

Marine and Offshore



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Dosch Design, processed

MARINE AND OFFSHORE

WAGO, Your Reliable Partner for Marine Technology

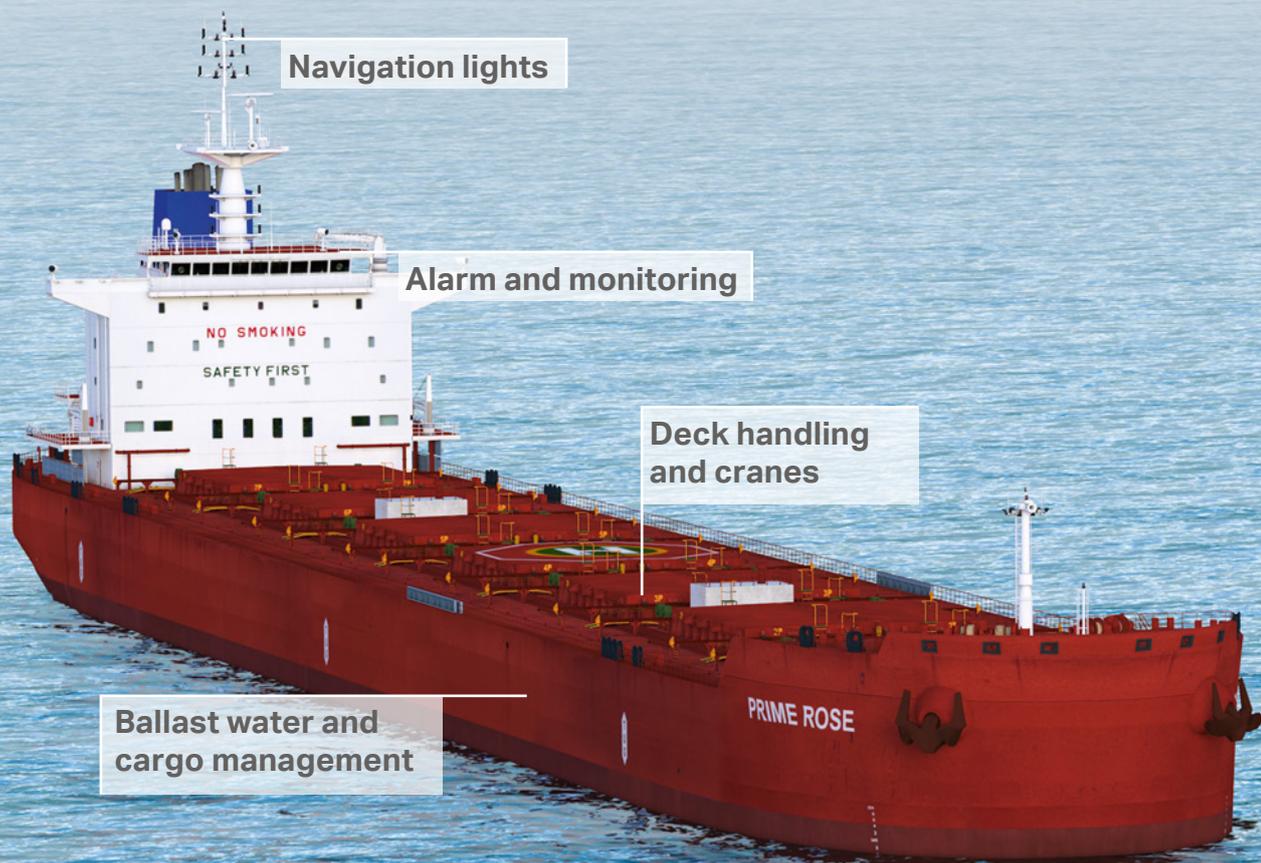
Safe, reliable and robust components – tested, verified and certified

Whether freighters or mega-yachts, all types of ships face the same tough requirements at sea. Our automation and connection technologies meet the most challenging requirements on the high seas. As confirmed by seals from the classification societies of the IACS Association, WAGO

products have proven their strength and durability, ability to withstand extreme temperatures and electromagnetic compatibility (EMC), as well as vibration and shock resistance.

These same components also fulfill the requirements for hazardous environments in accordance with IECEx and other local legislation.





Navigation lights

Alarm and monitoring

Deck handling and cranes

Ballast water and cargo management

Dosch Design, processed

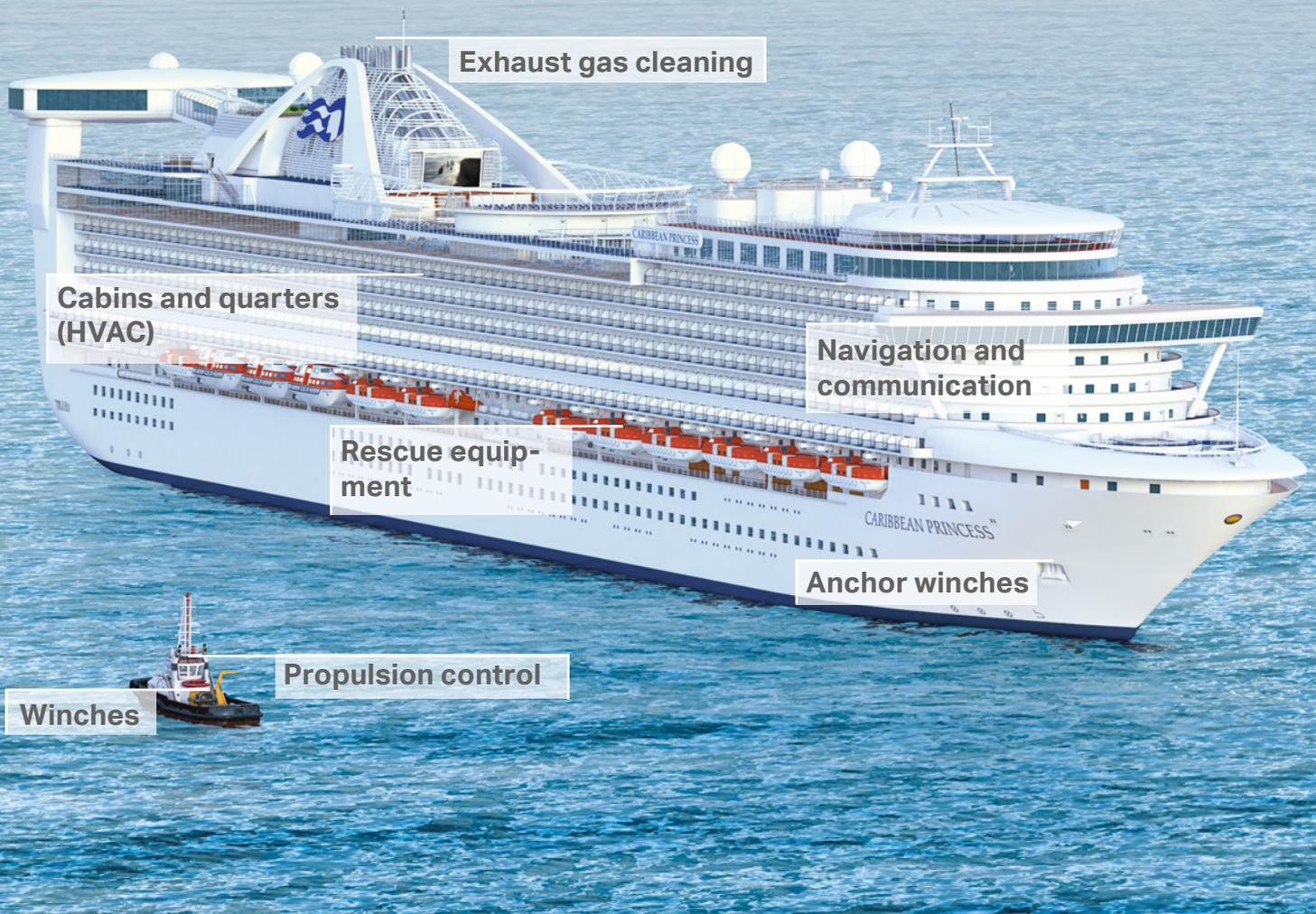
From the Bridge to the Engine Room

WAGO is at Home in All Applications.

