# MOXA®

## Your Trusted Partner in Automation

Moxa is a leading provider of edge connectivity, industrial computing, and network infrastructure solutions for enabling connectivity for the Industrial Internet of Things (IIoT). With 35 years of industry experience, Moxa has connected more than 82 million devices worldwide and has a distribution and service network that reaches customers in more than 80 countries. Moxa delivers lasting business value by empowering industries with reliable networks and sincere service. Information about Moxa's solutions is available at www.moxa.com.

# Professional Marine Solutions
Computers, Displays, and Ethernet Switches

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# Sailing to a Smarter Future

Moxa provides maritime professionals with industrial-grade marine computers, panel PCs, displays, and Ethernet switches that use leading technologies and reliable designs perfect for applications on the bridge, a dock, an open deck, or in a control room. Moxa's marine solutions pass strict tests and follow critical industrial standards to ensure compliance with international marine standards such as DNV, LR, ABS, NK, CCS, IEC 60945, and IACS-E10. Furthermore, our high performance, fanless, compact, rugged designs help reduce costs and streamline system integration.

## Control Room Requirements

• High computing performance
• Compact and fanless design
• Support for multiple independent displays

## Bridge Requirements

• High computing performance
• ECDIS IEC 61174 compliance
• NMEA 0183 interface for communication with marine devices

## Engine Room Requirements

• Fanless design with efficient cooling mechanism
• Wide temperature tolerance range

## Table of Contents

# The Keys to Building a Smart Ship

To guarantee navigational safety and improve the operational efficiency of a ship, there is an emerging trend of creating Smart Ships. The Smart Ship concept covers a whole range of improvements that include predictive maintenance, performance optimization, decision support tools, increased automation and robotics, and unmanned remote or autonomous ship operation. Smart Ships are reliant on big data, so reliable real-time data transmission, data collection, and remote control play a key role in building Smart Ships. Moxa offers high-performance computers, displays, and high-bandwidth networking solutions to ensure fast and reliable display, processing, and communication of data.

## Computer Technologies

### Comprehensive Connectivity Solution

Moxa's marine computers and panel computers incorporate a rich selection of communication interfaces to aid system integrators and ship designers in linking marine-specific devices and subsystems. The MC-7000 and MC-3000 Series marine computers include industry-standard **NMEA 0183** interfaces, giving system integrators a convenient means of connecting maritime sensors like gyrocompasses, echo sounders, and weather stations. These integrated NMEA ports simplify deployment and reduce costs in both the short and long term by cutting down on overall network complexity.

• NMEA 0183 for marine device connectivity
• DVI and VGA ports support up to 3 independent displays
• USB 3.0 for rapid data transfers
• PCI and PCIe (x16) slots for customized expansion
• Redundant Gigabit Ethernet ports for rapid, reliable Internet communication

### High Performance With Fanless Design

Moxa's embedded and panel computers for marine environments have been designed for easy incorporation into Integrated Bridge Systems, particularly with respect to power and temperature demands. Moxa computers combine high-performance Intel® Core™ i7 processors with fanless, rugged designs that deliver fast, reliable graphics or rapid number-crunching processing in whatever combination the system requires.

• No compromise on board design: Moxa's thermal design is used system wide, making the computer system more reliable across the board
• A centrally located CPU means that heat is evenly dissipated, increasing dispersion efficiency
• Heat pipes at the front and rear dissipate heat with much greater efficiency than fans
• The rugged thermal design guarantees the computer will operate without any worry of crashes from overheating—even when using the Turbo Boost technology
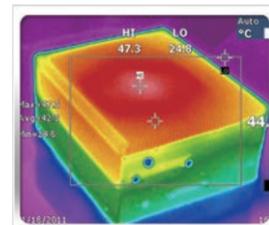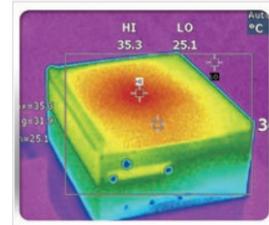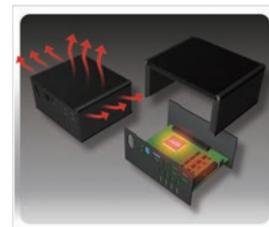
## Display Technologies

### ECDIS Compliance

Moxa's ECDIS type approved panel computers and displays have been thoroughly color calibrated and tested according to the **IEC 61174:2015** standard for ECDIS displays. To meet approval under the ECDIS color calibration standard, displays must pass several tests that include measuring the display's RGB color and luminance values and then using this data for conversion to a CIE standard. The final result is a carefully calculated, highly reliable color profile in digital RGB form.

### SavvyTouch Screen Control

SavvyTouch display controls are equipped with a proximity switch that lights up the controls with a mere wave of the hand, making it possible for users to easily adjust the display even in absolute darkness. At the same time, SavvyTouch also features a system information button that returns a BIOS-level rundown of hardware health, keeping users informed on the status of the motherboard, system memory, video feed, and power connections.

#### Illuminate Controls by Waving a Hand
SavvyTouch controls are fitted with a proximity sensor, so that a user operating the computer can easily illuminate the controls with a simple wave of their hand.

#### One-touch ECDIS-compatible Brightness Adjustment
ECDIS colors can become distorted when the brightness levels are changed, and retuning them to ECDIS standard color schemes can be a challenge. One-touch brightness adjustment brings things back to normal with the press of a button.

#### Hardware Monitoring and Service Check
Users can easily learn the status of key hardware elements even when the system fails to reboot. The info button on the panel is a powerful aid for maintenance personnel troubleshooting disabled systems.

