Raytheon Anschütz

Gyro Compass Standard 22 NX

Operator Manual

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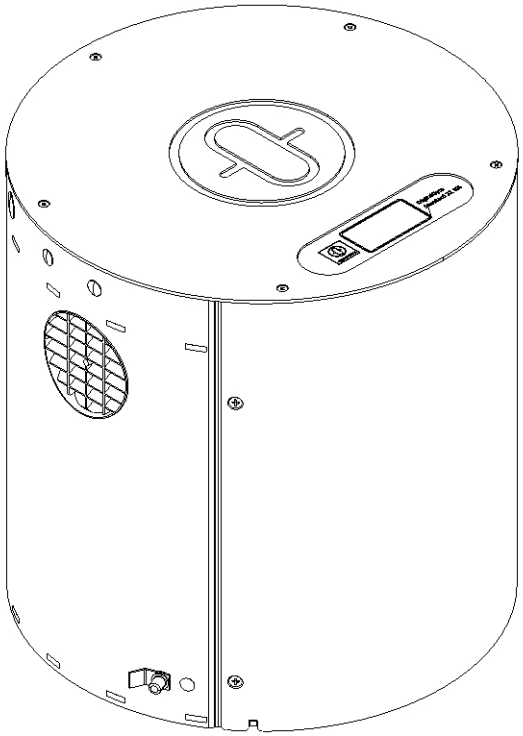

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List of Abbreviations

BAM	Bridge Alert Management
CAM-HMI	Central Alert Management Human Machine Interface
EPA	ESD Protected Area
ESD	Electrostatic Discharge
ISPC	Illustrated Spare Parts Catalog
RoT	Rate of Turn

Introduction

Preliminary Remarks

The present manual is a description and reference book only. It is intended to answer questions and to solve problems in the quickest possible manner.

Read and follow the instructions and notes in this manual before operating the equipment.

For this purpose, refer to the table of contents and read the corresponding chapters thoroughly.

If you have any further questions, contact us under the following address:

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Errors can hardly be avoided in the documentation despite all efforts. Therefore, we appreciate any remarks and suggestions.

Subject to alterations.

Safety

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

Consequence

- Preventive action

CAUTION!

Caution statements indicate a hazardous situation that, if not avoided, could result in material damage

Consequence

- Preventive action

Note

Notes indicate information considered important but not hazard-related.

General Safety Instructions

WARNING!

Danger due to nonadherence to general rules and regulations

Risk of death or serious injury and material damage

- Observe all national and regional rules and regulations.
- Observe all general rules and regulations that are specified for the work area.
- Observe all instructions that are placed on the components or described in related documentation.

WARNING!

Danger due to improper operation and use for other than the intended purpose

Risk of serious injury and material damage

- Use the 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 voltage-regulated devices

Risk of death or serious injury that is caused by electrical shock

- Switch off voltage supply if the wires have damaged insulation.
- Only skilled electricians must perform work on the electric system.
- Keep moisture away from live parts.
- Keep the system closed.
- Do not attempt to bypass or disable fuses.

1 Description

1.1 Technical Data

Dimensions	Height 432 mm Width 415 mm Depth 415 mm
Weight	17.5 kg
Protection Class	IP 22
Voltage Supply	18 V DC to 32 V DC
Power Consumption	max. 140 W (Heating) max. 80 W (Operation)
Operation Temperature	-10 °C to +55 °C
LAN Interface	10 / 100 MBit Teaming Mode

1.2 Functional Description

The digital gyro compass Standard 22 NX provides speed error corrected true heading and rate of turn. A gyro compass heading is not affected by the earth magnetic field.

The gyro compass generates an accurate directional reference signal to indicate the ship's heading relative to true north.

The inherent speed error of the gyro compass is corrected automatically by the use of position and speed input from GNSS (such as GPS, GLONASS, etc) and log. If this data is not available, the automatic speed error correction is not possible and the user must correct the heading manually.

1.3 Bridge Alert Management

Note
This text is general. Some functions (presentation) are only supported in conjunction with an operator unit.

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) Performancestandard for Bridge Alert Management”. Equipment-related details are defined in otherequipment-related performance and test standards.

The objective of *BAM* is to harmonize the priority, classification, handling, distribution andpresentation of alerts. It enables the bridge team to devote full attention to the safeoperation of the ship. Furthermore the bridge team immediately finds any alert situation requiring attentionand / or action to maintain the safe operation of the ship. Unnecessary distraction of the bridge team by redundant and superfluous audible

andvisual alert announcements shall be avoided. It reduces the cognitive workload of the operator by minimizing the presented information which is necessary to draw attention toand 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)*.

Alerts are divided in different priorities:

- Emergency alarm[1]

  Highest priority of an alert. These Alarms show immediate danger to human life or to the ship and its machinery and demand immediate action.

- 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. A warning makes 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) directly assigned to the function generating the alert. This 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. These alerts require more information about the status and treatment of the alerts (e.g. certain alerts from the engine).

Note
The following list of alarms can only be displayed at the operating unit (130-626) or at a CAM. The standard 22 NX itself cannot display this alarm itself.

