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PilotStar® NX Operator Unit

Software Version E00.20 and higher

Operator and Service Manual

102-820.NG001

Edition: 006
10000001054

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List of Abbreviations

AS	Advanced Steering
BNWAS	Bridge Navigational Watch Alarm System
CCRS	Consistent Common Reference System
COG	Course Over Ground
Deg	Degree
EMC	Electromagnetic Compatibility
FU	Follow Up
GNSS	Global Navigation Satellite System
HDG	Heading
INS	Integrated Navigation System
Mag	Magnetic
NFU	Non-Follow Up
RoT	Rate of Turn
RTC	Real-time clock
Rad	Radius
Stbd	Starboard
THD	True Heading Device
XTE	Cross Track Error

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0 Introduction

0.1 Preliminary Remarks

The present manual has been drawn up as a description and reference book.
It will help answer questions and will solve problems in the quickest possible manner.

Before operating the equipment read and follow the instructions and hints in this manual.

For this purpose, refer to the table of contents and read the corresponding chapters thoroughly.
If you have any further questions, please contact us on the following address:

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Since errors can hardly be avoided in the documentation in spite of all efforts, we should appreciate any remark and suggestion.
Subject to alterations.

0.2 Change History

Edition	Date	Change
001	September 2017	First Edition
002	January 2018	Setup Assistant added
003	May 2018	Second Edition
004	August 2018	Change 1.15 Technical Data: Protection class “IP12” deleted and “IP23” inserted
005	December 2020	Annex-Drawings updated
006	April 2021	• Chapter 0.4: document number updated • Chapter 1.7: note added • Chapter 6.1.1: Note regarding responsibility transfer added, table regarding alert messages moved to the annex

0.3 Safety

0.3.1 General Safety Regulations

The following safety symbols are used in this manual:

WARNING 	Warning statements indicate a hazardous situation that, if not avoided, could result in minor, moderate or serious injury or death.

CAUTION 	Caution statements indicate a hazardous situation that, if not avoided, could result in equipment damage or environmental damage.

	Notes indicate information considered important, but not hazard related.

0.3.2 General Safety Instructions

WARNING 	**Danger due to voltage-regulated devices** Risk of death or serious injury caused by electrical shock • Switch off voltage supply if the wires have damaged insulation. • Work on the electric system must be performed only by qualified electricians. • Keep moisture away from live parts. • Keep system closed. • Do not attempt to bypass or disable fuses.

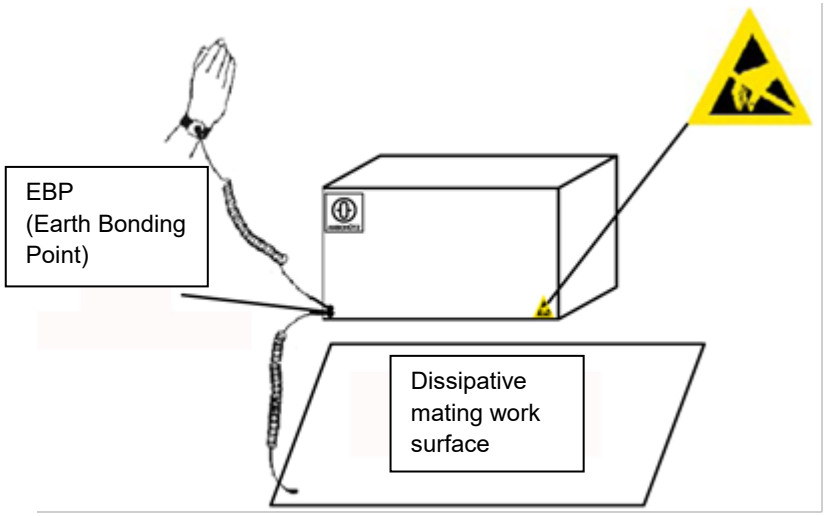
WARNING 	**Danger due to improper operation and purpose** Risk of serious injury and material damage • Use product only for the intended purpose. • Perform operation steps according to this manual. • Do not make any product modifications without authorization.

WARNING 	**Danger due to operation / maintenance by unqualified personnel** Risk of serious injury and material damage • Keep unqualified personnel away from the operation area. • All operation / maintenance must be performed only by qualified personnel.

WARNING	**Danger due to non-adherence of general rules and regulations**
	Risk of death or serious injury and material damage • Adhere all national and regional disposal rules and regulations. • Adhere all general rules and regulations specified for the work area. • Adhere all instructions placed on the components or described in related documentation.

CAUTION	**Hazard due to wrong disposal of harmful substances**
	Risk of environmental damage caused by wrong disposal • Adhere all national and regional disposal rules and regulations. • Adhere all disposal instructions placed on the components or described in related documentation.

ESD = Electrostatic Sensitive Device



Devices/assemblies, which are labelled as shown are electrostatic sensitive.
This label indicates that handling or use of this item may result in damage from ESD if proper precautions are not taken.
To perform installation and/or calibration work appropriate protective measures must be deployed.
All necessary equipment for these protective measures can be supplied (on special order) with the RAYTHEON Anschütz Ident. -Number 1.990106.

0.4 List of Further Documents

Documentation No.	Title	Type
3963	Configuration Tool AS (Service Tool AS)	NB42-232
3928	Rudder Feedback Unit AS	101-532.NG001 - NG004 and 101-532.SA200
4362	PilotStar® Interface Unit PSIF	102-821.NG001
4060	Tiller Follow Up AS	105-307.NG001 - NG006
4061	Tiller Non-Follow Up AS	105-308.NG001 - NG003
4054	FU Handwheel AS	105-400.NG001 - NG006
3957	CAN BUS Distribution Unit AS	138-128.NG001

0.5 Test Standards

Standards	Description
ISO 11674	Ships and marine technology - Heading control systems
IEC 62288	Maritime navigation and radiocommunication equipment and systems – Presentation of navigation-related information on shipborne navigational displays – General requirements, methods of testing and required test results
IEC 62616	Maritime navigation and radiocommunication equipment and systems - Bridge navigational watch alarm system (BNWAS)
IEC 61924-2	Maritime navigation and radiocommunication equipment and systems - Integrated navigation systems - Part 2: Modular structure for INS - Operational and performance requirements, methods of testing and required test results
IEC 62923-1:2018	Maritime navigation and radiocommunication equipment and systems - Bridge alert management - Part 1: Operational and performance requirements, methods of testing and required test results
IEC 61162 series	Maritime navigation and radiocommunication equipment and systems - digital interfaces
IEC 60945	Maritime navigation and radiocommunication equipment and systems - General requirements - Methods of testing and required test results
ISO 16329	Ships and marine technology - Heading control systems for high-speed craft

1 Description

1.1 Intended Purpose

PilotStar® NX to control steering of the ship.

1.2 Use Limitations

	Waypoint steering (NAV) operation mode is only permitted for non-SOLAS vessels. For SOLAS vessels, it is not allowed to have an external navigator connected except track control.

IMO has defined 2 different operating modes / systems for automatic steering. These are:

- Heading Control and
- Track Control

For both of these operating modes performance and test standards have been defined. Authorities / classification societies test against these standards and issue a corresponding certificate if the products are compliant to these standards.
There are no performance and test standards for waypoint steering (NAV) operating mode. Thus, these systems are not tested by authorities / classification societies.

1.3 Application Cases

1.3.1 NautoSteer AS Integration

PilotStar® NX is connected to a CAN bus of NautoSteer AS. In this application no PilotStar® NX Interface is required.

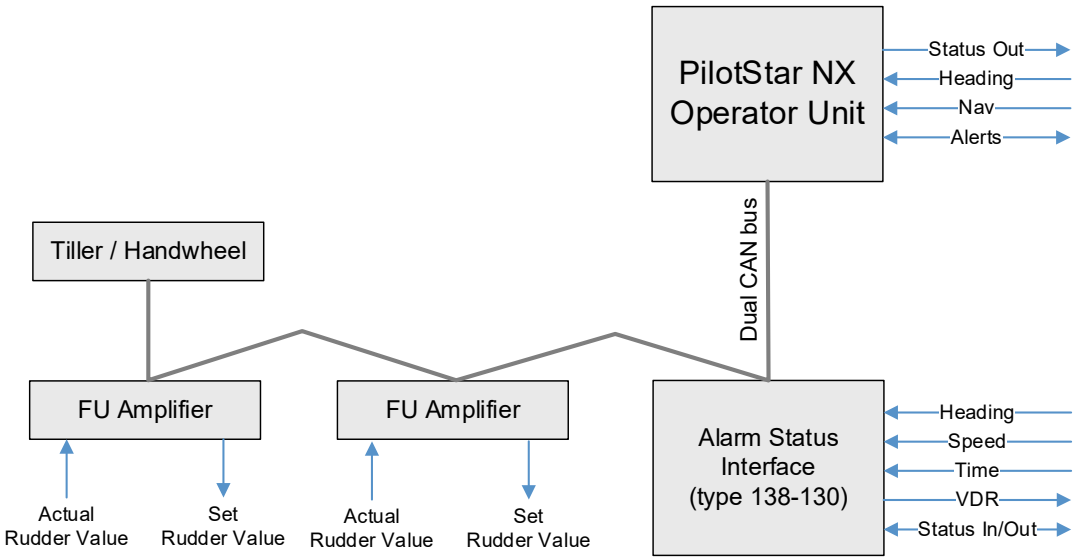


Figure 1-1 PilotStar® NX Integration with NautoSteer AS

1.3.2 Standalone

In the standalone application, PilotStar® NX controls the steering gear directly or is used in combination with steering gear control systems from other makers. For this application, the PilotStar® interface unit (102-821) is required.

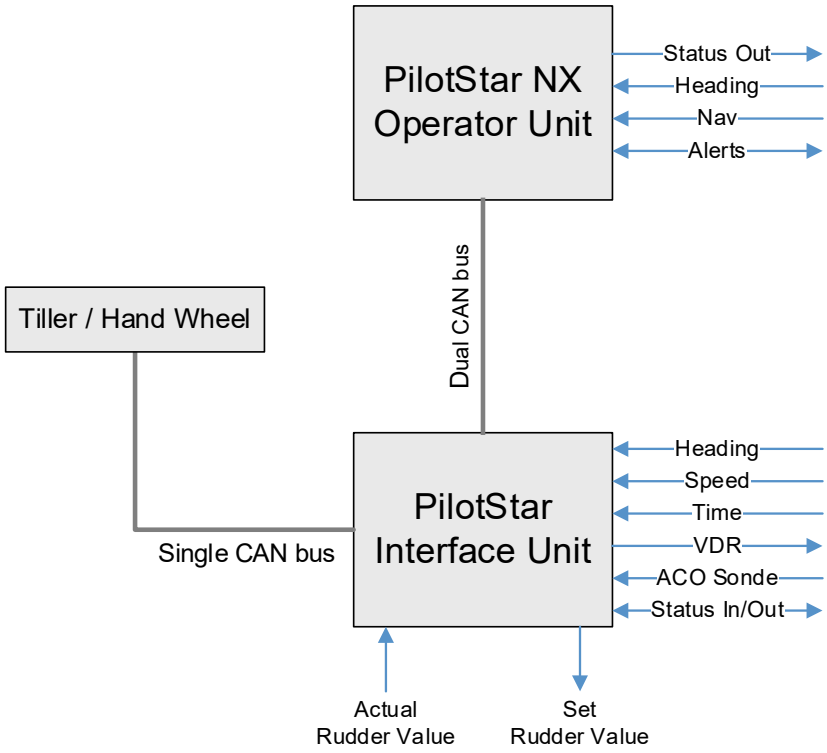


Figure 1-2 Standalone Application

1.4 Modes of Operation

1.4.1 Active Modes

Within these modes the autopilot is active. The autopilot controls the rudder steering.

1.4.1.1 Heading Control (HDG)

Vessels heading is the controlled parameter in this mode. Within heading control mode, the set heading value can be adjusted. Heading control can be performed with a heading value from a gyro compass, or a gyro equivalent compass (GPS, FDG, Strap Down) or from a magnetic compass.
The autopilot controls the heading by comparing the set heading value and the actual heading value.
Within in heading control mode it is possible to adjust a rudder offset. This function is called trim function and intended heading control for vessels with asymmetrical loads, such as fishing vessels and tugs.

1.4.1.2 Waypoint Steering (NAV)

	Waypoint steering (NAV) operation mode is only permitted for non-SOLAS vessels. For SOLAS vessels, it is not allowed to have an external navigator connected except track control.

	To use waypoint steering, a gyro (THD) must be used.

The waypoint steering mode is available if a route planning system is connected. Within mode waypoint steering a route is planned on a route planning system. The PilotStar® NX receives the route data from the route planning system to steer the vessel.
Possible route planning systems:

- GPS system
- Chart plotter

1.4.1.3 Manual Steering via Operation Unit (NFU/FU)

NFU/FU mode includes 2 possibilities of manual steering:

- NFU mode: rudder angle is set via control keys.
- FU mode: entry of target rudder angle value via rotary knob)

1.4.2 Inactive Modes

Within these modes, the autopilot is inactive. The autopilot does not control the rudder steering.

1.4.2.1 Manual Steering via External Source / Standby

An external tiller or hand wheel controls rudder.

1.4.2.2 Override

This mode is indicated when a manual steering unit (hand wheel or tiller) with an override function interrupts the control of the autopilot.
The override function must be activated on the respective steering unit to interrupt the control of the autopilot.

1.4.2.3 Not Activatable

Main steering is active or steering system is disconnected from voltage or autopilot is not selected by steering mode selector switch (is part of bridge installation). PilotStar® NX is inactive and not activatable.

1.5 Multiple PilotStar® NX Operator Units

1.5.1 Master - Slave Installation

It is possible to install up to 10 PilotStar® NX operator units in a steering system. The operator unit, which is connected with the CAN bus, is the master operator unit. The operator units, which are connected with the master operator unit, are called slave operator units.
Only the master operator unit performs the control function of a steering control system. The slave operator units are used for remote operation of the master operator unit.
At the current used operator unit, a green LED is on at the **Active / Standby** pushbutton, see chapter 1.8.1.
At the current unused operator units, a yellow LED is on at the **Active / Standby** pushbutton, see chapter 1.8.1.

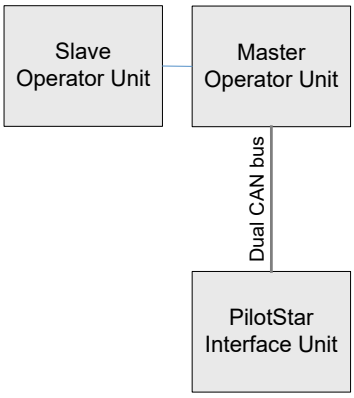


Figure 1-3 Master - Slave Installation

1.5.2 Master - Master Installation

It is possible to install up to 9 PilotStar® NX within NautoSteer AS system. PilotStar® NX is connected to the redundant CAN bus of NautoSteer AS. No PilotStar® NX interface unit required.

Use conditions:

- Each operator unit is independent, with own sets of parameters and adjustments.
- Occurred alert messages are not synchronized between the operator units.
- Switching over from override mode (see chapter 1.4.2.2) is performed to the last active operator unit. If the last active operator unit is currently not active, an alert is generated at the override unit.

1.6 Rear Steering Stand

It is possible to install a slave operator unit or master operator unit in opposite direction. The operator unit can be configured for rear steering stand, see chapter 5.3.7.59.

1.7 Operating Elements

The mentioned operating elements are on the front plate of the operator unit. Further operational items are softkey elements on the touchscreen (see chapter 4.3) and a reset button on the back of the operator unit casing (see chapter 5.2).

	Only standard function listed. Additional functions for operation elements possible in certain settings or operations, which are described within respective chapter.

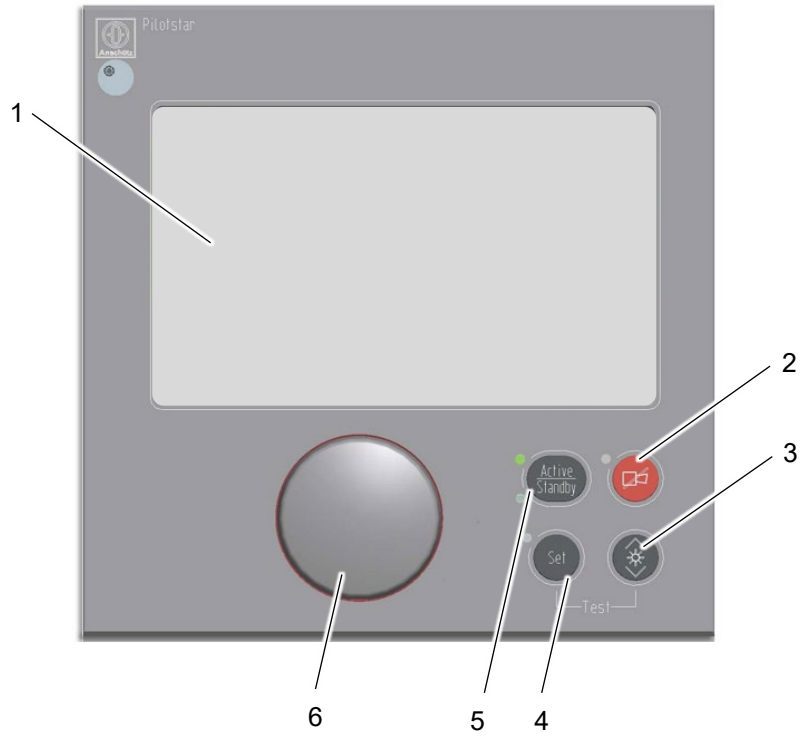


Figure 1-4 Operating Elements

Table 1-1 General Display Elements

Pos.	Depiction	Function
1	Touchscreen display	Displays data and enables operation via softkeys

Pos.	Depiction	Function
2	Pushbutton, **Alert Acknowledgement**	• Acknowledge alert • Scroll through the current alerts
3	Pushbutton, **Dim**	Adjust brightness of the display
4	Pushbutton, **Set**	Confirm value change
5	Pushbutton, **Active / Standby**	• Activate user interface • Activates heading control mode
6	**Rotary knob**	Turn: • Adjust set heading within HDG operation mode • Adjust set rudder within NFU/FU operation mode Press: • Confirm adjusted set heading within HDG operation mode • Close pages, which include no heading adjustment or rudder adjustment
-	Pushbutton, **Reset**	See chapter 5.2

	In order to avoid unintended acknowledgement of a new incoming alert, pushbutton Alert Acknowledgement is deactivated for 1 second after receiving a new alert.

1.8 LEDs

1.8.1 Button LEDs

Table 1-2 Button LEDs

LED	Color	Light Condition
	Green	Autopilot is active
	Yellow	• 1 operator unit: Autopilot is not active, but activatable • 2 or more operator units: Operator unit is not active
	• Red • Red flashing	• Acknowledged, but still active alert • Unacknowledged alert
	Yellow flashing	Value changed, but not yet confirmed by pressing the **Set** button

Table 1-3 Active / Standby LED within Operation Mode

Mode	Active LED	Standby LED
Heading control	On	Off
Waypoint steering	On	Off
Manual steering via operation unit	On	Off
Manual steering via external source	Off	On
Override	Off	On
Not activatable	Off	Off
Fail	Off	Off

1.8.2 PCB LEDs

The operator unit consist of two PCBs. The numbering of the LEDs is unmistakable. There are no double designations of LEDs.

Table 1-4 PCB LEDs

LED	Color	Light Condition
P1 - P9	Green	Internal voltage available
P10	• Green flashing 1 s • Green flashing 4 s	• HMI Running a connection to Server • HMI running and no connection to server
P11	Red	System buzzer is disabled
P12	Red	Alert buzzer is disabled
P26	Yellow	Ethernet 1 is connected
P27	• Green • Green flashing	• **Ethernet 1** is connected • Data transmission at **Ethernet 1**
P28	Yellow	Ethernet 2 is connected
P29	• Green • Green flashing	• **Ethernet 2** is connected • Data transmission at **Ethernet 2**
P501	Red	Alert is processed and transferred via relay **SYS FAIL** at X508
P502	Red	Alert is processed and transferred via relay **OFF HEADING** at X509
P503	Red	Alert is processed and transferred via relay **HEADING MONITOR** at X510
P504	Red	Alert is processed and transferred via relay **BACKUP NAVIGATOR** at X511
P505	Green flashing	Data transmission at X505 (RS422 interface)
P506	Green flashing	Data transmission at X506 (RS422 interface)
P507	Green flashing	Data transmission at X507 (RS422 interface)
P508	Green flashing	Data transmission at X508 (dual CAN interface)
P509	Green flashing	Data transmission at X509 (dual CAN interface)

1.9 Interfaces

1.9.1 Interface Inputs and Outputs

Table 1-5 Inputs and Outputs

Designation	Data / Signal	Plug
Outputs		
Relays / alarm and status outputs	System and alarm status	X508, X509, X510, X511
Inputs		
Supply voltage	24 V DC (18 to 36 V DC); 25 W (maximum)	X512
Output / Input		
Dual CAN bus	According to ISO 11898 with proprietary Raytheon Anschütz telegrams	X513, X514
USB	Software update	X20
Ethernet	Sensor data, navigation data, alert data, data for slave operator units	X19, X21
RS422 serial input / output	Sensor data, navigation data, alert data	X505, X506, X507

1.9.2 Plug Assignment / Interfaces

Table 1-6 Plug Assignment / Interfaces

Plug	Function
X19*	Ethernet 1 plug
X20	USB plug
X21*	Ethernet 2 plug
X501	Not used
X502	Not used
X505	Connects RS422 serial input / output, see chapter 3.7
X506	Connects RS422 serial input / output, see chapter 3.7

Plug	Function
X507	Connects RS422 serial input / output, see chapter 3.7
X508	Connects relay **SYS FAIL**, see chapter 3.8
X509	Connects relay **OFF HEADING**, see chapter 3.8
X510	Connects relay **HEADING MONITOR**, see chapter 3.8
X511	Connects relay **BACKUP NAVIGATOR**, see chapter 3.8
X512	Connects power supply, see chapter 3.5
X513	Connects dual CAN bus (**CAN BUS 1**), see chapter 3.6
X514	Connects dual CAN bus (**CAN BUS 2**), see chapter 3.6

* The available ethernet interfaces are a hardware redundancy. Internally, both represent one ethernet interface with the same IP and Mac address. The redundancy is managed by the operating system of the Operator unit.

1.10 Output Relays

Table 1-7 Output Relays

Plug	Relay	Function
X508	System failure (Sys Fail)	Indicates a failure within the PilotStar® NX Operator Unit if necessary data for operation are not accessible or user interface is not accessible, see chapter 6.1.2
X509	Off Heading	Trips if off heading threshold is exceeded, see chapter 1.13.3
X510	Heading Monitor	Trips if heading monitor threshold is exceeded, see chapter 1.13.2
X511	Backup Navigator	Trips if user alarm message is escalated by transfer to BNWAS, see chapter 6.1.1

1.11 Sensor Data

PilotStar® NX needs the following sensor data for heading control mode and NAV mode.

1.11.1 Heading

Heading data are the essential data for the device. A compass provides the heading data. Actual heading is required for the controller. Therefor a heading value from a gyro compass (THD (GNSS)) or from a magnetic compass (THD (Mag)) must be used.

1.11.2 Speed

A speed input is required as the rudder order from PilotStar® NX is speed dependent. The primary speed input is speed through water. The backup speed input is speed over ground. The third possibility is the manual editing of speed data by user.

1.11.3 Time

Upon reception of a valid ZDA-telegram the received time is used to synchronize the internal clock automatically to the received time information. Without a ZDA telegram a received position information is not used.

1.12 Condition-Based Input Parameters

To adjust the autopilot to the particular conditions, the relevant parameters must be evaluated and adjusted regularly on the environment and vessel conditions (e.g. loading, weather).
Condition-based parameters are:

- Rudder
- Counter rudder
- Yawing
- Radius or Rate of Turn
- Fix turn

1.13 Monitoring and Limit Functions

PilotStar® NX has several functions to monitor the autopilot function and the sensors.

1.13.1 Rudder Angle Limit

The rudder angle limit limits the rudder angle. This threshold is adjustable. An alert message indicates when the rudder angle limit is reached. The adjusted threshold

cannot be exceeded during heading control. The threshold can be exceeded during waypoint steering mode. The threshold is not used during manual steering modes.

1.13.2 Heading Monitor

The heading monitor monitors two independent sources for heading. One source must be from a gyro the other source from a magnetic compass. The accepted difference between both sensors is adjustable. An alert message indicates when this threshold is exceeded.

1.13.3 Off Heading

An off-heading alert is provided, if the vessel does not reach the set heading. The accepted difference between actual heading and set heading is adjustable. An alert message indicates when this threshold is exceeded.

1.13.4 Cross Track Error Limit

A cross track error alert is provided, if the vessel deviates from the course over ground line. The accepted cross track error is adjustable. An alert message indicates when this threshold is exceeded. This threshold applies only for waypoint steering operation mode.

1.13.5 Course Trim Limit

The accepted limit between actual heading and set course over ground is adjustable. An alert message indicates when this threshold is exceeded. This threshold applies only for waypoint steering operation mode.

1.14 Bridge Alert Management

Bridge alert management (BAM) is an overall concept to enhance the handling, distribution and presentation of alerts on the bridge in a consistent manner.

This concept is described in the IMO performance standard MSC.302(87) Performance standard for Bridge Alert Management. Equipment related details are defined in other equipment related performance and test standards.

The objective of BAM is to harmonize the priority, classification, handling, distribution and presentation of alerts, to enable the bridge team to devote full attention to the safe operation of the ship and to immediately identify any alert situation requiring attention and/or action to maintain the safe operation of the ship.
Unnecessary distraction of the bridge team by redundant and superfluous audible and visual alert announcements should be avoided. It reduces the cognitive workload of the operator by minimizing the information presented which is necessary to draw attention to and to assess the situation.

On the bridge alerts are presented on the individual equipment and/or on a central alert management human machine interface (CAM-HMI). This autopilot serves as a backup for the CAM display.

Alerts are divided in different priorities:

- Emergency alarm
  Highest priority of an alert. Alarms which indicate immediate danger to human life or to the ship and its machinery exists and that immediate action must be taken.

- Alarm
  An alarm is a high-priority alert. Conditions requiring immediate attention and action by the bridge team to avoid any kind of hazardous situation and to maintain the safe operation of the ship.

- Warning
  Conditions or situations which require immediate attention for precautionary reasons, to make the bridge team aware of conditions which are not immediately hazardous, but may become so. (Warning may be escalated to alarm.)

- Caution
  Lowest priority of an alert. Awareness of a condition which still requires attention out of the ordinary consideration of the situation or of given information.

Alerts are divided in different categories:

- Category A
  Alerts for which graphical information at the task station (such as Radar or ECDIS) directly assigned to the function generating the alert is necessary, as decision support for the evaluation of the alert-related condition. These alerts can only be acknowledged at the task station.

- Category B
  Alerts where no additional information for decision support is necessary besides the information which can be presented at the CAM-HMI. These alerts can be acknowledged at the task station or at the CAM-HMI.

- Category C
  Alerts that cannot be acknowledged on the bridge, but for which information is required about the status and treatment of the alerts (e.g. certain alerts from the engine).

Table 1-8 Alert List – Alarm Symbols

Icon/Symbol	Description
	Active – unacknowledged alarm (flashing)
	Active – silenced alarm (flashing)
	Active – acknowledged alarm
	Active - responsibility transferred alarm
	Rectified – unacknowledged alarm (flashing)

Table 1-9 Alert List – Warning Symbols

Icon/Symbol	Description
	Active – unacknowledged warning (flashing)
	Active – silenced warning (flashing)
	Active – acknowledged warning
	Active - responsibility transferred warning
	Rectified – unacknowledged warning (flashing)

Table 1-10 Alert List – Caution Symbol

Icon/Symbol	Description
	Caution

1.15 Technical Data

Supply voltage	24 V DC
Protection class	IP56 (front side) IP23 (back side)
Power consumption	25 W
Allowed ambient temperature	-15 to +55 °C
Display conditions:	Main viewing distance 1 m
Output telegrams	According to 61162-1: Talker ID for all output telegrams is always **AG** • ALC • ALF • ALR • ARC • DDC • EVE • HBT • HSC • HTD • RSA • TXT • VER • PANZRSA • PANZSTA

Input telegrams	According to 61162-1: • ACK: All Talker • CAN: All Talker • APB: All Talker • DDC: All Talker • GGA: Talker GA, GL, GN, GP, HC, HE, LC, II, IN, VD, VM, VW, ZA, ZC, ZQ, ZV • GLL: Talker GA, GL, GN, GP, HC, HE, LC, II, IN, VD, VM, VW, ZA, ZC, ZQ, ZV • GNS: Talker GA, GL, GN, GP, HC, HE, LC, II, IN, VD, VM, VW, ZA, ZC, ZQ, ZV • HDG: Talker HE, HF • HDT: Talker GP, HC, HE, HF • NSR: Talker IN • RMC: Talker GA, GL, GN, GP, HC, HE, LC, II, IN, VD, VM, VW, ZA, ZC, ZQ, ZV • THS: Talker GP, HC, HE, HF • VBW: Talker GP, VD, VM, VW, II, IN • VHW: Talker VD, VM, VW, II, IN • VTG: Talker GP, VD, II, IN • ZDA: All Talker

1.16 CAN Bus

The CAN bus is a Multi-Master-Bus allowing the connection of all devices and systems regardless of their task and function. This means that any number of devices can be connected. These devices must be designed for CAN bus technology. For the CAN bus it is essential that every CAN bus participant is addressable via a unique address. This address is set within each bus participant or via a component (participant) which is able to look into the CAN bus architecture.

	This CAN bus address can be set with a special Service Tool by the service personnel only. It cannot be changed without this tool.

Each CAN bus participant can send and receive data via the CAN bus. For data transmission, this data is combined with a header (address from the data source, a “Heart Beat”) and the data itself. The data is transmitted to the CAN bus cyclically. Each CAN bus participant monitors the CAN bus to take off the relevant data.

The CAN bus must be terminated at both ends (within an application) via an ohm resistor (120 Ohms). This terminating resistor is set by jumpers at the respective connection (see chapter 3.6).

The termination has always to be set between the termination terminals (T) and the CAN LOW terminal (L). There are two types of CAN bus in an application:

- Single CAN bus
- Dual CAN bus

The difference between a Single CAN bus application and a Dual CAN bus application is a CAN bus redundancy. In most cases the Single CAN bus is duplicated for redundancy, but this feature is for a redundancy of the respective device not for the CAN bus itself.

Table 1-11 CAN Bus Cable Data

Designation	Data
Type	2x2x0.75 mm², screened, twisted pair (twisted pitch length <80 mm)
Impedance	120 Ω ±10 %
Capacitance	max. 50 pF/m
Cable Line Delay	max. 5 ns/m
Cable Length	max. 400 m (termination to termination)

2 Mounting

If the operator unit could not be integrated in a console or in case of a standalone application, mounting frame is necessary, see spare parts catalogue.

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3 Installation

3.1 Establish a Common Ground Point

In order to comply with the stringent EMC requirements, abide by the information given below regarding cable connections.
Use the cable types specified.

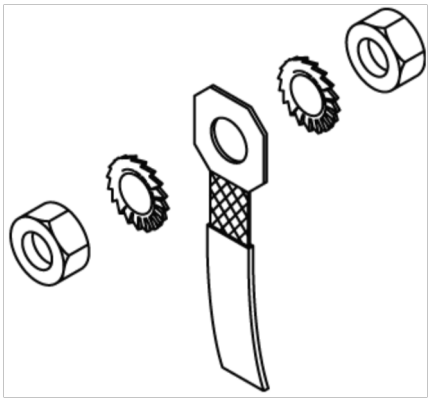


Figure 3-1 Establish a Common Ground Connection

Make all common ground connections as shown in the figure above.
The earthing cable attached to the cable bracket must possess a cross section of minimum 1.5 mm^2.
Mount the cable bracket between two toothed washers.
Common ground connections must be free of color, corrosion and well fastened.

3.2 Proper Cable Connections

CAUTION	**Hazard due to unintended use of shielding clamp** Risk of material damage • Do not use shielding clamp for any mechanical connection. • Use one shielding clamp only for one cable.

Adhere the following instructions:

- Strip the cable over a length of 60 mm, see Figure 3-2.
- Do not damage the cable shielding.
- Trim the cable shield until 15 mm is left on the cable.
- Use clamp to fix the cable at the casing, see Figure 3-3.

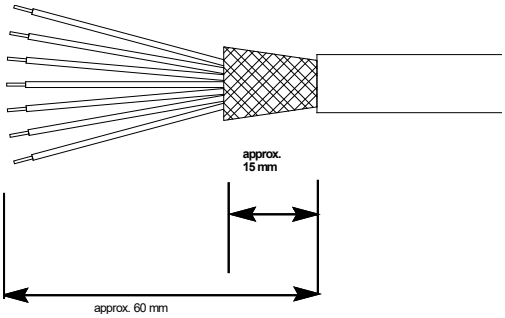


Figure 3-2 Stripping of Connection Cable

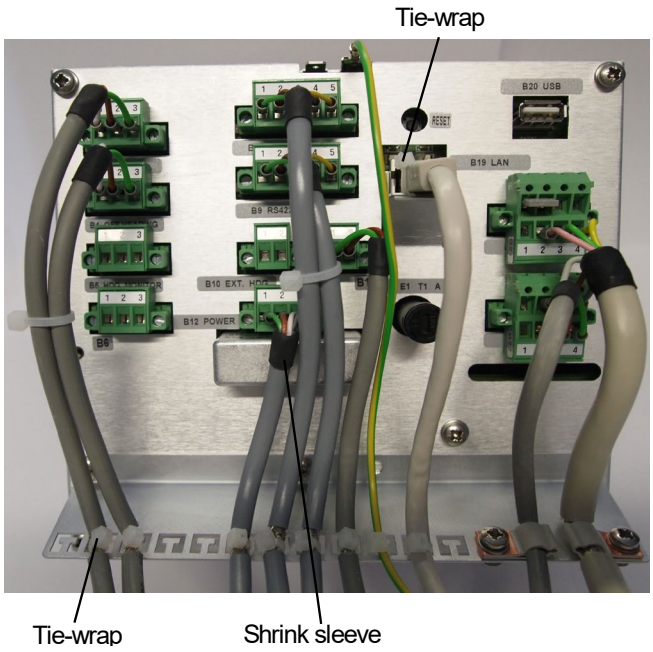


Figure 3-3 Example Cable Connection

3.3 Installation for BNWAS / BAM

To use PilotStar® NX in combination with a BNWAS and / or BAM system a MOXA switch is needed, see spare parts catalogue.
For configuration of the MOXA switch, see chapter 5.3.14.

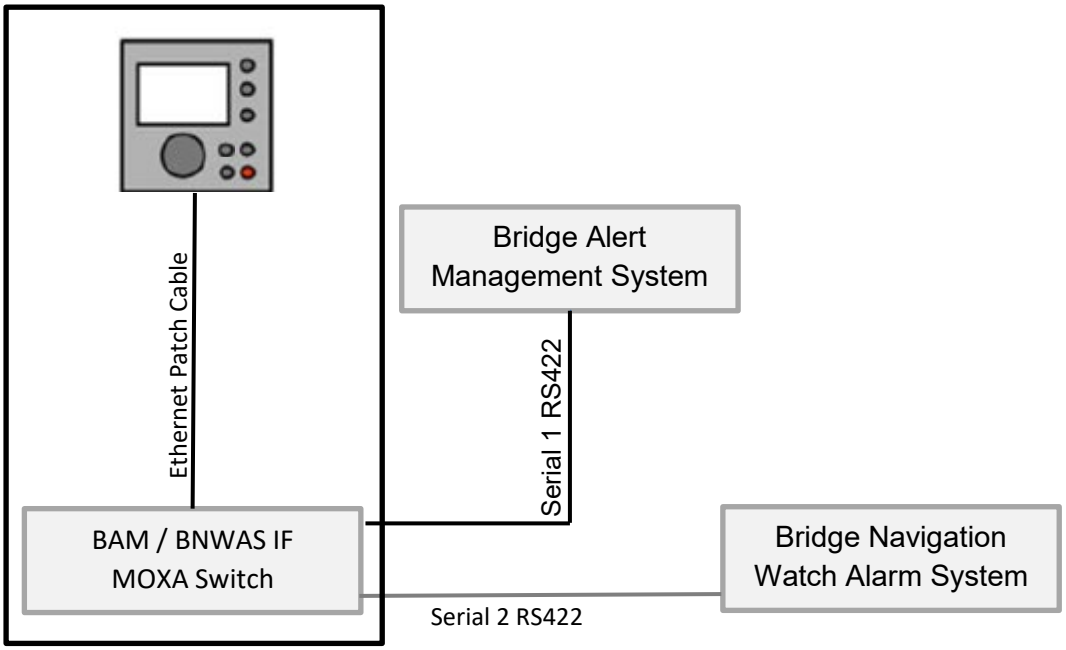


Figure 3-4 Installation for BNWAS / BAM with MOXA Switch

3.4 Connection Overview

Table 3-1 Connection Overview

Designation	Plug	Chapter
Outputs		
Relays / alarm and status outputs	X508, X509, X510, X511	3.8
Inputs		
Supply voltage	X512	3.5
Output / Input		
Dual CAN bus	X513, X514	3.6
USB	X20	-
Ethernet	X19, X21	-
RS422 serial input / output	X505, X506, X507	3.7

Table 3-2 External Interfaces

Device	Interface	No.	Standard
Operator Unit 102-820 NG1	Serial	3	IEC 61162-1, IEC 61162-2
Moxa NPort	Serial	2	IEC 61162-1, IEC 61162-2
Operator Unit 102-820 NG1	Relais	4	
Operator Unit 102-820 NG1	Ethernet	1	IEC 61162-450

Table 3-3 Internal Interfaces

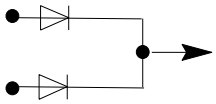
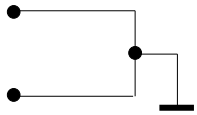
Device	Interface	No.	Standard
Operator Unit 102-820 NG1	Ethernet	1	Moxa NPort, Slave OU
Operator Unit 102-820 NG1	CAN Bus	2	APIF, Steering AS
Moxa NPort	Ethernet	1	Operator Unit

3.5 Connect Supply Voltage

Plug	X512
Connector poles	4

Pole numbers counted from left hand side (top view).

Table 3-4 Pole Assignment Supply Voltage

Pole	Depiction	Connection
X512/1		+24 V DC Power
X512/2		
X512/3		Ground +24 V DC
X512/4		

3.6 Connect Dual CAN Bus

Plug	X513, X514
Connector poles	4 each

Pole numbers counted from left hand side (top view).

Table 3-5 Pole Assignment Dual CAN Bus

Pole	Connection
X513/1	CAN bus termination
X513/2	CAN bus low
X513/3	CAN bus high
X513/4	CAN bus ground
X514/1	CAN bus termination
X514/2	CAN bus low
X514/3	CAN bus high
X514/4	CAN bus ground

Table 3-6 Dual CAN Bus Termination Jumper Position

Plug	Jumper Position for Termination
X513	Between X513/1 and X513/2
X514	Between X514/1 and X514/2

3.7 Connect RS422 Serial Inputs / Outputs

Plug	X505, X506, X507
Connector poles	5 each

Pole numbers counted from left hand side (top view).

Table 3-7 Pole Assignment RS4fff22 Serial Inputs / Outputs

Pole	Connection
X505/1	Receiver -Rx
X505/2	Receiver +Rx
X505/3	Transmitter +Tx
X505/4	Transmitter -Tx
X505/5	Ground
X506/1	Receiver -Rx
X506/2	Receiver +Rx
X506/3	Transmitter +Tx
X506/4	Transmitter -Tx
X506/5	Ground
X507/1	Receiver -Rx
X507/2	Receiver +Rx
X507/3	Transmitter +Tx
X507/4	Transmitter -Tx
X507/5	Ground

	In case of signal reflections, the serial inputs / outputs can be terminated to reduce signal reflections. Long signal cables or high baud rates cause signal reflections. Termination is done via DIP switches at the end of transmitter line and at the end of the receiver line. It is necessary to open the backside cover to reach the DIP switches.

