



*Solutions for*  
Marine Automation

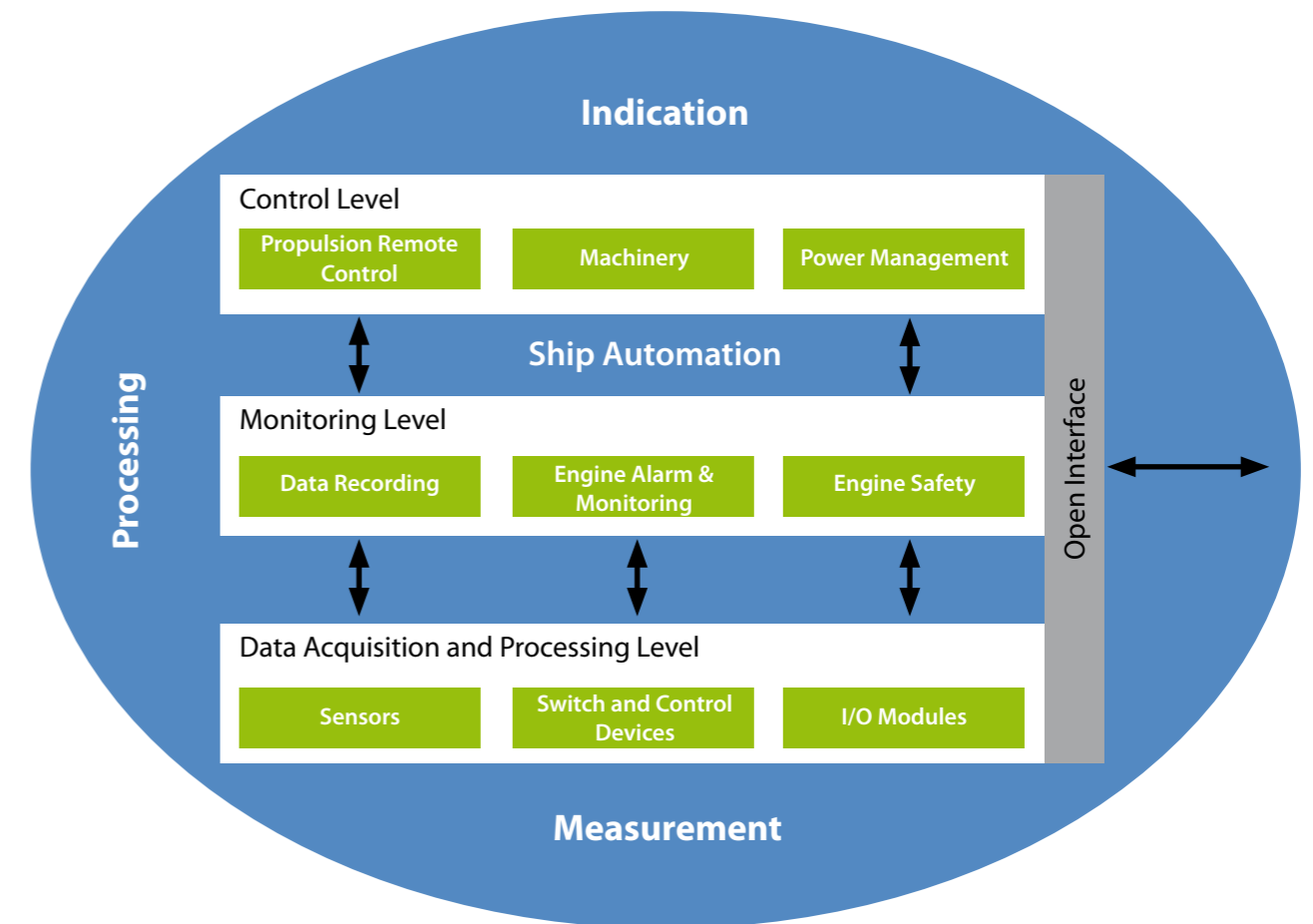
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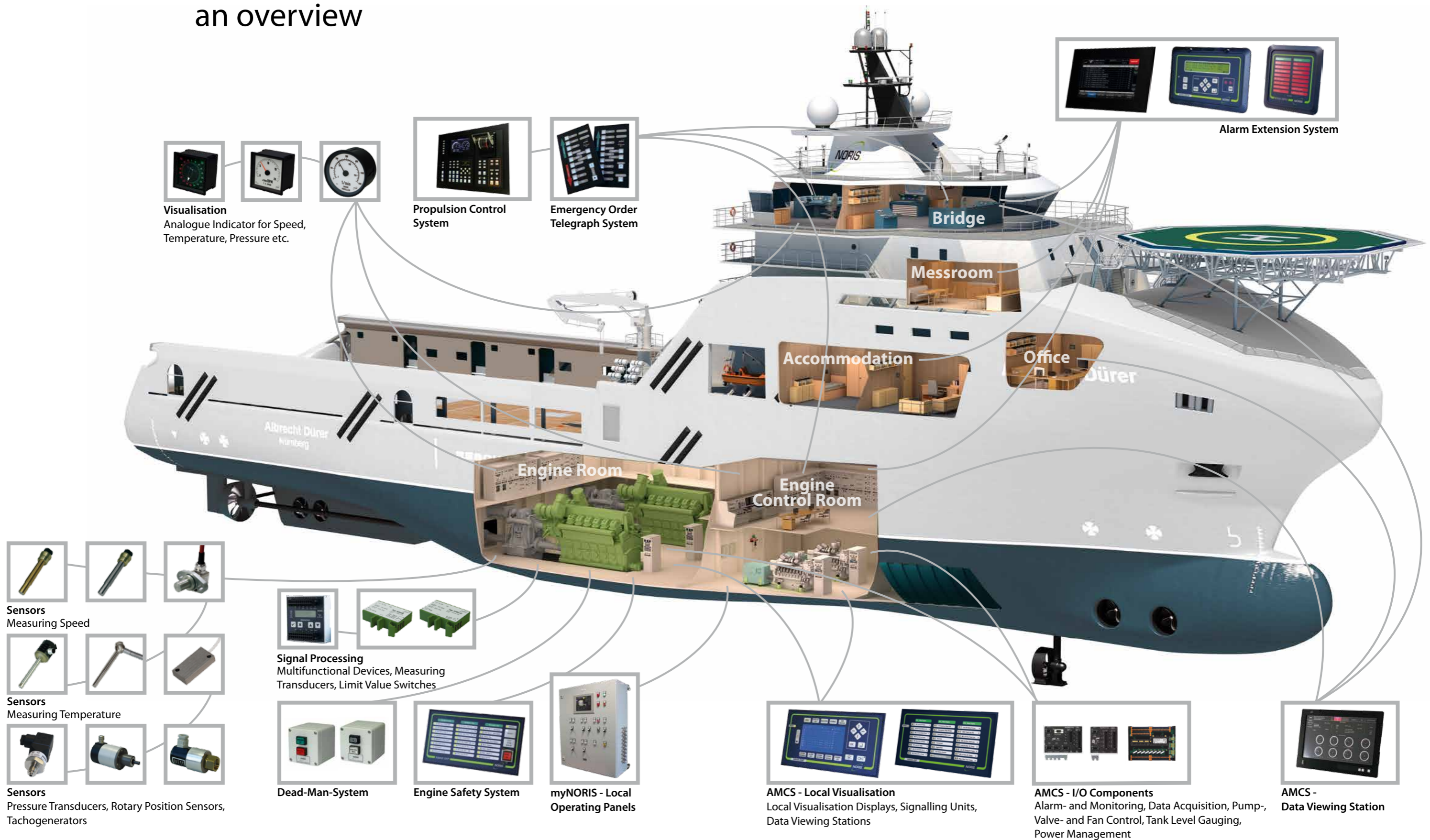
## Integrated ship solutions – everything from a single source

