Raytheon Anschütz

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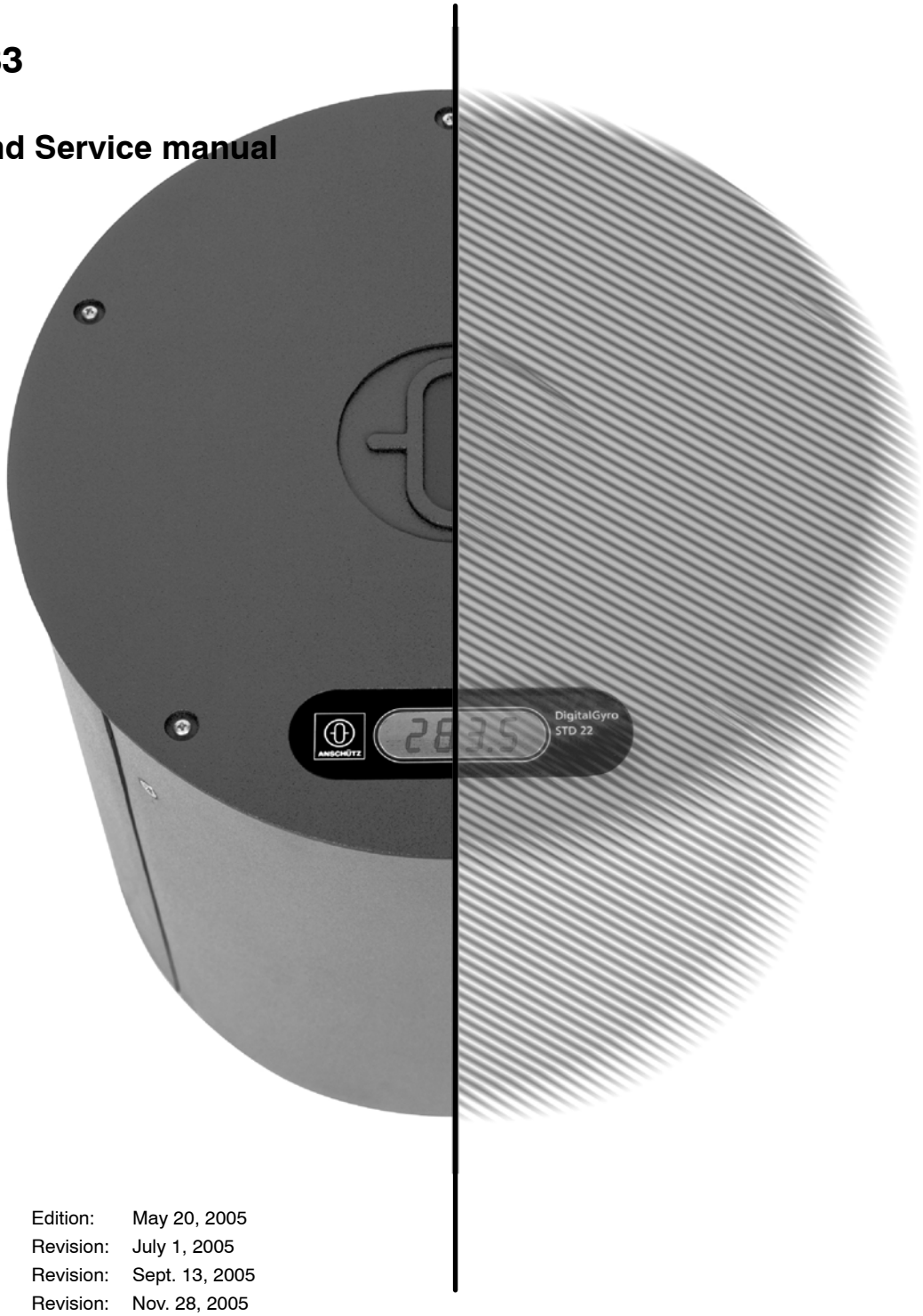
STD 22 Compact GYRO COMPASS and STD 22 GYRO COMPASS