# Ethernet Switch Technologies

## Secure, Reliable Maritime Ethernet Switches

Among the harsh shipboard elements network switches must resist are extreme temperatures, daily exposure to water, and constant vibration. Additionally, ship systems must also meet stringent reliability requirements like full redundancy and strong security, all while reliably managing a heavy stream of automation and control applications that receive constant input from large arrays of sensors and instruments.

Moxa delivers switching solutions for every layer of a hierarchical network—whether at the top or bottom, edge or core—making it easy to find the right device for any marine networking need.

## Network Redundancy Technologies for the Utmost Scalability, Reliability, and Cost Efficiency

Moxa switches offer Turbo Ring and Turbo Chain technologies to give our customers the strongest and fastest automated redundancies available for Ethernet networks. These ring technologies are paired with a full range of tough, robust maritime switch solutions designed to simplify and optimize your networks with superior availability, reliability, and flexibility, all while dropping costs on deployment and maintenance to give you substantial savings on the total cost of ownership (TCO).

**Turbo Ring:**
Enable Ring and Media Redundancy

**Turbo Chain:**
Increase Redundant Network Topology Flexibility

- Fast fault recovery < 20 ms
- Flexible ring topology
- Lower total cost of ownership

- Fast fault recovery < 20 ms
- Unlimited redundant network expansions
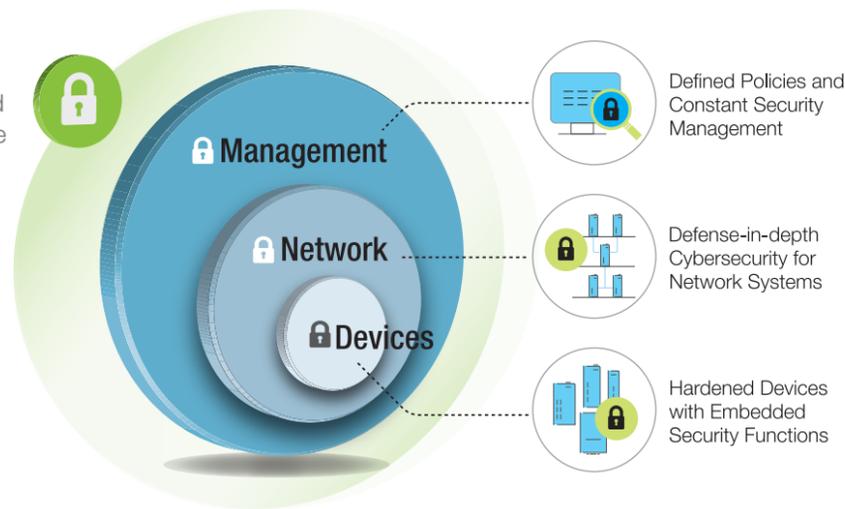- Live node expansion without network interruptions

Note: if the port link speed is 1 Gigabit or higher, the recovery time is < 50 ms.

## Industrial Cybersecurity Solution Protects Your Critical Control Network

Cybersecurity incidents severely compromise the reliability, availability, and security of maritime control systems. Moxa offers various industrial cybersecurity solutions that include enhanced device-level security and defense-in-depth network protection.

Moxa switches are developed to meet the technical security requirements of the **IEC 62443** standard to prevent external intrusions and attacks. Furthermore, Moxa's cutting-edge EDS-4000/G4000 products have been validated by market-leading companies for their futureproof, robust, reliable and secure performance towards cybersecurity evaluation and digital transformation.

Moxa industrial secure routers provide firewall functions for securing network segmentation between different systems and VPN functionality for providing secure remote access via Internet to the onboard systems.

**Management**

Defined Policies and Constant Security Management

**Network**

Defense-in-depth Cybersecurity for Network Systems

**Devices**

Hardened Devices with Embedded Security Functions

# Integrated Automation System (IAS)



### Product Highlights

**MC-1100**

Compact, DIN-rail marine computer with Intel Atom® E3800 series processor
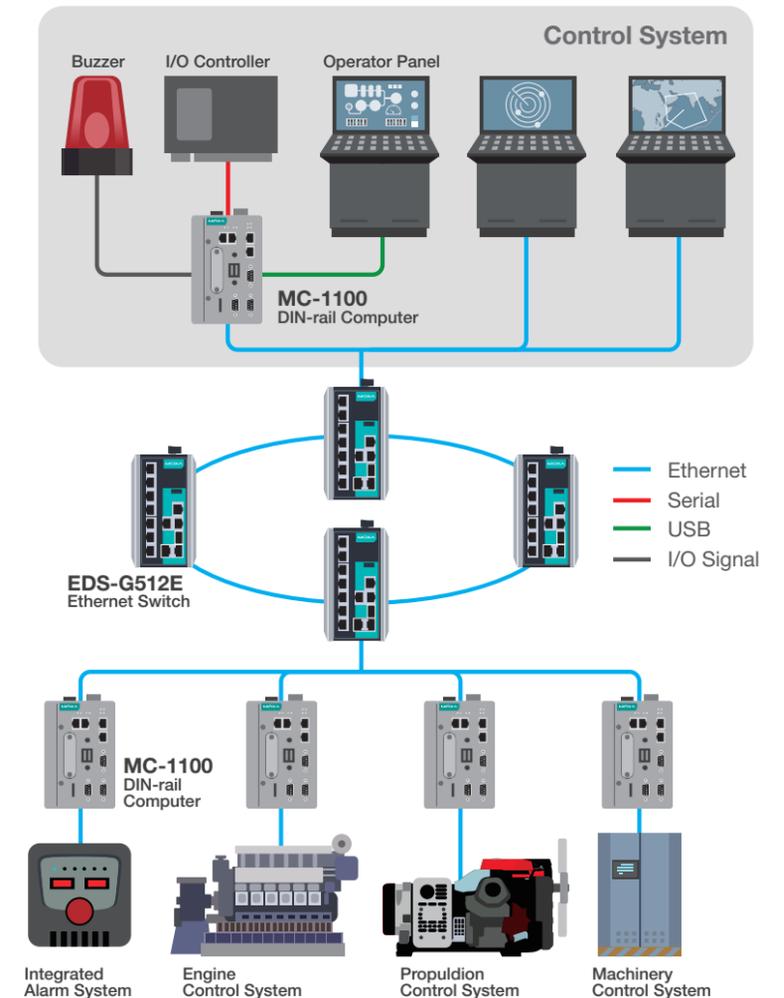
## Overview