### Customised automation solutions

Backed by over 90 years of experience, NORIS offers customised ship automation solutions. As one of the few providers on the market to do so, we not only support you from the design, planning, implementation and commissioning stages through to servicing your system but we also develop, produce and market all the necessary products and components: from sensor systems through signal processing and visualisation to components and systems for complex control systems - where everything simply fits.



# Our solutions – an overview



AUTOMATION SYSTEMS | Data acquisition systems | Alarm-, monitoring and control systems (AMCS) | Alarm extension systems | Safety systems for combustion engines | Power management systems | Propulsion control systems for ships | Emergency order telegraphs | Tank level gauging | Dead-man systems | SENSORS | Speed sensors | Temperature sensors | Combi-sensors | Speed encoders | Pressure transducers | Rotary position sensors | Tachogenerators | Sensor combinations | SIGNAL PROCESSING | Measuring transducers | Limit value switches | Multifunctional devices | VISUALISATION | LED indicators | Analogue indicators | etc.

# NORISYS 4 – the open automation platform

## The foundation for your application

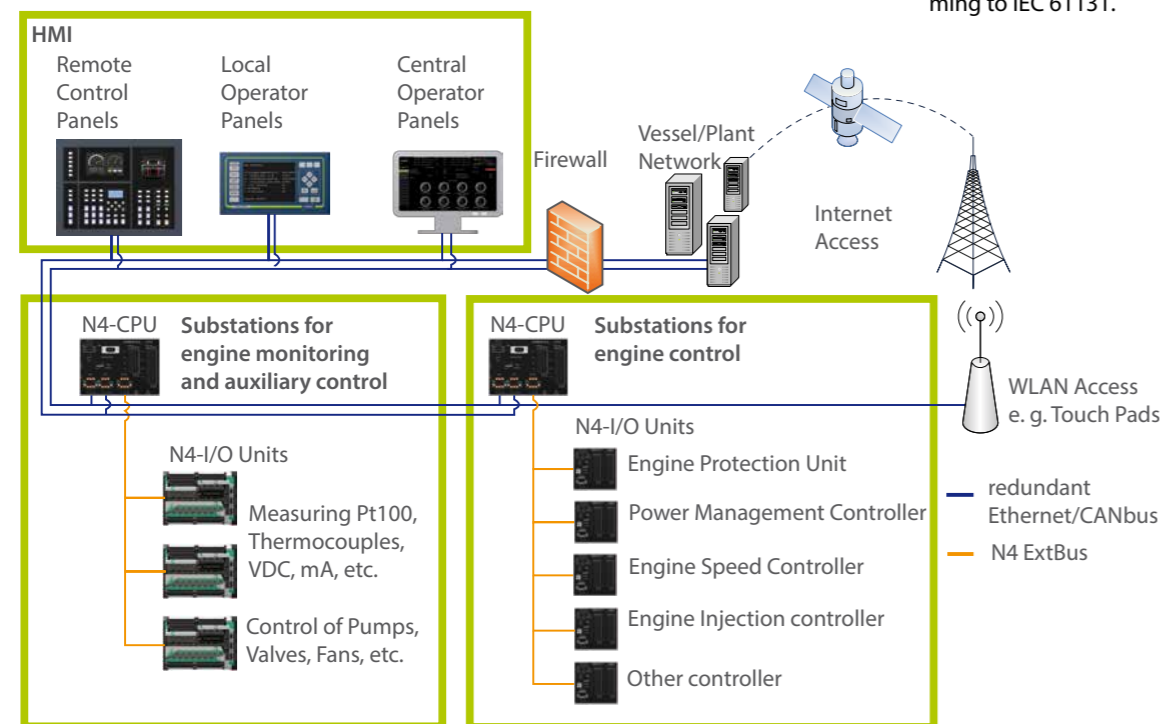
We realise all automation engineering applications with our flexible and open automation platform NORISYS 4. The system is based on recognised industrial standards with perfectly matched hardware and software components as well as consistent communication design throughout. It is suitable for both simple as well as for complex applications that require maximum operational reliability under the harshest conditions:

- Simple applications: speed measuring systems, data loggers, monitoring systems, control systems for pumps, valves, fans, etc.
- Local operating panels (LOPs): gearbox monitoring and control systems, safety systems for ship propulsion and generators, start-stop systems, etc.
- Alarm, monitoring and control systems (AMCS)
- Alarm extension system/duty alarm system
- Power management systems (PMS)
- Tank level measuring systems
- Highly complex and integrated platform management system (IPMS)
- Propulsion control systems for ship propulsion
- Emergency order telegraph systems

### System concept

The NORISYS 4 automation platform is a flexible master-slave system featuring a central control unit that is the heart of each and every application. Further I/O components with functionalities that cover a wide spectrum of applications are used to meet specific application requirements. Each automation system consists of one or several independent sub-systems that are linked by a redundant bus. This configuration ensures maximum operational reliability. Thanks to the compact and robust design of the modules, the system is particularly suitable for use in the harshest of environments, e.g. directly next to engines and machinery.