Table 3-8 DIP Switches for Termination of Serial Inputs / Outputs

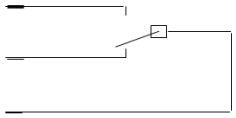
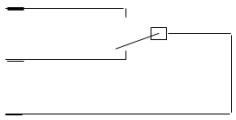
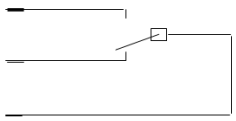
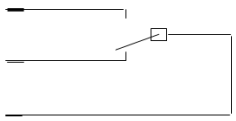
Pole	Function	Adjustments
S501	Termination of transmitter side at X505	Off = No termination (default) On = Termination
S502	Termination of receiver side at X505	Off = No termination (default) On = Termination
S503	Termination of transmitter side at X506	Off = No termination (default) On = Termination
S504	Termination of receiver side at X506	Off = No termination (default) On = Termination
S505	Termination of transmitter side at X507	Off = No termination (default) On = Termination
S506	Termination of receiver side at X507	Off = No termination (default) On = Termination

3.8 Connect Alarm and Status Outputs (Relays)

Plug	X508, X509, X510, X511
Connector poles	3 each

Pole numbers counted from left hand side (top view).

Table 3-9 Pole Assignment Alarm and Status Outputs (Relays)

	Pole	Depiction	Connection
System failure	X508/1		NO
	X508/2		NC
	X508/3		COM
Off Heading	X509/1		NO
	X509/2		NC
	X509/3		COM
Heading Monitor	X510/1		NO
	X510/2		NC
	X510/3		COM
Backup Navigator	X511/1		NO
	X511/2		NC
	X511/3		COM

Intentionally left blank

4 Operation

4.1 Safety Information

WARNING	**Danger due to installation by unqualified personnel**
	Risk of injury and material damage • Keep unqualified personnel away from the operation area. • All operation must be performed only by qualified personnel.

	Confirm value changes with pushbutton **Set.** If there are longer inactivity after a value change without pressing **Set**, the respective value returns to the previous value.

4.2 Switching On and Off

The system has no on and off-switch. System is ready for operation when voltage supply is connected.

4.3 General Display Elements for Operation

The following display functions / information are shown on several display pages.

4.3.1 Day / Night Softkey

Change between predefined day and night color mode. Day and night color mode can be predefined, see chapter 5.3.7.8 and 0.

Figure 4-1 Day / Night Softkey

4.3.2 Limits Indicator

This indicator is applicable for heading control mode and waypoint steering mode and displays the adjusted limit values, see chapter 1.13.
Click on this indicator to adjust limit values, see chapter 4.4.6.

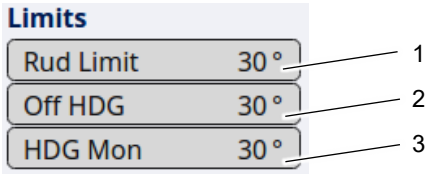


Figure 4-2 Parameter Indicator

Pos.	Designation
1	Rudder angle limit in degree, see chapter 1.13.1
2	Off heading (within heading control mode) in degree, see chapter 1.13.3 or cross track error limit (within waypoint steering mode) in meter, see chapter 1.13.4
3	Heading monitor in degree, see chapter 1.13.2

4.3.3 Status Header Line

The header line of every operation display page includes the information about the current used parameter set in the top right corner.
The header line of every operation display page, except the main display pages, includes the name of the current display page. In the top left corner.

In the middle of the header line, a status note is displayed, if available.
There are 2 possible status notes:

- No Server Connection
- Manual Speed

Figure 4-3 Status Header Line Operation Display Page

4.3.4 Alert Messages Indication

All alert messages are shown with alert symbol and specific color, see chapter 1.14. Alert messages appear in the top left corner of the display. For all unacknowledged alerts the alert long text message is shown, for all acknowledged alerts the alert short text message is shown, see chapter 6.1.1.
While scrolling through all active alerts with pushbutton **Alert Acknowledgement** (see Figure 1-4) the alerts are displayed for 3 seconds on after another with an ascending number. The scrolling can be interrupted by pressing the pushbutton **Alert Acknowledgement** again. The alert with the highest priority is shown, if the scrolling is interrupted.

Figure 4-4 Unacknowledged Alert Indication

Figure 4-5 Alert Indication with an Ascending Number while Alert Scrolling

4.3.5 Parameter Indicator

This indicator is applicable for heading control mode and waypoint steering mode and displays the adjusted parameter values. Click on this indicator to select a stored parameter set, see chapter 4.4.9.
The parameter values are editable on display page **Parameter Modify**, see chapter 4.4.10.

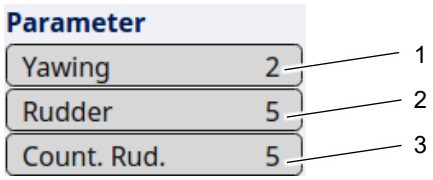


Figure 4-6 Parameter Indicator

Pos.	Designation
1	Yawing Ratio between rudder activity and heading accuracy Adjustable from 1 (maximum accuracy due to highest rudder activity) to 6 (minimum accuracy due to lowest rudder activity) Default: 2

Pos.	Designation
2	Rudder Ratio between rudder angle and rudder movement effectivity within heading change manoeuvre Adjustable from 1 (minimum rudder movement effectivity due to small rudder angle) to 9 (maximum rudder movement effectivity due to large rudder angle) Default: 5
3	Counter Rudder Counter rudder value which counteracts the turning movement within heading change manoeuvre Adjustable from 0 (lowest counter rudder value) and 9 (highest counter rudder value) Default: 5

4.3.6 Value / Speed Indicator

Actual speed is displayed in knots. Click on this indicator to select a speed source, see chapter 4.4.7.

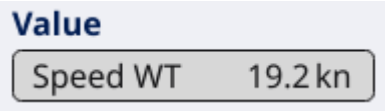


Figure 4-7 Value / Speed Indicator

4.3.7 Operation Mode Softkeys

Press the respective softkey to change the operation mode.
Further operational items are operating elements on the front of the operator unit casing (see chapter 1.7) and a reset button on the back of the operator unit casing (see chapter 5.2).

Table 4-1 Operation Mode Softkeys

Element	Depiction	Function / Description
	Operation mode softkey, **HDG**	Activate heading control mode; Softkey turns to inverse color if operation mode is deactivated.
	Operation mode softkey, **NAV**	Activate waypoint steering mode; Softkey turns to inverse color if operation mode is deactivated.
	Operation mode softkey, **NFU/FU**	Activate manual steering via operation unit; Softkey turns to inverse color if operation mode is deactivated.
	Operation mode softkey, **HDG TRIM**	Trim function within heading control mode is activated, see chapter 4.4.1.
	Operation mode softkeys are unavailable (greyed out)	PilotStar® NX is in an inactive mode, see chapter 1.4.2.

	To change the operation mode, the respective softkey has to be pressed for a defined time. Green colored time bar appears under the softkey while pressing the operation mode softkey. Release softkey as long as time bar is colored green. If the operation mode is pressed to long, a sound appears. While processing the change, the time bar is colored blue. After successful change of the operation mode, the color of the operation mode softkey turns in inverse color.

Figure 4-8 Green Colored Time Bar

Figure 4-9 Blue Colored Time Bar

4.4 Operation Displays Pages

	Input and operation of the display pages works by softkey elements on the touchscreen display and hardware operating elements on the front of the operator unit casing (chapter 1.7).

4.4.1 HDG Main

HDG main is the initial display page for operation within heading control mode. HDG main page is accessible via the respective operation mode softkey, see chapter 4.3.7. This display page has limited access during inactive mode, see chapter 4.5.

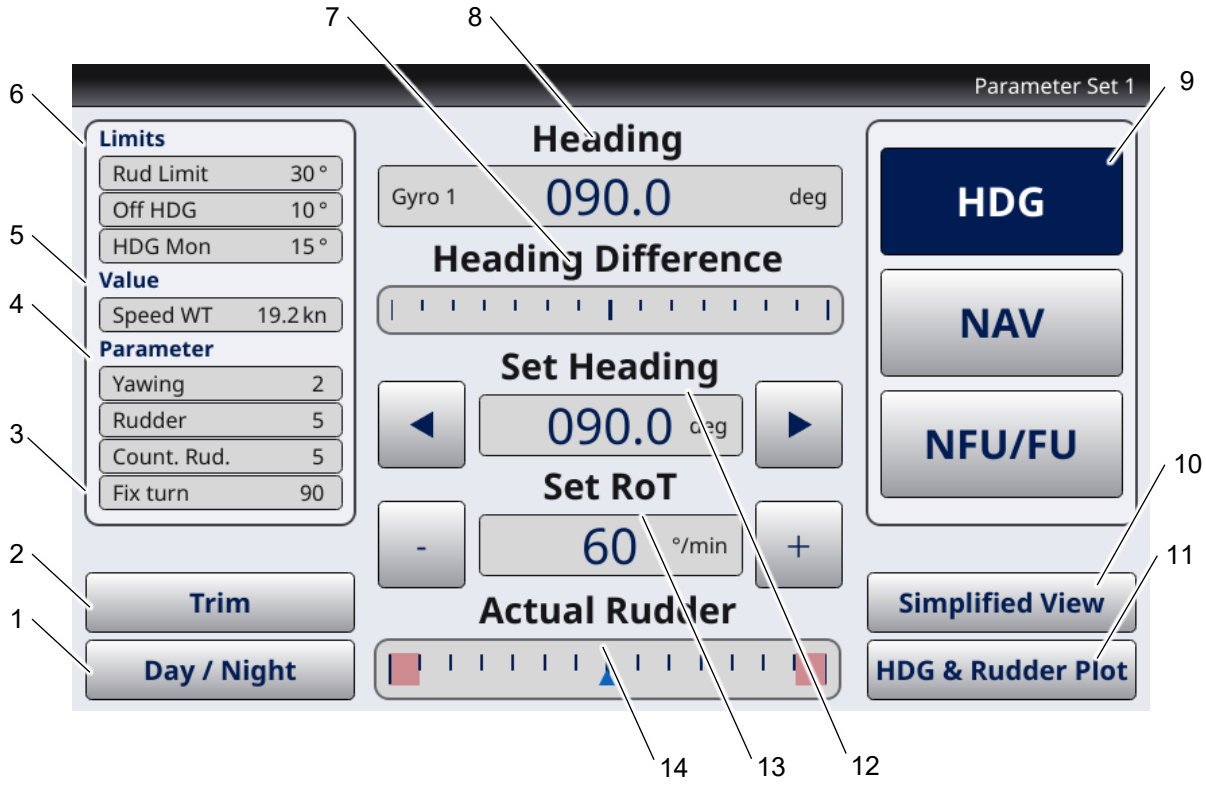


Figure 4-10 HDG Main Display Page

Pos.	Designation
1	Day / Night softkey See chapter 4.3.1

Pos.	Designation
2	Trim softkey Softkey that enables trim function, see chapter 1.4.1.1. Within trim function, offset on set rudder is adjustable via softkeys. The red bars show the rudder limits.  To disable trim function, select **NAV** or **NFU/FU** within operation mode softkeys.
3	Fix Turn Indication of adjusted change value of set heading by pressing arrow softkeys, see Figure 4-10/11 Clicking on this indication opens RoT & Radius display, where also fix turn value is adjustable, see chapter 4.4.11.
4	Parameter See Chapter 4.3.5
5	Value See chapter 4.3.6
6	Limits See chapter 4.3.2
7	Heading Difference Graphical indication of difference between set heading and actual heading in degree, scale limit shows adjusted heading monitor, see 1.13.3
8	Heading Actual heading is displayed in degree. Heading source is adjustable by clicking on this indication, see chapter 4.4.8.
9	Operation mode softkeys See chapter 4.3.7 HDG softkey is activated
10	Simplified view softkey Opens a display page **Simplified View**, see chapter 4.4.13
11	HDG & Rudder Plot softkey Opens a display page, which shows a steering history of last past minutes as a graph, see chapter 4.4.4.

Pos.	Designation
12	Set Heading Set heading is displayed in degree. Set heading is editable with side arrows by adjusted fix turn value, see Figure 4-10/3. Set heading is adjustable with sidewise softkeys or rotary knob by 0.5 degree per detent of the rotary knob. Turning the rotary knob clockwise increase the set heading value. Turning the rotary knob counter clockwise decreases the set heading value.
13	Set RoT Indication of rate of turn (displayed in °/min) or radius (displayed in nautical miles) within heading change manoeuvre. Value is adjustable with side softkeys. It is possible to switch between radius controlled heading changes and rate of turn controlled heading changes by clicking on this indication, see chapter 4.4.11.
14	Actual Rudder Graphical indication of actual rudder angle as a tendency display. Scale of tendency display depends on configured maximum rudder value. Limit of indication show configured maximum rudder value, see chapter 5.3.7.46. The limit zones are displayed as red bars on the left and the right side. The display shows the view backwards, so that the right side of the rudder indication represents port side and the left side of the rudder indication represents starboard.

4.4.2 NAV Main

NAV main is the initial display page for operation within waypoint steering mode. NAV main page is accessible via the respective operation mode softkey, see chapter 4.3.7. Connected route planning system generates all necessary steering data for waypoint steering.
This display page has limited access during inactive mode, see chapter 4.5.

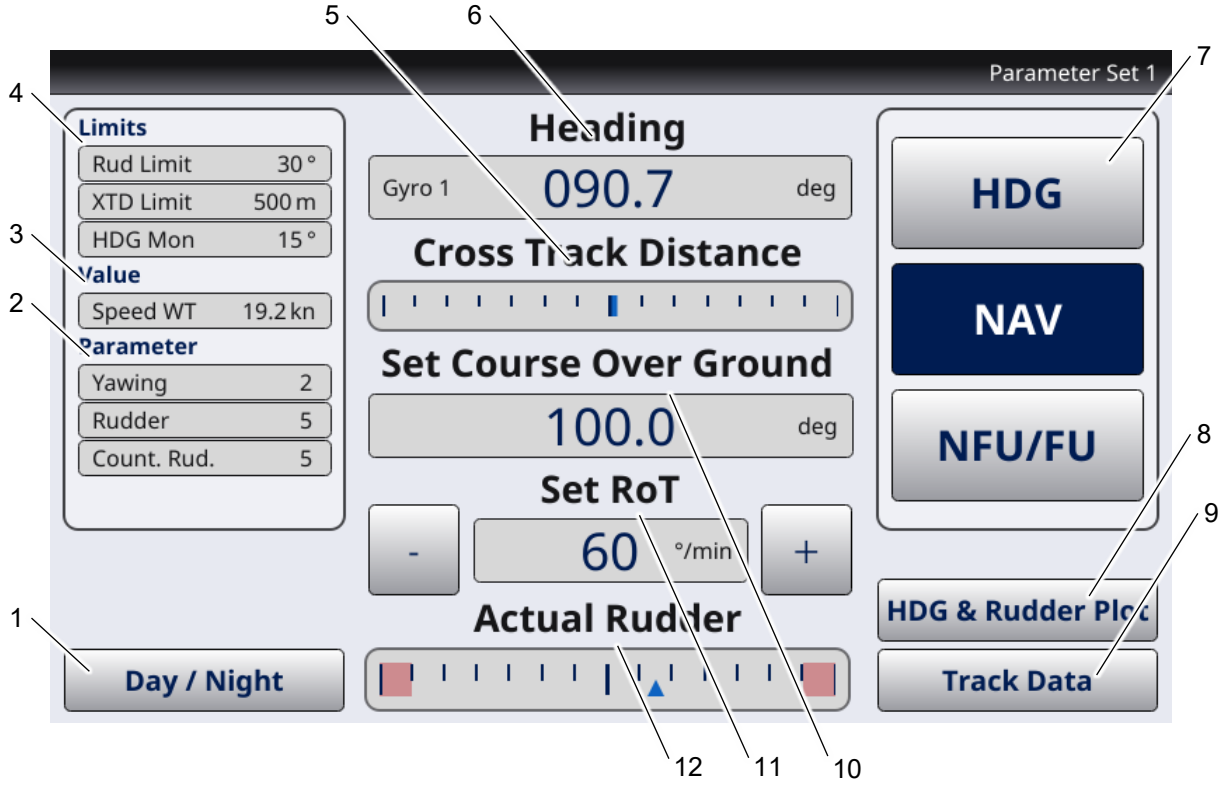


Figure 4-11 NAV Main Display Page

Pos.	Designation
1	Day / Night softkey See chapter 4.3.1
2	Parameter See Chapter 4.3.5
3	Value See chapter 4.3.6
4	Limits See chapter 4.3.2

Pos.	Designation
5	Cross Track Distance Graphical indication of difference between planned waypoint and current waypoint in degree, scale limit shows adjusted cross track error limit, see 1.13.4.
6	Heading Actual heading is displayed in degree. Heading source is adjustable by clicking on this indication, see chapter 4.4.8.
7	Operation mode softkeys See chapter 4.3.7 NAV softkey is activated
8	Track Data softkey Opens a display page, which shows a track history of last past minutes as a graph, see chapter 4.4.5.
9	HDG & Rudder Plot softkey Opens a display page, which shows a steering history of last past minutes as a graph, see chapter 4.4.4.
10	Set Course Over Ground Set course over ground is displayed in degree.
11	Set RoT Indication of rate of turn (displayed in °/min) or radius (displayed in nautical miles) within heading change manoeuvre. Value is adjustable with sidewise softkeys. It is possible to switch between radius controlled heading changes and rate of turn controlled heading changes by clicking on this indication, see chapter 4.4.11.
12	Actual Rudder Graphical indication of actual rudder angle as a tendency display. Scale of tendency display depends on configured maximum rudder value. Limit of indication show configured maximum rudder value, see chapter 5.3.7.46. The limit zones are displayed as red bars on the left and the right side. The display shows the view backwards, so that the right side of the rudder indication represents port side and the left side of the rudder indication represents starboard.

4.4.3 NFU/FU Main

NFU/FU is the initial display page for operation within NFU/FU mode. this page is accessible via the respective operation mode softkey, see chapter 4.3.7.
Within NFU/FU display page, there are two possibilities to set a rudder:

- NFU mode: rudder angle is set via control keys
- FU mode: entry of target rudder angle value via rotary knop

This display page has limited access during inactive mode, see chapter 4.5.

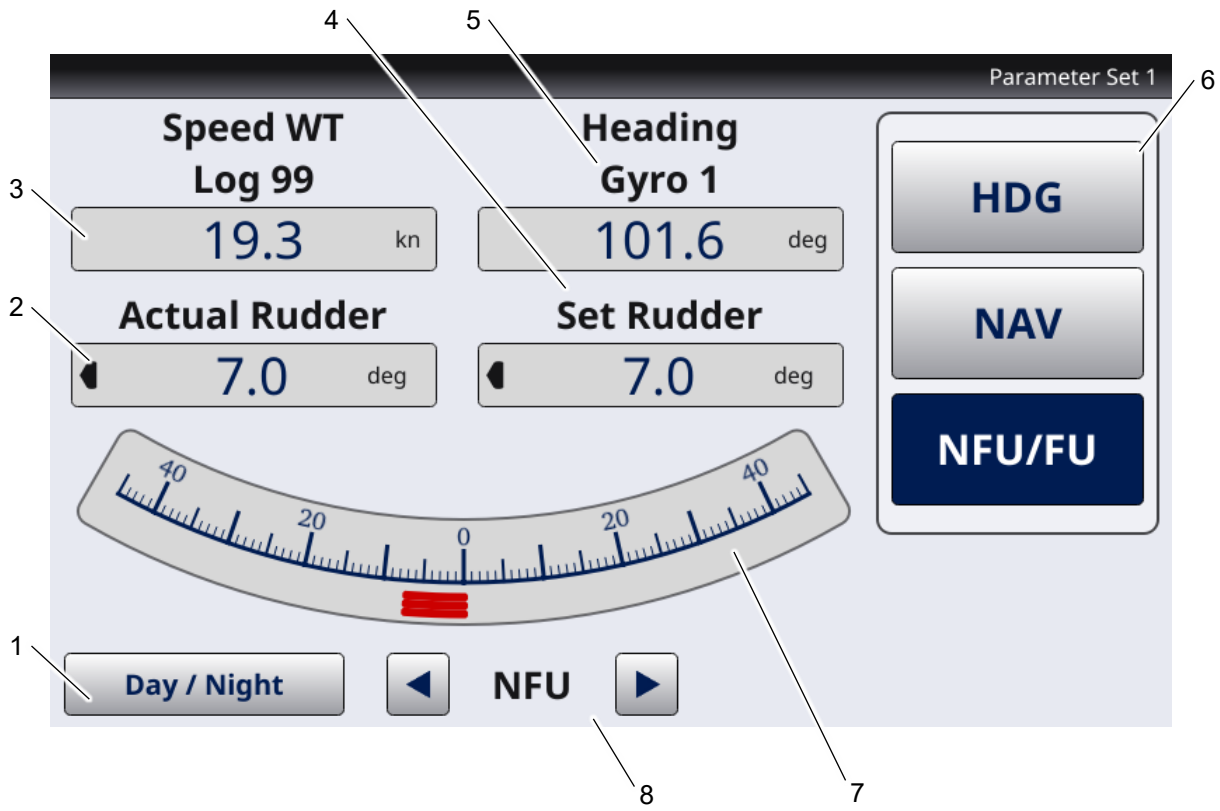


Figure 4-12 NFU/FU Main Display Page

Pos.	Designation
1	Day / Night softkey See chapter 4.3.1.
2	Actual Rudder Actual rudder angle is displayed in degree. If arrow indicator is displayed right, rudder angle is set on starboard side. If arrow indicator is displayed left, rudder angle is set on port side.

Pos.	Designation
3	Speed WT (Water tracked) or Speed BT (Bottom tracked) See chapter 4.3.6.
4	Set Rudder Set rudder angle is displayed in degree. If arrow indicator is displayed right, rudder angle is set on starboard side. If arrow indicator is displayed left, rudder angle is set on port side.
5	Heading Actual heading is displayed in degree. Heading source is adjustable by clicking on this indication, see chapter 4.4.8.
6	Operation mode softkeys See chapter 4.3.7. NFU/FU softkey is activated.
7	Rudder indication Graphical indication of set rudder angle and actual rudder angle. Upper outer line and lower outer line show actual rudder angle. Middle line shows set rudder angle. The limit zones are displayed as red bars on the left and the right side. The display shows the view backwards, so that the right side of the rudder indication represents port side and the left side of the rudder indication represents starboard.
8	NFU mode adjustment Rudder angle can be set via side softkey arrows. Right softkey arrow sets rudder angle on starboard side. Left softkey arrow sets rudder angle on port side.

4.4.4 HDG & Rudder Plot

This display page shows a steering history of last past minutes as a graph. This display page is accessible from display pages **HDG Main**, **HDG TRIM Main**, **NAV Main, Simplified View** and **Track Data** via respective softkey.

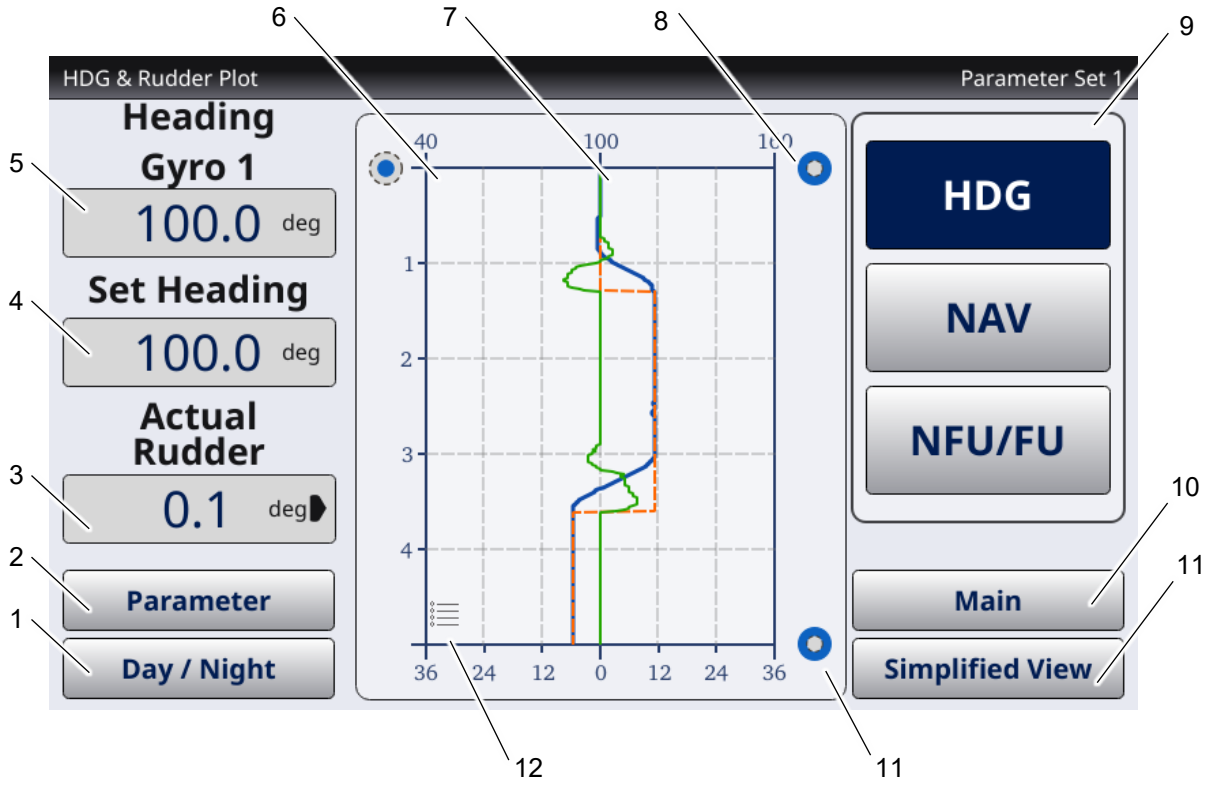


Figure 4-13 HDG & Rudder Plot Display Page

Pos.	Designation
1	Day / Night softkey See chapter 4.3.1
2	Parameter softkey Opens display page **Parameter Memory**, see chapter 4.4.10
3	Actual Rudder Actual rudder angle is displayed in degree. If arrow indicator is displayed right, rudder angle is set on starboard side. If arrow indicator is displayed left, rudder angle is set on port side.

Pos.	Designation
4	Set Heading / Set Course Over Ground Set heading is displayed in degree within heading control mode. Set course over ground is displayed in degree within waypoint steering mode.
5	Heading Actual heading is displayed in degree. Heading source is adjustable by clicking on this indication, see chapter 4.4.8.
6	Time axis [min] Axis for time recorded in minutes. Round checkbox to switch axis resolution between 5 minutes and 20 minutes.
7	Graph History of actual rudder angle in degree, actual heading in degree and set heading (set course over ground within waypoint steering mode) in degree displayed as a graph, see legend Figure 4-13/12
8	Heading axis [°] Axis for heading recorded in degree. Round checkbox to switch axis resolution between +/- 20 degree and +/60 degree.
9	Operation mode softkeys See chapter 4.3.7
10	Main softkey Opens previous main page (**HDG Main**, **HDG TRIM Main** or **NAV Main**)
11	Simplified view softkey Opens a display page **Simplified View**, see chapter 4.4.13
12	Rudder angle axis [°] Axis for rudder angle recorded in degree. Round checkbox to switch axis resolution between half of maximum rudder angle (e.g. +/- 8 degree) and maximum rudder angle (e.g. +/- 16 degree).
13	Legend of graph Legend of graph appears by clicking on the symbol. 

4.4.5 Track Data

This display page shows a track history of last past minutes as a graph. This display page is accessible only within waypoint steering mode from display page **NAV Main** and **HDG & Rudder Plot** via respective softkey.

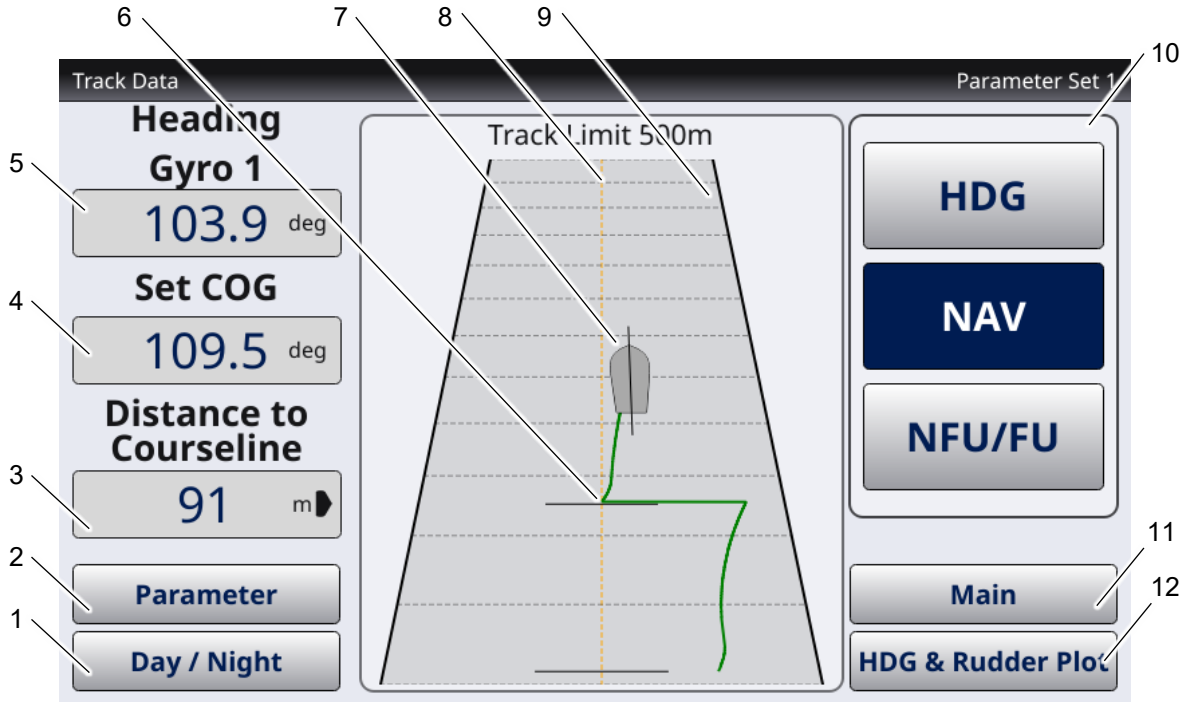


Figure 4-14 Track Data Display

Pos.	Designation
1	Day / Night softkey See chapter 4.3.1
2	Parameter softkey Opens display page **Parameter Memory**, see chapter 4.4.10.
3	Distance to Course line Distance to course line is displayed in meter. Arrow indicator shows the direction of the distance from the course line.
4	Set COG Set course over ground is displayed in degree.
5	Heading Actual heading is displayed in degree. Heading source is adjustable by clicking on this indication, see chapter 4.4.8.

Pos.	Designation
6	Heading change mark A horizontal line shows point when a heading change caused by calling up of the next waypoint is performed.
7	Current ship position.
8	Colored midline shows course line / track.
9	History of distance to course line in meter The distance between two dotted horizontal lines shows time interval of one minute. Adjusted track limit is readable above the graph. Graph is limited to each side by the adjusted track limit. Track limit is adjustable at display page **Limits**, see chapter 4.4.6.
10	Operation mode softkeys See chapter 4.3.7.
11	Main softkey Opens display page **NAV Main,** see chapter 4.4.2.
12	HDG & Rudder Plot softkey Opens a display page **HDG & Rudder Plot**, see chapter 4.4.4.

4.4.6 Limits

On this display page the available limits are adjustable. This display page is accessible from display pages **HDG Main, HDG TRIM Main** and **NAV Main** by clicking on limits indication, see chapter 4.3.2.

D	If no user action is recognized for more than 15 seconds, view returns to previous page.

Figure 4-15 Limits Display Page

Pos.	Designation
1	Track limit for cross track error in meter, see chapter 1.13.4. The track limit value is changeable in steps of 1 deg in the range from 5 deg up to 30 deg.
2	Course trim limit in degree, see chapter 1.13.5. The course trim value is changeable in steps of 1 m in the range from 10 m up to 2000 m.

Pos.	Designation
3	Off heading in degree, see chapter 1.13.3. The off-heading value is changeable in steps of 1 deg in the range from 5 deg up to 30 deg.
4	Heading monitor in degree, see chapter 1.13.2. The heading monitor value is changeable in steps of 1 deg in the range from 5 deg up to 30 deg.
5	Rudder angle limit in degree, see chapter 1.13.1. The rudder limit value is changeable in steps of 1 deg in the range from 5 deg up to max rudder value.
6	Softkeys to adjust selected limit values.
7	Cancel softkey Opens previous display page. Not saved changes will be lost.

4.4.7 Speed Selection

Display page to select speed source. This display page is accessible from display pages **HDG Main, HDG TRIM Main** and **NAV Main** by clicking on value / speed indication, see chapter 4.3.6.

	If no user action is recognised for more than 15 seconds, view returns to previous page.

Figure 4-16 Speed Selection Display Page

Pos.	Designation
1	System Radio button to select automatic system selection of speed source. Name of automatically selected speed source is displayed after colon. Selection is only possible, when speed sensor is available. Speed value is measured by sensor. The speed is marked with WT for water tracked or BT for bottom tracked.
2	Manual Speed Radio button to select manual input of speed value.

4.4.8 HDG Selection

Display page to select compass for heading source. This display page is accessible from display pages **HDG Main, HDG TRIM Main, NAV Main, HDG & Rudder Plot** and **Track Data** by clicking on heading indication.

	If no user action is recognized for more than 15 seconds, view returns to previous page.

Figure 4-17 HDG Selection Display Page

	If the autopilot is installed in an Integrated Navigation System (INS), which meets the standard IEC 61924-2 the heading information is distributed to the autopilot via a Consistent Common Reference System (CCRS). Therefore, the heading source is selected automatically and cannot be changed by the operator.

Pos.	Designation
1	System Radio button to select automatic system selection of heading source. Name of automatically selected heading source is displayed after colon. If system selection is activated, a heading source is selected automatically.
2	Magnet Radio button to select magnetic heading source, if available Name of magnet heading source is displayed after colon. If several magnet heading sources are connected within a navigation system, the heading source with the better performance or with a verified sequence is selected automatically.
3	Gyro Radio button to select gyro heading source, if available Name of gyro heading source is displayed after colon. If several gyro heading sources are connected within a navigation system, the heading source with the better performance or with a verified sequence is selected automatically. GPS heading sources are treated like gyro heading sources.
4	Cancel softkey Opens previous display page Not saved changes will be lost

4.4.9 Parameter Memory

Display page to select a stored parameter set or to create a new parameter set. This display page is accessible via softkey **Parameter** within display pages **HDG & Rudder Plot** and **Track Data**. Within display pages HDG Main and NAV Main this display page is accessible by clicking on parameter indication, see chapter 4.3.3.

	If no user action is recognised for more than 15 seconds, view returns to previous page.

Figure 4-18 Parameter Memory Display Page

Pos.	Designation
1	Set selection To modify a stored parameter set, select respective parameter set and select softkey **Modify**, see Figure 4-18/2. To create a new parameter set, select an empty entry and select softkey **Modify**, see Figure 4-18/2.

Pos.	Designation
2	Modify softkey Opens display page **Parameter Modify** to change parameter set, see chapter 4.4.10
3	Cancel softkey Opens previous display page Not saved changes will be lost

4.4.10 Parameter Modify

Display page to change stored parameter set or to create a new parameter set. This display page is accessible via softkey **Modify** within display page **Parameter Memory**.

	If no user action is recognised for more than 15 seconds, view returns to previous page.

Figure 4-19 Parameter Modify Display Page

Pos.	Designation
1	Parameter selection Select respective parameter
2	Softkeys to adjust selected parameter value
3	Cancel softkey Opens previous display page Not saved changes will be lost.

4.4.11 RoT & Radius

Display page to switch between radius controlled heading changes and rate of turn controlled heading changes and to adjust heading change values.
This display page is accessible from display pages **HDG Main, HDG TRIM Main** and **NAV Main** by clicking on RoT / Rad indication or the Fix turn value on the **HDG Main** and **HDG Trim Main** page.

	If no user action is recognised for more than 15 seconds, view returns to previous page.

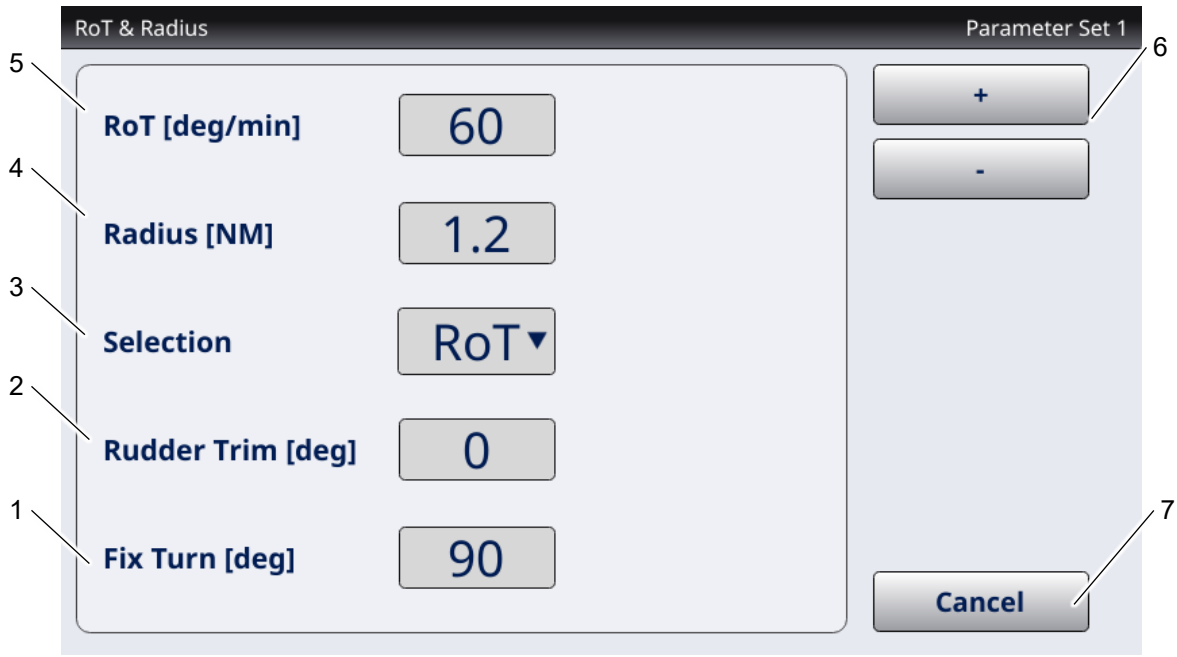


Figure 4-20 RoT & Radius Display Page

Pos.	Designation
1	Fix turn Adjust fix turn change value for heading within heading course mode, see chapter 4.4.1. The fix turn value is changeable in steps of 1 deg in the range from 1 deg up to 180 deg.

Pos.	Designation
2	Rudder trim Adjust the rudder Trim value only in HDG Trim Mode (displayed in degree) Starts always with 0 degree when HDG Trim is activated. The rudder trim value is changeable in steps of 1 deg in the range from -max. rudder angle up to +max. rudder angle (max. rudder angle is adjustable within service menu, see chapter 5.3.7.46).
3	Selection drop-down Select between: Rad radius controlled heading changes RoT rate of turn controlled heading changes
4	Radius Radius value for radius controlled heading changes (displayed in nautical miles) Radius value is changeable in steps of 0.1 NM in the range from 0.2 NM up to 99.0 NM.
5	RoT Rate of turn value for rate of turn controlled heading changes (displayed in °/min) Rate of turn is changeable in steps of 1 °/min in the range from 5 °/min up to 500 °/min.
6	Softkeys to adjust selected parameter value
7	Cancel softkey Opens previous display page Not saved changes will be lost.

4.4.12 Ship Data

Display page to get ship information. This display page is accessible from main display page only within inactive mode via respective softkey, see Figure 4-23.

Figure 4-21 Ship Data Display Page

4.4.13 Simplified View

This display page is accessible only within heading control mode from display page **HDG Main** and **HDG & Rudder Plot**, via respective softkey.
Simplified view is a simplification and summary of display page HDG Main, see chapter 4.4.1.

