SAFER AND SMARTER NAVIGATION.

Industry requirements and demands for more efficient and safer operations, calls for smarter vessels.
Common problems on-board vessels are multiple systems from multiple vendors or even from the same vendor, all having different design philosophies applied within the acceptance of the regulative. The result of such is very often wrong usage and inconsistent safety parameters set across the bridge system.

Part of the solution may be replacing the individual systems with Multifunctional Displays (MFD) hosting tasks:

Route Planning	-	Replacing the ECDIS
Route Monitoring	-	Replacing the ECDIS
Collision Avoidance	-	Replacing the RADAR
Navigation and Control	-	Conning Display with vessel control capabilities

Also embedding the following tasks for enhanced situational and system awareness

| Alert Management | - | Interfacing BNWAS and other systems on-board |
| Status and Data Display | - | For sensor monitoring and system monitoring |

The RAVEN INS is developed focusing on making navigation and operations on the bridge simpler and more intuitive, thus safer.
The tasks are embedded in a singular application hosted on embedded computers running on a Linux kernel Operating System. for enhanced reliability and Cyber Security.
The uniqueness in hosting the tasks in a singular application is not just a harmonized design, but the exact same design and user experience between the task.

DAYLIGHT PALETTES
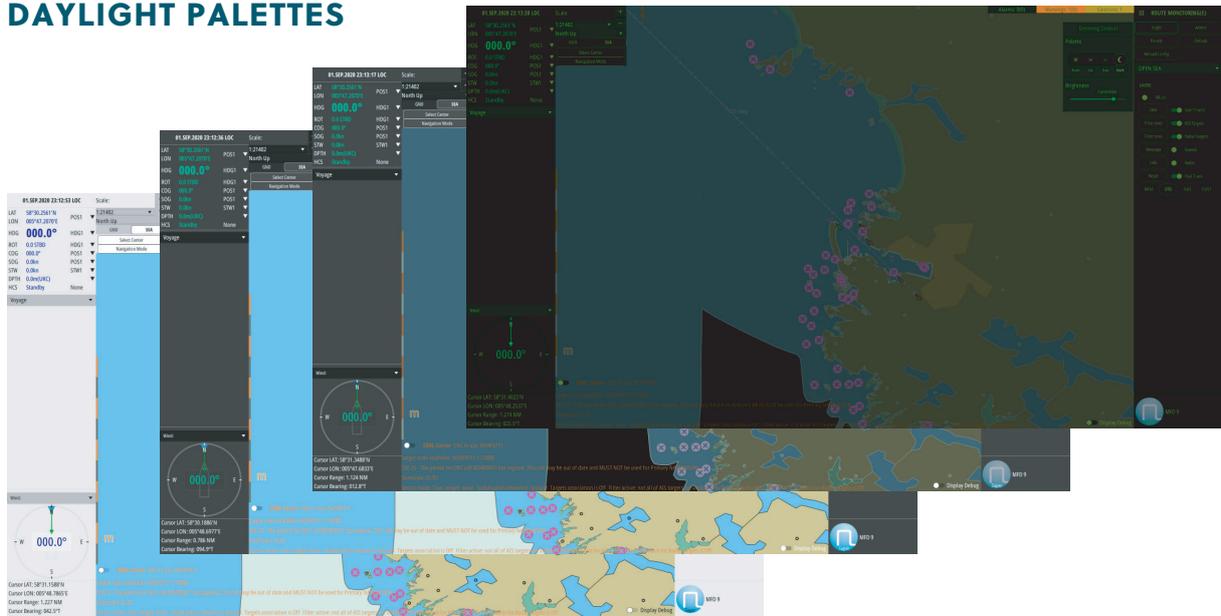
CONSISTENT DESIGN

The design and software focus on high degree of BRM
(Bridge Resource Management) through effective Human Centric Design –
both through user interface and bridge layout. The representation and future-proof integration capability has been
developed with input from partners in the OpenBridge consortium*.