An integrated automation system (IAS) for marine applications facilitates the fully-integrated operation of a ship, where systems and equipment must function seamlessly to ensure productivity and efficiency. Computers play an important role in the success of an IAS platform as they are used to collect and transmit data from a wide array of systems, including engine, thruster, and propulsion monitoring as well as alarm systems. To ensure safe operation of a ship, computers are used to constantly monitor external systems in real time, trigger alarms and warnings, and deliver information to the control systems for processing.

## System Requirements

- Computers that can be installed in control consoles and I/O cabinets or boxes where space is limited
- Power-efficient computers for efficient handling of multiple tasks simultaneously, including data collection, monitoring, system control, and data transmission
- A variety of I/O interfaces to connect to different sensors and machinery
- Multiple LAN ports for receiving data simultaneously from different systems
- Robust product design that provides reliable operation in harsh marine environments

## Moxa's Solution

The MC-1100 Series computer is a palm-sized, DIN-rail mountable x86-based platform that features an Intel Atom® E3800 series processor and multiple connection options, including 4 LAN ports, 2 serial ports, 4 DIs, and 4 DOs. The advanced thermal design of the MC-1100 ensures reliable system operation in extreme temperatures ranging from -40 to 70°C. The computer has passed rigorous testing and is compliant with DNV, IEC 60945, and Zone 2 standards to ensure long-lasting and reliable operation in harsh marine environments.

## System Architecture



Control System

Buzzer    I/O Controller    Operator Panel

MC-1100
DIN-rail Computer

EDS-G512E
Ethernet Switch

— Ethernet
— Serial
— USB
— I/O Signal

MC-1100
DIN-rail Computer

Integrated Alarm System    Engine Control System    Propuldion Control System    Machinery Control System

# Integrated Navigation System (INS)



## Overview

For the marine industry, ensuring the safe operation of a vessel is an ongoing process. This is also the main reason why the industry has taken steps to consolidate information from previously independent systems (for example, the radar, ECDIS, navigation, and conning systems) into an Integrated Navigation System (INS).

## System Requirements

The International Maritime Organization (IMO) standard, MSC.252(83),  defines the following key requirements for an INS:

- System redundancy and independence
- Separate cables and network components on redundant networks
- Independent networks
- Protection from network overload

- Continuous monitoring of network performance
- Fast recovery after a power failure
- Uniform time tagging
- Resistance to electromagnetic interference
- Exclusion of CCTV information

## Redundancy and Reliability

To achieve the safety level set in MSC.252(83), redundancy is essential in an INS. This includes system and device redundancy. In an INS where five workstations are connected to one conning system, two ECDIS systems, and two radar systems, all workstations must be able to access data from any system, either through a direct connection or through the Ethernet network. Deploying backups for mission-critical devices in a vessel is a common method to achieve device redundancy. For example, an INS can have two sensor systems and two radar systems and these systems send the same data to multiple workstations. In the event one sensor or radar system becomes unresponsive, the backup system can still provide the necessary data to ensure continuous operation of the vessel. In an INS where devices are connected to serial device servers that make device data available on the Ethernet network, workstations no longer need to have a rich set of communication interfaces. This results in reduced setup costs and network complexity. However, the reliability of the network and the serial device servers is critical to ensure the INS is reliable.

## Marine-grade Displays

One area that is often overlooked is the quality of displays. Marine displays must provide wide viewing angles and meet the IEC 61174:2015 standard for ECDIS applications. This means that brightness and color must be calibrated for displays to reproduce accurate chart displays. In addition, displays must meet the conditions for temperature, humidity, and vibration as defined in IEC 60945 to ensure reliable operation on the high seas.

## Moxa's Solution

Moxa offers proven marine solutions for your integration needs. Moxa's full product range includes computers, displays, devices servers, and network switches that are compliant with industrial standards to satisfy the demands of marine applications.

Ideal for INS applications, the high-performance MC-7400 marine computer comes with four NMEA ports for marine device connectivity and features an Intel® Core™ processor for high-volume data processing. In addition, its fanless design eliminates risk of fan failure, ensuring system reliability. For Bridge systems with limited space, the compact design of the MC-3201 marine computer is a perfect fit.

The widescreen MD-224 marine display with a 16:9 aspect ratio is compliant with the IEC 61174:2015 standard. The brightness and color of the MD-224 is calibrated to meet the highly specialized requirements of ECDIS applications.

To maximize high availability for industrial networks, Moxa's EDS-G512E switch features our proprietary Turbo Ring and Turbo Chain Ethernet network redundancy technologies with self-healing capabilities and fast fault recovery times of less than 50 ms at 1G connection speeds.

