





#### **ABOUT US**

Lyngaa Marine - Page 3

#### **LMB2100 STANDARD**

**Propulsion Control System - Page 5** 

#### **LMB2100 CONFIGURATIONS**

**Propulsion Control System - Page 6** 

#### **LMB 2100**

**Integrated Systems - Page 8** 

### **LMB 2100 Supply Vessels**

**Large Vessel Integrations - Page 12 - 15** 

#### **LMB 2100 Sailing Vessels**

System Integration and Energy recovery-Page 16

#### **LMB2101basic Systems**

**Tove Kynde & August - Page 17 - 19** 

#### LMA2100

Alarm, Monitoring and Control System - Page 20 - 21

#### LM FLOW

Focus on Fuel Economy - Page 22-23

#### **ABOUT**

# Lyngaa Marine

Lyngaa Marine

Front Runner in maritime automation.

Based in Birkerød, the Danish company Lyngaa Marine A/S enjoys great success in ship automation.

Lyngaa Marine has established itself as a specialist in advanced propulsion and automation systems for the maritime industry. Over the years, the company has expanded its portfolio from propulsion control into a complete program of integrated marine systems.

Today, the product range includes:

- LMB2100 Advanced Propulsion Control
- LMB2101 Basic Propulsion Control
- LMA2100 Alarm, Monitoring,
   Control and Power Management
- LMT2100 Thruster Control
- LMR2100 Rudder Control
- LMDP2100 Dynamic Positioning
- LMF2100 Fuel Flow Monitoring



X PRESS KARAKORAM 220 meter Container Vessel with retrofitted LMB2100 Propulsion Control System

Plus a wide selection of tailor-made solutions.

Since 2021, Lyngaa Marine has been delivering more than 120 systems annually, serving an increasingly diverse customer base. Recent projects include extensive integrated systems for fish transport vessels, crew transfer vessels, ferries, fishing vessels, offshore supply vessels, container vessels, tankers, research vessels, and the largest SAR boat to date for the Norwegian rescue company *Redningsselskapet* proving the stability of Lyngaa Marine systems.

Today, Lyngaa Marine employs around

25 people – a strong mix of marine engineers, civil engineers, automation technicians, and administrative staff.

To further strengthen its international presence and development capacity, Lyngaa Marine is now part of the **BSI Marine Group**.

Backed by this partnership, the company is well-positioned to accelerate innovation and continue its mission of delivering reliable, flexible, and competitive marine automation solutions worldwide.









## **LMB2100 STANDARD**

The LMB2100 propulsion control system is Lyngaa Marine's bid on the marine classification society approved propulsion control system, which meets with even the most comprehensive demands from the marketplace. The system is designed around a selection of first-class standard hardware components, which assures the reliability and durability of the system as well as easy

and quick access to spare parts.

The system offers communication with engine, gearbox, propeller, or waterjet. The color display gives the user information about all vital data such as: speed, pressures, and temperatures from the entire drive line as well as pitch and rotation direction of the propeller.



### LMB2100 Outdoor Panel

#### The features of the LMB2100 are:

- Affordable
- Build from standard components
- MCS approved hardware & software
- Easy to install and commission
- Up to eight control stations in one and same system
- Outdoor panels
- Full insight in all vital data from the propulsion line on touch screen
- Easy to re-calibrate
- Remote access via internet
- Efficient support via phone & internet
- Automatic engine speed control when clutching PTOs

- Automatic engine overload protection
- Can be extended with alarm system
- Programmable by user via PC browser or the build-in touch screen
  - Emergency mode
  - Flexible/customizable
  - Fuel measurement



LMB2100 Narrow Panel



#### LMB2100

## **Configurations**

#### LMB2100 - Dual

The LMB2100 Dual has been widely adopted for multi-engine vessels, including crew transfer vessels, aquaculture vessels, search and rescue (SAR) vessels, and ferries. Designed for versatility, the LMB2100 is compatible with CPP, water jets, and hybrid propulsion systems, making it an excellent choice for such applications.



#### LMB2100 - Electrical/Hybrid Propulsion (single- or multi engine)

The LMB2100 Electric Propulsion is specifically designed for electric and hybrid propulsion systems. It offers the same reliable functionality as the standard LMB2100, with added compatibility for seamless integration with frequency converters and battery packages.