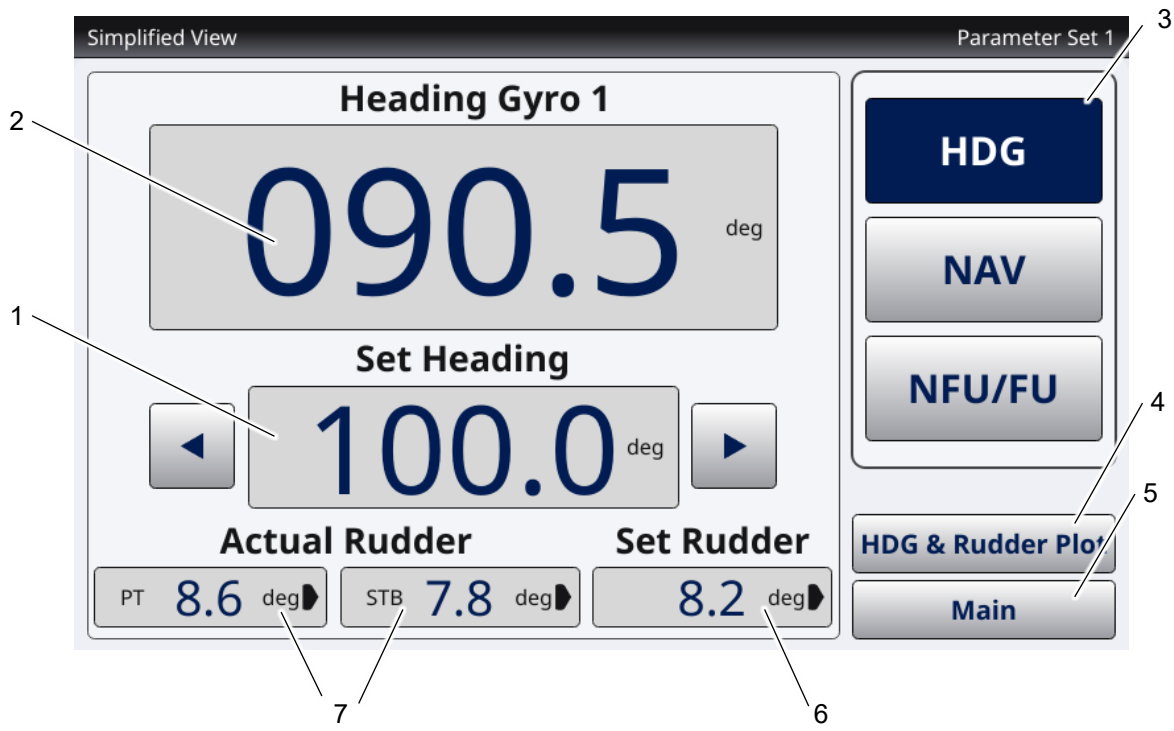


Figure 4-22 Simplified View Display Page

Pos.	Designation
1	Set Heading Set heading is displayed in degree. Set heading is editable with side arrows by adjusted fix turn value, see Figure 4-10/3. Set heading is adjustable with rotary knob by 0.5 degree per detent of the rotary knob. Turning the rotary knob clockwise increase the set heading value. Turning the rotary knob counter clockwise decreases the set heading value.

Pos.	Designation
2	Heading Actual heading is displayed in degree. Heading source is adjustable by clicking on this indication, see chapter 4.4.8.
3	Operation mode softkeys See chapter 4.3.7
4	HDG & Rudder Plot softkey Opens a display page, which shows a steering history of last past minutes as a graph, see chapter 4.4.4.
5	Main softkey Opens **HDG Main**, see chapter 4.4.1.
6	Set Rudder Set rudder is displayed in degree. If arrow indicator is displayed right, rudder angle is set on starboard side. If arrow indicator is displayed left, rudder angle is set on port side.
7	Actual Rudder Actual rudder angle is displayed in degree. If arrow indicator is displayed right, rudder angle is set on starboard side. If arrow indicator is displayed left, rudder angle is set on port side. If there is a rudder on starboard (STB) and port side (PT), there will be two displays. If there is only one rudder, there will be one display.

4.5 Inactive Modes

During inactive mode, there is no full access to all display pages and function. There is only one main display during inactive mode.

Figure 4-23 Main Display Page in Inactive Mode

Table 4-2 Access to Display Pages during Inactive Mode

Display	Inactive Access
HDG Main	Limited Access, see Figure 4-23 Value view and display adjustment only, no steering control
NAV Main	Limited Access, see Figure 4-23 Value view and display adjustment only, no steering control
NFU/FU	No access
HDG & Rudder Plot	No access
Track Data	No access
Limits	Full access
Speed Selection	Full access
HDG Selection	Full access
Parameter Memory	Full access
Parameter Modify	Limited Access

Display	Inactive Access
RoT & Radius	Full access
Ship Data	Access only in inactive mode
Simplified View	No access

4.6 Basic Operating Steps

4.6.1 Adjust RoT or Radius Controlled Heading changes

Precondition

- Operation mode heading control or waypoint steering is enabled
- Main display page of operation mode is active

1. Click on **RoT / Rad** indication.
   - **RoT & Radius** display page opens.
2. Use drop-down list within field **Selection** to select control method **RoT** or **Rad** for course change.
   - - **SET LED** is flashing.
3. Click on respective indication e.g. **Radius [NM]** to adjust value
4. Adjust value with **+** and **-** keys.
5. Confirm adjustment with **SET** button.
   - **RoT / Rad** indication on main display is adjusted.
   - Display page shuts down.

4.6.2 Set Digital NFU Tiller

Precondition

- Operation mode NFU / FU is enabled
- Main display page of operation mode is active

	Within NFU tiller function, rudder moves during adjustment of set rudder angle.

1. Use side arrow softkeys to set a rudder angle, see Figure 4-12/8.

   - Rudder moves.
   - Set rudder value is changed with a rate of 2,5 °/s as long as a softkey is pressed.
   - Display shows adjusted rudder angle, see Figure 4-12/4.

4.6.3 Set Digital FU Tiller

Precondition

- Operation mode NFU / FU is enabled
- Main display page of operation mode is active

	Within FU tiller function, rudder moves after adjustment of set rudder angle.

1. Turn rotary knob to set a rudder angle.
   - Display shows adjusted rudder angle, see Figure 4-12/4.
   - Rudder moves.

4.6.4 Heading Control Mode Operating Steps

	The maximum adjustable set heading difference for one set heading command is limited to 270°. Set heading changes > 270° will be discarded.

4.6.4.1 Change Set Heading via Rotary Knob - Preselected Mode

Precondition
- Operation mode heading control is enabled
- Main display page of operation mode or **HDG & Rudder Plot** display is active.

1. Use **Rotary Knob** to set a heading.
   - Display shows adjusted **Set Heading**, see Figure 4-10/11.
   - **SET LED** is flashing.
2. Confirm adjustment with **SET** button.
   - Autopilot controls rudder in order to approach set heading.

4.6.4.2 Change Set Heading via Rotary Knob - Direct Mode

Precondition
- Operation mode heading control is enabled
- Main display page of operation mode or **HDG & Rudder Plot** display is active.

1. Press **Rotary Knob**.
2. Turn **Rotary Knob** while still pressed.
   - Value of **Set Heading changes** without confirmation, see Figure 4-10/11.
   - Autopilot controls rudder in order to approach set heading.

4.6.4.3 Change Set Heading via Fix Turn

Precondition
- Operation mode heading control is enabled.
- Main display page of operation mode is active.

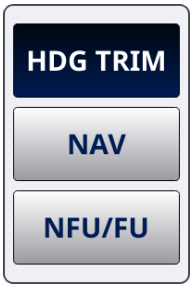
1. Use **Fix Turn** softkeys to set a heading, see Figure 4-10/11.
   - Display shows adjusted set heading, see Figure 4-10/11.
   - **SET LED** is flashing.
2. Confirm adjustment with **SET** button.
   - Autopilot controls rudder in order to approach set heading.

4.6.4.4 Using HDG Trim Function

Precondition

- Operation mode heading control is enabled.
- Main display page of operation mode is active.

1. Press softkey **Trim** to enable trim function, see Figure 4-10/2.
   - Operation mode softkey **HDG** changes to **HDG TRIM.**



   - Side softkeys on **Actual Rudder** indication appear.

2. Use side softkeys on **Actual Rudder** indication to adjust actual rudder.
   - Rudder moves.
   - Adjusted rudder angle is displayed on softkey **Trim**.

	To disable trim function, select NAV or NFU/FU within operation mode softkeys.

5 Service and Configuration

5.1 Safety Information

WARNING	**Danger due to improper operation and purpose**
	Risk of serious injury and material damage • Use product only for the intended purpose. • Perform operation steps according to this manual. • Do not make any product modifications without authorization.

WARNING	**Danger due to operation / maintenance by unqualified personnel**
	Risk of serious injury and material damage • Keep unqualified personnel away from the operation area. • All operation / maintenance must be performed only by qualified personnel.

5.2 Setting Reset

CAUTION	**Hazard due to wrong use of reset button**
	Risk of material damage • Do not use metallic objects to push the reset button.

Reset button is located at the backside of the casing.
Use the **Reset** button to restart the operator unit. Reset does not affect configuration settings.

5.3 Service Menu

	In case of Master – Slave installation access to service menu and configurations are possible from each operation unit. Configurations are distributed to all installed slave and master units. Only configurations within service display page **Local Settings** are specific for every operator unit.

	In case of Master – Master installation all configurations are specific for every operator unit.

5.3.1 Open Service Menu

Precondition Operator Unit is within inactive mode

	For service password contact Raytheon Anschütz service.

1. Press **Set** button and **Alarm Acknowledgement** button for 4 seconds.
   - Password input field appears.
   - **On-screen keyboard** appears.

2. Use **on-screen keyboard** to enter service password
   - **Service Menu Main** display page opens

5.3.2 Close Service Menu

1. Press **Rotary knob** within any service display page.
   - Service menu shuts down.
   - Not saved configurations will be lost.

or

1. Press softkey **Cancel** within **Service Menu Main**.
   - Service menu shuts down.

5.3.3 Structure of Service Menu

The **Service Menu Main** contains 5 menu points. The menu points **PilotStar® NX Settings** and **Steering Components** consit of several configuration sets.

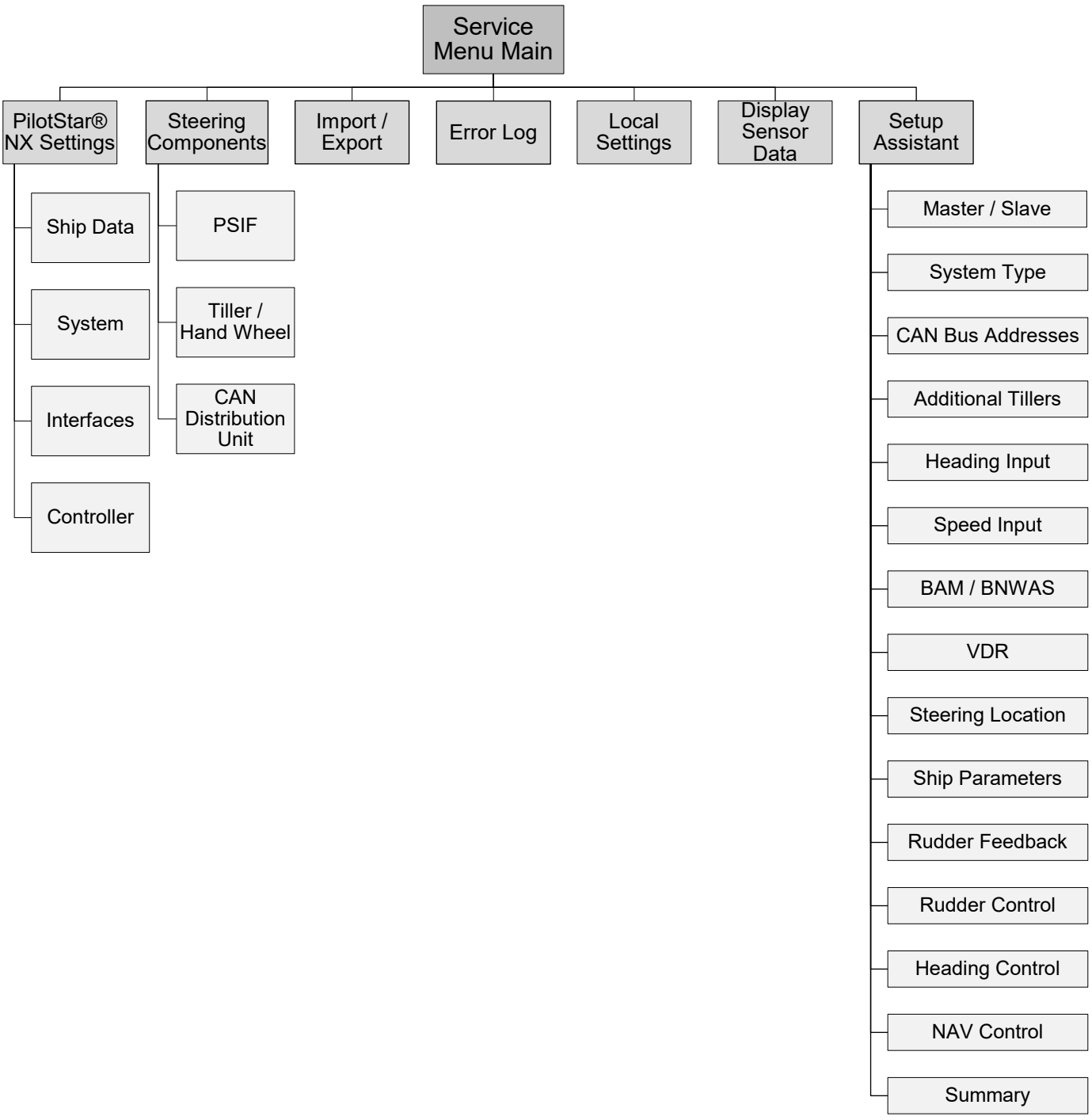


Figure 5-1 Service Menu Structure

5.3.4 General Display Elements for Service Menu

There are 4 types of input fields for configurable parameters:

- Combobox
- Text Field
- Number Field
- Checkbox

There is one another not editable field:

- Information field

5.3.4.1 Combobox

A combobox includes several predefined values, which can be selected via **+/-** softkeys. If combobox is selected via touchscreen, **+/-** softkeys appear.
For configuration of combobox, see chapter 5.3.8.1

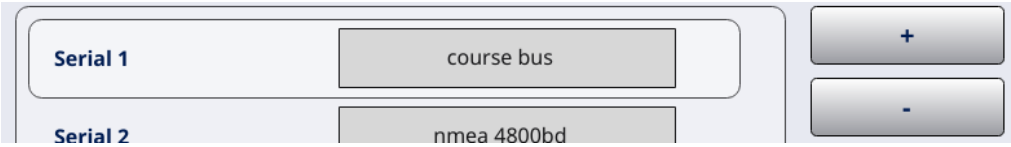


Figure 5-2 Combobox and Selection Softkeys

5.3.4.2 Number Field

A number field can be configured via **+/-** softkeys. If number field is selected via touchscreen, **+/-** softkeys appear.
For configuration of number field, 5.3.8.4

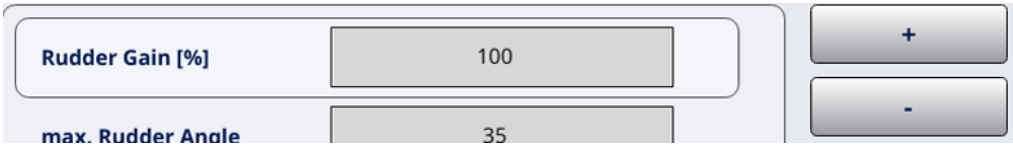


Figure 5-3 Number field and +/- Softkeys

5.3.4.3 Checkbox

A checkbox can be select via **check** softkey. If checkbox is selected via touchscreen, **check** softkey appears.
For configuration of checkbox, see chapter 5.3.8.2.

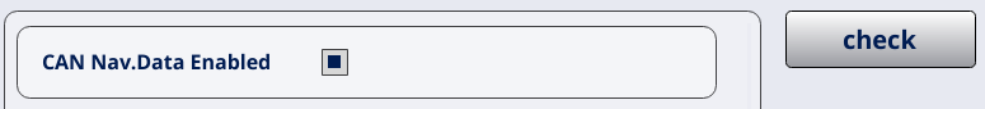


Figure 5-4 Checkbox and Check Softkey

5.3.4.4 Text Field

A text field includes text characters, which can be edited via **on-screen keyboard**. If text field is selected via touchscreen, **edit** softkey appears. After selection of edit softkey, on-screen keyboard appears.
For configuration of text field, see chapter 5.3.8.3

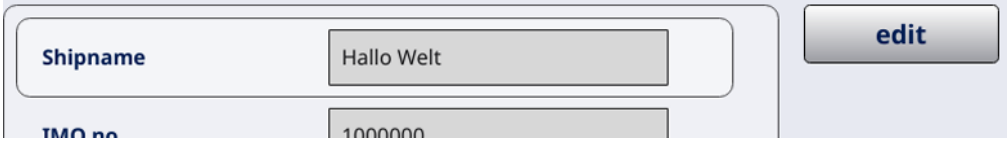


Figure 5-5 Text Field and Edit softkey

Figure 5-6 On-Screen Keyboard

5.3.4.5 Information Field

An information field includes not editable information within the **Setup Assistant** function. This information leads through the menu and gives advices for correct completion of **Setup Assistant.**

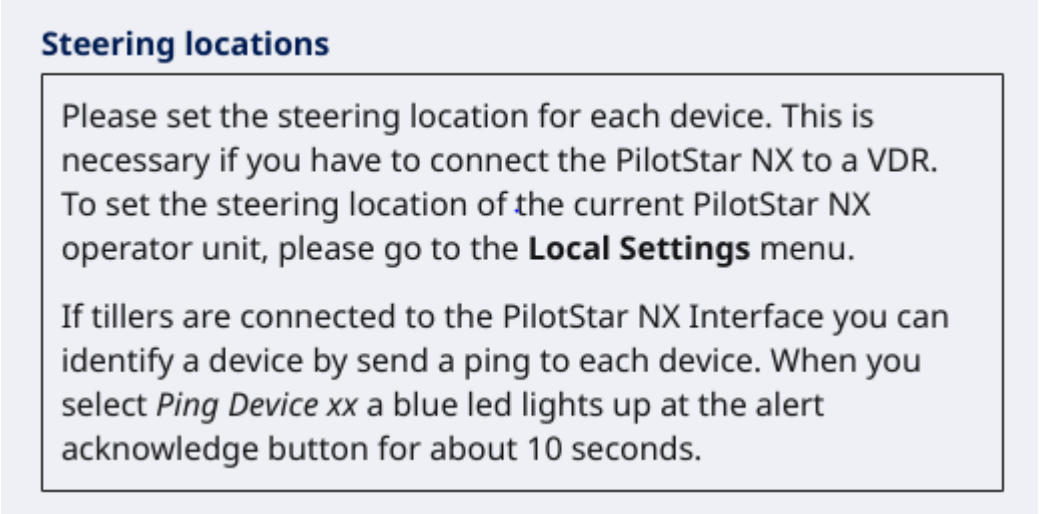


Figure 5-7 Information Field

5.3.5 Service Menu Points / Display Pages

	Input and operation of the display pages works by softkey elements on the touchscreen display and hardware operating elements on the front of the operator unit casing (chapter 1.7).

5.3.5.1 Service Menu Main

This service display page is the initial display page after starting service menu.
Alert messages can appear in the status header line during service menu, see chapter 4.3.4.

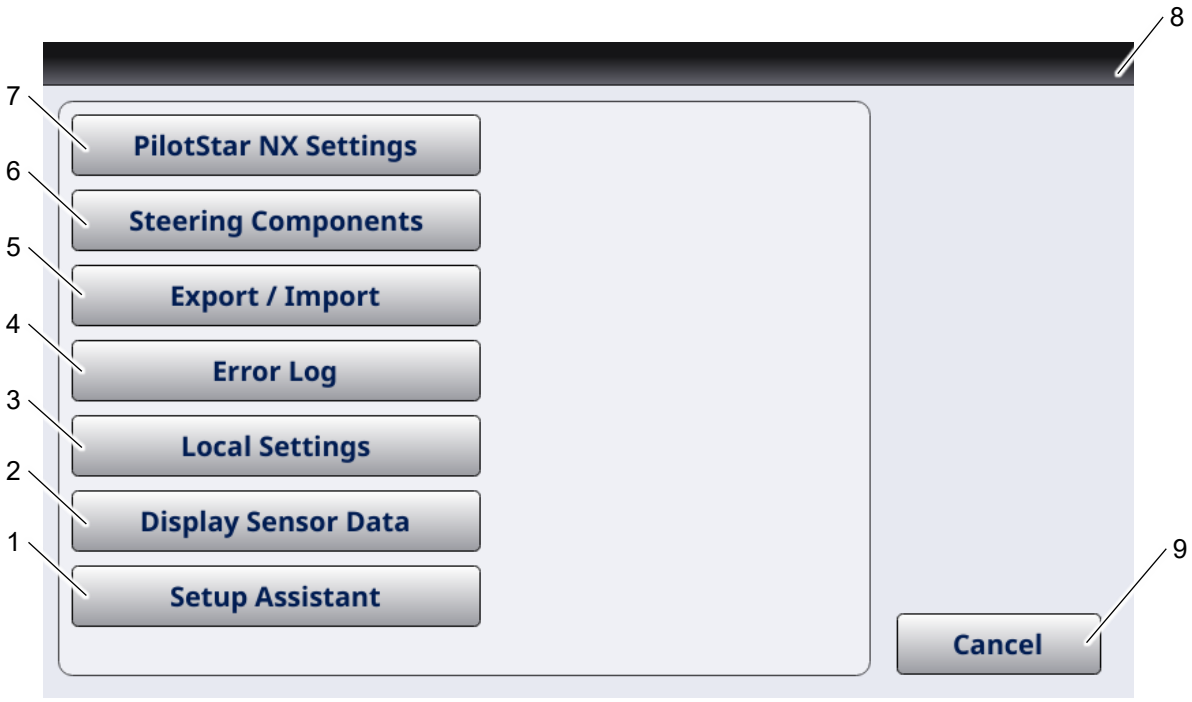


Figure 5-8 Service Menu Main Display Page

Pos.	Designation
1	Setup Assistant softkey Opens **Setup Assistant** function, see chapter 5.3.6.8.
2	Sensor Data softkey Opens **Service Sensor Data** service display page, see chapter 5.3.6.2.

Pos.	Designation
3	Local Settings softkey Opens **Local Settings** service display page, see chapter 5.3.6.2
4	Error Log softkey Opens **Error Log** service display page, see chapter 5.3.6.4.
5	Export / Import softkey Opens **Export / Import** service display page, see chapter 5.3.6.5.
6	Steering Components softkey Opens **Steering Components** service display page, see chapter 5.3.6.6.
7	PilotStar® NX Settings softkey Opens **PilotStar® NX Settings** service display page, see chapter 5.3.6.7.
8	Status Header Line The header line includes the name of the current service menu point in the top left corner and current configuration set in the middle.
9	Cancel softkey Shuts down service menu.

5.3.5.2 Display Sensor Data

This service display page shows the received sensor data.

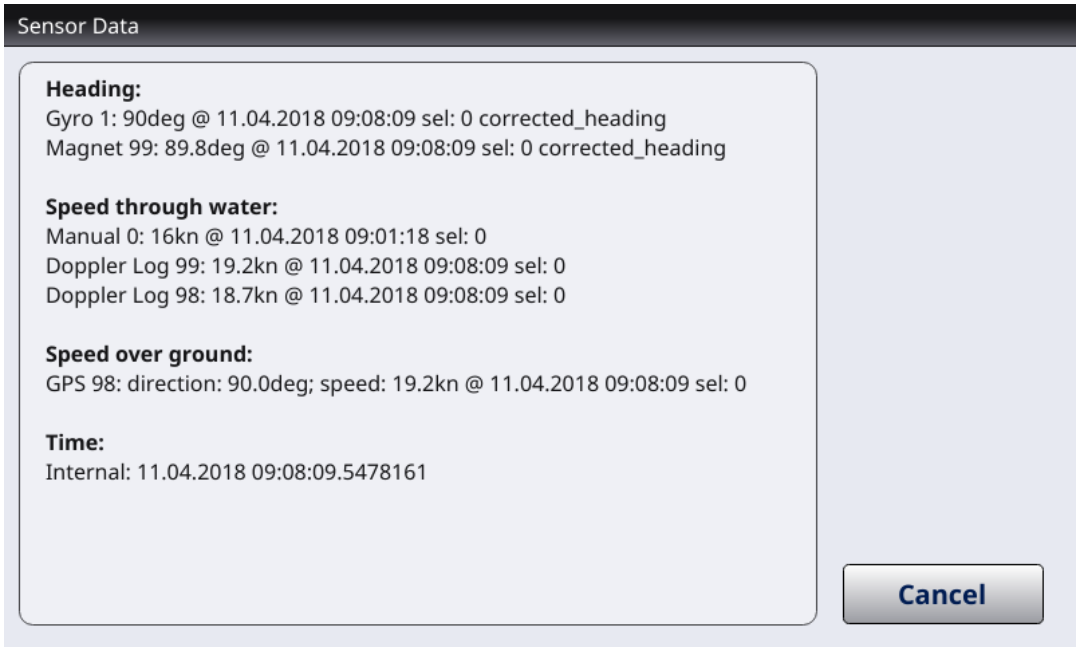


Figure 5-9 Sensor Data Service Display Page

Sensor information is built according to following scheme:
Source Identification: Sensor value @ time stamp: selection flag if available from sensor (if applicable further marking of sensor value e.g. corrected_heading)

5.3.5.3 Local Settings

This service display page includes configuration, which are specific for every operator unit.
Alert messages can appear in the status header line during service menu, see chapter 4.3.4.

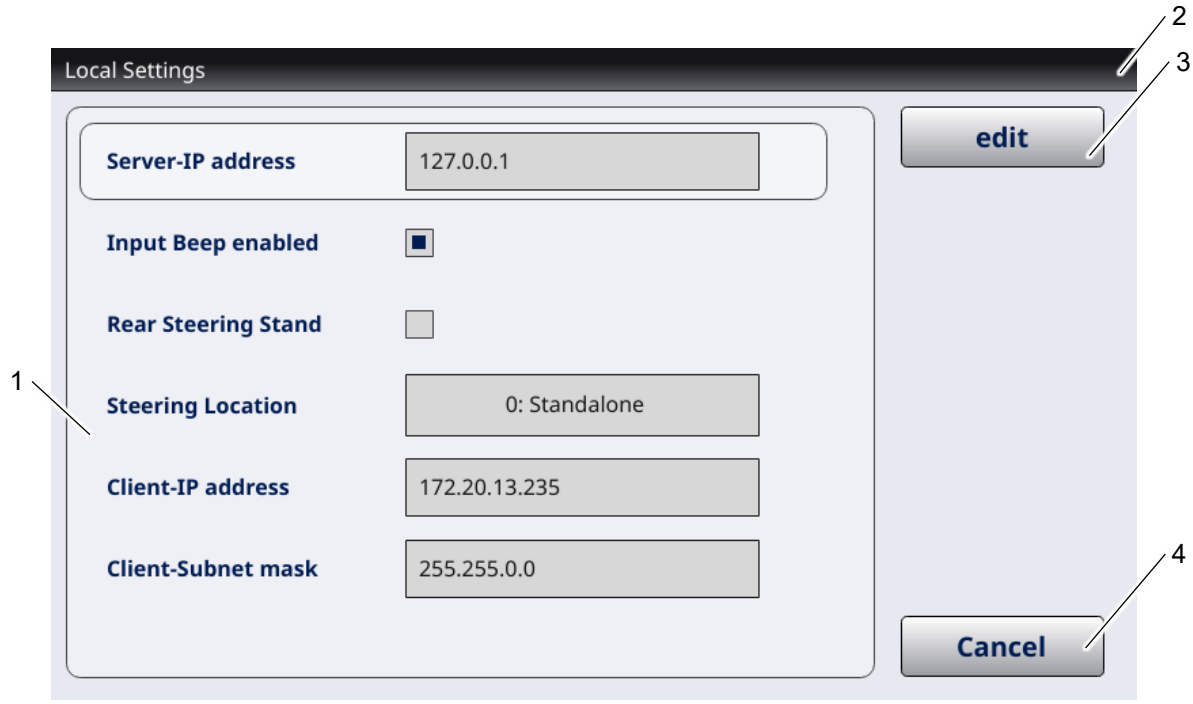


Figure 5-10 Local Settings Service Display Page

Pos.	Designation
1	Configurable Parameters See chapter 5.3.7 **Note:** IP addresses from multicast IP range (see annex 450 Support) are not allowed. The following IP address ranges are allowed: 10.0.0.0 - 10.255.255.255 172.16.0.0 - 172.31.255.255 192.168.0.0 - 192.168.255.255
2	Status Header Line The header line includes the name of the current service menu point in the top left corner.

Pos.	Designation
3	Edit softkey or +/- softkeys or check softkey Softkey to configure parameter Kind of softkey depends on kind of input field, see chapter 4.3.5.
4	Cancel softkey Opens **Service Menu Main** display page, see chapter 5.3.6.1

5.3.5.4 Error Log

This service display page shows history of occurred alerts up to 32 entries.
Alert messages can appear in the status header line during service menu, see chapter 4.3.4.

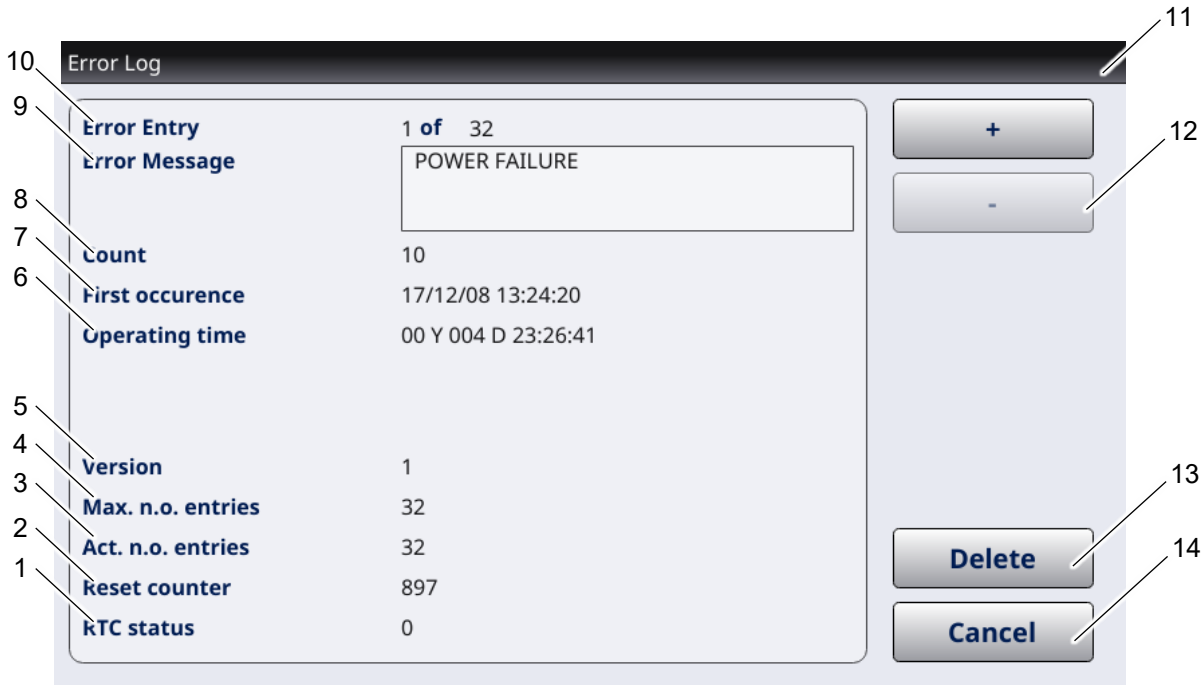


Figure 5-11 Error Log Service Display Page

Pos.	Designation
1	RTC Status Indicates if the autopilot has ever received UTC time. 1 UTC time received at least one time any time in the past. 0 UTC-time received.
2	Reset Counter Counts the number of resets.
3	Actual Number of Entries Current number of entries at the Error Log. If the number of entries achieves maximum number of entries all new incoming messages are not shown in **Error Log**.
4	Maximum Number of Entries Maximum possible number of entries.
5	Version Current **Error Log** version - for development only.

Pos.	Designation
6	Operating time Total operating time is displayed.
7	Cancel softkey Opens **Service Menu Main** display page, see chapter 5.3.6.1.
8	Count Number of rests is displayed.
9	Error Message Message text is displayed.
10	Entry Number of current entry is displayed.
11	Status Header Line The header line includes the name of the current service menu point in the top left corner.
12	+/- softkeys Shows next or previous entry.
13	Delete Deletes all entries of **Error Log**.
14	Next Shows next entry.

5.3.5.5 Export / Import

This service display page enables export and import of current configuration.
Alert messages can appear in the status header line during service menu, see chapter 4.3.4.

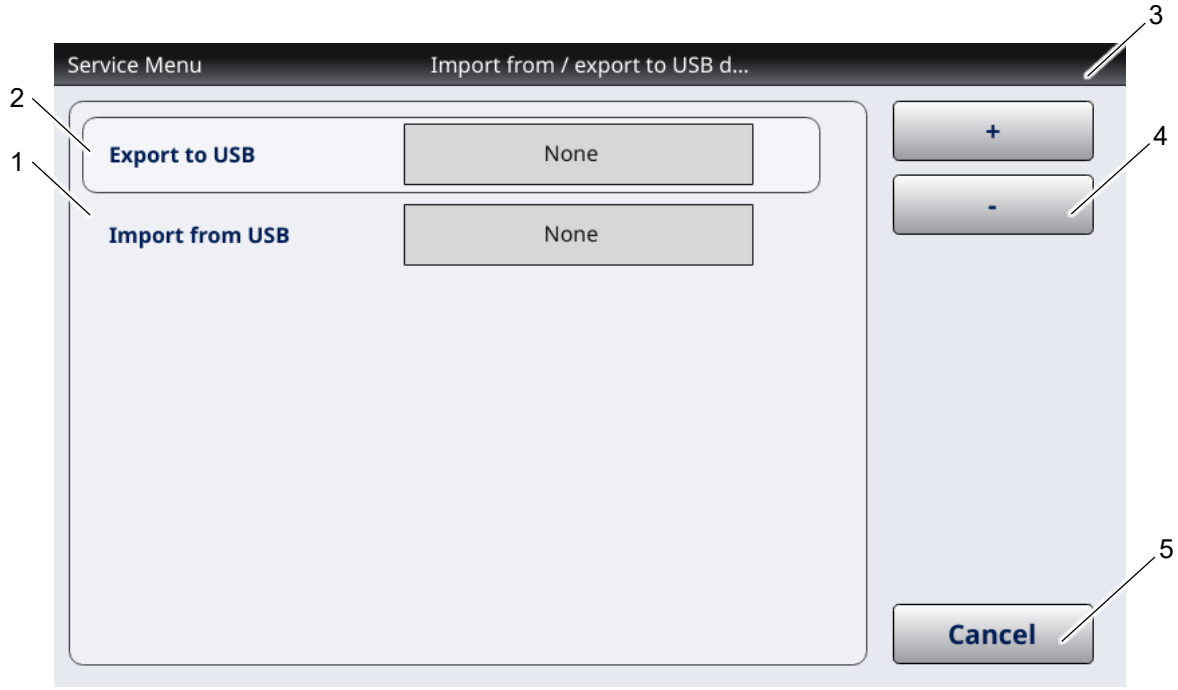


Figure 5-12 Export / Import Service Display Page

Pos.	Designation
1	Import Indication See chapter 5.3.11.
2	Export Indication See chapter 5.3.10.
3	Status Header Line The status header line indicates the function of this display page in the middle of the header line. The top left corner shows that this display page is part of service menu.
4	+/- softkeys Changes combobox selection of Export / Import indication.
5	Cancel softkey Opens **Service Menu Main** display page, see chapter 5.3.6.1.

5.3.5.6 Steering Components

This service display page enables the configuration of connected devices.
Alert messages can appear in the status header line during service menu, see chapter 4.3.4.

	For more Information about steering components refer to Documentation **3963 Configuration Tool**. The parameters within **Steering Components** should only be configured by Raytheon Anschütz service personnel.

Figure 5-13 Steering Components Service Display Page

Pos.	Designation
1	Configurable Parameters See chapter 5.3.7. Use touchscreen to scroll up and down.
2	Status Header Line The header line includes the name of the component to configure in the middle of the header line. The top left corner shows that this display page is part of service menu.

Pos.	Designation
3	Edit softkey or +/- softkeys or check softkey Softkey to configure parameter Kind of softkey depends on kind of input field, see chapter 5.3.5.
4	Next softkey Opens next configuration set, see chapter 5.3.4.
5	Cancel softkey Opens **Service Menu Main** display page, see chapter 5.3.6.1.

5.3.5.7 PilotStar® NX Settings

This service display page enables configuration of the PilotStar® NX Autopilot itself. Alert messages can appear in the status header line during service menu, see chapter 4.3.4.

	The parameters within **PilotStar® NX Settings** should only be configured by Raytheon Anschütz service personnel.

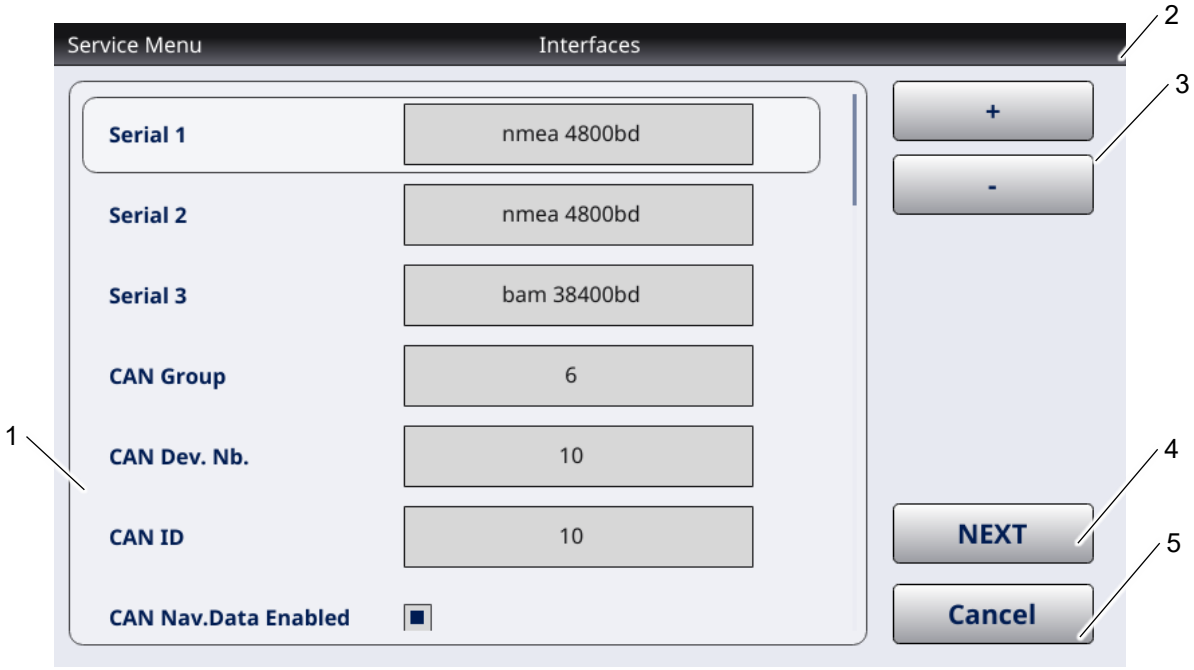


Figure 5-14 PilotStar® NX Settings Service Display Page

Pos.	Designation
1	Configurable Parameters See chapter 5.3.7. Use touchscreen to scroll up and down.
2	Status Header Line The header line includes the name of the configuration set to configure in the middle of the header line, see chapter 5.3.4. The top left corner shows that this display page is part of service menu.

