits in operation
- There is one contact point for all the equipment
- If a service is needed, our service engineer can check the status of all Auramarine's equipment at the same time for safe and reliable operation
- Auramarine's Lifecycles Services ensure the operational efficiency of your fuel supply and auxiliary systems throughout their lifetime

Scan the QR-codes to:

- Ask about our methanol solutions:



- Read more about our modernisation services:



Auramarine is your trusted fuel and auxiliary systems expert for marine, power and process industry. Our proud heritage stems from the founding of the company in Finland in the early 1970's. Since then we have delivered over 15 000 robust and reliable auxiliary systems to our customers all over the world, continuously aiming for superior service and customer value.

WE ARE THE PIONEERS IN FUEL SYSTEMS.

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