The central control unit processes the data from the connected sensors, actuators or other systems. Equipped with a powerful 32-bit processor the system is controlled with CODESYS by a freely programmable logic controller (PLC) conforming to IEC 61131.



### Your benefits at a glance

- Fast, multitasking 32-bit processor for processing highly complex controls
- Open communication and programming standards (PLC conforming to IEC 61131 with CODESYS) ensure a high degree of flexibility and compatibility
- Integrated web server with CODESYS Web Visualisation for fast and easy configuration
- Redundant bus systems (CANbus, Ethernet) ensure complete operational reliability
- Many application-specific modular expansions for exceptional flexibility
- Conforms to global shipbuilding standards

### Integrated web server for straightforward and convenient configuration

The configuration of the NORISYS 4 automation platform is based on the powerful CODESYS software suite which was specifically developed for complex applications in industrial automation engineering and provides the user with integrated solutions ranging from engineering through visualisation to safety control and field bus technology. Straightforward configuration and parametrisation via a standard Internet browser (e.g. Internet Explorer).

### The system components

#### Central control unit

Master module with high performance 32-bit processor, 4 digital inputs, 4 relay outputs, redundant Ethernet/CANbus interface, data logger via SD (HC) card and integrated web interface.

#### I/O module for 24 digital channels

I/O module for processing up to 24 digital channels, software-configurable as input or output.



NORISYS 4-CPU



NORISYS 4-24 DIO



NORISYS 4-UNIO

Product	Reference information
NORISYS 4	FL-NORISYS 4 FL-NORISYS 4-PMC DB-NORISYS 4-CPU

### Interfaces for system integration

Interfaces such as RS232/-422/-485 with MODBUS RTU or other user-defined protocols or redundant Ethernet for field bus connection ensure complete system flexibility. This layout effectively enables integration of and in third-party systems, in the ship's network as well as reliable access via Internet to the system (e.g. for maintenance purposes, system optimisation or to retrieve stored data).

Thanks to the compact and robust design of the modules, the system is particularly suitable for use in the harshest of environments, e.g. directly next to engines and machinery.

### Universal I/O module

#### for up to 8 analogue channels

I/O module configurable with up to 2 signal boards:

- AI board: 4 configurable analogue inputs, 1 digital input, 1 relay output
- AO board: 4 configurable analogue outputs, 1 digital input, 1 relay output
- Pt100 board: up to 8 Pt100 channels



**NORISYS 4-PMC**

**Power Management Controller**

The Power Management Controller can be used as an expansion unit of the NORISYS components or as an autarkic system. In its basic version the PMC is used to connect and disconnect generators to and from the power supply system and is also suitable for use in stand-by power supply facilities. An automatic start and synchronisation function is additionally implemented to accelerate the generator set to nominal speed as well as to synchronise and close the power circuit breaker.

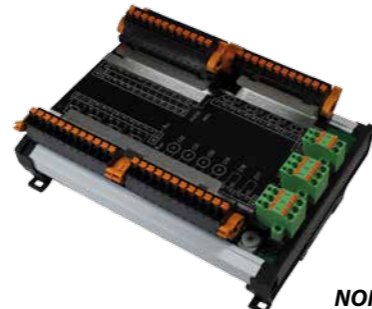
**I/O module for 16 universal analogue inputs**

I/O module for processing up to 16 universal analogue inputs in 2 or 3-wire configuration



**NORISYS 4-16AI**

**I/O module for 16 digital inputs, 2 relay outputs, 4 analogue inputs, 4 analogue outputs**



**NORISYS 4-16DI-4AI-4AO**

**I/O module for 32 digital inputs**

I/O module for up to 32 digital inputs with integrated open-circuit monitoring in 2-wire configuration or in part 3-wire configuration (of which up to 8 inputs with frequency measurement/counter function)



**NORISYS 4-32DI**

**I/O module for 16 digital inputs and 8 relay outputs**

I/O module with 16 digital inputs in 2 or, in part 3-wire configuration (of which 4 inputs with frequency measurement function), 8 relay outputs as changeover contacts, high-current, replaceable.



**NORISYS 4-16DI-8R**

**Central operator control module**

Operator control module (HMI) with redundant interface with central control units (see page 7), equipped with 12 software-configurable buttons, 4 analogue outputs, 4 digital inputs, 4 relay outputs, 2 dimmer channels



**NORISYS 4 MP-12L12B**

**Expansion module for operator control**

This operator control module (HMI) can be connected as an expansion to the central control unit (see page 7) or to the central operator control module and is available in several different versions.



**NORISYS 4 SP-6L6B**

# NORIMOS 4 - high performance, PLC-based alarm, monitoring and control system

**System concept NORIMOS 4**

The N4 is our alarm, monitoring and control system (AMCS) for highest demands in operating comfort, usability, flexibility and system availability. It is used to monitor and control ship technology, such as engines, generators, pumps, valves, ventilators or other auxiliary systems. The N4 is a PLC-based AMCS with decentrally placed subsystems. Each subsystem is operating independently with a high performance I/O CPU master and its slave units and is connected to the other subsystems. The system can be easily adapted to customer requirements. With features like data logging, trend monitoring, alarm and event history and user right management, the system is ideally suitable for simple as well as sophisticated applications. Furthermore, the system can be easily extended with remote access for automatic and secure data transfer and storage to onshore data services for analysing purposes. The optional alarm extension indicates the system status at any place on board the ship. Therefore, different display versions for accommodation and bridge are available.