Pos.	Designation
3	Edit softkey or +/- softkeys or check softkey Softkey to configure parameter Kind of softkey depends on kind of input field, see chapter 5.3.5.
4	Next softkey Opens next configuration set, see chapter 5.3.4.
5	Cancel softkey Opens **Service Menu Main** display page, see chapter 5.3.6.1

5.3.5.8 Setup Assistant

The setup assistant gives a guided setting into operation. During the setup assistant, the configuration will be aligned with the characteristics of the existing system.
The setup assistant guides through the menu and could only be finished, if all required entries will be done.

	Input and operation of the display pages works by softkey elements on the touchscreen display and hardware operating elements on the front of the operator unit casing (chapter 1.7).

WARNING 	**System configuration may cause rudder movements.** Risk of serious injury and material damage • Use product only for the intended purpose. • Perform operation steps according to this manual.

Influenced Parameter
The following parameters could be changed by the setup assistant. These parameters will be overwritten by the values, which are adjusted within the setup assistant.
If one of these parameters requires system specific adjustments or if the one of these parameters was adjusted before the system assistant was started, this parameter has to be checked within the respective service menu point after finishing of the setup assistant.
Parameter, which are not listed below, will not be changed by the setup assistant.

Table 5-1 Setup Assistant Influenced Parameter

Device	Influenced Parameter
PilotStar® NX operator unit	PSIFs, Instance Number, CAN Group, CAN Dev. Nb., CAN ID, Serial 1, Serial 2, Serial 3, Alert Mgr. UDP, BNWAS Mgr. UDP, MISC, NAVD, PROP, RCOM, SATD, TIME, TGTD, USR1, USR2, USR3, USR4, USR5, USR6, USR7, USR8, VDRD, Outgoing transm. Grp, Shiplength, No. of Rudder, max. Rudder Angle, Length, eff. Ship Length

Device	Influenced Parameter
PilotStar® NX interface unit	Analog Out Loop (B39), Analog Out Loop (B44), Pulse Log Input, PLOG [pulses/NM], ACO Probe Input, ACO Probe freq. [Hz], Max. Rudder [deg], Assignment, Deadband P1 [deg], Deadband P2 [deg], Deadband P1+P2 [deg], Analog Gain RudOut 1, Analog Gain RudOut 2, D-Return P1, D-Return P2, D-Return P1+P2, Solenoid Hyster. [%], Feedback Input, Gyro Input (B25), Magnetic Input (B29), Speed Input (B35)
FU tiller	Steering Position
NFU tiller	Max. Rudder [deg], Steering Position
Hand wheel	Steering Position

5.3.5.8.(1) Master/Slave

This setup assistant display page enables configuration of operator unit as slave or master unit.
Alert messages can appear in the status header line during service menu, see chapter 4.3.4.

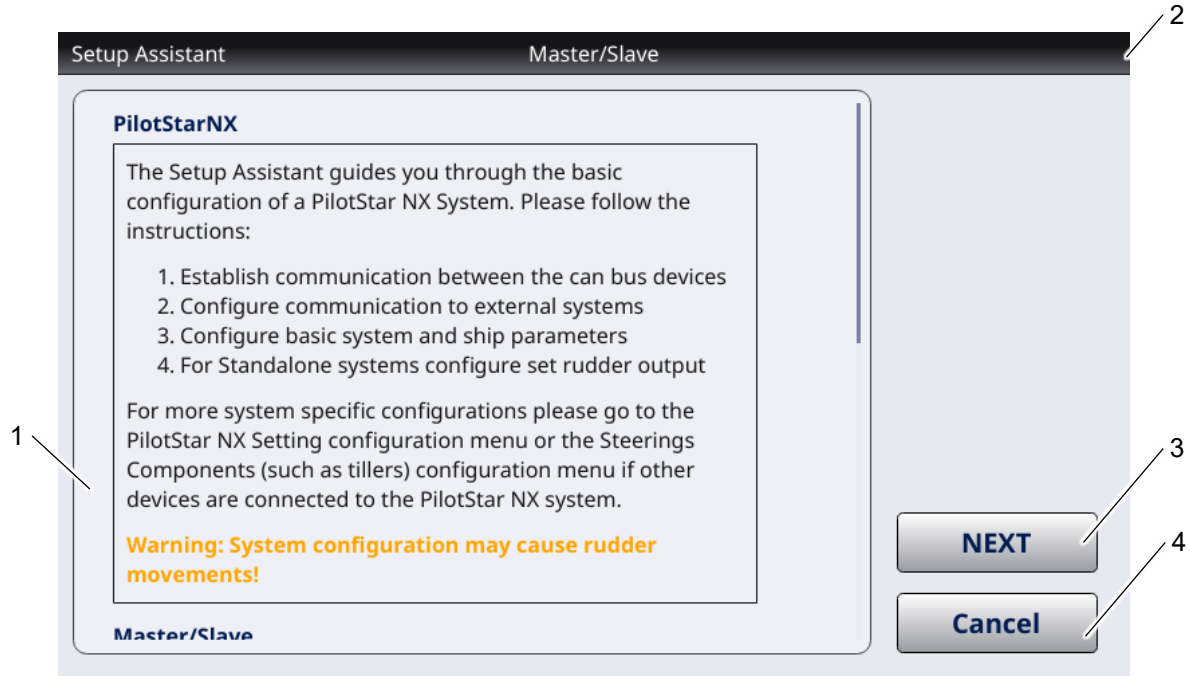


Figure 5-15 Master/Slave Setup Assistant Display Page

Pos.	Designation
1	Information and Configurable Parameters For configurable parameters see chapter 5.3.7. Use touchscreen to scroll up and down.
2	Status Header Line The header line includes the name of the configuration set to configure in the middle of the header line, see chapter 5.3.4. The top left corner shows that this display page is part of setup assistant.
3	Next softkey Opens next configuration set, see chapter 5.3.4.
4	Cancel softkey Opens **Service Menu Main** display page, see chapter 5.3.6.1

5.3.5.8.(2) System Type

This setup assistant display page enables configuration of system as standalone or NautoSteer AS integration.
Alert messages can appear in the status header line during service menu, see chapter 4.3.4.

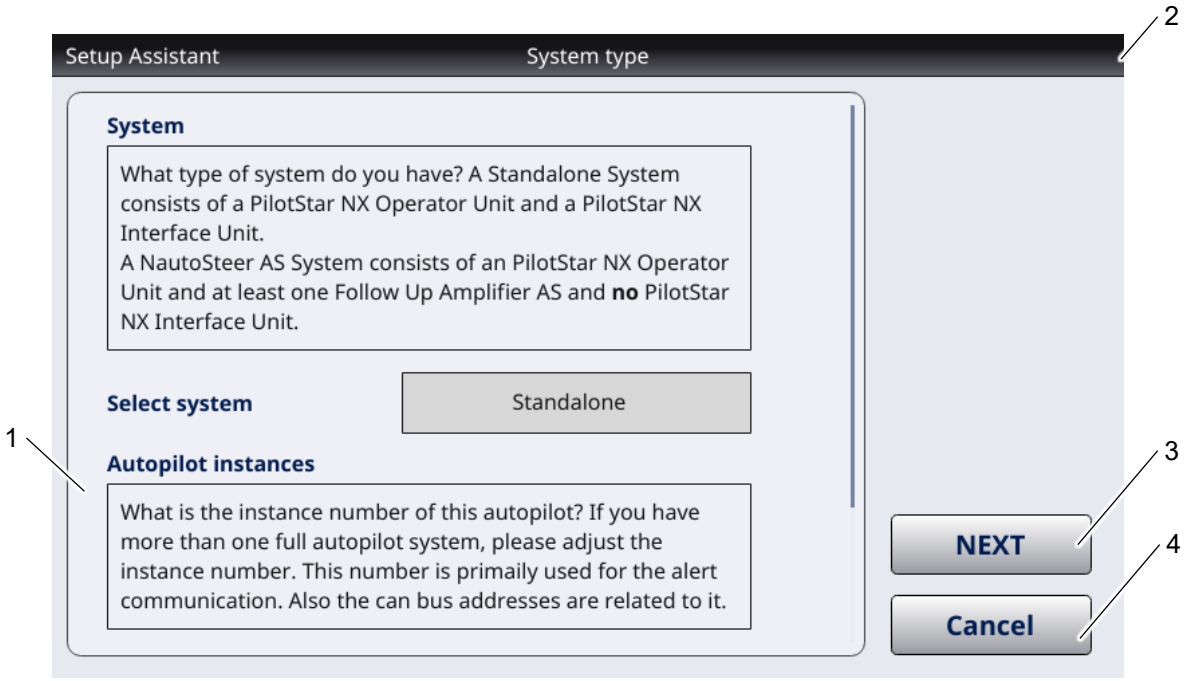


Figure 5-16 System Type Setup Assistant Display Page

Pos.	Designation
1	Information and Configurable Parameters For configurable parameters see chapter 5.3.7. Use touchscreen to scroll up and down.
2	Status Header Line The header line includes the name of the configuration set to configure in the middle of the header line, see chapter 5.3.4. The top left corner shows that this display page is part of setup assistant.
3	Next softkey Opens next configuration set, see chapter 5.3.4.
4	Cancel softkey Opens **Service Menu Main** display page, see chapter 5.3.6.1

5.3.5.8.(3) CAN Bus Addresses

This setup assistant display page enables configuration of CAN bus address for the used operator unit. .
Alert messages can appear in the status header line during service menu, see chapter 4.3.4.

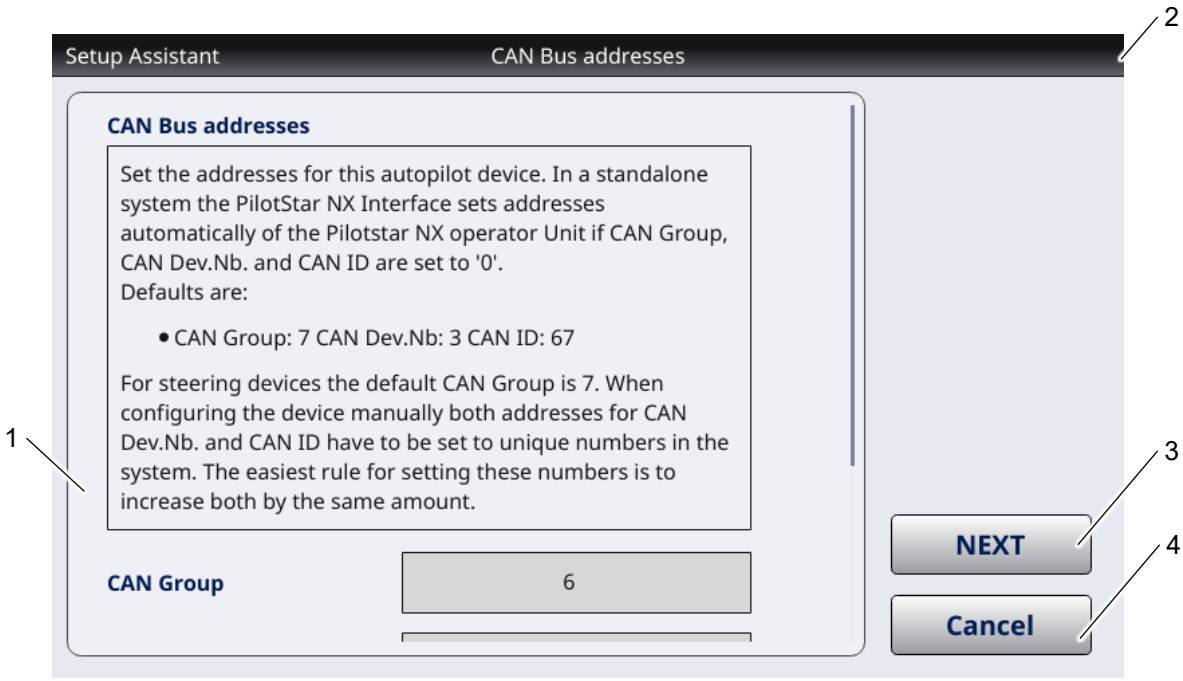


Figure 5-17 CAN Bus Addresses Setup Assistant Display Page

Pos.	Designation
1	Information and Configurable Parameters For configurable parameters see chapter 5.3.7. Use touchscreen to scroll up and down.
2	Status Header Line The header line includes the name of the configuration set to configure in the middle of the header line, see chapter 5.3.4. The top left corner shows that this display page is part of setup assistant.
3	Next softkey Opens next configuration set, see chapter 5.3.4.
4	Cancel softkey Opens **Service Menu Main** display page, see chapter 5.3.6.1

5.3.5.8.(4) Additional Tillers

This setup assistant display page enables configuration of further steering components. Alert messages can appear in the status header line during service menu, see chapter 4.3.4.

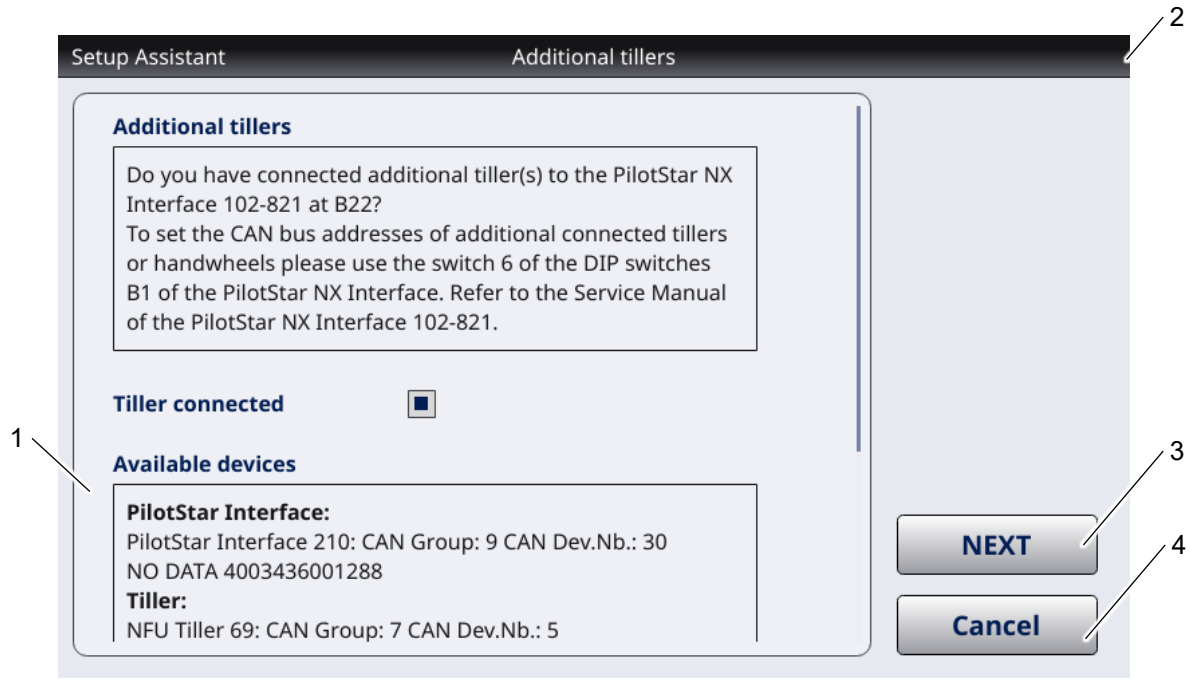


Figure 5-18 Additional Tillers Setup Assistant Display Page

Pos.	Designation
1	Information and Configurable Parameters For configurable parameters see chapter 5.3.7. Use touchscreen to scroll up and down.
2	Status Header Line The header line includes the name of the configuration set to configure in the middle of the header line, see chapter 5.3.4. The top left corner shows that this display page is part of setup assistant.
3	Next softkey Opens next configuration set, see chapter 5.3.4.
4	Cancel softkey Opens **Service Menu Main** display page, see chapter 5.3.6.1

5.3.5.8.(5) Heading Input

This setup assistant display page enables configuration of heading input.
Alert messages can appear in the status header line during service menu, see chapter 4.3.4.

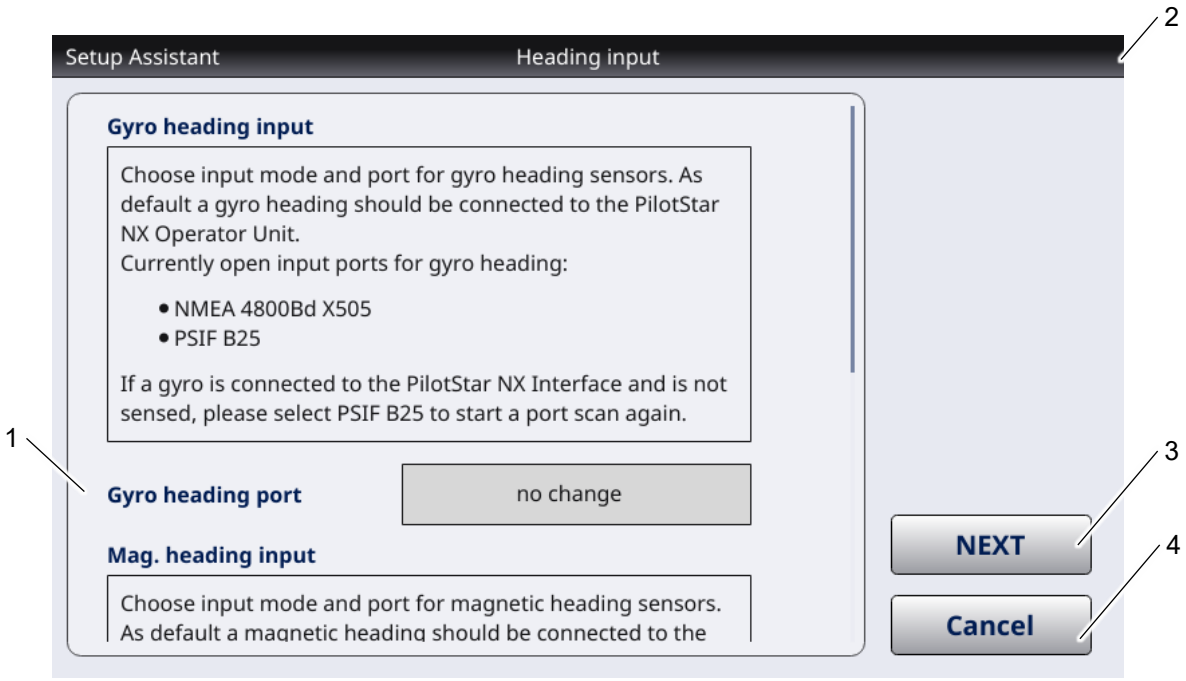


Figure 5-19 Heading Input Setup Assistant Display Page

Pos.	Designation
1	Information and Configurable Parameters For configurable parameters see chapter 5.3.7. Use touchscreen to scroll up and down.
2	Status Header Line The header line includes the name of the configuration set to configure in the middle of the header line, see chapter 5.3.4. The top left corner shows that this display page is part of setup assistant.
3	Next softkey Opens next configuration set, see chapter 5.3.4.
4	Cancel softkey Opens **Service Menu Main** display page, see chapter 5.3.6.1

5.3.5.8.(6) Speed Input

This setup assistant display page enables configuration of speed input.
Alert messages can appear in the status header line during service menu, see chapter 4.3.4.

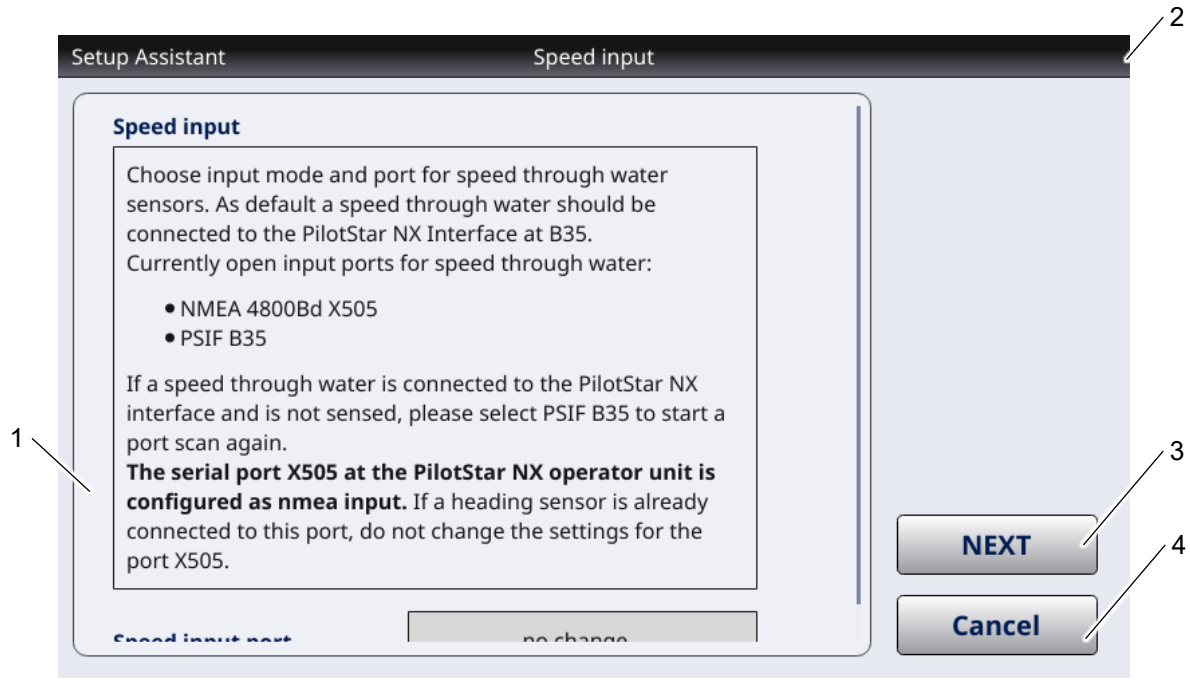


Figure 5-20 Speed Input Setup Assistant Display Page

Pos.	Designation
1	Information and Configurable Parameters For configurable parameters see chapter 5.3.7.
2	Status Header Line The header line includes the name of the configuration set to configure in the middle of the header line, see chapter 5.3.4. The top left corner shows that this display page is part of setup assistant.
3	Next softkey Opens next configuration set, see chapter 5.3.4.
4	Cancel softkey Opens **Service Menu Main** display page, see chapter 5.3.6.1

5.3.5.8.(7) BAM/BNWAS

This setup assistant display page enables configuration of interfaces for BAM and BNWAS.
Alert messages can appear in the status header line during service menu, see chapter 4.3.4.

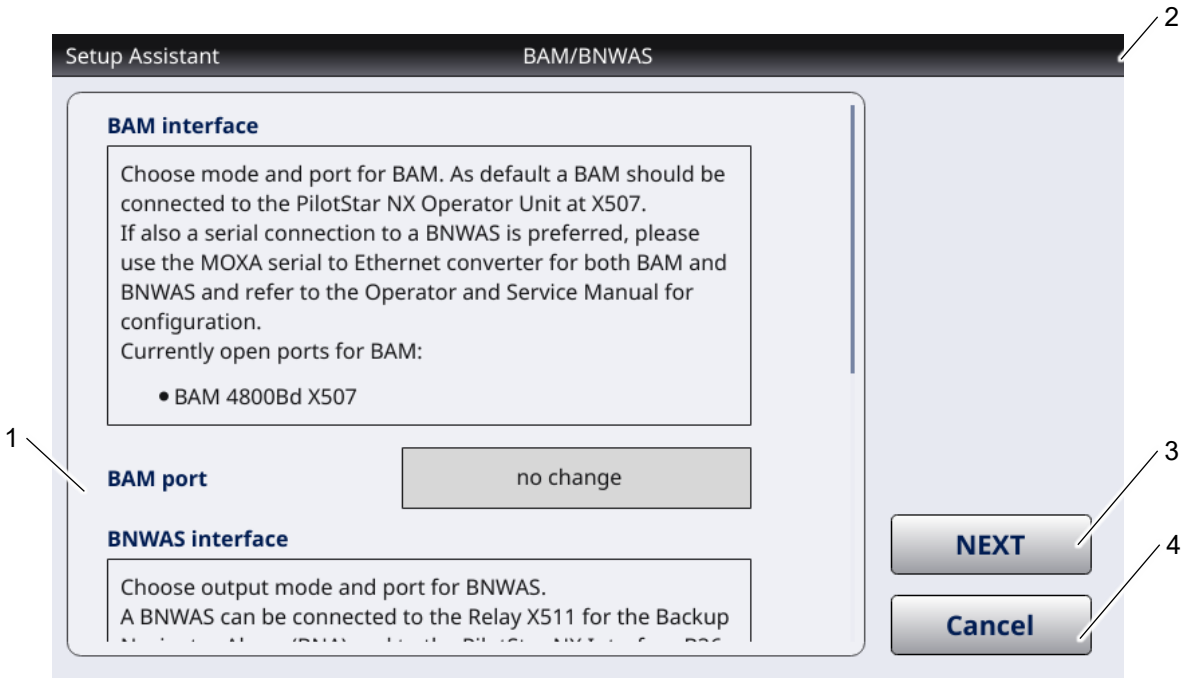


Figure 5-21 BAM/BNWAS Setup Assistant Display Page

Pos.	Designation
1	Information and Configurable Parameters For configurable parameters see chapter 5.3.7. Use touchscreen to scroll up and down.
2	Status Header Line The header line includes the name of the configuration set to configure in the middle of the header line, see chapter 5.3.4. The top left corner shows that this display page is part of setup assistant.
3	Next softkey Opens next configuration set, see chapter 5.3.4.
4	Cancel softkey Opens **Service Menu Main** display page, see chapter 5.3.6.1

5.3.5.8.(8) VDR

This setup assistant display page enables information of interface for VDR.
Alert messages can appear in the status header line during service menu, see chapter 4.3.4.

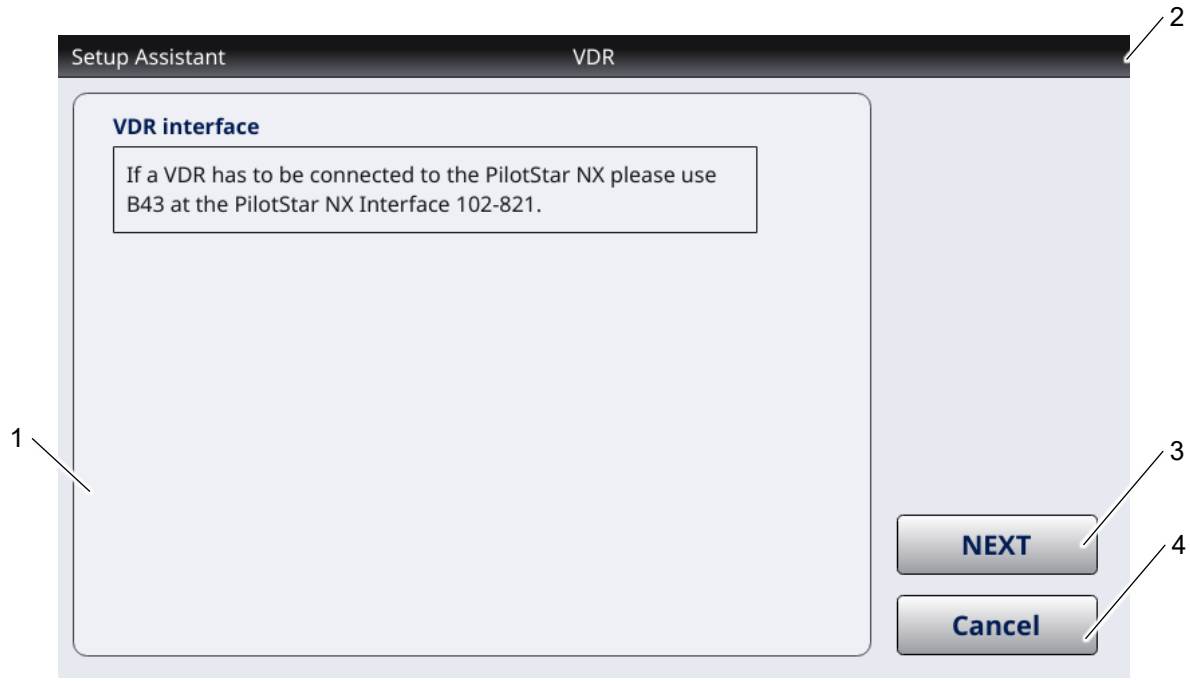


Figure 5-22 VDR Setup Assistant Display Page

Pos.	Designation
1	Information
2	Status Header Line The header line includes the name of the configuration set to configure in the middle of the header line, see chapter 5.3.4. The top left corner shows that this display page is part of setup assistant.
3	Next softkey Opens next configuration set, see chapter 5.3.4.
4	Cancel softkey Opens **Service Menu Main** display page, see chapter 5.3.6.1

5.3.5.8.(9) Steering Locations

This setup assistant display page enables configuration of steering location for connected steering devices.
Alert messages can appear in the status header line during service menu, see chapter 4.3.4.

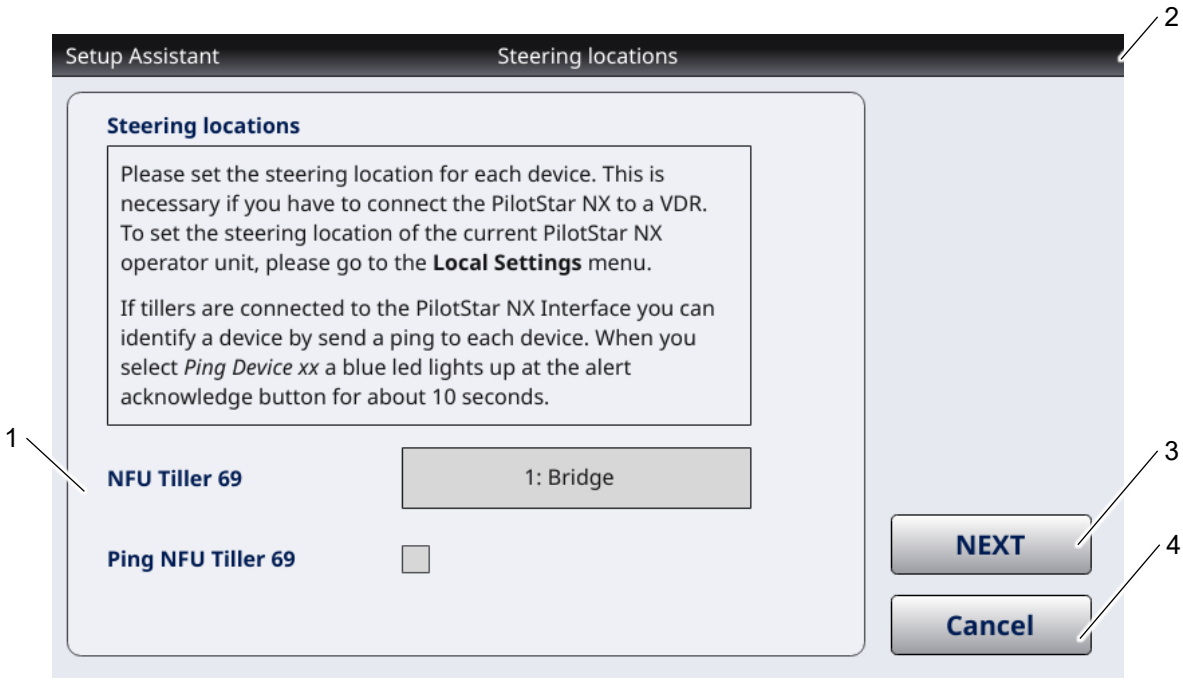


Figure 5-23 Steering Locations Setup Assistant Display Page

Pos.	Designation
1	Information and Configurable Parameters For configurable parameters see chapter 5.3.7. Use touchscreen to scroll up and down.
2	Status Header Line The header line includes the name of the configuration set to configure in the middle of the header line, see chapter 5.3.4. The top left corner shows that this display page is part of setup assistant.
3	Next softkey Opens next configuration set, see chapter 5.3.4.
4	Cancel softkey Opens **Service Menu Main** display page, see chapter 5.3.6.1

5.3.5.8.(10) Ship Parameters

This setup assistant display page enables configuration of essential ship parameter. Alert messages can appear in the status header line during service menu, see chapter 4.3.4.

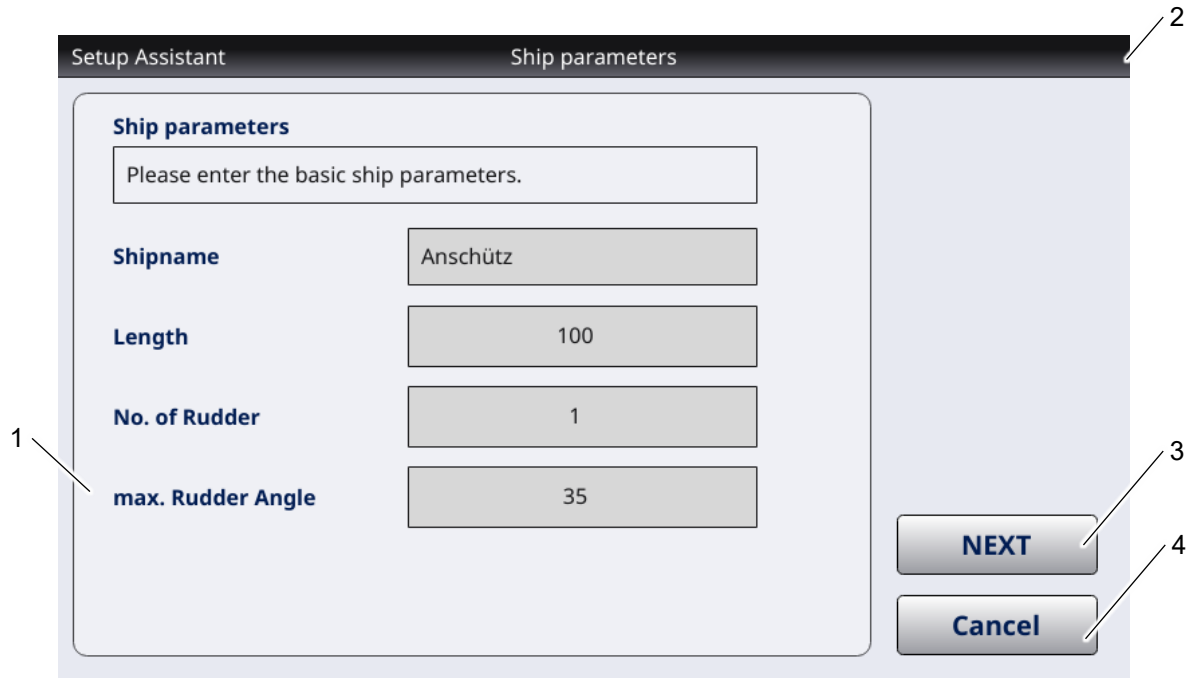


Figure 5-24 Ship Parameters Setup Assistant Display Page

Pos.	Designation
1	Information and Configurable Parameters For configurable parameters see chapter 5.3.7.
2	Status Header Line The header line includes the name of the configuration set to configure in the middle of the header line, see chapter 5.3.4. The top left corner shows that this display page is part of setup assistant.
3	Next softkey Opens next configuration set, see chapter 5.3.4.
4	Cancel softkey Opens **Service Menu Main** display page, see chapter 5.3.6.1

5.3.5.8.(11) Rudder Feedback

This setup assistant display page enables configuration of rudder feedback settings. Alert messages can appear in the status header line during service menu, see chapter 4.3.4.

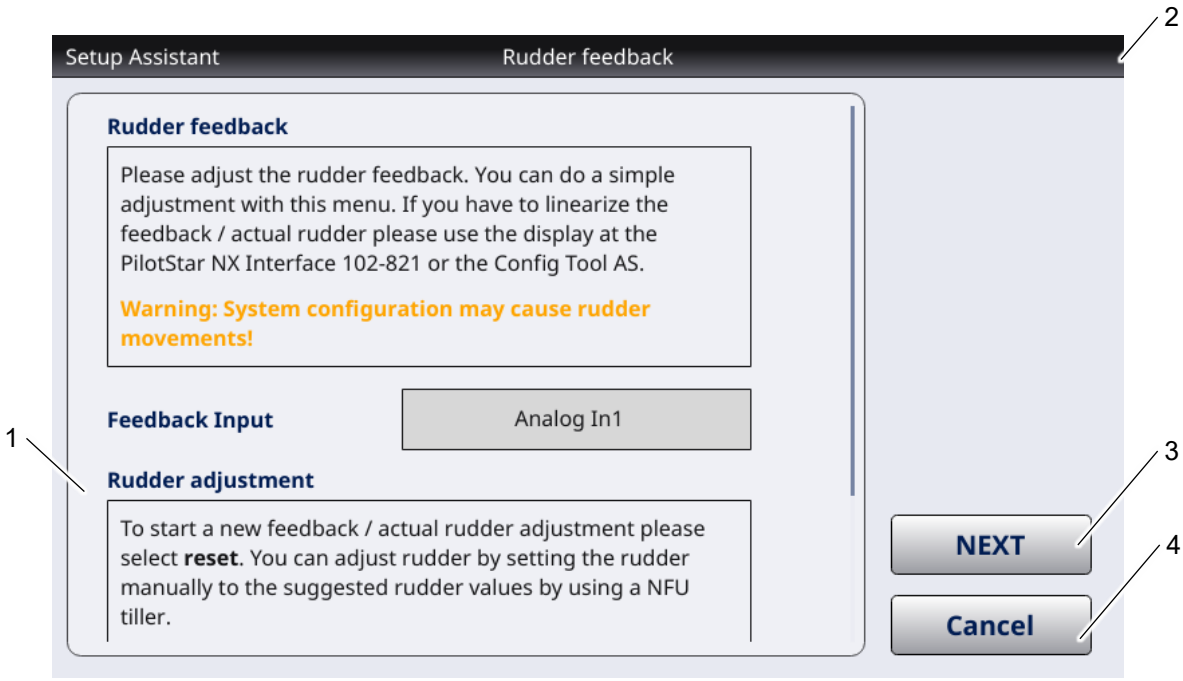


Figure 5-25 Rudder Feedback Setup Assistant Display Page

Pos.	Designation
1	Information and Configurable Parameters For configurable parameters see chapter 5.3.7. Use touchscreen to scroll up and down.
2	Status Header Line The header line includes the name of the configuration set to configure in the middle of the header line, see chapter 5.3.4. The top left corner shows that this display page is part of setup assistant.
3	Next softkey Opens next configuration set, see chapter 5.3.4.
4	Cancel softkey Opens **Service Menu Main** display page, see chapter 5.3.6.1

5.3.5.8.(12) Rudder Control

This setup assistant display page enables configuration of output for set rudder within standalone system.
Alert messages can appear in the status header line during service menu, see chapter 4.3.4.

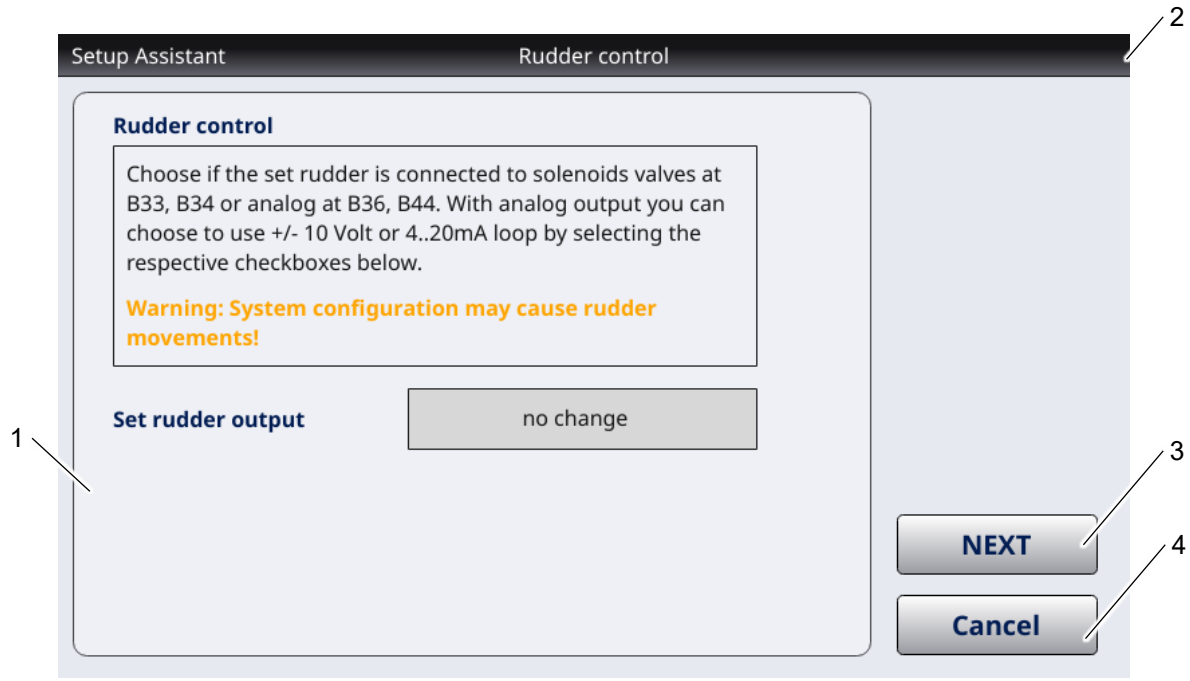


Figure 5-26 Rudder Control Setup Assistant Display Page

Pos.	Designation
1	Information and Configurable Parameters For configurable parameters see chapter 5.3.7.
2	Status Header Line The header line includes the name of the configuration set to configure in the middle of the header line, see chapter 5.3.4. The top left corner shows that this display page is part of setup assistant.
3	Next softkey Opens next configuration set, see chapter 5.3.4.
4	Cancel softkey Opens **Service Menu Main** display page, see chapter 5.3.6.1

5.3.5.8.(13) Heading Control

This setup assistant display page enables information of heading control.
Alert messages can appear in the status header line during service menu, see chapter 4.3.4.

