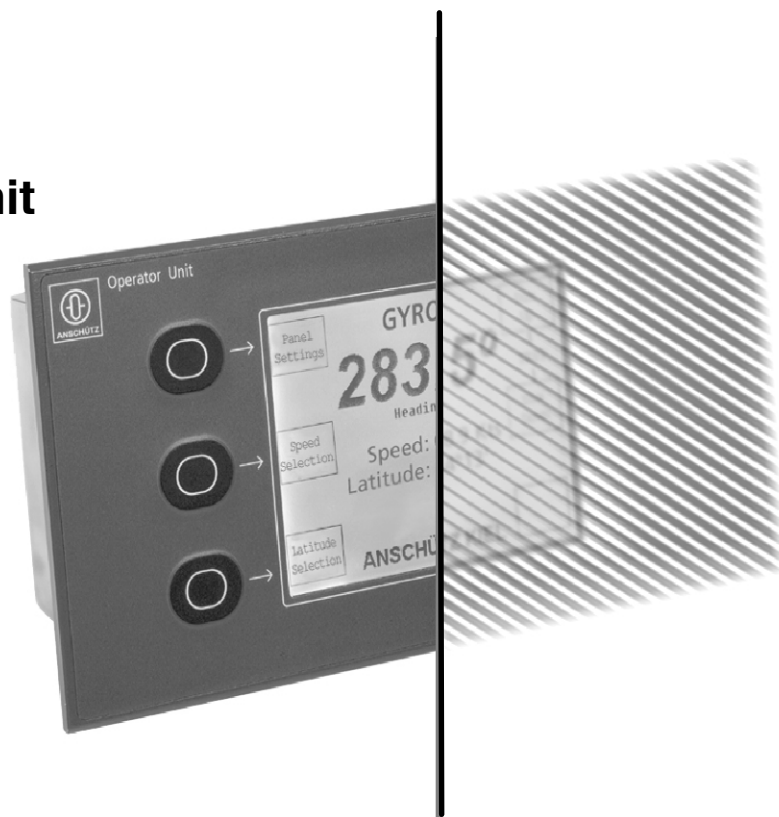




Operator Unit

Type 130 -613



1 Description

2 Operation

3 Maintenance and repairs

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Appendix: Operator Unit Dimensional Drawing 130 D 613 HP005



For operating in combination with a Satellite Compass
STD 21 GPS see respective manual no.: 3717



Only for GGMR application!
All manually set values have to be set for both
Distribution Units.

Operator Unit
130-613

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Konformitätserklärung des Herstellers

Artikel Nr. 10 der Richtlinie 96/98/EG

Manufacturer's Declaration of Conformity

Article 10 – EC-Directive 96/98/EC

Hiermit wird bestätigt, daß das nachfolgend aufgeführte Produkt dem baumustergeprüften Produkt entspricht und gemäß Qualitätssicherungs-Modul D erfolgreich getestet wurde.

This is to certify that the product identified below has been manufactured in accordance with type approved units and has been successfully tested according to the Quality Assurance Module D.

Produktbezeichnung/
Product Designation:

**Gyrocompass System /
Gyrocompass System for High Speed Craft**

Typ / Type:

Anschütz Gyro Compass Standard 22
(Systemkomponenten siehe Anlage/
system components see attached)

Baumusterprüfung durch/
Type Examination by:

GL Luxembourg
26, place de la Gare
L-1616 Luxembourg

Benannte Stelle Nr. 0801/
Notified Body No. 0801

Baumusterprüfbescheinigungen Nr./ 47778 - 03 Lux, 47779 - 03 Lux
Type Examination Certificates No.:

Angewendete Normen
und Richtlinien/-
Applied Standards and
Directives:

Directive 96/98EC / Additional Directive 2001/53/EC
Additional Directive 2002/75/EC
EN 61162-1, EN 60945, IEC 60945, IEC 61162-1
EN ISO 8728, ISO 16328
IMO Resolutions A.424 (XI), A.694 (17), A.813 (19)
A.821(19), MSC.64 (67) Annex 4, MSC.97(73)

Diese Erklärung wird verantwortlich für den Hersteller abgegeben durch/
This declaration has been made in the name of the manufacturer by:

Kiel, den 03.05.2004

Raytheon Marine GmbH
Head of Quality Management

Raytheon Marine GmbH
Head of Qualification / Certification



Michael Körner on behalf of
Martin Wloka



Günther Krappe

EG-BPB/GL-47778-03Lux/47779-03Lux

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Operator Unit 130-613



Operator Unit

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Konformitätserklärung des Herstellers

Artikel Nr. 10 der Richtlinie 96/98/EG

Manufacturer's Declaration of Conformity

Article 10 – EC-Directive 96/98/EC

Anschütz Gyro Compass Standard 22

Auflistung der Systemkomponenten / Listing of the system components:

Gyro Compass	110-233	
Gyrosphere	111-006	
Operator unit	130-613	
Distribution unit	138-118	
Additional output box	146-103 NG001	¹
AC DC Converter	121-062	¹

¹ Optional

Additional configurations:

The master compass STANDARD 22 type 110-233 with Gyrosphere type 111-006.E001 may be also used with the system configurations and equipment listed in EC-type approval certificate No. 6297/0032/00 (STANDARD 20) from Bundesamt für Seeschifffahrt und Hydrographie (BSH) Germany, and listed in EC-type approval certificate No. 17063-00 GL Lux (GYROSTAR II) from GL Luxembourg.

Operator Unit
130-613

List of used Abbreviations

CAN	Controller Area Network
Diff	Difference
GND	Ground
GPS	Global Positioning System
ESC	Escape
IP	Internal Protectio
kn	Knots
Lat	Latitude
LCD	Liquid Crystal Display
LED	Light Emitting Diode
Mag	Magnetic
Man	Manual
NMEA	National Marine Electronic Association
PCB	Printed Circuit Board
Pos	Positon
RoT	Rate of Turn
RS	Recommended Standard
Spd	Speed
VHW	Velocity Heading through Water
VTB	Velocity below Water
VTG	Velocity through Ground

1

General Information

The Operator Unit is designed so that users can operate all items of equipment connected to a CAN bus (see section 1.1.2).

All the equipment integrated into the navigational system, such as the gyro compass, the GPS compass and the magnetic compass can be operated through the Operator Unit application described here.

Several Operator Units can be connected to a CAN bus.

There is no priority control system for connected Operator Units. Each Operator Unit connected to the system has the same priority.

The Operator Unit is used to select, use and monitor the navigational devices (sensors).

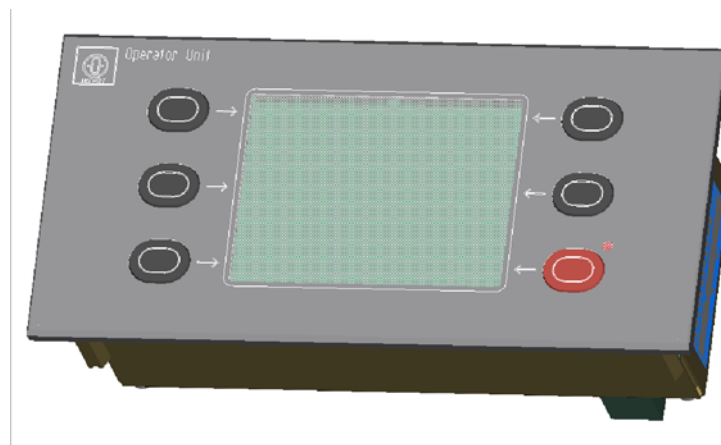


Figure 1: Operator Unit (desk flush mounted) 130 -613

1.1 The Construction of the Operator Unit

The Operator Unit is available in two versions – desk-flush mounted, and with angled fixing bracket.

The Operator Unit consists of a casing with a front panel.

All the electronics components required are accommodated inside the casing on 2 PCBs.

The front panel contains the display, 6 sealed membrane keys and a two-colour LED.

The PCBs are connected to the display unit via an optical fibre.

An alarm transmitter is mounted behind the front panel to transmit audible alarms.

The Operator Unit is designed for two redundancy CAN (CAN1 and CAN2) busses.

The Operator Unit is equipped with a PTC in the supply voltage line.

In the event of a fault (short circuit in the Operator Unit) this PTC reduces the current, thus preventing further damage to the equipment.

There is no voltage fuse protection.

1.1.1 Principle of Operation

Once a voltage supply is present, the Operator Unit is able to detect every connected item of navigational equipment (sensors) and indicate them on the display unit. Depending on the status of the device, heading information is also now displayed. Any gyro compasses connected will deliver a usable heading only after the heating and settling stages.

If several sensors are connected, in principle the heading data supplied by the gyro compass designated GYRO will be displayed (provided it is enabled and usable); if several gyro compasses are in use, the one designated GYRO 1 will be displayed. A membrane key (Select Sensor & Menu) can be used to select a different sensor or sub-menu (see also Figure 3 and section 2.2.1.4).

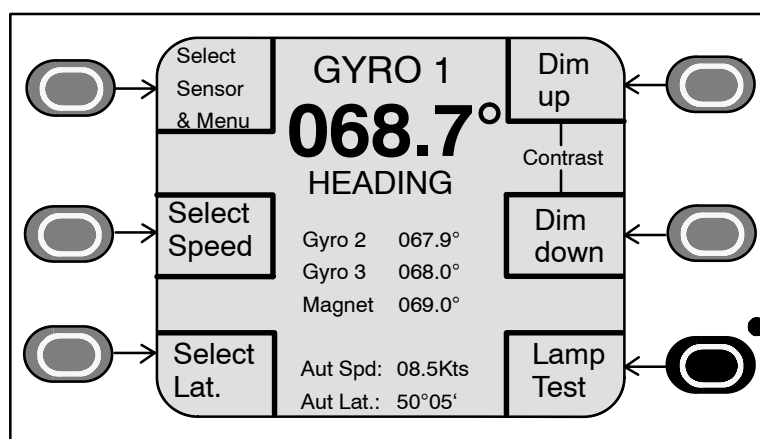


Figure 2: Example of a display after it has been put into operation

Explanation of the controls and indicators:

The Operator Unit display is divided into the display section and 6 soft keys.

The upper section of the display area indicates the sensor that is selected, and the heading data it is indicating. Additional information about the selected sensor is displayed underneath.

The lower section lists all the sensors connected to the CAN bus.

The display and the softkey designations (the fields on the display) alter depending on which sensor is currently selected, to enable you to make settings relevant to the sensor in question.

A membrane key is assigned to each soft key. The soft keys are operated by pressing this membrane key.

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A two-colour LED is positioned above the red membrane key. This LED indicates alarms and their status. It also serves to indicate when selected data has been transferred to the CAN bus. (the “SET” soft key).

See section 2 of this manual for further information about the controls and indicators.

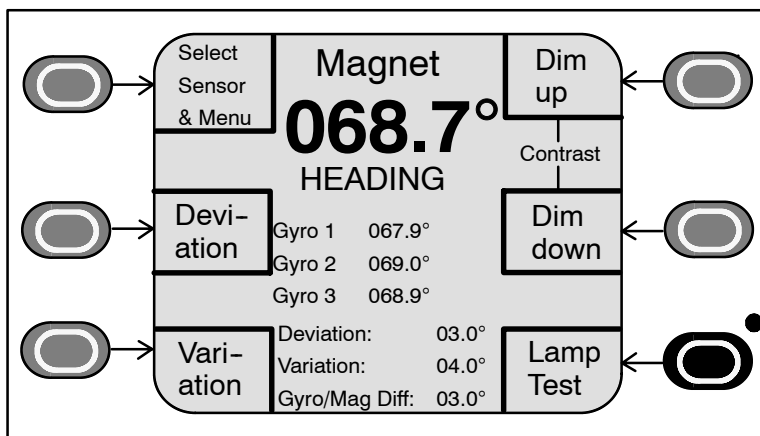



Figure 3: Example of the display when the “Magnetic Sonde” sensor is selected

All equipment and sensors connected to the CAN bus take the data they require for their particular function from the CAN bus.



The selected sensor leads the heading information to all connected receivers via the CAN bus. But not each heading receiver is allowed to use heading information from a magnetic compass if selected.

1.1.2

CAN-Bus

(CAN = Controller Area Network)

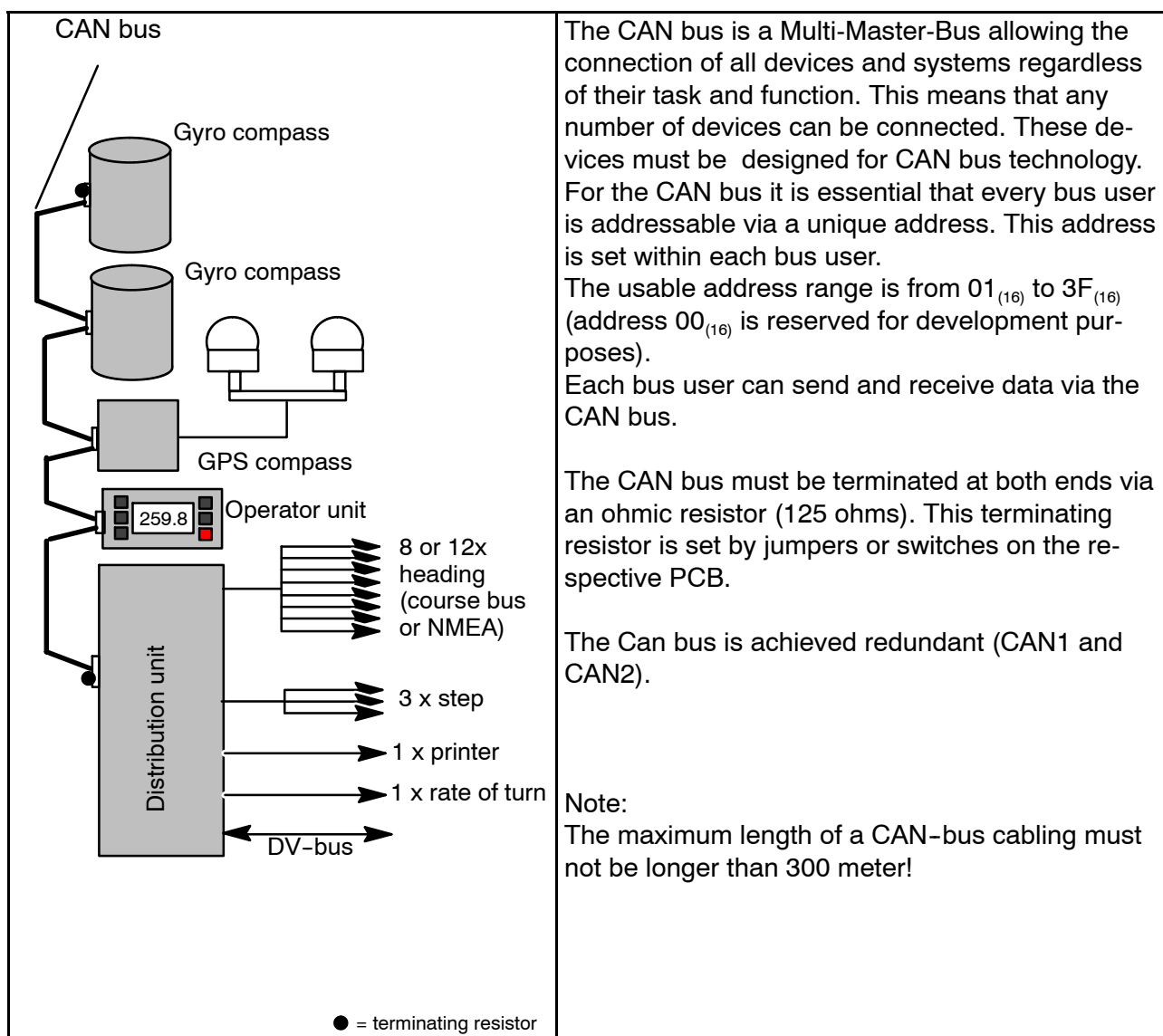


Figure 4: Principle of CAN bus

Operator Unit 130-613

1.2 **Technical data**

1.2.1 **Mechanical data**

Length Width Height:	80x192x96
Type of enclosure:	IP23 (higher rating with special casing)

See also OPERATOR UNIT DIMENSIONAL DRAWING 130 D 613 HP005

1.2.2 **Electrical data**

Supply voltage:	24 V d.c. (9 .. 36 V d.c.)
Current consumption:	0.2A)
Interfaces:	2 x CAN bus (optional RS422)

2 Operation

2.1 Controls and Indicators on the Operator Unit

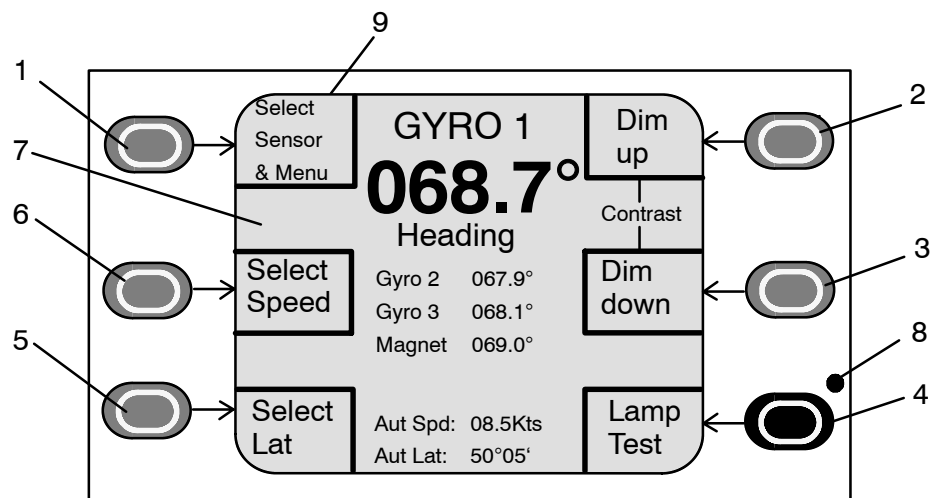


Figure 5: Controls and Indicators on the Operator Unit

Figure 5/no.	Signification
5/1, 5/2, 5/3, 5/4, 5/5, 5/6	Membrane keys The signification of the membrane keys is determined by Soft-key fields (5/9).
5/4	(Red) membrane key used to acknowledge alarms and confirm data entries. Performing Lamp Test.
5/7	LCD display
5/8	Two-colour LED red: alarm message yellow. request to confirm where: <ul style="list-style-type: none"> - values have been changed - a sensor has been selected Note: If an alarm message occurs during a period of request to confirm, then the alarm message has the higher priority.
5/9	Soft key field The software determines the function.

Operator Unit 130-613

2.2 Setting into Operation

The Operator Unit must be configured for CAN bus operation in accordance with the jumper list (see section 8.4.1.2) (the RS422 configuration is a special application only).

The Operator Unit switches on as soon as it has a supply of operating voltage.
Display once the operating voltage is present:

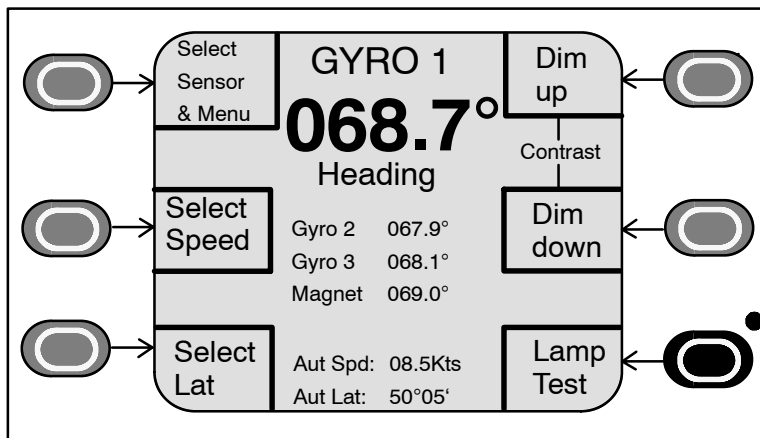




Figure 6 Display once the voltage supply is present.


2.2.1 General Information regarding the Operation of the Operator Unit

The principle of operation is explained on the figure illustrating the display for Gyro1.
The meaning and function of each soft key depends on the sensor concerned, and these are explained in more detail in the section referring to the sensor in question.

