

# Propulsion Control System

*Case stories and data - LMB 2100 and LMB 2000*



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Lyngaa Marine Aps  
Rugmarken 9B  
3520 Farum  
Denmark

Phone: +45 39 90 40 90  
Email: [sales@lyngaamarine.com](mailto:sales@lyngaamarine.com)  
Web: [www.lyngaamarine.com](http://www.lyngaamarine.com)

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## CASE STORY - LMB2100 Propulsion Control System

# M/T Key Star

The Norwegian owned tanker Key Star, mainly transporting products in Northern Europe, was retro fitted with Lyngaa Marine LMB2100 Bridge Manoeuvring System for Controllable Pitch Propulsion



M/T Key Star, DW 3000 tons.

In the spring of 2017 Lyngaa Marine delivered a LMB2100 Bridge Manoeuvring System for the Norwegian owned motor tanker Key Star.

Installation and commissioning took place in 18 hours onboard while discharging cargo. The vessel was able to leave harbour by own power within the scheduled berthing.

### Why replace a propulsion Control System

Key Star is a motor tanker build in 1992, with medium speed Bergen Diesel and an Ulstein propeller and propeller system, controlled by an Ulstein gear and remote-control system. Lack of spare parts for the analogue control system and decreasing reliability, lead to the owner's decision of replacing the control system.

Requirements to the new system was, in addition to two manoeu-

vring places, also fixed RPM shaft generator control including overload protection and combinator mode.

Shaft Generator and Load Protection

Full control of the propulsion system can be performed both from the control room and the bridge. However, as a safety precaution, the shaft generator can only be engaged and controlled from the control room.

When in shaft generator mode only pitch can be adjusted, while the engine speed remains at the desired level. Fixed RPM cannot be abandoned while shaft generator is engaged.

When in shaft generator mode pitch is decreased before engine is overloaded.



Engine Remote Control in Control Room

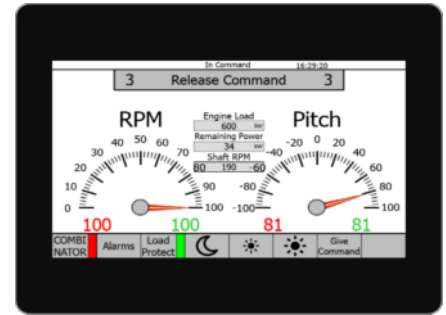


## Information on Displays

Command is easily moved from control room to bridge through the large 7" touch screens. The same screens offer a comprehensive overview of the propulsion plant performance including engine speed, pro-

peller pitch, clutch position, engine power supplied and remaining power available.

Display and illumination of handles can be dimmed and even a night mode with red light can be selected.



## Manoeuvre Stations

Key Star has one manoeuvre station installed on bridge. But up to three more manoeuvring stations can easily be added with only one data cable connecting them.

## Setup from Displays

All setups can easily be adjusted from the password protected self-explaining setup displays. Sensors and potentiometers can therefore be changed without the necessity of calling assistance. Also limits for gear engagement, load curves and combinator mode can be adjusted through the setup menu.

Setup screen shots



Bridge Console at M/T Key Star

## Alarms and Safety Precautions

A fully integrated alarm system is a part of the LMB2100 Bridge Manoeuvring System, offering supervision of sensors, actuators as well as gear and engine conditions.

To avoid total loss of maneuvering capabilities, the LMB2100 contains

a full backup system allowing the navigators to maneuver the ship from the bridge, even if the powerful maneuvering computer should fail. One of many features which lead to the owner's choice of this maneuver system.

## Modular Design

With the LMB2100 Bridge Manoeuvring Systems modular design, retrofit of elderly systems is easily performed and it is no longer necessary to take the vessel out of service to replace an unreliable expensive system. A large number of options for

various configuration and solutions are available in the standard software package and do not need to be programmed before delivery can take place.



## CASE STORY - LMB2100 Propulsion Control System

# Taresund

The Norwegian fishing vessel Taresund, specially equipped for harvesting seaweed, was delivered September 2017 to the owner FMC Biopolymer AS with a Lyngaa LMB2100 Bridge Maneuvering System installed.



Taresund ready for sea trial, Helleøy Shipyard July 2017

Lyngaa Marine delivered, in cooperation with Heimdal Propulsion in Norway, a LMB2100 Bridge Maneuvering System to the Norwegian new building Taresund. The new building is designed for harvesting seaweed on the Norwegian West Coast. Extreme safety, overview, and high maneuverability as well as easy access to all control handles, have been essential during the con-

struction of this vessel.

### Dual Computer Control

To achieve the highest reliability when manoeuvring few meters from the rocks, not only one computer is used for this manoeuvring system, but two parallel computers are installed. Each computer with its own set of sensors. All data on the two computers are constantly compared and evaluated. Should an error on a sensor or print

card occur, the computers will automatically switch over to the second computer. An option of manually selecting the computer is also available.

### Large Integrated Monitors

Both manoeuvring places at front and stern wheelhouse are equipped with large 15" monitors. Information such as pitch, engine speed, consumption of engine power, available engine power, clutch position, hydraulic pressure, and oil temperature is directly visible on the screen, as well as selected options such as fixed rpm and combinator mode.

Furthermore, monitors and handles can be dimmed or switched into red night mode.



Front of wheelhouse with maneuver panels

## Harvesting Seaweed

Not only can full control of engine and propeller be achieved from both maneuver stations onboard. But also, the optionally second computer can be selected from both maneuver stations. Seaweed is harvested close to the rocks on the outside of the Norwegian West Coast archipelago. Any loss of power will therefore be crucial and leave no time for second thoughts. This task is demanding good seamanship and extremely reliable equipment.