## System Architecture
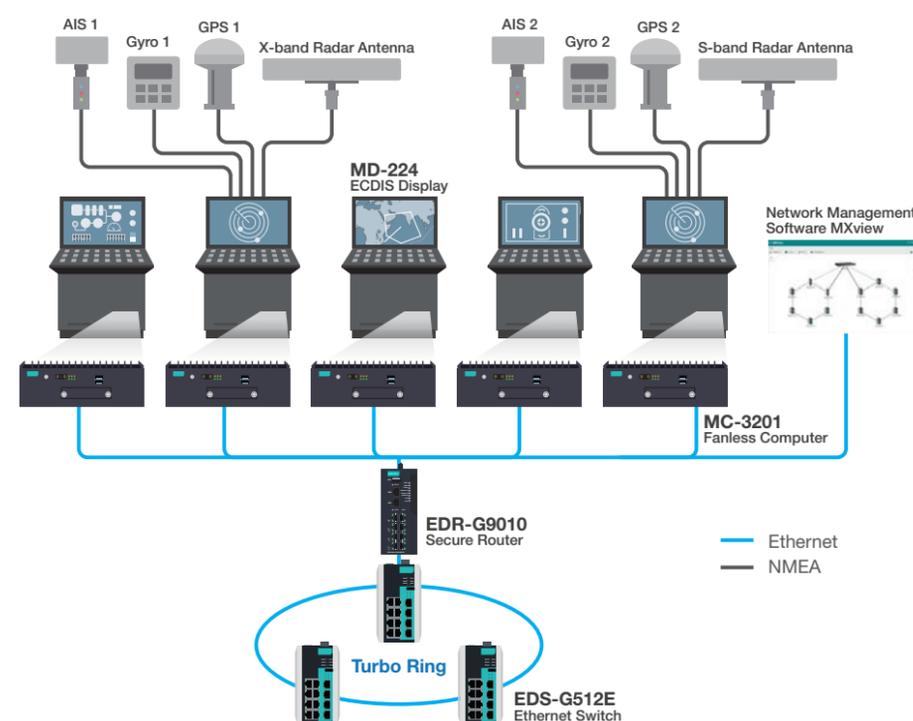


### Product Highlights



**MC-7400**

High-performance, wide-temperature marine computer with DNV certification and a rich set of I/O connectivity options



**MC-3201**

Compact wide-temperature marine computer with 11th Gen Intel® Core™ processor



**EDS-G512E**

12-port full Gigabit managed Ethernet switches



**MD-224/219**

24/19-inch ECDIS-compliant marine displays
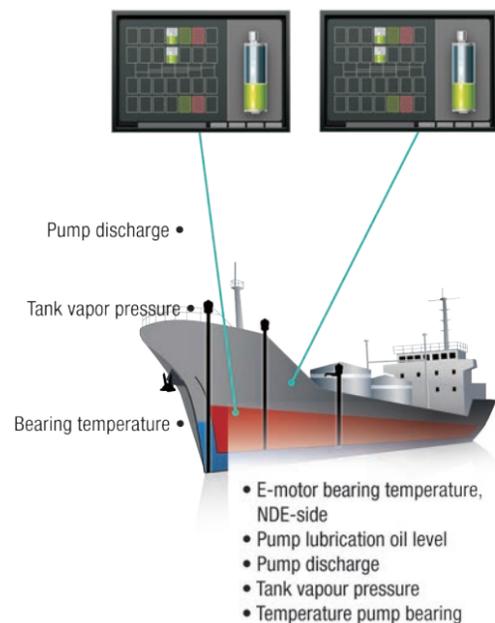
# Maritime Deep Well Pump System

## Overview

Over the last 40 years, deep well pumps have penetrated into every corner of the marine industry, whether on ships, in shipyards, or on offshore rigs. As the years have progressed, improvements in pump technology have generally taken the form of mechanical advances like oil-lubricated shafts or electric motors. Today, using IT technology and satellite communications, pump technology is incorporating a level of remote automation and monitoring that has never been possible before. This will give remote observers access to and situational awareness of pump activity and conditions, while increasing the safety, reliability, and efficiency of pumping procedures for the crews which use and maintain them.

## The Coming Changes in Deep Well Pump Technology

Deep well pumps serve many roles in the maritime industry, whether for onboard roles like cargo and ballast lading, or for dock and shipyard purposes like fueling stations. However, after the last 40 years of mechanical advances, the next generation of pumps has little more to offer in terms of mechanical improvement. Instead, manufacturers are taking pump advances in an entirely new direction: by consolidating the design and build of the entire pump system. For these self-contained pump systems, the latest mechanical, IT communications, and sensor technologies are being brought together to allow communication of detailed information about tank, cargo, and ballast conditions, not only to the pump operators and safety crews, but also in real time to remote locations that can interact with and troubleshoot them, regardless of where the maintenance engineers might be. In contrast to the current model of system integrators purchasing system components from many different vendors, this new generation of pump systems will see a single manufacturer incorporate temperature and pressure sensors with remote I/O and IT systems directly on the pump itself, all offered as a single package. This array will then be linked back to a touch screen HMI that will allow operators, crew, and maintenance personnel the opportunity to view all pump-related information (for either ballast or cargo) from a single SCADA station, in a variety of overviews. In addition to giving operators centralized remote control over all shipboard pumping stations, the SCADA system will also maintain a