2.2.1.1 Overview of display information (compass)

Information	Sense
Gyro 2: 067.9° Gyro 3: 067.8° Magnet: 069.0° A maximum of 3 not selected sensors can be displayed.	Gyro 1 selected. Displaying of not selected sensors. 2 Gyros and 1 Magnetic compass
Gyro 1: 067.9° Gyro 2: 067.8° GPS: 067.8° A maximum of 3 not selected sensors can be displayed.	Magnet selected Displaying of not selected sensors. 2 Gyros and 1 GPS-compass (for operating the GPS with the Operator Unit see manual no. 3717)
Gyro 2: 067.9° GPS: 067.8° Magnet: 067.8° A maximum of 3 not selected sensors can be displayed.	Gyro 1 selected Displaying of not selected sensors. 1 Gyro, 1 GPS-compass and 1 Magnetic compass (for operating the GPS with the Operator Unit see manual no. 3717)
GYRO 1 068.7° Heading	Heading of selected sensor (Gyro1)
GYRO 1  (QS-possible)	Gyro 1 selected. Still within the 3 minutes after switching-on in the heating stage. Quick Settling is possible.
GYRO 1  No Heading	Gyro 1 selected. No heading indication = error

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<p style="text-align: center;">GYRO 1  Heading (Heating)</p>	<p>Gyro 1 selected. Gyro 1 in the heating stage, time to activate quick settling (3 minutes) is over.</p>
<p style="text-align: center;">GYRO 1 068.7° Heading (Settling)</p>	<p>Gyro 1 selected. Gyro 1 in settling stage (heating stage is over). Heading information still inexact, see compass STD 22 manual.</p>
<p>Gyro 2: 067.9° (X) Gyro 3: 067.8° Magnet: 069.0°</p>	<p><u>"X" could be:</u> ---. °(E) Error, than heading information is not displayed.</p> <p>068.9 °(Q) Quick Settling, the heading value to which the gyro will settle is displayed.</p> <p>068.9 °(S) Settling Stage, the Gyro is still settling, heading is displayed, the precision is still restricted.</p> <p>---. °(H) Heating stage, the activation of the quick settling function is not possible, time to activate this function (3 minutes) is over.</p> <p>QS possib Quick Settling possible, during 3 minutes after switching on.</p> <p>068.9 °(C) Caution. This warnings show short disturbances, which lead (if not debugged) long dated to a breakdown. For more details see compass STD 22 manual, section 2.2.2.4</p>

2.2.1.2

Changing the Default Settings

Below is a short description (shown at one example) how to change default values.

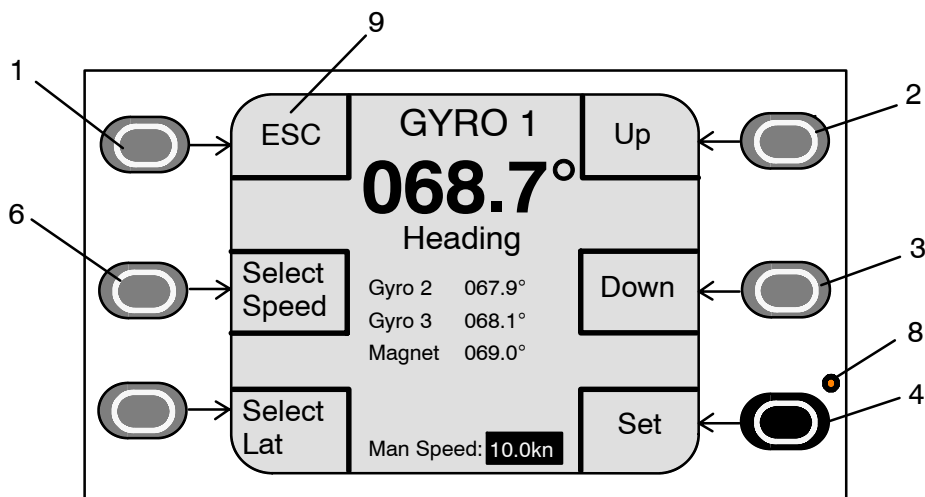


Figure 7: Controls and Indicators on the Operator Unit

Changing the values:

The “Man Speed” function is called by pressing the “Select Speed” soft key (see Figure 7/6) (as shown in Figure 7). The default value for this function is 10.0 kn. Press the up or down keys (Figure 7/2 and 3) to increase or reduce this value by increments.

Confirm:

Once the value has been altered to a value within the permitted range, the two-colour LED (Figure 7/8) flashes “yellow”. This means that the new value can be transferred to the CAN bus. The new value is accepted when you press the “Set” key (Figure 7/4). The amended value has been transferred successfully when the LED is no longer lit. If the operation is not finalised, you can press the ESC key (Figure 7/1) to restore the value you started with.

TIME OUT function:

If no key is pressed for a period of 12 seconds while starting altering a value, amend mode is cancelled and the display reverts to the previous indication. To change the value, you need to call the function again.

2.2.1.3 Adjusting Brightness and Contrast

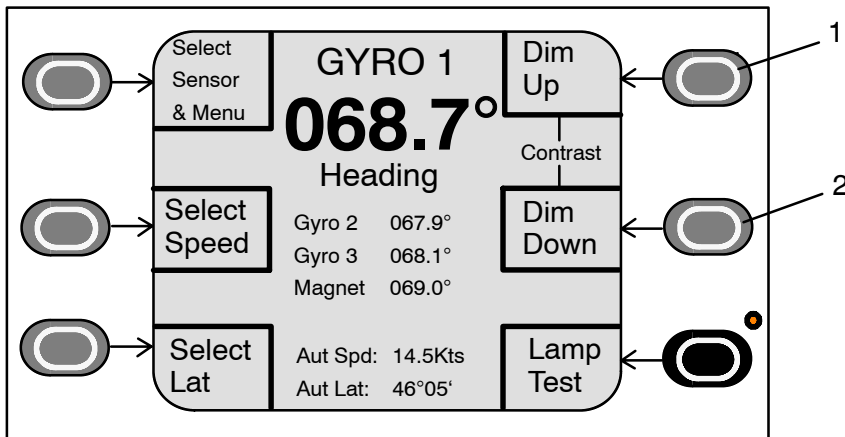


Figure 8: Controls and Indicators on the Operator Unit

Use the “Dim Up” key (1) to make the display brighter and the “Dim Down” key (2) to make it darker.

This setting is retained even after the equipment has been switched off.

To adjust the contrast first press the “Dim Up” (1) and “Dim Down” (2) keys simultaneously. The display now changes:

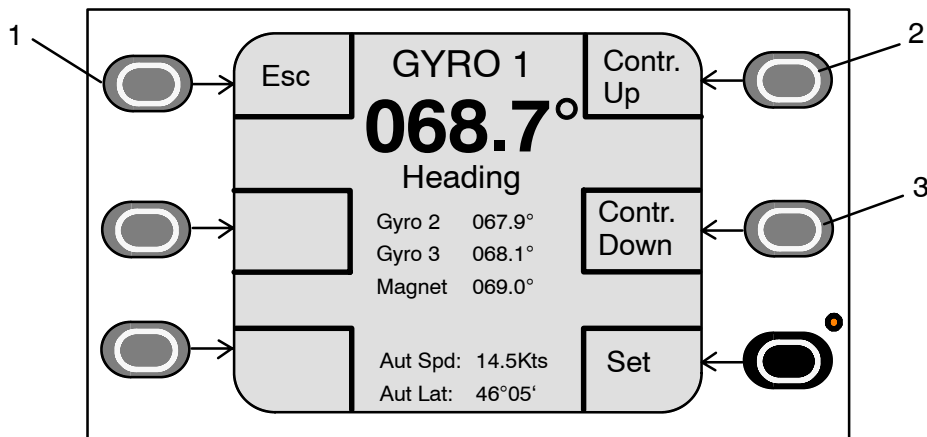


Figure 9: Adjusting the contrast

Once the display has changed (see Figure 9) you can adjust the contrast using the “Contr. Up” (2) and “Contr. Down” (3) keys.

The display reverts to the original setting if you press the “ESC” key (1) or after a time out period of approximately 4 seconds.

2.2.1.4

Changing the Current Sensor

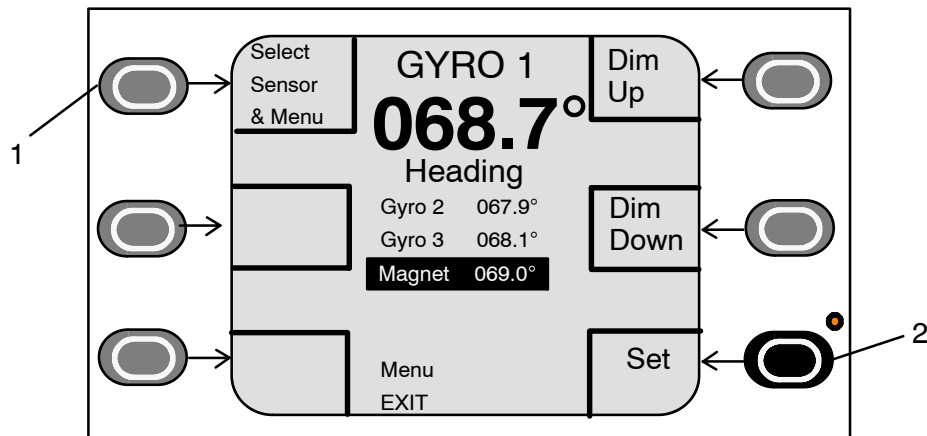
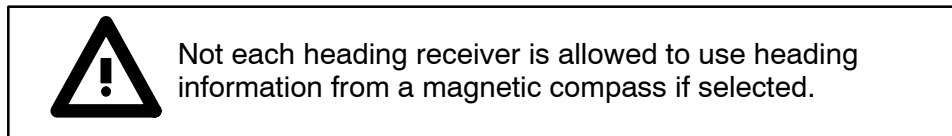


Figure 10: Controls and Indicators on the Operator Unit
(Selected Sensor: Gyro1)

Each time the “Select Sensor & Menu” key (Figure 10/1) is pressed one of the sensors connected to the CAN bus system will appear on the screen (top).

If you now press the “Set” key (Figure 10/2) to confirm the sensor you have selected, heading data provided by that sensor will now display on the display unit.

Use the Exit and Set keys to exit from the Select Sensor & Menu function.

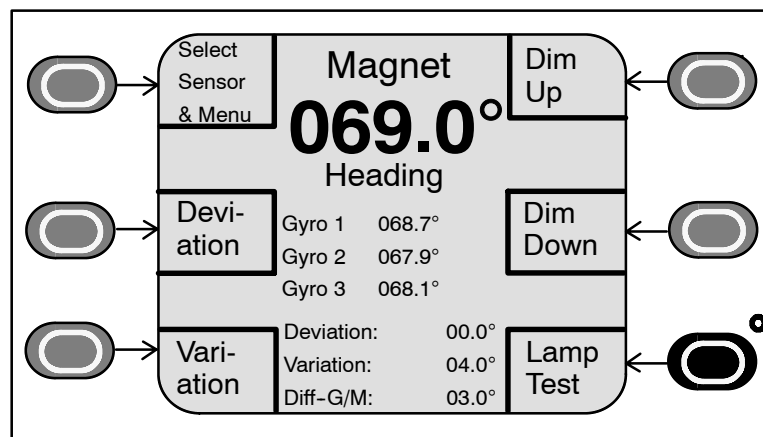


Figure 11: Controls and Indicators on the Operator Unit
(Selected sensor: Magnetic sonde)

2.2.1.5 Menu selection

Use the “Select Sensor & Menu” soft key to select a sub-menu.

This sub-menu is used to make settings that require updating relatively rarely, but which are provided for servicing purposes.

Sub-menu

- Diff.Alarm (see section 6.1.1 for Gyros and 4.1 for Magnetic compass)
The monitoring threshold setting between Gyro1, Gyro2 and Gyro3
GPS (if used) is identical to a Gyro.
(Default: Gyro/Gyro Diff = 03.0°)
The monitoring threshold settings between selected Gyro and Magnetic compass
(Default: Gyro/Mag Diff = 05.0°)
- Panel Set Up (see section 6.2)
In this sub-menu the volume of the alarm horn may be adjusted and the actual software status is displayed.
- Service (see section 6.3)
There are two pages which may be selected. The pages contain:
 - Displaying of CAN bus addresses and heading without correction values
(as there are speed error correction and alignment error)
 - Adjustment of damping of the Rate of Turn
 - Displaying and selection of speed source
 - Activation of DV-bus and adjustment of DV-bus address for the distribution unit
 - Automatic switch-over if a Gyro fails.
 - Applying and changing of a deviation table
 - Performing GPS configuration
 - Displaying operational data of all Gyros
 - Displaying of software versions of all Gyro and Distribution Unit memories
- Quick Settling (see section 3.4)
In this submenu the quick settling function can be activated for each gyro.
This submenu is shown only, if there is a possibility for Quick settling.

2.2.1.6

Lamp test

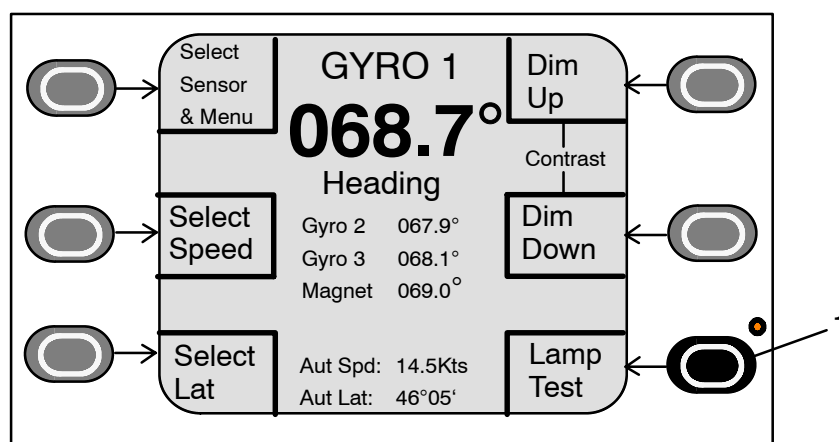
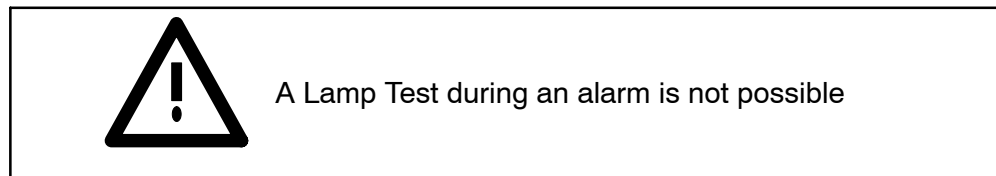


Figure 12: Controls and Indicators on the Operator Unit

By operating the softkey "Lamp Test" (Figure 12/1) for appr. 3 seconds the LED above this soft key lights up, an acoustic alarm occurs (with selected volume, see section 6.2) and the brightness increases.

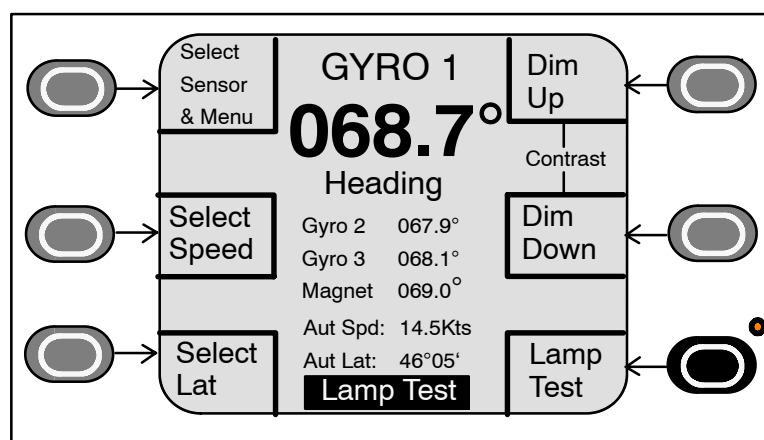


Figure 13: Controls and Indicators on the Operator Unit
(During Lamp Test)

2.2.2 Alarm and Fault Handling

2.2.2.1 Alarm handling

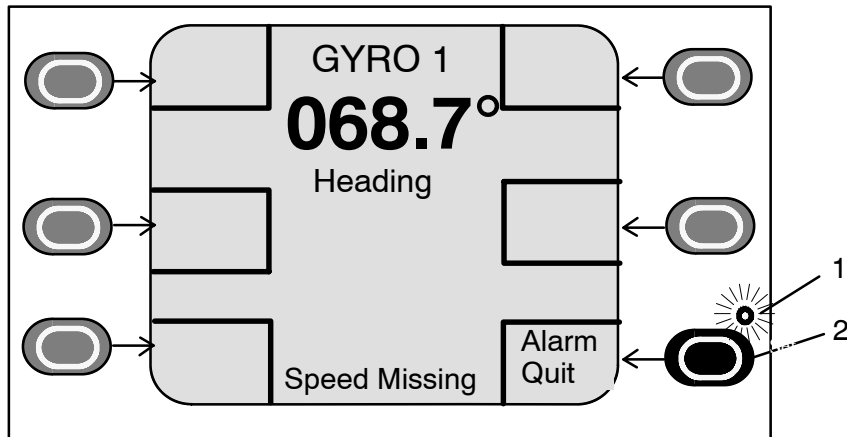


Figure 14: Controls and Indicators on the Operator Unit
(alarm is indicated)

An alarm is indicated in two ways; the two-colour LED (Figure 14/1) flashes red and the signal transmitter emits an audible signal.

The reason for and the origin of the alarm is also displayed.

In the event of an error, the unselected sensors are flagged as not usable (---.-°).

No audible signal is emitted.

Users cannot select a faulty sensor.

There is no need to remedy the cause of the alarm in order to alter values.

If the alarm is acknowledged by pressing the “quit” key (Figure 14/2) but the cause of the error is not remedied, the two-colour LED lights red and the audible signal stops.

The two-color LED will go out only once the cause of the alarm has been remedied.

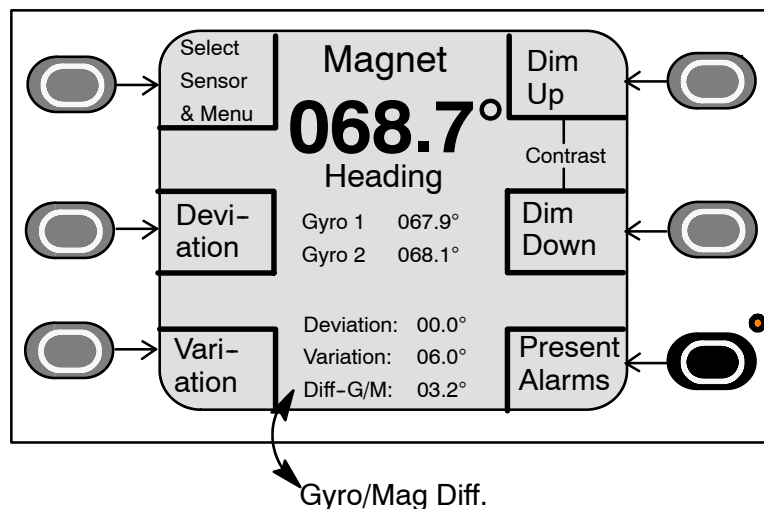


Figure 15: Controls and Indicators on the Operator Unit
(Example: Difference threshold alarm is indicated)

After an alarm is acknowledged without a remedy the button “Alarm Quit” is replaced by the button “Present Alarms”, the alphanumeric alarm message is no longer displayed, only the LED (red) still lights up.

By pressing the button “Present”Alarms” the alarm message is displayed again for the time of operating this button.

If there are several alarms, only the alarm with the highest priority is shown.

Only after a remedy of this fault, the next alarm message can be displayed by pressing the button “Present Alarms”.

The next table shows a summary of messages which can be displayed and which show an error or a faulty operational status.


Operator Unit
130-613

2.2.2.2 Status and alarm messages (an overview)

Displayed message	Meaning
No connection	CAN bus not connected to the Operator Unit
No Data on Bus	No usable data on the CAN bus.
Sensor Error	Is displayed if the selected sensor fails, or if the selected sensor is no longer connected to the CAN bus. This message can occur with a selected Gyro or a selected Magnetic compass. This message has to be seen in combination with Heading information “---.°”
Distribution Err.	Is displayed if the active Distribution Unit fails with a dropped relay “System Failure”. This message is displayed too if the active Distribution Unit is not connected to the CAN bus.
Speed Missing	<u>An external sensor fails.</u> Is displayed if the external connected speed sensor fails or generates unusable data and the operating mode “Aut Speed” is selected.
Pos. Missing	<u>An external sensor fails.</u> Is displayed if the external connected position sensor fails or generates unusable data and the operating mode “Aut Lat” is selected.
Gyro/Mag Diff.	Is displayed if the set heading difference threshold between a Gyro and a Magnetic compass is exceeded (see also sections 4.1. and 6.1).
Gyro/Gyro Diff.	Is displayed if the set heading difference threshold between two Gyros is exceeded (see also section 6.1).
GPS/Mag. Diff.	Is displayed if the set heading difference threshold between a Gyro and a Magnetic compass is exceeded, but this Gyro is a Satellite Compass STD 21 (GPS) (see also sections 6.1).
Gyro/GPS Diff.	Is displayed if the set heading difference threshold between two Gyros is exceeded, but one of the Gyros is a Satellite Compass STD 21 (GPS) (see also section 6.1).

Displayed message	Meaning
Switched to Mag.	Is displayed if the selected Gyro fails, no further Gyro is available, a Magnetic compass is connected and the automatic switch-over function is set (see also section 6.3.2.2).
Switched to Gy1	Is displayed if the selected Gyro or Magnetic compass fails and the automatic switch-over function has switched to Gyro 1 (see also section 6.3.2.2).
Switched to Gy2	Is displayed if the selected Gyro or Magnetic compass fails and the automatic switch-over function has switched to Gyro 2 (see also section 6.3.2.2).
Switched to Gy3	Is displayed if the selected Gyro or Magnetic compass fails and the automatic switch-over function has switched to Gyro 3 (see also section 6.3.2.2).
Switched to GPS	Is displayed if the selected Gyro fails, no further Gyro is connected and the automatic switch-over function has switched to Gyro 3/GPS (see also section 6.3.2.2).
No Heading	(Blinking line below the heading line) Is displayed together with Sensor Error. Note: The message "Sensor Error" is no longer displayed after acknowledging but the message "No Heading" still remains (see also section 2.2.2.3).
Heading (Heating)	(Blinking line below the heading line) Information that the selected sensor (Gyro) is in the heating stage (see section 3.1.1.1).
Heading (Settling)	(Blinking line below the heading line) Information that the selected sensor (Gyro only) is in the settling stage (see section 3.1.1.1).
QS possible	(Blinking line below the heading line) Indication that it is possible to activate the Quick Settling function for the selected sensor (Gyro only) (see section 3.4).
Quick Settling	(Blinking line below the heading line) Information that the selected sensor (Gyro only) is in the settling stage (Quick Settling) (see section 3.4).