DATA SHARING AND REDUNDANCY

Global target association together with unique system wide target identifiers. Synchronization of alert and monitoring
thresholds, charts, chart settings and safety related parameters. It all promotes better teamwork and optimum
situational awareness.
The sophisticated alert management system will advise and assist in asserting dangerous situations by pointing the
user to both the correct view and scale of display to address the situations such as danger of collision.
All workstations are separate and independently hosting the software and data for navigation and can take over any
task upon failure of another workstation. Data is shared across duplicated networks.

OPTIONAL WORKSTATIONS

Auxiliary MFDs may bring the Alert Management, ERBL/cursor readouts, Navigational Control (Conning, AIS and
Navtex messages) and automatic control functions (Autopilot) to the navigator's chair.
For operational rooms and similar, optional MFDs sized up to 55" planning tables are available – allowing for
presentation and operations of almost all functions - without interfering with the navigational bridge.

*OpenBridge is joint industry project led by The Oslo School of Arcitecture and Design.
The result is an open source design platform for maritime applications
www.openbridge.no
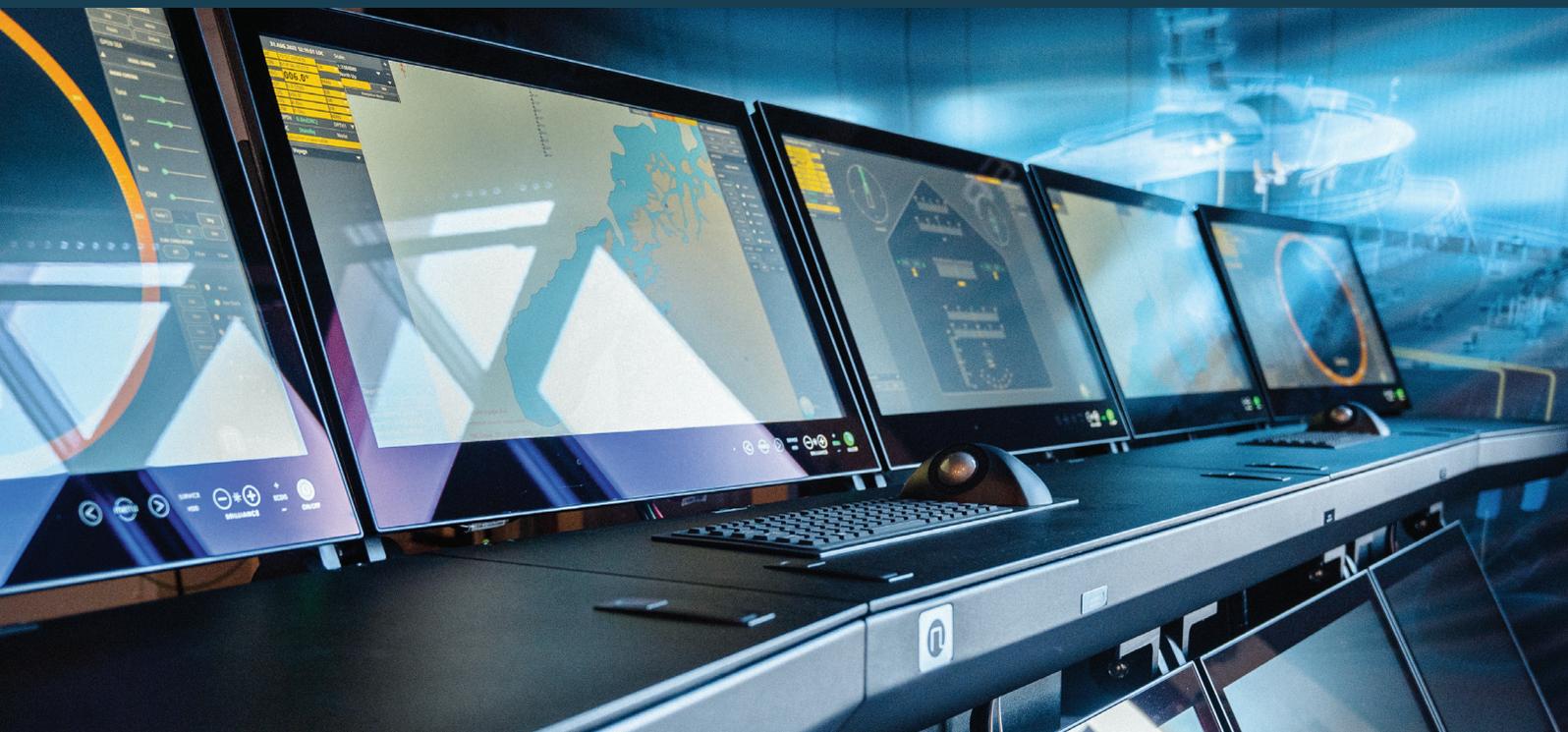
ADVANTAGES