[1] The emergency alarm is not used in this device

Tab. 1: Alert List, Alarm Symbols

Symbol	Description
	Active – unacknowledged alarm (flashing)
	Active – silenced alarm (flashing)
	Active – acknowledged alarm
	Rectified – unacknowledged alarm (flashing)

Tab. 2: Alert List, Warning Symbols

Symbol	Description
	Active – unacknowledged warning (flashing)
	Active – silenced warning (flashing)
	Active – acknowledged warning
	Rectified – unacknowledged warning (flashing)

Tab. 3: Alert List, Caution Symbols

Symbol	Description
	Caution

Tab. 4: Alert Signaling

Color	Meaning – Visual	Acoustic Signals
Red (alarm) flashing	Alarms (faults and / or dangerous situations)	3 short signals (pulse) every 7 seconds. Continues until acknowledgment
Yellowish orange (warning) flashing	Warnings	2 short signals (pulse) after the event without repetition
Yellow (caution)	Status messages information	There is no acoustic signal for status and global messages

2 Operation

2.1 Preliminary Remarks

Markup Elements

The manual uses different markup elements for hardware and software.

Markup Element	Description
Bold	This markup is used for the following elements: • Pushbuttons / Switches • Softkeys • Labeling • Defined areas
Italic	This markup is used for the following elements: • Menus • Dialogs

2.2 Safety Instructions for Operation

WARNING!

Danger due to improper operation and use for other than the intended purpose

Risk of serious injury and material damage

- Use the 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 by unskilled personnel

Risk of serious injury and material damage

- Keep all unskilled personnel away from the operation area.
- Perform all operation only by skilled personnel.

2.3 Setting Into Operation

2.3.1 Pre-Operation Procedures

Procedure

1. Switch on the log for speed input.
2. Switch on the GNSS receiver for position input.

2.3.2 Setting Into Operation

Procedure

Note
During the heating and settling stage a correct heading is not available. A significant deviation of the gyro compass heading from true north may occur.

1. Switch on the gyro compass via the distribution board.
   - ► The gyro compass is in the heating stage.
   - ► The display shows the display page *Heading (Heating)*.

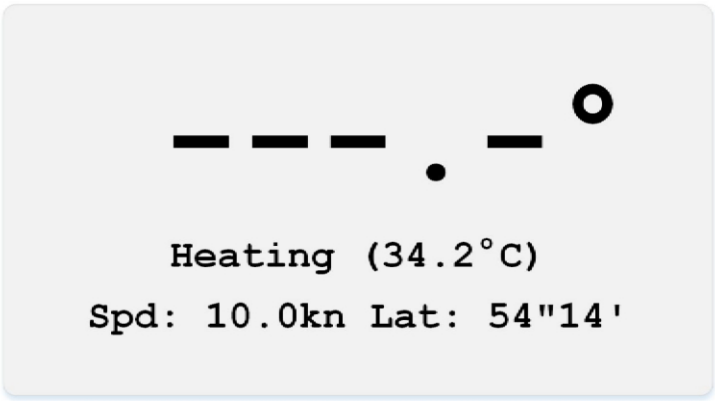

Fig. 1: Display Page: Heading (Heating)

Note
During the heating stage, no heading information is available.

Note
The heating of the gyro compass takes approximately 30 minutes. The heating time depends on the temperature of the supporting liquid when the heating starts.

2. Check the gyro compass after 30 minutes.
   - ► The gyro compass has switched over into the settling stage.
   - ► The display shows the display page *Heading (Settling)*.

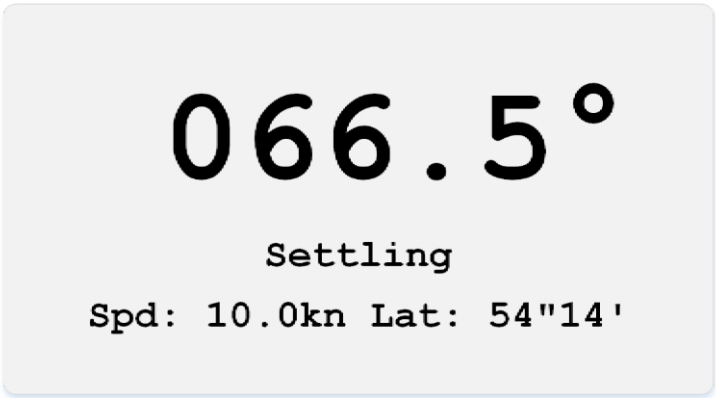

Fig. 2: Display Page: Heading (Settling)

Note
No valid NMEA heading and NMEA *Rate of Turn (RoT)* is distributed during the settling stage.

Note
The settling of the gyro compass takes approximately 3 hours.

3. Check the gyro compass after 3 hours.
   - ► The gyro compass is full operational.
   - ► The display shows the display page *Heading (Available)*.
   - ► The gyro compass distributes the heading to all connected systems.