Bridge Console at M/V Taresund

## Shaft Generator Control

In addition to the choice of dual computers, options like overload protection and fixed rpm were chosen for this project. The main engine is equipped with a huge 200 Kw generator

which could create a blackout if a sudden load increase appears. The engine load is therefore constantly monitored and compared with the engines power curve. Available power

is calculated, and pitch is reduced before engine is overloaded. It is even possible to add a minimum available power giving space for spikes in power consumption.

## Fuel Consumption

After harvesting seaweed the ship must return to base harbor with the cargo. A combinator mode makes it possible to achieve the best possible combination of engine speed and propeller pitch based on the fuel consumption diagram.

A feature which will give economic benefits to the owner.



## Space requirement

With the modern small size computer technology and optimized architecture, it has been possible to fit the complete control system into a small cabinet at 40x40 cm, fitted in the engine room.



## J1939 interface

Interface to engine is achieved with a simple J1939 CanBus interface transferring all information from engine to bridge control system,

including Engine Load, RPM, Lub.Oil Pressure, Temperatures, etc. and at the same time adding better performance a higher reliability to the overall ship.



## CASE STORY - LMB2000 Propulsion Control System

# Sara Karin

The Norwegian trawler Sara Karin, build for fishing cod in the northern part of Norway, delivered from Poltramp Shipyard S.A. June 2017 was installed with a Lyngaa LMB-2000 Bridge Maneuvering System.



Sara Karin sea trial, Polen June 2017

### High maneuverability

In June 2017 Lyngaa Marine delivered, in cooperation with Heimdal Propulsion in Norway, a LMB2000 Bridge Maneuvering System to the Norwegian new building Sara Karin. The new building is designed for trawling cod in the northern part of the Norwegian Sea. High maneuverability and easy access to all control

handles have been essential during the construction of this vessel.

The reaction on manoeuvring levers is surprisingly efficient, with the enormous force of 6 cylinder Mitsubishi S6R at nearly 1000 kw, 1400 RPM and the 2.5 meter CPP propeller in a nozzle, connected to a HG5 2PTOF Heimdal gear.

### Rapid and reliable transmission

To achieve high speed communication between bridge and engine room, a single CanBus network with LMB2000 has been established. CanBus cable is giving a rapid and reliable transmission between the propulsion system and the control system. All temperatures, pressures and alarms are also transferred through the same CanBus.

Two hydraulic pumps are connected directly on the PTOs (Power Take Out) on the gear. Both PTO's are individual engaged from the LMB2000 manoeuvring panel.

Both clutch and PTO's are protected from being engaged at high engine speed preventing stress on the gear.

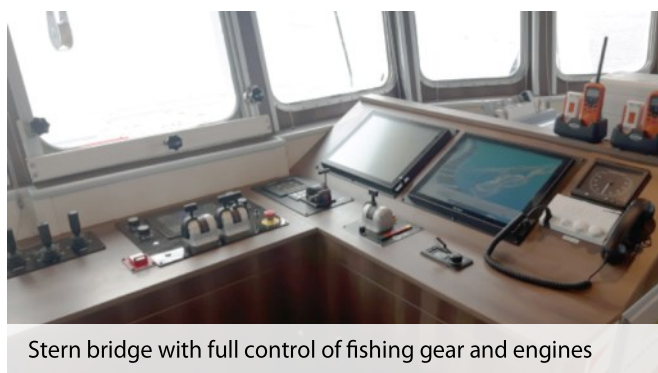




### Fast response, accuracy and automatically adjustment

A sophisticated feed forward system gives the markets fastest response and high accuracy on commands from the manoeuvre levers.

As a benefit to the ships crew, a combinator mode is added, automatically adjusting engine throttle to propeller pitch, optimizing fuel consumption.



Stern bridge with full control of fishing gear and engines

### Three maneuver stations and night vision

Full control of engine and propeller can be achieved from no less than three maneuver stations onboard.

Illuminated displays and levers can be dimmed to zero light emission. Main displays can at night also be changed to a black background with red instruments protecting night vision.

To avoid total loss of maneuvering capabilities, the LMB2000 contains a full backup system allowing the navigators to maneuver the ship from the bridge, even if the fast

powerful maneuver computer should fail. One of many features which lead to the owner's choice of this maneuver system.



The LMB 2000 for this vessel was delivered in five parts and was easily build into the ship with only two wires between bridge and engine room, benefitting in a very easy installation.



## CASE STORY - LMB2000 Bridge Maneuvering System

# Émilien D

The prawn trawler Émilien D, fishing in the arctic waters between Canada and Greenland, was delivered from Méridien Maritime in Québec, Canada May 2017 installed with a Lyngaa LMB2000 Bridge Maneuvering System.



Émilien D ready for delivery at Méridien Maritime in Matane, Québec

### Fishing in the harsh arctic waters

In May 2017 Lyngaa Marine delivered, in cooperation with Heimdal Propulsion in Norway, a LMB2000 Bridge Maneuvering System to the Canadian new building Émilien D. The new building is designed for prawn fishing in the harsh arctic waters between Canada and Greenland. All possible efforts have therefore been made to build a self-supporting ship with high reliability on all equipment.

### Rapid and safe transmission

LMB2000 is controlling an 8-cylinder MTU4000 engine, connected to a Heimdal HG5 gear with 2 PTOs through a current signal and an electrical actuator.

The LMB2000 is communicating between bridge and engine room through a single NMEA2000 CanBus

cable, giving a rapid and safe transmission between the propulsion system and the control system. All temperatures, pressures and alarms



are transferred through the same CanBus cable.

### Additional opportunities

Utilizing computer technology gives many additional opportunities. One option is a combinator mode selected from the membrane panel adapting engine revolution to propeller pitch. Another option is only allowing clutch operation when propeller is in zero pitch and engine is idling.

