Onyx

Marine Automation

Onyx Marine Automation

The secret to the success of the Onyx Marine Automation system lies in the custom design of its components for specific use in marine applications.

Key features

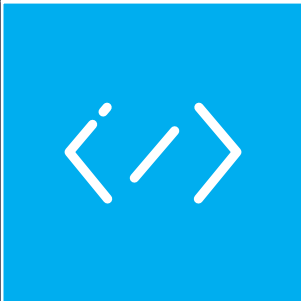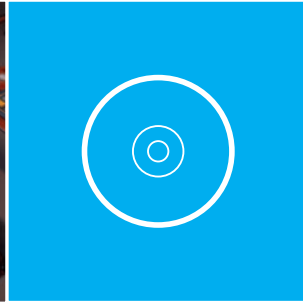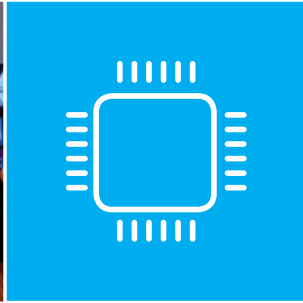- Featuring stylish, functional, intuitive graphics with numerous customization options;
- Minimizing the number of components and their weight;
- Simplifying installation, service and maintenance;
- Providing cost-effective solutions;
- Designing solutions with custom-made components to meet all requirements;
- Offering the highest level of control and integration currently available;
- Delivering a reliable system that guarantees maximum safety on board;
- Complying with the regulations of classification bodies.

An extensive network of partners and authorized installers enables Onyx Marine Automation to satisfy the needs of its customers both in Italy and the rest of the world.
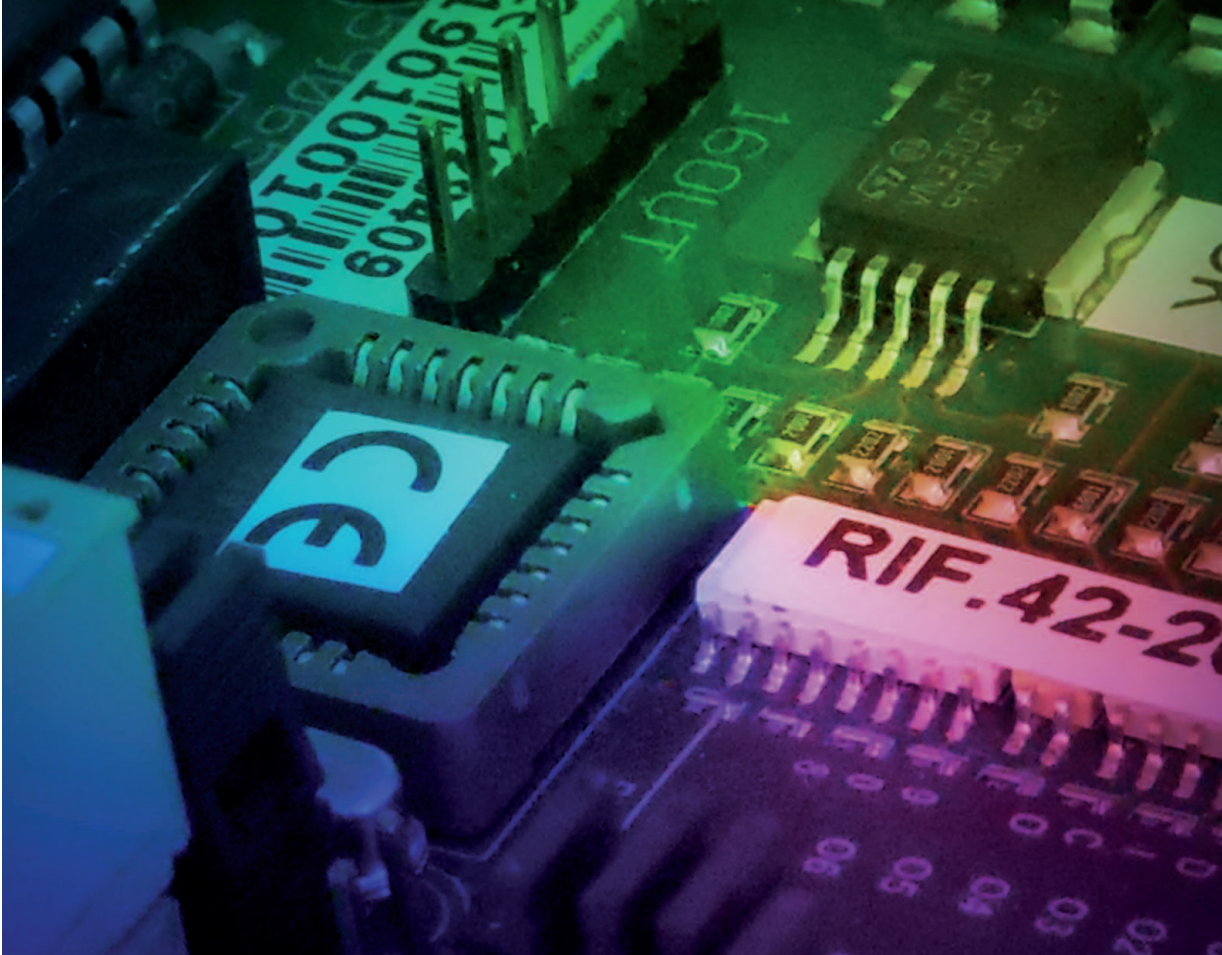
Philosophy

We design and manufacture hard and software solutions that deliver a higher level of control and integration than any of the systems developed with industrially produced components.