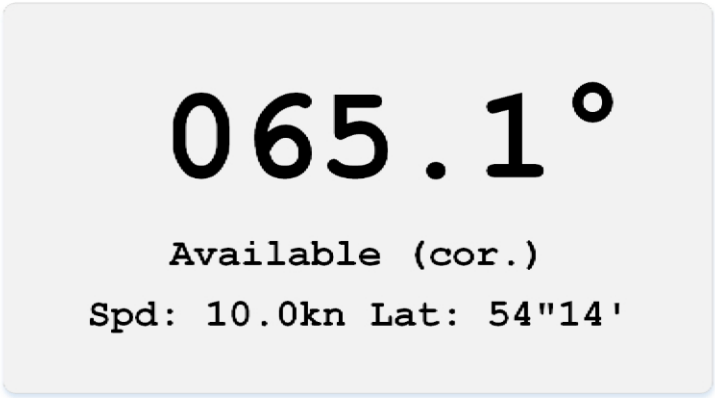

Fig. 3: Display Page: Heading (Available)

2.4 Normal Operation

2.4.1 Structure of Display Page: Heading

The display page *Heading* shows the heading of the vessel.

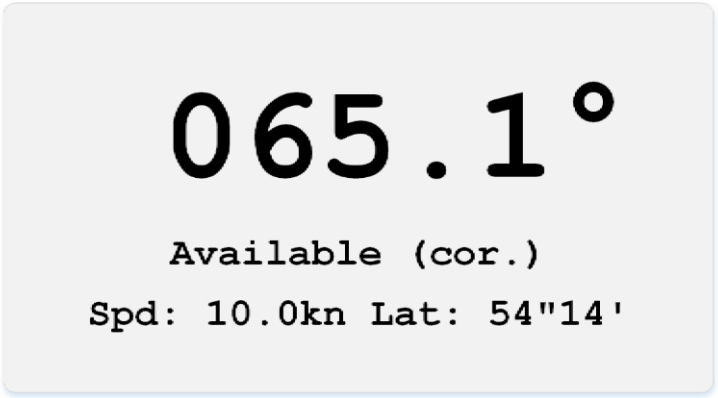

Fig. 4: Display Page: Heading

1 Heading
2 Stage
3 Latitude
4 Speed

Area / Element	Description
Heading	Shows the heading of the vessel
Stage	Shows the stage of the gyro compass **Note:** The different stages are descrobed in the following table.
Spd	Shows the speed of the vessel **Note:** If the log is not available, no speed is displayed.
Lat	Shows the latitude of the vessel **Note:** If the GNSS is not available, no latitude is displayed.

Stage	Description
OFF	The gyrosphere of the gyro compass is not in function. No heading is available. **Note:** For detailed information of the displayed failures, see chapter 3.1.
Heating	The gyro compass is in the heating stage. The current temperature is displayed. No heading is available.
Settling	The gyro compass is in the settling stage. No valid heading is available.
Available (cor.)	The gyro compass is fully operational. The automatic speed error correction is in function.
Available (uncor.)	The gyro compass is operational. The automatic speed error correction is not in function.

Note

If position and speed input from GNSS and log is not available, the automatic speed error correction is not in function.

Note

If the gyro compass detects an internal failure and the failure is displayed to the user, no heading is displayed and transmitted to connected devices, see Fig. 5.

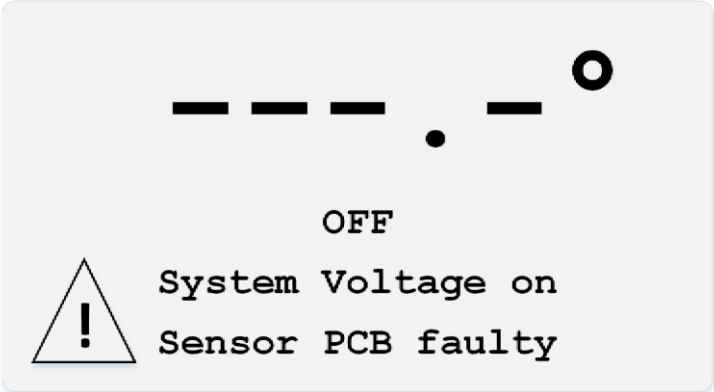

Fig. 5: Display Page: Heading (OFF)

2.5 Setting Out of Operation

2.5.1 Setting Out of Operation Procedures

Procedure

Note
This procedure must be used if the Standart 22 NX is set out of operation for less than 3 months.

1. Switch off the gyro compass via the distribution board.

2.5.2 Post-Operation Procedures

Procedure

1. If necessary, switch off the GNSS receiver.
2. If necessary, switch off the log.

2.5.3 Prepare Gyro Compass for Longer Time Setting Out of Operation

About this task

Note
The procedure for longer time setting out of operation can only be performed by Raytheon Anschütz Service and must be used if the Standard 22 NX is set out of operation for more than 3 months.

2.6 Manual Correction of Speed Error

The speed error cannot be calculated automatically, if speed and / or position are not available. In this case an uncorrected heading information is output. However, the speed error can also be calculated manually.

2.6.1 Correct Speed Error Manually

Procedure

1. Determine the latitude and the speed of the vessel.
2. Take the heading from the gyro compass.
3. Determine the correction value from the speed error table, see chapter 2.6.2.
4. Calculate the true heading.