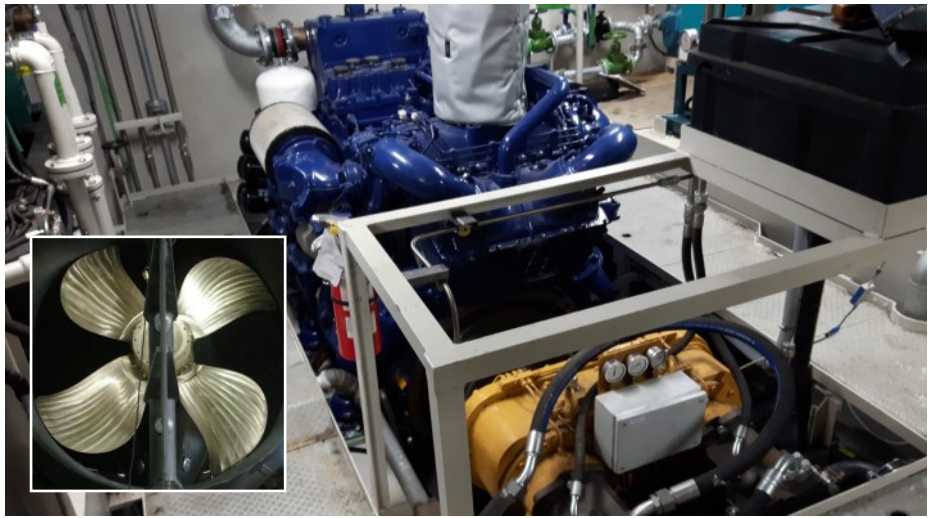
All sensors are duplicated and supervised to minimize the downtime as there is a build in automatic selecting system for these sensors.



### Response and accuracy

The huge 2.78-meter propeller in nozzle from Heimdal Propulsion, gives a remarkable power when trawling and is easily operated from the electronic low resistance engine and pitch levers on the bridge.

A sophisticated feed forward system gives the markets fastest response and high accuracy on commands from the maneuver levers.



### Several maneuver stations

Being a shorthanded trawler, the navigator needs always to be in full control of the ship. Not only when sailing but also during harbour maneuvers and while trawling. Full control of engine and propeller can be achieved from several maneuver stations onboard.

Illuminated displays and levers can be dimmed to zero light emission. Main displays can at night also be changed to a black background with red instruments protecting night vision.

### Full backup system for safety

To avoid total loss of maneuvering capabilities, the LMB2000 contains a full backup system allowing the navigators to maneuver the ship

from the bridge, even if the fast powerful maneuver computer should fail. One of many features which lead to the owner's choice of this maneuver system.



### Delivered in four parts

The LMB 2000 for this vessel was delivered in four parts and was easily build into the ship with only two wires between bridge and engine room, benefitting a very easy installation without unforeseen challenges.





## CASE STORY - LMB2100dual Bridge Maneuvering System

# World Marine Offshore



The Danish offshore operator "World Marine Offshore", owner of six crew transfer vessels, all build at Fjellstrand shipyard in Norway between 2013 and 2014, decided end 2017 to change the bridge control system to LMB2100dual from Lyngaa Marine

### What made WM Offshore replace Bridge Manoeuvring System

Changing bridge control system after just three to four years in service is a serious decision that no shipowner is pleased with. Decisions like this with a professional shipowner must be justified in both financial and technical terms. Facing a number of technical issues like components failing, simple failures on gear not giving alarms and causing severe damages, as well as huge invoices for spares

LMB2100dual installed on World Mistral in January 2018

and services in addition to lost hire, forced the technical management at WM Offshore to look for a new solution. After searching the market for possibilities, it was chosen to purchase an LMB2100dual for World Mistral which was installed January 2018.

## Owner's Requirements to New Bridge Control System

Minimize maintenance cost and "off hire" was the two key factors performing the set of technical requirements. From previous experience this led to several part requirement such as: Full access to adjustment of parameters, standard "Off the shelves" components, full integrated supervision of all parameters including safety system for gear, clutches and pitch servo system and remote access from office to assist crew under operation.

Further demands where load protection of engines, minimum two operation mode, rapid response from levers, ergonomic layout of bridge layout and full secondary control.

All requirements have been fulfilled to the owner's full satisfaction.

### WM Offshore setup

LMB2100dual is two independent systems, one for each gear. However the bridge panel contains both port and starboard control system. One of the challenges was that each



gear has two engines giving a total of four diesel engines. The system had to be able to operate with all combinations of engine engaged and engagements should only be possible when safe.

Engine engagement is supervised by the computer, but operation is also possible in an unsupervised mode called emergency mode.

All pressures and temperatures are monitored and showed in the conning displays.

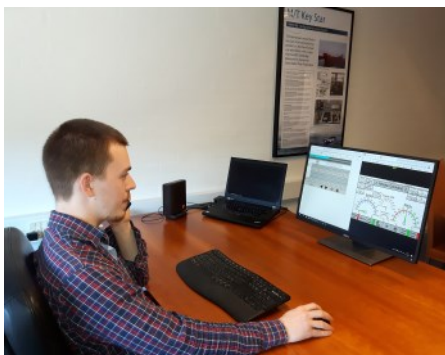
Failures on clutch pressure will immediately un-clutch and low hydrau-

lic pressure will first initialize an alarm and then stop the engines.

### Ergonomic improvement

Navigators at wind farm vessels often sits many hours in standby, making small adjustments on propellers to maintain the position and angle to the sea. To remove the unhealthy condition the navigators was sitting all day the lever was raised the navigators can now take a more natural position.

The display with white background is very easy to read and improves the working conditions for the operators.