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Displayed message	Meaning
Not Accepted	(Displayed at the bottom line for approx. 2 seconds). Is displayed during pressing "Set" key if the selected value is not accepted or the selected action is not practicable (like manual selection of a faulty sensor) (see also section 6.3.1.4).
<ul style="list-style-type: none">- Stern GPS Com.- Bow GPS Com.- Stern GPS Bit- Bow GPS Bit- Sync. Failure- IMU Error- Init. Failure- Data I/F#3 Com.- Data I/F#4 Com.- Heading Failure- Poor Sat. signals- Gyro Triad Error- Accel. Error	 <p>These alarm messages are generated by the Satellite Compass STD 21 (GPS). These alarm messages are possible only, if a Satellite Compass STD 21 is installed. For detailed information, see STD 21 manual no. 3717, section troubleshooting.</p>

PLEASE NOTE: The red softkey (Acknowledge alarm) has to be pressed to display above mentioned alarm messages.

PLEASE NOTE: Alarm messages from external sensors can occur, if a connection to an external sensor has been removed (for installation for example).
In this case a POWER OFF/POWER ON procedure will eliminate this alarm message.

2.2.2.3 General Error Messages

The CAN bus is designed for redundancy and carries out error processing in the background.

“One” CAN bus has failed.

Reaction:

This error can be detected only by constantly observing the display unit.

If one CAN bus fails (for example if the plug comes loose) the display information is frozen briefly (for appr. 2 seconds) while the data is transferred to the second CAN bus.

No special message is output onto the display unit.

Once the data has changed over to the second bus data transfer will continue undisturbed. User functions are not restricted as long as only one fault is present.

No usable data on the CAN bus.

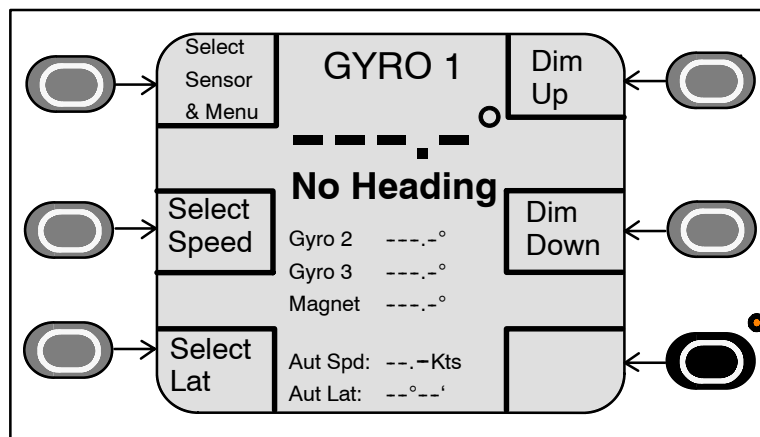


Figure 16: Controls and Indicators on the Operator Unit
(No usable data on the CAN bus – 1st message)

Initially the heading information is faded out and replaced with horizontal dashes in this first message (see Figure 16).

The display alters after 3-5 seconds and information about the error is displayed.

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This error message flashe , and at the same time the LED (Figure 17/1) lights red.

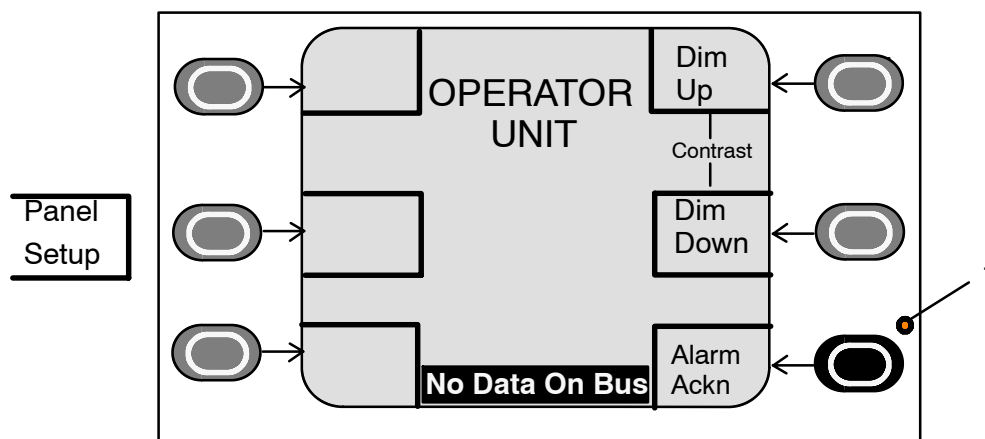


Figure 17: Controls and Indicators on the Operator Unit

(No usable data on the CAN bus - 2nd message)

Once the “Alarm Ackn” key is pressed, the error message and the LED cease to flash. The LED continues to light constant red and the error message stays on the display until the fault has been remedied.

After pressing the “Alarm Ackn” key the soft key “Panel Setup” is displayed too (from software version E10). After operating this key (“Penel Setup”) the actual software version is displayed (see also section 6.2).

Both CAN bus plugs on the Operator Unit have come loose.

Magnetic Sonde selected: First a “Distribution Err.” is displayed, than quit, than the message according to Figure 18 is displayed.

Gyro selected: First a “Sensor Error” is displayed, than quit, than the message according to Figure 18 is displayed.

How the error is indicated:

1.) All the indications are frozen for approximately 4 seconds.

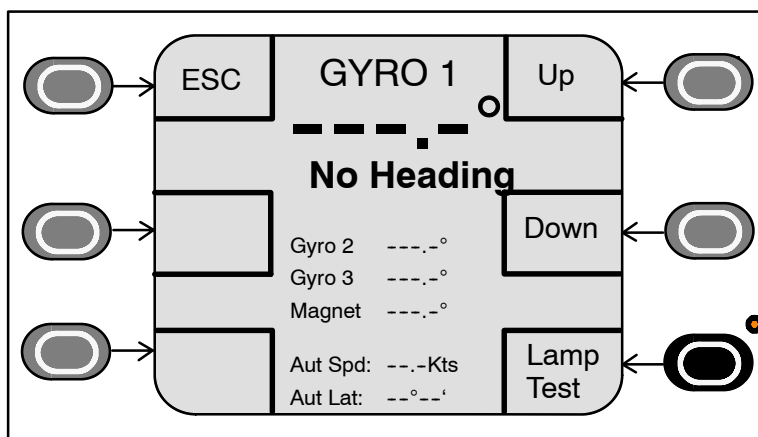


Figure 18: Controls and Indicators on the Operator Unit
(No CAN bus is connected to the Operator Unit)

- 2.) All the information is faded out and replaced with horizontal dashes (see Figure 18).

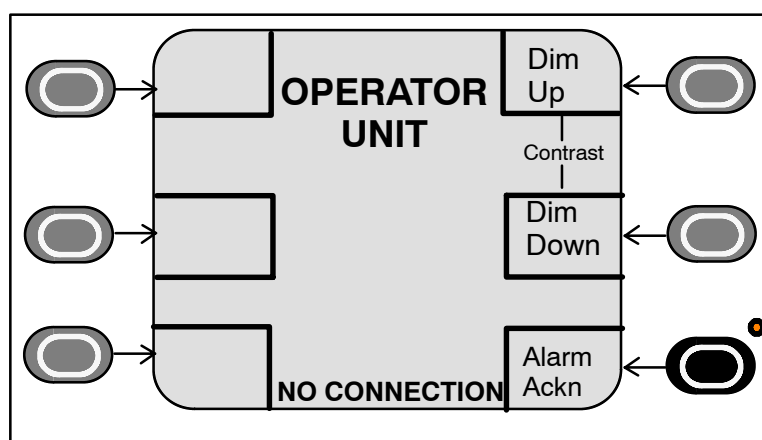


Figure 19: Controls and Indicators on the Operator Unit
(No CAN bus is connected to the Operator Unit)

- 3.) The display alters after 3-5 seconds and the error message "NO CONNECTION" is displayed. (see Figure 19).

A visual and audible alarm is emitted.

Cause of this error message can be either a missing termination resistor, a missing CAN bus connection or a wrong connected CAN bus.

Once the "Alarm Ackn" key is pressed, the error message and the LED cease to flash.

The LED continues to light constant red and the error message stays on the display until the fault has been remedied.

"Penel Setup" is possible.

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2.2.2.4 Warnings

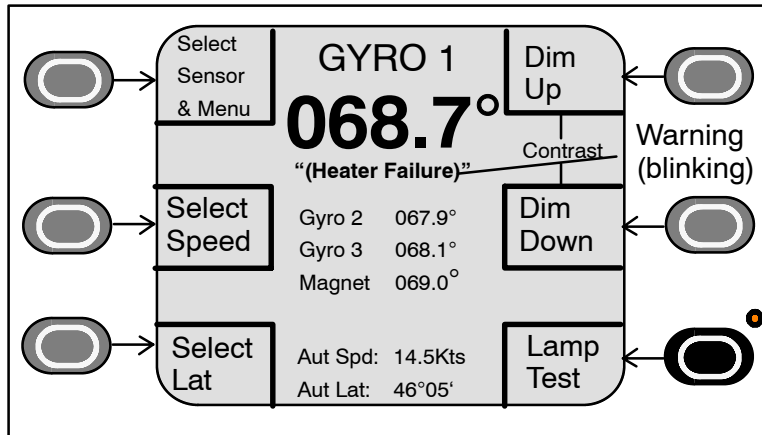


Figure 20: Controls and Indicators on the Operator Unit
(with a displayed warning -> blinking)

Each connected Gyro can generate one or more warnings.

These warnings do not stand for an error, but they may lead to a defect, if no measurement are attempt to eliminate the cause of this warnings.

For detailed information to warnings, their possible causes and the respective measurements, see Compass STD 22 manual .

There are 5 warnings possible, each warning has a priority (this priority is not displayed):

Warning	Priority
"(Voltage cut-off)"	Priority 1
"(Fan failure)"	Priority 2
"(Heater Failure)"	Priority 3
"(Liquid > 60~C)"	Priority 4
"(Liquid Level low)"	Priority 5

A warning is no longer displayed, if the cause is eliminated or, if the cause is no longer present.

If there are several warning at the same time, the warning with the highest priority is displayed. After the cause of this warning is eliminated, the warning with the next lower priority is displayed.

The warning "(Voltage cut-off)" – highest priority – has to be acknowledged (operating the red push button), the signal horn is on and the LED (red) blinks.

It is not necessary to acknowledge one of the other warnings.

Warnings and alarms may occur at the same time.

Alarms have to be handled prior (acknowledged).

If the warning ("Voltage cut-off") an alarm occur at the same time, the alarm has to be acknowledged first.

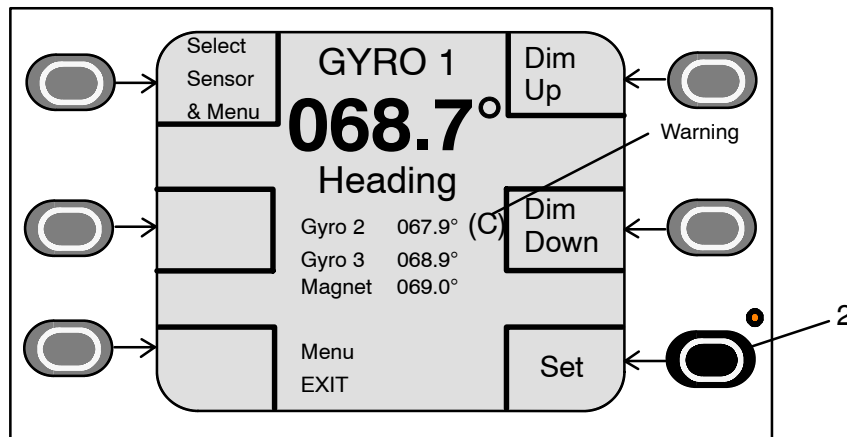


Figure 21: Controls and Indicators on the Operator Unit
(Warning of a not selected sensor)

3 Gyrocompass Operation

3.1 Selecting the Sensor

Initial status: Gyro 1 is selected as the navigational sensor.

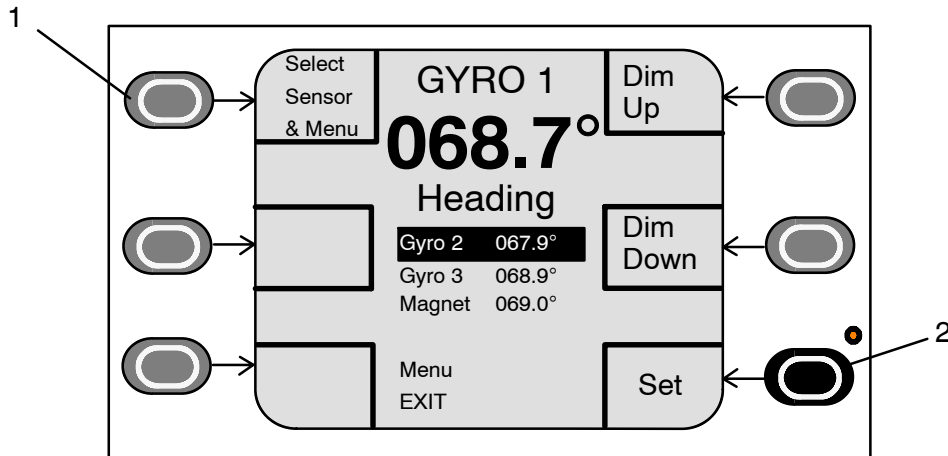


Figure 22: Controls and Indicators on the Operator Unit
(Gyro 1 sensor is selected)

Press the “Select Sensor & Menu” soft key (Figure 22/1) until the “Gyro 2” line is selected.

Confirm the selection by pressing the “Set” (Figure 22/2) softkey.

Heading information will now be output to the display by Gyro 2 (see Figure 23).

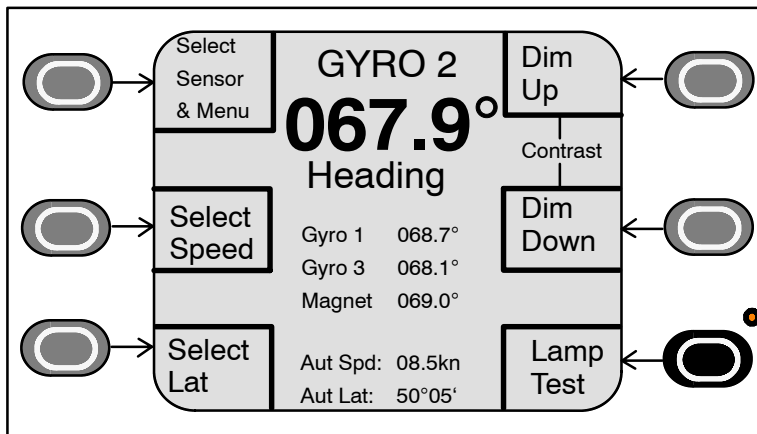


Figure 23: Controls and Indicators on the Operator Unit
(Gyro 2 sensor is selected)

3.1.1

The HEADING display

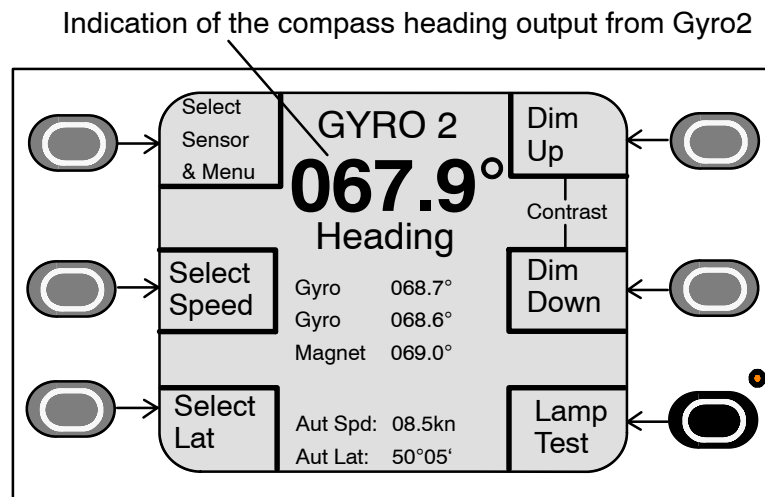


Figure 24: Controls and Indicators on the Operator Unit
(Compass heading indication)

After Power ON Gyro1 is selected as the default compass and the heading value is displayed in large lettering.

All other available heading sensors are available for selection and are also indicated on the display for monitoring purposes.

They can be changed over using the “Select sensor” and “Set” softkeys.

3.1.1.1 Heading indication from gyro system after switching on (Heating stage and settling stage)

Note: During the first 3 minutes after switching-on (heating stage), it is possible to activate the quick settling function (see section 3.4).

We distinguish between 2 different status
(see also manual 3646 "STD 22 Gyro Compass"):

- the heating stage
- the settling stage

During the heating stage on the gyro system the heading information is not valid and the only indication is a set of dashes (---.-°). The "Heating" status is indicated (flashing) next to the heading indication.

With a second gyro system (for example) a "H" (for heating) is positioned alongside the monitor indicator. (see Figure 25).

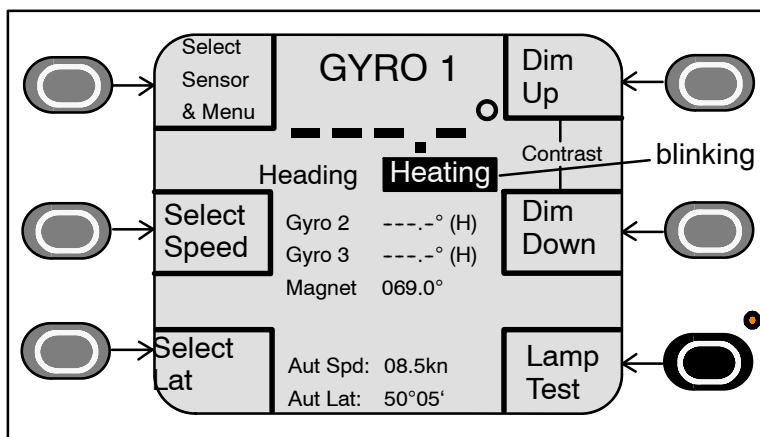


Figure 25: Controls and Indicators on the Operator Unit
(Indications on the gyro system during the heating stage)

The gyro heading may be used to a certain extent during the settling stage. However you should be aware that there will still be fairly high error margins. The gyro system is settled after a period of 4 hours and will then indicate the gyro heading to the specified precision.

The gyro heading is indicated on the display during the settling stage. The “Settling” status is indicated (flashing) next to the heading indication. With a further gyro system a “S” (for settling) is positioned alongside the monitor display (see Figure 26).

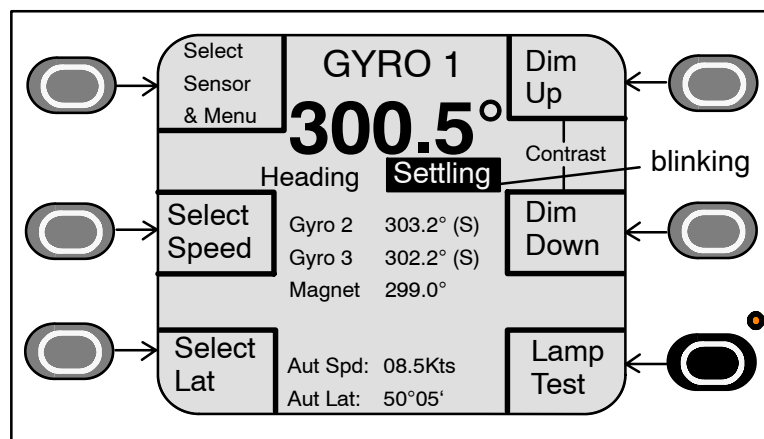


Figure 26: Controls and Indicators on the Operator Unit
(Indications on the gyro system during the settling stage)

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3.2 Selecting Man Speed / Aut Speed

If an automatic speed source (LOG) is available “Aut Spd” is selected as the default setting.

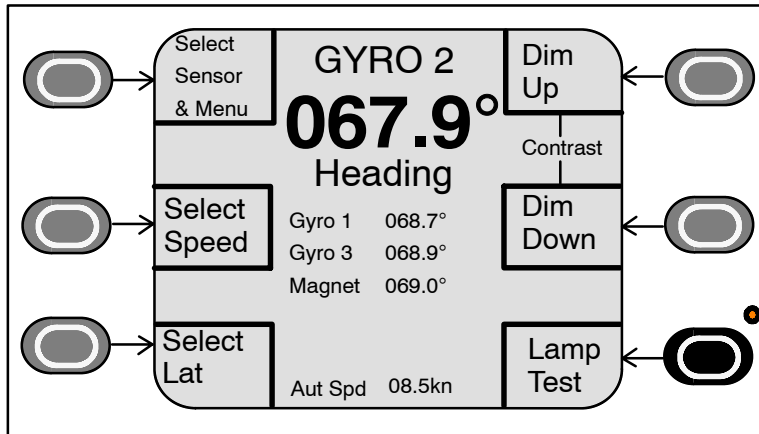


Figure 27: Controls and Indicators on the Operator Unit
("Aut Spd" selected)

In the event of a fault or if “Aut Spd” is not available you can switch over to “Man Spd” (see Figure 28).



