Gyro Compass
STANDARD 20

Type 110 - 800, 110 - 804 and 110 - 806

Consisting of:
- Gyro Compass Casing with Outer Sphere, Type 110 - 222,
- Supporting Liquid, Type 148 - 162,
- Distilled Water, Type 148 - 398 and
- Gyrosphere, Type 111 - 006

OPERATOR MANUAL

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</table>
Safety Regulations

Caution!

- Maintenance and repair must be performed by trained and qualified personnel who are knowledgeable in equipment safety requirements!
- When the gyro compass is switched off, the rotors come to a standstill not before a running-down time of approx. 15 to 30 min has elapsed. During this time, no intervention in the gyro compass must be made. The gyrosphere might be damaged!

- It is recommended that during times when the ship is in harbour for up to one week, the gyro compass is not switched off.
- If warnings occur, the function of the gyro compass equipment is not restricted. Elimination of the causes in good time prevents possible failures. Please, inform authorized service personal!

Caution!

If no RAYTHEOn repeater compass is connected, the warnings and error messages are only displayed visually at the compass. For this reason it is essential that the digital display at the compass is monitored all the time. If supplementary audible signalling of error messages is required, it is a necessary to utilise the relevant contacts in the control unit.
1 General
The Gyro Compass STANDARD 20 provides an analog heading indication referred to true north. Via an absolute, coded scanning and transmission system, it guarantees an absolute and clear transmission of the compass heading reference via a serial interface to analog or digital repeater compasses, autopilot or other periphery devices that are able to process the serial interfaces of the compass.

Operator Manual
This operator manual contains all operating instructions as well as a survey of possible warnings and alarms indicated on the digital display.

Service Manual
In addition to the operator manual a service manual is available. It contains:
- information about installation and first putting into operation
- information about maintenance and shipboard repair
- a description of the gyro compass STANDARD 20
The operating instructions for the entire gyro compass equipment can be found in the main system description.

This operator manual is valid for the gyro compass types:
- Type 110 - 800: normal gyro compass
- Type 110 - 804: gyro compass with quick settle for the equipment STANDARD 20 PLUS
- Type 110 - 806: gyro compass without casing for mounting in the steering stand ComPilot 20

2

Switching on the Gyro Compass
With switching-on the 24 V power supply, the gyro compass is put into operation.

3

Signalling during Operation
After switching on the gyro compass, the digital display – visible through the window in the supporting plate – indicates:
(The digital display of the gyro compass type 110 - 806 for steering stand ComPilot 20 is visible by opening up the operator panel of the steering stand.)

<table>
<thead>
<tr>
<th>Indications</th>
<th>Comments, Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1 Heating Phase</strong></td>
<td></td>
</tr>
<tr>
<td><img src="heatingscreen" alt="Image" /></td>
<td><strong>28.8</strong> During the heating phase, the temperature of the supporting liquid is indicated. For example: h: heating phase 28.8: 28.8 °C</td>
</tr>
<tr>
<td><strong>2 Settling Phase</strong></td>
<td></td>
</tr>
<tr>
<td><img src="settlingscreen" alt="Image" /></td>
<td><strong>130.5</strong> After reaching the lower operating temperature of 45 °C: - Automatical switching-on of the compass internal follow-up system by the sensor electronics - During a settling time of approx. 3h, the digital display indicates the heading with a full stop behind the last position. <strong>Course value still imprecise and not usable!</strong></td>
</tr>
<tr>
<td><strong>3 Heading Indication</strong></td>
<td></td>
</tr>
<tr>
<td><img src="headingscreen" alt="Image" /></td>
<td><strong>130.1</strong> After termination of the settling procedure: - Heading indication <strong>Accuracy:</strong> After approx. 3 hrs.: better 2° After approx. 5 hrs.: better 0.1° x 1/°cos latitude</td>
</tr>
</tbody>
</table>
4

**Speed Error Correction**

The speed error $\delta$ is the difference between the course indicated by the gyro compass and the true course. The underlaying causes of this error, which is governed by the ship's speed, course and local latitude, are of the physical type.

This speed error must be corrected as described below.

For amount and sign of speed error, see Speed Error Table on the following pages.

---

The **TRUE COURSE** equals the compass course taking into account the correction value drawn from the speed error table.

Pay attention to sign!

---

**Example 1:**

<table>
<thead>
<tr>
<th>compass course</th>
<th>345°</th>
<th>Example 2:</th>
</tr>
</thead>
<tbody>
<tr>
<td>latitude</td>
<td>55°</td>
<td></td>
</tr>
<tr>
<td>speed</td>
<td>16 kn</td>
<td></td>
</tr>
<tr>
<td>correction value from table</td>
<td>−1.7°</td>
<td>correction value from table</td>
</tr>
<tr>
<td>true course</td>
<td>345° − 1.7° = 343.3°</td>
<td>true course: 223.7° + 1.3° = 225.0°</td>
</tr>
</tbody>
</table>

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For a bearing:

<table>
<thead>
<tr>
<th>compass course</th>
<th>255°</th>
</tr>
</thead>
<tbody>
<tr>
<td>latitude</td>
<td>55°</td>
</tr>
<tr>
<td>speed</td>
<td>16 kn</td>
</tr>
<tr>
<td>bearing</td>
<td>135°</td>
</tr>
<tr>
<td>correction value from table</td>
<td>+0.5°</td>
</tr>
<tr>
<td>true bearing</td>
<td>135° + 0.5° = 135.5°</td>
</tr>
</tbody>
</table>

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**Valid:**

The **TRUE COURSE** is always 'west' of the compass course.
## 4.1 Speed–error Table

<table>
<thead>
<tr>
<th>Latitude in °</th>
<th>northerly Courses in °</th>
<th>southerly Courses in °</th>
<th>Speed in kn</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sign of Course Correction</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>0 to 20</td>
<td></td>
<td>0</td>
<td>360</td>
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<td></td>
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<td>15</td>
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<td>southerly</td>
<td>Speed in kn</td>
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</tr>
<tr>
<td></td>
<td>Courses in °</td>
<td>Sign of</td>
<td>Course Correction</td>
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</table>
5

Signalling in Case Warnings have occurred

After one or more warnings have occurred, the decimal point is flashing as long as the warning is pending.

If warnings occur, the function of the gyro compass equipment is not restricted. Elimination of the causes in good time prevents possible failures. Please, inform authorized service personal!

6

Signalling in Case an Alarm has occurred

Errors, which have occurred within the gyro compass STANDARD 20, are indicated in the digital display as an alarm; the compass internal follow-up system is switched off, the gyro compass supplies no course values, all connected indicators follows the course change no more!

Immediately take the following measures

- switch-over to redundant operating modes (other gyro compass, if possible; operation with magnetic compass)
- contact Raytheon Anschütz Service.

An alarm, which has occurred, is indicated in the digital display by an 'E' (as Error) and by a numeral, for example:

Following errors are indicated:

E1: Operating voltage in compass is faulty
E2: Gyro supply faulty
E3: Encoder faulty
E4: Gyro current faulty
E5: Gyro Compass internal Follow-up faulty
E6: Temperature sensor breakdown
E7: Height of gyrosphere outside of tolerance
E8: Breakdown in heating
E9: Overtemperature >70°C
7  Switching off the Sensor
The gyro compass sensor is put out of operation by switching off the 24 V power supply.

Caution!
The gyro rotors only come to a standstill after a run-down time of approx. 15 – 30 min after the gyro compass has been switched off. During this time the gyro compass must not be opened for service or similar. Gyrosphere might be damaged!

It is recommended that during times when the ship is in harbour for up to one week, the gyro compass is not switched off.