Operator and Owner

- Availability and redundancy

- High performance radar

- Adaptive Autopilot and track pilot minimizing rudder usage

- Integrated Vessel Controller possible to control from any MFD
- Easy to learn, Consistent design and good training package

- Trending and logging of data

- Few and standardized components

Shipyard and installers

- Reduced cabling and few hardware components

- Quick commissioning, fast and simple autotuning of Autopilot and Track pilot

- Configurable Conning Display by service personnel

- Bridge design and turn-key Bridge consoles

- One certificate covering the whole system (ECDIS, RADAR, INS, CID, BAM/CAM)

High resolution – Traditional
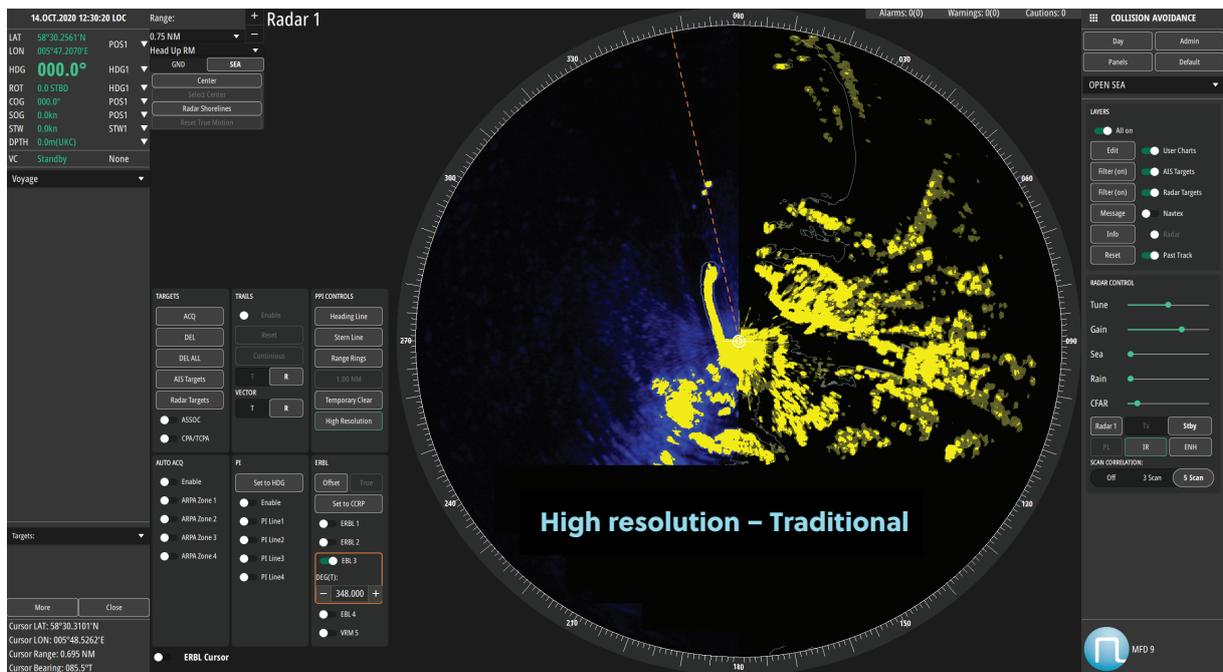
COLLISION AVOIDANCE (CHART RADAR FUNCTIONALITY)