Example

No.1

Latitude:	55°
Speed of the vessel:	16 kts
Gyro compass heading:	345°
Correction value:	- 1.7°
Calculation:	345° - 1.7° = 343.3°
True heading:	343.3°

No.2

Latitude:	55°
Speed of the vessel:	16 kts
Gyro compass heading:	223.7°
Correction value:	+ 1.3°
Calculation:	223.7° + 1.3° = 225°
True heading:	225°

2.6.2 Speed Error Tables

Latitude 0° to 20°

Latitude in °	North		South		Speed in Kts								
	Headings in ° sign for correction value												
	-		+		4	8	12	16	20	24	28	32	36
0 to 20	0	360	180	180	0.3	0.5	0.8	1.0	1.3	1.5	1.8	2.1	2.4
	15	345	165	195	0.3	0.5	0.8	1.0	1.3	1.4	1.7	2.0	2.3
	30	330	150	210	0.2	0.4	0.6	0.9	1.1	1.3	1.5	1.8	2.0
	45	315	135	225	0.2	0.4	0.5	0.7	0.9	1.1	1.3	1.5	1.7
	60	300	120	240	0.1	0.3	0.4	0.5	0.7	0.8	0.9	1.1	1.2
	75	285	105	255	0.1	0.2	0.2	0.3	0.4	0.4	0.5	0.5	0.6
	90	270	90	270	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Latitude in °	North		South		Speed in Kts								
	Headings in ° sign for correction value												
	-		+		40	44	48	52	56	60	64	68	72
0 to 20	0	360	180	180	2.6	2.9	3.1	3.4	3.7	3.9	4.2	4.4	4.9
	15	345	165	195	2.5	2.8	3.0	3.3	3.5	3.8	4.0	4.3	4.7
	30	330	150	210	2.3	2.5	2.7	3.0	3.2	3.4	3.6	3.8	4.2
	45	315	135	225	1.7	2.1	2.2	2.4	2.6	2.8	3.0	3.1	3.4
	60	300	120	240	1.2	1.4	1.6	1.7	1.8	2.0	2.1	2.2	2.4
	75	285	105	255	0.6	0.8	0.8	0.9	1.0	1.0	1.1	1.2	1.3
	90	270	90	270	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Latitude 30°

Latitude in °	North		South		Speed in Kts								
	Headings in ° sign for correction value												
	-		+		4	8	12	16	20	24	28	32	36
30	0	360	180	180	0.3	0.6	0.9	1.2	1.5	1.7	2.0	2.3	2.6
	15	345	165	195	0.3	0.6	0.9	1.1	1.4	1.6	1.9	2.3	2.6
	30	330	150	210	0.2	0.5	0.7	1.0	1.2	1.5	1.7	2.0	2.3
	45	315	135	225	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.7	1.9
	60	300	120	240	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.2	1.3
	75	285	105	255	0.1	0.2	0.3	0.3	0.4	0.4	0.5	0.6	0.7
	90	270	90	270	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Latitude in °	North		South		Speed in Kts								
	Headings in ° sign for correction value												
	-		+		40	44	48	52	56	60	64	68	72
30	0	360	180	180	2.9	3.2	3.5	3.8	4.1	4.4	4.7	5.5	5.3
	15	345	165	195	2.8	3.1	3.4	3.7	4.0	4.3	4.5	4.8	5.1
	30	330	150	210	2.5	2.8	3.0	3.3	3.6	3.8	4.1	4.3	4.6
	45	315	135	225	2.1	2.3	2.5	2.7	2.9	3.1	3.3	3.5	3.7
	60	300	120	240	1.5	1.6	1.8	1.9	2.1	2.2	2.3	2.5	2.6
	75	285	105	255	0.8	0.8	0.9	1.0	1.1	1.1	1.2	1.3	1.4
	90	270	90	270	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Latitude 40°

Latitude in °	North		South		Speed in Kts								
	Headings in ° sign for correction value												
	-		+		4	8	12	16	20	24	28	32	36
40	0	360	180	180	0.3	0.7	1.0	1.3	1.7	2.0	2.3	2.7	3.0
	15	345	165	195	0.3	0.7	1.0	1.2	1.5	1.9	2.2	2.6	2.9
	30	330	150	210	0.3	0.6	0.8	1.1	1.4	1.7	2.0	2.3	2.6
	45	315	135	225	0.2	0.4	0.7	0.9	1.2	1.4	1.6	1.9	2.1
	60	300	120	240	0.2	0.3	0.6	0.7	0.9	1.0	1.2	1.3	1.5
	75	285	105	255	0.1	0.2	0.3	0.3	0.4	0.5	0.6	0.7	0.8
	90	270	90	270	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Latitude in °	North		South		Speed in Kts								
	Headings in ° sign for correction value												
	-		+		40	44	48	52	56	60	64	68	72
40	0	360	180	180	3.3	3.7	4.0	4.3	4.6	5.0	5.3	5.6	6.0
	15	345	165	195	3.2	3.5	3.8	4.2	4.5	4.8	5.1	5.5	5.8
	30	330	150	210	2.9	3.2	3.5	3.7	4.0	4.3	4.6	4.9	5.2
	45	315	135	225	2.4	2.6	2.8	3.1	3.3	3.5	3.6	4.0	4.2
	60	300	120	240	1.7	1.8	2.0	2.2	2.3	2.5	2.7	2.8	3.0
	75	285	105	255	0.9	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.5
	90	270	90	270	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Latitude 45°