The gyro uses the speed information to calculate the automatic speed error correction.

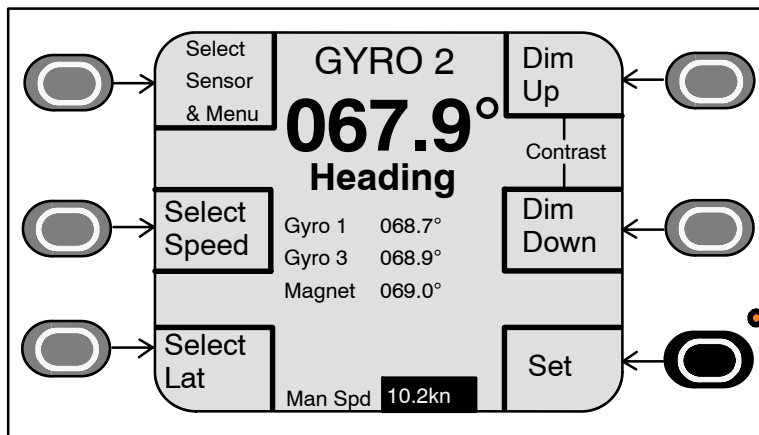


Figure 28: Controls and Indicators on the Operator Unit
(Man Spd selected)

Switching from “Aut Spd” ⇒ “Man Spd”

The “Select Speed” key (Figure 29/1) changes its functions when a change is made. It alters each time the setting is changed from “Aut Spd” to “Man Spd”

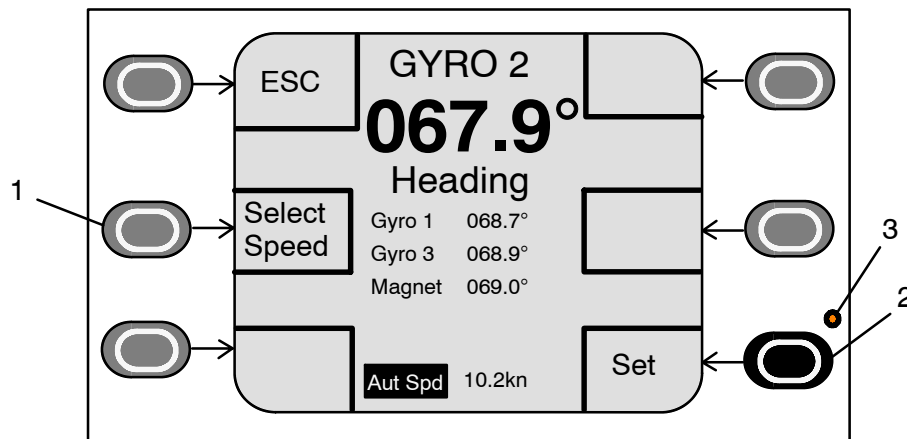


Figure 29: Controls and Indicators on the Operator Unit
(after “Aut Spd” has been selected)

The key (Figure 29/2) is now assigned with the “Set” function. The LED (Figure 29/3) flashes yellow.

Once confirmation is given via the “Set” key, the changeover is made and the gyro system is corrected using the manually entered speed values.

The changeover also affects the gyro system that is not currently selected.

Entering speed values manually

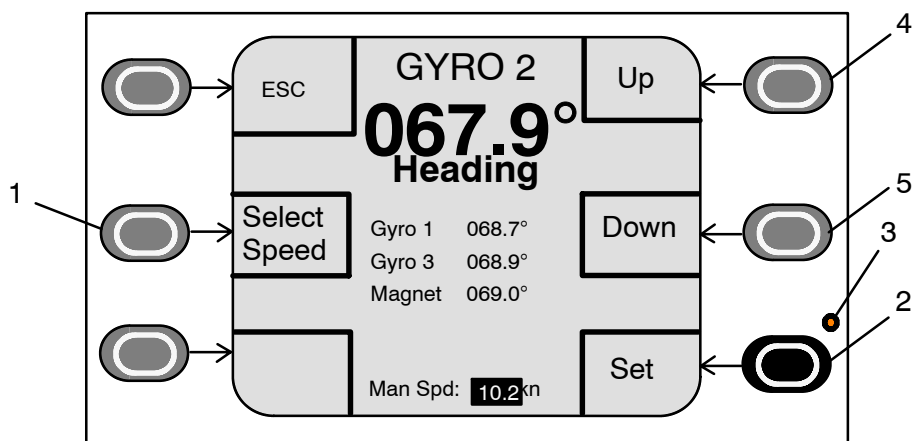


Figure 30: Controls and Indicators on the Operator Unit
(Man Spd selected)

Press the "Select Speed" key (Figure 30/1).

The cursor jumps to the manual speed indicator field and the value can be altered using the "Up" (Figure 30/4) and "Down" (Figure 30/5) keys.

Use the "Set" key (Figure 30/2) to accept the value into the system and the flashing LED (Figure 30/3) now goes out.

Comments regarding Speed Error Correction

Speed error is a physical deviation from the steering heading indicated on the gyro compass (compass heading) from the true heading (chart heading).

The speed error depends on the speed of the ship, the heading it is steering and the latitude. A speed-error table takes these items into consideration.

The ship's acceleration also affects the gyro system. Since this is a non linear error the speed-error table cannot take it into consideration.

The correction values are calculated within the gyro system and added or subtracted to the compass heading.

So, in the event that the speed error correction function is activated by manually entering speed and latitude, dynamic speed error correction will also be carried out.



This can lead to unexpected results because acceleration is produced by a simulated speed change (as opposed to the ship's speed) and this can lead to inaccurate correction values.

The result of the correction will only be correct if the manual entries (speed/latitude) align with the current ship's dynamics.

3.3

Selecting Man Lat and Auto Lat

The “Select Lat” key (Figure 31/1) changes its functions when a change is made. It alters each time the setting is changed from “Aut Lat” to “Man Lat”.



Figure 31: Controls and Indicators on the Operator Unit
(after Man Lat has been selected)

The key (Figure 31/2) is now assigned with the “Set” function. The LED (Figure 31 /3) flashes yellow.

Once confirmation is given via the “Set” key, the changeover is made and the gyro system is corrected using the manually entered latitude values.

The changeover also affects the gyro system that is not currently selected.

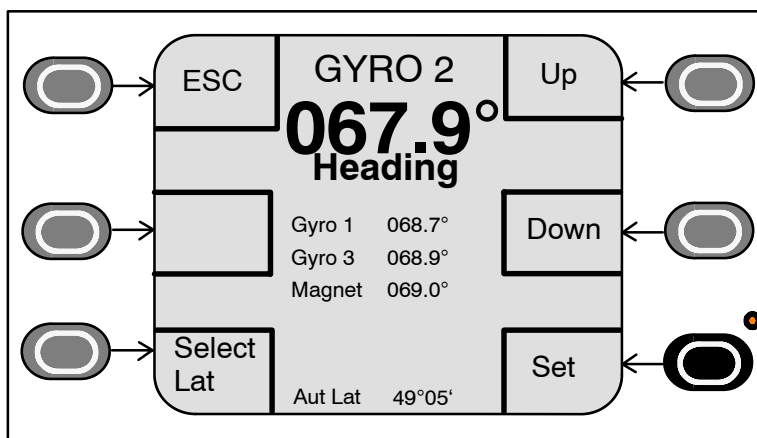


Figure 32: Controls and Indicators on the Operator Unit
(after “Aut Lat” has been selected)

Entering latitude values manually

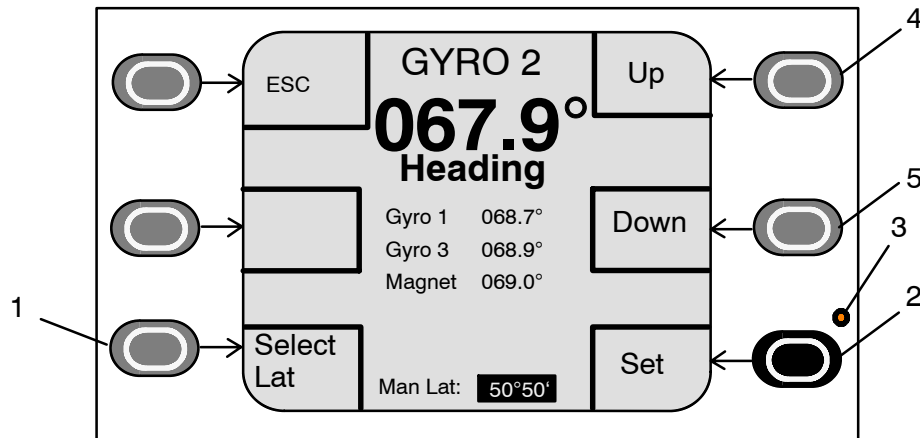


Figure 33: Controls and Indicators on the Operator Unit
(Man Lat selected)

Press the “Select Lat” key (Figure 33/1).

The cursor jumps to the manual latitude indicator field and the value can be altered using the “Up” (Figure 33/4) and “Down” (Figure 33/5) keys.

Use the “Set” key (Figure 33/2) to accept the value into the system and the flashing LED (Figure 33/3) now goes out.



Big differences of the latitude value which may occur while switching over from automatic to manual input, are included into the speed error correction (SEC) not until 2-3 hours.

3.4 Activation of the Quick Settling function

The “Quick Settling” function reduces the time the compass requires to settle from approximately 4 hours to approximately one hour

The most recent heading is stored when the gyro compass is switch off. When it is switched on the compass uses that value to make a default setting so that the settling time is reduced.



The Quick Settling function can only be used if the ships's heading has not been changed between switching off and switching back on.

The Quick Settling function can not be used:

- During the first setting up (Installation)
- If the ship's position has been changed between switching off and on again of the compass.

Immediately after switching on of the compass it is possible to activate the Quick Settling function at the Operator Unit.

By this the heating stage and the settling stage are reduced to (in total) one hour. After this time an usable heading information is displayed (for the accuracy of the heading information see compass manual).



Time to activate this function is only for 3 minutes after switching on

At the end of this 3 minutes (without activating this function) the heating stage and the settling stage runs in the sequence according to the compass manual.

NOTE: To activate this function is possible only during the first three minutes after switching on.

If there should be activated several (max. 3 gyro compasses) with the Quick Settling function it is recommended to switch on these compasses one after the other (if possible) in order not to exceed this three minutes.

3.4.1

Quick Settling activation of selected gyro

After switching on of the selected compass the possibility to activate the Quick Settling function is displayed. (Figure 34).

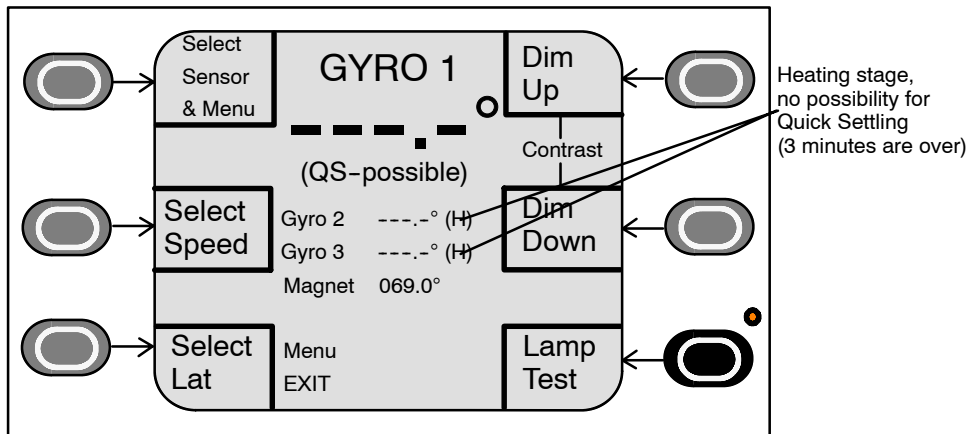


Figure 34: Controls and Indicators on the Operator Unit
(Heating stage of the selected gyro 1,
Quick Settling is possible during a time of 3 minutes)

During this 3 minutes the menu line "Menu" has to be selected
(softkey "Select Sensor &Menu").

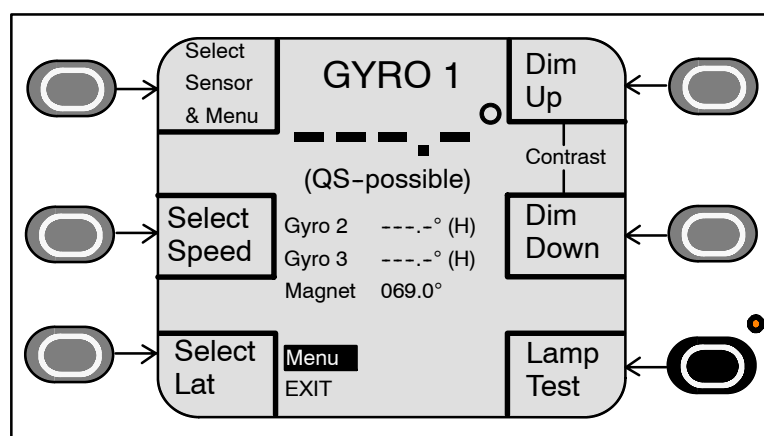


Figure 35: Controls and Indicators on the Operator Unit
(Heating stage of the selected gyro 1,
Quick Settling is possible during a time of 3 minutes,
menu line "Menu" selected)

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Basic Menu --> Selected line: "Menu" --> Display "Menu"

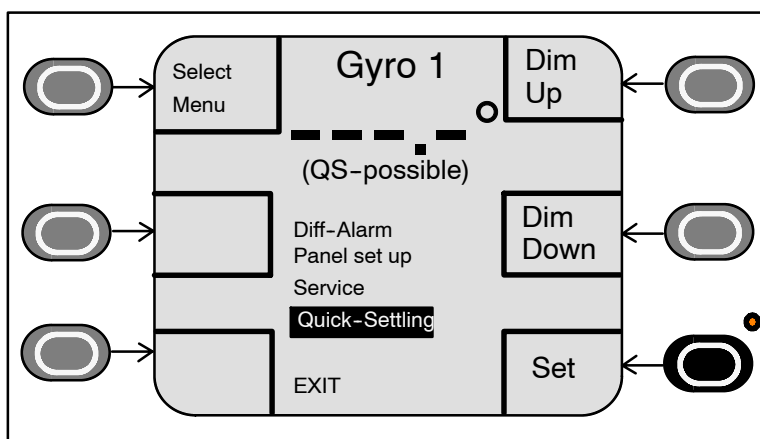
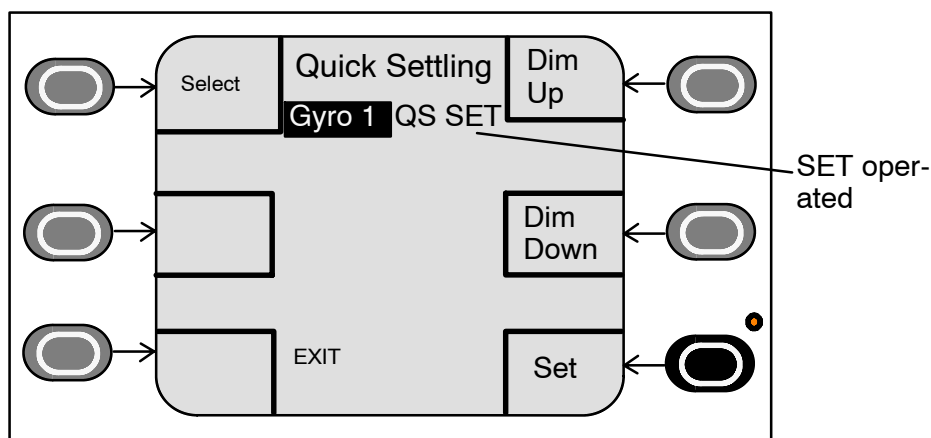


Figure 36: Controls and Indicators on the Operator Unit
(Heating stage of the selected gyro 1,
Quick Settling is possible during a time of 3 minutes,
menu line "Quick Settling" selected)

Basic Menu --> : Selected line "Menu" --> Display "Menu" --> Selected:
"Quick-Settling".



Note: Gyro 2 and gyro 3 not displayed because a
Quick Settling is no longer possible.
(Indication of "H" = Heating stage means also
Quick Settling no longer possible, 3 minutes
are over).

Figure 37: Controls and Indicators on the Operator Unit
(Heating stage of the selected gyro 1,
Quick Settling is possible during a time of 3 minutes,
menu "Quick Settling", gyro 1 is selected)

After confirming by “SET” the activated Quick Settling function for the selected gyro is displayed by “Gyro 1 QS Set” (Figure 37).

After selection of “Exit” the basic menu is displayed (Figure 38).

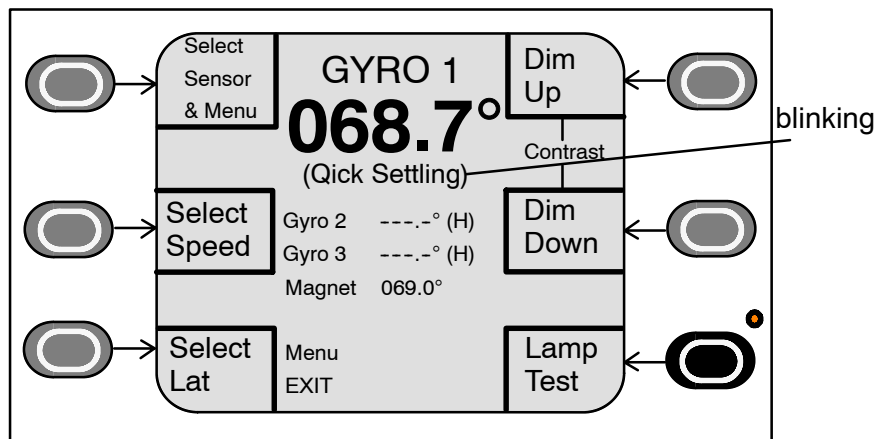


Figure 38: Controls and Indicators on the Operator Unit
(Function Quick Settling activated for gyro 1)



This menu “Quick Settling” is displayed only if this function is possible.

3.4.2 Quick Settling activation of not selected gyro

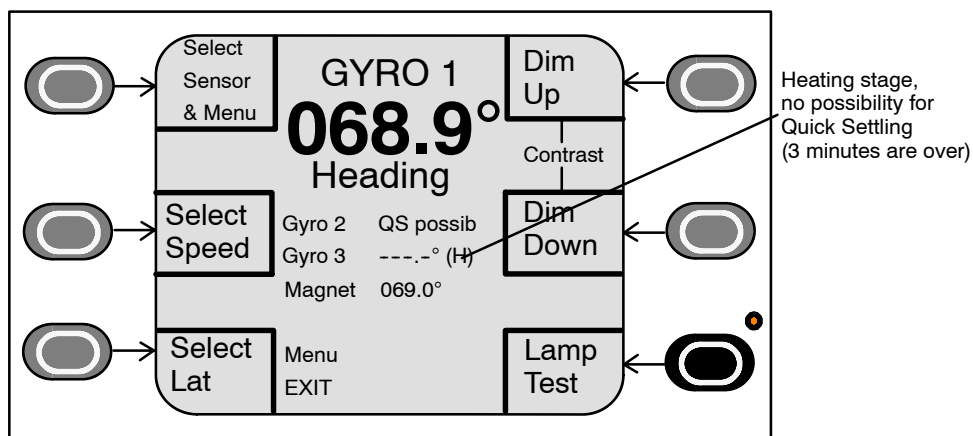


Figure 39: Controls and Indicators on the Operator Unit
(Gyro1 is in operation, gyro 2-status within 3 minutes after switching on,
gyro 3 is in the heating stage, - QS no longer possible
Quick Settling is possible during a time of 3 minutes,

The procedure to activate the Quick Settling function corresponds to the procedure in section 3.4.1 "Quick Settling activation of selected gyro".

Basic Menu --> Selected line: "Menu" --> Display "Menu" --> Selected:
"Quick-Settling".

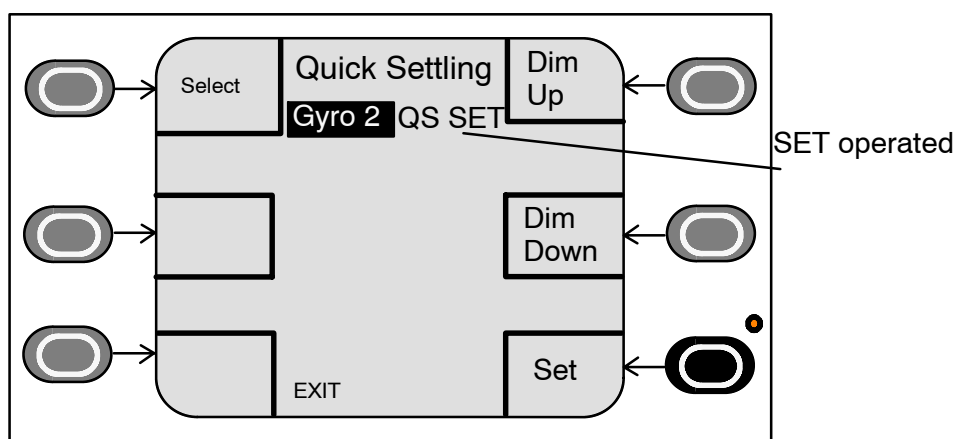


Figure 40: Controls and Indicators on the Operator Unit
(Heating stage of the not selected gyro 2 with QS function,
for gyro 1 and gyro 3 is no Quick Settling function selectable

After confirming by “SET” the activated Quick Settling function for the selected gyro is displayed by “Gyro 2 QS Set” (Figure 40).