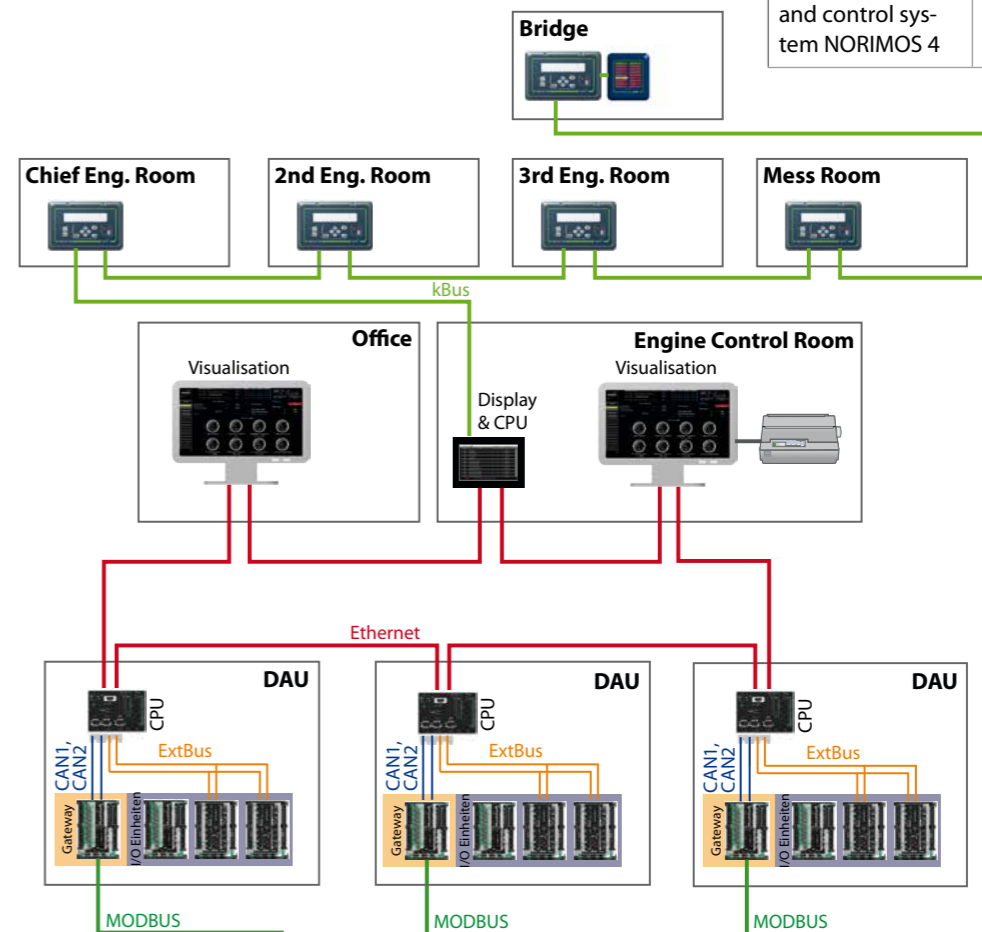
**Your benefits at a glance**

- Decentral and modular PLC-based system for maximum flexibility and failsafe operation
- Robust, reliable and approved components
- Easily expandable for your application
- Easy-to-customise thanks to modular design
- Customer-specific mimics
- Integrated web server for remote access and secure data transfer
- Powerful alarm extension system
- Worldwide service
- Class approvals: ABS, BV, DNV-GL, LR (in preparation)

**Visualisation for maximum flexibility**

The NORIVIS 4 visualisation software makes system information available on the screen in an application-oriented and comfortable way on data viewing stations (PCs), on displays in the engine control room, office, on the bridge or any other location on the vessel.

Product	Reference information
Alarm, monitoring and control system NORIMOS 4	FL-N4



# NORIMOS 3500 – cost-effective, computer-based alarm, monitoring and control system

## System concept NORIMOS 3500

The N3500 is our solution for a cost-effective alarm, monitoring and control system of the well-known NORIMOS family. It is used to monitor and control ship technology, such as engines, generators, pumps, valves, ventilators or other auxiliary system. The N3500 as a centralised system is based on two central PC master stations that are acquiring and monitoring the measurement data from the connected I/O modules. It can be easily extended to customer requirements. With up to 9,000 I/Os and features like trend tables and automatic and daily storage of the alarm history on hard disk, the system leaves sufficient space for different applications and thus, it is ideally suitable for both small data acquisition systems and complex alarm, monitoring and control systems. The optional alarm extension indicates the system status at any place on board the ship. Therefore, different display versions for accommodation and bridge are available.

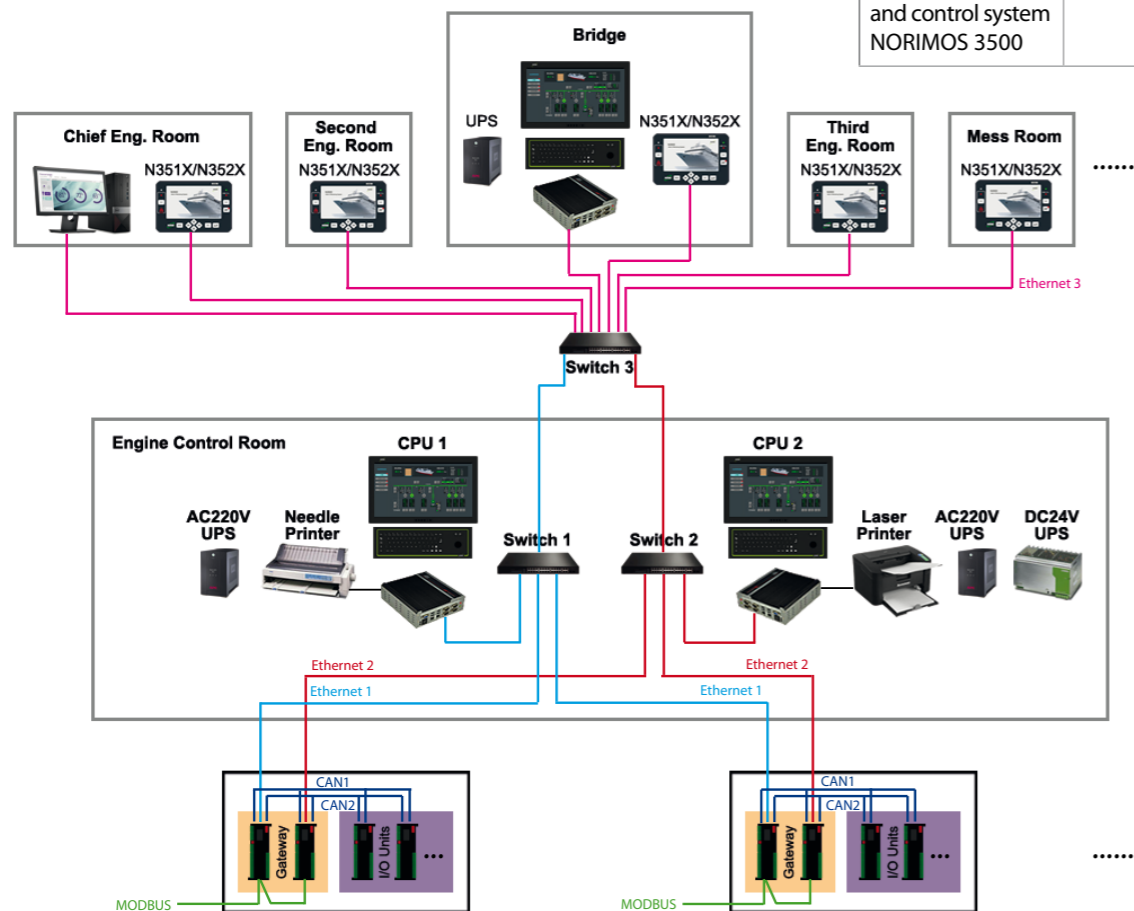
## Secure redundant system communication