### Cloud Connection

LMB2100 have the option of a cloud connection. Simply connect the network to the internet and the LMB2100 will automatically appear on the screens in owner's technical department and Lyngaa Marine service department. Display, alarm list and logs, as well as all adjustments,

will be visible and adjustments can be performed by authorized engineers. A powerful tool for helping the crew onboard.



## CASE STORY - Complete automation and bridge equipment

# M/S Sea Comfort

A new invention within the operation of offshore wind turbines and other maritime offshore installation.

### State of the art - new thinking

In the spring 2014 Lyngaa Marine had the pleasure of delivering the complete automation and bridge equipment for the new catamaran M/S Sea Comfort owned by TP Offshore.

This new vessel is not only state of the art, with a variety of new thinking in how to support the growing Wind Industry but is also using many new technologies to support the small crew of only four people.



M/S Sea Comfort doing her job for the offshore wind industry

### Lyngaa Marine as trusted partner

Lyngaa Marine participated as a trusted partner and designed all electrical distribution and automation as well as performed power calculation of the main switch board.

M/S Sea Comfort offers all modern facilities offshore service crews can ask for in open light colored comfortable living areas. Both crew and passengers are staying in single cabins with television and internet.





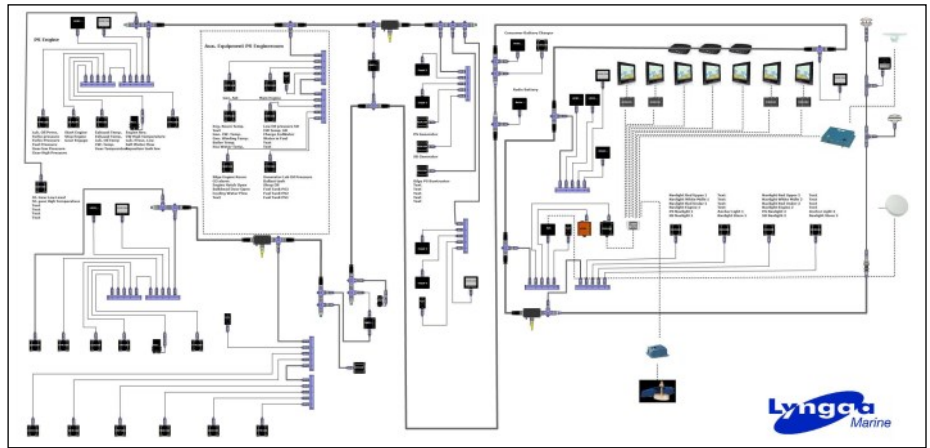
The Backbone, in the necessary automation making it possible to handle such a large passenger ship with only four crew, is the three NMEA2000 canbus network, all “speaking” together cross the high-speed net bus extenders from Maretron. This offers high redundancy and reduces the risk of break downs. Furthermore it offers the critical possibility of extending the network to up to 150 users. Even in this large application there is still 75 per cent vacant capacity.

It is not only the generators that are controlled from the bridge displays. But also, the propulsion system, ballast system, bilge system, deck light, fire system, all tank levels, navigation instruments, navigation lights as well as an extended alarm system.

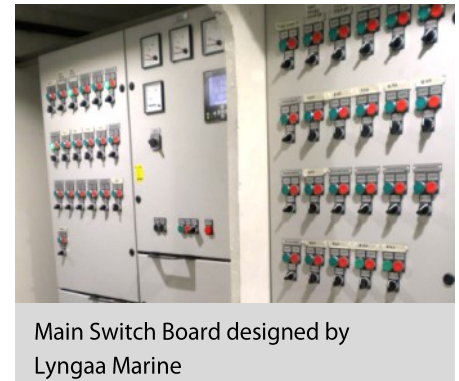
Two Generator are both set at 100 KVA supplies the power and are syn-chronized as well as automated with the Lyngaa Marine LPM2000® power management system. Most functions can be operated directly from the bridge consoles or the local display placed in engine rooms or switch board rooms.

The two 100 KVA Cummins 6BT Generator sets supplies the power to the engine room, passengers and two bow thrusters.

Lyngaa Marine also designed and calculated the main switch board.



Power Distribution and Power Management



Main Switch Board designed by Lyngaa Marine





Cummins KTA38M2 Engines and Servo Gear for Pitch Control.

Propulsion is performed by the two powerful Cummins KTA38M2 main engines through the Servo gear Pitch Propeller system. Main Engines and gears are supervised and controlled by the LMB2000 Bridge Maneuvering System and Alarm System.

Supervision is not limited to only the traditional Lub. Oil pressure and Jacket Water Temperature. But also exhaust gas temperature, charge air pressure and temperatures, lub. oil temperature, cooling water level flow of both salt and fresh water as well as stern tube temperature etc. are monitored.

The fuel consumption is carefully monitored and presented to the navigator with an accuracy better than .25 per cent. Even the fuel consumption per nautical mile is presented making it possible for the crew to obtain the best economical cruising speed.

A complete emergency control system is built in to both the LMB2000®



Bridge Maneuvering System and Rudder Control.

Bridge Maneuvering System and the LMR2000® Rudder Controls System. The rudders can be synchronized or controlled individually as in Joystick mode.

Engines, Pitch and rudders are all controlled by the Lyngaa Marine LMB2000® Bridge Maneuvering System. The system offers three different modes Separate mode, Combinator mode and Joystick mode and makes it easy always to

obtain the best possible maneuvering condition no matter of the navigation or weather situation.

Modes are easily changed from the membrane panel which also illuminating the possible solutions with a flashing led. On the build in monitoring panel the propulsion can be instantly monitored. Most important propulsion data are also shown on the bridge screens.