After selection of “Exit” the basic menu is displayed (Figure 41).

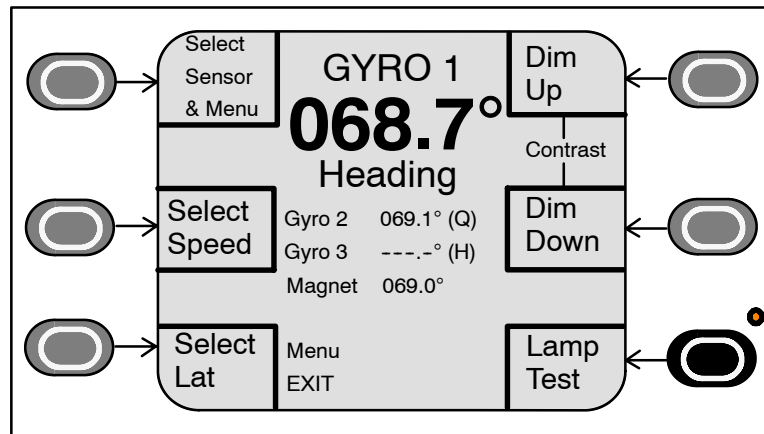


Figure 41: Controls and Indicators on the Operator Unit
(Gyro 1 in operation, Gyro2 in Quick-Settling Mode and
Gyro 3 in the heating stage - QS no longer possible
3 minutes are over)



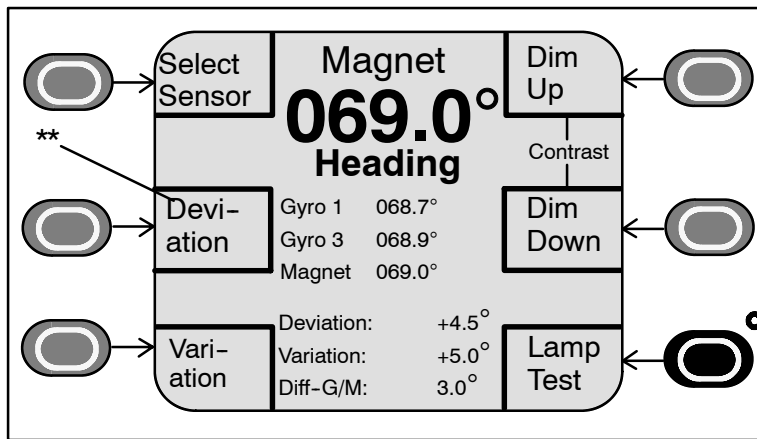
This menu “Quick Settling” is displayed only if this function is possible.

4 Magnetic Compass Operation



It has to paid attention that not every heading receiver is allowed to be connected to a heading from a magnetic compass.

Initial status: The magnetic compass is selected as the sensor providing the heading.



** if the term "Deviation" is displayed in this field, then the value of the deviation has to be entered according to section 4.1.1 as a single value.

Figure 42: Controls and Indicators on the Operator Unit
(Magnetic compass selected)

4.1

Display/amend alarm threshold for Gyro/Magnet

(see also section 6.1)

The Diff G/M function makes it possible to monitor the selected gyro compass (here Gyro1) using data from the magnet compass.

Both heading values are monitored for difference.

If they exceed the pre-set limits, an alarm is triggered (both visual and audible).

If Magnet is selected as heading sensor, the magnetic heading value is monitored against the heading values from each Gyro for difference.

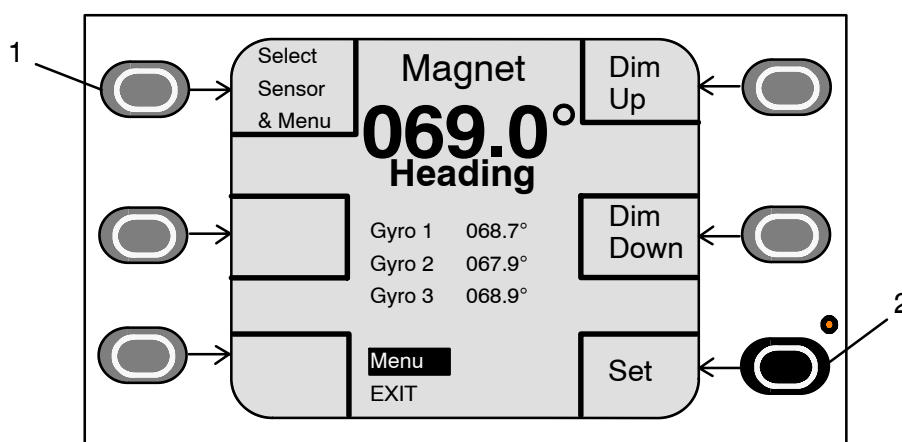


Figure 43: Controls and Indicators on the Operator Unit
("Menu" line selected)

The menu line is selected by pressing the "Select Sensor & Menu" key (Figure 43/1). Enter the menu by pressing "Set" (Figure 43/2).

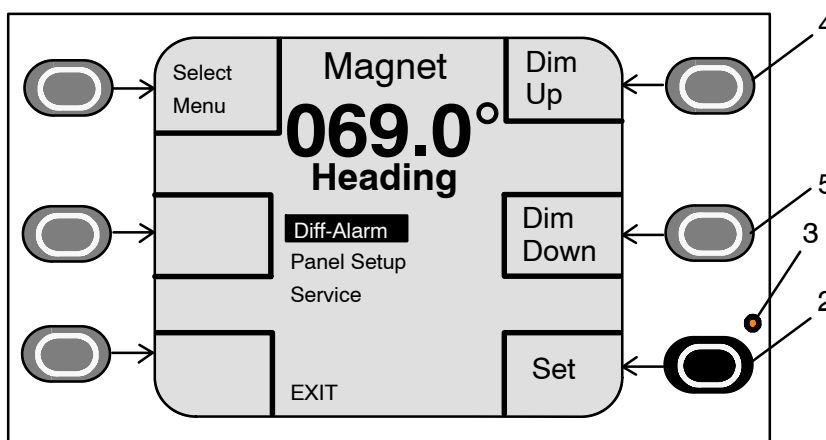


Figure 44: Controls and Indicators on the Operator Unit
("Diff-Alarm" line selected)

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Select "Diff-G/M*: 03.0° on the "Diff-Alarm" sub-menu by pressing "Set" (Figure 45/3) (LED Figure 45/4 flashing) and then alter it by pressing "Up"/"Down" (Figure 45/1 and 2).

*the display "Diff-G/M" can also mean: difference between GPS and magnet.

Confirm the values by pressing "Set".

Leave the menu by selecting "EXIT"

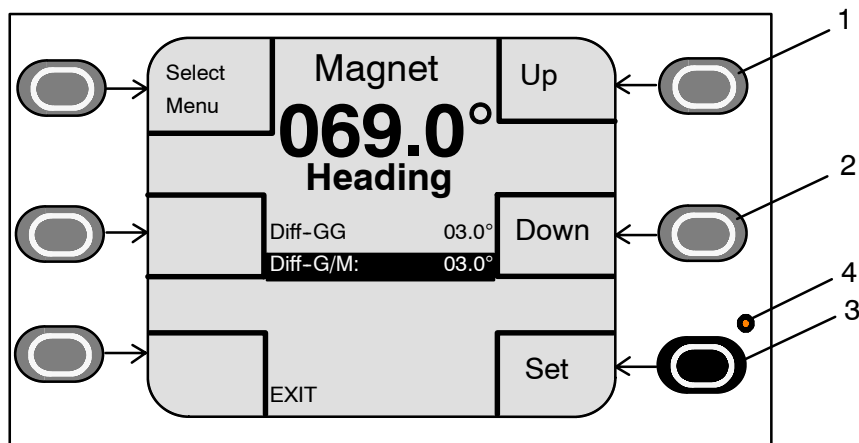


Figure 45: Controls and Indicators on the Operator Unit
("Diff-G/M 03.0°" line selected)

The minimum threshold G/M is 3°.

The maximum threshold G/M is 89,9°.

Changeable in steps of 1/10°.

4.1.1 Display and alter Variation/Deviation

Deviation

A heading display from a compass may be affected by permanent magnetic parts of steel, lines with direct current flow or magnetic soft iron parts in that manner, that the heading information is faulty.

With correction values (deviation values) this fault can be corrected.

This correction value is entered via the Operation Unit to the Distribution Unit and is used to correct the magnetic heading information.



An indication if it is possible to apply or to amend a deviation table is the soft key field "Deviation".
If there is no term "Deviation" in this field, than the function of a deviation table is available (this function reflect a higher development status. At Distribution Unit with a lower development status the field has the term "Deviation". In this case single correction value to each heading have to be entered according to section 4.1.1.1).
At Distribution Unit with the function of a deviation table, see section 4.1.1.2.

Variation

Because of the magnetic north pole is not identical to the geographic pole, there is a declination, this declination is designated with variation.

This variation varying and it is possible to take out this alteration out of a sea chart (depending location).

This value has to be entered as a single value. It is stored in the Distribution Unit and used to correct the magnetic heading information.

4.1.1.1 Single value input

Initial status: The magnetic compass is selected as the navigational sensor.

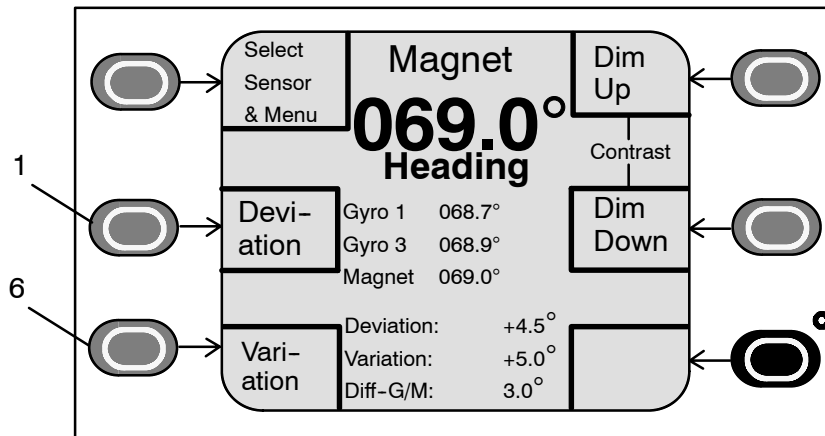


Figure 46: Controls and Indicators on the Operator Unit
(Magnetic compass selected)

Changing the Variation and Deviation using the Deviation/Variation softkey (Figure 46)

The Change Deviation/Variation menu

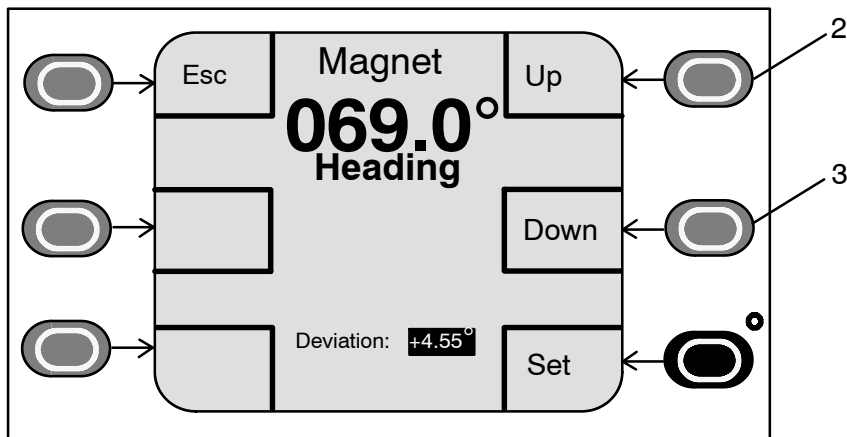
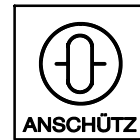


Figure 47: Controls and Indicators on the Operator Unit
(Deviation marked)



Deviation (deviation in relation to the ship)

Select the deviation input field by pressing the “Deviation” key (Figure 46/1)

Alter the values (deviation) by pressing the “Up” or “Down” keys.

(Figure 47/2 or 3).

Once you have confirmed (using the “Set” key) these values are accepted, stored into an internal table and the magnet compass heading is corrected accordingly by interpolation of the set (stored) values.

The menu reverts back to its initial status.

Variation (deviation in relation to location)

Select the variation input field by pressing the “Variation” key (Figure 46/6).

Change the value and finalise the alteration procedure as described under “Changing the Deviation”.

4.1.1.2 Applying or amending a deviation table

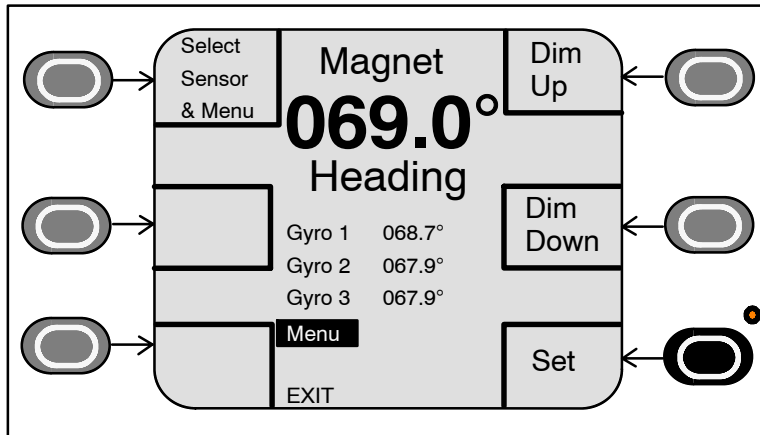


Figure 48: Controls and Indicators on the Operator Unit
(Line "Menu" selected)

Select the line "Menu" with soft key "Select Sensor & Menu" and soft key "Set".

Select the line "Service" in the next display with soft key "Select Sensor & Menu" and soft key "Set".

Select the line "Next page" in the display "Service Mode (page1)" with soft key "Select Menu" and soft key "Set".

Select the line "Deviation Table" in the display "Service Mode (page2)" with soft key "Select Menu" and soft key "Set".

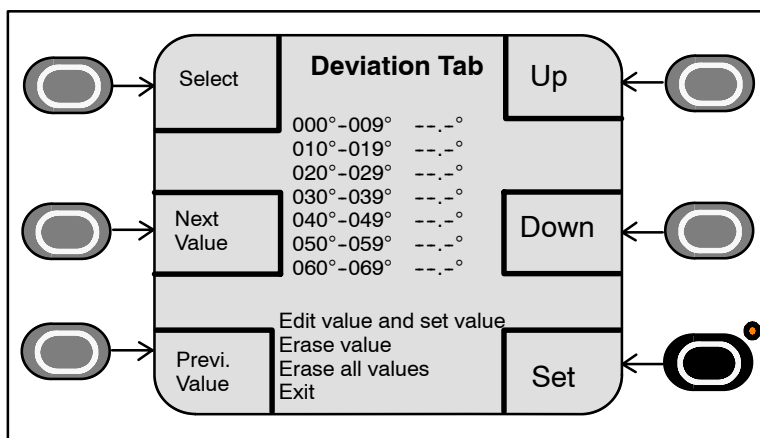


Figure 49: Controls and Indicators on the Operator Unit
(Display "Deviation Table")



Note: Value ---.-° -> if there is a value before and after this not-set-value, an internal value is calculated (by interpolation) and displayed (see Figure 3). But the not-set-value in the deviation table is still ---.-°.

Value 000.0° is a deviation value which is set in that manner.

In the display (Figure 49) a deviation Table is shown.

The deviation table is segmented into 36 sets of data, each set with 10° (000°...009° to 350°...359°). To each set a correction value can be entered.

With soft key "Next value" and soft key "Previ. Value" a data set of the deviation table can be selected.

The soft keys "Next value" and "Previ. Value" are enabled only if this function is reasonable (respective term in the soft key is displayed), for example: no "Next Value" at the end of the deviation table.

With the soft keys "Up" and "Down" the correction value is adjusted and entered with the soft key "Set" – the line "Edit value and set value" has to be selected with soft key "Select".

With soft key "Select" one of the lower lines is selected and with soft key "Set" the function is executed:

Edit value and set value

With this line the adjusted or entered correction value is stored.

Erase value

With this line the selected correction value is erased.

Erase all values

With this line all correction values of the deviation table are erased (after a safety question "For sure????").

Exit

With this line the display to edit the deviation table is quit.

Operation of Satellite Compass STD 21 (GPS)

Within a navigation system, which is based on a Gyro compass STD 22, it can connect except a magnetic compass a Satellite Compass STD 21 (GPS) too.

This compass is displayed as GPS.

The organisational integration of a GPS is identical to a Gyro compass.

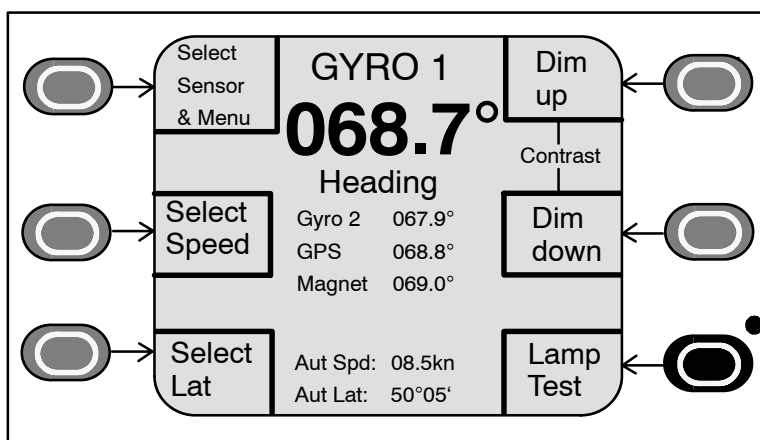


Figure 50: Controls and Indicators on the Operator Unit
(Display with a GPS in the application)

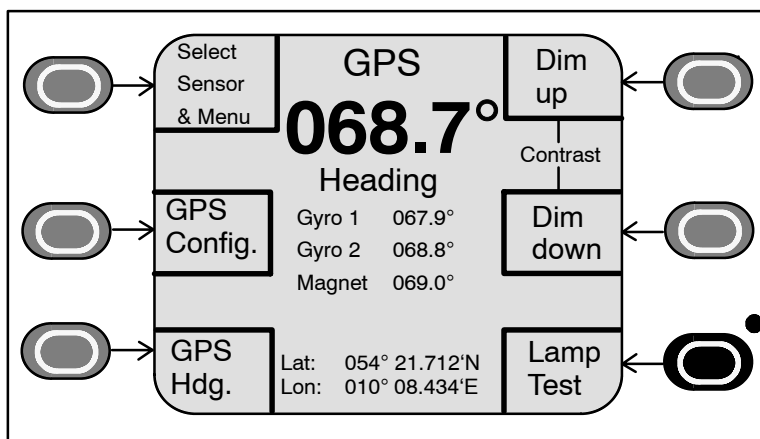


Figure 51: Controls and Indicators on the Operator Unit
(Display with GPS as selected heading sensor)

For all adjustments, configurations and operation functions see Satellite Compass STD21 manual (no. 3717).

6 Adjustment of additional operation modes with the service menu

After selection of the menu line “Menu” below mentioned submenus are displayed to select other operational modes:

- Diff-Alarm (Difference Alarm) (see section 6.1)
- Panel Setup (see section 6.2)
- Service (see section 6.3)
- Quick Settling (see section 3.4)

6.1 Difference Alarm

In such a compass system all connected heading sensors are compared together constantly. If there is a deviation more than the adjusted threshold than there will be a difference alarm displayed and output.

A conclusion about which of the connected sensors deviates is not possible.

Each connected sensor has to be checked depending his function.

All adjustments necessary for a difference alarm are shown in the table below.

Parameter	G*/M	G/G*
Minimum threshold	3°	1°
Maximum threshold	89,9°	89,9°
Increment	1/10°	1/10°

* “G” can be Gyro or GPS. A GPS is dealt as a Gyro.



In case of a reduced availability of the GPS (STD21) a difference alarm may occur.
For reasons of a reduced availability see manual 3717, section “Principles of Operation”.

The following table shows the connectable sensors referring to their comparison procedures.