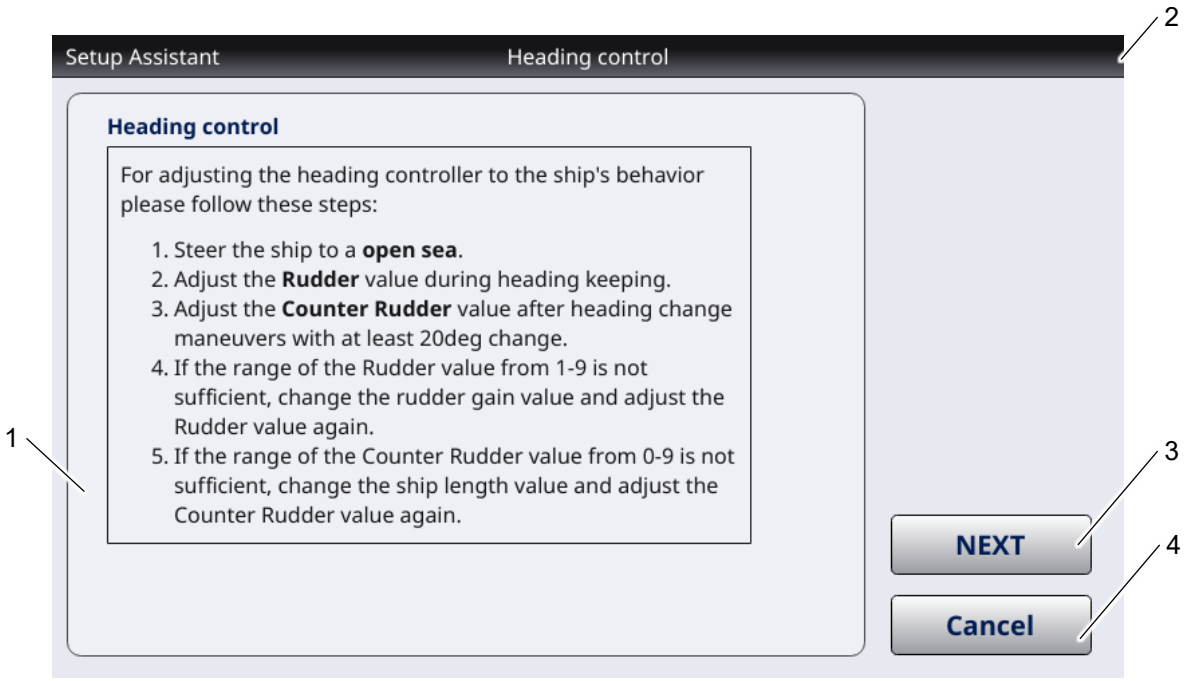


Figure 5-27 Heading Control Setup Assistant Display Page

Pos.	Designation
1	Information
2	Status Header Line The header line includes the name of the configuration set to configure in the middle of the header line, see chapter 5.3.4. The top left corner shows that this display page is part of setup assistant.
3	Next softkey Opens next configuration set, see chapter 5.3.4.
4	Cancel softkey Opens **Service Menu Main** display page, see chapter 5.3.6.1

5.3.5.8.(14) NAV Control

This setup assistant display page enables configuration and information of interface for NAV control.
Alert messages can appear in the status header line during service menu, see chapter 4.3.4.

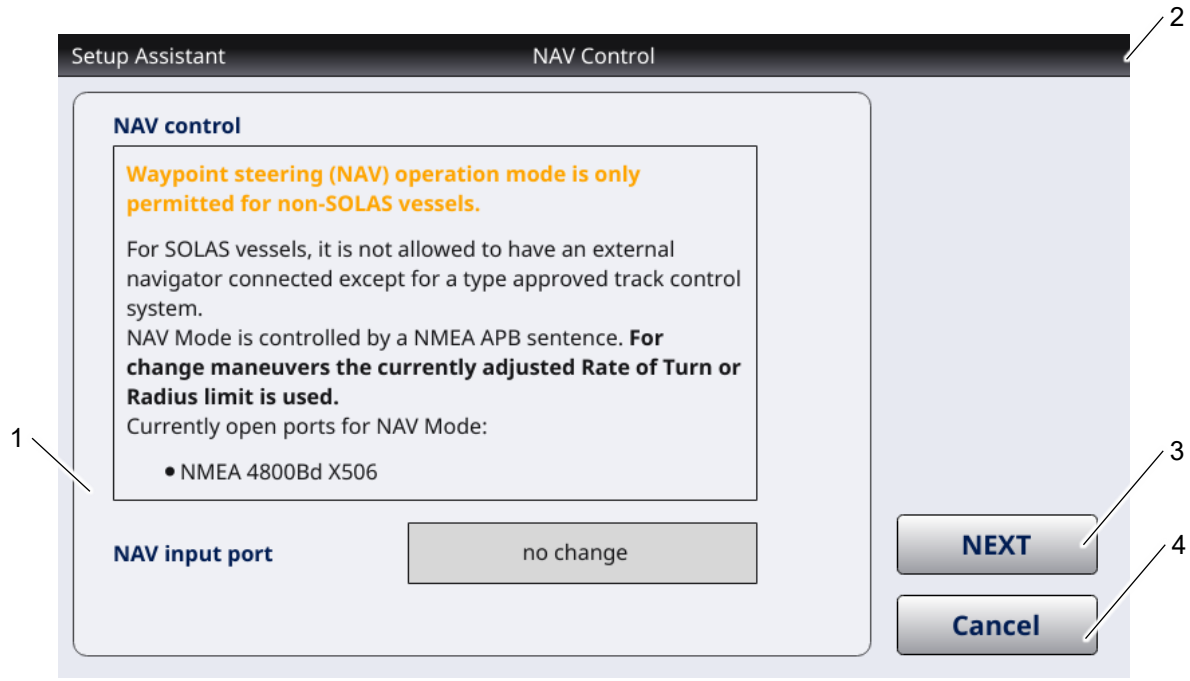


Figure 5-28 NAV Control Setup Assistant Display Page

Pos.	Designation
1	Information and Configurable Parameters For configurable parameters see chapter 5.3.7.
2	Status Header Line The header line includes the name of the configuration set to configure in the middle of the header line, see chapter 5.3.4. The top left corner shows that this display page is part of setup assistant.
3	Next softkey Opens next configuration set, see chapter 5.3.4.
4	Cancel softkey Opens **Service Menu Main** display page, see chapter 5.3.6.1

5.3.5.8.(15) Summary

This setup assistant display page enables summary of configuration within setup assistant and configuration of Ethernet interface.
Alert messages can appear in the status header line during service menu, see chapter 4.3.4.

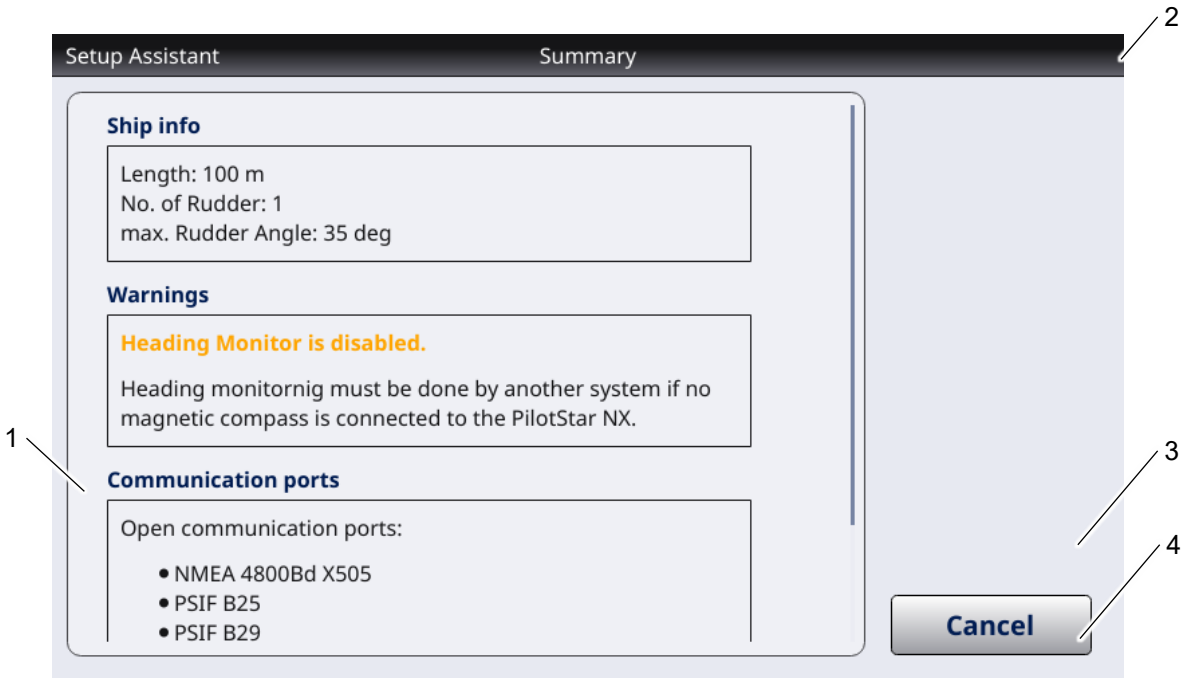


Figure 5-29 Summary Setup Assistant Display Page

Pos.	Designation
1	Information and Configurable Parameters For configurable parameters see chapter 5.3.7. Use touchscreen to scroll up and down.
2	Status Header Line The header line includes the name of the configuration set to configure in the middle of the header line, see chapter 5.3.4. The top left corner shows that this display page is part of setup assistant.
3	Next softkey Opens next configuration set, see chapter 5.3.4.
4	Cancel softkey Opens **Service Menu Main** display page, see chapter 5.3.6.1

5.3.6 Configurable Parameters

There are several sets of configurable parameters:

- Table 5-2 Parameters within PilotStar® NX Settings / Ship Data
- Table 5-3 Parameters within PilotStar® NX Settings / System
- Table 5-4 Parameters within PilotStar® NX Settings / Interfaces
- Table 5-5 Parameters within PilotStar® NX Settings / Controller
- Table 5-6 Parameters within Steering Components / PSIF
- Table 5-7 Parameters within Steering Components / Tiller Hand Wheel
- Table 5-8 Parameters within Steering Components / CAN Distribution Unit
- Table 5-9 Parameters within Local Settings
- Table 5-10 Parameters within Setup Assistant / Master/Slave
- Table 5-11 Parameters within Setup Assistant / System Type
- Table 5-12 Parameters within Setup Assistant / CAN Bus Addresses
- Table 5-13 Parameters within Setup Assistant / Additional Tillers
- Table 5-14 Parameters within Setup Assistant / Heading Input
- Table 5-15 Parameters within Setup Assistant / Speed Input
- Table 5-16 Parameters within Setup Assistant / BAM/BNWAS
- Table 5-17 Parameters within Setup Assistant / Steering Locations
- Table 5-18 Parameters within Setup Assistant / Ship Parameters
- Table 5-19 Parameters within Setup Assistant / Rudder Feedback
- Table 5-20 Parameters within Setup Assistant / Rudder Control
- Table 5-21 Parameters within Setup Assistant / NAV Control

Table 5-2 Parameters within PilotStar® NX Settings / Ship Data

PilotStar® NX Settings / Ship Data			
Parameter	Description	Type	Default
Shipname	5.3.7.1	Text Field	
IMO No.	5.3.7.2	Text Field	
Length	5.3.7.3	Number Field	
No. of Rudder	5.3.7.4	Number Field	1
Rudder Type	5.3.7.5	Combobox	Normal
Order Code	5.3.7.6	Text Field	

Table 5-3 Parameters within PilotStar® NX Settings / System

PilotStar® NX Settings / Systems			
Parameter	Description	Type	Default
Instance Number	5.3.7.7	Number Field	1
Day Color	5.3.7.8	Combobox	Day1
Night Color	5.3.7.9	Combobox	Night1
Software Archive	5.3.7.10	Combobox	
Software Action	5.3.7.11	Combobox	None
Service Menu enabled	5.3.7.12	Checkbox	Inactive

Table 5-4 Parameters within PilotStar® NX Settings / Interfaces

PilotStar® NX Settings / Systems			
Parameter	Description	Type	Default
Serial 1	5.3.7.13	Combobox	nmea4800bd
Serial 2	5.3.7.14	Combobox	nmea4800bd
Serial 3	5.3.7.15	Combobox	bam38400bd
CAN Group	5.3.7.16	Number Field	0
CAN- Dev. Nb.	5.3.7.17	Number Field	0
CAN ID	5.3.7.18	Number Field	0
CAN Nav.Data enabled	5.3.7.19	Checkbox	Active
Alert Mgr. UDP	5.3.7.20	Text Field	
Alert Mgr. Type	5.3.7.21	Combobox	INS
BNWAS Mgr. UDP	5.3.7.22	Text Field	
PSIFs	5.3.7.23	Number Field	1
CAN Central Dimming	5.3.7.24	Checkbox	Inactive
DDC Central Dimming	5.3.7.25	Checkbox	Inactive
INS	5.3.7.26	Checkbox	Inactive
Turn headings 180deg	5.3.7.27	Checkbox	Inactive
MISC	5.3.7.28	Checkbox	Inactive

PilotStar® NX Settings / Systems			
Parameter	Description	Type	Default
TGTD	5.3.7.29	Checkbox	Inactive
SATD	5.3.7.30	Checkbox	Inactive
NAVD	5.3.7.31	Checkbox	Inactive
VDRD	5.3.7.32	Checkbox	Inactive
RCOM	5.3.7.33	Checkbox	Inactive
TIME	5.3.7.34	Checkbox	Inactive
PROP	5.3.7.35	Checkbox	Inactive
USR1	5.3.7.36	Checkbox	Inactive
USR2	5.3.7.37	Checkbox	Inactive
USR3	5.3.7.38	Checkbox	Inactive
USR4	5.3.7.39	Checkbox	Inactive
USR5	5.3.7.40	Checkbox	Inactive
USR6	5.3.7.41	Checkbox	Inactive
USR7	5.3.7.42	Checkbox	Inactive
USR8	5.3.7.43	Checkbox	Inactive
Outgoing transm. grp.	5.3.7.44	Combobox	NAVD

Table 5-5 Parameters within PilotStar® NX Settings / Controller

PilotStar® NX Settings / Controller			
Parameter	Description	Type	Default
Rudder Gain [%]	5.3.7.45	Number Field	100
max. Rudder Angle	5.3.7.46	Number Field	35
Heading Monitor	5.3.7.47	Checkbox	Active
Heading Grad. Control	5.3.7.48	Checkbox	Active
HDG Grad. [deg/s]	5.3.7.49	Number Field	12
Set Rudder limited	5.3.7.50	Checkbox	Active
High Speed Craft	5.3.7.51	Checkbox	Active
SW-Key	5.3.7.52	Text Field	xxxx-xxxx-xxxxx-xxxx
Low Speed	5.3.7.53	Number Field	3
Eff. Ship Length	5.3.7.54	Number Field	100
Back up Nav. Alarm	5.3.7.55	Checkbox	Active
Developer Key	5.3.7.56	Text Field	

	The parameter within **Steering Components** should only be configured by Raytheon Anschütz service personnel.

Table 5-6 Parameters within Steering Components / PSIF

Steering Components / PSIF	
Parameter	Description
Analog In Wire Break	See manual of configuration tool
Analog Out Loop (X39)	See manual of configuration tool
Analog Out Loop (X44)	See manual of configuration tool
Analog Out:	See manual of configuration tool
Analog In	See manual of configuration tool
Pulse Log Input	See manual of configuration tool
PLOG [pulses/NM]	See manual of configuration tool
ACO Probe Input	See manual of configuration tool
ACO Probe freq. [Hz]	See manual of configuration tool
Max. Rudder [deg]	See manual of configuration tool
Assignment	See manual of configuration tool
Trans/Diff	See manual of configuration tool
Linear/SinCos	See manual of configuration tool
Rudder stop enabled	See manual of configuration tool
Rudder Pulse enabled	See manual of configuration tool
Pulse length [ms]	See manual of configuration tool
SteeringFail enabled	See manual of configuration tool
Threshold [deg]	See manual of configuration tool
Delay Time [s]	See manual of configuration tool
Deadband P1 [deg]	See manual of configuration tool

Steering Components / PSIF	
Parameter	Description
Deadband P2 [deg]	See manual of configuration tool
Deadband P1+P2 [deg]	See manual of configuration tool
Analog Gain RudOut 1	See manual of configuration tool
Analog Gain RudOut 2	See manual of configuration tool
D-Return P1	See manual of configuration tool
D-Return P2	See manual of configuration tool
D-Return P1+P2	See manual of configuration tool
SoleNoid Hyster. [%]	See manual of configuration tool
Feedback Input	See manual of configuration tool
Gyro Input (X25)	See manual of configuration tool
Magnetic Input (X30)	See manual of configuration tool
Speed Input (X35)	See manual of configuration tool
GPS Input (X40)	See manual of configuration tool
Override Trigger	See manual of configuration tool
Type Number	See manual of configuration tool
Serial Number	See manual of configuration tool
Software Version	See manual of configuration tool
Description	See manual of configuration tool
History/Remarks	See manual of configuration tool

	The parameter within **Steering Components** should only be configured by Raytheon Anschütz service personnel.

Table 5-7 Parameters within Steering Components / Tiller Hand Wheel

Steering Components / Tiller Hand Wheel	
Parameter	Description
Take Over Enable	See manual of configuration tool
Give Over Enable	See manual of configuration tool
Rudder Freeze	See manual of configuration tool
WatchAlarmReset	See manual of configuration tool
Contact Free Sensor	See manual of configuration tool
Port - Stbd	See manual of configuration tool
Auto brightness	See manual of configuration tool
Ext. Dim.	See manual of configuration tool
Dimming Cycle	See manual of configuration tool
Offset	See manual of configuration tool
Slope	See manual of configuration tool
Grad. Alarm enabled	See manual of configuration tool
Grad. thrshld [deg/s]	See manual of configuration tool
Max. Rudder [deg]	See manual of configuration tool
Transferrate [ms]	See manual of configuration tool
Steering Position:	See manual of configuration tool
Steering Group	See manual of configuration tool
Rudder Assignment	See manual of configuration tool
Operator Unit	See manual of configuration tool
Auto On	See manual of configuration tool
Input Port Unit Id	See manual of configuration tool

Steering Components / Tiller Hand Wheel	
Parameter	Description
Input Port StartBit	See manual of configuration tool
Type Number	See manual of configuration tool
Serial Number	See manual of configuration tool
Software Version	See manual of configuration tool
Description	See manual of configuration tool
History/Remarks	See manual of configuration tool

	The parameter within **Steering Components** should only be configured by Raytheon Anschütz service personnel.

Table 5-8 Parameters within Steering Components / CAN Distribution Unit

Steering Components / CAN Distribution Unit	
Parameter	Description
Hardwired CAN Active	See manual of configuration tool
Single CAN X2 Active	See manual of configuration tool
Single CAN X3 Active	See manual of configuration tool
Single CAN X4 Active	See manual of configuration tool
Single CAN X5 Active	See manual of configuration tool
Operating Time [h]	See manual of configuration tool
Restart Counter Text	See manual of configuration tool
Output Dual CAN	See manual of configuration tool
Output Single CAN	See manual of configuration tool
Delete All	See manual of configuration tool
Set All	See manual of configuration tool
Type Number	See manual of configuration tool
Serial Number	See manual of configuration tool
Software Version	See manual of configuration tool
Description Text	See manual of configuration tool
History/Remarks Text	See manual of configuration tool

Table 5-9 Parameters within Local Settings

Local Settings			
Parameter	Description	Type	Default
Server-IP Address	5.3.7.57	Text Field	127.0.0.1
Input Beep Enabled	5.3.7.58	Checkbox	Active
Rear Steering Stand	5.3.7.59	Checkbox	Inactive
Steering Location	5.3.7.60	Combobox	0: Standalone
Client-IP Address	5.3.7.61	Text Field	192.168.85.1
Client-Subnet	5.3.7.62	Text Field	255.255.255.0

Table 5-10 Parameters within Setup Assistant / Master/Slave

Setup Assistant / Master/Slave			
Parameter	Description	Type	Default
Operator Unit Type	5.3.7.63	Combobox	Master

Table 5-11 Parameters within Setup Assistant / System Type

Setup Assistant / System Type			
Parameter	Description	Type	Default
Select System	5.3.7.64	Combobox	Standalone
Instance Number	5.3.7.7	Number Field	1

Table 5-12 Parameters within Setup Assistant / CAN Bus Addresses

Setup Assistant / CAN Bus Addresses			
Parameter	Description	Type	Default
CAN Group	5.3.7.16	Number Field	0
CAN Dev. Nb.	5.3.7.17	Number Field	0
CAN ID	5.3.7.18	Number Field	0

Table 5-13 Parameters within Setup Assistant / Additional Tillers

Setup Assistant / Additional Tillers			
Parameter	Description	Type	Default
Tiller Connected	5.3.7.65	Checkbox	Inactive
Update Devicelist	5.3.7.66	Checkbox	Inactive

Table 5-14 Parameters within Setup Assistant / Heading Input

Setup Assistant / Heading Input			
Parameter	Description	Type	Default
Gyro heading port	5.3.7.67	Combobox	No Change
Mag. heading port	5.3.7.68	Combobox	No Change
ACO Probe freq. . [Hz]	See manual of configuration tool		

Table 5-15 Parameters within Setup Assistant / Speed Input

Setup Assistant / Speed Input			
Parameter	Description	Type	Default
Speed input port	5.3.7.69	Combobox	No Change
PLOG [pulses/NM]	See manual of configuration tool		

Table 5-16 Parameters within Setup Assistant / BAM/BNWAS

Setup Assistant / BAM/BNWAS			
Parameter	Description	Type	Default
BAM Port	5.3.7.70	Combobox	No Change
Alert Mgr. UDP	5.3.7.20	Text Field	192.168.85.185:8100
BNWAS Port	5.3.7.71	Combobox	No Change
BNWAS Mgr. UDP	5.3.7.22	Text Field	192.168.85.185:8200

Table 5-17 Parameters within Setup Assistant / Steering Locations

Setup Assistant / Steering Locations			
Parameter	Description	Type	Default
NFU Tiller xxx	5.3.7.72	Combobox	Standalone
Ping NFU Tiller xxx	5.3.7.73	Checkbox	Inactive
FU Tiller xxx	5.3.7.74	Combobox	Standalone
Ping FU Tiller xxx	5.3.7.75	Checkbox	Inactive
Handwheel xxx	5.3.7.76	Combobox	Standalone
Ping Handwheel xxx	5.3.7.77	Checkbox	Inactive

Table 5-18 Parameters within Setup Assistant / Ship Parameters

Setup Assistant / Ship Parameters			
Parameter	Description	Type	Default
Shipname	5.3.7.1	Text Field	
Length	5.3.7.3	Number Field	100
No. of Rudder	5.3.7.4	Number Field	1
Max. Rudder Angle	5.3.7.46	Number Field	35

Table 5-19 Parameters within Setup Assistant / Rudder Feedback

Setup Assistant / Rudder Feedback			
Parameter	Description	Type	Default
Feedback Input	5.3.7.78	Combobox	Analog In1
Current Angle	5.3.7.79	Combobox	None

Table 5-20 Parameters within Setup Assistant / Rudder Control

Setup Assistant / Rudder Control			
Parameter	Description	Type	Default
Set Rudder Output	5.3.7.80	Combobox	No Change
Deadband P1 [deg]	See manual of configuration tool		
Deadband P2 [deg]	See manual of configuration tool		
Deadband P1+P2 [deg]	See manual of configuration tool		
D-Return P1	See manual of configuration tool		
D-Return P2	See manual of configuration tool		
D-Return P1+P2	See manual of configuration tool		
SoleNoid Hyster. [%]	See manual of configuration tool		
Analog Gain RudOut 1	See manual of configuration tool		
Analog Gain RudOut 2	See manual of configuration tool		
Analog Out:	See manual of configuration tool		
Analog Out Loop (X39)	See manual of configuration tool		
Analog Out Loop (X44)	See manual of configuration tool		

Table 5-21 Parameters within Setup Assistant / NAV Control

Setup Assistant / NAV Control			
Parameter	Description	Type	Default
NAV Input Port	5.3.7.81	Combobox	No Change

Table 5-22 Parameters within Setup Assistant / Summary

Setup Assistant / Summary			
Parameter	Description	Type	Default
Disable Ethernet X19	5.3.7.82	Checkbox	Inactive

5.3.6.1 Shipname

Parameter to set the ship name.

Type: Text field
For configuration of text field, 5.3.8.3.

5.3.6.2 IMO no.

Parameter to set the ship's IMO number.

Type: Text field
For configuration of text field, see chapter 5.3.8.3.

5.3.6.3 Length

Parameter to set the ship's length in meters.

Type: Number field
Range: 10 - 999
Step: 1
For configuration of number field, see chapter 5.3.8.4.

5.3.6.4 No. of Rudder

Parameter to set the number of rudders.

Type: Number field
Range: 1 - 6
Step: 1
For configuration of number field, see chapter 5.3.8.4.

5.3.6.5 Rudder Type

Parameter to set the type of rudders. Parameter is for information only and does not affect operation. Select from predefined values to set this parameter.

Predefined rudder types to set are:

- Normal
- Water jet
- Pod drive
- Flap

Type: Combobox
For configuration of combo box, see chapter 5.3.8.1.

5.3.6.6 Order Code

Use this parameter to input the Raytheon Anschütz order number.

Type: Text field
For configuration of text field, see chapter 5.3.8.3.

5.3.6.7 Instance Number

For Master operator unit only. Each master operator unit must have a unique instance number, even there is only one master operator unit.

Type: Number field
Range: 1 - 9
Step: 1
For configuration of number field, see chapter 5.3.8.4.

5.3.6.8 Day Colour

Parameter to set day colors. Select from predefined values to set this parameter. Configured values for each mode can be selected via the **Day / Night** softkey, see chapter 4.3.1.

Predefined values:

- Day1 (Bright sun colors)
- Day2 (Day colors - white)
- Day3 (Day colors - black)
- Night1 (Dusk colors)
- Night2 (Night colors - green)
- Night3 (Night colors – red)

Type: Combobox
For configuration of combobox, see chapter 5.3.8.1

5.3.6.9 Night Colour

Parameter to set night colours. Select from predefined values to set this parameter. Configured values for each mode can be selected via the **Day / Night** softkey, see chapter 4.3.1.

Predefined values:

- Day1 (Bright sun colors)
- Day2 (Day colors - white)
- Day3 (Day colors - black)
- Night1 (Dusk colors)
- Night2 (Night colors - green)
- Night3 (Night colors – red)

Type: Combobox
For configuration of combobox, see chapter 5.3.8.1

5.3.6.10 Software Archive

Combobox to select a software version. Select from predefined values to set this parameter. Up to 4 saved software version are predefined for selection.
The selected action within parameter **Software Action** (see chapter 5.3.7.11) happens to the selected software version. A maximum of four software versions can be stored. The software currently used is not displayed in the software archive.

Type: Combobox
For configuration of combobox, see chapter 5.3.8.1

5.3.6.11 Software Action

Parameter to set an action for the software version which is selected in **Software Archive** (5.3.7.10).
Select from predefined values to set this parameter.

Select from predefined values:

- None (default)
- Install
- Remove

Type: Combobox
For configuration of combobox, see chapter 5.3.8.1

5.3.6.12 Service Menu enabled

With this checkbox it is possible to configure the PilotStar® NX in any control mode. It is not necessary to switch into inactive mode to start service menu. This function can be used for configuration under control conditions (test the configurations during operation).
Use the checkbox to enable **Developer Key**, see chapter 5.3.7.56.
If configuration is finished, parameter should set back to disabled.

Type: Checkbox
For configuration of checkbox, see chapter 5.3.8.2

5.3.6.13 Serial 1

Parameter to select the data format/content of the serial input RS422 (at plug X505).
Select from predefined values to set this parameter.

Select from predefined values:

- not used (which means this input is not connected)
- nmea 4800bd (one of following: heading, speed, NAV control data, low baud rate)
- nmea 38400bd (one of following: heading, speed, NAV control data, high baud rate)
- ecdis 4800bd (do not use)
- ecdis 38400bd (do not use)
- coursebus (Raytheon Anschütz format - contains all headings and speed over ground)
- bam 4800bd (connection to BAM, low baud rate)
- bam38400bd (connection to BAM, high baud rate)

Type: Combobox
For configuration of combobox, see chapter 5.3.8.1

5.3.6.14 Serial 2

Parameter to select the data format/content of the serial input RS422 (at plug X506).
Select from predefined values to set this parameter.

Select from predefined values:

- not used (which means this input is not connected)
- nmea 4800bd (one of following: heading, speed, NAV control data, low baud rate)
- nmea 38400bd (one of following: heading, speed, NAV control data, high baud rate)
- ecdis 4800bd (do not use)
- ecdis 38400bd (do not use)
- coursebus (Raytheon Anschütz format - contains all headings and speed over ground)

- bam 4800bd (connection to BAM, low baud rate)
- bam38400bd (connection to BAM, high baud rate)

Type: Combobox
For configuration of combobox, see chapter 5.3.8.1

5.3.6.15 Serial 3

Parameter to select the data format/content of the serial input RS422 (at plug X507).
Select from predefined values to set this parameter.

Select from predefined values:

- not used (which means this input is not connected)
- nmea 4800bd (one of following: heading, speed, NAV control data, low baud rate)
- nmea 38400bd (one of following: heading, speed, NAV control data, high baud rate)
- ecdis 4800bd (do not use)
- ecdis 38400bd (do not use)
- coursebus (Raytheon Anschütz format - contains all headings and speed over ground)
- bam 4800bd (connection to BAM, low baud rate)
- bam38400bd (connection to BAM, high baud rate)

Type: Combobox
For configuration of combobox, see chapter 5.3.8.1

5.3.6.16 Can Group

Parameter to expand the CAN ID. CAN groups can be

- Compass and data distribution
- Steering components
- Navigation data sensors

The recommended group numbers for steering systems are 6, 7, 8 and 9.
The combination of the CAN Group and CAN Device Number must be unique within each steering system.

Type: Number field
Range: 0 - 9
Step: 1
For configuration of number field, see chapter 5.3.8.4

5.3.6.17 Can- Dev. Nb.

Parameter to set the CAN Device Number according to the connection diagram. Adjust the value to set this parameter. The combination of the CAN Group and CAN Device Number must be unique within the steering system.

Type: Number field
Range: 0 - 63
Step: 1
For configuration of number field, see chapter 5.3.8.4

5.3.6.18 CAN ID

Parameter to set the CAN Identification Number. This number identifies a CAN device within a CAN Group. The CAN ID must be unique within each steering system.

Type: Number field
Range: 0 - 255
Step: 1
For configuration of number field, see chapter 5.3.8.4

5.3.6.19 CAN Nav.Data enabled

Parameter to enable use of navigational data received via the CAN Bus. Use the checkbox to set this parameter. A set checkbox means that navigational data is taken from the CAN bus.

Type: Checkbox
For configuration of checkbox field, see chapter 5.3.8.2

5.3.6.20 Alert Mgr. UDP

Parameter to connect to the Alarm Manager port. This port is essential for an integrated Ethernet application.
Recommended is to set 192.168.85.185:8100 for this parameter.
The following IP address ranges are allowed:
10.0.0.0 - 10.255.255.255
172.16.0.0 - 172.31.255.255
192.168.0.0 - 192.168.255.255
For configuration of this parameter, see chapter 5.3.12

Type: Text field
For configuration of text field, see chapter 5.3.8.3

5.3.6.21 Alert Mgr. Type

Parameter to set the Alert Manager Telegram type. The selected type will be sent to the connected Alert Management System. The port must be entered at parameter **Alert Mgr. UDP**, see chapter 5.3.7.20.

Select from predefined values:

- INS (for ACN, ALC, ALF and ARC telegrams communication. IEC 61924-2)
- ALR/ACK (older alert communication)
- BAM (IEC 62923-1)

Type: Combobox
For configuration of combobox, see chapter 5.3.8.1

5.3.6.22 BNWAS Mgr. UDP

Parameter to connect to the BNWAS port. This port is essential for an integrated Ethernet application. Recommended is to set 192.168.85.185:8200 for this parameter.
The following IP address ranges are allowed:
10.0.0.0 - 10.255.255.255
172.16.0.0 - 172.31.255.255
192.168.0.0 - 192.168.255.255
For configuration of this parameter, see chapter 5.3.13

Type: Text field
For configuration of text field, see chapter 5.3.8.3

5.3.6.23 PSIFs

Parameter is used to define the number of PSIFs within the application.
Adjust the value to set this parameter.

Type: Number field
Range: 1 - 9
Step: 1
For configuration of number field, see chapter 5.3.8.4

5.3.6.24 CAN Central Dimming

Parameter is used to activate the function **CAN Central Dimming**. By activation of this parameter all connected components/devices of the respective dimming group (currently Dimming Group 1) can be adjusted (brightness) via the CAN bus.

Type: Checkbox
For configuration of checkbox, see chapter 5.3.8.2

5.3.6.25 DDC Central Dimming

Parameter to enable **DDC Central Dimming.** Within this function the device processes DDC telegram and adjusts the brightness according to given brightness values. The brightness of the device can be requested by “request” after DDC.

Type: Checkbox
For configuration of checkbox, see chapter 5.3.8.2

5.3.6.26 INS

This parameter is used to deactivate heading monitoring, position monitoring and the sensor selection (for heading and speed) because these functions are performed via INS.
This parameter can be set/reset during the installation from the service personnel.

Type: Checkbox
For configuration of checkbox, see chapter 5.3.8.2

5.3.6.27 Turn headings 180deg

This parameter is used to cover all incoming headings values with an offset of 180°. Activate checkbox to enable this parameter.

Type: Checkbox
For configuration of checkbox, see chapter 5.3.8.2

5.3.6.28 MISC

This parameter is used to receive data according to IEC61162-450 Ed.1 from transmission group MISC. Activate checkbox and restart device to enable this parameter.

Type: Checkbox
For configuration of checkbox, see chapter 5.3.8.2

5.3.6.29 TGTD

This parameter is used to receive data according to IEC61162-450 Ed.1 from transmission group TGTD. Activate checkbox and restart device to enable this parameter.

Type: Checkbox
For configuration of checkbox, see chapter 5.3.8.2

5.3.6.30 SATD

This parameter is used to receive data according to IEC61162-450 Ed.1 from transmission group SATD. Activate checkbox and restart device to enable this parameter.

Type: Checkbox
For configuration of checkbox, see chapter 5.3.8.2

5.3.6.31 NAVD

This parameter is used to receive data according to IEC61162-450 Ed.1 from transmission group NAVD. Activate checkbox and restart device to enable this parameter.

Type: Checkbox
For configuration of checkbox, see chapter 5.3.8.2

5.3.6.32 TIME

This parameter is used to receive data according to IEC61162-450 Ed.1 from transmission group TIME. Activate checkbox and restart device to enable this parameter.

Type: Checkbox
For configuration of checkbox, see chapter 5.3.8.2

5.3.6.33 PROP

This parameter is used to receive data according to IEC61162-450 Ed.1 from transmission group PROP. Activate checkbox and restart device to enable this parameter.

Type: Checkbox
For configuration of checkbox, see chapter 5.3.8.2

5.3.6.34 USR1

This parameter is used to receive data according to IEC61162-450 Ed.1 from transmission group USR1. Activate checkbox and restart device to enable this parameter.

Type: Checkbox

For configuration of checkbox, see chapter 5.3.8.2

5.3.6.35 USR2

This parameter is used to receive data according to IEC61162-450 Ed.1 from transmission group USR2. Activate checkbox and restart device to enable this parameter.

Type: Checkbox
For configuration of checkbox, see chapter 5.3.8.2

5.3.6.36 USR3

This parameter is used to receive data according to IEC61162-450 Ed.1 from transmission group USR3. Activate checkbox and restart device to enable this parameter.

Type: Checkbox
For configuration of checkbox, see chapter 5.3.8.2

5.3.6.37 USR4

This parameter is used to receive data according to IEC61162-450 Ed.1 from transmission group USR4. Activate checkbox and restart device to enable this parameter.

Type: Checkbox
For configuration of checkbox, see chapter 5.3.8.2

5.3.6.38 USR5

This parameter is used to receive data according to IEC61162-450 Ed.1 from transmission group USR5. Activate checkbox and restart device to enable this parameter.

Type: Checkbox
For configuration of checkbox, see chapter 5.3.8.2

5.3.6.39 USR6

This parameter is used to receive data according to IEC61162-450 Ed.1 from transmission group USR6. Activate checkbox and restart device to enable this parameter.

Type: Checkbox
For configuration of checkbox, see chapter 5.3.8.2

5.3.6.40 USR7

This parameter is used to receive data according to IEC61162-450 Ed.1 from transmission group USR7. Activate checkbox and restart device to enable this parameter.

Type: Checkbox
For configuration of checkbox, see chapter 5.3.8.2

5.3.6.41 USR8

This parameter is used to receive data according to IEC61162-450 Ed.1 from transmission group USR8. Activate checkbox and restart device to enable this parameter.

Type: Checkbox
For configuration of checkbox, see chapter 5.3.8.2

5.3.6.42 Outgoing transm. grp.

This parameter enables to send data according to IEC61162-450 Ed.1 to selected group. This parameter must be identical to the group, which was selected for reception, see chapter 5.3.7.28 to 5.3.7.43.

Further information for data transfer according to IEC61162-450 Ed.1:

- Maximum number of datagrams per second received, intended for and processed by the equipment: 160
- Maximum number of datagrams per second received but not intended for the equipment: 40

- Maximum number of datagrams per second received by, but not intended for, the equipment at 50 % of the maximum load for item a): 120

ONF (Other Node Function): Client server communication data rate per connected slave operator unit about 650bytes net (40 frames) TCP/IPv4 Port 8000 during normal operation. During service mode higher bursts.
Client update only during service. TCP/IPv4 Port 8005 burst with size of software package typical 5Mbyte per client once.
Note: IP addresses from multicast IP range (see annex 450 Support) are not allowed.

Select from predefined values:

- DISABLED
- MISC
- TGTD
- SATD
- NAVD
- TIME
- PROP
- USR1
- USR2
- USR3
- USR4
- USR5
- USR6
- USR7
- USR8

Type: Combobox. Restart device for changes to take effect.
For configuration of combobox, see chapter 5.3.8.1

5.3.6.43 Rudder Gain [%]

Adjust this parameter to fit the rudder angle to that rudder value which is needed. If it is necessary to adjust a greater or smaller rudder value as it is configurable than the rudder gain value can be increased or decreased. The parameter is indicated in percent.