This means we can:

- make installation easy;
- reduce the number of components required;
- simplify control and maintenance;
- ensure cost-effectiveness.

Quality Management System

Onyx Marine Automation is an ISO-9001:2015 certified company.

The complete Onyx Marine Automation product range is Type Approved by Lloyd's Register of Shipping (LRS), the American Bureau of Shipping (ABS) and the Italian Naval Register (RINA).

This means that all our automation systems can be installed on any vessel requiring class notation.

Quality is our number one priority and these certifications are a guarantee that we offer our customers the best service and design standards, both before and after sale.

SYSTEM ARCHITECTURE

MONITORING AND REMOTE ALARM NOTIFICATION

MOBILE PHONE

COMPUTER

TOUCH-SCREEN DISPLAY

REDUNDANT ETHERNET NETWORK

PC

TABLET

ETHERNET PORT FOR CONNECTING EXTERNAL DEVICES

J1939 PORT FOR ENGINES/GENERATORS

CPU

SYSTEM WITH REDUNDANT CPU THE BACKUP CPU CONTINUOUSLY CONTROLS THE ACTIVITY OF THE MAIN ONE ON BOTH THE CAN AND ETHERNET NETWORKS. IN CASE OF FAILURE THE BACKUP CPU SWITCHES THE MAIN ONE OFF AND TAKES CONTROL OF THE SYSTEM

REDUNDANT DOUBLE CAN-BUS NETWORK

D I/O DIGITAL MODULES

SSD SOLID STATE POWER MODULES

A I/O ANALOG MODULES

SERIAL MODULES

The Onyx Marine Automation system is based on a CAN-bus network that connects a main CPU (Central Processing Unit) to a number of remote I/O (Input/Output) units. Both the digital and analog data acquisition modules are available in different versions from 4 to 32 channels per unit. In addition to these I/O standard modules, others for specific functions are also available: light control, solid-state power, alarms, serial controllers and access control interfaces. All these modules are designed exclusively for our marine automation systems. The CPU's two Ethernet ports and two CAN-bus ports allow the system to communicate efficiently with a wide range of onboard devices. Engines, generators, water makers, A/C systems, power meters, light dimmers, entertainment systems, CCTV units and many other devices can easily be interfaced with our system. Data are collected from the onboard machinery, exchanged through the field bus and processed by the powerful CPU equipped with a real-time proprietary operating system.

The data are then output to the graphic displays (operator panel and/or PC) via the Ethernet network. Managing the critical, safety-related and alarm functions on the CPU means the display system is not required to perform any critical functions.

Hence, one or more operator displays can be switched off without losing the alarm history and the power management system remains operational even if a display malfunctions. The system architecture can accommodate a second CPU as a hot-swap backup unit, ready to seamlessly take over from the main unit if required, in order to guarantee redundancy.

Moreover, a second Ethernet and CAN-bus network have been added to provide full functional redundancy in order to achieve complete continuity in back-up mode and provide unparalleled levels of safety.

Electronic Onyx Marine Automation modules are specifically designed and manufactured for use in marine environments. After production, each module undergoes an exhaustive series of tests (burn-in) to ensure its reliability and functionality. The electronic components used are of the highest quality and suitable for a wide range of temperatures (-20 ÷ 85 °C).

Each electronic module can be mounted onto either plastic or aluminum cradles for EN50035 DIN rail mounting inside distribution panels, or inside a case in extruded anodized aluminum (the protection class then becomes IP65). Thanks to the CAN-bus communication port, each electronic module can be installed anywhere onboard, minimizing weight and space and optimizing the times and ease of wiring. Compatibility with all the PLCs on the market allows full implementation and integration with those systems that are already installed onboard during the refitting of the boat. All the Onyx Marine Automation components are Type Approved by Lloyd's Register of Shipping (LRS), the American Bureau of Shipping (ABS) and the Italian Naval Register (RINA). This means that all our automation systems can be installed on any vessel requiring class notation.
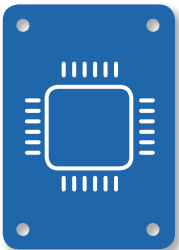
## CPU MODULES

The heart of the system.

Our powerful CPUs have high computing power and extensive range of communication peripherals: 4 serial ports (RS485/232/422), 2 CAN-bus and 2 Ethernet ports. This platform provides unparalleled efficiency in managing several different communication protocols at a time, while the real-time operating system and complete set of functions ensure easy integration with all onboard systems. Network interfaces are electrically insulated to avoid electrical interference. The CPU supports a master/slave configuration to extend the number of onboard serial ports and has the capacity to drive up to 128 modules on each CAN-bus network.
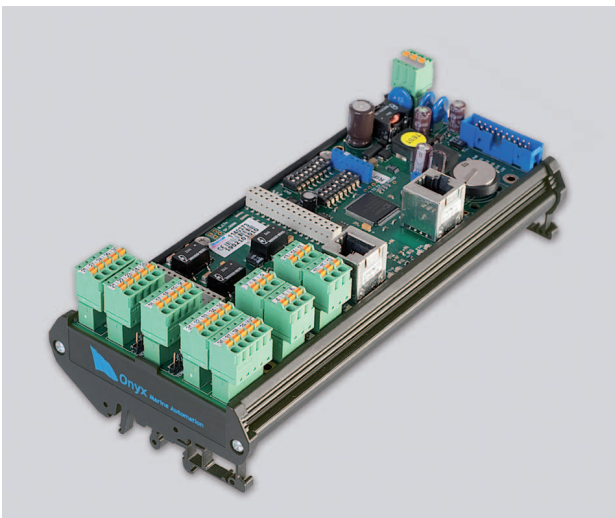
Standard (4 serial + 2 CAN + 2 Ethernet)