Pump discharge •

Tank vapor pressure •

Bearing temperature •

• E-motor bearing temperature, NDE-side
• Pump lubrication oil level
• Pump discharge
• Tank vapour pressure
• Temperature pump bearing

full alarms, and performance and sensor readings. Most remarkably, the pump will also be capable of direct communications with remote stations of any sort, whether onboard the ship, in distant central offices, or even with mobile stations only a kilometer or two away. As with so many other recent advances in maritime technology, the situational awareness and scope of access are unprecedented.
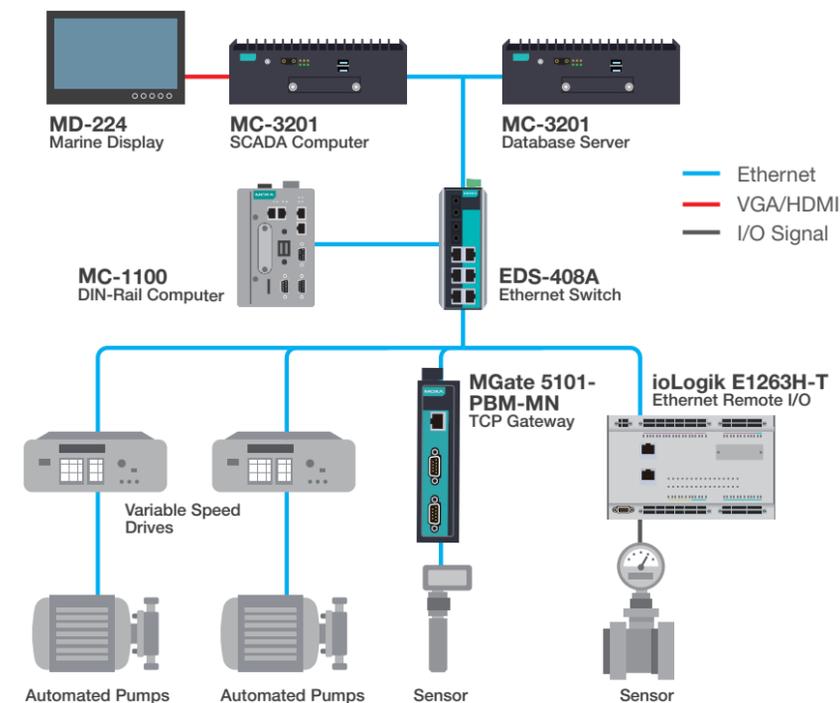
## System Requirements

- HMI master processor / SCADA server
- Master database server
- Local pump controller
- Sensor processing and management hub
- Multiple I/O and NMEA interfaces for direct links to shipboard I/O and sensor stations

## Moxa's Solution

One of the world's leading deep well pump suppliers for maritime shipping has chosen to build their latest, cutting-edge system using Moxa's MC-3201 Series computers. Moxa computers were chosen for their durability and high performance; data processing is key to this technologically advanced pump system, and this role is filled by rugged, powerful, fanless Moxa computers that are built to last and are backed by a 3-year warranty.

The computers in this pumping system must serve three key roles. First, a touch screen HMI and a SCADA server are needed to run advanced software systems that have been developed through an in-house partnership with a control systems software company to give pump operators intuitive and feature-filled control and monitoring. This is handled by an MD-224 display and MC-3201 Series marine computer. Another MC-3201 Series marine computer serves as the system's database, doing real-time collation, storage, and analysis of all sensor information, and triggering real-time alarms when critical, system-wide benchmarks or thresholds are passed. The third computer manages, receives, stores, and transmits all local mechanical and sensor activity and sends this data to both the database and the centralized HMI. A Moxa MC-1100 Series embedded computer performs this role and sits directly on each pump, withstanding vibrations of 1g/11ms.

## System Architecture



MD-224
Marine Display

MC-3201
SCADA Computer

MC-3201
Database Server

MC-1100
DIN-Rail Computer

EDS-408A
Ethernet Switch

MGate 5101-
PBM-MN
TCP Gateway

ioLogik E1263H-T
Ethernet Remote I/O

— Ethernet
— VGA/HDMI
— I/O Signal

Variable Speed
Drives

Automated Pumps    Automated Pumps    Sensor    Sensor

## Product Highlights

**MC-3201**

Compact wide-temperature marine computer with 11th Gen Intel® Core™ processor

**MC-1100**

Ultra-compact fanless marine computer with Intel Atom® E3845 1.9GHz processor

**ioLogik E1263H-T**

Ethernet remote I/O with 2-port Ethernet switches, 12 DIOs, 5 AIs, and 3 RTDs

**MGate 5101-PBM-MN**

1-port PROFIBUS-to-Modbus TCP gateways

**EDS-408A**

8-port entry-level managed Ethernet switches
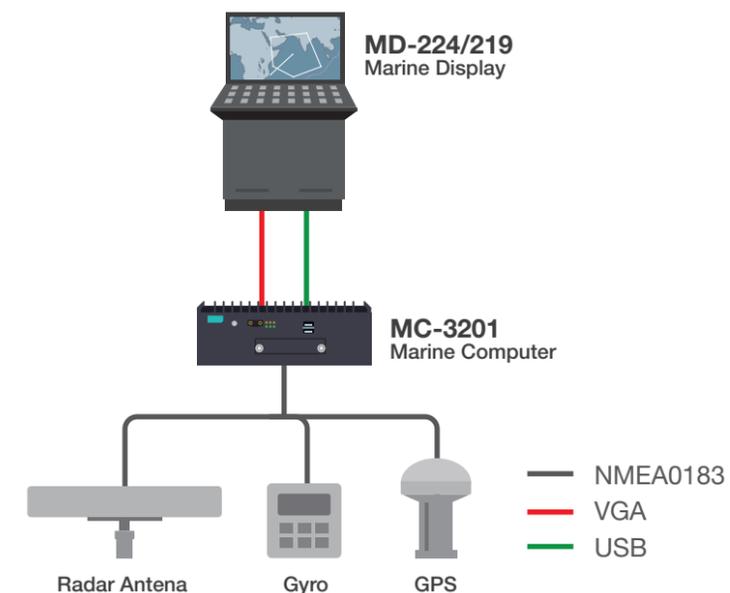
# Oil Spill Detection System