Example 1:
Rudder = 7 and Rudder Gain = 100%
is the same as
Rudder = 5 and Rudder gain = 170%

Example 2:
Rudder = 3 and Rudder Gain = 100%

is the same as
Rudder = 5 and Rudder Gain = 85%

Type: Number field
Range: 10 - 200
Step: 1
For configuration of number field, see chapter 5.3.8.4

5.3.6.44 Max. Rudder Angle

Use this parameter to set the rudder's maximum angle in degrees. This is the maximum desired rudder angle output from the autopilot.
The mechanical maximum rudder angle is defined by the limit switches in a rudder feedback unit. The maximum possible rudder angle to be ordered by the autopilot is to be less than this value. The parameter is indicated in degree.

Type: Number field
Range: 5 - 99
Step: 1
For configuration of number field, see chapter 5.3.8.4

5.3.6.45 Heading Monitor

The heading monitor function is needed for an approved Heading Control System according to ISO 11674.
This function can be switched off manually during the configuration procedure (controller parameter). This may be necessary if this monitoring is performed via other monitoring functions/devices. Only one heading monitor function must be active at the Heading Control System. Use this parameter to activate the comparison between selected gyro and magnetic compass. An alert is generated if difference between the heading sensors changes more than the configured limit during heading keeping or if one of the sensors transmits invalid or no data.
Use the checkbox to activate this function.

Type: Checkbox
For configuration of checkbox, see chapter 5.3.8.2

5.3.6.46 Heading Grad. Control

Heading Gradient Control function observes the incoming heading values and detects heading jumps between following values or while sensor switching. Enables/disables heading jump (gradient) monitor and heading jump detection and compensation of selected heading sensor.

Type: Checkbox
For configuration of checkbox, see chapter 5.3.8.2

5.3.6.47 HDG Grad. [deg/s]

This parameter value is used to define the threshold of a heading jump. Heading jumps lower than this threshold will remain without effect. Heading jumps greater than this threshold will lead to an action by the autopilot. In heading control mode, the actual heading is adjusted by the jump value as a new set heading. Within waypoint steering mode the set course over ground will remain without changes. Course trim is adjusted. Adjustments will not result in unintended rudder moves.

Type: Number field
Range: 8 - 20
Step: 1
For configuration of number field, see chapter 5.3.8.4

5.3.6.48 Set Rudder limited

If checkbox is selected, an alert is generated if the rudder command from the autopilot exceeds the configured rudder limit value.
If this checkbox is not selected, an alert is generated if actual rudder exceeds the configured rudder limit.

Type: Checkbox
For configuration of checkbox, see chapter 5.3.8.2

5.3.6.49 High Speed Craft

Use this checkbox to set the control parameter for high speed craft. High speed is defined as a speed greater than 30 knots. Use the checkbox to set this parameter.
A set checkbox means that the control type (regulation behaviour) is matched to high speed craft.

Type: Checkbox
For configuration of checkbox, see chapter 5.3.8.2

5.3.6.50 SW-Key

Use this field to enter the 19-digit key of the current software version of the operator unit.

Type: Text field
For configuration of text field, see chapter 5.3.8.3

5.3.6.51 Low Speed

Use this parameter to set the alert activation limit.

Type: Number field
Range: 0 - 10
Step: 1
For configuration of number field, see chapter 5.3.8.4

5.3.6.52 Eff. Ship Length

Use this parameter to adjust the influence of the ship length on the control loop. This parameter should be set to the actual ship's length. It is useable to influence the suitable value for the counter rudder. Some more length results in more counter rudder and less length results in less counter rudder.

Type: Number field
Range: 10 - 999
Step: 1
For configuration of number field, see chapter 5.3.8.4

5.3.6.53 Back up Nav. Alarm

Use this parameter to set the Backup Navigator Alarm. This setting is for waypoint steering only.
A Backup Navigator Alarm is activated if a basic alarm is not acknowledged within a specified time period.

Type: Checkbox
For configuration of checkbox, see chapter 5.3.8.2

5.3.6.54 Developer Key

	This parameter is for development only.

This key is necessary to enable parameter **Service Menu enabled**, see chapter 5.3.7.12.

This code can be input with the displayed keyboard after touching the input field.
Type: Text field
For configuration of text field, see chapter 5.3.8.3

5.3.6.55 Server-IP address

Use this parameter to set the internal server address of the autopilot for data transmission between the operator unit and the autopilot controller.
Example for network configuration If there is more than one operator unit within a Master – Slave configuration:

Designation	Master Main Bridge	Slave Port	Slave Starboard
Server-IP address	127.0.0.1	192.168.85.199	192.168.85.199
Client-IP address	192.168.85.199	192.168.85.198	192.168.85.197
Client-Subnet	255.255.255.0	255.255.255.0	255.255.255.0

The following IP address ranges are allowed:
10.0.0.0 - 10.255.255.255
172.16.0.0 - 172.31.255.255
192.168.0.0 - 192.168.255.255

Type: Text field
For configuration of text field, see chapter 5.3.8.3

5.3.6.56 Input Beep enabled

This checkbox enables an acoustical signal after valid data input.

Type: Checkbox
For configuration of checkbox, see chapter 5.3.8.2

5.3.6.57 Rear Steering Stand

Activate this checkbox in case of rear standing stand. Operator display page **NFU/FU Main** is converted for rear standing stand.

Type: Checkbox
For configuration of checkbox, see chapter 5.3.8.2

5.3.6.58 Steering Location

This parameter adjusts steering location at which the operator unit is built in.

Select from predefined values:

- 0: Standalone
- 1: Bridge
- 2: Wing (Port)
- 3: Wing (Stbd)
- 4: Aft
- 5: Location 5
- 6: Location 6
- 7: Location 7
- 8: Location 8

Type: Combobox
For configuration of combobox, see chapter 5.3.8.1

5.3.6.59 Client-IP address

Use this parameter to set the address of the NautoPilot Operator Unit for data transmission.
Example for network configuration If there is more than one operator unit within a Master – Slave configuration:

Designation	Master Main Bridge	Slave Port	Slave Starboard
Server-IP address	127.0.0.1	192.168.85.199	192.168.85.199
Client-IP address	192.168.85.199	192.168.85.198	192.168.85.197
Client-Subnet	255.255.255.0	255.255.255.0	255.255.255.0

The following IP address ranges are allowed:
10.0.0.0 - 10.255.255.255
172.16.0.0 - 172.31.255.255
192.168.0.0 - 192.168.255.255

Type: Text field
For configuration of text field, see chapter 5.3.8.3

5.3.6.60 Client-Subnet

Use this parameter to set a subnet mask for data filter.
Example for network configuration If there is more than one operator unit within a Master – Slave configuration:

Designation	Master Main Bridge	Slave Port	Slave Starboard
Server-IP address	127.0.0.1	192.168.85.199	192.168.85.199
Client-IP address	192.168.85.199	192.168.85.198	192.168.85.197
Client-Subnet	255.255.255.0	255.255.255.0	255.255.255.0

Type: Text field
For configuration of text field, see chapter 5.3.8.3

5.3.6.61 Operator Unit Type

Use this parameter to set type of operator unit, see chapter 1.5.

Predefined values:

- Master
- Slave

Type: Combobox
For configuration of combobox, see chapter 5.3.8.1

5.3.6.62 Select System

Use this parameter to set type of system, see chapter 1.3.

Predefined values:

- NautoSteer AS

- Standalone

Type: Combobox
For configuration of combobox, see chapter 5.3.8.1

5.3.6.63 Tiller Connected

Activate this checkbox in case of connected tiller. Checkbox will be activated automatically, if tiller will be detected. If checkbox is activated, list of devices appears.

Type: Checkbox
For configuration of checkbox, see chapter 5.3.8.2

5.3.6.64 Update Devicelist

Activate this checkbox to update list of devices, which appears in case of connected tiller, see chapter 5.3.7.65.

Type: Checkbox
For configuration of checkbox, see chapter 5.3.8.2

5.3.6.65 Gyro Heading Port

Use this parameter to set the standard interface of the gyro compass. If other interfaces than the predefined should be used, this must be set within the respective configuration tool or configuration menu, in this case **other** should be selected from predefined values.

If this selection within the setup assistant is done once before, the current setting appears in the information field above. **PSIF B25** is always activated and cannot be deactivated.
Ethernet SATD X19 cannot be deactivated within this selection. To deactivate **Ethernet SATD X19** use the parameter **Disable Ethernet X19**, see chapter 5.3.7.82.

Select from predefined values:

- no change (no change to the current setting shown in the above information field)
- Coursebus X505 (operator unit port X505 will be configured as coursebus interface)
- NMEA 4800bd X505 (operator unit port X505 will be configured as NMEA 4800 Baud / IEC 61162-1 interface)
- NMEA 38400bd X505 (operator unit port X505 will be configured as NMEA 3800 Baud / IEC 61162-1 interface)
- Ethernet SATD X19 (receive group SATD according to IEC 61162-450 will be activated at operator unit port X19)

- other (possible ports at operator unit and at PilotStar® NX interface unit will be reset and no further ports will be opened)
- PSIF B25 (port scan at PilotStar® NX interface unit port B25 unit will be activated)

Predefined values might change depending on system configuration.
Type: Combobox
For configuration of combobox, see chapter 5.3.8.1

5.3.6.66 Mag. Heading Port

Use this parameter to set the standard interface of the magnetic heading. If other interfaces than the predefined should be used, this must be set within the respective configuration tool or configuration menu, in this case **other** should be selected from predefined values.

If this selection within the setup assistant is done once before, the current setting appears in the information field above. **PSIF B29** is always activated and cannot be deactivated.
Ethernet SATD X19 cannot be deactivated within this selection. To deactivate **Ethernet SATD X19** use the parameter **Disable Ethernet X19**, see chapter 5.3.7.82.

Select from predefined values:

- no change (no change to the current setting shown in the above information field)
- Coursebus X505 (operator unit port X505 will be configured as coursebus interface)
- NMEA 4800bd X505 (operator unit port X505 will be configured as NMEA 4800 Baud / IEC 61162-1 interface)
- NMEA 38400bd X505 (operator unit port X505 will be configured as NMEA 3800 Baud / IEC 61162-1 interface)
- Ethernet SATD X19 (receive group SATD according to IEC 61162-450 will be activated at operator unit port X19)
- other (possible ports at operator unit and at PilotStar® NX interface unit will be reset and no further ports will be opened)
- same as gyro (heading from magnetic compass will be received at the same interface as heading from gyro compass)
- disable (no magnetic heading available, heading monitoring will be deactivated)
- PSIF B29 (port scan at PilotStar® NX interface unit port B29 unit will be activated)
- PSIF ACO Probe B32 (Anschütz magnetic sonde will be connected at PilotStar® NX Interface unit port B32)

Predefined values might change depending on system configuration.
Type: Combobox

For configuration of combobox, see chapter 5.3.8.1

5.3.6.67 Speed Input Port

Use this parameter to set the standard interface of speed through water. If other interfaces than the predefined should be used, this must be set within the respective configuration tool or configuration menu, in this case **other** should be selected from predefined values.

If this selection within the setup assistant is done once before, the current setting appears in the information field above. **PSIF B35** is always activated and cannot be deactivated.
Ethernet NAVD X19 cannot be deactivated within this selection. To deactivate **Ethernet NAVD X19** use the parameter **Disable Ethernet X19**, see chapter 5.3.7.82.

Select from predefined values:

- no change (no change to the current setting shown in the above information field)
- Coursebus X505 (operator unit port X505 will be configured as coursebus interface)
- NMEA 4800bd X505 (operator unit port X505 will be configured as NMEA 4800 Baud / IEC 61162-1 interface)
- NMEA 38400bd X505 (operator unit port X505 will be configured as NMEA 3800 Baud / IEC 61162-1 interface)
- Ethernet NAVD X19 (receive group NAVD according to IEC 61162-450 will be activated at operator unit port X19)
- other (possible ports at operator unit and at PilotStar® NX interface unit will be reset and no further ports will be opened)
- PSIF B35 (port scan at PilotStar® NX interface unit port B35 unit will be activated)

Predefined values might change depending on system configuration.
Type: Combobox
For configuration of combobox, see chapter 5.3.8.1

5.3.6.68 BAM Port

Use this parameter to set the standard interface for communication via BAM system.

If this selection within the setup assistant is done once before, the current setting appears in the information field above.
Ethernet NAVD X19 cannot be deactivated within this selection. To deactivate **Ethernet NAVD X19** use the parameter **Disable Ethernet X19**, see chapter 5.3.7.82.

Select from predefined values:

- no change (no change to the current setting shown in the above information field)
- BAM-4800bd X507 (operator unit port X507 will be configured as NMEA 4800 Baud / IEC 61162-1 interface)
- BAM-4800bd X507 (operator unit port X507 will be configured as NMEA 3800 Baud / IEC 61162-1 interface)
- Ethernet NAVD X19 (receive group NAVD according to IEC 61162-450 will be activated at operator unit port X19)
- Alert Mgr. UDP (in case of MOXA switch, see chapter 3.3, default setting for communication will be set, if not already done)
- disable (possible ports at operator unit will be reset and no further ports will be opened)

Predefined values might change depending on system configuration.
Type: Combobox
For configuration of combobox, see chapter 5.3.8.1

5.3.6.69 BNWAS Port

Use this parameter to set the standard interface for BNWAS.

If this selection within the setup assistant is done once before, the current setting appears in the information field above.
Ethernet NAVD X19 cannot be deactivated within this selection. To deactivate **Ethernet NAVD X19** use the parameter **Disable Ethernet X19**, see chapter 5.3.7.82.

Select from predefined values:

- no change (no change to the current setting shown in the above information field)
- PSNX X511 – PSIF B36 (output Backup Navigator Alarm at operator unit X511 and Watch Alarm Reset at PilotStar® NX interface unit B35)
- Ethernet NAVD X19 (receive group NAVD according to IEC 61162-450 will be activated at operator unit port X19)
- BNWAS Mgr. UDP (in case of MOXA switch, see chapter 3.3, default setting for communication will be set, if not already done)
- disable (possible ports at operator unit will be reset and no further ports will be opened)

Predefined values might change depending on system configuration.
Type: Combobox
For configuration of combobox, see chapter 5.3.8.1

5.3.6.70 NFU Tiller xxx

This parameter adjusts steering location at which the NFU tiller is built in.
(xxx represents the CAN ID of the device.)

Select from predefined values:

- 0: Standalone
- 1: Bridge
- 2: Wing (Port)
- 3: Wing (Stbd)
- 4: Aft
- 5: Location 5
- 6: Location 6
- 7: Location 7
- 8: Location 8

Type: Combobox
For configuration of combobox, see chapter 5.3.8.1

5.3.6.71 PING Tiller xxx

If this checkbox is selected, a blue LED will be activated for 10 s at the respective device to identify the device.
(xxx represents the CAN ID of the device.)

Type: Checkbox
For configuration of checkbox, see chapter 5.3.8.2

5.3.6.72 FU Tiller xxx

This parameter adjusts steering location at which the FU tiller is built in.
(xxx is represents the CAN ID of the device.)

Select from predefined values:

- 0: Standalone
- 1: Bridge
- 2: Wing (Port)
- 3: Wing (Stbd)
- 4: Aft
- 5: Location 5
- 6: Location 6

- 7: Location 7
- 8: Location 8

Type: Combobox
For configuration of combobox, see chapter 5.3.8.1

5.3.6.73 PING FU Tiller xxx

If this checkbox is selected, a blue LED will be activated for 10 s at the respective device to identify the device.
(xxx represents the CAN ID of the device.)

Type: Checkbox
For configuration of checkbox, see chapter 5.3.8.2

5.3.6.74 Handwheel xxx

This parameter adjusts steering location at which the FU tiller is built in.
(xxx is represents the CAN ID of the device.)

Select from predefined values:

- 0: Standalone
- 1: Bridge
- 2: Wing (Port)
- 3: Wing (Stbd)
- 4: Aft
- 5: Location 5
- 6: Location 6
- 7: Location 7
- 8: Location 8

Type: Combobox
For configuration of combobox, see chapter 5.3.8.1

5.3.6.75 PING Handwheel xxx

If this checkbox is selected, a blue LED will be activated for 10 s at the respective device to identify the device.
(xxx represents the CAN ID of the device.)

Type: Checkbox

For configuration of checkbox, see chapter 5.3.8.2

5.3.6.76 Feedback Input

This parameter adjusts feedback input.

Select from predefined values:

- Digital In (CAN0) (for development only, do not use)
- Analog In1 (rudder is connected at analog input 1)
- Analog In2 (rudder is connected at analog input 1)
- Analog In1+In3 R1+R2 (starboard rudder is connected at analog input 1, port side rudder is connected at analog input 3)
- Analog In1+In3 R1+R1 (two feedback signals of one rudder are connected redundant at analog input 1 and analog input 3)

Type: Combobox
For configuration of combobox, see chapter 5.3.8.1

5.3.6.77 Current Angle

This parameter adjusts rudder correction value.

Select from predefined values:

- reset (all correction values will be deleted)
- port max deg (correction value for maximum port side rudder will be used)
- port 30 deg (correction value for 30 deg port side rudder will be used)
- port 20 deg (correction value for 20 deg port side rudder will be used)
- port 10 deg (correction value for 10 deg port side rudder will be used)
- 0 deg (correction value for rudder midship will be used)
- starboard 10 deg (correction value for 10 deg starboard rudder will be used)
- starboard 20 deg (correction value for 20 deg starboard rudder will be used)
- starboard 30 deg (correction value for 20 deg starboard rudder will be used)
- starboard max deg (correction value for maximum starboard rudder will be used)

Type: Combobox
For configuration of combobox, see chapter 5.3.8.1

5.3.6.78 Set Rudder Output

This parameter adjusts rudder output.

If this selection within the setup assistant is done once before, the current setting appears in the information field above.

Select from predefined values:

- no change (no change to the current setting)
- Solenoids (use values for Solenoid valves)
- Analog (use values for analog connection)

Type: Combobox
For configuration of combobox, see chapter 5.3.8.1

5.3.6.79 NAV Input Port

Use this parameter to set the standard interface for waypoint steering (NMEA APB-telegram).

If this selection within the setup assistant is done once before, the current setting appears in the information field above.
Ethernet NAVD X19 cannot be deactivated within this selection. To deactivate **Ethernet NAVD X19** use the parameter **Disable Ethernet X19**, see chapter 5.3.7.82.

Select from predefined values:

- no change (no change to the current setting shown in the above information field)
- NMEA 4800bd X506 (operator unit port X506 will be configured as NMEA 4800 Baud / IEC 61162-1 interface)
- NMEA 38400bd X506 (operator unit port X506 will be configured as NMEA 3800 Baud / IEC 61162-1 interface)
- Ethernet NAVD X19 (receive group NAVD according to IEC 61162-450 will be activated at operator unit port X19)
- disable (possible ports at operator unit will be reset and no further ports will be opened)

Type: Combobox
For configuration of combobox, see chapter 5.3.8.1

5.3.6.80 Disable Ethernet X19

If this checkbox is selected, recipient groups and sender group will be reset/deactivated.

Type: Checkbox
For configuration of checkbox, see chapter 5.3.8.2

5.3.7 Change Configurations of Parameters

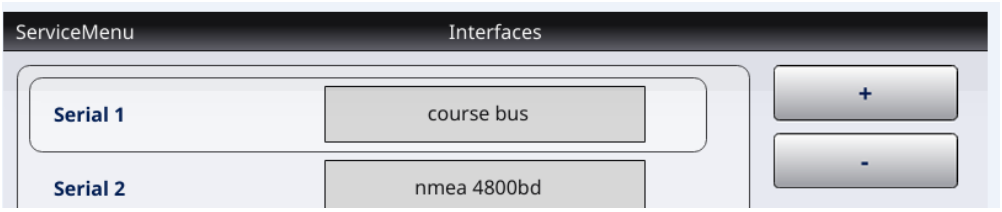
5.3.7.1 Configure Combobox

	Within a combobox one of several predefined values can be selected. For predefined values for the configurable parameters, see chapter 5.3.7.

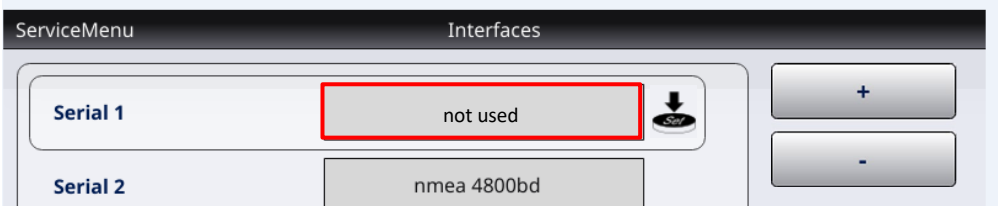
Precondition

- Service menu is running.
- Service display page is active which includes configurable parameter of the type combobox.

1. Use touchscreen to select desired combobox.
   - **+/-** softkeys appears.
   - Selected combobox is highlighted and black framed.



2. Use **+/-** softkeys until input field shows desired value.
   - Input field gets red framed.
   - Set symbol appears next to input field.



3. Press pushbutton **Set**.
   - Red frame disappears.
   - Set symbol disappears.
   - Parameter is configured.

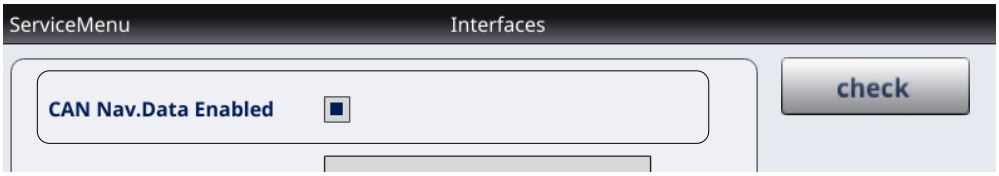
5.3.7.2 Configure Checkbox

	Within a checkbox, a function or setting can be selected or deselected. Overview of all configurable parameters, see chapter 5.3.7

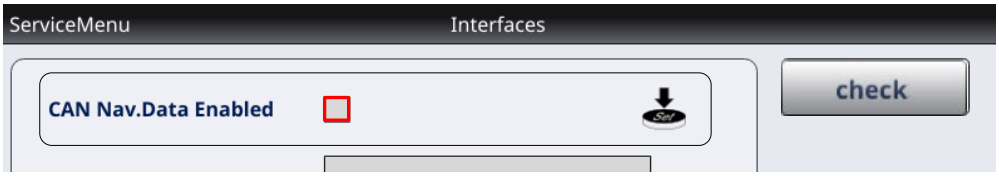
Precondition

- Service menu is running.
- Service display page is active which includes configurable parameter of the type checkbox.

1. Use touchscreen to select desired checkbox.
   - **check** softkey appears.
   - Selected combobox is highlighted and black framed.



2. Use **check** softkey to select or deselect checkbox.
   - Checkbox gets red framed.
   - Set symbol appears next to checkbox.



3. Press pushbutton **Set**.
   - Red frame disappears.
   - Set symbol disappears.
   - Parameter is configured.

5.3.7.3 Configure Text Field

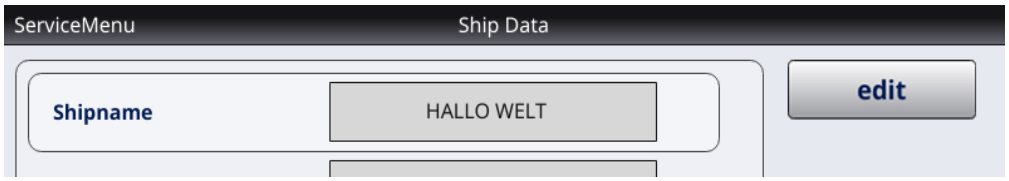
	Context of text field is changed via data input with on-screen keyboard. Overview of all configurable parameters, see chapter 5.3.7

	Data input of some text fields is limited in length and type of character. If input of these text fields is not according to limitations, signal tone appears and context of text field returns to previous value.

Precondition

- Service menu is running.
- Service display page is active which includes configurable parameter of the type text field.

1. Use touchscreen to select desired text field.
   - **edit** softkey appears.
   - Selected text field is highlighted and black framed.



2. Select **edit** softkey.
   - **On-screen keyboard** and input field appear in separate window.

3. Use **on-screen keyboard** to change text field**.**
   - Text field gets red framed.
   - Set symbol appears next to input field.

4. Press pushbutton **Set.**
   - Separate window closes.
   - Previous service display page reappears.

5. Press pushbutton **Set.**
   - Red frame disappears.
   - Set symbol disappears.
   - Parameter value is configured.

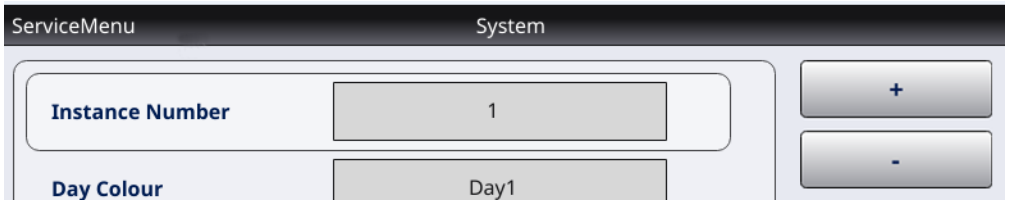
5.3.7.4 Configure Number Field

	Within a number field, numerical value can be changed within a predefined range. For predefined value ranges for the configurable parameters, see chapter 5.3.7.

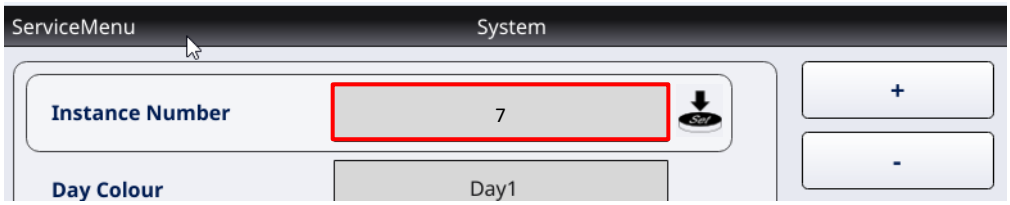
Precondition

- Service menu is running.
- Service display page is active which includes configurable parameter of the type number field.

1. Use touchscreen to select desired number field.
   - **+/-** softkeys appears.
   - Selected number field is highlighted and black framed.



2. Use **+/-** softkeys until input field shows desired value.
   - Input field gets red framed.
   - Set symbol appears next to input field.



3. Press pushbutton **Set**.
   - Red frame disappears.
   - Set symbol disappears.
   - Parameter is configured.

5.3.8 Update of Software

	Use only from Raytheon Anschütz admitted USB sticks.

	In case of Master – Slave installation to update software, update is only possible from master operator unit. After successful installation of new software version on master unit, new software version is spread out to all slave units. After update of software on slave units, slave units shut down and restart.

	For newest software version contact Raytheon Anschütz service.

Precondition **Service Action** within service display page **PilotStar® NX Setting / System** is set to **Install.**

1. Plug in USB stick with new software version.
2. Alert **COPYING VERSION EXX.XX** appears in status header line.
3. Wait until alert **SOFTWARE SUCCESSFULLY COPIED: EXX.XX** appears in status header line.
4. Open service display page **PilotStar® NX Setting.**
5. Use softkey **NEXT** until header status line shows the text **System.**
6. Use touchscreen to scroll down to parameter **Software Archive**.
7. Use touchscreen to select **Software Archive**.
8. Use **+/-** softkeys to select desired software version.
   - Input field gets red framed.
   - Set symbol appears next to input field.

9. Press pushbutton **Set.**
   - Red frame disappears.
   - Set symbol disappears.
   - System shuts down and restarts.
   - New software version is completely installed and ready to use after restart.

5.3.9 Export of Configuration

	Use only from Raytheon Anschütz admitted USB sticks.

	All local adjustments on the operator unit are saved within the export of configuration.

Precondition

- Service menu is running.
- Service display page **Service Menu Main** is active.

1. Plug in empty USB stick.
2. Select **Import / Export** from **Service Menu Main**.
   - Service display page **Import / Export** opens.
3. Use touchscreen to select **Export** from service display page **Import / Export**.
4. Use **+/-** softkeys until input field shows **Export**.
   - Input field gets red framed.
   - Set symbol appears next to input field.

5. Press pushbutton **Set**.
   - Red frame disappears.
   - Set symbol disappears.
   - Configuration will be saved under an automatically generated file name, which includes the name of the ship.

5.3.10 Import of Configuration

	Use only from Raytheon Anschütz admitted USB sticks.

	All local adjustments on the operator unit are saved within the export of configuration.

Precondition

- Service menu is running.
- Service display page **Service Menu Main** is active.

1. Plug in USB stick with saved configurations.
2. Select **Import / Export** from **Service Menu Main**.
   - Service display page **Import / Export** opens.
3. Use touchscreen to select **Import** from service display page **Import / Export**.
4. Use **+/- softkeys** to select desired configuration.
   - Input field gets red framed.
   - Set symbol appears next to input field.

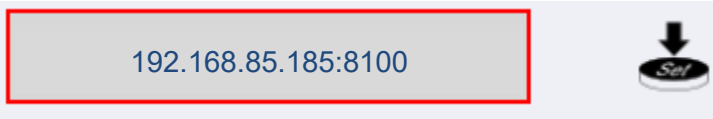
5. Press pushbutton **Set**.
   - Red frame disappears.
   - Set symbol disappears.
   - System shuts down and restarts.
   - New software version is completely installed and ready to use after restart.

5.3.11 Configure PilotStar® NX for BAM

Precondition

- Service menu is running.
- Service display page **Service Menu Main** is active.

1. Open service display page **PilotStar® NX Settings.**
2. Use softkey **NEXT** until header status line shows the text **Interfaces.**
3. Use touchscreen to scroll down to parameter **Alert Mgr. UDP.**
4. Use touchscreen to select **Alert Mgr. UDP.**
5. Press softkey **edit**.
   - **On-screen keyboard** and input field appear in separate window.
6. Use **on-screen keyboard** to enter **192.168.85.185:8100**
   - Input field gets red framed.
   - Set symbol appears next to input field.



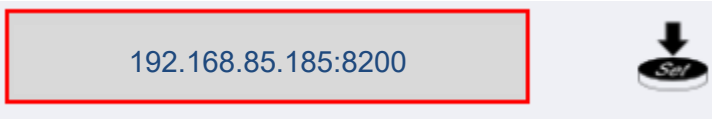
7. Press pushbutton **Set.**
   - Separate window closes.
   - Service display page PilotStar® NX Settings / Interfaces reappears.
8. Press pushbutton **Set.**
   - Red frame disappears.
   - Set symbol disappears.
   - Parameter value is configured.

5.3.12 Configure PilotStar® NX for BNWAS

Precondition

- Service menu is running.
- Service display page **Service Menu Main** is active.

1. Open service display page **PilotStar® NX Settings.**
2. Use softkey **NEXT** until header status line shows the text **Interfaces.**
3. Use touchscreen to scroll down to parameter **BNWAS Mgr. UDP.**
4. Use touchscreen to select **BNWAS Mgr. UDP.**
5. Press softkey **edit**.
   - **On-screen keyboard** and input field appear in separate window.
6. Use **on-screen keyboard** to enter **192.168.85.185:8200.**
   - Input field gets red framed.
   - Set symbol appears next to input field.



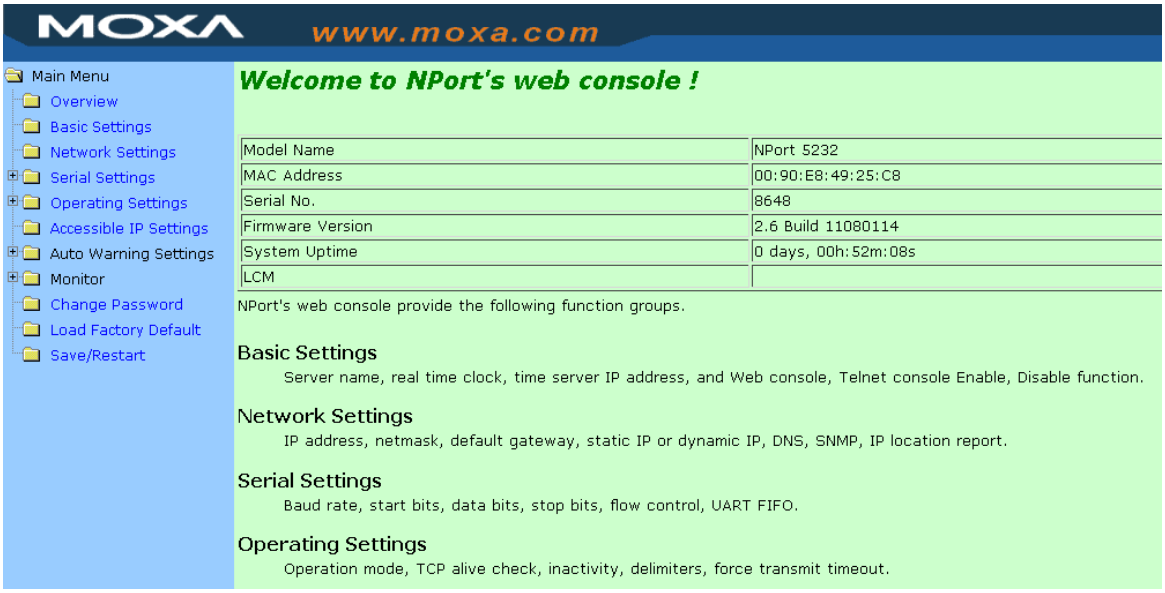
7. Press pushbutton **Set.**
   - Separate window closes.
   - Service display page PilotStar® NX Settings / Interfaces reappears.
8. Press pushbutton **Set.**
   - Red frame disappears.
   - Set symbol disappears.
   - Parameter value is configured.

5.3.13 Configure MOXA Switch

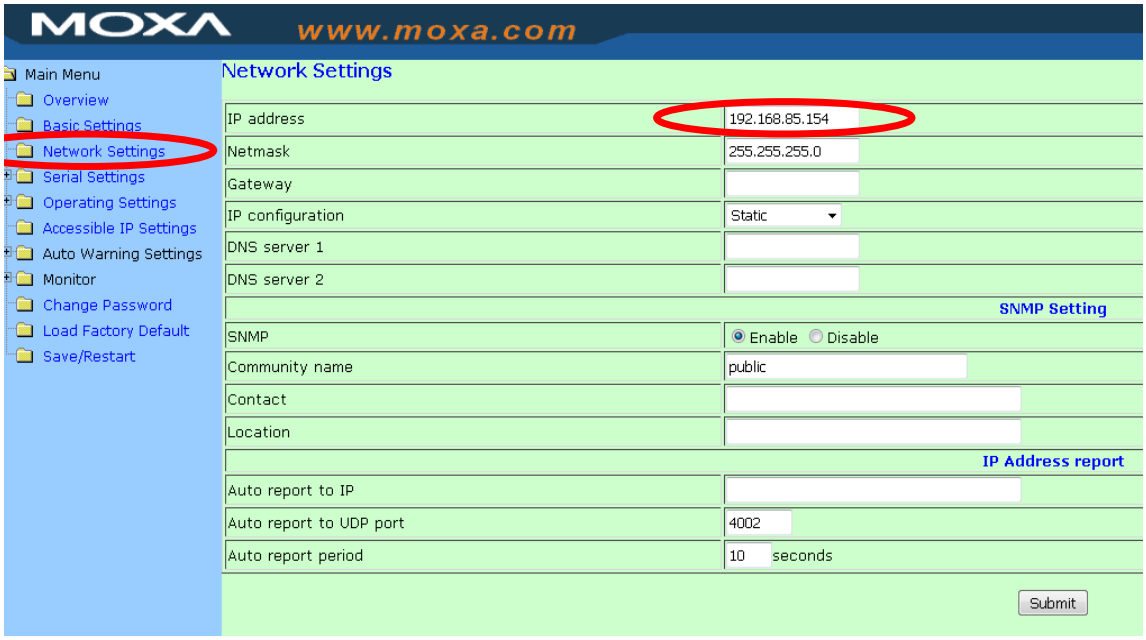
Precondition

- MOXA switch is installed, see chapter 3.3.
- Service display page **Service Menu Main** is active.
- **Alert Mgr. UDP** is configured, see chapter 5.3.7.20
- **BNWAS Mgr. UDP** is configured, see chapter 5.3.7.22

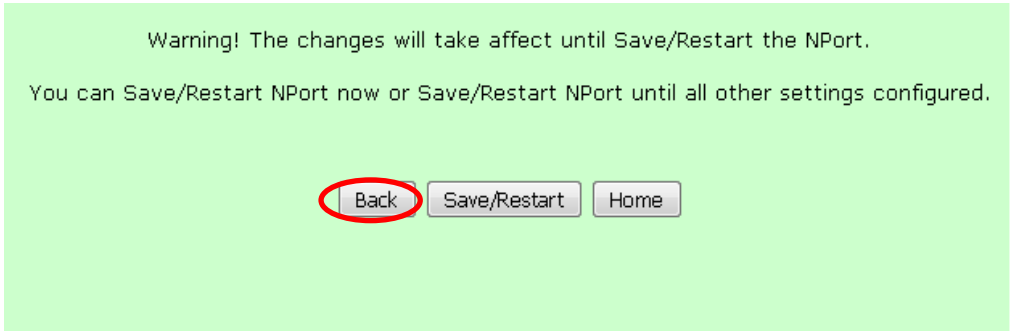
1. Connect MOXA and laptop vial Ethernet Patch Cable.
2. Check for IP address that is printed on the back of the MOXA-switch or stated in the belonging manual.
3. Set the IP address of the used laptop as follows:
    1. Put the first three blocks to the same as the MOXA switch.
    2. For the last block choose a number with a big difference to the one of the MOXA-switch.
4. Open a web browser and go to http://IP_address from the back of the MOXA switch.
5. Website welcome to NPort's is displayed.



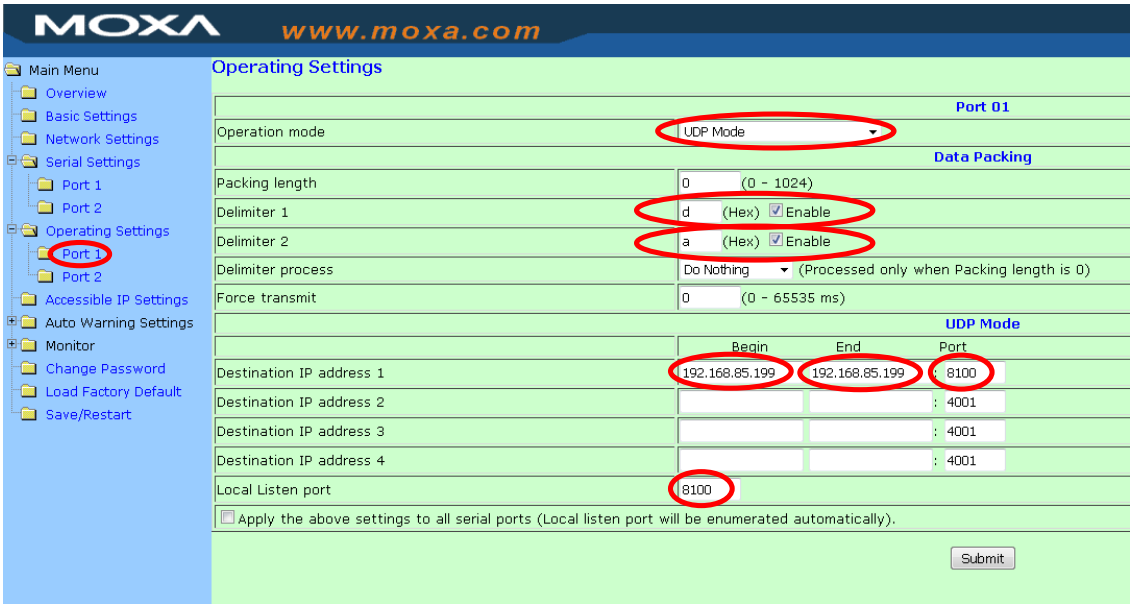
6. Click on **Network Settings** and edit settings.