The main control center on this single-handed controlled ship is placed on the bridge. The layout of the bridge has been essential through the whole design of the ship and offers the possibility of controlling all essential functions for the operation of the ship. For instance joy sticks are placed in the bridge wings offering full visibility for the operator.

All displays are Sun Light Visible screens manufactured by Lyngaa Marine offering 1200 nits and can be adjusted from zero to full brightness from the remote control knob.

Lyngaa Marine is proud of this One-Man-Bridge and Ship Control System, supplied to the owner of TP Offshore and we are looking forward to hearing from new customers, whom will be interested to learn more about the possibilities given by the central Can-Bus system offered in this elegant system from Lyngaa Marine.

Any question regarding this system can be forwarded to Lyngaa Marine,



### Lyngaa Marine Deliveries:

#### Bridge Maneuvering System LMB2000®

With emergency control, combinator mode, rudder control and JoyStick Interface.

#### Power Management LPM2000® :

With Automatic load share, start-stop, synchronizing, voltage and frequency control.

#### Monitors:

22" Sunlight Monitors

#### Alarm and Control System:

With remote control of tank-, bilge-, ballast, deck light-, watertight door- and fire system.

#### Fuel Consumption:

With instant consumption and liter/Nm

#### Design and approval of Main Switch Board and electrical drawings

Including dimensioning of cables, spare capacity, and remote control.



## CASE STORY - New Caterpillar 3508C and a LMB2000 Bridge Maneuvering System

# M/S Göta II

The ferry M/S Göta II, normally engaged in the archipelago outside Gothenburg, was refitted in October 2014 with a new Caterpillar 3508C and an LMB2000 Bridge Manoeuvring System



M/S Göta II in the Gothenburg Archipelago

Lyngaa Marine delivered a LMB2000 Bridge Maneuvering System in the autumn 2014 to the ferry M/S Göta II. The new Bridge Maneuvering System controls the brand-new Caterpillar 3508C and the original installed pitch propeller gear box from Heimdal Propeller in Norway. The installation of both the new engine, conversion of the gear to adapt the new electric actuators

and installation of the LMB2000 Bridge Maneuvering System, was performed by the Swedish yard Ö-Varvet placed on the island Öckerö outside Gothenburg.

The gearbox is equipped with two actuators controlling the Clutch and the propeller position. The speed on the pitch actuator is controlled by the gear pressure and do not over-

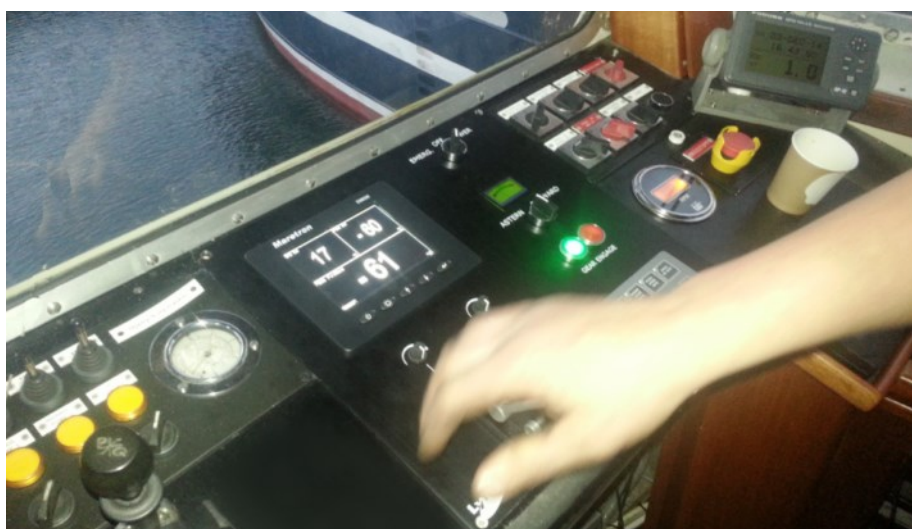
load the control mechanism even at low hydraulic pressure.

All sensors are duplicated and supervised, minimizing the downtime as there is a built-in automatic selecting system for these sensors.

### Intelligent combinator system

The LMB2000 is not only an engine and pitch control system but it also helps the navigators to operate the main engine without overloading it. Through the intelligent combinator system, main engine revolution and the pitch position is chosen for the optimal performance, depending on engine and propeller load and demand for power.

A sophisticated feed forward system gives the market's fastest response from the maneuver levers.



## CASE STORY - LMB2100basic Bridge Maneuvering System

# FN226 Andrea Klitbo



The Danish marine electrical company HM Electro installed a LMB2100basic bridge manoeuvring system on the fishing vessel FN226 Andrea Klitbo from Læsø over the summer. The replacement of the bridge manoeuvring system was a part of the bridge refurbishment undertaken in 2018.

### What is LMB2101basic

LMB2101basic is a highly reliable, simple to install, simple to program and simple to use bridge manoeuvring system. It is based on the same software as the larger LMB2100. Lever, instrument, and buttons are chosen because of their robustness.

Instrument also contain touch screen enabling soft keys for PTO, combinator mode etc.

Up to five control stations can be connected on the same system. Load protection of engines from a predefined curve or J1939 canbus interface is optional.

Commissioning and adjustment of parameters are easily performed through the built-in web-interface. Simply connect your lap-top computer to the RJ45 plug in the front of the computer, start your standard browser like Explorer and add



address and password and you have full access to all parameters as well as an internal alarm list with log.



## CASE STORY - LMB2100dual Bridge Maneuvering System

# Hidrografia 5



In August 2018 commissioning of the LMB2100dual on the Taiwanese hydrographic survey vessel Hidrografia 5 took place on the shipyard Lung Teh in Taiwan. Lyngaa Marine Aps. supplied the bridge control system for this vessel and participated in the commissioning.