From the bridge to the engine room – automated and reliably connected with WAGO

Our marine automation and offshore sector products automate nearly every application on board. Propulsion automation, auxiliary and deck machinery, navigation and communication equipment: Every application has its own special requirements. The solutions for continually meeting all of these requirements: WAGO relays, optocouplers, signal conditioning modules, power supplies and network switches.

The TOPJOB® S Rail-Mount Terminal Blocks cover conductor sizes from 0.08 to 185 mm² – this creates a broad platform for electrical connection technology in marine applications. The same also applies to more than 500 modules found in the WAGO-I/O-SYSTEM 750. Special certificates (BSH, near the compass) enable these components to be used everywhere from the bridge to the bilge.



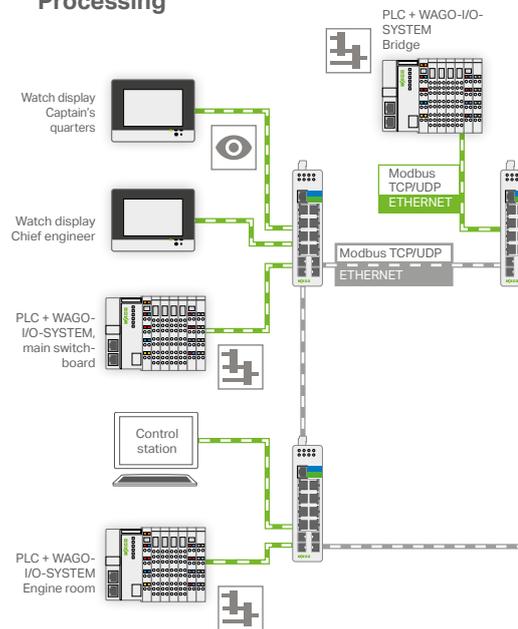
SAFE AND RELIABLE IN ALL APPLICATIONS

- Bridge approval based on IEC EN 60945
- Classified for extreme environments (approved for use in the engine room)
- Low storage and training costs
- Broad application scope for the WAGO-I/O-SYSTEM 750



shutterstock.com/Jeanette Dietl

Topology of a Ring-Network-Based Alarm Processing



ALARM AND MONITORING SYSTEMS

All Signals in View – Ship Monitoring with WAGO Products

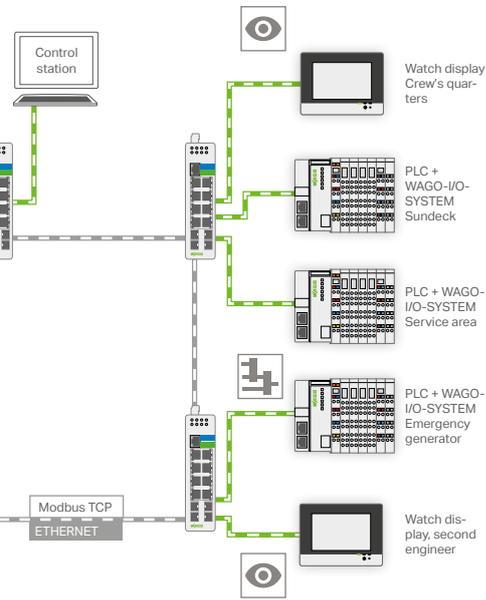
Collecting, processing and visualizing data, as well as generating alarms – routine, yet important, tasks that the WAGO-I/O-SYSTEM handles easily.

As an engineering planner, you can implement any conceivable configuration in different network topologies using the modular components from the WAGO-I/O-SYSTEM 750. Whether you are configuring decentralized intelligence or a central control system with a powerful PLC or using digital and analog signals for valve control, or creating light scenarios for a pleasant ambience, our comprehensive automation portfolio lets you create custom solutions.

The **e!COCKPIT** engineering platform supports you throughout the entire life cycle.

Mapping entire topologies and processing multi-controller systems is perfectly compatible with the processing of alarm and monitoring systems with up to 10,000 measuring points. Visualization is based on HTML5 and can be displayed on WAGO displays or mobile devices.

Alarm and Monitoring System with Distributed



Works photo, besecke

ALARM AND MONITORING SYSTEMS

- Modular, distributed
- Bus-independent, scalable
- Network technology and automation from a single source





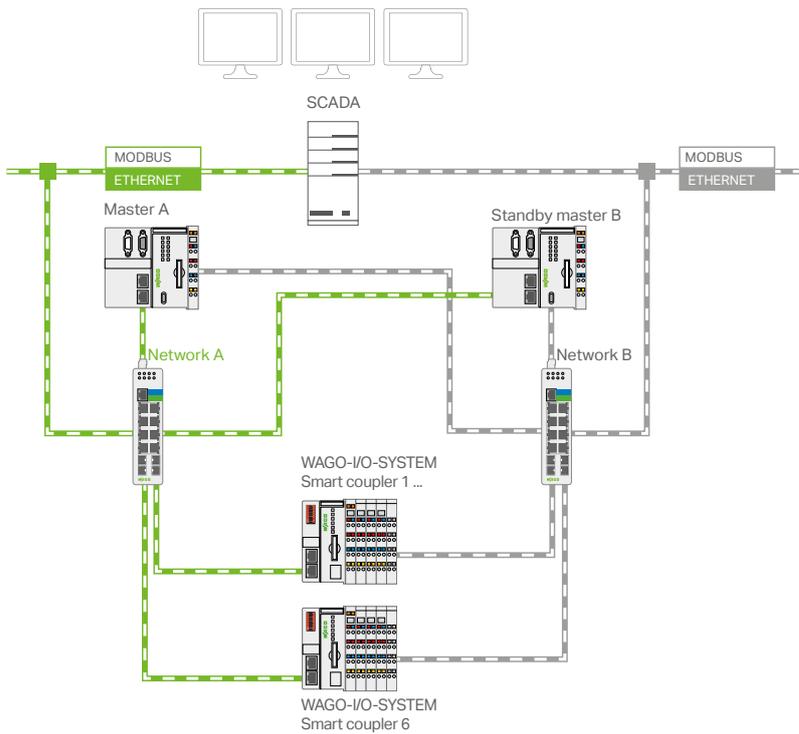
HIGH AVAILABILITY ON STANDARD COMPONENTS