#### LMB2100 - Water Jet

The LMB2100 Water Jet is specifically designed for water jet control, retaining all the core attributes and reliability of the standard LMB2100.



#### LMB2101 - Reverse Gear

The LMB2101 Reverse Gear is tailored for reverse gear systems, building on the proven foundation of the popular LMB2100. It delivers the same trusted performance and, reliability.



#### LMB2100 - Azimuth

The LMB2100 Azimuth is designed for vessels equipped with azimuth thrusters, supporting both main propulsion and retractable bow thruster applications.

It can also be delivered with an interface for integration with Dynamic Positioning systems, ensuring seamless control and performance.



#### LMB2100—Double Ender

The LMB2100 Double ender system is specially developed for RORO double ender ferries, with propeller in each end of the vessel.





### LMB2100

## **Configurations**

#### **LMDP2100**

#### **Dynamic Positioning System**

The Lyngaa Marine DP system is designed for easy maneuvering - in dock or on open water. The system includes a joystick control panel.

At docking speed, the system keeps the ships orientation while maneuvering. At higher speed the joystick can be used to control the pitch of the main propeller(s) and rudder(s). The system has a Hold Position mode, where it will keep its current position, and an anchor mode where it will hold its current position but turn the ship so that the bow will always be against the wind.



#### LMR2100

#### **Rudder Control**

The LMR2100 is a dedicated rudder control system designed to manage a vessel's steering machines. Key features include rudder synchronization, rudder position monitoring, standby pump activation, emergency control, and integration with both autopilot and Dynamic Positioning (DP) systems.



#### LMT2100

#### **Thruster Control**

The LMT2100 is Lyngaa Marine's advanced thruster control system, compatible with diesel, electric, and hydraulic thrusters. It can be delivered as a stand-alone solution or seamlessly integrated into the LMB2100 series. The LMT2100 is approved by all major marine classification societies, ensuring reliability and compliance.



#### LMPM2100

#### **Power Management**

The system monitors and controls all electric power production and consumption in the vessel.









#### **INTEGRATED SYSTEMS**

The Lyngaa bridge control system can be delivered as a complete package with full integration between:

**LMR2100 Rudder Control System** 

**LMB2100Dual Propulsion Control System** 

**LMPM2100 Power Management System** 

LMA2100 Alarm & Monitoring System

**LMT2100 Thruster Control System** 

**LMDP2100 Dynamic Positioning System** 

The integrated LM2100 system manages a wide range of critical vessel functions, including propulsion-, rudder- and thruster controls, power management, alarm and monitoring, automation, navigation lights, pumps, and tank management.

Building on the success of the NOS project, Lyngaa Marine has expanded its reach, delivering similar advanced systems for the latest live fish carriers of Norwegian company Frøy Rederi AS and a new Norwegian SAR vessel for Redningsselskapet, and Swede Ship on Tjörn.



SAR: RS OSCAR TYBRING V



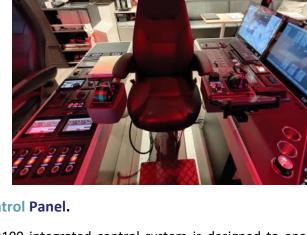
M/V Energizer



## **INTEGRATED SYSTEMS - NOS Energizer**

### The Captain's Chair.

The Lyngaa Marine LM2100 system is designed to provide full control of the vessel from the captain's chair, ensuring safe and efficient operation. With a carefully prioritized layout of all essential functions, the system enhances navigational efficiency and operational reliability. Successfully delivered in February 2022, the LM2100 has been highly appreciated by both the yard and crew for its seamless functionality and user-friendly design



#### The Control Panel.

The LM2100 integrated control system is designed to enable navigators to perform all essential ship control functions without leaving their chair. With a fully optimized layout, it ensures complete monitoring and control of all critical vessel operations, enhancing safety, efficiency, and ease of use.

The LMR2100 and LMT2100 systems add precise control over the rudders and thrusters seamlessly integrated with the LMB2100 propulsion control system





#### The LMA2100 Alarm & Monitoring System.

The LMA2100 is a comprehensive Integrated Automation System (IAS) designed to meet crew demands for realtime information while offering a wide range of automated and remote-controlled functions. For the NOS Energizer, we developed 10 dedicated screens covering all integrated system functions.