Benefitting from the engine J1939 interface, transferring all engine conditions directly to the bridge control system, and a direct PWM speed setting signal. Cables between engine and bridge control system is limited to two wires and at the same time giving a robust and rapid interface protecting the engine from overload.

Despite the size of the vessel the bridge control system was delivered with full approval from Bureau Veritas.

Being equipped with two Caterpillar C18 Acert in the engine room, space left for auxiliary equipment was limited in this hydrographic vessel. Together with the high demand for interface to engines LMB2100 was the perfect choice for this vessel.

Yard management was very impressed with the number of options, easy installation, and programming. But most of all how easy it is to operate.



Bridge console on Hidrografia 5

## CASE STORY - LMB2100 Bridge Maneuvering System

# Dredging Vessel Idun R

After experiencing numerous fall out on its previous maneuvering system, the Danish owned dredging vessel Idun R had its maneuvering system replaced with an LMB2100dual end of 2018. Since change of maneuvering system there has been no faults.



December 2018 Lyngaa Marine delivered an LMB2100dual Bridge Maneuvering System to the Danish owned dredging vessel Idun R.

The previous system builds up with traditional analog components such as transistors and amplifiers had during the past years started to drift, with repeating of hire and endless calls for service, consequently.

Not only was the previous bridge control

system taking care of maneuvers, but at the same time controlling the shaft generator connected to one main engine and the huge dredging pump connected to the other main engine.

Both propulsion systems is operated either from the engine room, main helm station or the dredging station.

### Contact free sensors

Idun is equipped with propellers and gears from the Dutch factory Lips Propel-

lers. These propellers have the hydraulic servo amplifier placed in the propeller hub and a rod inside the propeller shaft transmitting actual pitch. Specially the sensors were one of the weak point causing many failures and was therefore changed to modern contact free position sensors improving lifetime and accuracy of the sensors.

### Improved Engine Protection

To protect the engine two Selco M2600 shut down units and load feedback sensors for engine load were added to the two Smit-Bolnes 7DNL170/600 engines. Not only will the engines stop automatically in case overspeed or a fatal engine failure, but the engines are also now protected against overload.





## Changing Station in Command

Command is easily moved from engine room to bridge main helm or dredging station through the large 7" touch displays. The same displays offer a comprehensive overview of the propulsion plant performance including engine speed, propeller pitch, clutch position, engine power supplied and remaining power available. Bumbles transfer is easy performed simply by moving the engine or pitch lever until the two needles in the displays are over each other and needles changes color to green. Engaging the dredging pump is also performed from the same display and at the same time protecting the clutch from overload by shortly reducing engine speed during engaging.

## Engine Console

In the center of the engine room the vertical maneuver console is placed. From the maneuver console all engine values can be controlled and monitored. Also, from here engines are started and monitored before command is transferred to the bridge. An emergency mode is also available and gives access for the engineer to bypass the computers. In the control system.

## Fully Integrated Alarm System

A fully integrated alarm system, with all standard facilities, such as alarm delays and suppression of alarms when equipment is not running, is integrated into the LMB2100 Bridge Maneuvering System offering supervision of levers, sensors, actuators as well as gear and engine conditions.



Engine Room Console placed in the center of the engine room

## Emergency Control

To avoid total loss of maneuvering capabilities the LMB2100 contains a full backup system, allowing the navigators to maneuver the ship from the bridge even if the powerful maneuvering computer should fail. One of many features which lead to a more safe and reliable control system.

## Why is LMB2100 so suitable for retrofit?

Already when starting the development of the LMB2100 back in 2014 the features for the new control system was planned. Among the features requested were flexibility in software and hardware. Full access to all internal parameters and a highly flexible display solution. But most of all only one software covering all requests. Specially the demand for only one software was a challenge which later became a mayor benefit. The LMB2100 can today be scaled up and down as well

as adopting all types of propellers, engines, gearboxes, input, and output. All LMB2100 runs with the same software. Previously delivered systems from Lyngaa Marine can be upgraded simply by making a firmware update. Setup and data remain the same after a firmware update and only the new features will be added. The ship can within a few minutes continue with its operation benefitting from the new features.



Dredging Panel

# LMB 2100

## Bridge Maneuvering System

Easy to install, easy to programme and most of all easy to operate with all information available from engines and propeller systems are some of the many advantages there is to be said about the electronic bridge control system LMB2100 from Lyngaa Marine.

LMB2100 is developed to meet ship owner's requirements for computerized control systems, not demanding specialists to perform adjustments or repairs by expensive engineers because only special trained engineers can get access to vital parameters.

All setups are made directly from the 7" monitor serving both as multiple information system and access panel to all parameters in the LMB2100.

The system contains all you need, to achieve a fast and reliable control of revolution on the engine, protection of the clutch and gear including limits on clutch engagement, temperature and pressure visualization and alarms as well as an adaptable incredible fast and precise pitch control.



The LMB2100 can be extended with up to five manoeuvre stations. Manoeuvre stations can be set up in up to five groups allowing free transfer of command within each own group. Transferring command to another group will require acknowledgement from the releasing group.

From the main panel and an eventual ECR panel full emergency control of the pitch and clutch is available and is easily selected by activating the emergency mode switch. When in emergency mode, the independent illuminated pitch indicator will be displaying the actual propeller pitch.

The full adaptable interfaces to sensors make the LMB2100 an obvious choice for refit as well as new buildings.

Both engine speed and pitch lever are supplied with double potentiometer. When deviation limitations are exceeded, the computer will automatically select the best and safest signal from the two potentiometers.

Dual feedback from actuators, PTO and PTI are optional.