Operator Unit
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Sensors in the system	Comparison
Gyro 1/ Gyro 2	The selected sensor is compared with the not selected sensor.
Gyro/ Magnet	The selected sensor is compared with the not selected sensor.
Gyro 1/ Gyro 2/ Magnetic compass	<p>Gyro 1 selected:</p> <ul style="list-style-type: none"> - Comparison Gyro 1 to Gyro 2 and to Magnet. <p>Gyro 2 selected:</p> <ul style="list-style-type: none"> - Comparison Gyro 2 to Gyro 1 and to Magnet. <p>Magnetic compass selected:</p> <ul style="list-style-type: none"> - Comparison Magnet compass to Gyro 1 and Gyro 2.
Gyro 1/ Gyro 2/ Gyro 3	<p>Gyro 1 selected:</p> <ul style="list-style-type: none"> - Comparison Gyro 1 to Gyro 2 and to Gyro 3 and - Comparison Gyro 2 to Gyro 3. <p>Gyro 2 selected:</p> <ul style="list-style-type: none"> - Comparison Gyro 2 to Gyro 1 and to Gyro 3 and - Comparison Gyro 1 to Gyro 3. <p>Gyro 3 selected:</p> <ul style="list-style-type: none"> - Comparison Gyro 3 to Gyro 1 and to Gyro 2 and - Comparison Gyro 1 to Gyro 2.
Gyro 1/ Gyro 2/ Gyro 3 Magnetic compass	<p>Gyro 1 selected:</p> <ul style="list-style-type: none"> - Comparison Gyro 1 to Gyro 2 and to Gyro 3 and - Comparison Gyro 2 to Gyro 3 and - Comparison Gyro 1 to Magnetic compass. <p>Gyro 2 selected:</p> <ul style="list-style-type: none"> - Comparison Gyro 2 to Gyro 1 and to Gyro 3 and - Comparison Gyro 1 to Gyro 3 and - Comparison Gyro 2 to Magnetic compass. <p>Gyro 3 selected:</p> <ul style="list-style-type: none"> - Comparison Gyro 3 to Gyro 1 and to Gyro 2 and - Comparison Gyro 1 to Gyro 2 and - Comparison Gyro 3 to Magnetic compass. <p>Magnetic compass selected:</p> <ul style="list-style-type: none"> - Comparison Magnetic compass to Gyro 1, to Gyro 2 and to Gyro 3.



Sensors in the system	Comparison
Gyro/ GPS	The selected sensor is compared with the not selected sensor.
GPS/ Magnet	The selected sensor is compared with the not selected sensor.
Gyro 1/ GPS/ Magnetic compass	<p>Gyro 1 selected:</p> <ul style="list-style-type: none"> - Comparison Gyro 1 to GPS and to Magnet. <p>Gyro 2 selected:</p> <ul style="list-style-type: none"> - Comparison GPS to Gyro 1 and to Magnet. <p>Magnetic compass selected:</p> <ul style="list-style-type: none"> - Comparison Magnet compass to Gyro 1 and GPS.
Gyro 1/ Gyro 2/ GPS	<p>Gyro 1 selected:</p> <ul style="list-style-type: none"> - Comparison Gyro 1 to Gyro 2 and to GPS - Comparison Gyro 2 to GPS. <p>Gyro 2 selected:</p> <ul style="list-style-type: none"> - Comparison Gyro 2 to Gyro 1 and to GPS - Comparison Gyro 1 to GPS. <p>GPS selected:</p> <ul style="list-style-type: none"> - Comparison GPS to Gyro 1 and to Gyro 2 - Comparison Gyro 1 to Gyro 2.
Gyro 1/ Gyro 2/ GPS Magnetic compass	<p>Gyro 1 selected:</p> <ul style="list-style-type: none"> - Comparison Gyro 1 to Gyro 2 and to GPS - Comparison Gyro 2 to GPS - Comparison Gyro 1 to Magnetic compass. <p>Gyro 2 selected:</p> <ul style="list-style-type: none"> - Comparison Gyro 2 to Gyro 1 and to GPS - Comparison Gyro 1 to GPS - Comparison Gyro 2 to Magnetic compass. <p>GPS selected:</p> <ul style="list-style-type: none"> - Comparison GPS to Gyro 1 and to Gyro 2 - Comparison Gyro 1 to Gyro 2 - Comparison GPS to Magnetic compass. <p>Magnetic compass selected:</p> <ul style="list-style-type: none"> - Comparison Magnetic compass to Gyro 1, to Gyro 2 and to GPS.

Operator Unit 130-613

6.1.1 G1/G2/G3 or GPS difference alarm

This alarm is generated, if one of the gyros shows a heading value (in comparison to the others - if there are), which is more than the set threshold.

Only one level (threshold) for all connected gyros can be set and adjusted.

The Satellite Compass STD 21 (GPS) is handled as a Gyro.

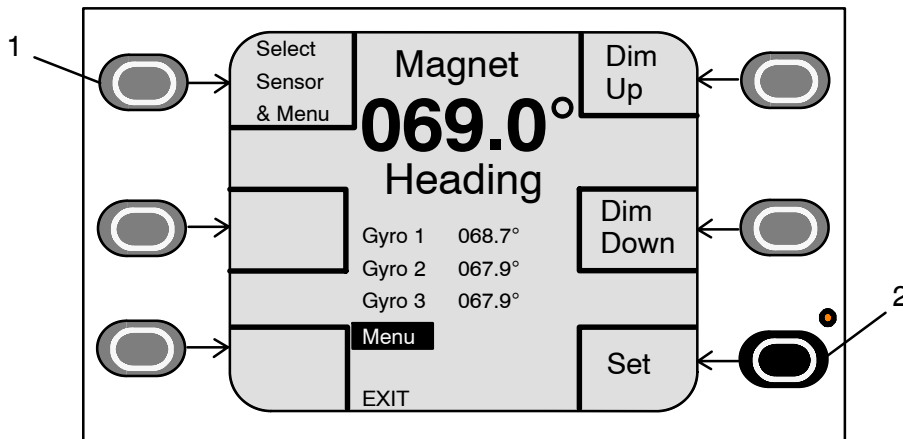


Figure 52: Controls and Indicators on the Operator Unit
("Diff-Alarm" line selected)

The menu line is selected by pressing the "Select Sensor & Menu" key (Figure 52/1). Enter the menu by pressing "Set" (Figure 52/2).

You can select “Diff-G/G: 03.0°” on the “Diff-Alarm” sub-menu by pressing “Set” (Figure 54/2) (LED Figure 54/3 flashing) and then alter it by pressing “Up”/“Down” (Figure 54/4 and 5).

Confirm the value by pressing “Set” (LED Figure 54/3 no longer flashes).

Leave the menu by selecting “EXIT”

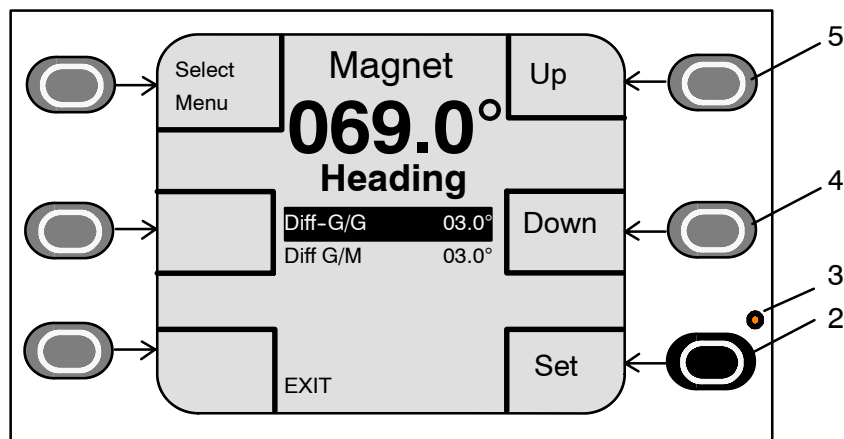


Figure 54: Controls and Indicators on the Operator Unit
("Diff-G/G 03.0" line selected)

6.2

Panel Setup
Software version

With this sub-menu the volume of the alarm buzzer can be adjusted and the software version of the Operation Unit is displayed.

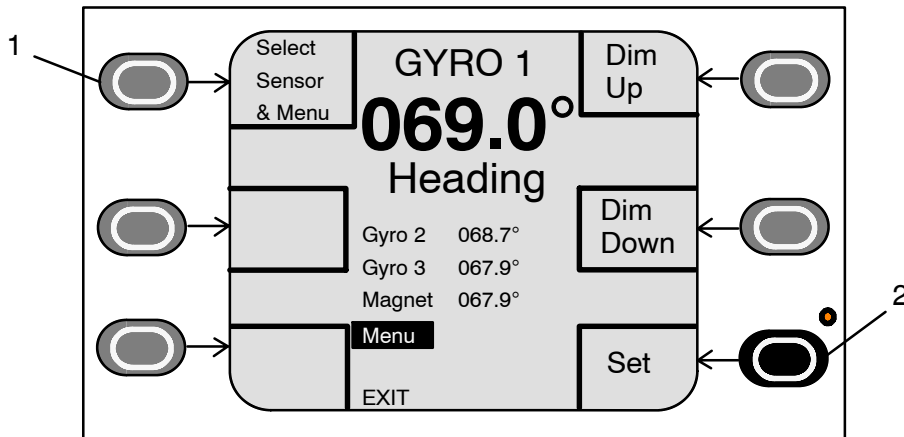


Figure 55: Controls and Indicators on the Operator Unit
("Menu" selected)

The menu line is selected by pressing the "Select Sensor & Menu" key (Figure 55/1). Enter the menu by pressing "Set" (Figure 55/2) and a sub-menu is displayed.

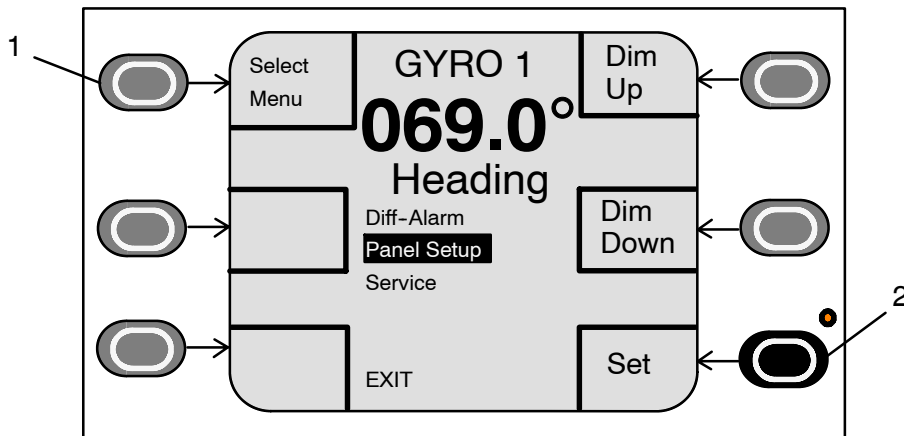


Figure 56: Controls and Indicators on the Operator Unit
(sub-menu "Panel Setup" selected)

The sub-menu line "Panel Setup" is selected by pressing the "Select Menu" key (Figure 56/1). Enter the sub-menu by pressing "Set" (Figure 56/2) and the function "Panel Setup" is displayed.

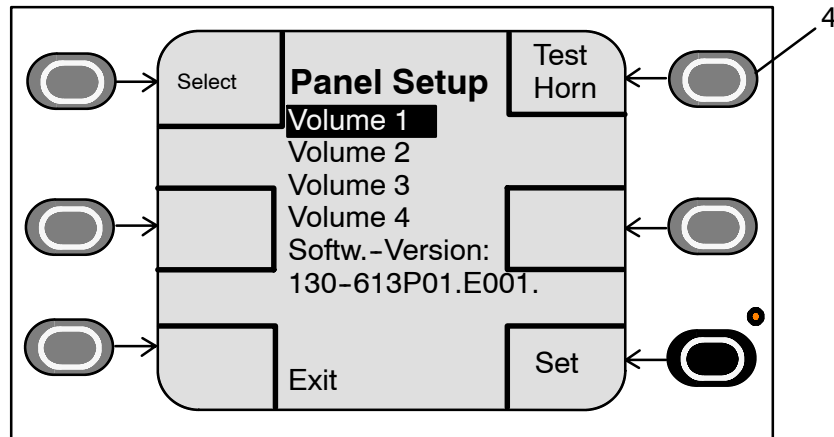


Figure 57: Controls and Indicators on the Operator Unit
(Sub-menu “Panel Setup” selected)

NOTE: The software version shown in must not be the actual version

By operating the softkeys “Select” and “Set” the desired volume is adjusted.

Volume 1 means lowest adjustment.

By operating softkey “Test Horn” (Figure 57/4) the adjusted volume can be tested.

Information about the software version is displayed only.

With “Select” to the “Exit”-line and with “Set” this function can be closed.

PLEASE NOTE: A display without any heading information (for example a.m. display) will be displayed for at least appr. 10 seconds, if there are no activities. After these 10 seconds the basic display (with a heading information) is called up.

PLEASE NOTE: The volume has to be adjusted according to the background noise. Under all operational conditions of the ship an alarm must recognized clearly.

6.3

Service Mode

This sub-menu is divided into two pages and contains:

Page 1	Page 2
Speed Source (not for DV bus application)	Auto Heading
Heading Uncorrected	DV bus
Rate of Turn	Deviation Table*
GPS Setup**	Gyro Data*
CAN-Devices	Software Versions*
Next Page	Back
Exit	

* Depends on the development status. If a sub-menu is not displayed, it cannot be selected.

** Only if a Satellite Compass STD 21 (GPS) is connected.

In the sub-menu "Service Mode" it is possible to adjust values and read out information for service purpose only.

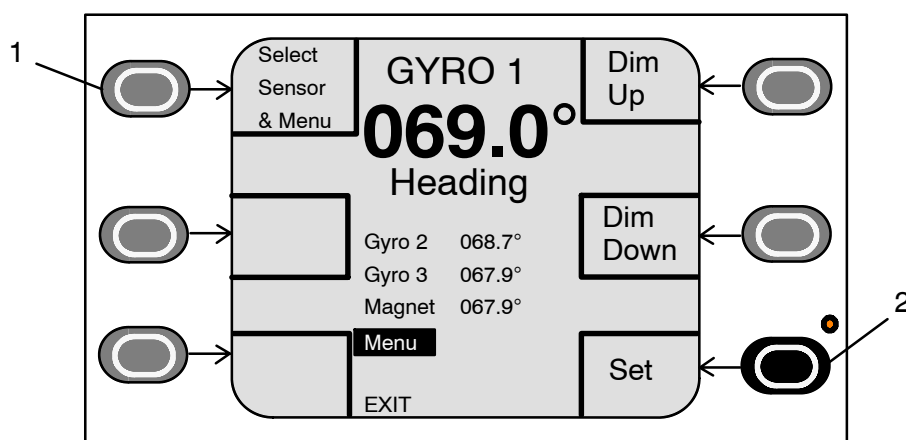


Figure 58: Controls and Indicators on the Operator Unit
("Menu" selected)

Basic menu (see Figure 58) --> select "Menu" line --> select "Service" line.

6.3.1

Service Mode Page 1

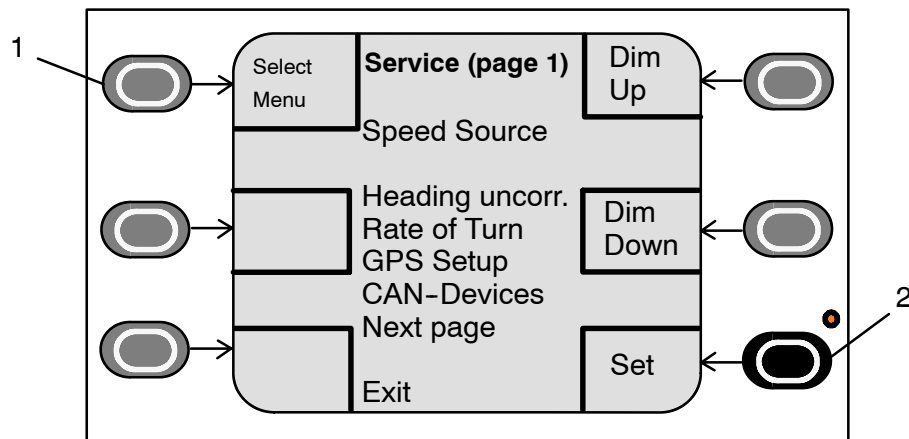


Figure 59: Controls and Indicators on the Operator Unit
"Service (page 1)" menu selected

Each service function has a time-out counter of 60 seconds.

If there are no activities within this time, the display changes to a display with heading information.

By selection of the respective menu line and with the key "Set", the selected menu is displayed.

By selecting the menu line "Next page" the page two of the service mode is displayed (see section 6.3.2).

6.3.1.1 CAN-Bus Addressees

With this sub-menu all addresses of connected devices at the CAN bus can be displayed.

By this it is not necessary to open all devices in case of an enlargement of the system. Inputs and/or changes are not possible with this function.

Basic menu --> select "Menu" line --> select "Service" line --> select function "CAN-Devices".

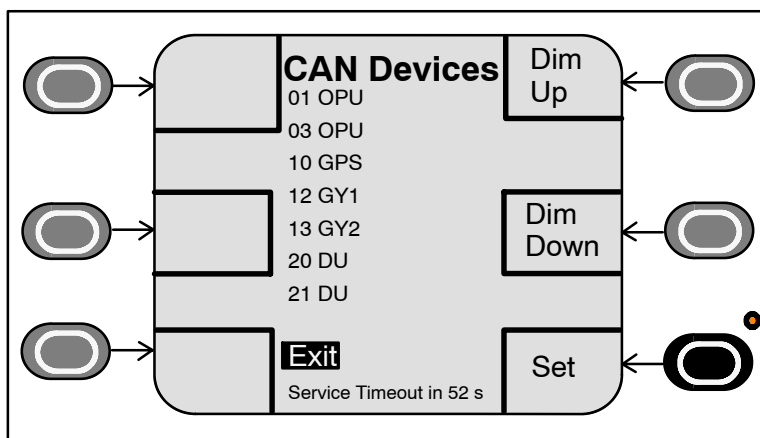


Figure 60: Controls and Indicators on the Operator Unit
(Function "CAN-Devices")

OPU = Operator Unit

GY1 = Gyrocompass1

DU = Distribution Unit

GPS = Satellite Compass STD21 (GPS)

With this function all addressees within the CAN-bus system are displayed decimal.

With "Select" to the "Exit"-line and with "Set" this function can be closed.

6.3.1.2 Heading without correction values

With this function the heading values without correction values of the gyros (as there are speed error correction, alignment error) are displayed.

Inputs and/or changes are not possible in with this function.

Basic menu --> select "Menu" line --> select "Service" line --> select function "Heading uncorr."

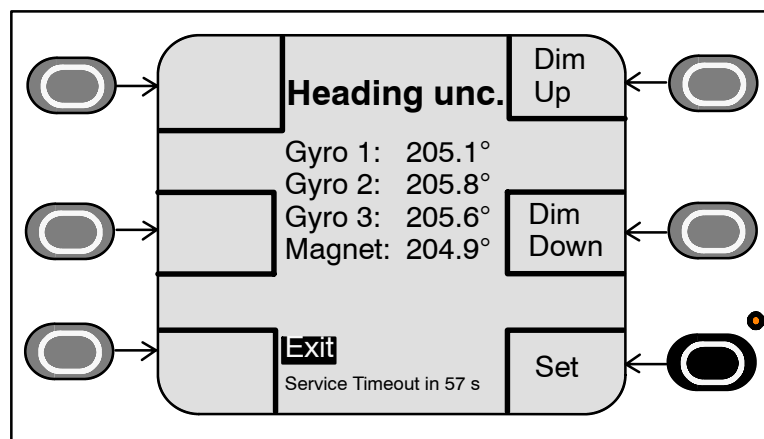


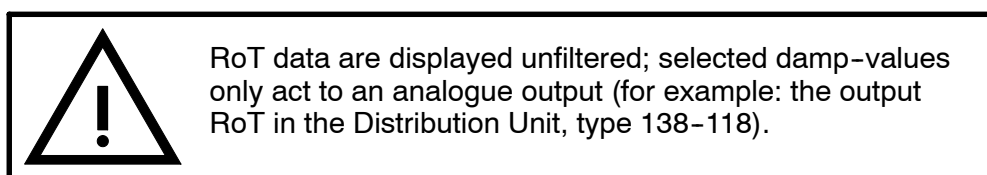
Figure 61: Controls and Indicators on the Operator Unit
(Function "Heading uncorr.")

With "Select" to the "Exit"-line and with "Set" this function can be closed.

6.3.1.3 Damping of the Rate of Turn

With this function it is possible to damp the influence of the seastate to the Rate of Turn. This Damping only acts to analogue RoT-devices.

RoT-devices which are controlled via NMEA-telegrams are controlled with the min. damping and have to be damped separately.



Basic menu --> select "Menu" line --> select "Service" line --> select function "Rate of Turn."

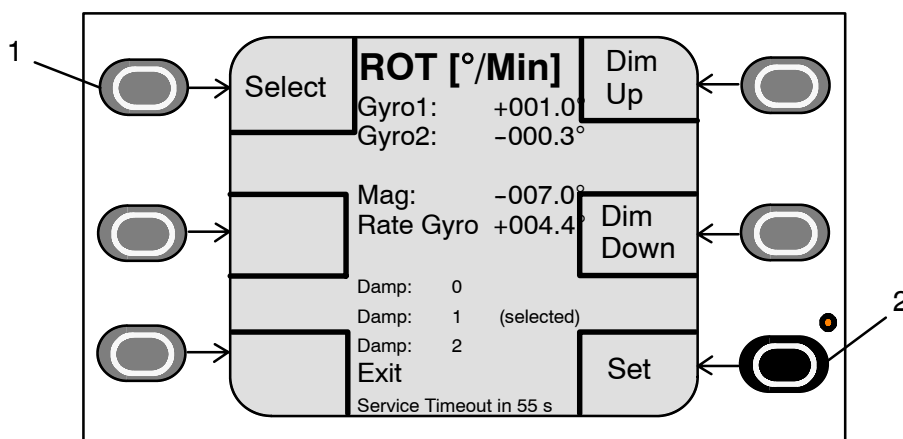


Figure 62: Controls and Indicators on the Operator Unit
(Function "Rate of Turn")

With this function the Rate of Turn of selected heading sensor is displayed. A positive sign means a Rate of Turn to starboard, a negative sign means a rate to portside.