- Supreme and consistent target detection with ARPA tracker running autonomous filters separate from display filters

- Exceeding CAT1 requirements, capable of tracking up to 200 targets

- Full Chart Radar capabilities using the same database and layer setup as the Ecdis part of the system

- Full target association capabilities Radar – AIS and Radar – Radar with up to 3 radar trackers

- Individual gain and clutter management on all MFD regardless of MFD in control not interfering with target tracking

- Will track the AIS targets based on past positions if reported speed and course is missing or evaluated as reported wrong

- Unique and intuitive Arpa trial functionality, also available in Ecdis modes

- 4 PI lines

- 2 EBL, 2 VRM, 2 ERBL and quick ERBL features

- 4 ARPA Zones

ROUTE PLANNING AND ROUTE MONITORING (ECDIS FUNCTIONALITY)

- All official ENCs (PRIMAR, AVCS, etc.) in S-57/S-63 and NAVTOR SENC distribution format

- Synchronization of updated databases throughout the system (update one station: send to all)

- Synchronization of User Charts throughout the system

- Parallel Index Lines & EBL/VRM, full radar set of navigation tools

- Radar Overlay using the same processing as the radar system with full interswitching capabilities

- Navtex message display and overlay if geographical are points available.

- Simplifying chart updating by supporting Navtor Navbox a Cyber Secure approved gateway

- Route exchange using Navtor Navbox

- Weather Service subscription available

- Voyage plan export generation

- Import
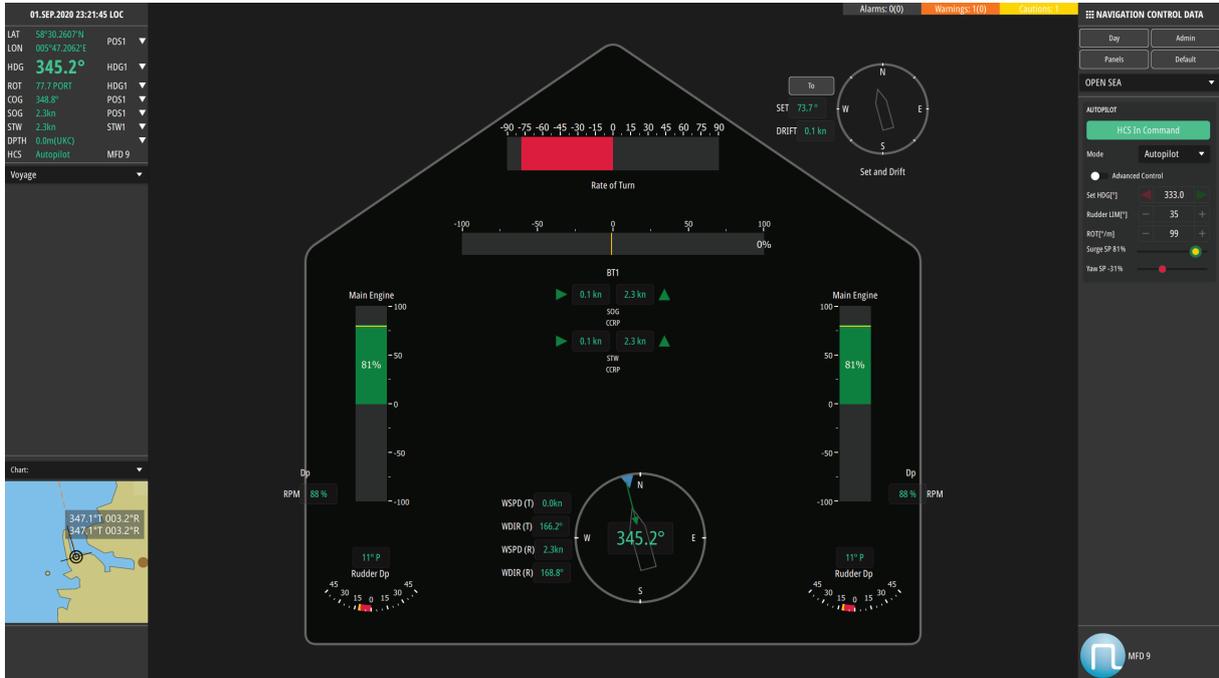
NAVIGATION AND CONTROL DATA (CONNNING INFORMATION DISPLAY)