## System Requirements

The OSD processor is the heart of the oil spill detection system, the place where raw information from the radar is collated with information received from navigation devices such as GPS, the gyrocompass, the speed log, and AIS. This information must be received over NMEA 0183 interfaces, and then processed in real time for immediate display. Due to the massive amount of real-time data that needs to be processed, the OSD processing units require high-performance CPUs capable of handling a heavy data load, and which will serve reliably in a wide variety of extreme temperatures, humidity, and other environmental conditions.

## Moxa's Solution

Moxa provides a range of marine embedded and panel computers for OSD systems that are certified for use in the marine bridge system and offshore installations. Moxa's MC and MPC series computers are powered by high-performance Intel® Core™ i7 processors that provide the computing performance required to process the enormous amounts of data received in real time. Fanless MC and MPC Series marine computers are designed to install easily into vessels' bridge systems and operate reliably within a wide temperature range in enclosed spaces. These rugged computers have no moving parts and feature hardened enclosures and integrated I/O connections, making them an ideal computing choice for an OSD system.

## System Architecture

## Overview

Oil spill contingency plans are essential to minimizing the risk of oil spills in the ocean. The success of these plans depends on accurate, real-time data on the location, size, and movement of a spill and a powerful computing infrastructure that can consolidate and process this data to support monitoring and recovery operations.

## What is an Oil Spill Detection System?

Normal Sea Surface

Oil-polluted Sea Surface
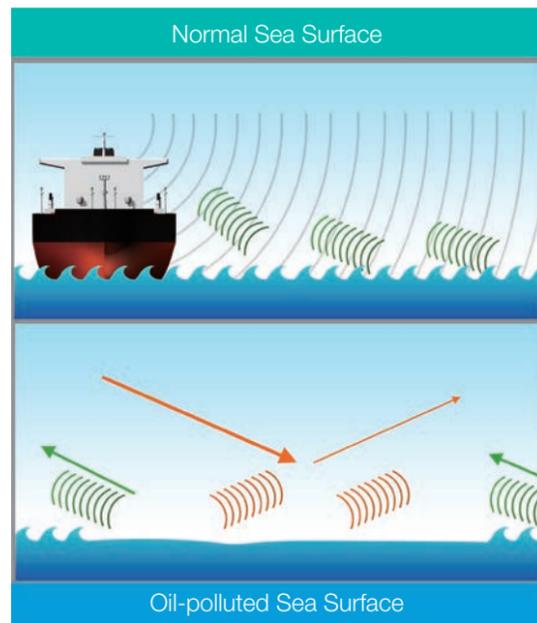
An oil spill detection system (OSD) is used to monitor and give early warning of the spread of oil across the open ocean. OSD systems may be installed on ships, drills or well rigs, or onshore surveillance stations. OSD systems work by collecting digitized images of the sea surface and then utilizing directional wave spectra to estimate sea surface currents. Marine X-band radars, satellite monitors, or video cameras may all be used to collect these images, but because of its economy and efficiency, X-band radar technology is the method most commonly used. Areas covered by oil reflect less of the image spectrum due to the dampening of the sea surface capillary waves, leaving areas contaminated by oil rendered as dark areas in the returned surface images.

A basic OSD configuration contains:

• Radar sensors (antennas, transceivers)
• OSD processor units
• Controls (local or remote)

**MD-224/219**
Marine Display

**MC-3201**
Marine Computer

Radar Antena    Gyro    GPS

— NMEA0183
— VGA
— USB

### Product Highlights

**MC-3201**
Compact wide-temperature marine computer with 11th Gen Intel® Core™ processor

**MD-224/219**
24/19-inch ECDIS-compliant marine displays

**MPC-2240/2190**
High-performance fanless marine panel computer with Intel® Core™ i7 processor and 24/19-inch ECDIS-compliant display

### Moxa's Marine Customer - Miros AS

"After software testing followed by a more rigorous system test, we are left with the impression that Moxa's Marine computers will satisfy all customer and product critical requirements."