Latitude in °	North		South		Speed in Kts								
	Headings in ° sign for correction value												
	-		+		4	8	12	16	20	24	28	32	36
45	0	360	180	180	0.4	0.7	1.1	1.4	1.8	2.2	2.5	2.9	3.2
	15	345	165	195	0.3	0.7	1.0	1.4	1.7	2.1	2.4	2.8	3.1
	30	330	150	210	0.3	0.6	0.9	1.2	1.6	1.9	2.2	2.5	2.8
	45	315	135	225	0.3	0.5	0.8	1.0	1.2	1.5	1.8	2.0	2.3
	60	300	120	240	0.2	0.4	0.5	0.7	0.9	1.1	1.3	1.4	1.6
	75	285	105	255	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.7	0.8
	90	270	90	270	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Latitude in °	North		South		Speed in Kts								
	Headings in ° sign for correction value												
	-		+		40	44	48	52	56	60	64	68	72
45	0	360	180	180	3.6	4.0	4.3	4.7	5.0	5.4	5.8	6.1	6.5
	15	345	165	195	3.5	3.8	4.2	4.5	4.9	5.2	5.6	5.9	6.3
	30	330	150	210	3.1	3.4	3.8	4.0	4.4	4.7	5.0	5.3	5.6
	45	315	135	225	2.5	2.8	3.1	3.3	3.6	3.8	4.1	4.3	4.6
	60	300	120	240	1.8	2.0	2.2	2.3	2.5	2.7	2.9	3.1	3.2
	75	285	105	255	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7
	90	270	90	270	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Latitude 50°

Latitude in °	North		South		Speed in Kts								
	Headings in ° sign for correction value												
	-		+		4	8	12	16	20	24	28	32	36
50	0	360	180	180	0.4	0.8	1.2	1.6	2.0	2.4	2.8	3.2	3.6
	15	345	165	195	0.4	0.8	1.1	1.5	1.8	2.2	2.6	3.1	3.4
	30	330	150	210	0.3	0.7	1.0	1.3	1.6	2.0	2.3	2.7	3.1
	45	315	135	225	0.3	0.6	0.8	1.1	1.4	1.7	2.0	2.2	2.5
	60	300	120	240	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8
	75	285	105	255	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
	90	270	90	270	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Latitude in °	North		South		Speed in Kts								
	Headings in ° sign for correction value												
	-		+		40	44	48	52	56	60	64	68	72
50	0	360	180	180	4.0	4.3	4.8	5.1	5.5	5.9	6.3	6.7	7.1
	15	345	165	195	3.8	4.2	4.6	5.0	5.4	5.7	6.1	6.5	6.9
	30	330	150	210	3.4	3.8	4.1	4.5	4.8	5.1	5.5	5.8	6.2
	45	315	135	225	2.8	3.1	3.4	3.6	3.9	4.2	4.5	4.8	5.0
	60	300	120	240	2.0	2.2	2.4	2.6	2.8	3.0	3.2	3.4	3.6
	75	285	105	255	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8
	90	270	90	270	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Latitude 55°

Latitude in °	North		South		Speed in Kts								
	Headings in ° sign for correction value												
	-		+		4	8	12	16	20	24	28	32	36
55	0	360	180	180	0.4	0.9	1.3	1.8	2.2	2.7	3.1	3.6	4.0
	15	345	165	195	0.4	0.9	1.3	1.7	2.1	2.6	3.0	3.4	3.9
	30	330	150	210	0.4	0.8	1.1	1.5	1.9	2.3	2.7	3.1	3.5
	45	315	135	225	0.3	0.6	0.9	1.3	1.6	1.9	2.2	2.5	2.8
	60	300	120	240	0.2	0.4	0.7	0.9	1.1	1.3	1.6	1.8	2.0
	75	285	105	255	0.1	0.2	0.3	0.5	0.6	0.7	0.8	0.9	1.0
	90	270	90	270	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Latitude in °	North		South		Speed in Kts								
	Headings in ° sign for correction value												
	-		+		40	44	48	52	56	60	64	68	72
55	0	360	180	180	4.4	4.9	5.3	5.8	6.2	6.7	7.1	7.5	8.0
	15	345	165	195	4.3	4.7	5.1	5.6	6.0	6.4	6.9	7.3	7.7
	30	330	150	210	3.8	4.2	4.6	5.0	5.4	5.8	6.1	6.5	6.9
	45	315	135	225	3.1	3.5	3.8	4.1	4.4	4.7	5.0	5.3	5.6
	60	300	120	240	2.2	2.4	2.7	2.9	3.1	3.3	3.5	3.8	4.0
	75	285	105	255	1.1	1.3	1.4	1.5	1.6	1.7	1.8	2.0	2.1
	90	270	90	270	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Latitude 60°