STC (2 Serial + 1 CAN)
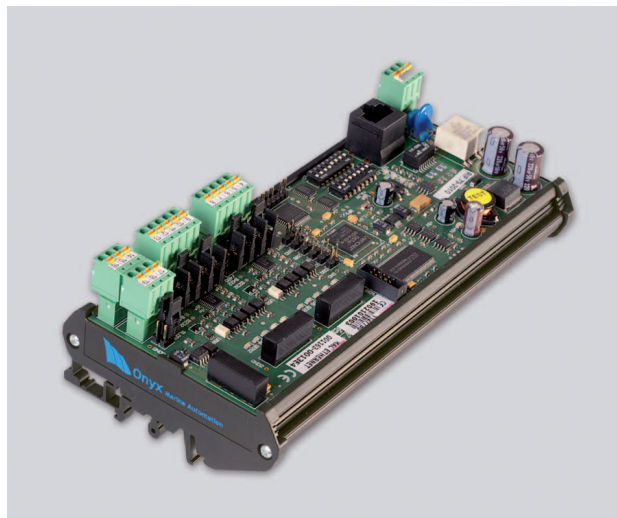
Available versions: Standard (4 serial ports + 2 CAN + 2 Ethernet) - STC (2 serial ports + 1 CAN)

SSD
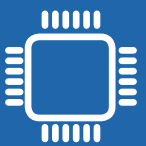
Solid-state power modules

These power modules replace the traditional circuit breakers and control relays for managing lights, pumps and any other DC or AC device.

To provide overload and short circuit protection, each module measures the current drained by the load and automatically breaks the circuit if the current exceeds the programmed threshold. Additional safety is provided by an onboard fuse on each channel. By checking current consumption, the system detects faults such as failing bulbs, idle or jammed pumps or interrupted circuits.

Each channel can be controlled by the automation system and traditional, hard-wired switches that provide local control, e.g. cabin lights. Automatic functions for tank draining and bilge suction are also provided. Should the automation system be switched off for any reason, the modules continue to work in stand-alone mode.

A low-current version is also available for controlling and monitoring LED navigation lights.
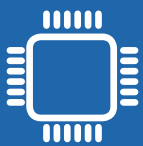

AC (230 VAC, 12 2.5A channels)
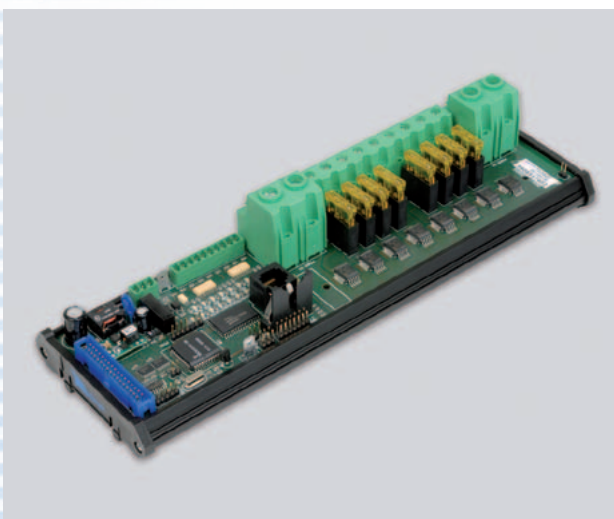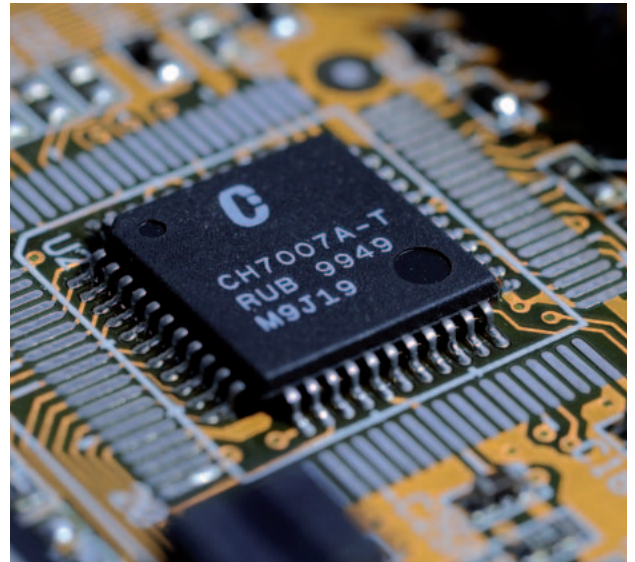
DC (12/24 VDC, 8 16A channels)