Application-Based Controller Redundancy

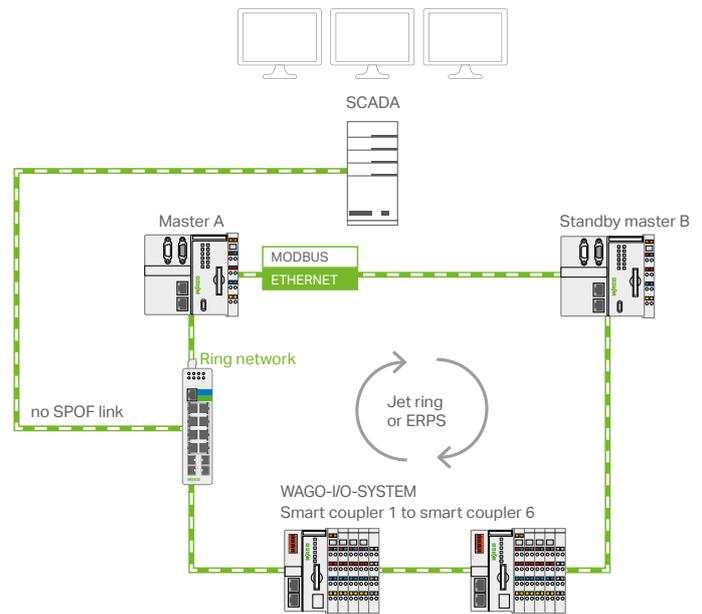
Redundant, but not superfluous – increase availability using two parallel controllers. WAGO's **e!COCKPIT** engineering software tool is the programming environment for the controller. The multi-node programming environment can easily transmit the PLC program to both PLCs. For the application-based controller redundancy to be used, a software library with the necessary synchronization functions must be linked into the master PLC. The library offers the option of redundantly linking subnodes via dual LAN. The subnodes, also known as smart couplers, do not have to be programmed; they are simply booted from an SD card and then configured using an integrated webserver. The analog input/output modules and digital input/output modules are detected automatically by the smart coupler; the process image is also automatically made available to the higher-level master PLC.

The master PLCs can communicate with higher-level SCADA systems via the Modbus TCP protocol. The redundant connection is performed over two separate networks.

The solution's design corresponds to an SPOF-tolerant system, which means that any occurring fault – like a failure of the voltage supply, LAN connection, switches or controller – can always be compensated for. Doubling the ETHERNET topology and the redundant message transmission enables bumpless switching during a fault in the network. Typical switching times after the failure of a PLC are within the requirements of DNV GL when used in typical alarm and monitoring systems.



Controller redundancy in the DUAL LAN



Controller redundancy in the RING LAN

An ETHERNET network can be designed as a dual LAN network or as a ring. The dual LAN network enables bumpless switching, but is associated with increased cabling costs.

Ring network protocols are more economical alternatives; however, these usually require longer switching times from the system. Switching times for the familiar redundancy protocols of office networks (STP, RSTP, MSTP) are cold redundant at best – they typically require more than two seconds. A standardized, manufacturer-independent ring protocol that enables switching in less than 200 ms is ERPS.

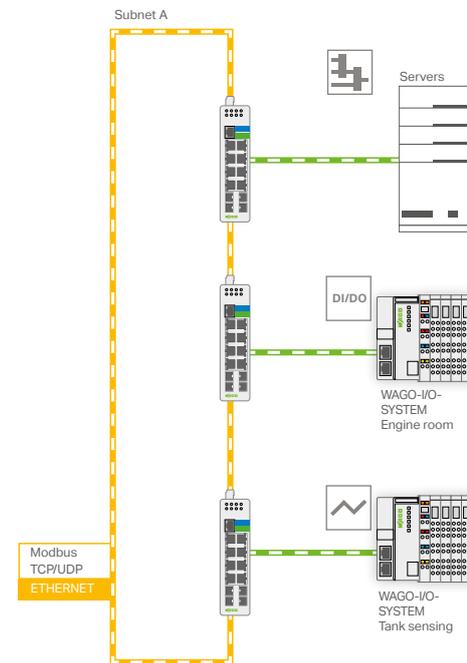
Based on the Modbus TCP protocol, this solution is already used in alarm and monitoring systems. What makes this redundancy solution special? Extremely simple commissioning of the entire system using WAGO's standard hardware. For WAGO customers, this represents tremendous cost savings during the system integration of their automation system.

	DUAL LAN	RING LAN (ERPS)
Network	Uninterruptible	200 ms
PLC	200 ms	200 ms
System	200 ms	200 ms

Switching time



Topology of a tank ballast system with a d



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PERFECTLY IN BALANCE

Automation for Tank Ballast and Cargo Management Systems

Maintaining stability in rough seas is vital for freighters.

A reliable tank ballast system is a ship's insurance against incorrect trim, heel or draft. The anti-heeling system can automate a number of steps for this essential function. Rapid loading and unloading can be dramatically simplified with an automated cargo management system. Ensure that processes run down safely in the event of a fault with a WAGO automation-equipped emergency shutdown system. This solution for protecting people and the environment has long been

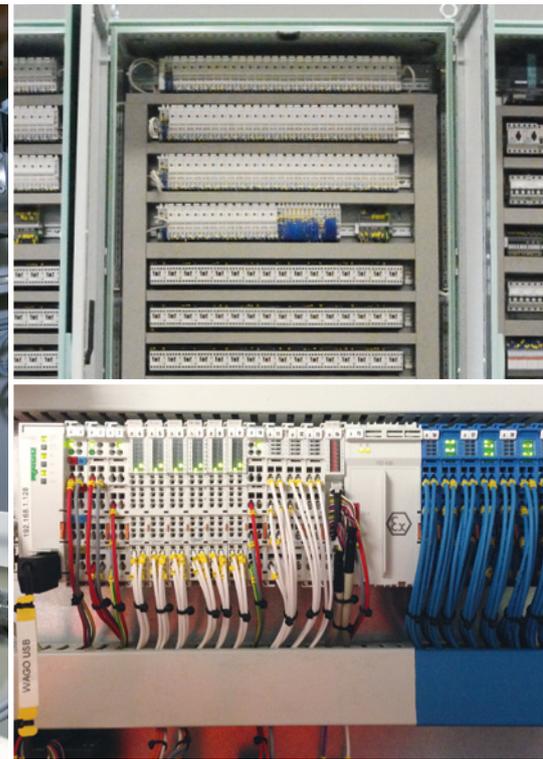
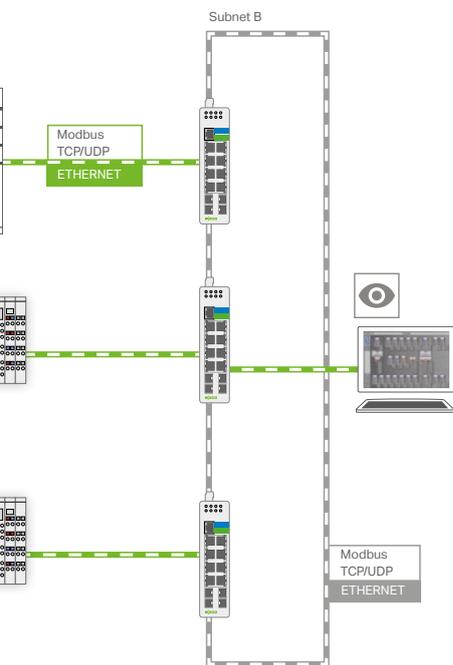
standard equipment for German- and Italian-built cruise ships. Globally, the shipping industry has made the protection of native species an increasingly important issue. Microorganisms are transported from one biosphere to another in ballast water and can upset nature's delicate balance. The IMO Convention for the treatment of ballast water has defined limits for this that can only be achieved using filtration systems. A modular, efficient and effective setup with WAGO components will help you minimize the additional costs associated with this.