Latitude in °	North		South		Speed in Kts								
	Headings in ° sign for correction value												
	-		+		4	8	12	16	20	24	28	32	36
60	0	360	180	180	0.5	1.0	1.5	2.0	2.5	3.1	3.6	4.1	4.6
	15	345	165	195	0.5	0.9	1.4	1.9	2.4	2.9	3.4	3.9	4.4
	30	330	150	210	0.4	0.8	1.3	1.7	2.1	2.6	3.1	3.5	4.0
	45	315	135	225	0.4	0.7	1.1	1.4	1.8	2.2	2.5	2.9	3.2
	60	300	120	240	0.3	0.5	0.8	1.0	1.3	1.5	1.8	2.0	2.3
	75	285	105	255	0.2	0.3	0.4	0.6	0.7	0.8	0.9	1.1	1.2
	90	270	90	270	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Latitude in °	North		South		Speed in Kts								
	Headings in ° sign for correction value												
	-		+		40	44	48	52	56	60	64	68	72
60	0	360	180	180	5.1	5.6	6.1	6.6	7.1	7.6	8.2	8.7	9.2
	15	345	165	195	4.9	5.4	5.9	6.4	6.9	7.4	7.9	8.4	8.9
	30	330	150	210	4.4	4.9	5.3	5.7	6.2	6.6	7.1	7.5	7.9
	45	315	135	225	3.6	4.0	4.3	4.7	5.0	5.4	5.8	6.1	6.5
	60	300	120	240	2.5	2.8	3.0	3.3	3.6	3.8	4.1	4.3	4.6
	75	285	105	255	1.3	1.5	1.6	1.7	1.8	2.0	2.1	2.2	2.4
	90	270	90	270	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Latitude 65°

Latitude in °	North		South		Speed in Kts								
	Headings in ° sign for correction value												
	-		+		4	8	12	16	20	24	28	32	36
65	0	360	180	180	0.6	1.2	1.8	2.4	3.0	3.6	4.2	4.8	5.4
	15	345	165	195	0.6	1.2	1.7	2.3	2.9	3.5	4.1	4.7	5.2
	30	330	150	210	0.5	1.0	1.6	2.1	2.6	3.1	3.6	4.2	4.7
	45	315	135	225	0.4	0.9	1.3	1.7	2.1	2.6	3.0	3.4	3.8
	60	300	120	240	0.3	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7
	75	285	105	255	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.2	1.4
	90	270	90	270	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Latitude in °	North		South		Speed in Kts								
	Headings in ° sign for correction value												
	-		+		40	44	48	52	56	60	64	68	72
65	0	360	180	180	6.0	6.7	7.2	7.8	8.4	9.1	9.7	10.3	10.9
	15	345	165	195	5.8	6.4	7.0	7.6	8.2	8.7	9.3	9.9	10.5
	30	330	150	210	5.2	5.7	6.3	6.8	7.3	7.8	8.4	8.8	9.4
	45	315	135	225	4.3	4.7	5.1	5.5	6.0	6.4	6.8	7.2	7.7
	60	300	120	240	3.0	3.3	3-6	3.9	4.2	4.5	4.8	5.1	5.4
	75	285	105	255	1.6	1.7	1.9	2.0	2.2	2.3	2.5	2.6	2.8
	90	270	90	270	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Latitude 70°

Latitude in °	North		South		Speed in Kts								
	Headings in ° sign for correction value												
	-		+		4	8	12	16	20	24	28	32	36
70	0	360	180	180	0.7	1.5	2.2	3.0	3.7	4.5	5.2	6.0	6.7
	15	345	165	195	0.7	1.4	2.2	2.9	3.6	4.3	5.0	5.8	6.5
	30	330	150	210	0.6	1.3	2.0	2.6	3.2	3.9	4.5	5.2	5.8
	45	315	135	225	0.5	1.1	1.6	2.1	2.6	3.2	3.7	4.2	4.7
	60	300	120	240	0.4	0.7	1.1	1.5	1.9	2.2	2.6	3.0	3.4
	75	285	105	255	0.2	0.4	0.6	0.8	0.9	1.2	1.4	1.5	1.7
	90	270	90	270	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Latitude in °	North		South		Speed in Kts								
	Headings in ° sign for correction value												
	-		+		40	44	48	52	56	60	64	68	72
70	0	360	180	180	7.5	8.2	8.9	9.7	10.5	11.2	12.0	12.7	13.5
	15	345	165	195	7.2	7.9	8.6	9.4	10.1	10.8	11.6	12.3	13.0
	30	330	150	210	6.5	7.1	7.7	8.4	9.0	9.7	10.3	11.0	11.7
	45	315	135	225	5.3	5.8	6.3	6.8	7.4	7.9	8.4	9.0	9.5
	60	300	120	240	3.7	4.1	4.5	4.8	5.2	5.6	6.0	6.3	6.7
	75	285	105	255	1.9	2.1	2.3	2.5	2.7	2.9	3.1	3.3	3.5
	90	270	90	270	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Latitude 75°