Type 110-233

Installation and Service manual



3646/110-233.DOC010302

Edition: May 20, 2005
Revision: July 1, 2005
Revision: Sept. 13, 2005
Revision: Nov. 28, 2005
Revision: Feb. 17, 2006

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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./ Type Examination Certificates No.:	47778 - 03 Lux, 47779 - 03 Lux
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 18.03.2005

Raytheon Marine GmbH
Head of Quality Management

Martin Wloka

Raytheon Marine GmbH
Head of Qualification / Certification

Günther Krappe

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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	
Repeater Compass	133 - 560	
Additional output box	146-103 NG001	1
AC DC Converter	121-062	1
Multi Display	AN 300	1
Change–over box	138 – 119	2
Change-over switch	124 – 187	2

[1] Optional
[2] Optional (For the redundant STD 22 compass system with automatic change-over function)

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 Seeschiffahrt und Hydrographie (BSH) Germany, and listed in EC-type approval certificate No. 17063-00 GL Lux (GYROSTAR II) from GL Luxembourg.

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Manufacturer's Declaration of Conformity

Article 10 -- EC-Directive 96/98/EC.
As amended by Directive 2001/53/EC , 2002/75/EC.

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.

Product Designation:	**Gyrocompass System /** **Gyrocompass System for High Speed Craft /** **Gyrocompass System as Rate- of-turn Indicator**
Type:	**Anschütz Gyro Compass Standard 22** system components see attached)
Type Examination by:	GL Luxembourg 26, place de la Gare L-1616 Luxembourg Notified Body No. 0801
Type Examination Certificates No.:	47778 - 03 Lux, 47779 - 03 Lux
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) A. 526 (13) (Rate-of-turn indicator see remark page 2)

This declaration has been made in the name of the manufacturer by:

Kiel, den 15.02.2006

Raytheon Marine GmbH
Head of Quality Management

Martin Wieka

Raytheon Marine GmbH
Quality Mangement

Günther Krappe

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Manufacturer's Declaration of Conformity

Article 10 – EC-Directive 96/98/EC.
As amended by Directive 2001/53/EC , 2002/75/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 Seeschiffahrt und Hydrographie (BSH) Germany, and listed in EC-type approval certificate No. 17063-00 GL Lux (GYROSTAR II) from GL Luxembourg.

Remark
The Raytheon Anschütz Gyro Compass Standard 22 system fulfils the accuracy requirements for a rate –of-turn Indicator according to IMO Resolution A.526 (13)- Rate- of- turn Indicator.

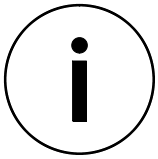
The system consists of.
- Gyro Compass Standard 22 (drawing No.110 - 223)
- Distribution Unit (drawing No.138 - 118)
- Operator Unit (drawing No.130 - 613)

The rate- of- turn output has to be taken from the Distribution Unit (drawing No. 138-118) to comply with IMO Resolution A.526(13)- Rate- of- turn Indicator.

Safety notes

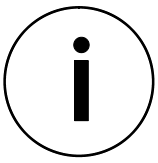
Caution:

- Maintenance and repair work should be carried out only by trained and qualified staff who are well versed in national safety regulations.
- After the gyro compass has been switched off it is necessary to wait at least 15 minutes before accessing the interior of the gyro compass. Otherwise the sphere could be damaged!
- Never switch off the compass at sea, the sphere could be damaged.



- It is advisable to leave the gyro compass switched on when lying in port for periods of up to one week.
- If warnings occur, the operation of the gyro equipment is not restricted. If the cause of the problem is rectified quickly, it is possible to prevent the equipment from breaking down. Please inform the authorised service staff (via the hotline). Refer to the service manual as appropriate.
- When error messages appear, the heading is no longer displayed on the compass; the heading is not followed up on a connected course receiver. The compass must be repaired by well trained staff.

Please note that all ship‘s of 500 gross tonnage and upwards according to SOLAS regulations must be equipped with a gyro compass. The gyro compass must be operational. For this reason it is not allowed to have a switched-off gyro during voyages.
A switched-off gyro compass during voyages could cause damage to the gyrosphere.