TANK AND BALLAST SYSTEMS

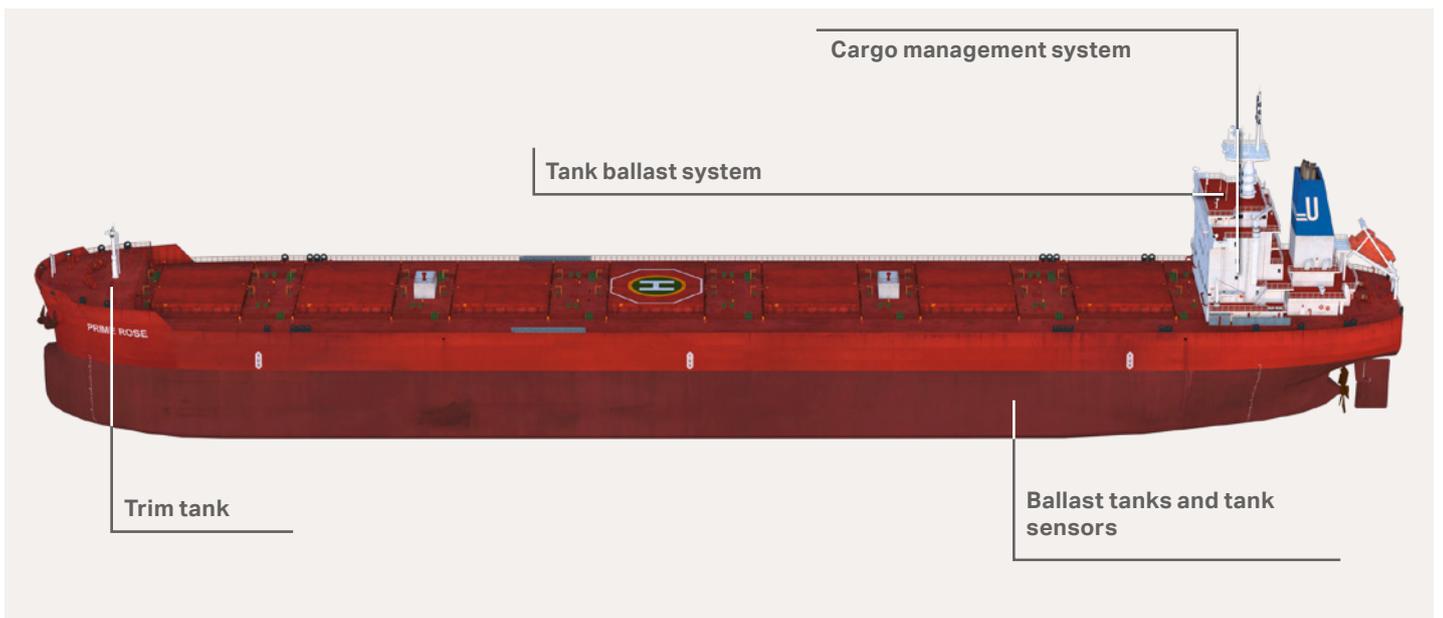
- General purpose use
- Distributed, modular and approved for use on ships
- Visualization with a differentiated authorization concept

Cargo management	Anti-heeling system	Alarm and monitoring system	Emergency shutdown systems
Tank ballast control	Tank measurement system	Ballast water treatment	Quick release valve controllers
Valve, pump and tank sensing probe		Pumps, filtration system	SOS valves

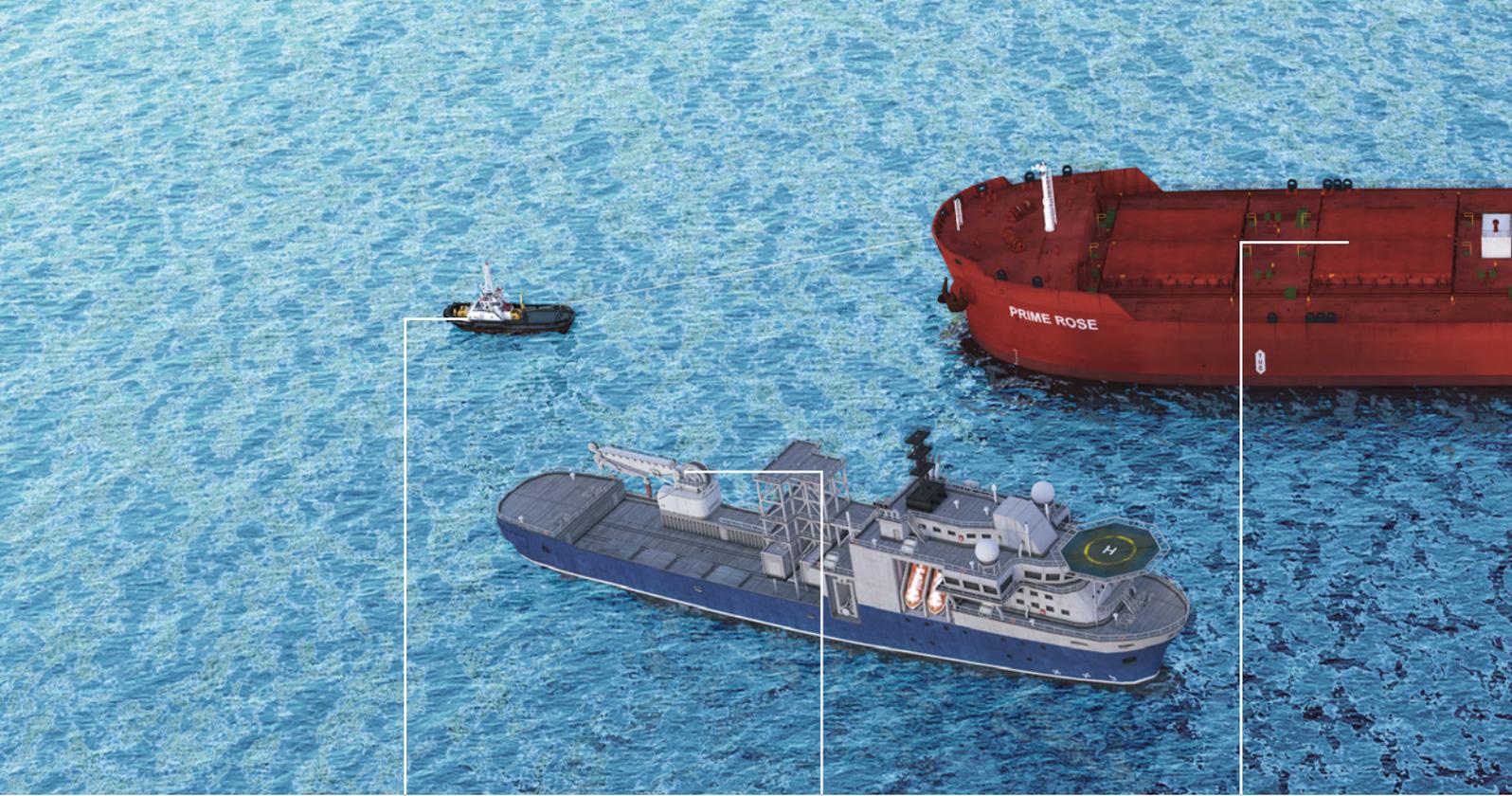
ual ring and central processing



Left: Works photo, Besi; upper right: Besi, lower right: MIFO



Dosch Design, processed



Dosch Design, processed



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DECK AND CARGO HANDLING

Closed Hatches and Secured Cargo

In rough seas or in environmental protection zones, modern tugboats must escort larger ships safely into port.