Latitude in °	North		South		Speed in Kts								
	Headings in ° sign for correction value												
	-		+		4	8	12	16	20	24	28	32	36
75	0	360	180	180	1.0	2.0	3.0	3.9	4.9	5.9	6.9	7.9	8.9
	15	345	165	195	0.9	1.9	2.9	3.8	4.8	5.7	6.7	7.6	8.6
	30	330	150	210	0.8	1.7	2.6	3.4	4.3	5.1	6.0	6.8	7.7
	45	315	135	225	0.7	1.4	2.1	2.8	3.5	4.2	4.9	5.6	6.3
	60	300	120	240	0.5	1.0	1.5	2.0	2.5	3.0	3.4	3.9	4.4
	75	285	105	255	0.3	0.5	0.8	1.0	1.3	1.5	1.8	2.0	2.3
	90	270	90	270	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Latitude in °	North		South		Speed in Kts								
	Headings in ° sign for correction value												
	-		+		40	44	48	52	56	60	64	68	72
75	0	360	180	180	9.9	10.9	11.9	12.9	13.9	14.9	15.9	16.9	17.9
	15	345	165	195	9.5	10.5	11.4	12.4	13.4	14.4	15.3	16.3	17.3
	30	330	150	210	8.6	9.4	10.2	11.1	12.0	12.9	13.7	14.6	15.5
	45	315	135	225	7.0	7.7	8.4	9.1	9.8	10.5	11.2	11.9	12.6
	60	300	120	240	4.9	5.4	5.9	6.4	6.9	7.4	7.9	8.4	8.9
	75	285	105	255	2.5	2.8	3.1	3.3	3.6	3.8	4.1	4.3	4.6
	90	270	90	270	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

3 Faultfinding

3.1 Faultfinding Table

Failure	Error Code	Possible Cause	Remedy
Errors			
Display shows the error *Inductive Transmission faulty*.	EL01	Gyro compass component is defective.	Call the Raytheon Anschütz service for repair.
Display shows the error *System Voltage on Sensor PCB faulty*.	EL02	Gyro compass component is defective.	Call the Raytheon Anschütz service for repair.
Display shows the error *Encoder Voltage faulty*.	EL03	Gyro compass component is defective.	Call the Raytheon Anschütz service for repair.
Display shows the error *Interface Voltage faulty*.	EL04	Gyro compass component is defective.	Call the Raytheon Anschütz service for repair.
Display shows the error *Encoder faulty*.	EL05	Gyro compass component is defective.	Call the Raytheon Anschütz service for repair.
Display shows the error *Internal CAN Dialogue faulty*.	EL06	Cable connection in the gyro compass is disturbed.	Call the Raytheon Anschütz service for repair.
		Gyro compass component is defective.	Call the Raytheon Anschütz service for repair.
Display shows the error *Follow-Up System faulty*.	EL07	Cable connection between Outer sphere and sensor PCB is disturbed	Call the Raytheon Anschütz service for repair.
		Tooth belt is defective.	Call the Raytheon Anschütz service for repair.
		Step motor out of operation.	Call the Raytheon Anschütz service for repair.
Display shows the error *Support Liquid error*.	EL08	Support liquid level is too low.	Call the Raytheon Anschütz service for repair.

Failure	Error Code	Possible Cause	Remedy
		Gyro compass component is defective.	Call the Raytheon Anschütz service for repair.
Display shows the error *System Voltage on Outer Sphere PCB faulty*.	EL09	Cable connection in the gyro compass is disturbed.	Call the Raytheon Anschütz service for repair.
		Gyro compass component is defective.	Call the Raytheon Anschütz service for repair.
Display shows the error *Operating Voltage 24V faulty*.	EL10	Gyro compass component is defective.	Call the Raytheon Anschütz service for repair.
Display shows the error *Operating Voltage 15V faulty*.	EL11	Gyro compass component is defective.	Call the Raytheon Anschütz service for repair.
Display shows the error *Heater Operating Voltage faulty*.	EL12	Cable connection in the gyro compass is disturbed.	Call the Raytheon Anschütz service for repair.
		Gyro compass component is defective.	Call the Raytheon Anschütz service for repair.
Display shows the error *Operating Voltage 72V faulty*.	EL13	Cable connection in the gyro compass is disturbed.	Call the Raytheon Anschütz service for repair.
		Gyro compass component is defective.	Call the Raytheon Anschütz service for repair.
Display shows the error *Operating Voltage 78V faulty*.	EL14	Gyro compass component is defective.	Call the Raytheon Anschütz service for repair.
Display shows the error *Gyro Supply 55Veff faulty*.	EL15	Gyro compass component is defective.	Call the Raytheon Anschütz service for repair.
Display shows the error *Gyro Current faulty*.	EL16	Cable connection in the gyro compass is disturbed.	Call the Raytheon Anschütz service for repair.
		Gyro compass component is defective.	Call the Raytheon Anschütz service for repair.
Display shows the error *Pump Voltage faulty*.	EL17	Gyro compass component is defective.	Call the Raytheon Anschütz service for repair.