The redundant communication via CANbus and Ethernet ensures maximum system availability. All system components are designed redundantly and even in case of failure of single components, the system can still be operated.

## Your benefits at a glance

- Central and modular system, easily expandable for your application
- Cost-effective due to components with standardised functionality
- Redundant system communication
- Made for reliable operation under extreme conditions
- Powerful alarm extension system: High-resolution displays for demanding graphical indication for bridge and accommodation
- Customisable mimics
- Worldwide service
- Class approval: BV, ABS, DNV-GL, CCS (others on request)

Product	Reference information
Alarm, monitoring and control system NORIMOS 3500	FL-N3500



# NORISTAR 4 – the propulsion control system for your ship

## System concept NORISTAR 4

NORISTAR 4 is a modular and flexible propulsion control system and our solution for fixed propeller, variable-pitch propeller, Azipod and diesel-electric propulsion systems and various belt drive systems. The system is based on the central control unit and I/O components of the NORISYS 4 automation platform (see page 7). Several versions of the control desk are available for remote propulsion control on the bridge, aft bridge and wing control stands. Each control desk can be expanded with various operator control panels and can be easily adapted to any customer-specific application or requirement. All system components are interconnected by state-of-the-art field bus technology. The redundant bus concept of the control desk ensures maximum operational reliability.

## Interfaces with external systems

The propulsion control system can be connected via a bus link to the Integrated Bridge System (IBS). An interface with the Voyage Data Recorder (VDR) is also integrated in the system.

## Commissioning and service

Straightforward system configuration takes place on a touch screen display with a menu-supported user interface with the central control unit. The intuitive and standardised operating procedures allow customers to perform the commissioning procedure for the propulsion control system themselves.

## Your benefits at a glance

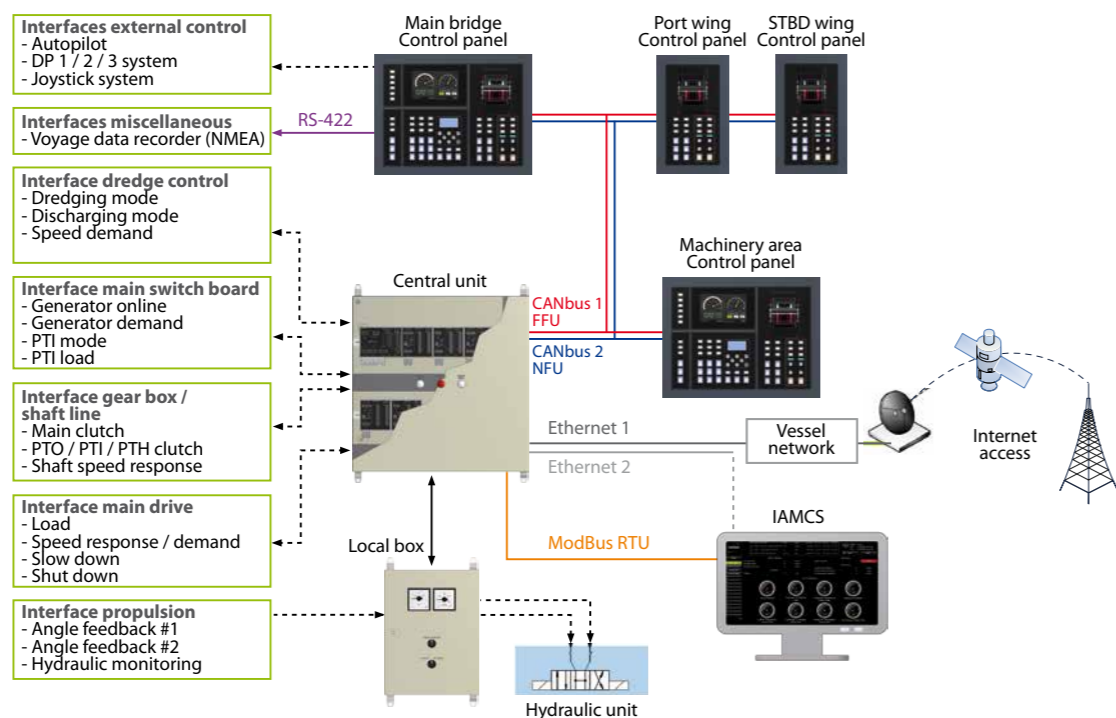
- For CPP, FPP, POD and all types of thruster systems
- Can be adapted to any propulsion application
- Integrated protection to prevent engine overloading
- Defined control programs for various operating modes
- Integrated NFU control
- Interfaces with external systems (e.g. VDR, IBS, etc.)
- Integrated touch panel display for user-friendly configuration and monitoring
- Easy installation
- Commissioning by customer possible
- Maximum availability backed by worldwide service
- Optionally available with additional functions: Load distribution, electronic synchronisation, start-stop logic, connection to dynamic positioning and joystick systems, etc.

Product	Reference information
Propulsion control NORISTAR 4	FL-NORISTAR4
Control lever system LA4	DB-NORISYS4_LA4
Control lever system LS4	DB-NORISYS4_LS4
Control lever system LT4	DB-NORISYS4_LT4



NORISTAR 4

**Propulsion control system concept**



**Control lever systems for ship propulsion**

**System concept NORISYS control lever system**

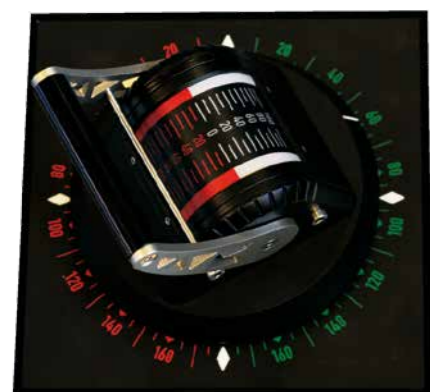
The NORISYS 4 control lever system was developed for shipboard propulsion systems and is our solution for propulsion control applications. It is the ideal addition to the propulsion control system. The control lever is available as a single or double control lever with a simple design (with potentiometric or analogue standard signal outputs) or as a fully electronic version with integrated data interface and can be configured customer-specific for any application.