Setpoint	Value	Unit	Setpoint	Value	Unit
Setpoint 1	4975	RPM	Setpoint 1	3175	Pitch
Setpoint 2	5020	RPM	Setpoint 2	3175	Pitch
Output	5020	RPM	Output	3175	Pitch

Feedback	Value	Unit	Feedback	Value	Unit
Feedback 1	7775	RPM	Feedback 1	254.10	Pitch
Feedback 2	7775	RPM	Feedback 2	254.10	Pitch
Output	7775	RPM	Output	254.10	Pitch

LMB2100 screen shots



Lyngaa Marine Aps. Started 2006 as a consulting and design company for the marine industry. But soon after, also import of electronics for the marine industry was added to the port folio. The main segment at that time was mega yachts, crew-, offshore vessels and workboats. Later also passenger ships and fishing vessels became a part of the customer group.

In 2013 the first version of the LMB2000 computerized bridge manoeuvring system was developed for a small passenger ferry with two engines and two CPP propellers. Continuing the success and knowledge gained during this project, customers asked Lyngaa Marine Aps. to deliver more units, now for all type of vessels with CPP propellers. In 2019 more than 50 units has been sold to a variety of ships such as fishing vessels, crew and work boats, ferries and middle size tankships.

With the LMB2100 type approved bridge manoeuvring system and the smaller LMB2101 Basic bridge manoeuvring system Lyngaa Marine is delivering some of the markets most adaptable solutions for ships with CPP propellers.

Safe operation, easy to install and programme and easy to operate has been the key focus in every aspects of the design.

### Technical Data LMB2100

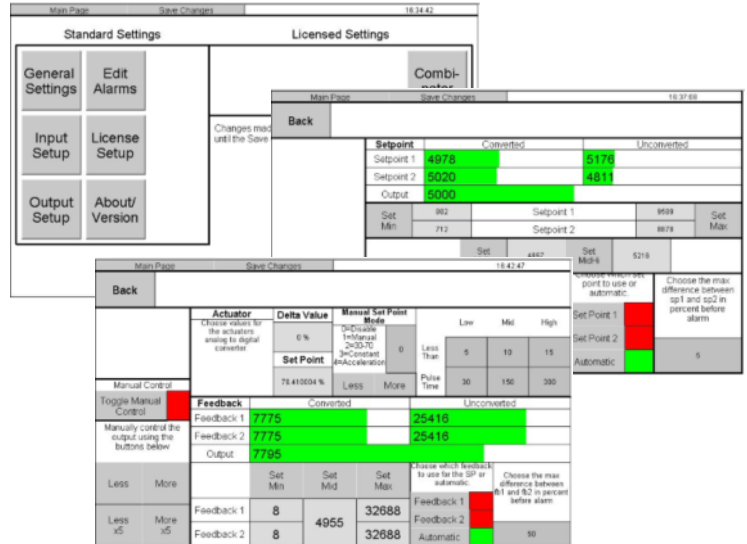
Main Power Supply (supervised)	24 Vdc
Emergency Power Supply (supervised)	24 Vdc
Power Consumption without actuator	<0.7 Amp
Power Consumption Slave Panels	<0.3 Amp
Resistance input	8
Digital input	16
Digital input free	1
Digital output	16
Digital output free (For PTO)	2
Voltage input 0-10 Volt	2
Voltage input 0-30 Volt	2
Data communication	TCP/IP
Degree of protection indoor panels	IP54
Operating temperature	-25 to +55 Celcius
IEC 60945 Classification	Exposed
Weight Master Panel	2700 g
Dimension Master	360 c 260 mm
Weight Slave Panel indoor	2500 g
Dimension Slave Panel	360 x 260 mm
Weight computer	2000 g
Approvals	BV, DNV, GL Pending



LMB2100 Dual Panel

# LMB2101 BASIC

## Bridge Maneuvering System



Easy to install, easy to programme and most of all easy to operate are some of the many features there is to be said about the LMB-2101 Basic from Lyngaa Marine.

LMB2101 Basic is specially developed for controlling engine, clutch and propeller pitch on small and middle size ships with Controllable Pitch Propeller (CPP).

The system contains all you need to achieve a fast and reliable control of revolution on the engine, protection of the clutch and gear including limits on clutch in, temperatures and pressure alarms as well as an adaptable incredible fast and precise pitch control.

The LMB2101 Basic can be extended with up to five maneuver stations. Maneuver stations can be set up in up to five groups allowing free transfer of command within each own group. Transferring command to another group will require acknowledgement from the releasing group.

From the main panel a full emergency control of the pitch and clutch is available and is easily selected by activating the emergency mode switch.

The emergency mode switch will illuminate when activated.

Physical input signals and devices for control of engine and propeller can be 0-10V, 4-20 mA, pneumatic signals, hydraulic actuators, or electric actuators.

Both engine speed and pitch lever are supplied with double potentiometer. When deviation limitations are exceeded, the computer will automatically select the best and safest signal from the two potentiometers.

All adjustments and setup of the system is made directly from the build in web-page which also serves as a diagnostic system for fault findings during installation and later maintenance.

All setups and adjustments are password protected.



Lyngaa Marine Aps. started in 2006 as a consulting and design company for the marine industry. But soon after, also import of electronics for the marine industry was added to the portfolio. The main segment at that time was mega yachts, crew, offshore vessels, and workboats. Later also passenger ships and fishing vessels became a part of the customer group.

In 2013 the first version of the LMB-2000 computerized bridge maneuvering system was invented for a small passenger ferry with two engines and two CPP propellers. Continuing the success and knowledge gained during this project, customers asked Lyngaa Marine Aps. to deliver more units, now for all type of vessels with CPP propellers. In 2019 more than 50 units has been sold to a variety of ships such as fishing vessels, crew, and work boats, ferryies, and middle size tankships.