Each interface was designed in close collaboration with the owner and yard, ensuring a user-friendly, selfexplaining layout that reflects the crew's specific needs and operational requirements.

#### LMDP2100 Dynamic Positioning Systems.

When activated, the LMDP2100 takes full control of the vessel, ensuring it maintains an exact position throughout DP mode operation, enhancing stability and maneuverability or when in standby operation the virtual anchor is contributing to the fuel savings.

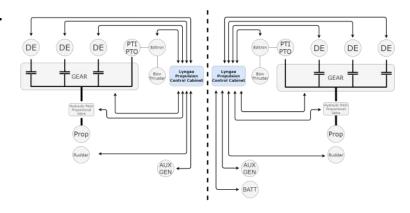


## **INTEGRATED SYSTEMS - NOS Energizer**

#### The LMPM2100 Power Management System.

The LMPM2100 power management system has been extensively designed to optimize interaction between the six diesel engines delivering power to the two gear boxes together with the two efficient permanent magnet motors. All again integrated with the two auxiliary gensets and the 275 kWh battery bank.

This enhanced system ensures seamless energy distribution, efficiency, and reliability for all onboard operations.



## **SYSTEM INTEGRATION - Examples from Oscar Tybring V**

#### **SAR Vessel Oscar Tybring V**

The rescue vessel Oscar Trybring V is the most advanced vessel built for the Norwegian rescue service to date.

Lyngaa Marine was responsible for the integration of propulsion, bow thruster, two individual rudders, alarm system, power management including synchronization and load distribution of power.

Many special features were introduced along the way, such as reduction of rudder angle at high speed and control of propeller force when another vessel are being towed.



Oscar Tybring making more than 30 knots



**Special Design Maneuver Control Station** 

#### Safety above all:

When operating at high speed and in particularly rough conditions, it is important that the crew has full confidence in the control system. It was therefore designed with high redundancy and still with full overview for the crew.

All systems for propulsion, tanklevels, power, etc. are integrated and have a common, easy-to-understand control interface including dynamic positioning system LMDP2100.



## **M/V** Explorer



## Complete Retrofit Propulsion Control System

As a part of the upgrade of the dynamic positioning system on M/V Explorer it was found necessary also to change the control system for propulsion, side thrusters and retractable side thruster.

Based on previous positive experience with Lyngaa Marine this contract was given to Lyngaa Marine.

Being a previous anchor handler with four main engines on two gear and shaft generator, two stern side thrusters, one bow thruster and one retractable azimuth in front, this was a comprehensive job. Existing frequency converters were to be re-used, and interfaces had to work together.

Updating the control system allowed old cables to be removed and replaced with modern communication cables. Even overhead displays where replaced with large displays and common dimmer for all displays.

A "one push" take command was also implemented for the convenience of the operators.



#### **Dynamic Positioning integration**

A new dynamic positioning system grade DP2 was integrated into the new propulsion control system.

The easy access to adjust parameters was a great help during commissioning. The ship's propellers and thrusters could perform at their maximum without overloading the engines.



## **M/V Notus**

## **Comprehensive Bridge Control System Upgrade**

The offshore supply vessel Notus received a complete retrofit of its outdated original bridge control system. The upgrade integrated two propulsion azimuth thrusters, one retractable azimuth, and one bow thruster into the LMB2100 control system, seamlessly interfacing with a DP(2) system. This modernization enhances vessel maneuverability, efficiency, and operational reliability.



#### The retrofit project for Notus included:

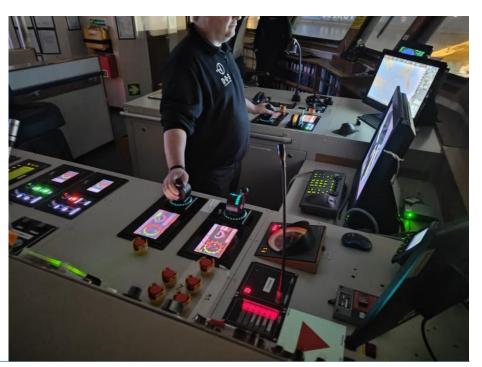
- Integrating 20-year-old equipment with a new PLC control system while retaining existing hardware.
- Installing two maneuver stations on the bridge, including emergency control and local operation from the engine room.
- Close collaboration with electricians to connect existing wiring and hardware to the new Lyngaa system.
- Designing and integrating new bridge control stations.
- Coordinating with the DP supplier throughout design, construction, and sea trials.
- This upgrade ensures seamless system integration, improved control, and enhanced operational efficiency.