**Communication with other automation systems**

The fully electronic version of the control lever can be connected to any automation system via a redundant CANbus or via the integrated RS-485 interface with MODBUS-RTU or the ExtBus protocol of our NORISYS 4 automation platform.

**Your benefits at a glance**

- Available as a single or double control lever
- Version also available for azimuthing and transverse thrusters
- Different scales available for each control lever
- Position indicator for each control lever
- Optionally with electrical shaft function and force feedback for each lever
- Configurable for different applications
- Factory preconfigured for easy installation and commissioning by customer
- Suitable for indoor and outdoor applications
- Interfaces: 2x CANbus or 1x CANbus + 1x RS232/485



NORISYS 4 LA4



NORISYS 4 LS4



NORISYS 4 LT4

# NORISTAR-EOT - emergency order telegraph system

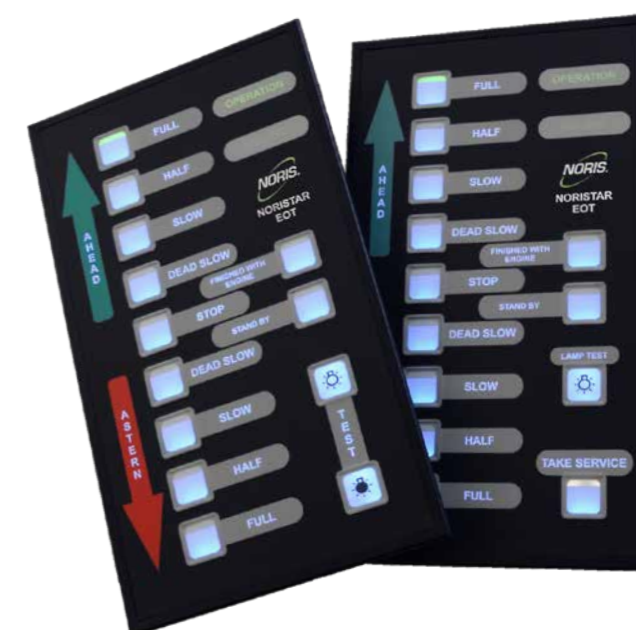
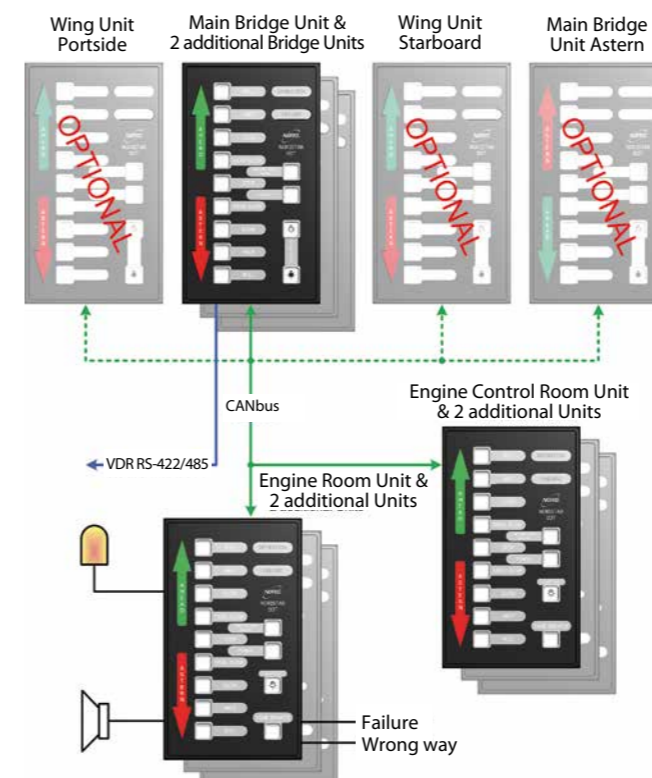
**System concept**

The NORISTAR-EOT is an emergency communication system used to transfer vital commands between the wheelhouse and engine room fast and reliably. Up to 12 emergency engine order telegraphs can be integrated in a master-slave system. Different versions are available for the bridge (ahead/astern) and engine room or engine control room.

Each emergency order telegraph is equipped with 11 order buttons. When an order button is pressed on a master unit on the bridge, the order is signalled visually by the corresponding button flashing and acoustically by an integrated buzzer on the slave devices in the machine room or machine control room. The order must then be confirmed by pressing the flashing order button on the slave unit.

**Your benefits at a glance**

- Robust devices for use in harsh environments
- Different versions for different applications
- Up to 12 emergency order telegraphs in one system
- Visual and audible alarm triggering
- Operating status indicator on each unit
- Dimmable lighting for bridge units
- 6 floating relay outputs per unit, e.g. for Wrong Way Alarm or for connecting external buzzers
- Connection to the Voyage Data Recorder (VDR)



NORISTAR-EOT

Product	Reference information
NORISTAR-EOT	DB-EOT

# myNORIS – Local operating panels (LOPs) for monitoring and control applications

### Expandable system concept

We develop smart solutions for machinery automation in one-off or series production. They can be used to monitor and control engines, gearboxes, drive systems and auxiliary systems. Each solution is engineered to customer-specific requirements and can be easily extended with additional displays for decentral visualisation or additional operating panels to provide local operation. Standard interfaces, such as MODBUS, J1939, CANopen, Profibus or NMEA enable a simple integration into third-party systems. The intuitive visualisation is based on the powerful CODESYS (IEC 61131) software suite and can be easily adapted to customer's corporate design. All components are especially suitable for the use in harsh environments and ensure maximum operational reliability.

### Construction and customised mechanical design

The mechanical design of our LOPs is manufactured to your requirements for vibration and shock resistance. To ensure the recognition of system changes and to enable the planning of your maintenance cycles (predictive maintenance), detailed system response calculations can be integrated on request. In addition, a 3D modelling of the LOP simplifies the involvement during your planning phase.