NL (24 VDC, 7 2.5A channels)
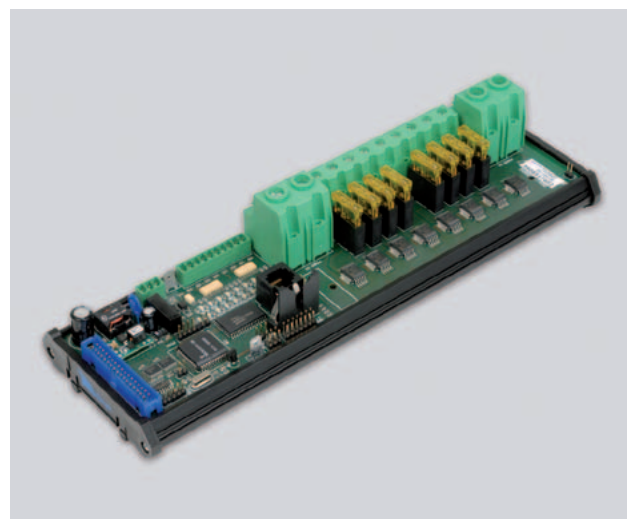
Available versions: DC (12/24 VDC, 8 16A channels) - AC (230 VAC, 12 2.5A channels) - NL (24 VDC, 7 2.5A channels)

D

Digital I/O modules

A wide range of I/O digital modules is available. Each module features a CAN-bus port, so it can be located throughout the vessel to gather signals or distribute commands with just one cable connecting the module to the CAN-bus network.

All input channels (either PNP or NPN type) are optoisolated and protected against reverse current leakage. Output channels supply up to 500mA each and are protected against short circuits. A version suitable for reading the 230VAC line is designed for reading feedback signals directly from the loads. A special version, equipped with one Wiegand input (26, 30 or 44 bits), can be used to integrate access control devices (biometric readers, transponders etc.) within the automation system. Another version features the ISA-1 standard annunciator sequence, a function which allows the module to be used as a stand-alone alarm annunciator when disconnected.
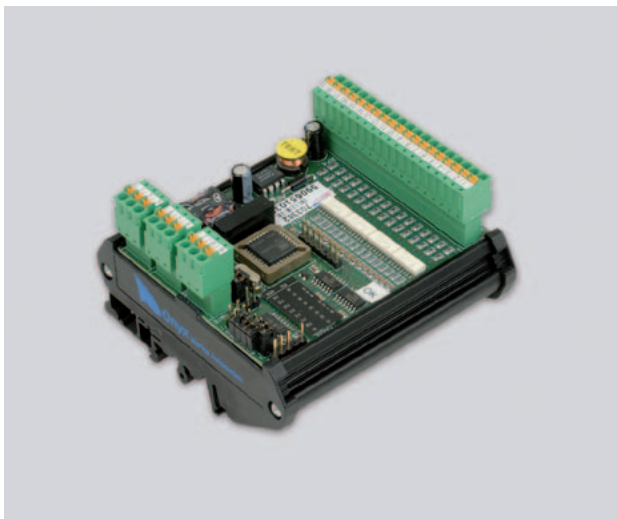
8DI-8DO (PNP/NPN)

16DI (NPN)

16DI+16DO (PNP input)

16DI (230 VAC)

Available versions: 8DI+8DO (PNP/NPN) - 16DI (PNP), 16DI (NPN) - 16DI (230VAC) - 16DI+16DO (PNP input) - 16DI+16DO (NPN input) - 16DO (500mA) - 16DO - 8DI+8DO Wiegand.

Analog I/O modules

A

Our analog modules are designed to deal with all signal inputs from the onboard sensors. Input channels can monitor battery voltage (0-40V), 4-20mA signals to interface with industry-standard sensors, and 0-200mV signals to read battery currents by means of shunts. They also support the most common temperature sensors (PT100, PT1000, thermocouple and RTD) and resistive sensors to interface with level gauges, trim tabs and rudder angle sensors. Output channels can handle devices controlled by voltage modulated analog signals. Single or dual outputs ranging from 0-5V to 0-10V are also available.
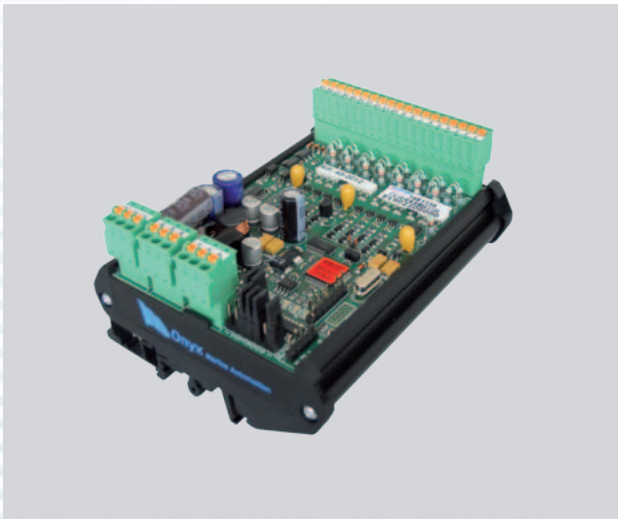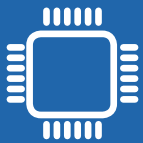
8 AI
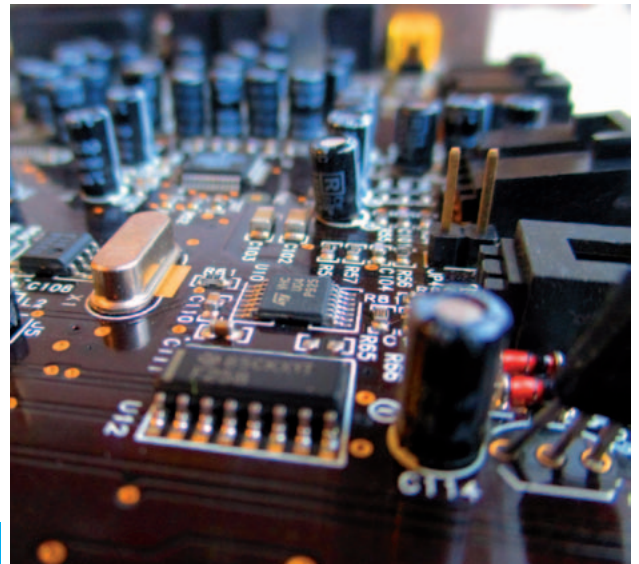
4AI
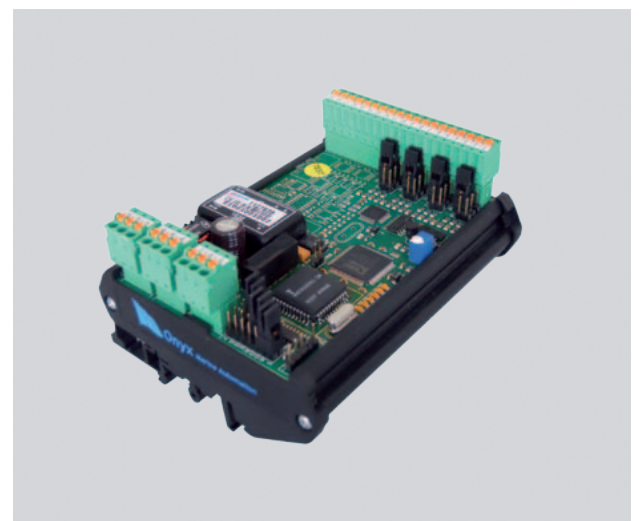
4AI + 4 AO