LMB2100 Azimuth Panel



LMB2100 Emg Azimuth Panel





#### **JD Crafts Sima**

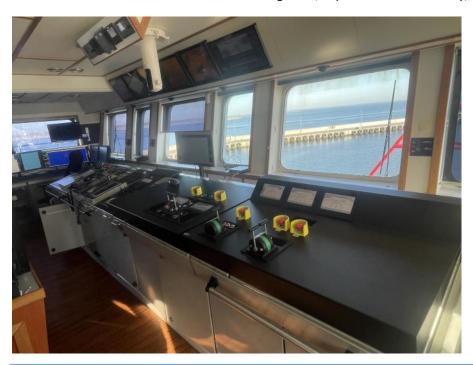
#### **Upgraded Bridge Control System**

The offshore supply vessel *Sima* has undergone a comprehensive retrofit of its bridge control system, originally developed in the Soviet Union around the fall of the Iron Curtain. The outdated system, which relied on air pressure to control the propulsion lines, has now been fully electrified. The new LMB2100 control solution integrates two propulsion lines, two stern thrusters, and one bow thruster, and seamlessly interfaces with a DP(2) system. This modernization significantly enhances the vessel's maneuverability, efficiency, and operational reliability.



#### The retrofit project for Sima included:

- Replacing a Soviet-era bridge control system originally built around the fall of the Iron Curtain.
- Electrifying propulsion control lines previously operated by air pressure.
- Integrating two propulsion lines, two stern thrusters, and one bow thruster into the new LMB2100 control system.
- Installing new bridge control stations and ensuring full compatibility with a DP(2) system.
- Collaborating closely with onboard technicians and electricians to adapt legacy wiring and interfaces.
- Supporting sea trials and final commissioning to ensure full functionality and performance.
   This modernization delivers seamless integration, improved maneuverability, and increased system reliability.





Maneuver desk on front bridge prior to replacement with LMB2100



## **Nørresundby Shipping Karmsund**

#### **Precision Control for Reliable Performance**

The LMB2100 propulsion control system ensures seamless operation of RPM setpoints and propeller pitch, providing optimal vessel maneuverability.

**Key Features for the Karmsund vessel:** 2 maneuver stations with easily switch control between stations for seamless operation.

**Secure operation:** Pitch, speed, and clutch functions work only from the active command panel. Clutch engages only when pitch is at zero and the engine is idling or matching gearbox input speed.

**Emergency Control Mode:** In case of faults, pitch and clutch can be controlled from the master bridge panel or an optional local panel in the engine room.

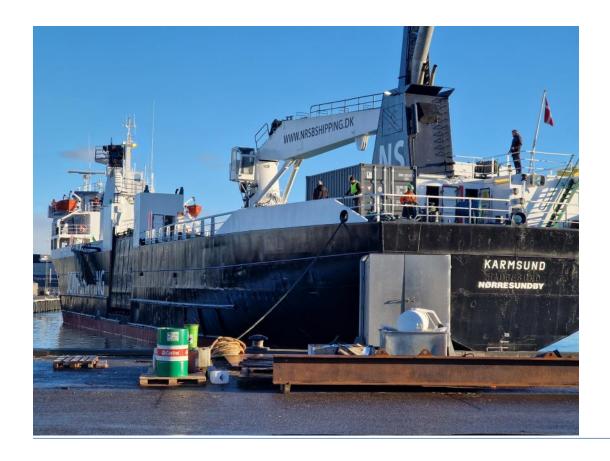
**Shaft generator:** Full control with built-in safety features. Clutch-out function is disabled while the shaft generator is active

**Comprehensive Alarm System:** Gearbox alarms shown in clear text for quick identification. Alarm log page stores historical data for review.