Failure	Error Code	Possible Cause	Remedy
Display shows the error *Pump Current faulty*.	EL18	Cable connection in the gyro compass is disturbed.	Call the Raytheon Anschütz service for repair.
		Gyro compass component is defective.	Call the Raytheon Anschütz service for repair.
Display shows the error *Temperature Sensor faulty*.	EL19	Gyro compass component is defective.	Call the Raytheon Anschütz service for repair.
Display shows the error *Heating System faulty*.	EL20	Gyro compass component is defective.	Call the Raytheon Anschütz service for repair.
Display shows the error *Watch-Dog Counter*.	EL21	Software is corrupted.	Call the Raytheon Anschütz service for software update.
		Gyro compass component is defective.	Call the Raytheon Anschütz service for repair.
Display shows the error *Power-On Counter*, if no normal switch on / off was performed..	EL22	Cable connection is disturbed.	Check the cable connection to the gyro compass.
		Gyro compass component is defective.	Call the Raytheon Anschütz service for repair.
Display shows the error *Off-State Counter*.	EL23	24 V DC voltage supply is disturbed.	Check the stability of the 24 V DC voltage supply.
		Gyro compass component is defective.	Call the Raytheon Anschütz service for repair.
Display shows the error *Other Internal Malfunction*.	EL24	Internal software problem.	Restart the gyro compass.
		Other internal error.	Call the Raytheon Anschütz service for repair.
Cautions			
Display shows the caution *Fan faulty*.	CL01	Fan is defective.	Call the Raytheon Anschütz service for repair.
Display shows the caution *Heater faulty*.	CL02	Heater is defective.	Call the Raytheon Anschütz service for repair.

Failure	Error Code	Possible Cause	Remedy
Display shows the caution *Support liquid > 60 °C*.	CL03	Air flow to the gyro compass is disturbed.	Check the air flow to the gyro compass. If required, establish an open access to the fan of the gyro compass.
		Gyro compass component is defective.	Call the Raytheon Anschütz service for repair.
Display shows the caution *Support liquid too low*.	CL04	Support liquid level is too low.	Call the Raytheon Anschütz service for repair.
		Gyro compass component is defective.	Call the Raytheon Anschütz service for repair.
Display shows the caution *Voltage cut-off counter*.	CL05	24 V DC voltage supply is disturbed.	Check the stability of the 24 V DC voltage supply.
		Gyro compass component is defective.	Call the Raytheon Anschütz service for repair.
Other Disturbances			
Gyro compass is out of operation.		24 V DC voltage supply is disturbed.	Check the availability and connection of the 24 V DC voltage supply. If required, switch on the power supply.
Gyro compass has a leakage.		A hose of support liquid at the pump is disconnected.	Call the Raytheon Anschütz service for repair.
		Outer sphere is defective.	Call the Raytheon Anschütz service for repair.
Position and speed data input is not available.		Cable connection is disturbed.	Check the availability and connection of the position and speed data source.
		Position and speed sources are defective or not available	Correct the speed error manually, see chapter 2.6.1.

4 Care and Maintenance

4.1 Safety Instructions for Care and Maintenance

WARNING!

Danger due to maintenance and service by unskilled personnel

Risk of serious injury and material damage

- Keep all unskilled personnel away from the working area.
- Perform all maintenance and service only by skilled personnel.

WARNING!

Danger due to electrical current

Risk of death or serious injury that is caused by electrical shock

- Switch off voltage supply before starting work.
- Secure against switching on again.
- Perform work on the electric system only by skilled electricians.

CAUTION!

Hazard due to wrong disposal of harmful substances

Risk of environmental damage that is caused by wrong disposal

- Observe all national and regional disposal rules and regulations.
- Observe all disposal instructions that are placed on the components or described in related documentation.

4.2 Maintenance Schedule

Note

After 550 days, in the display appears the information that a maintenance is required.

Tab. 5: Maintenance Schedule

Maintenance Task	Maintenance Level	Frequency	Reference
Clean components	Operator	If required	chapter 4.3.1
Replace supporting liquid and distilled water	Raytheon Anschütz Service	18 - 24 month	see Service Manual

Maintenance Task	Maintenance Level	Frequency	Reference
Replace pump rotor	Raytheon Anschütz Service	18 - 24 month	see Service Manual
Check Outer Sphere	Raytheon Anschütz Service	18 - 24 month	see Service Manual

4.3 Care Procedures

4.3.1 Clean Components

Requirements

Required Conditions
No conditions

Required Persons
1 Operator 0.5 h

Support Equipment
No support equipment

Consumables, Materials and Expendables

Appropriate cleaning material

Spares
No spares

Safety Conditions

WARNING!

Danger due to nonadherence to safety instructions

Risk of death or serious injury and material damage

- Observe all general safety instructions.
- Observe all safety instructions for installation and maintenance.

Procedure

1. Remove rough dirt and dust from respective device or component.

CAUTION!

Hazard due to wrong cleaning agents

Risk of material or environmental damage

- Use only suitable cleaning agents with no dangerous or acidic ingredients.

CAUTION!

Hazard due to clogging

Risk of material damage

- Use only cleaning cloth for cleaning.
- Do not use cotton waste for cleaning.

2. Clean device or component with suitable cleaning material.

Close Up
No close up

4.4 Preventive Maintenance Procedures

This system or equipment requires no preventive maintenance procedures performed by the operator.

4.5 Repair Procedures

This system or equipment requires no repair procedures performed by the operator.