Available versions: 8 inputs (0-40V, 4-20mA, 0-200mV configurable) - 4 inputs (4-20mA, PT100, PT1000, TC, RTD configurable) - 4 outputs (±0-5V, ±0-10V configurable)
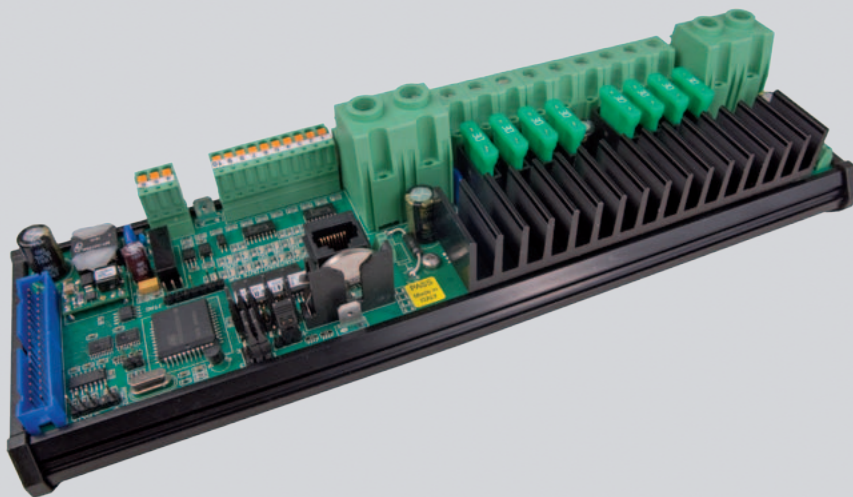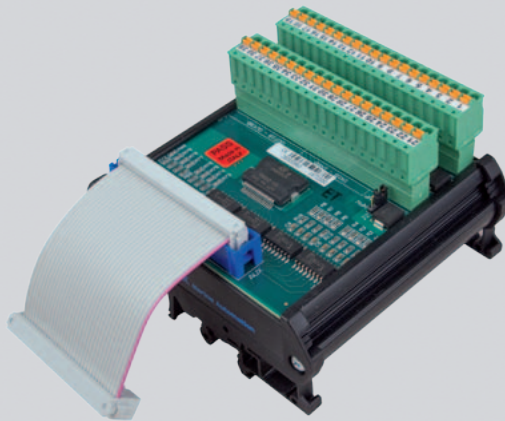
Dimmer modules

Specifically designed for use in marine environments, dimmer modules are the ideal solution for switching on/off and dimming any 24V PWM dimmable lighting source, both traditional and LED. The master module features 8 channels, each of which can be programmed in either on/off or dimmer mode, output up to 16A and be electronically protected with current limitation and overheating protection. A built-in fuse protects each channel for additional safety.

The module can operate in stand-alone mode - when the monitoring system is not present or is switched off - or integrated with the monitoring system in order to ensure complete control of the command and feedback signals, as well as measuring the drained current. The module can be controlled locally using pushbuttons in both operating modes. The optional slave module offers 32 additional I/O channels: 8 digital inputs are available for programmable scenario pushbuttons, 8 digital outputs can be used as feedback for the wall mounted switch plates, and a further 8 digital inputs and 8 digital outputs can be used to drive up to 4 motorized blinds or curtains or any other device, such as cabin extractors.
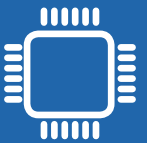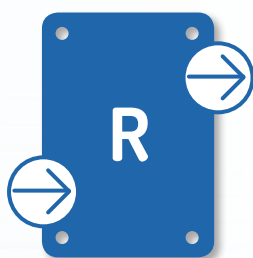