Time is money – in the truest sense of the word – and you have a competitive edge when you can offer your services as frequently as possible and nearly “around the clock.” Highly automated winches and machines on deck provide the best possible protection when maneuvering at sea. The

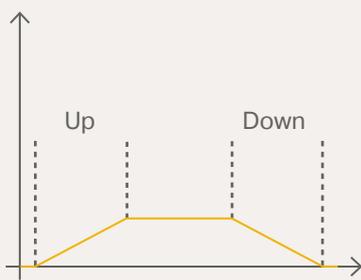
same holds true for loading and unloading using cranes and gangway systems on offshore wind farms or oil drilling platforms. One highlight here is the direct control of proportional valves, making expensive valve drives and proprietary solutions a thing of the past. Parameterization moves into automation at the point where the tool chain is available anyway.

DECK AND CARGO HANDLING

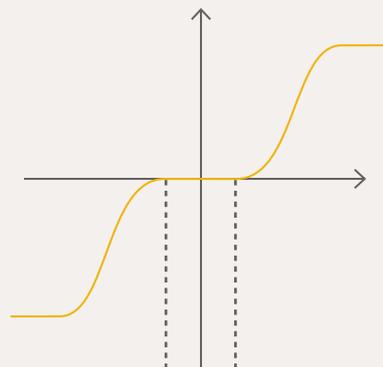
- Direct valve control from the WAGO-I/O-SYSTEM
- CODESYS controller library
- Parameterization of proportional valve modules via WAGO-I/O-CHECK



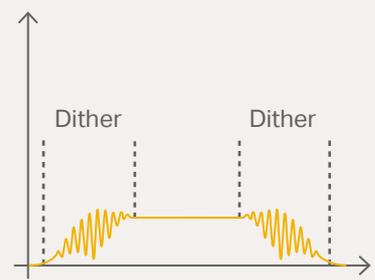
Setpoint ramps



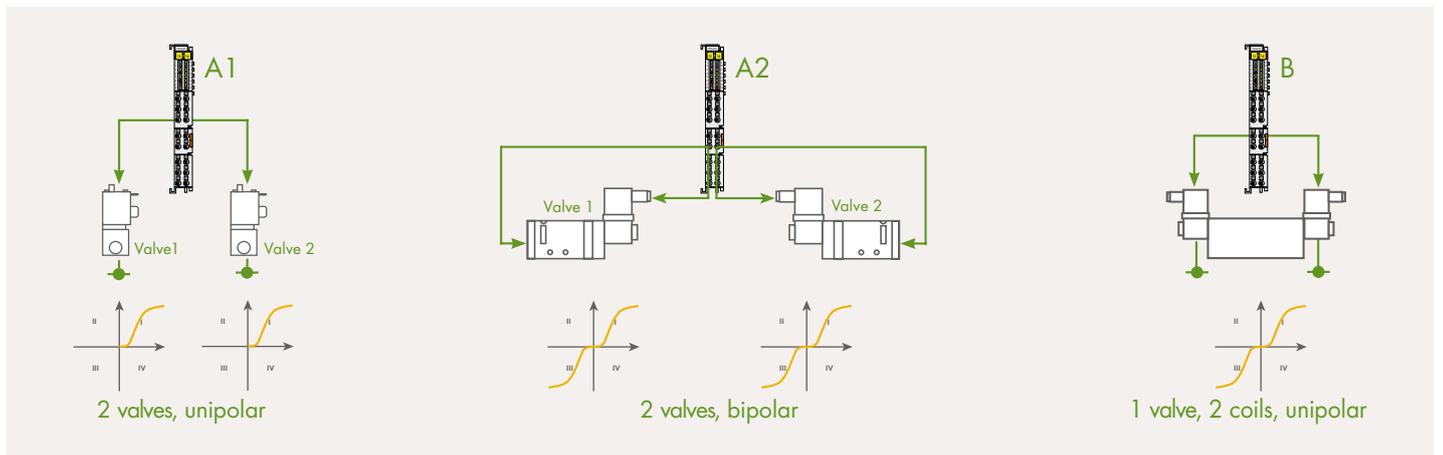
Valve adjustment

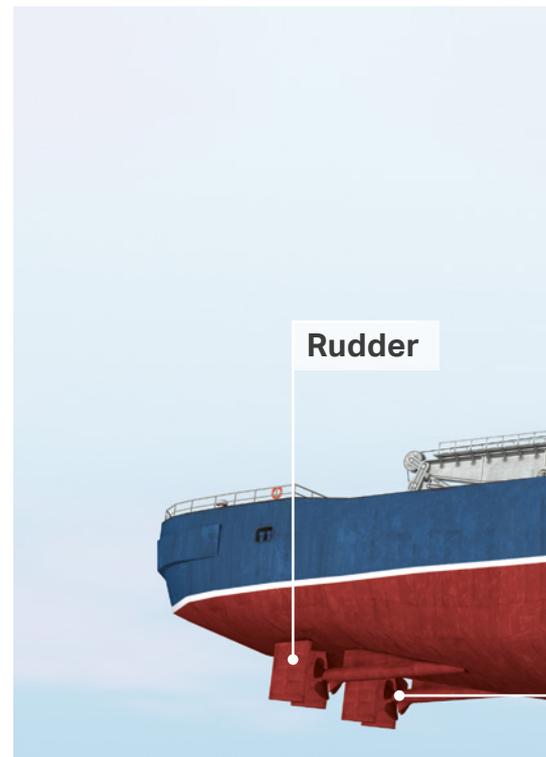
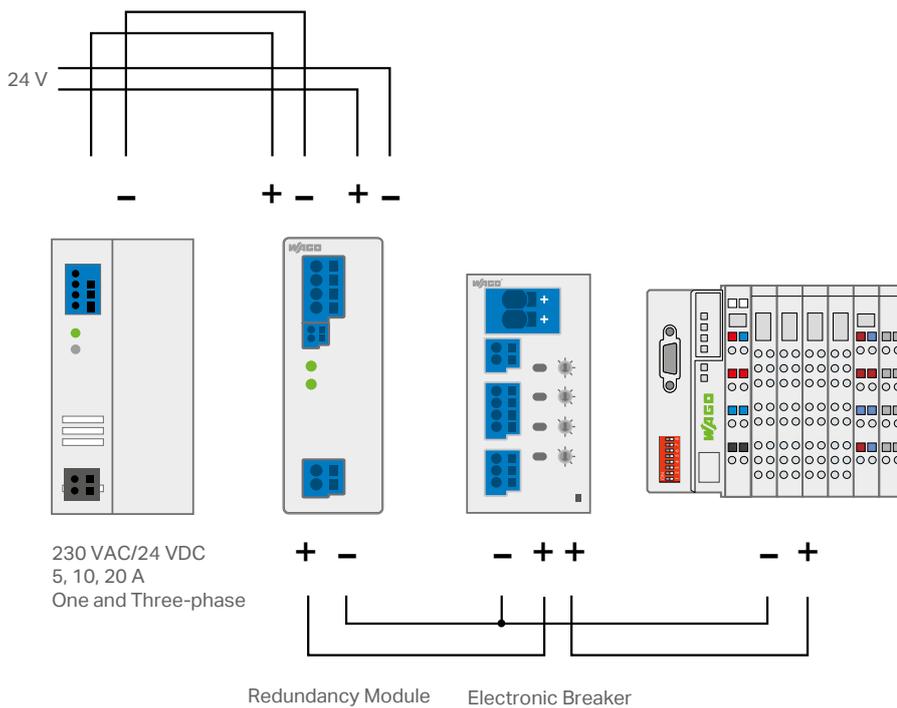


Dithering



Operating Modes





Dosch Design, processed

FULL SPEED AHEAD

**Whether a Diesel Engine with Exhaust Gas Cleaning or a Hybrid Propulsion System:
The Propulsion Automation Comes from WAGO.**

Marine propulsion technology is being put to the test.