The damp menu line is selected by pressing the "Select" key (Figure 62/1). Enter the respective damp-value by pressing "Set" (Figure 62/2) and this line will be marked with "(selected)".

The Rate of Turn can not be adjusted, displayed only.

The scaling of the Rate of Turn has to be carried out in the Distribution Unit

The line “Rate Gyro” displays the Rate of Turn of an external Rate of Turn sensor connected at the Distribution Unit.

This line is not shown if there is no Rate of Turn sensor connected.

“Damp 0” means strong damping.

“Damp 1” means middle damping.

“Damp 2” means small damping.

With “Select” to the “Exit”-line and with “Set” this function can be closed.



If there is no Rate of Turn indicator connected in the respective application, the RoT-displays for STD21 and Magnetic compass are only for a tends indication of RoT.

6.3.1.4

Speed Source

With this function the source of the speed resp. the kind of the speed, which is necessary for the speed error correction, can be selected.



This function can not be adjusted in DV-bus operation, because the speed sensor is not connected to the distribution unit (Display information by selecting this menu is "Not accepted").
The same happens if no external speed sensor is connected.

Basic menu --> select "Menu" line --> select "Service" line --> select function "Speed Source."

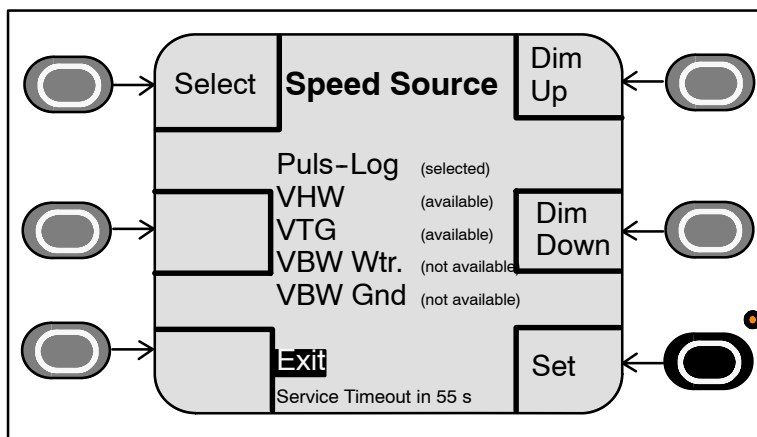


Figure 63: Controls and Indicators on the Operator Unit
(Function "Speed Source" selected)

Default adjustment is "Puls-Log".

Other speed sources may be selected by the softkey "Select" (Figure 63/1) and the softkey "Set" (Figure 63/2).



The telegram types VTG or VBW have to be used preferably because they transfer a more exact speed value in relation to the others.

Meaning of abbreviations and add-on :

VHW	Velocity Heading through Water	Available	connected but not selected
VTG	Velocity through Ground	Selected	connected and selected
VBW Wtr.	Velocity below Water	Not Available	possible, but actually not connected
VBW Gnd	Velocity over Ground	Not Available	possible, but actually not connected

With "Select" to the "Exit"-line and with "Set" this function can be closed.

6.3.1.5

GPS Setup

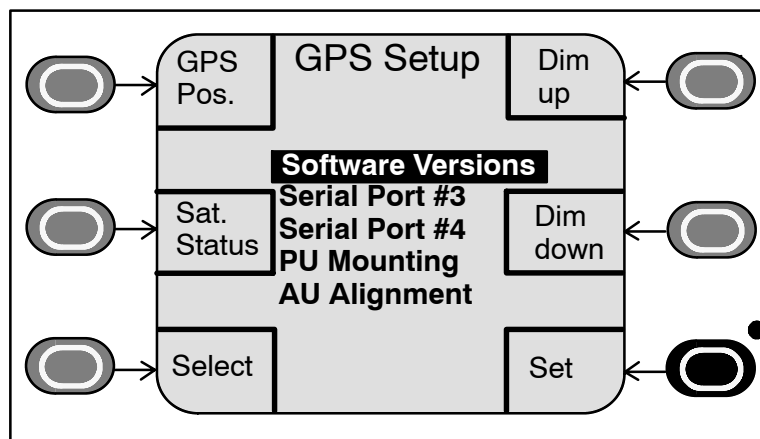


Figure 64: Controls and Indicators on the Operator Unit
(GPS Setup selected)

With this service menu it is possible to:

- Display software versions of Processor Unit (GPS) and Operator Unit.
- Adjust the data format for the serial outputs (#3 and #4).
- Adjust position and location of the installed Processor Unit (GPS)
(this is necessary to define the position of the built in accelerometers in the Processor Unit (GPS).
- Enter the difference of the Antenna Unit (AU) from the ship's baseline.

For detailed information, see Satellite Compass STD 21 manual (manual no. 3717).

6.3.2 Service Mode Page 2

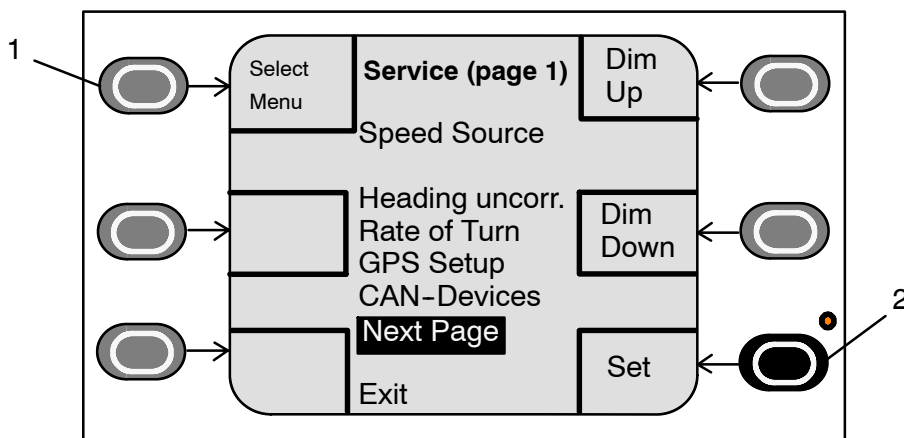


Figure 65: Controls and Indicators on the Operator Unit
"Service (page 1)" menu selected

With "Select Menu" to menu line "Next Page" and soft key "Set", the second page of the service mode is displayed (see Figure 66).

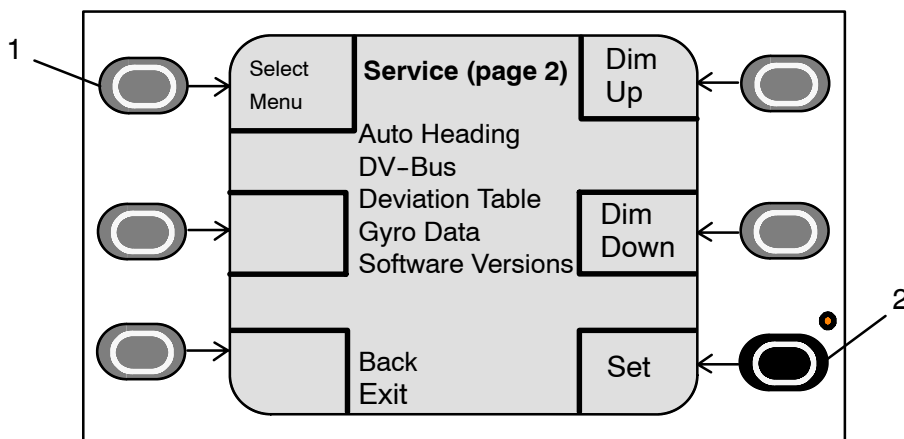
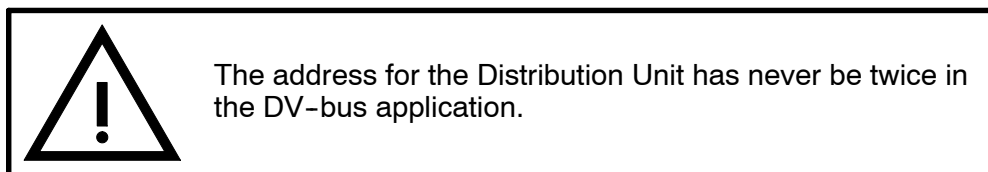


Figure 66: Controls and Indicator on the Operator Unit
"Service (page 2)" menu selected

With "Back" the page 1 of service mode is displayed again.
With "Exit" the service mode can be closed.

6.3.2.1 DV-bus application

With this function it is to be adjusted, if the Distribution Unit 138-118 (see manual no.: 3647) is connected to a DV-bus and if so the respective address of the Distribution Unit on the DV-bus is set.



Basic menu --> select "Menu" line --> select "Service" line --> select "DV-Bus" line.

The selection of this line "DV-bus" is only possible, if the distribution unit is equipped with this feature. Older versions of the distribution unit do not have this feature, in this case the line "DV-bus" is not displayed.

Select "Service" line --> select "DV-Bus" line --> select function "DV-Bus".

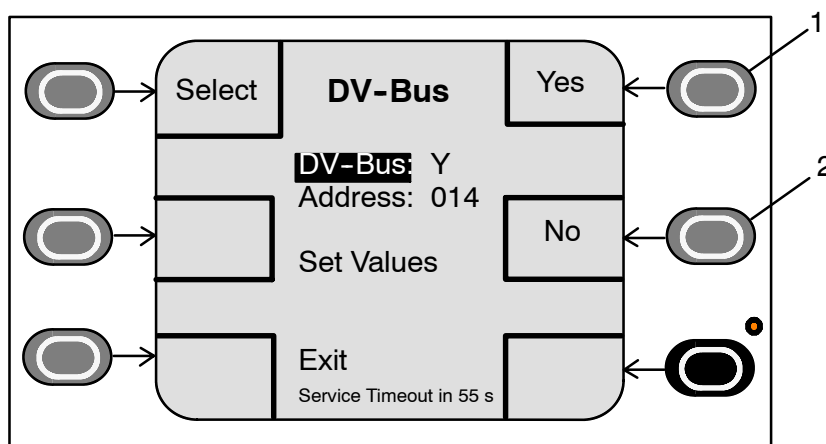


Figure 67: Controls and Indicators on the Operator Unit
(Function "DV-Bus Yes or No" selected)

By operation of respective softkey (Figure 67/1 or 2) the DV-bus application is selected.

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Select "Service" line --> select "DV-Bus" line --> select function "Address".

With this function a DV-bus address is selected.

By operating the softkeys "Up" or "Down" addresses from 001 up to 015 can be adjusted. The address for the distribution unit has never be twice in the DV-bus application!

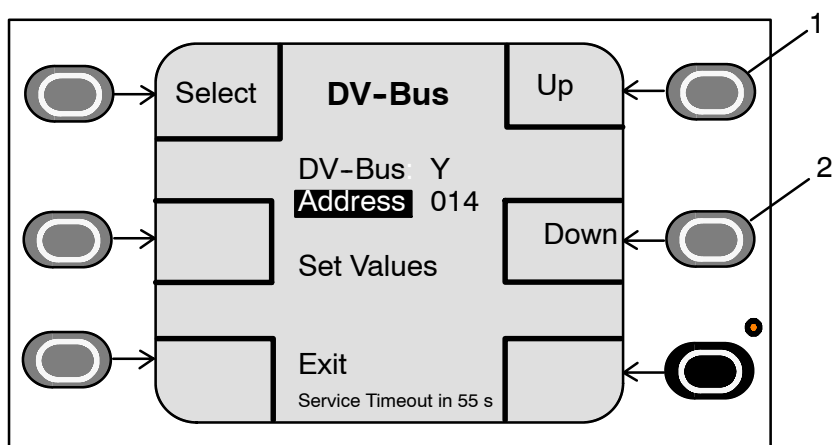


Figure 68: Controls and Indicators on the Operator Unit
(Function "DV-Bus address" selected)

Select "DV-Bus" line --> select function "Set Values".

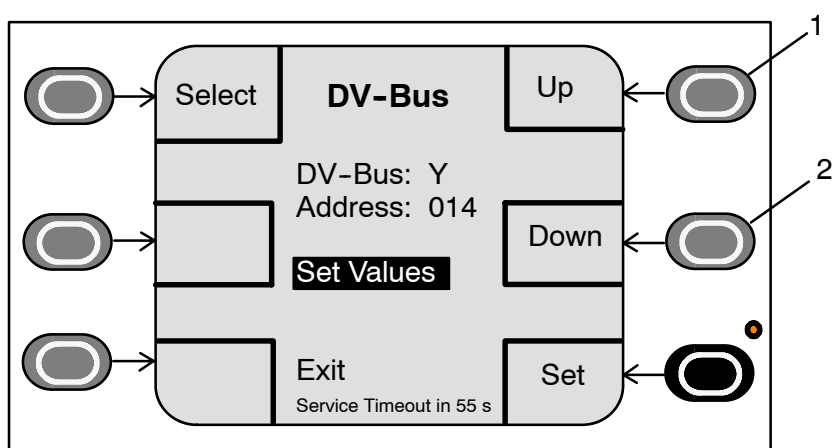


Figure 69: Controls and Indicators on the Operator Unit
(Function "DV-Bus address" selected)

By selection of "DV-bus" line and selection of function "Set Values" the adjusted values are set.

6.3.2.2 Auto Heading Switch-over

This function is to establish if, in case of a selected heading sensor fails an automatic switch-over to the next heading sensor in function, takes place.

It is to select if a change-over to the next Gyro, GPS or to a Magnetic compass should be performed.



An automatically switching-back is not possible.
A switching-back has to be performed manual (see also section 3.1).

With “Select Menu” select the function “Auto Heading” and quit with “Set” .

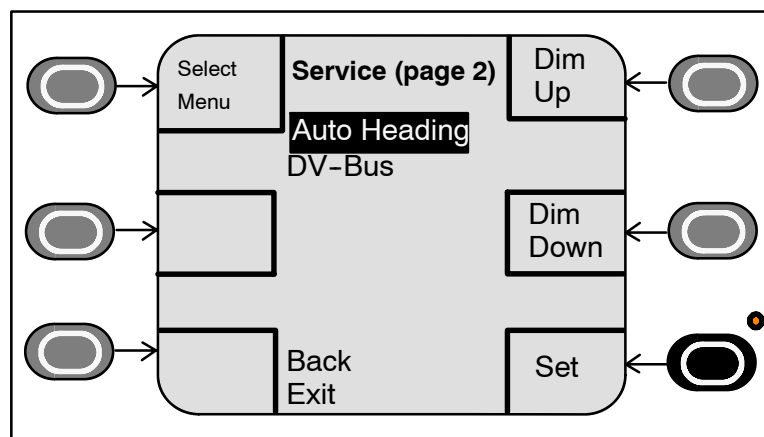
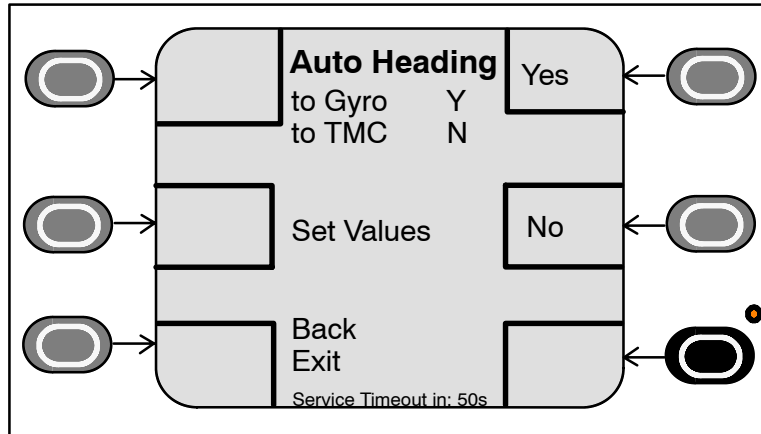
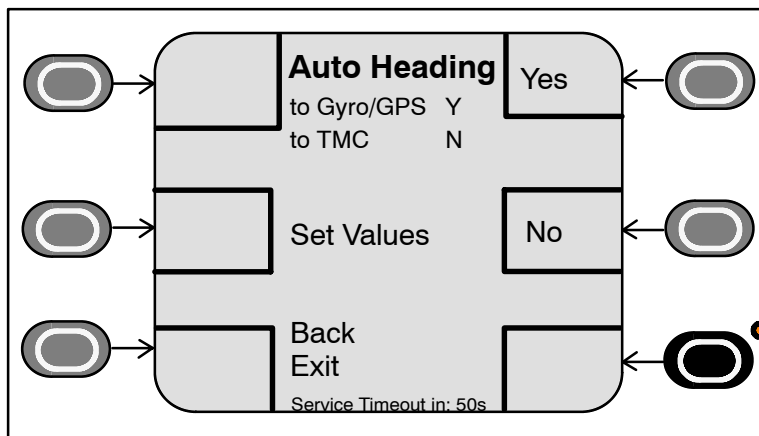


Figure 70: Controls and Indicators on the Operator Unit
(Function “Auto Heading” selected)

**Operator Unit
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Without GPS














With GPS

Figure 71: Controls and Indicators on the Operator Unit
(Function “Auto Heading”)

Only if a Satellite Compass STD 21 (GPS) is integrated in this application, the “GPS” is displayed.

The following table shows the automatically switch-over from a defect but selected sensor to the next possible sensor.

Sensors (basic is the selected sensor)	Alarm message
 Gyro 1 Gyro 2	Switched to Gy 2
 Gyro 1 TMC	Switched to Mag
 Gyro 1  Gyro 2 TMC	Switched to Gy 2 Switched to Mag
 Gyro 1  Gyro 2  GPS TMC	Switched to Gy 2 Switched to GPS Switched to Mag
 Gyro 1  GPS TMC	Switched to GPS Switched to Mag
 GPS TMC	Switched to Mag
 Gyro 2 Gyro 1	Switched to Gy 1

With selection of line “to Gyro/GPS” to Yes (Y) and confirmation with selection of line “Set Values” it is to switch-over automatically to the next gyro in function (depending on the CAN-bus address) if the selected gyro fails.

With selection of line “to TMC” to Yes (Y) and confirmation with selection of line “Set Values” it is to switch-over automatically to a Magnetic compass if the selected gyro or GPS fails.

Condition of the switch-over is, that there is either a Magnetic compass or a second gyro a GPS connected to the compass system.

If one or both possibilities to switch-over are selected with “N”, so the respective automatic switch-over function is not enabled and it has to be switched-over manually at the Operator Unit.

Only if an automatic switch-over to a gyro, GPS or a Magnetic compass took place a message like “Switched to Gy1”, “Switched to Gy2”, “Switched to Gy3”, “Switched to GPS” or “Switched to Mag” is displayed.
There is no message in case of a manual switch-over.

NOTE: If there is no Magnetic compass connected the line “TMC.....” is not displayed.
There is no “GPS” add-on if it is not connected.

6.3.2.3 Deviation Table

With this sub-menu correction values for the deviation table are applied or amended, see section 4.1.1.2.

6.3.2.4

Gyro Data

With this sub-menu the essential operating data of all connected Gyros (max. three) are displayed.

Select line "Menu" with the softkeys "Select Sensor & Menu" and "Set".

Select line "Service" with the softkeys "Select Menu" and "Set" in the following display.

Select "Next Page" with the softkeys "Select Menu" and "Set" in the display

"Service Mode (page1).

Select line "Gyro Data" with the softkeys "Select Menu" and "Set" in the display

"Service Mode (page2).

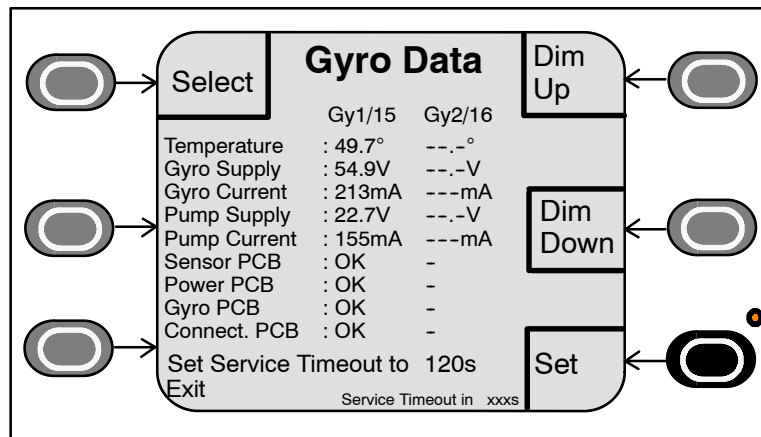


Figure 72: Controls and Indicators on the Operator Unit

(Sub menu "Gyro Data" selected)

Two Gyros connected, one with an older development status

Parameter	Meaning
Gy1/15	Gyro 1 with Can-bus address 15
Temperature	Temperature of the supporting liquid
Gyro Supply	Supply voltage of the gyrosphere
Gyro Current	Current consumption of the gyrosphere
Pump Supply	Supply voltage of the pump
Pump Current	Current consumption of the pump
Sensor PCB	OK* = no error message of the Sensor PCB
Power PCB	OK* = no error message of the Power PCB
Gyro PCB	OK* = no error message of the Outer Sphere PCB
Connect. PCB	OK* = no error message of the Connection PCB
	*Failure = Error at the respective PCB

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With softkey "Select" one of the lines "Set Service Timeout to 120s" or "Exit" can be selected.

By operating the softkey "Set" and selected line "Set Service Time out to 120s" the internal counter is set to 120 seconds again.