Master Module

Slave Module

**Available versions: 8 24 VDC 16A dimmer channels**

Fully redundant system

The OM-961M/OM-961S modules are designed to offer a complete redundancy solution for Onyx Marine systems. The OM-961M module is the master unit and, once it is connected to a couple of OM-430B controllers and the double CAN-bus network, handles the switchover between master and backup controller, as well as primary and backup CAN-bus paths. The OM-961S module is a slave unit, and is used to handle the switchover between primary and secondary CAN-bus paths at board or switchboard level. Both modules feature fail-to-safe design, a redundant power supply and a number of I/O lines used for diagnostic purposes. Like all Onyx Marine Automation components, these modules have been specifically designed for marine environments: the use of extended temperature range components (-20 to +85 °C) and Type Approval certification make them an invaluable feature for a modern marine automation system.
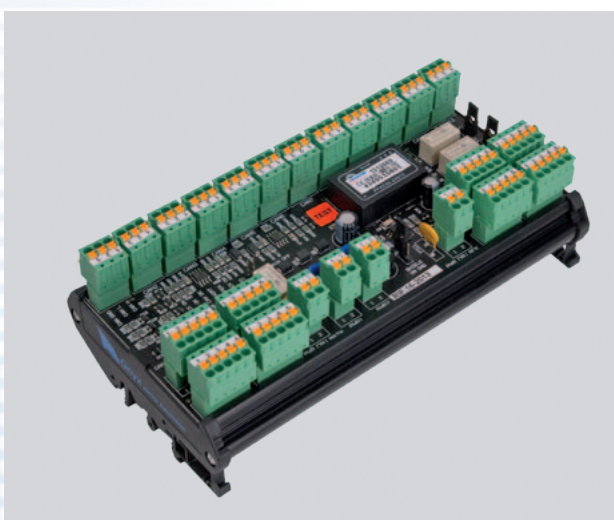
Master unit

Slave unit

HARDWARE
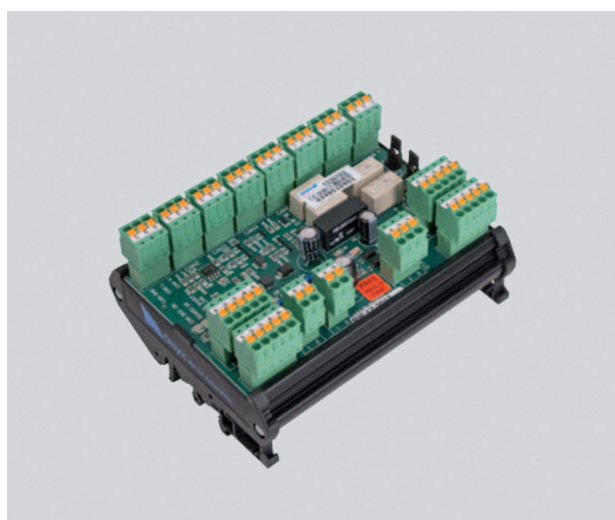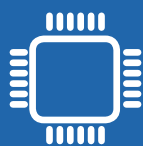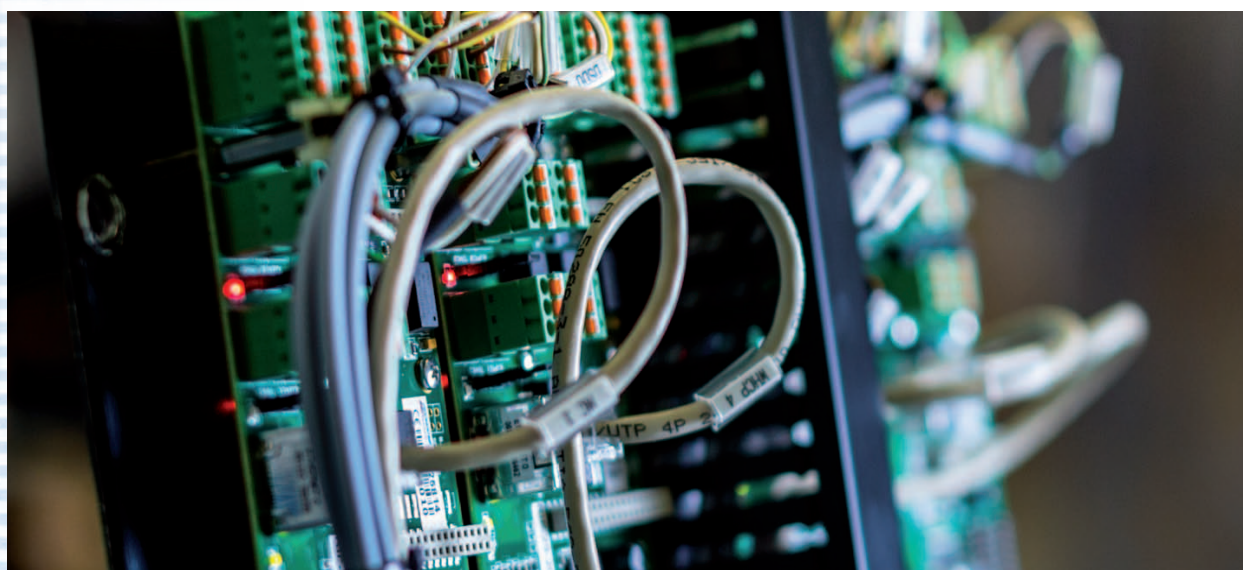
Touch-Screen Displays