Trends such as slow steaming, dual fuel, exhaust gas reduction, hybrid propulsion and LNG as fuel entail requirements that are increasing powertrain complexity. In this light, demands for intelligent automation solutions make perfect sense. The portfolio for the intrinsically safe WAGO-I/O-SYSTEM 750 enables you to automate LNG propulsion systems or retrofit scrubber and filter systems for exhaust gas reduction. The 750 XTR Series components are specifically fortified for use at particularly high or low ambient temperatures,

with extreme vibration or under EMC conditions. Our power supply modules are designed for more stringent availability and reliability requirements. In the event of a fault, single- and multi-phase power supplies and buffer modules ensure automation system availability. Protection of the secondary circuits is conveniently provided via remote-controlled electronic fuses. Energy test terminal blocks for diesel electric drives and a rich portfolio of signal converters and signal amplifiers complete the range.



Exhaust gas cleaning

Power management

Propulsion control

MARPOL Annex 6: Fuel Sulfur Content		
Time	Upper limit for fuel sulfur content (%)	
	SOx ECA*	Rest of World
2000	1.5 %	4.5 %
July 2007	1.0 %	
2012		3.5 %
2015	0.1 %	
2020 **		0.5 %

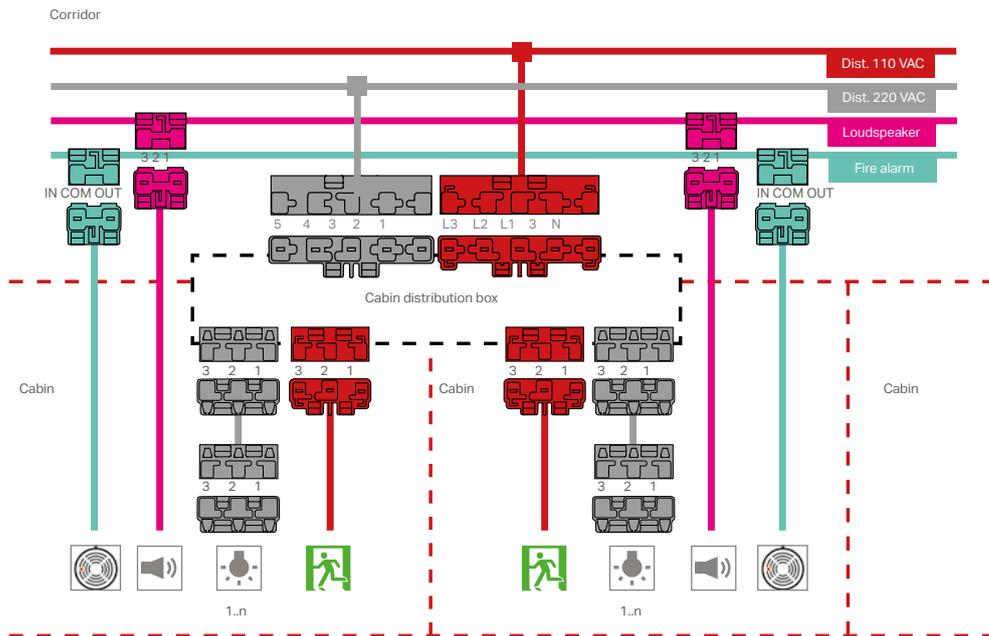
MARPOL Annex 6: Nitrogen Oxide Emission Limits				
Tier	Time	NOx limit g/kW		
		n < 130	130 <= n < 2000	n >= 2000
Tier I	2000	17.0	45 * n ^{-0.2}	9.8
Tier II	2011	14.4	44 * n ^{-0.23}	7.7
Tier III	2016 *	3.4	9 * n ^{-0.2}	1.96

Overview of exhaust gas standards



The WAGO-I/O-SYSTEM 750 XTR is temperature-resistant from -40 °C to +70 °C and vibration-proof up to 5 g while featuring high impulse-voltage withstand according to EN 60870-2-1.

- PROPULSION AND RUDDER SYSTEMS**
- Intrinsically safe modules for sensors in Zone 2
 - Marine-compliant power supply design
 - Signal conversion and automation from a single source



Ingrid Fiebak-Kremer

CABIN DISTRIBUTION

The Floating Hotel – Safety and Functionality

Cruises are becoming more and more popular, prompting a justifiable rise in demands for comfort and safety.

The WINSTA® Pluggable Connection System for electrical distribution contributes to the safety and reliability of onboard plugged connections. The plugs are pre-assembled under carefully controlled conditions in the workshop – a win-win situation, enhancing wiring quality and minimizing expensive on-board installation times. Whether for cabin distribution or the dining area, lighting manufacturers are relying more and more on pluggable PCB connectors from the WINSTA® line. The WINSTA® product line is supplemented with the pluggable X-COM®-SYS-

TEM for rapid plugging within the control cabinet – two products that complement each other perfectly.

The benefits of the WAGO-I/O-SYSTEM are also evident in cabin distribution boxes: Easily program switching and control functions using WAGO's comprehensive function libraries.

Use WAGO's e!COCKPIT Engineering Software to easily program and start up multi-controller systems. The new object orientation prevents repeating errors, while improving reusability of existing code.

CABIN INSTALLATION

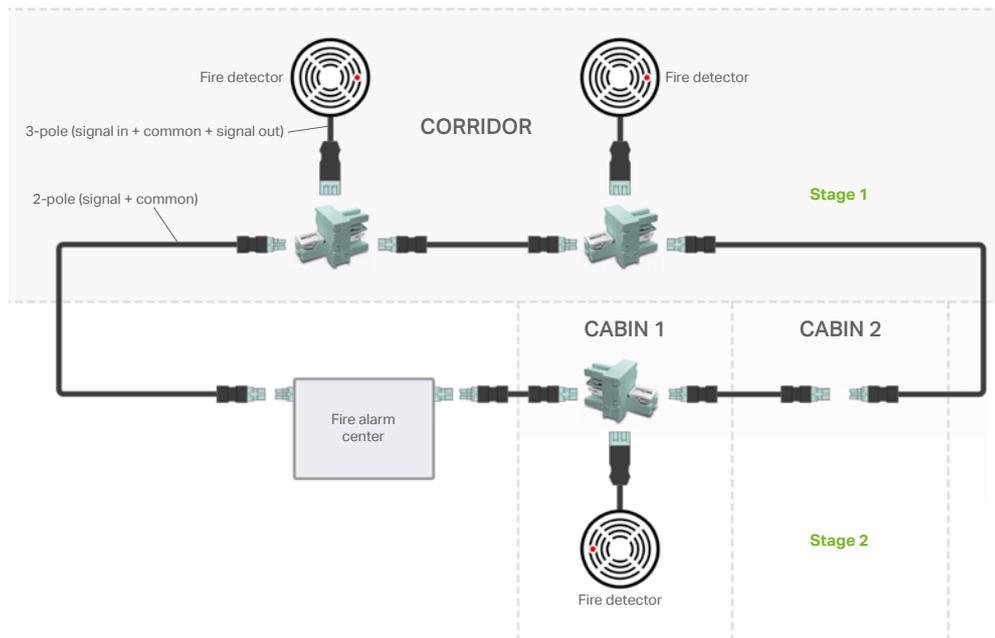
WINSTA® and X-COM®-SYSTEM:

- Color-coded
- Mechanically coded
- Reduced costs for on-board electrical installations

CABIN AUTOMATION

WAGO-I/O-SYSTEM:

- Modular and distributed
- Access to building automation libraries
- Flexible solution for various signals and bus protocols



The fire alarms are installed in two stages for the same loop:

- Stage 1:** During commissioning: installation of all fire alarms, or every other fire alarm, in the corridors
- Stage 2:** Subsequent connection of in-cabin fire alarms possible during commissioning

FIRE ALARM SYSTEMS

Pluggable Solution for Fire Alarm Systems

Convenient installation of fire alarm systems

The WINSTA® pluggable connector system for modern marine engineering offers a simple, economical and efficient solution for the manufacturers of fire alarm systems on ships and cruise shipyards: The loop permits pluggable connection of the fire alarm system loop for the first time. WAGO's flexible system also allows subsequent connections, e.g., for additional fire alarms installed in cabins, without extensive downtime.

The system is perfectly tailored to the requirements of on-board fire alarm systems and coordinated with DNV GL with a focus on the MED Directive. All components are DNV GL-approved (further approvals upon request).

BENEFITS

- Simple pluggable connection of an additional fire alarm within the line
- Time-consuming, on-board wiring replaced by plug-and-play configured cables
- Simple setup of a temporary fire alarm network at the time of commissioning



DGzRS/Helmut Hofer

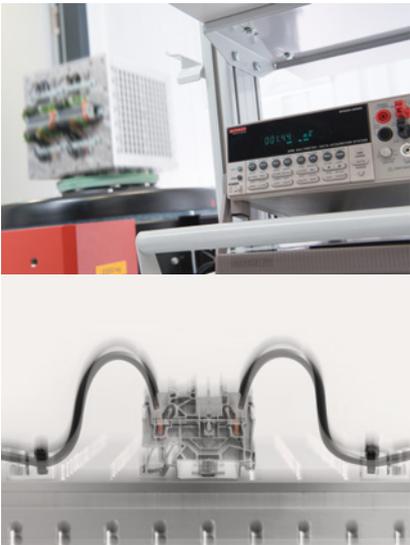
OUR LAB TESTS

Tough Challenges in Rough Seas

Quality comes from experience and uncompromising attention to detail.

As the world market leader and inventor of screwless connection technology, we offer the industry's broadest range of rail-mount terminal blocks with spring pressure connection technology,

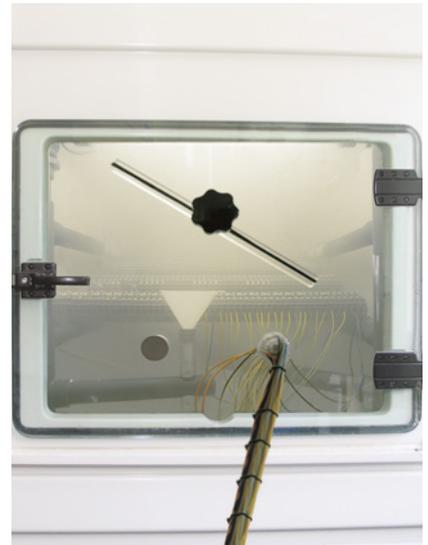
accommodating conductors from 0.08 to 185 mm² (28–4/0 AWG). We can boast that years of experience have proven that our maintenance-free spring clamp connections remain secure – even after 35 years!



Vibration test



Climatic chamber



Salt spray test



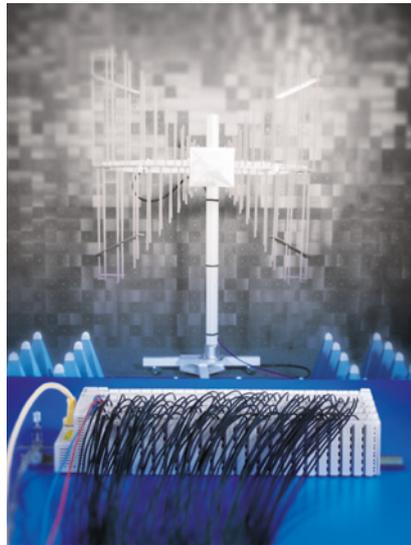
Proven quality thanks to certified processes and products

We don't just promise that our products meet the highest quality demands – you also get this in black and white as internationally recognized

certificates. In addition to the requirements of DIN ISO 9001:2000 and ISO 14001, WAGO also meets the necessary maritime approvals: DNVGL, ABS, LRS, BV, KRS and classNK



Gastight clamping unit



EMC tests

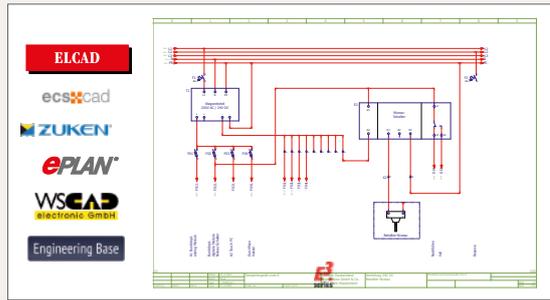
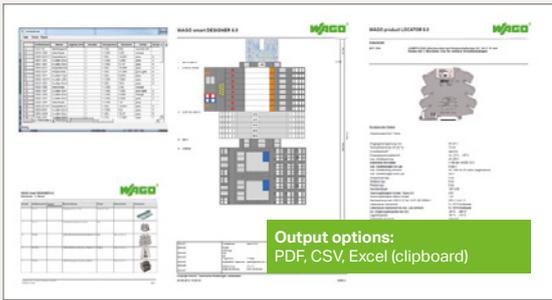


Temperature test

Planning

Export/import

CAD data download

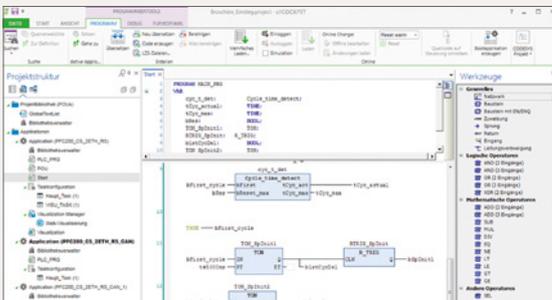


e!COCKPIT

Programming

Visualization

Configuration



THE WAGO TOOL CHAIN

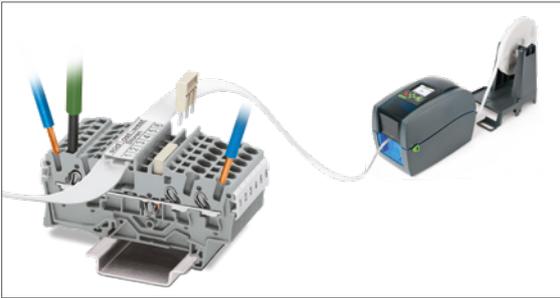
Full Support – from Planning to Commissioning

Rapid engineering is essential for success in today's globally networked world. You must adapt to your customers' needs and demands in order to tap into new markets and outperform competitors. WAGO supports you in these efforts with an end-to-end tool chain.

