TMACS ENGINE

Team Maritime Alarm & Control System





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For any sized vessel, it is necessary to have a functional, and reliable automation system to increase safety onboard and simplify day to day tasks. With these principals in mind, we have developed a modern alarm and control system, TMACS Engine. The system is very scalable, and can be adapted to almost any vessel. With remote gateway installed, most troubleshooting and software updates can be done without the attendance of a service engineer. We in Team Maritime are experts on refit and retrofit.



Key benefits

- Secure remote connection for support and updates
- Zero system downtime with redundant controllers
- Fully integrated with TMACS Cargo and PMS.
- Easy installation and easy to use
- Class Certified Products (e.g. DNV GL)
- Security Certified Product
- Availability and competitive pricing of spare parts
- Safe and simple back-up / restore
- System fully **functional** during updates
- Competitive pricing

Functionality

- Pressure & temperature measurement
- Tank level measurement
- Exhaust gas monitoring with deviation view
- Flooding and bilge system
- Light control
- Draft, trim/list indication
- Bunkering control system
- Fuel oil transfer system
- Valve control, pumps, PID-controllers
- Watch Calling Alarm System (E0)
- Dead Man Alarm System

Scalability

TMACS Engine can be delivered with two different solutions for HMI. For smaller systems, a web server is the most reasonable option, while for larger systems with demands for trend history, SCADA is the recommended solution. SCADA communicates with the PLC through the OPC UA protocol and can store trend data up to a year back in time (Longer periods can be stored upon request). The mimic pictures are tailor made to suit customer's preference regardless of chosen solution. **TMACS Engine** can be delivered with controller redundancy, or as a standalone controller system, depending on the application of the system.

Watch call alarm system (EO)

TMACS Engine has an integrated watch call system which is used for managing on-duty selection and indication. The integrated watch call system satisfies the E0-classification for watch calling systems.

Panels

ECR panel

The ECR panel is the main panel in the system. It has an alarm page, limit page, fault page and the watch calling system. The watch calling system contains functions for selecting engineer on duty or ECR watch, call all engineers and harbor mode. It also has indication for system failure.

Bridge panel

The bridge watch panel has indicators for indicating engineer on duty or ECR watch, call all engineers, harbor mode, cabin ack, repeat alarm, system failure and group alarms. Additionally, the panel has an alarm list showing the 3 most recent alarms.

Engineer panel

The engineer's panels have indicators for Group alarms, engineer on-duty, harbor mode, system failure, call from engine and call from bridge.

All panels

The extended alarm is also programmed so that each panel can have an external buzzer in addition to the integrated buzzer in the panel. At night or off duty, each panel has a "Dim light" button for turning off the backlight on the panel. Each panel can be designed for the actual vessel.









Topology – Redundant Control Topology

TMACS Engine is a modern and highly flexible alarm and control system for your vessel. Based on our TMACS 1000 platform. The TMACS Engine system uses operator stations, controllers and remote I/O units (RIO). The controllers process all data, while RIOs are used for distributed inputs and outputs. The equipment can be placed all over the vessel to reduce cabling. In addition to this, it is possible to operate the system from multiple locations. The operator stations and the controllers are redundant to minimize the downtime of the system. Most software updates can be done on the controllers without affecting any running processes. Our controllers support a wide range of industrial protocols including ASAP, Modbus TCP, CAN bus and OPC UA. TMACS Engine is always delivered with remote connection for service and support.

Following is an example of a redundant system:

- One pair of redundant controllers with double network connection.
- Both controllers run simultaneously, where one is master and the other is standby.
- The master controllers detect errors on the standby controller and the RIOs. It also runs network diagnostics to the operator stations.
- I/O data and control functions such as state of pumps are continuously synchronized to standby controller.
- "Bumpless Changeover" on RIOs. The RIO units are not affected if a master controller fails. The standby controller immediately takes over the control of the RIOs. The system is therefore unaffected by a master failure, but the operator will be alarmed of the event.



Warm Standby Controllers

With the redundant option, TMACS Engine is equipped with a minimum of two redundant master/standby controllers. These controllers are identical, and contains the exact same software and configuration. A modern synchronizing routine makes sure that the standby controller receives all data necessary such that if an unforeseen event occurs (Such as a power failure on the master controller), the standby controller will automatically take control of the processes and continue with the exact same data as the master had before the failure. This makes sure that all ongoing processes on the vessel and communication to third party equipment such as engines and frequency drives is maintained. The controllers are of high maritime standard with a high processing capacity to ensure safe operation of the system.

Secure remote maintenance

We always include remote access opportunity as a part of our delivery. This can be used for support, updates, assistance, maintenance or analysis and reduces service and travel costs. The connection is established through a VPN tunnel to a highly secure gateway on site. The unit can block any incoming connections with a simple key switch.

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#### SECURITY CERTIFIED

Our remote solution is security certified according to IEC62443 standards. The solution is designed uniquely for the Automation Industry to meet both operational technology and IT requirements with security at its core.







#### **Navigation Light Control**



Navigation light control for a 15m vessel. Includes time counters and alarm for replacement of bulbs. System also delivered with ballast and bilge control.

#### **Power Management Control (PMS)**



TMACS PMS delivered as an integrated part of TMACS Engine. Can also be delivered as stand alone.

#### **Main Engine Overview**



TMACS Engine replaced an older alarm system on a 64m vessel as a refit project. The entire commissioning of the system was performed remotely from our head office.

#### Monitoring of exhaust with deviation



Monitoring of exhaust temperatures with deviation alarms and customized start/stop of standby and pre lubrication pumps.