Our touch-screen control panels are manufactured by the leading European companies in the field. Reliability, design and sturdiness, together with the functional specifications designed for the marine market, make these displays the perfect choice for marine applications. The front IP66 protection class, screen visibility even in severe conditions and powder-coated aluminum case make them suitable for any outdoor installation in harsh, rigorous weather conditions. A high brightness version is also available for clear visibility, even in strong sunlight.
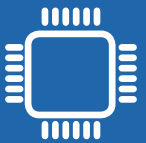
15" wide display

15" 4:3 glass display

7" wide display

7" wide glass display

SOFTWARE

Software is the very heart of the Onyx Marine Automation system. A complete set of predefined functions is held in a library installed on the CPU. Although most of the configuration work, designed specifically for marine applications, is carried out by Onyx engineers during project development, the installer can modify or even reprogram the whole system simply by entering updated parameters in an Excel file and uploading them to the CPU.

Unlike PLC-based systems, where the installer must be able to use PLC language, our system can be fully programmed without any specific programming knowledge. Onyx software is also designed for easy remote upgrading via an Internet connection or using a laptop or USB memory key. Using state-of-the-art tools, our graphic designers work with captains and project managers to customize, interpret and develop specific solutions in order to meet any customer's need.

SOFTWARE
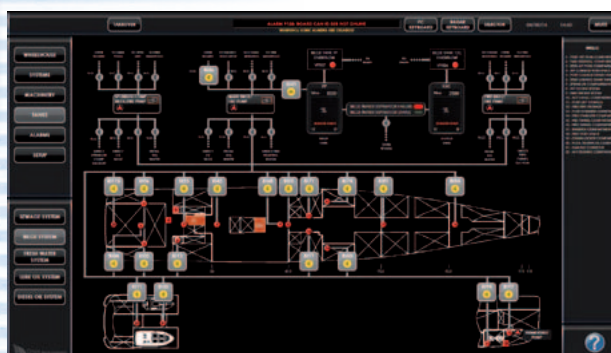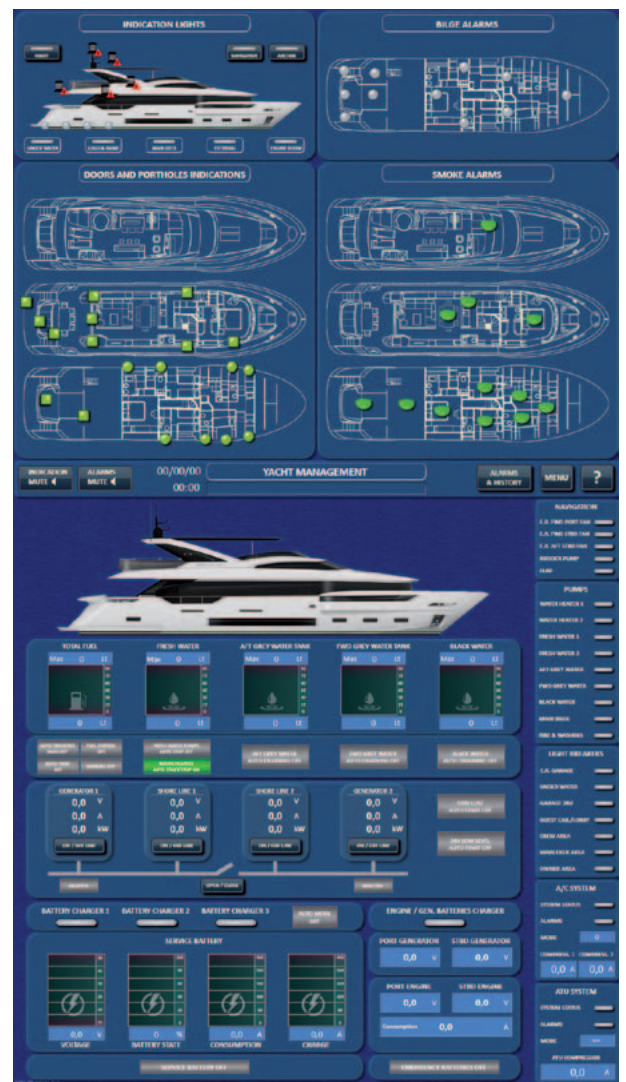
Optional solutions

All Onyx Marine Automation monitoring systems can be equipped with valuable optional packages to increase performance and safety on a boat. Easy to use and install, these solutions can be mounted both on new systems and those already in use, providing the boat with valuable new functions.

Remote Control
This package enables all the functions of a monitoring system to be controlled by means of a tablet (iPad or Android) or notebook computer. The tablet works as an additional, standalone control unit and allows complete freedom to browse through any page at any time. The pages displayed on the tablet may be customized on request to ensure easy, user-friendly browsing.

Remote Alarm Notification
This package sends an SMS to a cellphone when a new alarm is detected by the onboard monitoring system. The list of alarms the user wishes to be notified about can be configured and several phone numbers set. Our RAN package provides peace of mind when a boat is left unattended.

Remote Diagnostic
This package allows users to check, upgrade and configure their monitoring system remotely (Internet line, wi-fi connection or internal UMTS modem). Onyx Marine staff can connect to a customer's boat in order to provide support and maintenance as quickly as possible.