With the LMB2100 type approved bridge maneuvering system and the smaller LMB2101 Basic bridge maneuvering system Lyngaa Marine is delivering some of the markets most adaptable solutions for ships with CPP propellers.

Safe operation, easy to install and program and easy to operate has been the key focus and every aspect of the design.



### Technical Data LMB2101 Basic

Main Power Supply (supervised)	24 Vdc
Emergency Power Supply (supervised)	24 Vdc
Power Consumption without actuator	<0.5 Amp
Power Consumption Slave Panels	<0.1 Amp
Resistance input	8
Digital input	16
Digital input free	1
Digital output	16
Digital output free (For PTO)	2
Voltage input 0-10 Volt	2
Voltage input 0-30 Volt	2
Degree of protection indoor panels	IP54
Degree of protection outdoor panels	IP67
Operating temperature	-25 to +55 Celcius
IEC 60945 Classification	Exposed
Weight Master Panel	2400 g
Dimension Master	295 x 280 mm
Weight Slave Panel indoor	2300 g
Weight Slave Panel outdoor	3300 g
Dimension Slave Panel	295 x 280 mm
Weight computer	2000 g



LMB2101 Slave Panel



LMB2101 Slave Panel Outdoor

# LMB2100 RG

## Bridge Maneuvering System

### Smart and reliable Control System for reverse gear

Lyngaa Marine is now offering remote control for reverse gears.

The new reverse gear control has been named LMB2120 and is a further development on the popular LMB2100 and LMB2101 basic.

### Many new features are included and can be adjusted by the owner.

Features like adjustable acceleration of engines, adjustable maximum - engine speed for engaging propeller and free running of engines are standard.

Emergency control and supervision of gear and engine can be added as well as a display showing data from engine and gear.



Up to five maneuver stations can be added to the LMB2120RG. Station in command is easily transferred with the command button indicating with a blue light that station is active.

Upon request the LMB2120RG can also be delivered with approval from classification societies.

Stay up-to-date with  
Electronic Bridge Control  
[www.lyngaamarine.com](http://www.lyngaamarine.com)



# LMA2100

## Alarm & Control

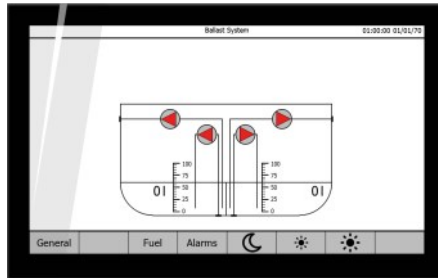
A newly developed Alarm and Control System easy to install and operate

LMA2100 is a complete alarm and control system for small and middle size ships. The alarm and control system offer possibility of multiple accesses with displays in all sizes. Further an engineer watch system is included and local displays for alarms can be added to engineer rooms and public rooms.

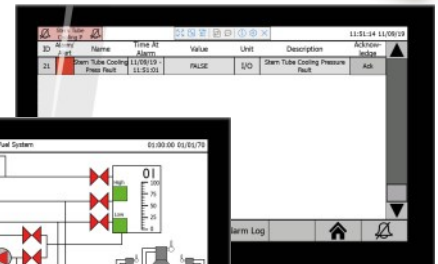
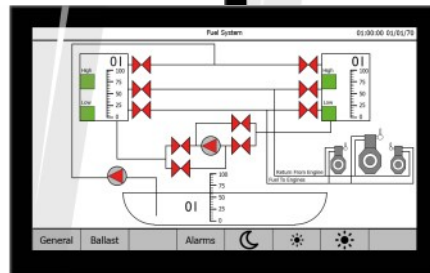
The LMA2100 in and output can be including a number of remote stations placed locally in the ship, cutting down cable and installation time.

In and output devices can be added by the yard technicians and configured directly in the system.

Layouts of screen pictures are easily added together with functions like valve operation, start/stop of pump, standby pumps, or engines as well as other functions from the huge library of functions. Also, intelligent



Easy-to-understand displays ensure quick and accurate alarm handling.



communication with generator synchronizers, refrigerating plants, navigation light etc. is possible.

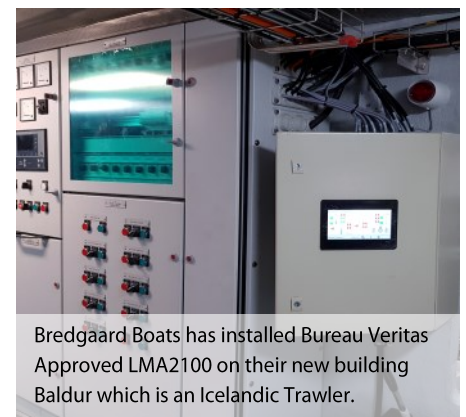
Automation can also be added to the LMA2100 Alarm and Control System.

Functions like automatic filling of day tanks, trim system and full power management system is already tested and available.

Development of the LMA2100 was started in 2018 and the first system

including approval from Bureau Veritas was delivered in 2019.

By choosing LMA2100 Alarm and Control System together with Lyngaa Bridge Control Systems, advantages like "off the shelf" components and "same" components as LMB2100 Bridge Control System are achieved. Also programming and setup is easily recognized.



Bredgaard Boats has installed Bureau Veritas Approved LMA2100 on their new building Baldur which is an Icelandic Trawler.

## 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've full availability of spares and equipment from our own warehouse.

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

Lyngaa Marine Aps  
Rugmarken 9B  
3520 Farum  
Denmark

Phone: +45 39 90 40 90  
Email: [sales@lyngaamarine.com](mailto:sales@lyngaamarine.com)  
Web: [www.lyngaamarine.com](http://www.lyngaamarine.com)