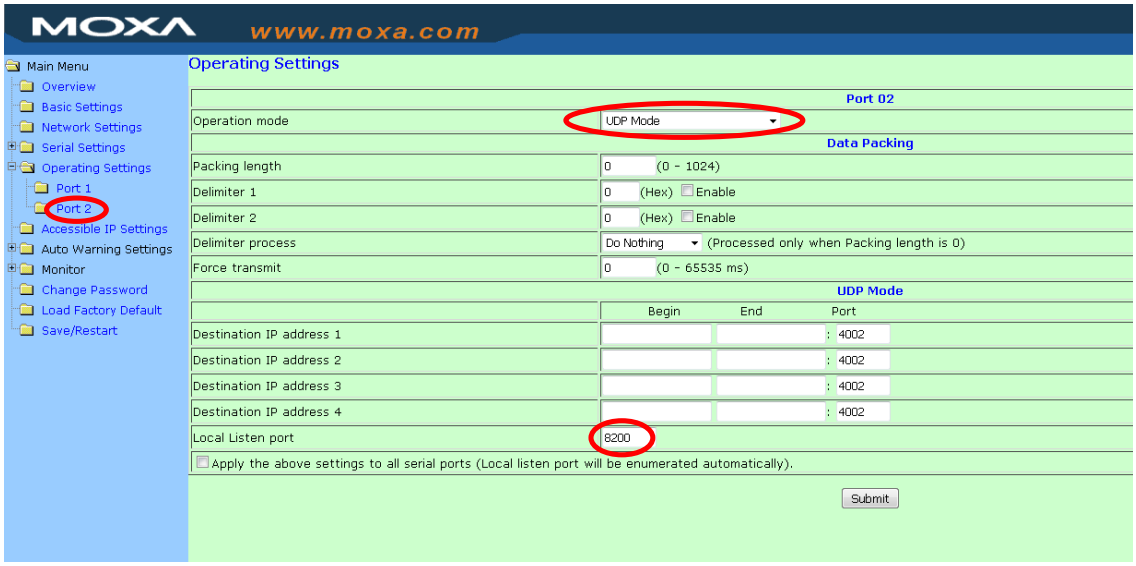
7. Delete the old IP address. Then type in the new IP address which is selected at the PilotStar® NX for **Alert Mgr. UDP** (e.g. 192.168.85.185).
8. Finish settings with **Submit** button.
   - Submit page is displayed.
9. Click on Back button and continue with the next step.



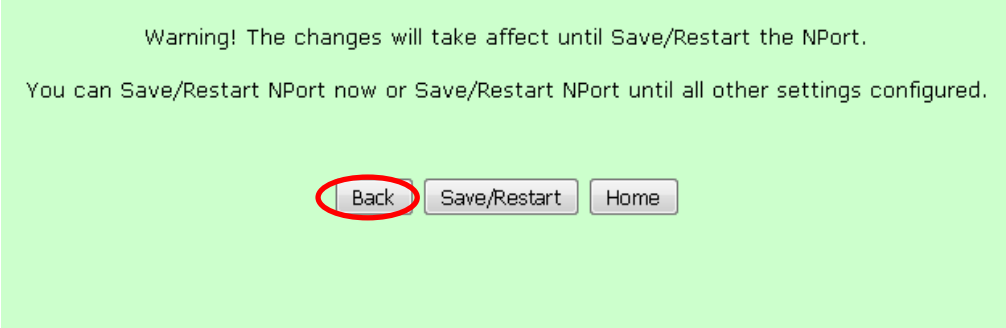
10. Click on **Operating Settings/ Port 1** and edit settings.



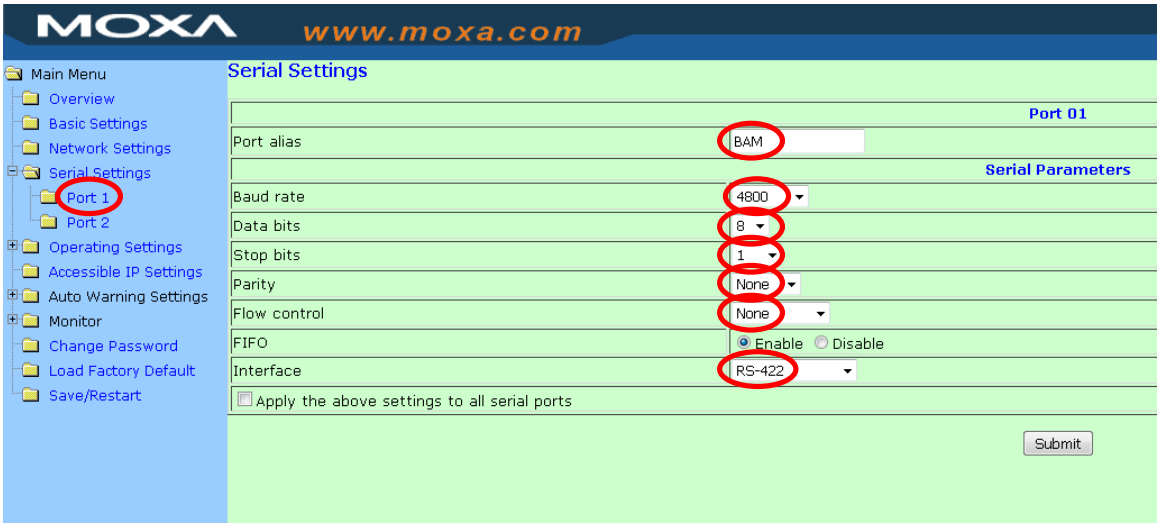
11. Set **Operation mode** to **UDP Mode**.
    Set **Delimiter 1** to **d** and enable checkbox.
    Set **Delimiter 2** to **a** and enable checkbox.
    Set **Destination IP Address 1 Begin** to the Local IP-Addr. (The master autopilot IP address, e.g. 192.168.85.199).
12. a) Remain default value for Master Autopilot only.
13. b) Refer to section xx for Master-Slave-Configuration.
14. Set **Destination IP Address 1 End** to the same IP address as set as **Destination IP Address 1 Begin**.
15. Set **Local Listen Port** to port from autopilot-setting **Alert Mgr. UDP** (e.g. 8100).
16. Finish settings with **Submit** button.
    - Submit page is displayed.
17. Click on **Serial Settings / Port 1** and edit settings.
18. Click on **Operating Settings / Port 2** and edit settings.



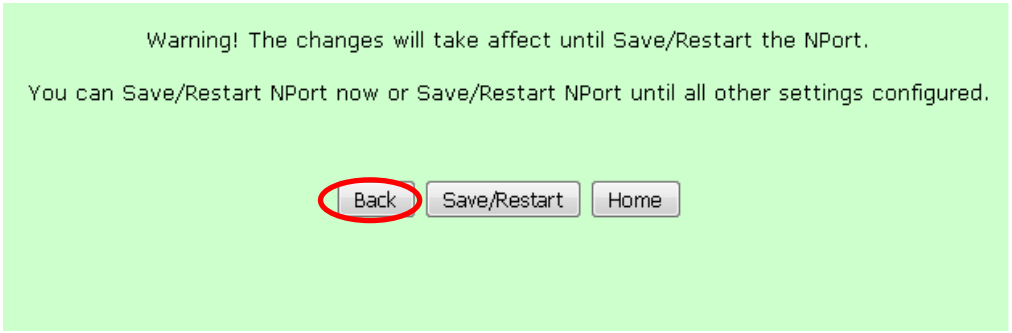
19. Set **Operation mode** to **UDP Mode.**
20. Set **Local Listen Port** to port from autopilot-setting **BNWAS Mgr. UDP** (e.g. 8200)**.**
21. Finish settings with **Submit** button.
    - Submit page is displayed.
22. Click on **Back** button and continue with the next step.



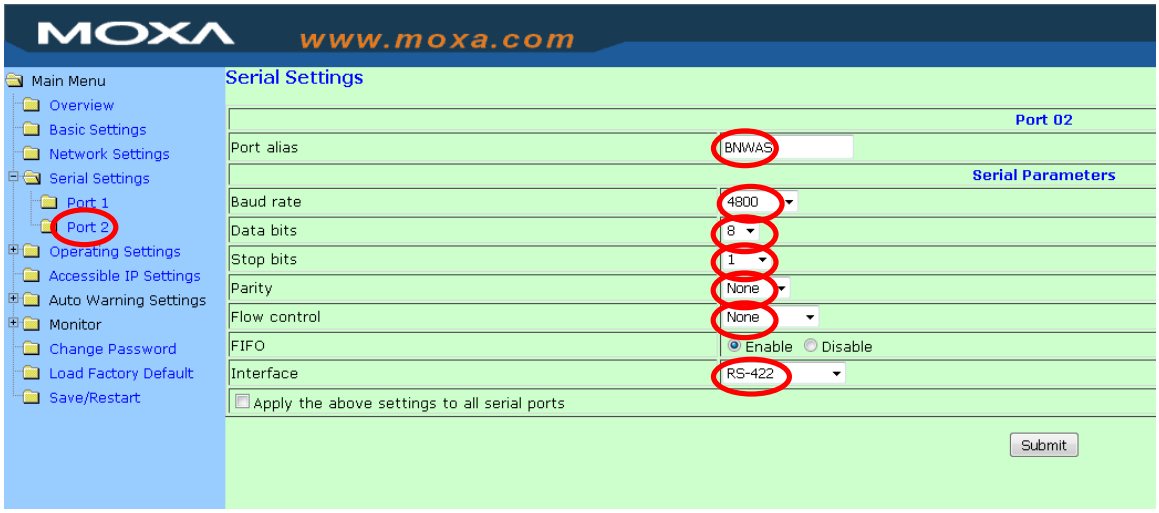
23. Click on **Serial Settings / Port 1** and edit settings.



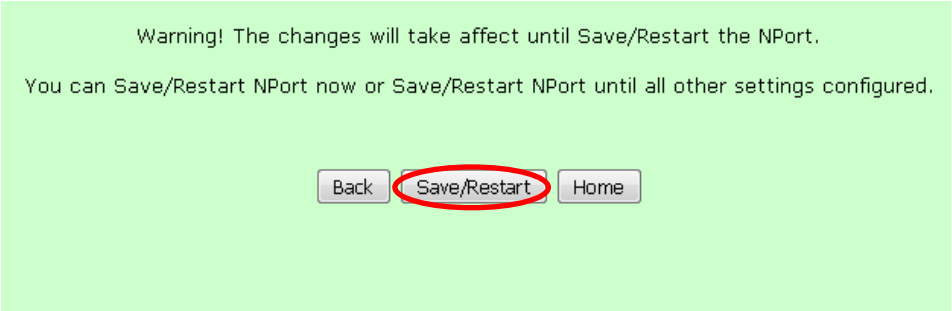
24. Set **Port alias** to preferred alias, e.g. **BAM**.
25. Set **Baud rate** to **4800** or system's specific value.
26. Set **Data bits** to **8** or system's specific value.
27. Set **Stop bits** to **1** or system's specific value.
28. Set **Parity** to **none**.
29. Set **Flow control** to **none**.
30. Set **Interface** to **RS-422** or enter system's specific value.
31. Finish settings with **Submit** button.
    - Submit page is displayed.
32. Click on **Back** button and continue with the next step.



33. Click on **Serial Settings/ Port 2** and edit settings.



34. Set **Port alias** to preferred alias, e.g. **BAM**.
35. Set **Baud rate** to **4800** or system's specific value.
36. Set **Data bits** to **8** or system's specific value.
37. Set **Stop bits** to **1** or system's specific value.
38. Set **Parity** to **none**.
39. Set **Flow control** to **none**.
40. Set **Interface** to **RS-422** or enter system's specific value.
41. Finish settings with **Submit** button.
    - Submit page is displayed.



42. Click on **Save/Restart** button.
43. Set the IP address of the used laptop as follows:
    1. Repeat the first three blocks of the IP address changed in step 7.
    2. For the last block choose a number with a big difference to the one which is set in step 7.
44. Open a web browser and enter the IP address of the PilotStar® NX, which was set in step 7.

Press **F5** on the keyboard. After website **welcome to NPort's** is displayed, it is possible to check all settings.

6 Fault Finding

6.1 Faults

6.1.1 Alert Messages

Alert messages that are unacknowledged but still active are escalated. Based on priority and category, the following escalations are possible:

- The alert is repeated
- The alert is escalated as an alarm
- The alert is escalated as an alarm and transferred to BNWAS (if available)

For more information see the Alert List in chapter 9 Annex.

The PilotStar® NX poses as the backup for the CAM display as defined in IEC 62923-1. PilotStar® NX is not able to silence alerts. Silencing is only possible with CAM.

The PilotStar® NX supports the responsibility take over functionality as defined in IEC 62923-1.
The display of incoming alerts is delayed by 4 seconds in order to allow responsibility transfer before activating optical and acoustical signals.
The PilotStar® NX accepts responsibility transfer from external systems using the alert communication as defined in IEC 62923-1 for category B alerts. The responsibility of category A alerts cannot be transferred to external systems.
The PilotStar® NX itself does not request responsibility from external systems.

	PSIF related alert messages are displayed with “PSIF” add-on. For explanation of PSIF related alert messages, see PSIF manual. All PSIF related alerts are from category B.

	Not acknowledged warnings will be repeated after a given period of time. They might be related as warning again or as an alarm (see table in the annex).

	User related alert messages are displayed with “USER” add-on. User related messages are caused by wrong operation / data input.

	A list of alert messages not designated as user alert messages (for those, see Table 6-1) is displayed in the annex.

Table 6-1 User Alert Messages

Message Text	Alert Category	Possible Cause	Remedy
USER: SOFTWAREINSTAL. SKIPPED: Exx.xx	B	During software update from USB stick a software version was found, which was already available on the device.	Software version can be selected within service menu, see chapter 5.3.7.10.
USER: HEADING MONITOR IS DISABLED	B	Heading monitor cannot be changed within **Limits** operator display page.	Activate heading monitor function within service menu, see chapter 5.3.7.47.
USER: ERROR ADJUSTING RUDDER	B	Rudder feedback within service menu (Steering Components / PSIF) could not be configurated.	• Try again. • Configure rudder feedback within PSIF device.
USER: UNPLAUSIBLE SET HEADING CHANGE	B	Entry of set heading could not be detected.	Enter Set Heading again.

Message Text	Alert Category	Possible Cause	Remedy
USER: NO VAILD LICENCE	B	Try to switch to local NFU/FU, but no valid license for device found.	Contact Raytheon Anschütz service.
USER: NO VAILD LICENCE	B	Try to switch to waypoint steering, but no valid license for device found.	Contact Raytheon Anschütz service.
USER: NO VAILD LICENCE	B	Try to switch to HDG Control, but no valid license for device found.	Contact Raytheon Anschütz service.
USER: LOW HEADING INTEGRITY	B	Try wo switch to waypoint steering, but the heading sensor integrity check has not been past.	Check heading sensor system.
USER: NO GYRO SELECTED	B	Attempt to start waypoint steering, but magnetic compass is selected.	• Check heading source. • Select gyro compass source, see chapter 4.4.8.
USER: NO SPEED	B	No speed data available	• Select seed source, see chapter 4.4.7. • Check function of respective sensor. • Select manual speed, if no sensor available.

Message Text	Alert Category	Possible Cause	Remedy
USER: SPEED TO SLOW	B	Attempt to start waypoint steering, but selected speed is below low speed threshold.	Increase speed of ship.
USER: AP IS NOT ACTIVE SWITCH TO HDG CTRL	B	Attempt to start waypoint steering, but autopilot is not active.	Switch to heading control.
USER: NO TRACK COURSE	B	Waypoint steering is activated, but no data from a route planning system available.	• Check function of respective route planning system. • Check connection of respective route planning system.
USER: NO XTE	B	Attempt to switch to waypoint steering, but there is no valid cross track error.	• Check function of respective route planning system. • Check connection of respective route planning system.
USER: XTE GREATER THAN 1 NM	B	Ship is located out of track limit.	• Adjust new track limit, see chapter 4.4.6. • Check steering system and steering parameter.
USER: HDG MUST BE WITHIN 60DEG OF RTE LEG BEARING	B	Attempt to switch to waypoint steering, but actual heading is more than 60 ° away from current waypoint.	Orient ship according to current waypoint.

Message Text	Alert Category	Possible Cause	Remedy
USER: TRACK CONTROLLER NOT AVAILABLE	B	Attempt to switch to waypoint steering, but data set no complete.	Check function of route planning system.
USER: POWER FAILURE	B	Autopilot could not be started because of a power failure.	• Check LED indication, see Chapter 1.8.2. • Contact Raytheon Anschütz Service.
USER: NO HEADING	B	Attempt to switch to waypoint steering, but no valid heading found.	Check heading sensor system.
USER: HEADING CONTROLLER NOT AVAILABLE	B	Attempt to switch to waypoint steering, but data set no complete. try to switch to Heading Control,	Check heading sensor system
USER: DEVICE ACTIVATION NOT POSSIBLE	B	Try to start autopilot, but external system interrupts.	Check if autopilot is selected with steering mode selector switch (is part of bridge installation).
USER: UPDATE CLIENT SOFTWARE	B	After successful installation of new software version on master unit, software version is spread out to all slave units.	No action necessary.

6.1.2 Further Faults

Table 6-2 Further Faults

Fault	Possible Cause	Remedy
Operator unit does not start	Fuse is broken.	Change fuse, see chapter 6.2.
Operator unit does not react on input .	Display, operating element or LEDs is defective; Start display test to be sure, see chapter 6.3.	Contact Raytheon Anschütz service.
One or more of the LEDs P1 - P9 do not work.	Electrical fault within operator unit	Contact Raytheon Anschütz service.
Controller performance insufficient, although parameter was configured.	Wrong frequency	Check if heading value was sent with at least 10 Hz.
System Failure	• Voltage supply interrupted • Necessary data not available • User interface not accessible	• Check fuse and voltage supply • Check alert messages • Contact Raytheon Anschütz Service

6.2 Change Fuse

Precondition: Voltage supply is disconnected.

1. Use screw driver to open fuse holder.
2. Replace broken fuse, see spare parts catalogue.
3. Close fuse holder.

6.3 Start Display Test

Purpose: Test the function of display, LEDs and operator elements.
Precondition: Any inactive mode runs.

4. Press **Set** and **Dim** for 4 sec.
   - Display test starts.
5. Follow the instructions on the display within the shown time window.
6. Press Set to stop the display test at any time.
   - Display shows previous display page.

Result: Contact Raytheon Anschütz service if any tested component failed the test.

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7 Documentation of Settings

Table 7-1 Documentation of User Settings

PilotStar® NX Settings / Ship Data		
Parameter	Default	User Settings
Shipname		
IMO no.		
Length	100	
No. of Rudder	1	
Rudder Type	Normal	
Order Code		
Instance Number	1	
Day Color	Day1	
Night Color	Night1	
Software Archive		
Software Action	none	
Service Menu enabled	Inactive	
Serial 1	nmea4800bd	
Serial 2	nmea4800bd	
Serial 3	bam38400bd	
Can Group	0	
Can- Dev. Nb.	0	
CAN ID	0	
CAN Nav.Data enabled	Active	
Alert Mgr. UDP	192.168.85.185:8100	
Alert Mgr. Type	INS	
BNWAS Mgr. UDP	192.168.85.185:8200	
PSIFs	1	

PilotStar® NX Settings / Ship Data		
Parameter	Default	User Settings
CAN Central Dimming	Inactive	
DDC Central Dimming	Inactive	
INS	Inactive	
Turn headings 180deg	Inactive	
MISC	Inactive	
TGTD	Inactive	
SATD	Inactive	
NAVD	Inactive	
VDRD	Inactive	
RCOM	Inactive	
TIME	Inactive	
PROP	Inactive	
USR1	Inactive	
USR2	Inactive	
USR3	Inactive	
USR4	Inactive	
USR5	Inactive	
USR6	Inactive	
USR7	Inactive	
USR8	Inactive	
Outgoing transm. grp.	NAVD	
Rudder Gain [%]	100	
max. Rudder Angle	35	
Heading Monitor	Active	
Heading Grad. Control	Active	
HDG Grad. [deg/s]	12	

PilotStar® NX Settings / Ship Data		
Parameter	Default	User Settings
Set Rudder limited	Active	
High Speed Craft	Active	
SW-Key	xxxx-xxxx-xxxxx-xxxx	
Low Speed	3	
Eff.Ship Length	100	
Back up Nav. Alarm	Active	
Developer Key		
Server-IP address	127.0.0.1	
Input Beep enabled	Active	
Rear Steering Stand	Inactive	
Steering Location	0: Standalone	
Client-IP address	192.168.85.1	
Client-Subnet	255.255.255.0	

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8 Disposal

The PilotStar® NX Operator Unit or components of it can be disposed according to the respective national regulations for electronic waste without harmful material according to 2002/96 EC WEEE (Waste Electrical and Electronically Equipment).

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9 Annex

9.1 Telegram Definitions

PANZRSA Telegram

PANZRSA is a Raytheon Anschütz specific NMEA telegram.

```
$PANZRSA,x.x,A,x.x,A,x.x,x.x*hh<CR><LF>
  |    |   |   | | |   |   |    |
  A    B   C   D E F   G   H    J
```

Pos.	Designation	Description
A	Private identifier	PANZ = propriety Anschütz
B	Sentence name	RSA = Rudder Sensor Angle
C	Starboard or single rudder sensor	x.x
D	Status	A = valid; V = invalid
E	Port rudder sensor	x.x
F	Status	A = valid; V = invalid
G	Starboard or single rudder order	x.x
H	Port rudder order	x.x
I	ChkSum	*hh<CR><LF>

* The number of digits behind the decimal point can be variable.

PANZSTA Telegram

PANZSTA is a Raytheon Anschütz specific NMEA telegram.

```
$PANZSTA,A,c,A,c,c,A,A,cccccccc,x.x*hh<CR> <LF>
   |   |   |  |  |  |  |  |  |     |       |
   A   B   C  D  E  F  G  H  I     J       K
```

Pos.	Designation	Description
A	Private identifier	PANZ = propriety Anschütz
B	Sentence name	STA = Status autopilot
C	Status	A = autopilot ready, V = autopilot not ready
D	Control mode	H = manual C = heading control D = course control T = track control O = override E = external heading control (currently not used)
E	Status	A = change manoeuvre running, V = change manoeuvre not running
F	Mode	P = precision, E = economy (only adaptive mode)
G	Request	A = request for waypoint, V = successful transmission
H	Status	A = waypoint transmission permitted V = waypoints are not accepted
I	Status	A = check waypoints V = no check, check finished (only NP5500)
J	Version	Used version of Track Control Standard 62065ED1 = IEC62065:2002 62065ED2 = IEC62065:2014
K	Distance	Distance between WOP and Waypoint for TO- Waypoint in meters

* The number of digits behind the decimal point can be variable.

9.2 Alerts

9.2.1 Alert List

Note
PSIF related alert messages are displayed with PSIF add-on. For explanation of PSIF related alert messages, see *PilotStar® Interface Unit PSIF* (chapter 0.4). All PSIF related alerts are from category B.

Tab. 11: Alerts HDG Control

Alert Title **Alert Description**	**Category** **Priority**	**Escalation**	**Possible Cause**	**Remedy**
HCS STOPPED POWER FAILURE: CHECK POWER SUPPLY	Alarm B	none	Power supply of the operator unit is outside of tolerable limits.	Use manual steering. Check supply voltage. Reset operator unit. Replace Operator unit.
SIM SENSOR DATA SIMULATED SENSOR DATA IN USE: CHECK SENSORS	Alarm B	none	Sensor data received which is tagged as simulated.	Check connected sensors, use manual steering.
ACT. OU FAIL CHECK AP OPERATOR UNIT	Warning B	none	Active Operator reports a failure	Use manual steering, check Operator unit
GYRO-MAG DIFF HDG DIFFERENCE DETECTED: CHECK HDG SENSORS	Warning B	as Warning	Heading monitor has detected a difference between two heading sources. The operator adjusted off heading limit was exceeded.	Check heading sensors.
HDG JUMPED CHECK ACTUAL AND SET HEADING	Warning B	as Warning	A jump in the heading data was detected.	Check set heading, check heading sensors.

Alert Title Alert Description	Category Priority	Escalation	Possible Cause	Remedy
LOW SPEED CTRL ACCURACY LIMITED: USE MANUAL STEERING	Warning B	as Warning	Current speed is below adjusted low speed limit. Control accuracy is degraded.	Increase speed, use manual steering.
MAG FAILED BACK UP HDG SENSOR FAILED: CHECK SENSOR	Warning B	as Warning	Backup magnetic heading sensor failed.	Check magnetic heading sensor.
MAG HDG SEL. MAGNETIC HEADING USED FOR HEADING CONTROL	Warning B	as Warning	Magnetic heading sensor selected for heading control.	
NO VALID SPD SWITCH TO VALID SPEED SOURCE	Warning B	as Warning	No valid speed available.	
OFF HEADING DEVIATED FROM SET HEADING: TAKE HELM	Warning A	as Alarm to BNWAS	Offset between actual and set heading exceeds operator adjusted off heading limit.	Check surroundings, use manual steering, check rudder limit, check steering system
POS VALID POS AVAILABLE: SWITCH TO VALID POSITION	Warning B	as Warning	Valid position available.	Select the position sensor
RUDDER LIMIT RUDDER LIMIT REACHED	Warning B	as Warning	Rudder reached the operator adjusted rudder limit.	
SET HDG REFUSED COMMANDED SET HDG GREATER 270°: PLEASE REPEAT INPUT	Warning B	as Warning	Operator tried to input a course change > 270°	Repeat input, max. adjustable set heading difference is 270°
SPD IS VALID VALID SPEED AVAILABLE: SWITCH SPD SOURCE	Warning B	as Warning	Valid speed available	Select the speed sensor.

Alert Title Alert Description	Category Priority	Escalation	Possible Cause	Remedy
SPEED JUMPED SPEED JUMP DETECTED: CHECK SPEED SENSOR	Warning B	as Warning	Speed jump detected.	Check speed sensors.
ACT. FAIL DEVICE ACTIVATION NOT POSSIBLE	Caution B	none	Heading control not activated, No rudder control was transferred to Autopilot	Check steering system.
BACKUP GYRO FAIL NO BACKUP GYRO AVAILABLE	Caution B	none	A backup gyro sensor has reported an error.	Check backup gyro sensor.
CHECK LIMITS CHECK RUDDER/ROT/RAD LIMITS	Caution B	none	NAV Control was interrupted.	The operator shall check the limits for RAD/ROT and Rudder limits. Those might have changed by the TCS.
HCS UNAVAIL. NO HEADING: CHECK HEADING	Caution B		Autopilot in standby, but no heading data available. Heading control cannot be activated.	Check Heading sensors.
HCS UNAVAIL. POWER FAILURE: CHECK POWER SUPPLY	Caution B	none	Power supply of the opertor unit is outside of tolerable limits, the device is in standby mode	Check power supply.
HCS UNAVAIL. PSIF: AUTOPILOT ACTIVATION FAILED	Caution B		AP was not activated.	
HCS UNAVAIL. CANNOT ACTIVATE HCS: USE MANUAL STEERING	Caution B		Unexpected behaviour in case of giveover of rudder control by steering system. Heading control not activated.	

Alert Title Alert Description	Category Priority	Escalation	Possible Cause	Remedy
HDG CHANGE SENSOR USED FOR CONTROL FUNCTION CHANGED	Caution B	none	Automatic change of selected heading sensor.	
HDG DOUBTFUL FUNCTION NOT ACTIVATABLE	Caution B	none		
HDG MON DIS. HEADING MONITOR DISABLED	Caution B	none		
HDG UNCORR. CHECK HEADING CORRECTION	Caution B	none	Gyro reports uncorrected heading information.	Check Gyro
LOW SPEED CTRL ACCURACY LIMITED	Caution B	none		
MAG FAILED BACK UP HDG SENSOR FAILED: CHECK SENSOR	Caution B	none	Magnetic compass connected to AP failed.	Check magnetic compass.
NO BACKUP GYRO NO BACKUP GYRO AVAILABLE	Caution B	none	Backup gyro reports failure.	Check backup gyro
NO RUD. CTRL NO RUDDER CTRL ON CAN: USE MANUAL STEERING	Caution B		Take over of rudder control not successful.	Check steering system.
NO SET HDG SET HDG REJECTED: ENTER NEW SET HEADING	Caution B	none	Error during set heading adjustment	Repeat set heading adjustment
NOT SPD ADAPTIVE NO SPEED: CHECK SPEED SENSOR	Caution B	none	No speed sensor data available. Autopilot will not adapt to speed changes.	Check speed sensors.

Alert Title Alert Description	Category Priority	Escalation	Possible Cause	Remedy
OU CHANGE ACTIVE OPERATOR UNIT CHANGED	Caution B	none	Another OU was activated and is now the active OU.	
POS CHANGED POSITION SENSOR CHANGED	Caution B	as Warning		
POS INVALID SWITCH TO VALID POS SOURCE	Caution B	none	Selected Position sensor sends no or invalid data.	Select valid position sensor, check position sensor
REM. OU FAIL CHECK REMOTE OPERATOR UNITS	Caution B	none	An additional OU has reported an error.	Check remote operator units.
SPD CHANGED SPEED SENSOR CHANGED	Caution B	none	Selected speed sensor was changed automatically.	

Tab. 12: Alerts NAV Control

Alert Title Alert Description	Category Priority	Escalation	Possible Cause	Remedy
NO SPEED TURN RADIUS MAY NOT MATCH	Alarm B	to BNWAS	No speed information during Track control. May result in less accurate control, especially during turns.	Check speed sensors, adjust manual speed.
TCS STOPPED NO HEADING: USE MANUAL STEERING	Alarm B	to BNWAS	Track control stopped due to missing heading information, HDG control is active as fallback but rudder is frozen.	Use manual steering, check heading sensors
XTE EXCEEDED OFF TRACK CROSS TRACK LIMIT EXCEEDED: nonexm	Alarm A	none	Ship is outside of adjusted limits around the current leg.	Check surroundings, use manual steering
POS INVALID SWITCH TO VALID POSITION SOURCE	Warning B	as Warning	No valid position available.	

Alert Title Alert Description	Category Priority	Escalation	Possible Cause	Remedy
TCS STOPPED HDG INTEGRITY: CHECK HEADING SENSORS	Warning B	none	Track control stopped due to doubtful heading information. Selected HDG differs from reference sensors or only one HDG sensor is available	Check heading sensors, use HDG Control or manual steering
TCS STOPPED POWER FAILURE: CHECK POWER SUPPLY	Warning B	as Warning	OU Power failure detected while in Track control	Check power supply.
TCS STOPPED INVALID INFORMATION FROM ECDIS: CHECK ECDIS	Warning B	as Alarm to BNWAS	ECDIS Status is missing.	Check connection to ECDIS
TCS STOPPED NO SET COURSE: CHECK SET COURSE FROM ECDIS	Warning B	as Alarm to BNWAS	Track control interrupted, no leg course received from ECDIS.	Check ECDIS
TCS STOPPED NO POSITION: CHECK POSITION SENSOR	Warning B	as Alarm to BNWAS	Track control stopped, no position data available.	Check position sensors.
TCS STOPPED NO XTE: CHECK CROSS TRACK ERROR FROM ECDIS	Warning B	as Alarm to BNWAS	Track control interrupted, no cross track error received from ECDIS.	Check ECDIS
TCS STOPPED POSITION JUMP: CHECK POSITION	Warning B	as Alarm to BNWAS	Track control interrupted, position jump detected.	Check position sensors
TCS STOPPED MAG HDG SELECTED: SELECT GYRO HEADING	Warning B	as Alarm to BNWAS	Track control interrupted, magnetic heading source selected.	Select gyro heading source.

Alert Title Alert Description	Category Priority	Escalation	Possible Cause	Remedy
TRCK-CRS-HDG.DIFF TAKE HELM TO KEEP COURSE STEADY	Warning A	as Warning	Difference between actual heading and leg course exceeds operator adjusted off course limit.	Check surroundings, high drift or other disturbances present.
AP NOT ACTIVE AUTOPILOT NOT ACTIVE: ACTIVATE HDG CONTROL	Caution B	none	Heading control has to be active to activate Track control	Activate Heading control
APPROACH WP APPROACHING NEW WAYPOINT	Caution B	none		
GYRO NOT SEL NO TCS OR CC WITH MAG: SELECT GYRO HEADING	Caution B	none	TCS may not be used in when a magentic heading source is selected	Select Gyro compass as heading source
NEW TRACK NEW TRACK 000°	Caution B	none	Track change maneuver is complete.	none necessary.
NO TRACK CRS CHECK CONNECTION TO ECDIS	Caution B	none		
NO TRC DATA CHECK CONNECTION TO ECDIS	Caution B	none		
NOT SPD ADAPTIVE NO SPEED: CHECK SPEED SENSOR	Caution B	none	Activation of Track or Course control while no speed is avaiable - activation not possible.	
POWER FAIL. CHECK POWER SUPPLY	Caution B	none		
TCS NOT ACTIVAT. ACTIVATE TRACK CONTROL ON ECDIS	Caution B	none	Attempted to activate Track at the Operator unit.	Track control mode can only be activated at ECDIS

Alert Title Alert Description	Category Priority	Escalation	Possible Cause	Remedy
TCS UNAVAIL. NO POSITION: CHECK POSITION	Caution B	none	No position data available, AP is not in track control. Track control cannot be activated.	Check position sensors.
XTE MISSING CHECK CONNECTION TO ECDIS	Caution B	none		
XTE TO LARGE XTE GREATER THAN 000NM	Caution B	none	Activation of track control from ECDIS, XTE is greater than 1 nautical mile	

Tab. 13: Alerts PSIF

Alert Title Alert Description	Category Priority	Escalation	Possible Cause	Remedy
OVERRIDE PSIF: EXTERNAL AUTOPILOT OVERRIDE	Alarm B	none	External override is triggered.	
RUD. STOPPED PSIF NO ACTUAL RUDDER: USE MANUAL STEERING	Alarm B	none	Missing rudder feedback information from CAN. Rudder is frozen.	Check PSIF Manual, use manual steering.
RUD. STOPPED. PSIF ANALOG FEEDBACK: USE MANUAL STEERING	Alarm B	none	Missing analog rudder feedback. Rudder is frozen.	Check PSIF Manual, use manual steering.
RUD. STOPPED PSIF CONFIG FAILED: USE MANUAL STEERING	Alarm B	none	PSIF Configuration corrupted. PSIF SYS FAIL and Rudder is frozen.	Check PSIF Manual, use manual steering.
RUD. STOPPED PSIF SET RUDDER FAIL: USE MANUAL STEERING	Alarm B	none	PSIF has not received a valid Set rudder. Rudder is frozen.	Check PSIF Manual, use manual steering.

Alert Title Alert Description	Category Priority	Escalation	Possible Cause	Remedy
PSIF RESTART PSIF SOFTWARE RESTART: CHECK PSIF	Warning B	none	PSIF was restarted by internal watchdog.	Check PSIF Manual.
RUD. STOPPED PSIF CAN BUS FAILURE: USE MANUAL STEERING	Warning B	as Warning	No CAN-connection between PSIF and Feeback Unit. Rudder is frozen.	Check PSIF Manual, use manual steering.
STEER. FAIL. PSIF STEERING FAILURE: USE MANUAL STEERING	Warning B	none	PSIF has detected a difference between set and actual rudder exceeding the configured limit. Should occur only if PSIF is controling the rudder.	Check PSIF Manual, use manual steering.
SYSTEM FAIL. PSIF DA CONVERTER FAIL: USE MANUAL STEERING	Warning B	none	D/A-Failure detected during self-test or signal fault discovered.	Check PSIF Manual, use manual steering.
SYSTEM FAIL. PSIF FRAM FAIL: USE MANUAL STEERING	Warning B	none	PSIF FRAM not accessable. PSIF SYS FAIL. Rudder is frozen.	Check PSIF Manual, use manual steering.
SYSTEM FAIL. PSIF POWER FAILURE: USE MANUAL STEERING	Warning B	none	PSIF Power failure. PSIF SYS FAIL.	Check PSIF Manual, use manual steering.
CAN 1 FAIL PSIF: USING BACKUP CAN2: CHECK WIRING	Caution B	none	Communication error using CAN1, only CAN2 as backup available.	Check CAN connection.
CAN 2 FAIL PSIF: USING BACKUP CAN1: CHECK WIRING	Caution B	none	Communication error using CAN2, only CAN1 as backup available.	Check CAN connection.

Alert Title Alert Description	Category Priority	Escalation	Possible Cause	Remedy
GYRO FAILED PSIF GYRO HEADING FAILED: CHECK HDG SENSOR	Caution B	none	Gyro connected at PSIF failed.	Check Gyro connected to PSIF.
GYRO FAILED PSIF GYRO: SELECT OTHER HEADING SENSOR	Caution B	none	Gyro connected at PSIF failed.	Check Gyro connected to PSIF.
HCS UNAVAIL. PSIF FAILURE: CHECK PSIF	Caution B	none	PSIF is not responding, AP is in standby.	Check PSIF.
MAG FAIL. PSIF: CHECK MAGNETIC HEADING SENSOR	Caution B	none	Magnetic compass connected to PSIF failed.	Check magnetic compass connected to PSIF.
POS FAILED PSIF: CHECK POSITION SENSOR	Caution B	none	Position sensor connected to PSIF failed.	Check position sensor connected to PSIF.
SPD FAILED PSIF SPEED SENSOR FAILED: CHECK SPEED SENSOR	Caution B	none	Speed sensor connected to PSIF failed.	Check speed sensor connected to PSIF.

9.2.2 Alert IDs and Instances

Tab. 14: List of all Alert IDs and Instances

Alert ID	Alert Instance	Alert Title	Alert Description
3012	76	GYRO-MAG DIFF	HDG DIFFERENCE DETECTED: CHECK HDG SENSORS
3014	10	NO SPEED	TURN RADIUS MAY NOT MATCH
3014	4	TCS STOPPED	NO HEADING: USE MANUAL STEERING
3024	15	XTE EXCEEDED	OFF TRACK CROSS TRACK LIMIT EXCEEDED: xxxxm

Alert ID	Alert Instance	Alert Title	Alert Description
3059	169	HCS UNAVAIL.	NO HEADING: CHECK HEADING
3065	65	LOW SPEED	CTRL ACCURACY LIMITED: USE MANUAL STEERING
3156	157	NOT SPD ADAPTIVE	NO SPEED: CHECK SPEED SENSOR
18015	79	NO VALID SPD	SWITCH TO VALID SPEED SOURCE
18018	78	SPD IS VALID	VALID SPEED AVAILABLE: SWITCH SPD SOURCE
18032	79	POS VALID	POS AVAILABLE: SWITCH TO VALID POSITION
18078	78	POS INVALID	SWITCH TO VALID POSITION SOURCE
20008	59	HDG JUMPED	CHECK ACTUAL AND SET HEADING
20012	60	SPEED JUMPED	SPEED JUMP DETECTED: CHECK SPEED SENSOR
20015	61	SPD CHANGED	SPEED SENSOR CHANGED
20017	17	ACT. OU FAIL	CHECK AP OPERATOR UNIT
20018	80	MAG HDG SEL.	MAGNETIC HEADING USED FOR HEADING CONTROL
20022	81	BACKUP GYRO FAIL	NO BACKUP GYRO AVAILABLE
20027	16	SIM SENSOR DATA	SIMULATED SENSOR DATA IN USE: CHECK SENSORS
20055	97	RUDDER LIMIT	RUDDER LIMIT REACHED
20062	62	POS CHANGED	POSITION SENSOR CHANGED
20062	214	SET HDG REFUSED	COMMANDED SET HDG GREATER 270°: PLEASE REPEAT INPUT
20082	82	MAG FAILED	BACK UP HDG SENSOR FAILED: CHECK SENSOR
20098	98	SW INSTALL ERROR	SOFTWARE INSTALLATION ERROR PACKAGE E00.00
20103	183	NO SET HDG	SET HDG REJECTED: ENTER NEW SET HEADING

Alert ID	Alert Instance	Alert Title	Alert Description
20103	188	POS INVALID	SWITCH TO VALID POS SOURCE
20103	191	ACT. FAIL	DEVICE ACTIVATION NOT POSSIBLE
20103	193	NOT SPD ADAPTIVE	NO SPEED: CHECK SPEED SENSOR
20103	194	HCS UNAVAIL.	NO HEADING: CHECK HDG SENSORS
20103	195	HDG DOUBTFUL	FUNCTION NOT ACTIVATABLE
20103	198	NO TRC DATA	CHECK CONNECTION TO ECDIS
20103	201	HDG MON DIS.	HEADING MONITOR DISABLED
20103	202	POWER FAIL.	CHECK POWER SUPPLY
20109	109	OU CHANGE	ACTIVE OPERATOR UNIT CHANGED
20113	103	BACK. POS CHNG	BACKUP POSTION SENSOR CHANGED
20119	102	HDG UNCORR.	CHECK HEADING CORRECTION
20123	101	HDG CHANGE	SENSOR USED FOR CONTROL FUNCTION CHANGED
20126	111	SOFTWARE COPIED	SOFTWARE SUCCESSFULLY COPIED E00.00
20129	112	SW INST SKIPPED	SOFTWARE INSTALLATION SKIPPED
20143	158	MAG FAILED	BACK UP HDG SENSOR FAILED: CHECK SENSOR
20156	156	NO BACKUP GYRO	NO BACKUP GYRO AVAILABLE
20159	159	LOW SPEED	CTRL ACCURACY MAY BE LIMITED
20169	179	MAN.CAUT.TEST	MANUAL CAUTION TEST 000° SECOND LINE
3008, 3007	35, 144	TCS STOPPED	MAG HDG SELECTED: SELECT GYRO HEADING
3021 (HC)	1	HCS STOPPED	POWER FAILURE: CHECK POWER SUPPLY

Alert ID	Alert In-stance	Alert Title	Alert Description
3022 (TC)	177	TCS STOPPED	POWER FAILURE: CHECK POWER SUPPLY
3023 (Standby)	178	HCS UNAVAIL.	POWER FAILURE: CHECK POWER SUPPLY
3025, 3024	74, 122	OFF HEADING	DEVIATED FROM SET HEADING: TAKE HELM
20162, 20161	32, 175	HCS UNAVAIL.	PSIF: AUTOPILOT ACTIVATION FAILED
20005	57	CHECK LIMITS	CHECK RUDDER/ROT/RAD LIMITS
20092	92	REM. OU FAIL	CHECK REMOTE OPERATOR UNITS
20205, 20204	95, 152	NO RUD. CTRL	NO RUDDER CTRL ON CAN: USE MANUAL STEERING
20208, 20207	96, 153	HCS UNAVAIL.	CANNOT ACTIVATE HCS: USE MANUAL STEERING

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PilotStar® NX Operator Unit

IEC 61162-450 Support

102-820.NG001

Edition: 001
10000001054

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0 Introduction

0.1 Preliminary Remarks

The present manual has been drawn up as a description and reference book.
It will help answer questions and will solve problems in the quickest possible manner.