### Your benefits at a glance

- Local availability of measurement data, operating states and control functions
- High-resolution, graphic depiction of operating states
- Integrated data logging
- Standardised interfaces to higher-level systems (AMCS, RCS, IPMS, etc.)
- Predictive maintenance
- Easy firmware and software update via USB
- Extensive project and installation support
- Integrated safety logic
- Remote access during servicing
- Various expansion levels

### Application examples

We engineer each LOP to your specific applications:

- Propulsion engine
- Reduction gear-box
- Hybrid gear-box
- Trolling clutch
- Genset
- Others (e.g. winches, separators, purifiers, fresh and waste water treatment)

Product	Reference information
myNORIS LOPs	FL-myNORIS
myNORIS AMCS	FL-myNORIS-AMS



Indicator remote panel

myNORIS gearbox control



Display remote panel

# Safety systems for combustion engines



N3000-SAP

### Clear visualisation of channel status

Relating to the measuring point, the channel statuses are indicated by three-colour status LEDs. Each LED is arranged on the front next to a labelled text field highlighted in colour.

### System flexibility and scalability

The safety system can be expanded with our automation components to integrate a data logger or a start-stop system for example. As a further advantage, the interfaces of our components with other systems are then available (via MODBUS protocol or Ethernet).

### Your benefits at a glance

- Suitable for almost all types of combustion engines
- Fast and quartz-precision speed acquisition
- Fast and reliable engine shut-down by open circuit monitored shut-down outputs
- Large number of preprogrammed engine types set via coding switches for easy configuration
- User-friendly installation in the control cabinet door
- Plug-in connections for easy servicing (screw or spring-type terminals)

### System concept

The N3000-SAP safety system monitors the primary operating parameters of an engine. It is the central unit for triggering an emergency shut-down of the engine to avoid damage. Thanks to its compact yet robust design, the safety system is particularly suitable for use on ships and can be installed directly on the engine. Signal processing is purely digital. Together with fast and quartz-precise speed acquisition it ensures maximum safety and system reliability. A large number of preprogrammed engine types and the straightforward class-compliant configuration enable fast adaptation to existing applications.

### System availability

In addition to a redundant operating voltage, the system availability is guaranteed by several internal monitoring functions:

- Operating voltage monitoring
- Input earth fault monitoring
- Input open-circuit monitoring
- Pick-up signal discrepancy monitoring

Product	Reference information
Engine safety system N3000-SAP	FL-N3000-SAP



## Sensors and signal processing for your automation

We have been there from the very beginning. As one of the few manufacturers of automation components, we have gained more than 90 years of experience in the sensor, signal processing and visualisation sectors. Whether speed measurement for your ship propulsion, measurement of exhaust gas, oil, coolant and bearing temperatures, recording pressures in hydraulic systems or registering angle positions on mounted shafts: we have available the right sensors and signal processing devices for your system. Our products are designed to reliably operate for years under the most extreme environmental conditions in safety applications.

### Speed sensors

Our speed sensors are used in speed measuring systems for engines, gearboxes, generators as well as in other machinery.

- Non-contact or mechanically driven sensors (pick-ups, tachogenerators)
- Various designs and different connections
- A range of measuring principles: Difference-hall, inductive-magnetic or eddy current for scanning ferromagnetic or aluminium gearwheels
- Different enclosure materials (e.g. brass, stainless steel or aluminium)



### Pressure transducers

You will find our pressure transducers on engines and gearboxes for measuring the lubricating oil pressure, on hydraulic and pneumatic pumps, on filters, compressors and pressure tanks as well as on tank installations for measuring fluid levels.

- Registering pressure of liquid and gaseous media
- Absolute and relative pressure measurement
- Standard signals 4...20 mA, 0...10 V
- With different connections



### Temperature sensors

Our temperature sensors are used to measure exhaust gas, oil, coolant and bearing temperatures.

- Different designs, different immersion depths, different measuring elements: Pt100/Pt1000, NTC thermistors, thermocouples
- Different enclosure materials: brass, stainless steel, CuNiFer
- Enclosure protection class up to IP68



### Combi-sensors

- Up to 3 sensors in one enclosure for combined measurement of speed, temperature and acceleration (vibration)



### Rotary position sensors

- For precisely registering angular positions
- Mounted directly on the drive shaft
- Maintenance-free



### Signal processing devices

Our signal processing devices are used for monitoring limits and converting measured values in speed measurement systems or to make available additional output signals for further control systems.

- Measuring transducers for frequency and temperature
- Limit value switches for frequency, temperature, DC and AC voltages
- Multifunctional devices for measuring up to two speed signals with slip and offset measurement, 2 galvanically isolated signal outputs and 6 relay outputs



## Analogue indicators for your application

Our indicator instruments feature stepper motor technology or are equipped with a moving-coil element. They are primarily used wherever great demands are placed on durability and reliability. The high electromagnetic compatibility as well as the immunity to shock and vibration as stipulated by the ship classification bodies enable continuous use under increased mechanical stress conditions.

### We make instrumentation to your specification

Whether to indicate speed, temperature, pressure, propeller pitch or rudder position. We make instrumentation to your specifications. In addition to different designs (round or square) and sizes, you can define the scale, scale colour, pointer lighting and much more. Additional functions are available on request, e.g. integrated direction of rotation detection for measuring the speed of reversing propulsion systems, a status LED for showing when limits are exceeded as well as additional signal or relay outputs for signal processing.