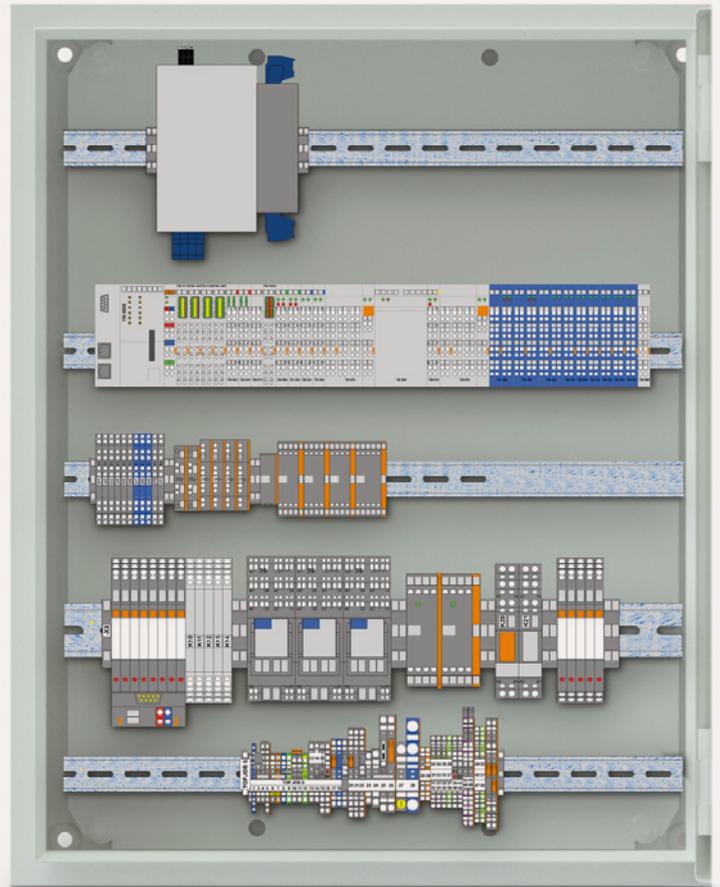
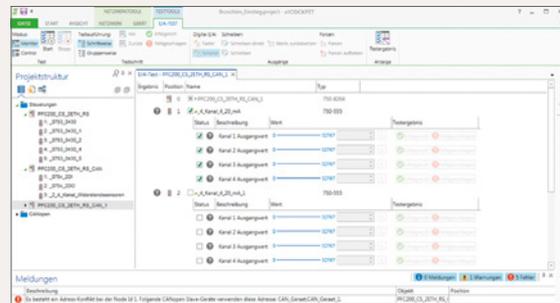
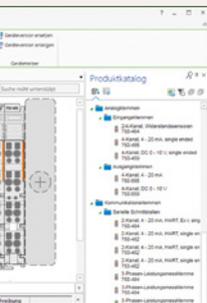
e!COCKPIT invites you to discover an overview of your entire project – from graphic network design up to the parameterization and diagnostics of the WAGO-I/O-SYSTEM 750, standards-compliant programming in CODESYS 3.5 and modern visualization in HTML5.

smartDESIGNER accompanies you in every phase of control cabinet construction – with bidirectional interfaces to CAE systems, smartPRINTER and of course WAGO's eShop. As a result, the management of master data and parts lists is performed at a single point.

Marking



Diagnostics



Continual Support

- e!COCKPIT for integrated engineering in automation
- smartDESIGNER for the life cycle of a control cabinet
- Seamless integration into CAE systems



PROVEN AND RELIABLE

Innovation – Quality – Safety

Quality Through Experience and Attention to Detail

- QA is integrated into the manufacturing process
- 100% testing for proper operation
- In-house, accredited laboratory for internal electrical and mechanical testing on terminal blocks and connectors, as well as for environmental simulation per DIN EN ISO/IEC 17025
- In-house accredited EMC laboratory
- Worldwide approvals

Proven Quality Thanks to Certified Processes and Products

- DIN ISO 14001:2004 certificate
- DIN EN ISO 50001 energy management certification
- DIN ISO 9001:2008 certificate
- IRIS certificate
- KTA approval for select products



ZERTIFIKAT • CERTIFICATE • CERTIFICADO • CERTIFICAT


Management Service

ZERTIFIKAT

Die Zertifizierungsstelle
der TÜV SÜD Management Service GmbH
bescheinigt, dass das Unternehmen

WAGO
WAGO Kontakttechnik GmbH
(nach Schweizer Recht) & Co. KG
Hansastr. 27, 32423 Minden, Deutschland
einschließlich der Standorte gemäß Anlage

für den Geltungsbereich

ELECTRICAL INTERCONNECTIONS
Entwicklung, Produktion und Vertrieb von Klammern, Klemmkästen und Steckverbindern mit Federklemmtechnik für die Elektrotechnik und Elektronik

AUTOMATION
Entwicklung, Produktion und Vertrieb von Komponenten & Subsystemen für die Automatisierung von Maschinen, Anlagen und Gebäuden auf der Basis von Feldbusystemen, steckbaren und schwenkvorstellbaren Interface Bauelementen

ein Qualitäts- und Umweltmanagementsystem eingeführt hat und anwendet.

Durch Audits, dokumentiert im Auditbericht (Bericht-Nr. 70024958), wurde der Nachweis erbracht, dass diese Managementsysteme die Forderungen folgender Normen erfüllen:

ISO 9001:2008
ISO 14001:2004

Dieses Zertifikat ist gültig vom 2013-11-04 bis 2016-11-01.
Zertifikat-Registrier-Nr. 12 100/104 16077 TMS

 
Product Compliance Management
München, 2013-11-04
Seite 1 von 2

TÜV SÜD Management Service GmbH • Zertifizierungsstelle • Riederstraße 61 • 85358 München • Germany 

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Management Service

C E R T I F I C A T E

awarded to

WAGO Kontakttechnik GmbH & Co. KG
Hansastr. 27
32423 Minden
Germany

TÜV SÜD Management Service GmbH

confirms, as an IRIS approved certification body, that the Management System of the
above organization has been assessed and found to be in accordance with the

International Railway Industry Standard (IRIS)
Revision 02, May 2009

for the activity of Design and development & Manufacturing
for the scopes of certification 9 (On board vehicle control),
20 (Single railway components)

for products of interconnection components with spring clamp technology, automation
components for field bus systems and interface modules for railway industries.

Certificate valid from: 30/08/2013 Certificate valid until: 29/08/2016 *


This certificate was modified on: 12/08/2013
Certificate-Register-No.: 1211316077/01

*Providing that the subsequent surveillance audits are successful before the anniversary of this validity date.
This document has been produced by the Audit-Unit 4, 2, 2.3
Issued by TÜV SÜD MANAGEMENT SERVICE on 12/08/2013
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1 / 2

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Management Service

ZERTIFIKAT

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ELECTRICAL INTERCONNECTIONS
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ISO 9001:2008

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Zertifikat-Registrier-Nr. 12 100 16077 TMS

 
Product Compliance Management
München, 2013-10-21
Seite 1 von 3

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Complaints	0571/887 - 77666
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