Before operating the equipment read and follow the instructions and hints in this manual.

For this purpose, refer to the table of contents and read the corresponding chapters thoroughly.
If you have any further questions, please contact us on the following address:

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Since errors can hardly be avoided in the documentation in spite of all efforts, we should appreciate any remark and suggestion.
Subject to alterations.

0.2 Change History

Date	Change
April 2021	First Edition

1 IEC 611162-450 Support

The autopilot PilotStar® NX supports communication compliant to IEC 61162-450.

	No router and repeater hubs are allowed within network compliant to IEC61162-450.

	The device does not provide any repeater hub functions.

	The underlying network for communication compliant to IEC 61162-450 is Ethernet based.

	SFIs are configured at system setup. At runtime it is not possible for the mariner to modify the SFIs of the system.

	The device supports IGMP-2.

1.1 Ethernet Interface Requirements

All interface connections must meet the requirements of IEC 61162-450, IEC 61162-450 Edition 2.0 table 3 (type 100BASE-T).

1.2 Transmission Groups

The autopilot PilotStar® NX has per default the following transmissions groups:

For transmitting:

Transmission Group	Multicast Address	Destination Port	Changeable in
SATD	239.192.0.3	60003	Ethernet Input

For receiving:

Transmission Group	Multicast Address	Destination Port	Changeable in
NAVD	239.192.0.4	60004	Ethernet Output

Table 1-1 Supported Transmission Groups for Alert Management

Transmission Group	Multicast Address	Destination Port	Default Setting
MISC	239.192.0.1	60001	Active
TGTD	239.192.0.2	60002	Active
SATD	239.192.0.3	60003	Active
NAVD	239.192.0.4	60004	Active
VDRD	239.192.0.5	60005	Active
RCOM	239.192.0.6	60006	Active
TIME	239.192.0.7	60007	Active
PROP	239.192.0.8	60008	Active
USR1	239.192.0.9	60009	
USR2	239.192.0.10	60010	
USR3	239.192.0.11	60011	
USR4	239.192.0.12	60012	
USR5	239.192.0.13	60013	
USR6	239.192.0.14	60014	
USR7	239.192.0.15	60015	
USR8	239.192.0.16	60016	
NETA	239.192.0.56	60056	Active

For alert management, the following transmission groups can be activated or deactivated via the service menu page **Interfaces**:

Table 1-2 Transmission Groups for Alert Management

Transmission Group	Multicast Address	Destination Port	Default Setting
BAM1	239.192.0.17	60017	
BAM2	239.192.0.18	60018	
CAM1	239.192.0.19	60019	Active if BAM1 selected
CAM2	239.192.0.20	60020	Active if BAM2 selected

The following settings are preselected or selectable via the service menu page **Interfaces**.

Table 1-3 Default Settings for Transmission Groups

Transmission Group	Transmitting (max. 1 option)	Transmitting BAM (max. 1 option)	Transmitting SRP	Receiving
MISC	Selectable			Selectable
SATD				Preselected
NAVD	Preselected	Preselected		Preselected
TGTD				Selectable
TIME				Selectable
PROP	Selectable			Selectable
USR1 to USR8	Selectable			Selectable
BAM1		Selectable		
BAM2		Selectable		
CAM1				Selectable, preselected if BAM1 is selected for Transmitting BAM
CAM2				Selectable, preselected if BAM2 is selected for Transmitting BAM
NETA			Preselected	Preselected, not alterable

	Multicast addresses and destination ports are not configurable.

1.3 Internal Logging

The internal logging uses an internal logfile which contains internal error messages as well as syslog messages. Each error is listed with its number, a counter, the error code and the error message and is not sent to other devices, see also chapter 5.3.7.44 of the Operator and Service Manual.

Once the maximum number of messages is reached the counter is reset. The counter is also reset once the system is started. The counter is found within the service menu, see chapter 5.3.6.1 of the Operator and Service Manual.

Figure 1-1 Error Counter

1.4 Maximum Input Data Rates

The maximum input rates for the autopilot PilotStar® NX are:

a) Maximum number of datagrams per second received, intended for and processed by the equipment = 30
b) Maximum number of datagrams per second received by, but not intended for the equipment = 50
c) Maximum number of datagrams per second received by, but not intended for the equipment at 50% of the maximum load for item a) = 20

2 Interface Specification

The following telegrams can be sent / received via serial connection or via Ethernet (UDP) or via Ethernet (IEC 61162-450) depending on configuration.

2.1 ACK - Acknowledge Alert

Acknowledge device alert. This sentence is used to acknowledge an alert condition reported by a device.

Input only, cycle on event

```
$--ACK,xxx*hh<CR><LF>
     a    b
```

a) ACK identifier for acknowledge alert
b) Unique alert number (identifier) at alert source

Talker: All

2.2 ACN - Alert Command

This sentence is used for acknowledge, request, mute / silence alerts at the autopilot.

Input only, cycle on event

NP5100-NP5500: Not all sentences are used or transmitted by each Autopilot type. The types are marked if the sentence is applicable for that.

```
$--ACN,hhmmss.ss,aaa,x.x,x.x,c,a*hh<CR><LF>
     a      b      c   d   e  f  g
```

a) ACN identifier for alert command
b) Time
c) Manufacturer mnemonic code
d) Alert identifier
e) Alert instance, 1 to 999999
f) Alert command, A, Q, O or S
g) Sentence status flag

Talker: All

2.3 ALC - Cyclic Alert List

The ALC sentence provides condensed ALF sentence information. It contains the identifying data for each present alert of one certain source / device so that the receiver can understand which ALF has been missed (and retransmission of ALF can be requested by using the ACN sentence). It shall be published cyclically at least every 30 s by each alert generating device. When all alerts are in normal state the cyclic alert list is empty.

Output only, cycle on event and every 30 s

```
$--ALC,xx,xx,xx,x.x,aaa,x.x,x.x,x.x,……..,aaa,x.x,x.x,x.x*hh<CR><LF>
     a   b   c   d   e   f   g   h   i    j    k   l   m    n
```

a) ALC identifier for cyclic alert list
b) Total number of sentences for this message, 01 to 99
c) Sentence number, 01 to 99
d) Sequential message identifier, 00 to 99
e) Number of alert entries
f) Manufacturer mnemonic code alert entry 1
g) Alert identifier alert entry 1
h) Alert instance alert entry 1
i) Revision counter alert entry 1
j) Additional alert entries
k) Alert entry n

Talker: HE

2.4 ALF - Alert Sentence

This sentence is used to report an alert condition and the alert state of a device. An ALF message shall be published for an alert each time the alert information in this sentence changes and on alert request.

Output only, cycle on event

```
$--ALF,x,x,x,hhmmss.ss,a,a,a,aaa,x.x,x.x,x.x,x,c---c*hh<CR><LF>
     a  b c d     e     f g h  I   j   k   l  m    n
```

a) ALF identifier for alert sentence
b) Total number of ALF sentences for this message, 1 to 2
c) Sentence number, 1 to 2

d) Sequential message identifier, 0 to 9
e) Time of last change
f) Alert category, A, B or C
g) Alert priority, E, A, W or C
h) Alert state, A, S, N, O, U or V
i) Manufacturer mnemonic code
j) Alert identifier
k) Alert instance, 1 to 999999
l) Revision counter, 1 to 99
m) Escalation counter, 0 to 9
n) Alert text

Talker: HE

2.5 ALR - Set Alert State

Local alert condition and status. This sentence is used to report an alert condition on a device and its current state of acknowledgement.

Output only, cycle on event

```
$--ALR,hhmmss.ss,xxx,A,A,c---c*hh<CR><LF>
     a      b      c  d e    f
```

a) ALR identifier for set alert state
b) Time of alert condition change, UTC
c) Unique alert number (identifier) at alert source
d) Alert condition (A = threshold exceeded, V = not exceeded)
e) Alert's acknowledge state, A = acknowledged, V = unacknowledged
f) Alert's description text

The BNWAS Mgr. NMEA interface transmits only the emergency call (navigator alert) telegram:

Navigator alert unacknowledged:
$AGALR,,260,A,V,Emergency Call*0C<CR><LF>
Navigator alert acknowledged:
$AGALR,,260,A,A,Emergency Call*0A<CR><LF>

Talker: HE

2.6 ARC - Alert Command Refused

This sentence is used for:

Category A or C alerts (see IMO MSC.302(87)), for which it is illegal to accept acknowledge or responsibility transfer.
Category B (see IMO MSC.302(87)), if the source of acknowledge is not acceptable.

Output only, cycle on event

```
$--ARC,hhmmss.ss,aaa,x.x,x.x,c---c*hh<CR><LF>
     a       b       c    d    e      f
```

a) ARC identifier for alert command refused
b) Time
c) Manufacturer mnemonic code
d) Alert identifier
e) Alert instance, 1 to 999999
f) Refused alert command, A, Q, O or S

Talker: HE

2.7 GGA - Global Positioning System (GPS) Fix Data

Time, position and fix-related data for a GPS receiver.

Input only, cycle adjustable 1 Hz, 10 Hz, 50 Hz, default 1 Hz

```
$--GGA,hhmmss.ss,lll.ll,a,yyyyy.yy,a,x,xx,x.x,x.x,M,x.x,M,x.x,xxxx*hh<CR><LF>
     a       b        c    d     e     f g  h   i    j   k  l  m  n     o
```

a) GGA for GPS fix data
b) UTC of position
c) Latitude
d) N/S
e) Longitude
f) E/W
g) GPS quality indicator
h) Number of satellites in use, 00-12, may be different from the number in view
i) Horizontal dilution of precision
j) Antenna altitude above / below mean sea level (geoid)
k) Units of antenna altitude, m
l) Geoidal separation
m) Units of geoidal separation, m
n) Age of differential GPS data
o) Differential reference station ID, 0000-1023

Fields h-o not used.
Only quality indicators 1, 2, 3 are accepted.

Accepted talker: GA, GL, GN, GP, II, IN, for serial NMEA

2.8 GLL - Geographic Position – Latitude / Longitude

Latitude and longitude of vessel position, time of position fix and status.

Input only, cycle adjustable 1 Hz, 10 Hz, 50 Hz, default 1 Hz

```
$--GLL,llll.ll,a,yyyyy.yy,a,hhmmss.ss,A,a*hh<CR><LF>
     a      b     c      d     e      f      g  h
```

a) GLL for geographic position – latitude / longitude
b) Latitude
c) N/S
d) Longitude
e) E/W
f) UTC of position
g) Status A=data valid, V=data invalid
h) Mode indicator

Only mode indicators A, D, E are accepted.

Accepted talker: GA, GL, GN, GP, LC, II, IN for Serial NMEA

2.9 GNS - GNSS Fix Data

Fix data for single or combined satellite navigation systems (GNSS). This sentence provides fix data for GPS, GLONASS, possible future satellite systems and systems combining these. This sentence could be used with the talker identification of GP for GPS, GL for GLONASS, GA for Galileo, GN for GNSS combined systems, as well as future identifiers.

Input only, cycle adjustable 1 Hz, 10 Hz, 50 Hz, default 1 Hz

```
$--GNS,hhmmss.ss,llll.ll,a,yyyyy.yy,a,c—c,xx,x.x,x.x,x.x,x.x,x.x,x.x,a*hh<CR><LF>
     a      b         c     d     e     f  g  h   i   j   k   l   m   n
```

a) GNS for GNSS fix data
b) UTC of position
c) Latitude
d) N/S
e) Longitude
f) E/W
g) Mode indicator
h) Total number of satellites in use, 00-99
i) Horizontal dilution of precision
j) Antenna altitude, m, re: mean sea level (geoid)

k) Geoidal separation, m
l) Age of differential data
m) Differential reference station ID
n) Navigational status indicator

Fields h-m not used.
Only quality indicators A, D are accepted.

Navigational status indicator S is accepted.

Accepted talker: GA, GL, GN, GP, II, IN, for serial NMEA

2.10 HBT - Heartbeat Supervision Sentence

This sentence is intended to be used to indicate that equipment is operating normally. The sentence is transmitted at regular intervals specified in the corresponding equipment standard.

Output only, cycle every 10 s (adjustable 5 to 30 s)

```
$--HBT,x.x,A,x*hh<CR><LF>
     a   b  c  d
```

a) HBT identifier for heartbeat supervision sentence
b) Configured repeat interval
c) Equipment status
d) Sequential sentence identifier

Talker: HE

2.11 HCR - Heading Correction Report

This sentence is used to inform the state and value of a heading correction included in the heading reported by the THS sentence when the heading source can apply a correction.

This sentence requires tight synchronization with THS sentence. This sentence should be sent immediately prior to every THS sentence for which the correction state field has changed compared to the previous THS sentence. For all correction states the HCR sentence should be transmitted periodically at intervals of not greater than 1,0 s.

Output only, cycle adjustable 1 Hz, 10 Hz, 50 Hz

```
$--HCR,x.x,a,a,x.x*hh<CR><LF>
     a   b  c d   e
```

a) HCR identifier for heading correction report
b) Heading, degrees true1
c) Mode indicator2
d) Correction state3
e) Correction value4

Comments:

1) Value of heading for which this HCR is referenced. This value is not replacing heading value from the THS sentence. This value is used for synchronization between high data rate of THS sentence and low data rate of HCR sentence.
2) Mode indicator. This field should not be null.
   A = Autonomous
   E = Estimated (dead reckoning)
   M = Manual input
   S = Simulator mode
   V = Data not valid (including standby)
3) Correction state. This field should not be null.
   A = Both speed / latitude and dynamic correction included in heading
   D = Dynamic correction included in heading
   S = Speed / latitude correction included in heading
   N = No correction included in heading
   V = Not available, reporting device does not know about correction state
4) Value of correction included in heading. Degrees +/- 180,0º with 1 decimal. Null field indicates correction state N (no correction included) or V (not available).

Talker: HE

2.12 HDT - Heading True

Actual vessel heading in degrees true produced by any device or system producing true heading.

Output only, cycle adjustable 1 Hz, 10 Hz, 50 Hz

```
$--HDT,x.x,T*hh<CR><LF>
      a   b   c
```

a) HDT for heading true
b) Heading [degrees]
c) T, true

Talker: HE

2.13 RMC - Recommended Minimum Specific GNSS Data

RMC and RMB are the recommended minimum data to be provided by a GNSS receiver. All data fields should be provided, null fields used only when data is temporarily unavailable.

Input only, cycle adjustable 1 Hz, 10 Hz, 50 Hz, default 1 Hz

```
$--RMC,hhmmss.ss,A,llll.ll,a,yyyyy.yy,a,x.x,x.x,xxxxxx,x.x,a,a,a*hh<CR><LF>
     a      b     c    d    e     f     g  h   i    j     k  l m  n
```

a) RMC for recommended minimum specific GNSS data
b) UTC of position fix
c) Status A = data valid V = navigation receiver warning
d) Latitude
e) N/S
f) Longitude
g) E/W
h) Speed over ground, knots
i) Course over ground, degrees true
j) Date: dd/mm/yy
k) Magnetic variation, degrees
l) E/W
m) Mode indicator
n) Navigational status

Fields k, l are not used.
Only mode indicators A, D are accepted. Navigational status indicator S is accepted.

Accepted talker: GA, GL, GN, GP, II, IN, for serial NMEA

2.14 ROT - Rate of Turn

Rate of turn and direction of turn.

Output only, cycle adjustable 1 Hz, 10 Hz, 50 Hz

```
$--ROT,x.x,A*hh<CR><LF>
     a   b   c
```

a) ROT for rate of turn
b) Rate of turn, °/min, "-" = bow turns to port
c) Status: A = data valid
v = data invalid

Talker: HE, TI

2.15 THS - True Heading and Status

Actual vessel heading in degrees true produced by any device or system producing true heading. This sentence includes a mode indicator field providing critical safety related information about the heading data, and replaces the deprecated HDT sentence.

Output only, cycle adjustable 1 Hz, 10 Hz, 50 Hz

```
$--THS,x.x,a*hh<CR><LF>
     a    b    c
```

a) THS for True heading and status
b) Heading, true [degrees]
c) Mode indicator

Only mode indicator A is accepted.
Accepted talker: GP, HC, HE, HF
Transmitted talker: HE, GP

	This sentence replaces the deprecated sentence HDT.

Talker: HE

2.16 VBW - Dual Ground / Water Speed

Water-referenced and ground-referenced speed data

Input only, cycle adjustable 1 Hz, 10 Hz, 50 Hz, default 1 Hz

```
$--VBW,x.x,x.x,A,x.x,x.x,A,x.x,A,x.x,A*hh<CR><LF>
     a    b    c  d  e    f  g  h  i  j    k
```

a) VBW for dual ground / water speed
b) Longitudinal water speed [kn]
c) Transverse water speed [kn]
d) Status: water speed, A = data valid, V = data invalid
e) Longitudinal ground speed [kn]
f) Transverse ground speed [kn]
g) Status, ground speed, A = data valid, V = data invalid

h) Stern transverse water speed [kn]
i) Status: stern water speed, A = data valid, V = data invalid
j) Stern transverse ground speed [kn]
k) Status: stern ground speed, A = data valid, V = data invalid

Fields c, h - k are not used.

Accepted talker: GA, GL, GN, GP, VD, VM, VW, II, IN

2.17 VER - Version

This sentence is used to provide identification and version information about a device. This sentence is produced as a reply to a query sentence.

In order to meet the 79-character requirement, a multi-sentence message may be needed to convey all the data fields.

Output only, cycle every 120 s (adjustable 60 to 120 s)

```
$--VER,x,x,aa,c--c,c--c,c--c,c--c,c--c,c--c,·x*hh<CR><LF>
     a  b c  d   e    f    g    h    i    j    k
```

a) VER for version
b) Total number of sentences needed, 1 to 9: 3
(1 = System, 2 = Sensor PCB, 3 = OS PCB)
c) Sentence number, 1 to 9: 1 to 3
d) Device type: HE
e) Vendor ID: ANZ
f) Unique identifier: STD30 NX-1
g) Manufacturer serial number: 4006247xxxxxxx
h) Model code (product code): 110-244.NG001
i) Software revision: 110-244.P0001 Exx.xx
j) Hardware revision: NB06-367 Exx
k) Sequential message identifier

Talker: HE

2.18 VHW - Water Speed and Heading

The compass heading to which the vessel points and the speed of the vessel relative to the water.

Input only, cycle adjustable 1 Hz, 10 Hz, 50 Hz, default 1 Hz

```
$--VHW,x.x,T,x.x,M,x.x,N,x.x,K*hh<CR><LF>
     a   b  c  d  e  f  g  h   i
```

a) VHW for water speed and heading
b) Heading true [degrees]
c) T, true
d) Heading magnetic [degrees]
e) M, magnetic
f) Speed [kn]
g) N, knots
h) Speed [km/h]
i) K, km/h

Fields b - e and h - i are not used when receiving or sending.

Accepted talker: GA, GL, GN, GP, VD, VM, VW, II, IN

2.19 VTG - Course Over Ground and Ground Speed

The actual course and speed relative to the ground.

Input only, cycle adjustable 1 Hz, 10 Hz, 50 Hz, default 1 Hz

```
$--VTG,x.x,T,x.x,M,x.x,N,x.x,K,K*hh<CR><LF>
     a   b  c  d  e  f  g  h  i  j
```

a) VTG for course over ground and ground speed
b) Course over ground, true [degrees]
c) T, true
d) Course over ground magnetic [degrees]
e) M, magnetic
f) Speed over ground [kn]
g) N, knots
h) Speed over ground [km/h]
i) K, km/h
j) Mode indicator

Fields h - i are not used. Field d is used if field b is empty.

Accepted talker: GA, GL, GN, GP, LC, VD, VM, VW, II, IN

2.20 ZDA - Time and Date

UTC, day, month, year and local time zone.

Input only, cycle adjustable 1 Hz, 10 Hz, 50 Hz, default 1 Hz

```
$--ZDA,hhmmss.ss,xx,xx,xxxx,xx,xx*hh<CR><LF>
     a      b      c  d   e   f   g
```

a) ZDA for time and date
b) UTC
c) Day, 01 to 31 (UTC)
d) Month, 01 to 12 (UTC)
e) Year (UTC)
f) Local zone hours (see note), 00 h to ±13 h
g) Local zone minutes (see note), 00 to +59

Fields f - g are not used.

Accepted talker: all

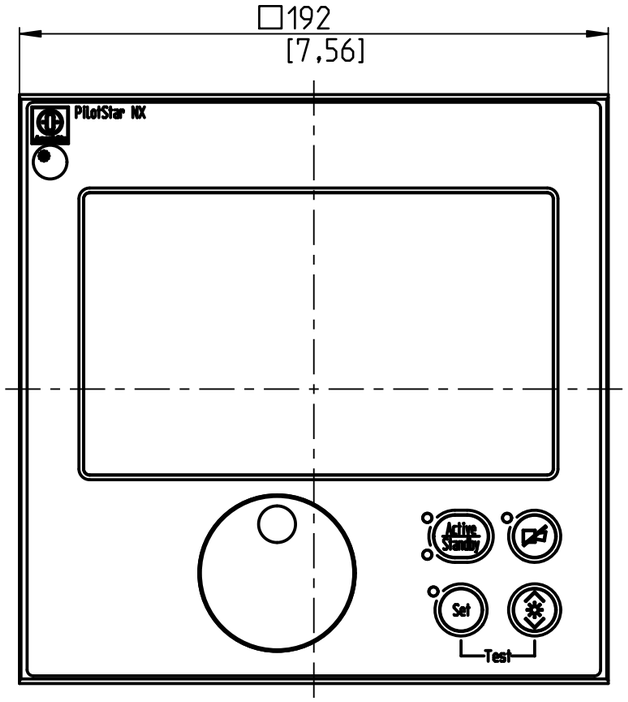
2.21 PANZHRP

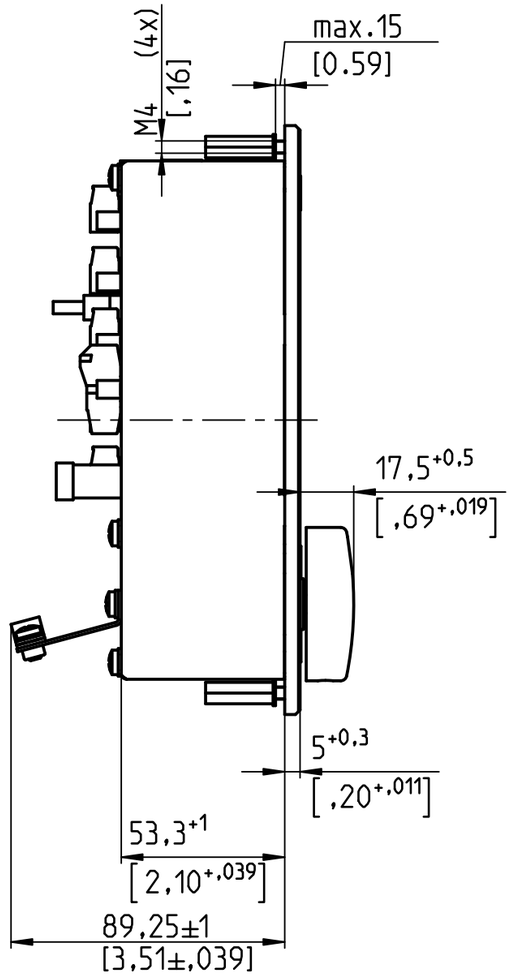
Private data sentence for HEADING, ROLL, PITCH according to NMEA183 version 2.0

```
$--PANZHRP,x,x.x,x.x,x.x,x.x,x.x,x.x,a,a*hh, <CR><LF>
       a    b  c   d   e   f   g   h  i  j  k
```

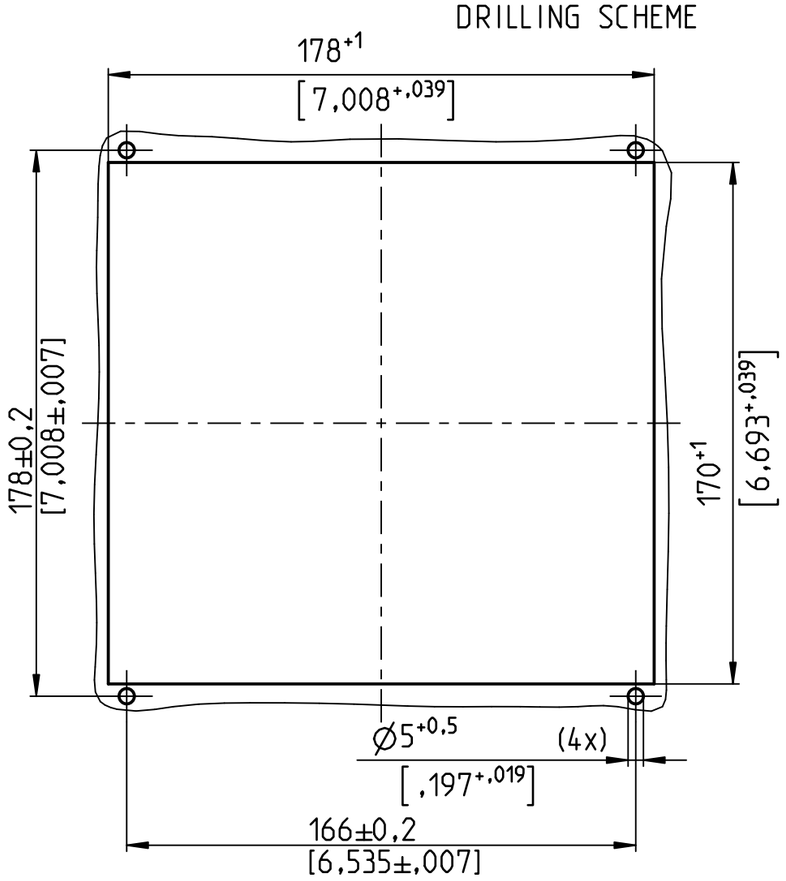
a) Private identifier
b) Sentence identifier
c) Source
d) Heading angle
e) Roll angle
f) Pitch angle
g) Heading angular rate
h) Roll angular rate
i) Pitch angular rate
j) Status
k) Selection (optional)

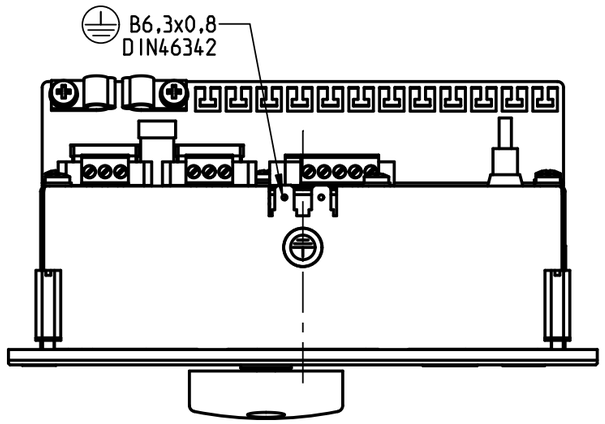
Intentionally left blank





DRILLING SCHEME





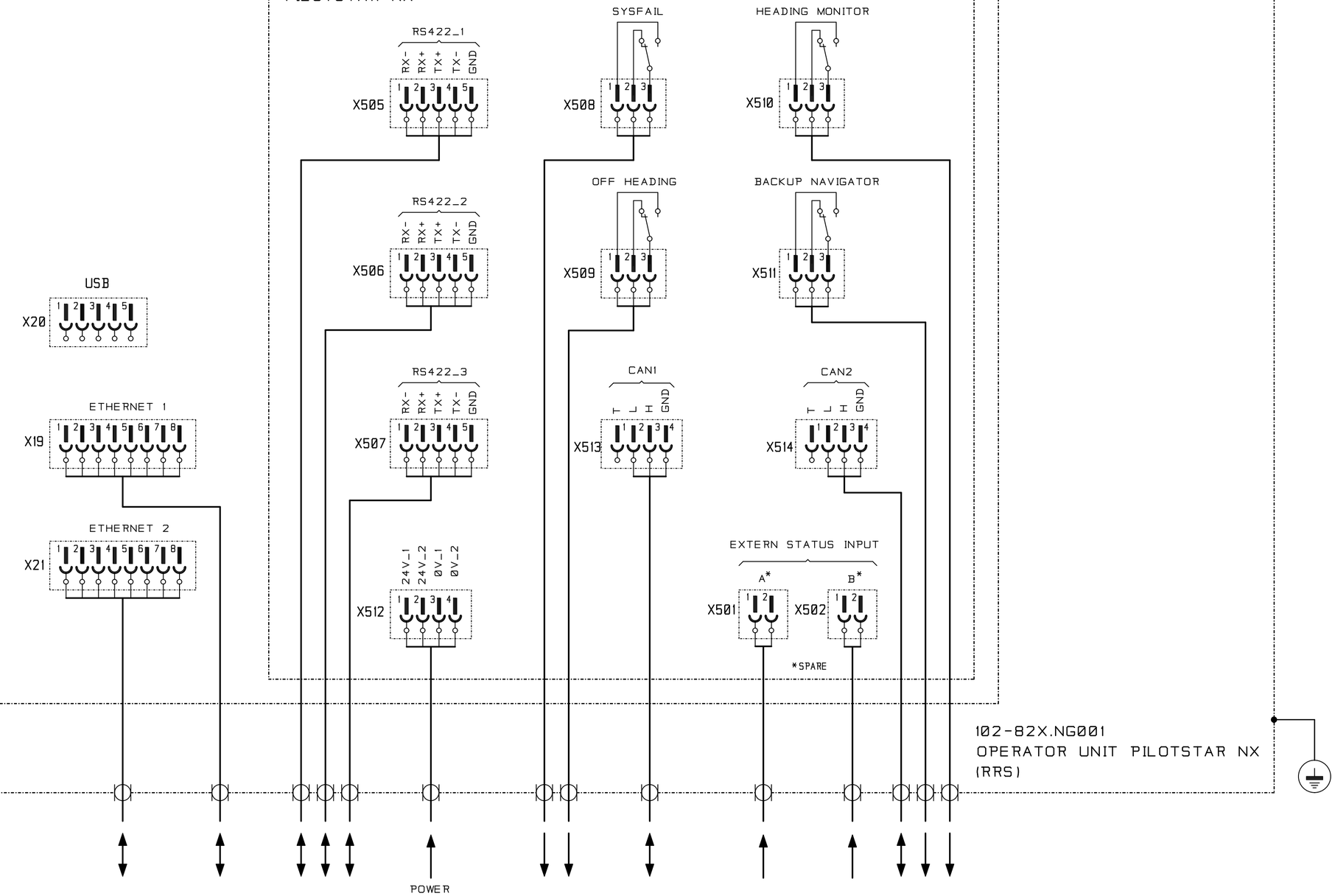
TYPE OF ENCLOSURE: EN 60529 IP23/IP56 FRONT-SIDED
EVENNESS OF MOUNTINGSURFACE < 0,1mm

DIMENSIONS WITHOUT TOLERANCES ARE MAXIMUM DIMENSIONS

				CAD: Pro/E	ID.NO. 5023317
				SCALE –	WEIGHT ca. 1,5
				mm (inch)	
				CREATED BY Zm	DRAWING TITLE: Operator Unit PilotStar NX – DIMENSIONAL DRAWING
				APPROVED BY Lü	
00	500000038693	24.06.14	Zm	Raytheon Anschütz	DRAWING NO. 102-820.HP005
VER.	REVISIONS	DATE OF ISSUE			SHEET 1 OF 1

NB06-360
BASIS KARTE
PILOTSTAR NX

NB05-421
STECKER KARTE
PILOTSTAR NX



102-82X.NG001
OPERATOR UNIT PILOTSTAR NX
(RRS)

VER.	ANDERUNG	AUSGABEDATUM	NAME
01	5000000044142	01.08.2019	RO
00	5000000038693	23.11.2016	KO

ALLGEMEINTOLERANZ ISO 2768 - mK
ERSTELLT DURCH KOHL
GENEHMIGT VON STOFFER

Raytheon Anschütz

CAD B 5030_01
ID.NR. 5025976
MASSSTAB
WERKSTOFF
BENENNUNG
OPERATOR UNIT
PILOTSTAR NX
ANSCHLUSSPLAN / CONNECTION DIAGRAM
ZEICHNUNGSNUMMER 102-820.HP008
BLATT 1
VON 1

Raytheon Anschütz GmbH
Zeyestr. 16-24
24106 Kiel
Germany

www.raytheon-anschuetz.com

PilotStar® NX Operator Unit

Illustrated Spare Parts Catalog

102-820.NG001

10000001054
Edition: 001

Illustrated Spare Parts Catalog

Content

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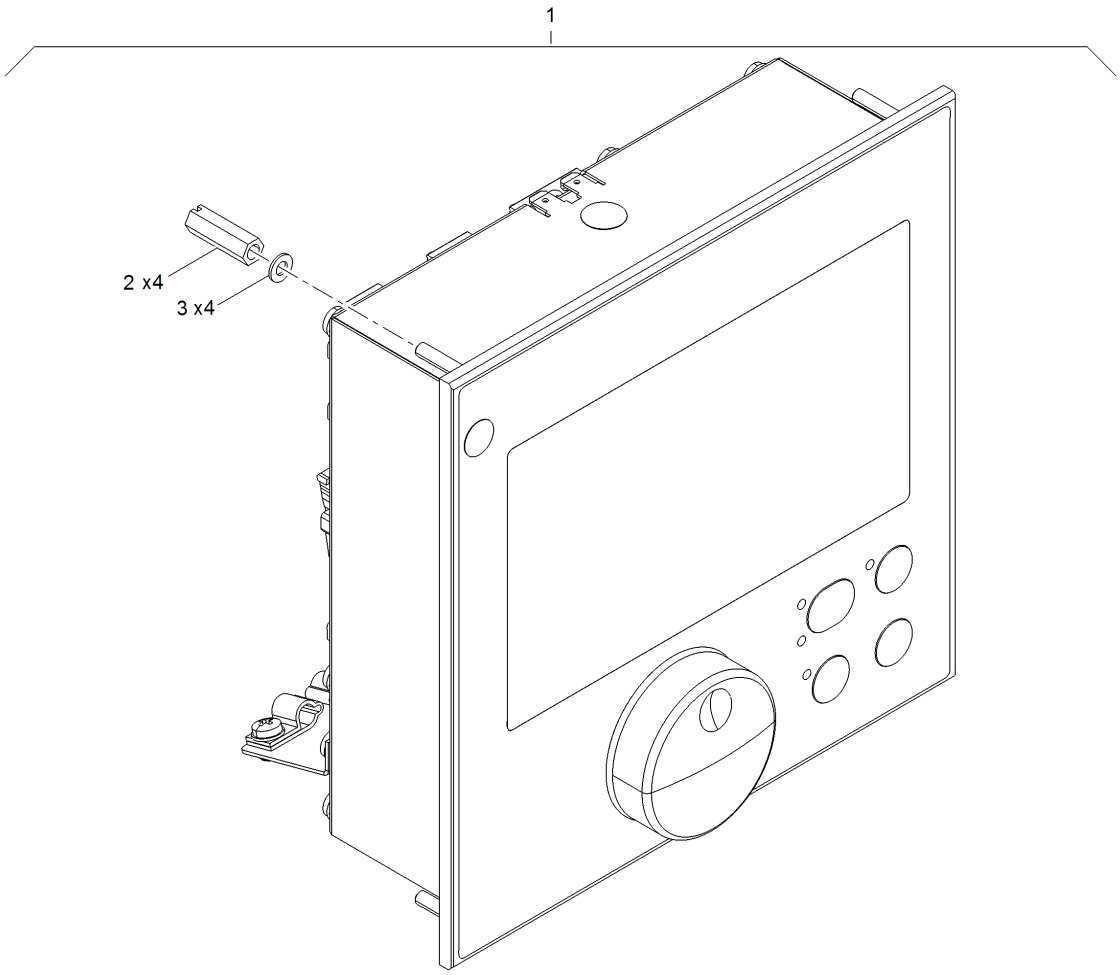
Definitions

Col.	Description
1	**Fig. No.** The figure number gives the relation to the respective figure.
2	**Item No.** The item number gives the relation to the position number on the respective figure.
3	**Designation** This column comprises the designation of a spare part.
4A	**Supplier** This column comprises the name of the manufacturer. If column 4A and 4b contain only one name, then the supplier is also the manufacturer.
4B	**Manufacturer** This column comprises the name of the manufacturer. If column 4A and 4b contain only one name, then the supplier is also the manufacturer.
5A	**Supplier Part No.** This column comprises the supplier part number of the spare part.
5B	**Manufacturer Part No.** This column comprises the manufacturer part number of the spare part.
6	**UOI (Unit of Issue)** The unit of issue determines the measure-, weight-, count or the packing drum units for the supply of the spare parts. EA = Each, MR = Meter, SE = Set, GR = Gramm
7	**QI (Quantity Installed)** This column gives the installed quantity of the spare part only for this unit or subunit.
8	**Remarks** This column gives more information about the spare part.



PilotStar® NX Operator Unit 00-0000, Sheet 1 of 1

Fig. No.	Item No.	Designation	Manufacturer Supplier	Manufacturer Part No. Supplier Part No	UOI	QI	Remarks
00-0000	01	PilotStar® NX Operator Unit	Raytheon Anschütz	4006050	EA	1	No color
00-0000	01	PilotStar® NX Operator Unit	Raytheon Anschütz	4006051	EA	1	Color RAL 7012
00-0000	01	PilotStar® NX Operator Unit	Raytheon Anschütz	4006052	EA	1	Color RAL 9005
00-0000	02	Nut	Raytheon Anschütz	1500299	EA	4	
00-0000	03	Washer, contact	Ettinger GmbH Raytheon Anschütz	03.20.049 1620363	EA	4	
00-0000	04	Frame, Mounting	Raytheon Anschütz	4005216	EA	1	Not illustrated
00-0000	05	2Port Serial Device Server	Moxa Raytheon Anschütz	NPORT 5232-T 2012319	EA	1	Not illustrated

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