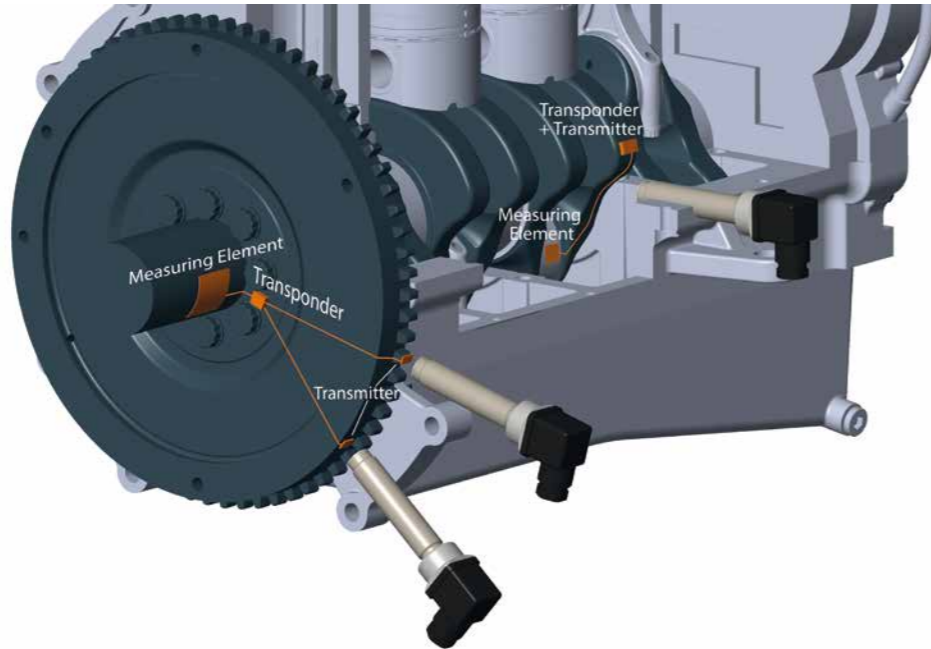


Product	Reference information
Sensors, signal processing devices, indicators	BR-NAN-Overview
Speed sensors	FL-FAHU52, FL-FAW, FL-KA, DB-FA5, DB-FA52, DB-FA11, DB-FA13, DB-FAH12, DB-FAHZ53, DB-FAJ12
Temperature sensors	DB-TA..., DB-TP..., DB-T.3.
Pressure transducers	DB-PAx9, DB-VD61
Rotary position sensors	DB-DWA
Multifunctional devices	DB-FMN6
Limit value switches	DB-R...
Measuring transducers	DB-V..
Analogue indicators	FL-NIR-NIQ, FL-NIQ31, FL-SIR-SIQ, DB-NIR3/NIQ3, DB-NIQ31, DB-SIR3/SIQ3

# Innovations

## Smart sensor concept for wireless data logging on moveable parts

A passive, superior transponder is the basis of this smart concept. By means of an inductive principle it operates without its own energy source. By this measurement principle, a coil is mounted on a moveable part (e.g. on a flywheel or piston rod) and is used as transducer for the measurement data. By means of this movement, the transducer passes constantly the sensor element, and thus, is supplied with energy by an electromagnetic induction. This energy is sufficient to detect the measurement data from a measuring element (e.g. Pt100) and store it in a transponder. As soon as the transducer passes the sensor element, the measurement data is retrieved from the transponder and transmitted to the sensor element with a frequency of 13.56 MHz (ISM band). Thus, the transponder saves and transmits wirelessly the measurement data from e.g. temperature, acceleration or pressure measuring elements as well as from sensor combinations to a receiver at regular intervals.



### Your benefits at a glance

- Ideally suitable for Condition Monitoring
- Measurement data acquisition on moveable objects that are difficult to access
- Measurement of temperature, torsion and speed
- Combined measurement in one housing possible, e.g. temperature and speed (eddy current principle)

## NORINET for secure data transfer and remote access

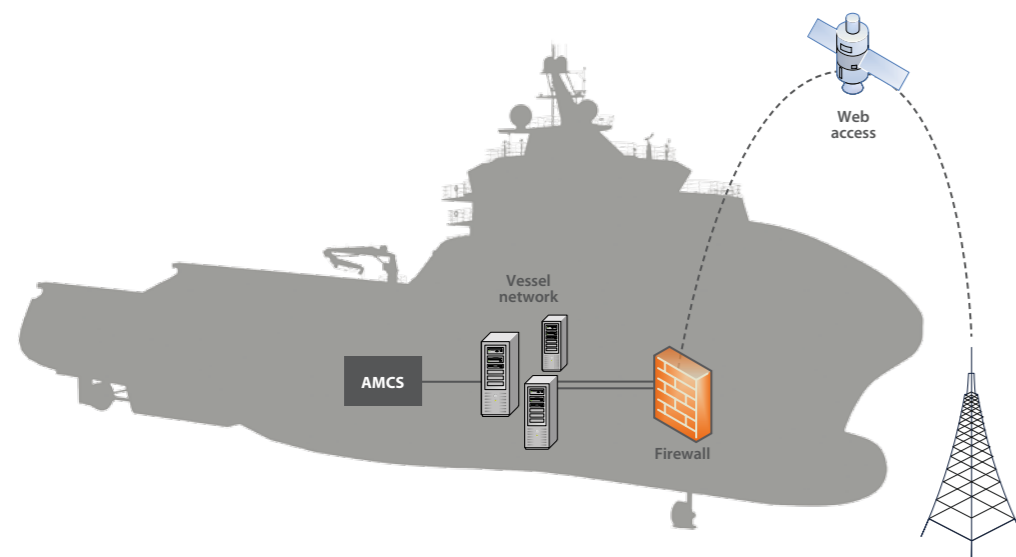
System maintenance is essential in order to minimise service and repair costs and to keep all systems on board running. We have the right solution that avoids idle time in ports and enables us to react flex-

ibly and fast. Remote access and the long time storage of engine and monitoring system data are further essential factors concerning analysis and predictive maintenance. In times of skyDSL/GSM/GPRS

the remote access is a useful feature to stay in touch with your vessel. NORIS offers the appropriate infrastructure for all its systems. The data is stored on board into a ring buffer of an offshore data unit and is cyclically transferred via secure connection and HTTPS to the NORINET.

### Your benefits at a glance

- Flexibility for the ship owner and his crew
- Enables system secure remote access
- Realtime access to monitoring system
- Optimises maintenance processes, and thus, ensures failsafe operation
- Easy system updates
- Enables data transfer for analysing purposes



# A strong global partner close to you



● = Centres of competence

● = NORIS representatives and service partners

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Providing the highest level of service means delivering maximum performance in every area and going above and beyond – day after day. As an experienced manufacturer of devices and systems for measuring and automation technology, not only are we experts on which components and system parts are subject to particularly high levels of stress, but we are also ideally placed to know what really matters in our field.

You and your product are at the centre of what we do. We provide you with guidance and support throughout the entire life cycle of our products – as an adviser and as a partner. Whenever you need us and wherever you are. Our network of representatives is spread across the entire globe, ensuring that we can respond extremely quickly, whether it's in drawing up a quotation or performing a service job. We are always nearby and always ready to help!

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