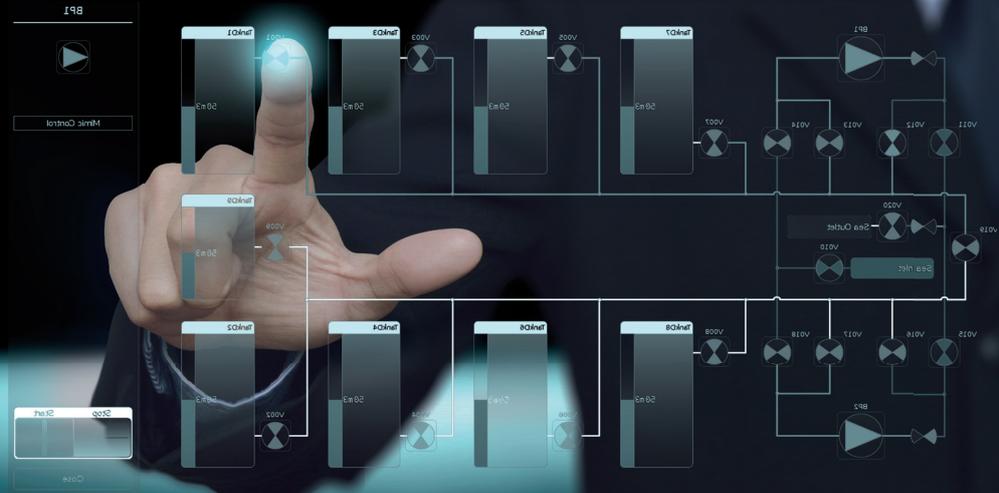


Marpower Ballast Control System (BCS)



How do you maintain stability during navigation? The Marpower Ballast Control System automatically regulates the pumping of ballast water between tanks. For optimal stability and depth of the ship, in length and width direction. Manual ballast operations remain possible in every situation.

The Marpower Ballast Control System contributes to a stable ship; even when on-board crane activities are deployed. Ballasting or de-ballasting will be done by means of using gravity as a source, or with use of active pumping capacity. The system controls pumps and valves and monitors the tank levels. The intake of ballast water takes place at a central location. From this location, a total overview of the system with all essential parameters will be available. Set points and alarm levels are adjustable, which helps the officer performing his tasks. The system will be designed with fail-safe procedures as a standard.

The Marpower Ballast Control System can be integrated in the Marpower Automation System (MAS). Modules can be added to the basic setup, which provides a complete information system for complete control of the ship. We call this our Total Ship Automation concept (TSA).



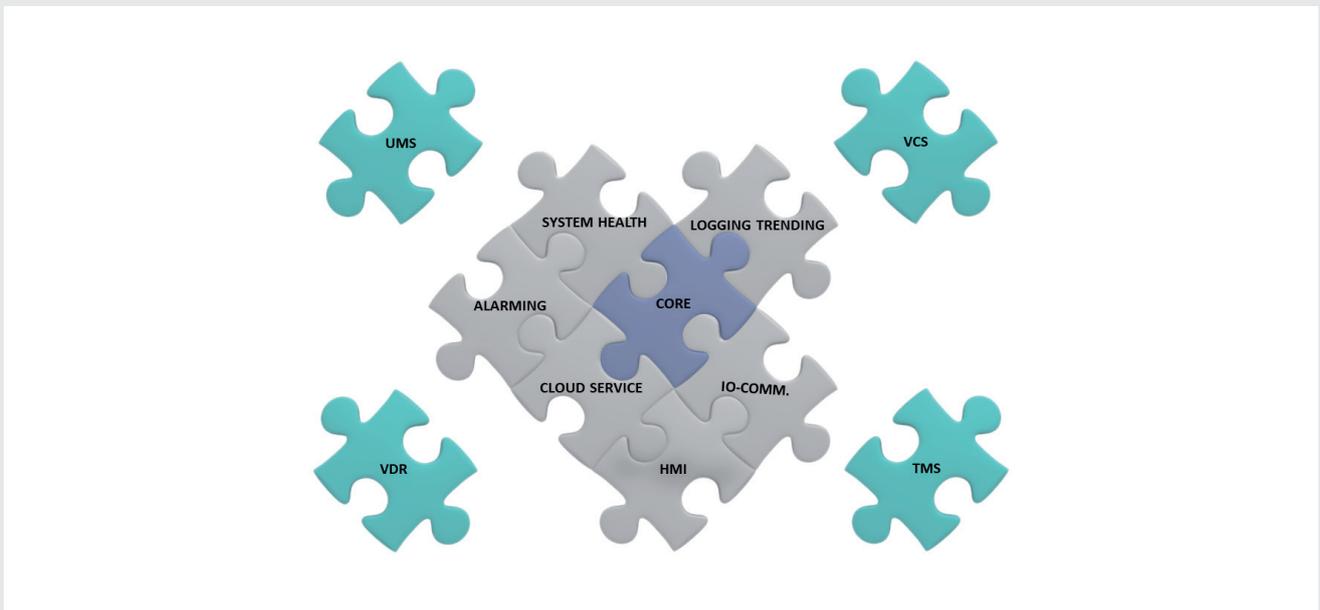
Advantages of the Marpower Ballast Control System

- ✓ Stabil vessel, even with on-board crane activities
- ✓ Overflow monitoring
- ✓ Dry running monitoring
- ✓ Overload monitoring
- ✓ Cavitation- and work space limitation of pumps
- ✓ Adjustable set points
- ✓ System path tracing possible
- ✓ Integration of Ballast Water Management System possible
- ✓ Automatic bilge system integration possible

A Ballast Control System (BCS) is more than just controlling a few valves and pumps. Every ballast system is tailor-made and therefore also the control system which is attached.

A BCS basically needs a complete MAS system with the modules Valve Control System and Tank Monitoring System. The properties of these systems also apply to this application. The valves and pumps are visualized on the mimics and operated via the screen. The intervention of the ballast system will be determined by the trim and list measurements. A BCS has the

possibility to limit the operation by an authority level check. The control can be claimed via a control-take-over procedure. An automatic system must be equipped with sensors for trim and or list. Manual control is possible in every situation. Pumps that require operate within their working area, can be protected by the system. Cavitation protection and measurement can be part of pump control curves. The limitations and specifications of the manifold must also be taken into account, so the system can be set-up to limit the maximum transit speed of the discharge pipe.



Marpower is a brand name for automation systems, frequency converters, electronics and power converters which are produced in-house.

The Marpower Automation System is a flexible and scalable platform for alarming, monitoring and control of systems. The graphical user interface is intuitive, user-friendly and scalable, it can be adapted to user specific requirements. A unique feature of the Marpower Automation System is ability to configure the system in a multiple redundant configuration. In addition, the software components are hot-standby, so seamless redundant services can provide an optimal user experience in case of a system failure. The minimum system consists of 2 industrial workstations or industrial panel PCs, combined with PLC hardware and remote I/O.

The Marpower Automation System can process large I/O amounts (> 10000) without losing reaction speed. With optimum tuning of the system components via a gigabit network, reaction times of 250 ms maximum can be realized. The system is executed from a Linux environment for optimum speed, stability and security. Due to this operating system, no licenses are needed for our software. Another advantage is the use of commercial off-the-shelf hardware which is world-wide available. With the Marpower Automation System, a suitable solution can be offered for each ship, from coaster to cruise ship!

Marpower Automatising System

- BCS - Ballast control system
- EMS - Energy management system
- FOMS - Fuel oil monitoring system
- PMS - Power management system
- TMS - Tank monitoring system
- VCS - Valve control system