✕ MIROS

Mikael Rydberg
Sales Manager, Miros AS

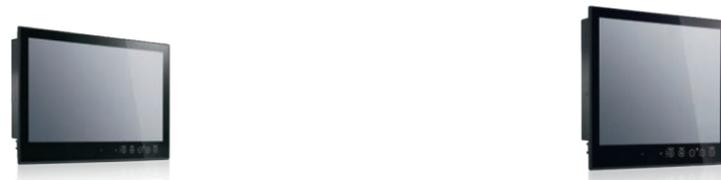| Computers | MC-3201 Series | MC-7400 Series | MC-7200 Series |
|---|---|---|---|
| CPU | 11th Gen Intel® Core™ i3/i5/i7 processor | 6th Gen Intel® Core™ i5/i7 processor | Intel® Core™ i7-3555LE / i3-3120ME / Celeron® 1047UE |
| System Memory | 2 x DDR4 memory slots; total capacity up to 32 GB | 2 x DDR4 memory slots; total capacity up to 32 GB | 2 slots, 4 GB preinstalled |
| Storage Expansion | 1 removable SSD tray, 1 SSD slot (internal) | 2 removable 2.5" SSD storage bays | MC-7200-MP-T: 2 removable SSD trays MC-7200-DC-CP-T: 1 removable SSD tray, 1 SSD slot (internal) |
| USB Ports | 2 x USB 3.1 4 x USB 2.0 | 4 x USB 3.0 4 x USB 2.0 | 6 x USB 2.0 2 x USB 3.0 (MC-7200-MP-T only) |
| LAN Ports | 4 x RJ45 10/100/1000 Mbps | 5 x RJ45 10/100/1000 Mbps | 4 x RJ45 10/100/1000 Mbps |
| Serial Ports | 2 x RS-232/422/485 (DB9-M, software-selectable) | • 4 x RS-232/422/485 (DB9-M, software-selectable) • 2 x RS-232 (DB9-M) | • 2 x RS-232/422/485 (DB9-M, software-selectable) • 2 x RS-232 (DB9-M) |
| PCI/PCIe | - | - | 2 x PCI, 1 x PCIe (MC-7200-MP-T only) |
| NMEA 0183 Ports | 4 | 4 | 8 (terminal block) (MC-7200-MP-T only) |
| Video Output | 2 x DisplayPort | 1 x DVI-I, 1 x DVI-D, 1 x DisplayPort | 2 x DVI-D, 1 x VGA |
| Dimensions | 220 x 80 x 170 mm (8.66 x 3.15 x 6.69 in) | 240 x 209 x 160 mm (9.45 x 8.23 x 6.3 in) | MC-7200-MP-T: 320 x 240 x 160 mm (12.6 x 13.39 x 6.3 in) MC-7200-DC-CP-T: 287 x 250 x 70 mm (11.30 x 9.84 x 2.76 in) |
| Operating Temperature | -20 to 55°C | -25 to 55°C | -40 to 70°C |
| Type Approvals | IEC 60945, E10 | DNV, CCS | DNV, CCS |

| Panel Computers | MPC-2240 Series | MPC-2190 Series |
|---|---|---|
| CPU | Intel® Core™ i7-3517UE / Celeron 1047UE | Intel® Core™ i7-3517UE / Celeron 1047UE |
| System Memory | 1 slot, 4 GB preinstalled | 1 slot, 4 GB preinstalled |
| Storage Expansion | 2 removable SSD trays (internal) | 1 SSD slot (internal) |
| Panel Size | 24" (16 : 9) | 19" (5 : 4) |
| Pixels | 1920 x 1080 | 1280 x 1024 |
| Brightness | 300 nits | 300 nits |
| Touch | Projected capacitive multi-touch | Projected capacitive multi-touch |
| USB Ports | 4 x USB 2.0 | 4 x USB 2.0 |
| LAN Ports | 2 x LAN 10/100/1000 Mbps | 2 x LAN 10/100/1000 Mbps |
| Serial Ports | 2 x RS-232/422/485 (DB9, software selectable) | 2 x RS-232/422/485 (DB9, software selectable) |
| NMEA 0183 Ports | 8 (terminal block) | 4 (terminal block) |
| Video Output | 1 x DVI-D + 1 x VGA | 1 x DVI-D + 1 x VGA |
| Dimensions | 595 x 393 x 75 mm (23.43 x 15.47 x 2.95 in) | 429 x 387 x 75 mm (16.89 x 15.24 x 2.95 in) |
| Operating Temperature | -15 to 55°C | -15 to 55°C |
| Type Approvals | DNV, ABS, CCS, NK, IACS E10 | DNV, ABS, CCS, NK, IACS E10 |

| Computers | MC-1111/1121 Series | MC-1112/1122 Series |
|---|---|---|
| CPU | Intel Atom® E3845 / E3826 | Intel Atom® E3845 / E3826 |
| System Memory | 1 slot, 4 GB preinstalled | 1 slot, 4 GB preinstalled |
| Storage Expansion | 1 x CFast slot 1 x SD slot | 1 x CFast slot |
| USB Ports | 2 x USB 2.0 | 2 x USB 2.0 |
| LAN Ports | Up to 4 x RJ45 10/100/1000 Mbps | Up to 4 x RJ45 10/100/1000 Mbps |
| Serial Ports | Up to 2 x RS-232/422/485 (DB9-M, software-selectable) | Up to 4 x RS-232/422/485 (DB9-M, software-selectable) |
| PCI/PCIe | 1 x Mini PCIe | 1 x Mini PCIe |
| NMEA 0183 Ports | - | - |
| Video Output | 1 x DisplayPort, 1 x VGA | 1 x VGA |
| Dimensions | 132 x 122 x 87 mm (5.20 x 4.81 x 3.43 in) | 132 x 122 x 87 mm (5.20 x 4.81 x 3.43 in) |
| Operating Temperature | -40 to 70°C | -40 to 70°C |
| Type Approvals | DNV, Class 1 Division 2, ATEX Zone 2, IECEx | DNV, Class 1 Division 2, ATEX Zone 2, IECEx |