LMB2100 Propulsion Control System on Karmsund

Class Approved: by Rina.





#### **TOWT Artemis & Anemos**

The French-owned sailing vessels *Anemos & Artemis*, primarily transporting products across the Atlantic Ocean, was built with the Lyngaa Marine LMB2100 Bridge Maneuvering System for Controllable Pitch Propulsion.

Optimized for efficiency and reliability, our system ensures precise control and smooth operations, minimizing downtime and maximizing performance.

These two vessels are the first in a series of 8 hybrid sailing vessels that will sail goods and passengers across the Atlantic Ocean using sail and hybrid propulsion.



#### The Lyngaa scope consists of the following:

**Dual Propulsion Control:** 2 diesel engines, 2 electric motors, pitch, clutches, and load protection of both electrical and diesel engines.

**Propulsion Modes:** Combinator: by controlling pitch handle, the engine speed automatically increases in a preset curve. Feathering: While sailing, the propeller pitch is set at angle to minimize resistance through water. Regen: While using sail, the pitch angle is set so propeller turns and power is generated through a frequency converter.

Thruster Control: Full control of vessels electrical bow thruster with alarms and 2 bridge panels.

**Rudder Control:** 2 independent rudders that can operate both synchronized or individually.

**Remote Box:** A remote box for control of the vessel on either port or star board side outside of the wheel house by connecting a plug.



One of the two maneuver places on the bridge





Two independent LMB2100 Propulsion Controllers







#### LMB2101 BASIC

The LMB2101Basic Propulsion Control System was created specifically to smaller, unclassed work boats. The idea was to meet the requirements from the market-place to offer a "no-nonsense" system that should be simple, reliable, and not the least affordable. Thus, the LMB2101Basic was created as a narrowed down version of the LMB2100 system.

The LMB2101Basic offers the same basic features as the LMB2100, however, the communication between the system and the user is based on the use of a PC instead of the touch displays that the LMB2100 features.



L 232 Tove Kynde delivered with LMB2101Basic

The LMB2101 is built from "off-the-shelve" standard components that are well proven and accepted by users worldwide for their ruggedness and durability. The system is not class approved but all hardware and software used in the LMB2101Basic are approved by all major marine classification societies. This ensures that National Marine Authorities (NMA) will approve the

LMB2101Basic system.

The system communicates with all known engines, gear boxes, propellers, and water jets.



LMB2101 Master Panel

## LMB2101 Compact Panel



LMB2101 Outdoor Panel

LMB2101 Slave Panel

#### The features offered are:

- Affordable
- Build from standard components
- MCS approved hardware & software
- Easy to install and commission
- Up to five control stations in one and same system
- Engine overload protection
- Outdoor panels

- Easy to re-calibrate
- Efficient support via phone & internet
- Automatic RPM control when clutching PTOs
- Automatic engine overload protection
- Can be extended with alarm system
- Programmable by PC browser



## LMB2101 Basic with alarms

Small to mid-sized vessels can benefit from the LMB2101Basics ability to extend the system with monitoring & alarm, and simple automation features (e.g., start-up & shut-down processes, valve controls, tank management, etc.)

The 2101Basic system has been installed in more than 100 work boats in the following segments:

Fishing, aqua culture, wind service, crew transfer vessels, ferries, tugs, yachts, coasters and dredgers.



HM95 August delivered with LMB2101 & LMA2101

## Building HM95 'August' at Jobi Yard in Strandby

When the new gill netter/Danish siener HM95 August was ordered at the Jobi Shipyard in Strandby, both yard and owner held a preference for a locally manufactured propulsion control system. However, when the question about monitoring & alarm system arose, Lyngaa Marine approached the shipyard and the yards electrical contractor with a suggestion to an "extended" propulsion control system with 20 alarm & monitoring channels and control of engine overload and controlled coupling of PTOs.



The owner immediately recognized the smartness of the system as well as the positive impact on the



HM95 August delivered with LMB2101 & LMA2101

of the system as well as the positive impact on the budget, so the decision was easy to make. The LMB2101 system with alarm and monitoring extension was installed and commissioned in February 2021.

Skipper René Olsen explains:

"We have not had any reason to regret the choice of LMB2101 for our new building. The system has worked reliably from day one and we certainly appreciate the functionality and the easy operation of the alarm and control side of the system."