Data Logger
This package makes it possible to extend the alarm history of a monitoring system and add powerful data acquisition and analysis tools. The new LogX data logger can record a large number of different parameters for months without interruption. Once recorded, the data can be plotted on a graph or exported to Excel for more accurate assessment. Users can keep track of the time and frequency of bilge pump activation, monitor engine fuel consumption while at sea, and check the average and peak power requests of the electrical system.
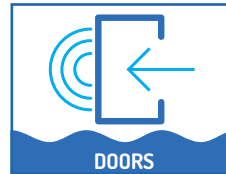
SYSTEM FUNCTIONS
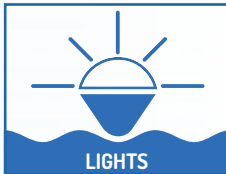
LIGHTS
Management of internal, external and scenery lighting.

SIGNAL HORNS
With foghorn function and preset signals according to COLREG rules and regulations.

FLUID TRANSFER
Monitor and control of pumps and valves, control of the fuel, water and bilge systems and automatic transfers between tanks. Automatic detection of valve failure.

DOORS
Personalized alarms for controlling access points and door openings. Automatic selection for harbor and navigation modes.

FIRE AND GAS DETECTION
Fire and gas detection–monitoring systems on each deck.

AIR CONDITIONING
Monitoring and control of air-conditioning systems. Interfacing with entertainment systems

SEARCH LIGHTS
Handling control.

TANK LEVELS
Monitoring of tank levels with automatic curve linearization.

BILGE SYSTEM
Monitoring and control of pumps and valves

ON DUTY SYSTEM
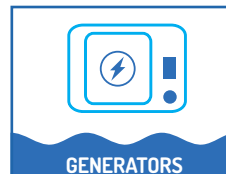Selection of on-duty officer cabin with alarm relay system.

WINDOW BLINDS
Management of opening/closing of blinds and windows.

REMOTE ACCESS
Remote access via the Internet for diagnostics, configuration and upgrading.

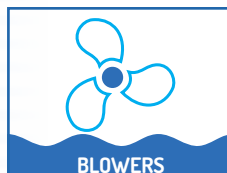**I PAD™**
Monitoring replica on i-Pad™.

GENERATORS
Monitoring and control of generators (via serial and/or J1939).

TRIM TABS
Automatic control of trim tabs and surface propellers to optimize navigation.

VIDEO SURVEILLANCE
Camera control.

BLOWERS
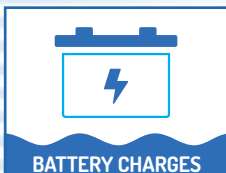Monitoring and control of blowers/ventilation systems and inverters

DATA LOGGING
System data registration.

ENGINE ORDER TELEGRAPH
Engine order telegraph (LRS approved).

WORK TIME MONITORING
Monitoring the work times of each individual machine with maintenance software interface.

BATTERY CHARGES
Monitoring of batteries and battery chargers.

POWER MANAGEMENT
Comprehensive power management system with automatic parallel (generators + shore power).

WINDSHIELD WIPERS
Comprehensive management of windshield wipers, windshield washers and heaters.
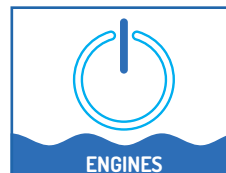
ENGINES
Engines monitoring (via serial and/or J1939).

ALARM MESSENGER
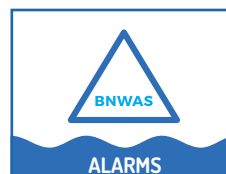Remote alarm notification via SMS or UHF radio. Alarm notification on onboard phones via PABX.

WATERTIGHT/FIREPROOF DOORS
Monitoring of watertight and fireproof doors (LRS approved)

LOG BOOK
Filling out of machinery forms.
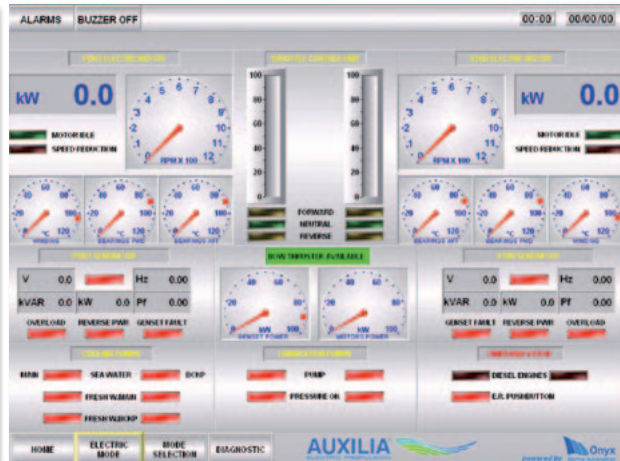
ONLINE MANUALS
Online manuals.

ALARMS
Comprehensive alarms management (UMS/ACCU approved): alarms history, active alarms page, multiple buzzers, selection of on-duty officer cabin and alarms printout. LRS approved BNWAS function

ENTERTAINMENT
Interface with entertainment systems.

HYBRID PROPULSION

Onyx Marine Automation's highly versatile architecture makes it possible to interface onboard automation with any kind of electric or electronic device. This is crucial in the case of a hybrid propulsion system, where onboard automation becomes a link for traditional, electrical and generated propulsion systems.

The first four international projects to be developed within the sphere of hybrid systems bear the name Onyx Marine Automation and have been a resounding success. They were developed in association with Siemens Marine Solutions and RTN.

Onyx
Marine Automation

TEAM ITALIA *Group*

| Fano | Forlì |