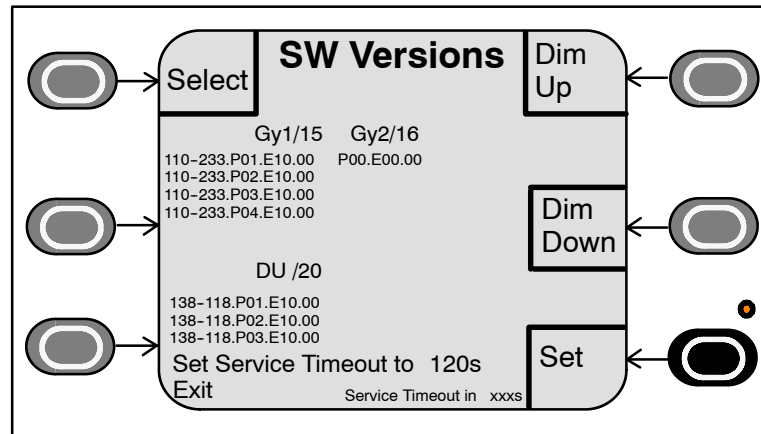
The standard menu (Figure 2) is displayed, if this internal counter counts to zero.

By operating softkey "Set" and selected line "Exit", the display "Service mode (page1) is displayed again .

6.3.2.5

Software Versions

With this submenu the software status of all processor program-memories of PCB of the connected Gyros (max. three) and of the Distribution unit are displayed.



Note: There is no display for PCB's with an older development status

Figure 73: Controls and Indicators on the Operator Unit
(Submenu “SW Versions” displayed)
One Gyro and one Distribution Unit connected.

Display	Meaning
Gy1/15	Gyro 1 with CAN-bus address 15
110-233.P01.E10.00	110-233 = Compass STD 22 P01 = Program at the Sensor PCB P02 = Program at the Power PCB P03 = Program for MC 1 at the Outer Sphere PCB P04 = Program for MC 1 at the Outer Sphere PCB E10.00 = Software version
DU /20	Distribution Unit with CAN-bus address 20
138-118.P01.E10.00	138-118 = Distribution Unit P01 = Program of the CAN-bus Processor at the Interface PCB P02 = Program of the DV-bus Processor at the Interface PCB P03 = Program at the I/O PCB E10.00 = Software version
Gy2/16	Gyro 2 with CAN-bus address 16
	P00.E00.00 older development status

Operator Unit

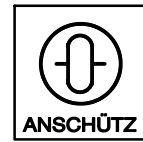
130-613

With softkey "Select" one of the lines "Set Service Timeout to 120s" or "Exit" can be selected.

By operating the softkey "Set" and selected line "Set Service Time out to 120s" the internal counter is set to 120 seconds again.

The standard menu (Figure 2) is displayed, if this internal counter counts to zero.

By operating softkey "Set" and selected line "Exit", the display "Service mode (page1) is displayed again .



6.4 Switching Off the Operator Unit

The equipment is switched off when the voltage supply to the operator unit is switched off.

Even if the equipment in question is installed as the “end device” on a CAN bus application, the operation of the other connected devices will not be affected.

Operator Unit maintenance and repair

The Operator Unit is maintenance-free.

If necessary wipe the display unit clean with a dry cloth.

Repair:

In case of malfunction, the Operator Unit has to be replaced complete .



Operation during a replacement can only be performed when the CAN-bus is terminated.
It is absolute necessary that the CAN-bus is terminated correctly on both ends.
If there is no terminator by jumpers or switches within the respective devices, than each CAN-bus (CAN1 and CAN2) has to be terminated by, in total 2 resistors (each 120Ohm) from CAN-low to CAN-high

PLEASE NOTE: There are no changes respective to settings or adjustments, while flashing a new software version.

8 Installation

8.1 Assembly

The Operator Unit must be assembled with the aid of dimensional drawing 130-613 HP005 either on an angled fixing bracket or desk-flush mounted. Make sure that the installation is resistant to sea-water.

8.2 Overview of switches, jumpers and plugs

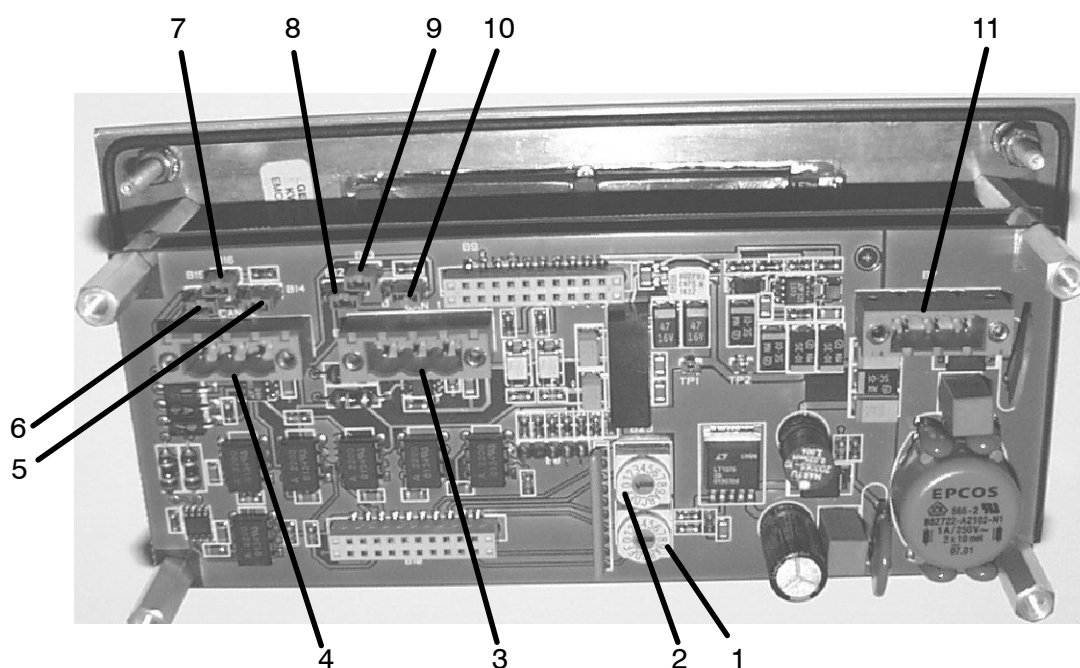


Figure 74: Operator Unit, rear view (with casing removed)

- 1 Hexadecimal switch B24 (0 to F) for setting the device address
- 2 Hexadecimal switch B23 (0 to F) for setting the device address
- 3 Plug B1, either CAN 1 or RS422 Transmit (depending on jumper)
- 4 Plug B2, either CAN 2 or RS422 Receive (depending on jumper)
- 5 Jumper B14, CAN 2 - RS 422 (Receive)
- 6 Jumper B15, CAN 2 - RS 422 (Receive)
- 7 Jumper B13 (plugged - CAN1 Bus terminating resistor on end device only)
- 8 Jumper B12, CAN 1 - RS 422 (Transmit)
- 9 Jumper B16 (plugged - CAN2 Bus terminating resistor on end device only)
- 10 Jumper B11, CAN 1 - RS 422 (Transmit)
- 11 Plug B7, voltage supply (9-36 V d.c.)

8.3 Setting the device address

Use the two hexadecimal switches to set the device address for the Operator Unit. The device address is set by the manufacturer to 01 decimal.

To change this setting is only necessary if another Operator Unit should be installed. Below mentioned table shows the agreements depending on the device addresses within a navigation system.

Device(s)	CAN-Bus-Address, decimal	CAN-Bus-Address, hexadecimal
Operator Units	01 to 09	01 to 09
GPS	10 to 13	0A to 0D
Sensors (Gyro Compass)	14 to 19	0E to 13
Distribution Units	20 to 29	14 to 1C
Repeaters	30 to ...	1E to...



The device address can be allocated within a CAN bus system only once!

If the Operator Unit is operated on an RS422 interface (jumper setting), the device address has no signification.

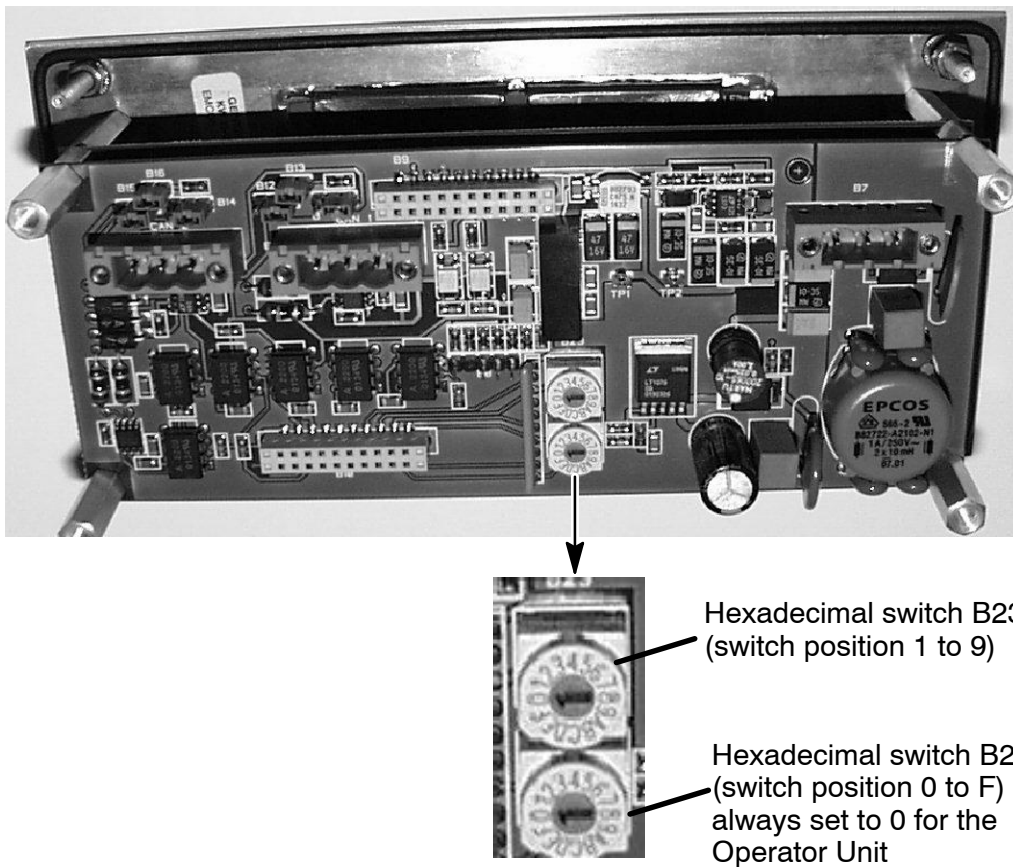


Figure 75: Setting the device address

8.4 Making the cable connections

8.4.1 General information about establishing on-board wiring



Caution!

When establishing cable connections ensure that the cables are disconnected from the power supply. It is essential to ensure that all cables are disconnected from the power supply, if necessary measure the voltage beforehand and/or disconnect the relevant distributor.

In order to ensure that the compass operates correctly, it is essential that you follow the procedures described below for establishing cable connections.

Cable type CAN bus and RS422 interface (manufacturer's recommendation):

6x0.75mm² , twisted with screening.

Cable type voltage supply Raytheon cable no. WN219-401-3.0 with connected plug or 3x0.75mm², twisted.

- Strip approx. 180 mm of the cable length.
Make sure you do not damage the screening.
- Strip off the screening leaving a remaining section measuring approximately 15mm and strip off over the outer insulation (see Figure 76).

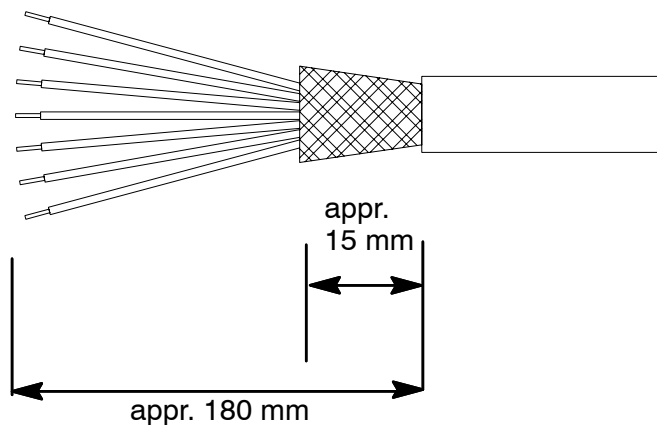


Figure 76: How to strip the connection cable

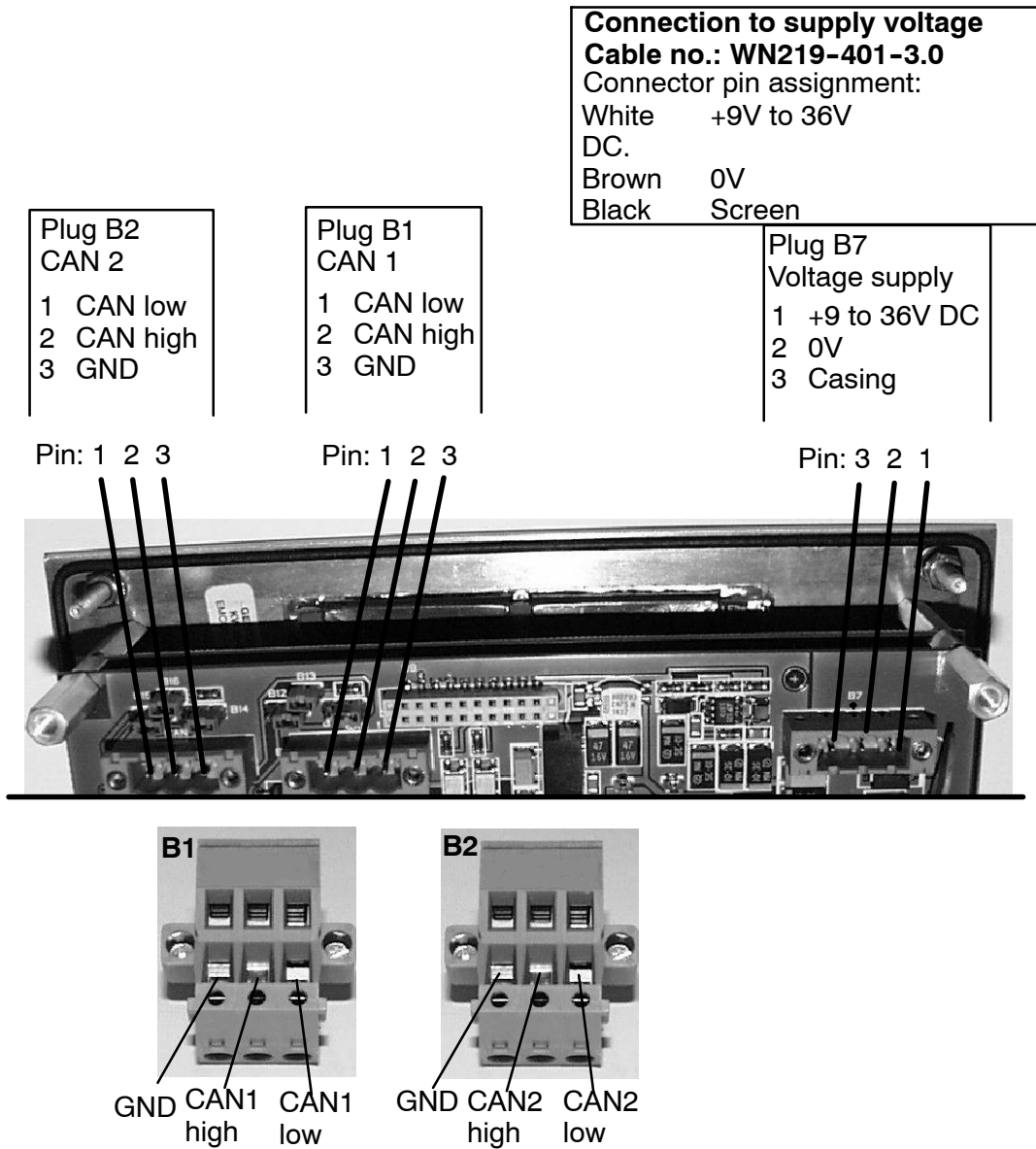
-
- Connect the plug as shown in Figure 78 or Figure 79.
 - Plug the plug into the corresponding counter plug.



Figure 77: Example of a CAN1 bus - CAN2 bus connection
(the Operator Unit is not the end device)

Operator Unit 130-613

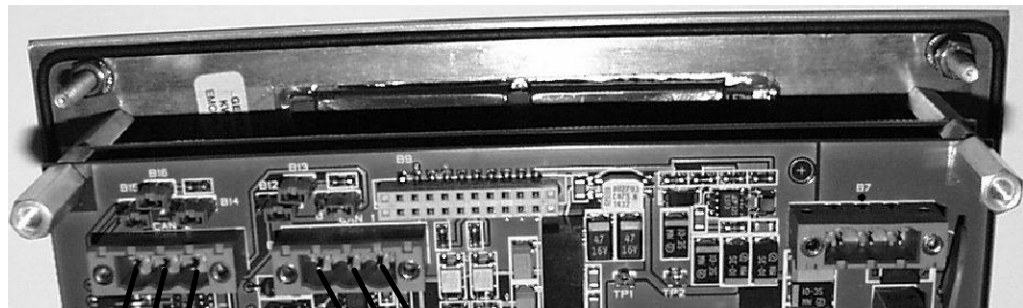
8.4.1.1 Connections to the plug connections



**CAN1 or CAN 2 connection to the plug,
Operator Unit CAN-Bus connection**
with terminating resistor
Jumper B13 and Jumper B16 (see section 8.4.1.2)

Figure 78: Making the connections to the plugs for supply voltage and CAN-Bus

OPTION (currently not used)



Pin: 1 2 3

Plug B2
RS422
Receive

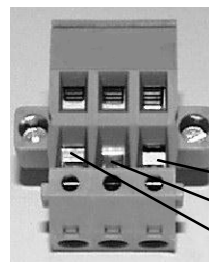
1 RX-
2 RX+
3 GND

Pin: 1 2 3

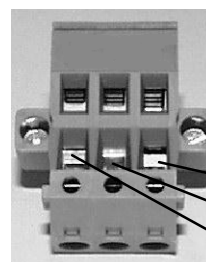
Plug B1
RS422
Transmit

1 TX-
2 TX+
3 GND

RS422 connection
Plug B1 = Transmit
Plug B2 = Receive



RS 422 TX-
RS 422 TX+
GND



RS 422 RX-
RS 422 RX+
GND

Figure 79: Making the connections to the plugs for RS422 interface (TX and RX)

8.4.1.2 Plugging in the jumpers

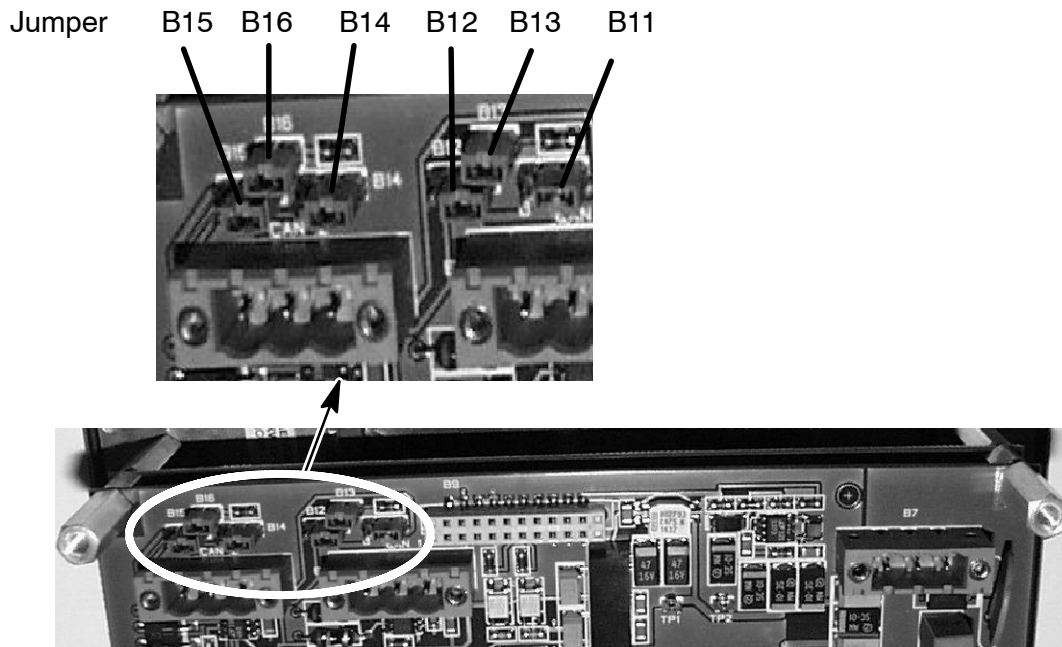


Figure 80: Plugging in the jumpers

Jumper	Pin 3-2-1	Default	Function
B11		Default	Plug B1 - CAN 1
			Plug B1 - RS422
B12		Default	Plug B1 - CAN 1
			Plug B1 - RS422
B13			CAN bus terminating resistor plugged in - on end device only
B14		Default	Plug B1 - CAN 2
			Plug B1 - RS422
B15		Default	Plug B1 - CAN 2
			Plug B1 - RS422
B16			CAN bus terminating resistor plugged in - on end device only