| Panel Computers | MPC-2120 Series | MPC-2070 Series |
|---|---|---|
| CPU | Intel Atom® E3826 / E3845 | Intel Atom® E3826 |
| System Memory | 1 slot, 4 GB preinstalled | 1 slot, 4 GB preinstalled |
| Storage Expansion | 1 x CFast slot + 1 x SD slot (external) | 1 x CFast slot + 1 x SD slot (external) |
| Panel Size | 12" (4:3) | 7" (16:9) |
| Pixels | 1024 x 768 | 800 x 480 |
| Brightness | 350 / 1,000 nits | 350 / 1,000 nits |
| Touch | Projected capacitive multi-touch | Projected capacitive multi-touch |
| USB Ports | 2 x USB 2.0 | 2 x USB 2.0 |
| LAN Ports | 2 x LAN 10/100/1000 Mbps | 2 x LAN 10/100/1000 Mbps |
| Serial Ports | 2 x RS-232/422/485 (DB9, software selectable) | 2 x RS-232/422/485 (DB9, software selectable) |
| NMEA 0183 Ports | – | – |
| Video Output | – | – |
| Dimensions | 306 x 245 x 64 mm (12 x 9.6 x 2.5 in) | 200 x 140 x 45 mm (7.9 x 5.5 x 1.8 in) |
| Operating Temperature | -40 to 70°C | -40 to 70°C |
| Type Approvals | DNV, Class 1 Division 2, ATEX Zone 2, IECEx | DNV, Class 1 Division 2, ATEX Zone 2, IECEx |

| Displays | MD-224 Series | MD-219 Series |
|---|---|---|
| Panel Size | 24" widescreen | 19" |
| Aspect Ratio | 16 : 9 | 5 : 4 |
| Brightness | 300 nits (HB model with 1000 nits) | 300 nits (HB model with 1000 nits) |
| Pixels | 1920 x 1080 | 1280 x 1024 |
| Viewing Angles | 178 / 178 | 178 / 178 |
| Touch | Projected capacitive multi-touch | Projected capacitive multi-touch |
| RS-232 Ports | 1 (DB9-M) | 1 (DB9-M) |
| RS-422/485 Ports | 1 terminal block | 1 terminal block |
| Video Input | 1 x DVI-D, 1 x VGA | 1 x DVI-D, 1 x VGA |
| Dimensions | 595 x 393 x 75 mm (23.43 x 15.47 x 2.95 in) | 429 x 387 x 75 mm (16.89 x 15.24 x 2.95 in) |
| Operating Temperature | -15 to 55°C | -15 to 55°C |
| Type Approvals | DNV, ABS, CCS, IACS E10, Class 1 Division 2 | DNV, ABS, CCS, IACS E10, Class 1 Division 2 |

| DIN-rail Ethernet Switches | EDS-408A | EDS-G205 / G308 | EDS-316 | EDS-2010-ML |
|---|---|---|---|---|
| Switch Type | Managed | Unmanaged | Unmanaged | Unmanaged |
| No. of Ports | 8 | 5 / 8 | 16 | 10 |
| Gigabit Ethernet | - | 5 / 8 | - | 2 |
| Fast Ethernet | 8 | - | 16 | 8 |
| Power Supplies | 24 VDC | 12/24/48 VDC | 12/24/48 VDC | 12/24/48 VDC |
| Operating Temperature | • 0 to 60°C • -40 to 75°C (-T model) | • -10 to 60°C • -40 to 75°C (-T model) | • 0 to 60°C • -40 to 75°C (-T model) | • -10 to 60°C • -40 to 75°C (-T model) |
| Type Approvals | DNV | DNV, ABS, LR, NK | DNV | DNV, ABS, LR, NK |

| DIN-rail Ethernet Switches | EDS-G4014-LV | EDS-518E | EDS-510E | EDS-P510 |
|---|---|---|---|---|
| Switch Type | Managed | Managed | Managed | Managed, PoE |
| No. of Ports | 14 | 18 | 10 | 10 |
| Gigabit Ethernet | 14 | 4 | 3 | 3 |
| Fast Ethernet | - | 14 | 7 | 7 (4 PoE) |
| Power Supplies | 12/24/48 VDC | 12/24/48/-48 VDC | 12/24/48/-48 VDC | 48 VDC |
| Operating Temperature | • -10 to 60°C • -40 to 70°C (-T model) | • -10 to 60°C • -40 to 75°C (-T model) | • -10 to 60°C • -40 to 75°C (-T model) | • 0 to 60°C • -40 to 75°C (-T model) |
| Type Approvals | DNV, ABS, LR, NK | DNV, ABS, LR, NK, IACS E10, IEC 60945 | DNV, ABS, LR, NK | DNV, ABS, LR, NK |

| Rackmount Ethernet Switch | IKS-6726A/6728A | Industrial Secure Router | EDR-G9010 | Ethernet Remote I/O | ioLogik E1263H-T |
|---|---|---|---|---|---|
| Switch Type | Managed | No. of Ports | 10 | Configurable DI/DOs | 24 |
| No. of Ports | 26/28 | Gigabit Ethernet | 10 | Analog Inputs | 10 |
| Gigabit Ethernet | 2/4 | Fast Ethernet | - | RTD Inputs | 3 |
| Fast Ethernet | 24 | Security Features | Firewall/NAT/VPN/ Router/Switch | Ethernet Ports | 1 x RJ45 10/100 Mbps |
| Power Supplies | 24/48 VDC; 110/220 VAC | Power Supplies | 12/24/48 VDC (DNV-certified for 24 VDC) | Switch (Daisy Chain) | Yes |
| Operating Temperature | -40 to 75°C | Operating Temperature | • 0 to 60°C • -40 to 75°C (-T model) | Protocols | Modbus/TCP, TCP/IP, UDP, DHCP, BOOTP, HTTP |
| Type Approvals | DNV, ABS, LR, NK | Type Approvals | DNV | Certification | IEC 60945 |