- Configurable to meet the demand of users and classification societies

- Rudder

- Azimuth

- Thruster

- Engine Telegraph

- Wind Display with heading indicator

- Set and Drift indicator

- Rate of Turn indicator

- Speed indicators for Water, Ground and also stern speed

- Trip counter

- Route monitoring

- Autopilot and Track pilot control

NETWORK TOPOLOGY
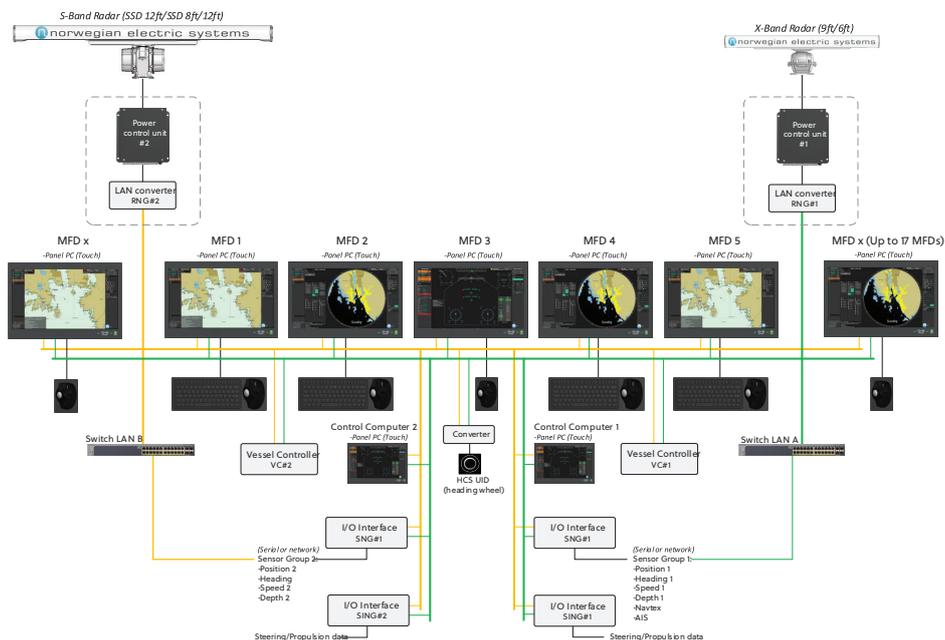
CENTRAL ALERT MANAGEMENT (CAM/BAM)
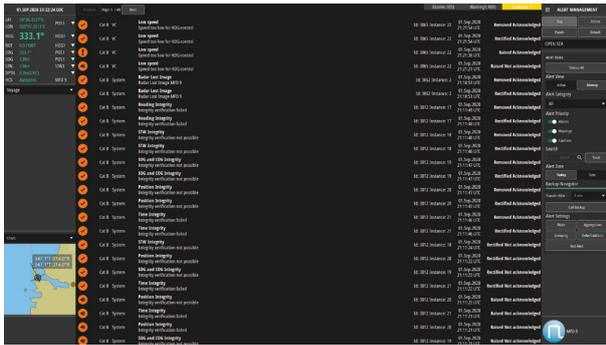
- Overview of all active and historical alerts