#### LMA2101

## **MONITORING, ALARM & CONTROL SYSTEMS**

The LMA2101 monitoring & alarm system is the most flexible and affordable monitoring, alarm, and control system that the marine industry has seen to date. The LMA2100 is build on the same software architecture as the LMB2100 and LMB2101 systems. It is therefore possible to extend both the LMB systems with an alarm section, which is driven by the LMB computer. This solution is extremely affordable and is well suited to vessels, which requires up to approximately 50 alarm channels.



#### The main features are:

- Affordable
- Same software architecture as the LMB2100 family
- Build from standard components
- Easy to configure
- MCS approved hardware & software

- Remote access via internet
- Efficient support via phone and internet
- Programmable via PC or the build in display(s)
- Flexible/customizable

The LMA2101 offers access through displays of all sizes and the displays can be placed in any compartment of the vessel. The system can be extended with extra channels and the yard or the ship's crew can easily configure new alarms and create new layouts.

The LMA2101 facilitates the opportunity to control and operate many processes i.e., valve operation, start/stop of pumps, start/stop of engines, tank management and many other processes from the huge library of functions. Also, intelligent commu-

nication with alternator synchronizers, refrigeration plants, navigation lights, stand-by equipment, automatic filling of day tanks, operation of trim systems, full power management, and much more is possible.

LMA2101 is approved by all major marine classification societies.







# LM FLOW FOCUS ON FUEL ECONOMY

The new LM-Flow is a new and necessary development to all vessels whose operation is sensitive to fuel consumption. With the new developments with unrest in the World and subsequent rising bunker prices, it has become more important than ever to manage fuel consumption carefully.



#### LM FLOW

#### **FOCUS ON FUEL ECONOMY**

Lyngaa Marine has developed the new LM-Flow system, which caters for vessels with engines with a fuel flow from 2 l/hr to 6000 l/hr - or measured in engine power - up to approximately 15.000 kW diesel engines.

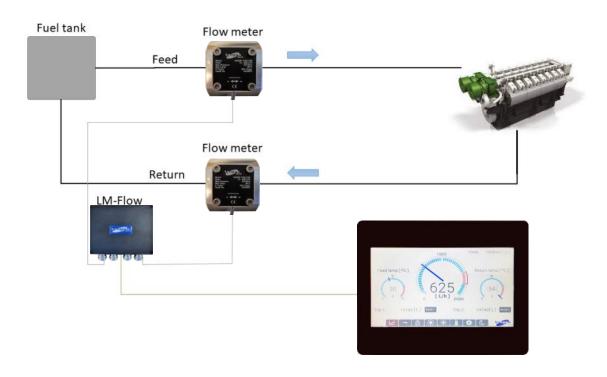
The LM-Flow can form part of the LMB2100 propulsion control systems, the LMA2100 alarm & monitoring systems, or it can be used as a stand-alone system, or form part monitoring systems from other manufacturers.

The LM-Flow offers an amplified out-going signal, which is not vulnerable to electric noise or transmission over long distances.



## LM FLOW

## **FOCUS ON FUEL ECONOMY**



#### The LM-Flow systems support the following system parameters:

- RS485 + Modbus
- Interface with any external Modbus compliant display or computer
- Designed to Lyngaa Marine Oval Wheel flowmeters with built-in temperature sensors
- Compensation for return fuel heating
- Accuracy better than 0.5 per cent
- Connect multiple LM-Flow systems on the same RS485 bus in a multi-engine vessel
- User configurable fluid type and custom thermal expansion coefficient (MDO, Water, Lube oil, Gasoline, Custom)
- User configurable flowmeter K-factor and flowmeter type pre-sets





#### Lyngaa Marine

The Danish company Lyngaa Marine was founded in 1998. More than 30 years of experience in the ship building- and marine electronics industry, makes a solid base for today's company.

At Lyngaa Marine we offer 24 hour service. Our customers are highly professional and dependent on the daily use of the equipment and solutions supplied by us. Therefore we have full availability of spares and equipment from our own warehouse.

We represent several high end manufacturers for the marine industry. And we offer engineering solutions and design for the shipbuilding industries.



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