- Acknowledgement per task

- Filtering and searching

- External equipment alarms (Navigational sensors, IAS/DP depending on configuration)

- Automatic and manual activation of "Backup Navigator" (BNWAS)

STATUS AND DATA DISPLAY

- Integrity and status of sensors and system

- Network overview and MFD task remote switch

- Compare, analyse and trend sensor data
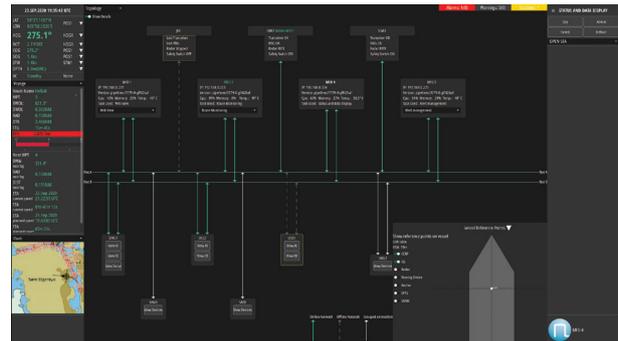
INTEGRATION OF OTHER SYSTEMS

- Supports integration of other systems by WEB and VNC technology

- The interconnection is to be approved on a case by case basis

OPTIONAL AUTOMATIC CONTROL FUNCTIONS

- Adaptive autopilot using both speed and propulsion feedback resulting in better steering during acceleration and deceleration phases also

- Auto tuning for two set of speeds and for shallow and deep draft allows for optimum steering during various speed and load conditions

- Speed pilot and ETA pilot (Controlling acceleration and retardation phases to achieve a desired cruising speed or sailing time for a given route)

- Track pilot and Autopilot compliant with DNV additional NAUT-AW requirements

- Course pilot, weather compensating autopilot

- Position keeping

- Indication of actual and planned maneuvers by curved heading lines drawn based on vessel hydrodynamical model

INTEGRATION OFF THIRD PART EQUIPMENT

System is Type approved for Web/VNC presentation off 3rd part equipment and sensors.

Simplified integration of Rutter oilspill, ice and wave radar systems by networked transferal of sensor and radar video.
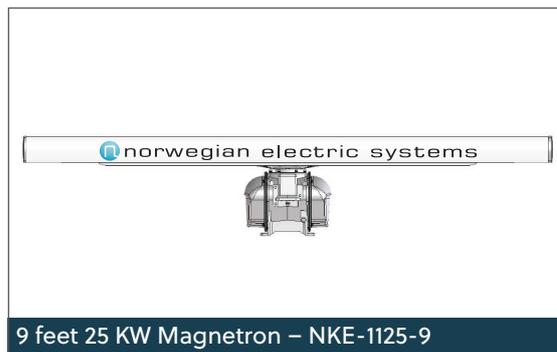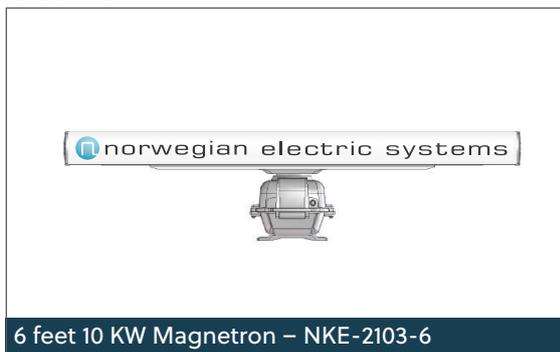
FUTURE PROOF BRIDGE

- The computer and network solution also ensure adaptability to future requirements and needs

- The comprehensive system developed by the company is ready for new functions to be added.

- 'As additional needs become apparent and the technology develops, more functions can be added.

- The system is being developed and tested in compliance with on-going S100 work
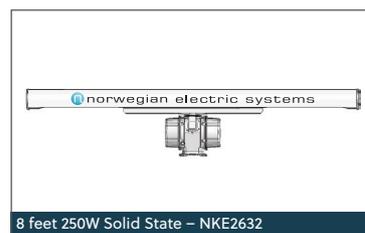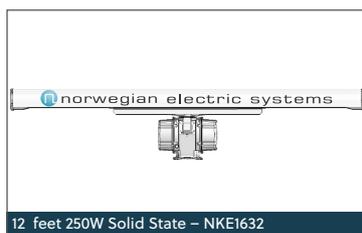

- The network solution also means that RAVEN INS® is ready to interact with shore on data capture and remote monitoring.

- 'This is an important element in the development towards increasing automation and autonomous vessels.

- RAVEN INS® support enhanced user and operational support. And a digital twin is already part of the system, which allows for remote training where the crew can sit at home with their laptop and receive training.'

X-BAND

6 feet 10 KW Magnetron – NKE-2103-6

9 feet 25 KW Magnetron – NKE-1125-9

S-BAND: SOLID STATE OR TRADITIONAL MAGNETRON

12 feet 30 KW Magnetron – NKE1130

12 feet 250W Solid State – NKE1632

8 feet 250W Solid State – NKE2632
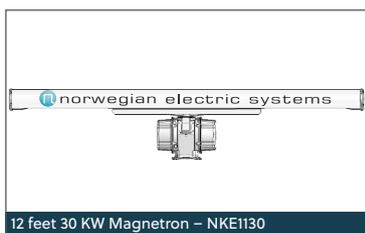
MONITOR AND MULTICOMPUTER LIST (MFD LIST)

- 13.3" Multi Computer (Touch): BAM/HCS/ Support

- 24" Multi Computer (Touch, ECDIS Cal.) – NAV

- 27" Multi Computer (Touch, ECDIS Cal.) – NAV

- 13.3 Multidisplay, Touch): BAM, HCS/Support

- 24" Multidisplay (Touch, ECDIS cal, NAV)

- 26" Multidisplay (Touch, ECDIS cal, NAV

- 27" Multidisplay (Touch, ECDIS cal, NAV)

- 32" Multi Display (Touch, ECDIS Cal.) – NAV

- 55" Multi Display (Touch, ECDIS Cal.) – PLAN/ NAV

COMPLIANCE STATEMENT

Product approval:
I.   IMO MSC252(83) - IEC61924-2(2012)-INS

Functions covered by the INS approval:
II.   IMO MSC A817(19) - IEC61174(2014) -ECDIS as part of INS
III. IMO MSC 192(79) – IEC62388(2013) -ChartRADAR as part of INS
IV.   IMO MSC64(67) – ISO11674(2019): Heading Control System (Autopilot) as part of INS
V.   IMO MSC74(69) – IEC62065(2014): Track Control

Systems as part of INS
VI.   IMO MSC A.302(87)-IEC62923 1,2(2019) - Bridge Alert Management – INS as CAM

Hardware and Interface:
VII. IEC62065
VIII. IEC61162-1
IX.   EC61162-2
X.   IEC61162-450

ANTENNA 15 METERS ABOVE SEA LEVEL:	REQUIRED	RAVEN INS W. TRANSCEIVER
Minimum horizontal range: From antenna to the target is visible	<40 m	<30 m depending on antenna
RANGE Discrimination of targets on a line on a distance of 0,375-0,75 Nm	<40 m	12-30m depending on antenna
BEARING discrimination (differentiate 2 targets on same range apart)	<2,5°	<2.5°
RANGE Accuracy (accuracy of distance as %: e.g 1%=18m on 1 NM	1%	0.5% (optimal tuning)
BEARING Accuracy (accuracy and resolution of bearing measurement)	1°	0.5° (optimal tuning)

norwegian
electric systems

Raven INS®
An intelligent viewpoint

The Raven is regarded as a smart and intelligent bird, and its importance to the Vikings is shown by how often the bird's image is used – often painted on their sails.

Odin, called the Raven God had two ravens, Huginn and Muninn.

www.norwegianelectric.com