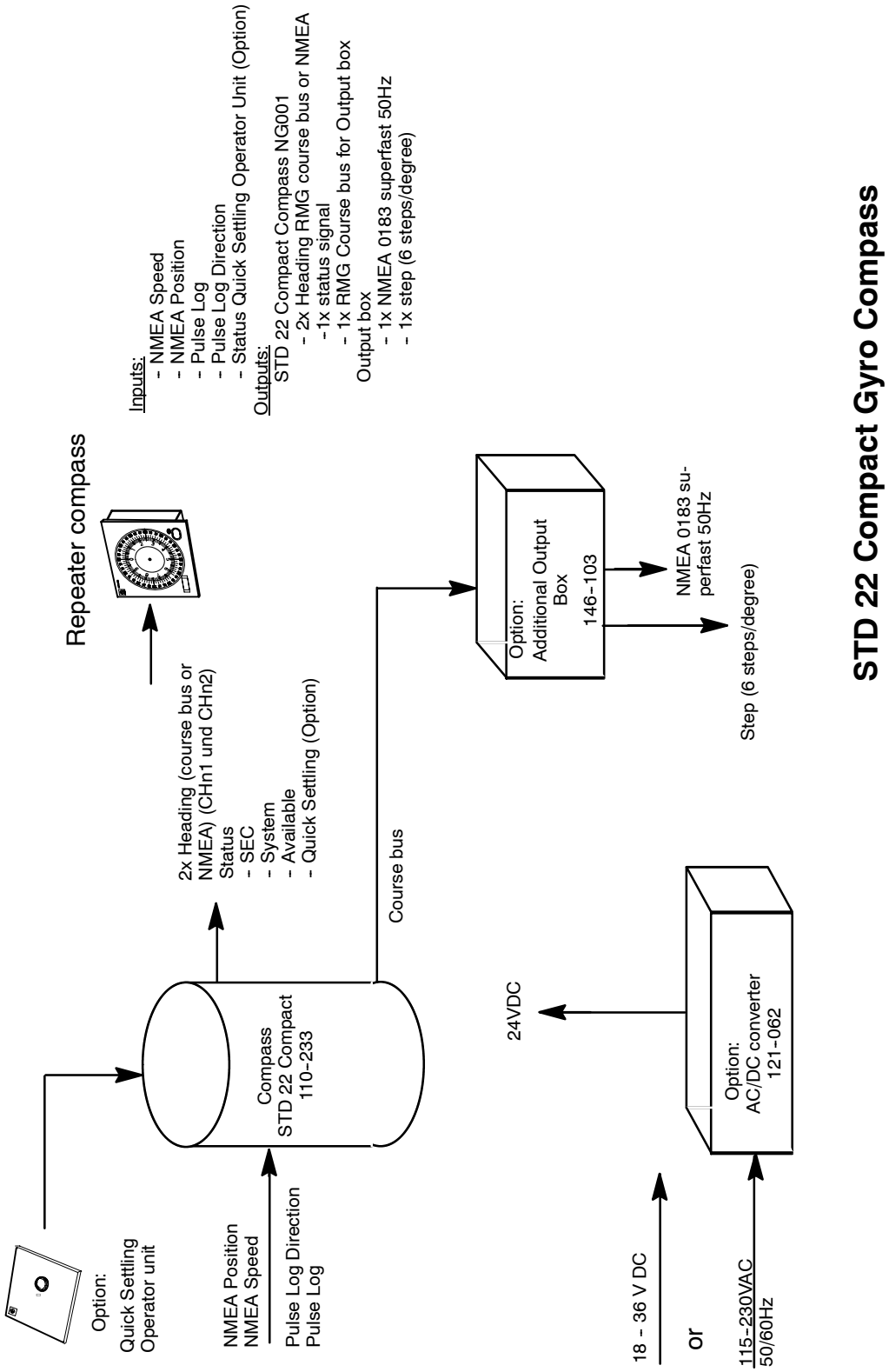
Caused by technical progress the PC-Boards of the Gyro Compass are changed.
Due to that some pictures and/or procedures have been changed.
Respective changes are marked with “E10”.

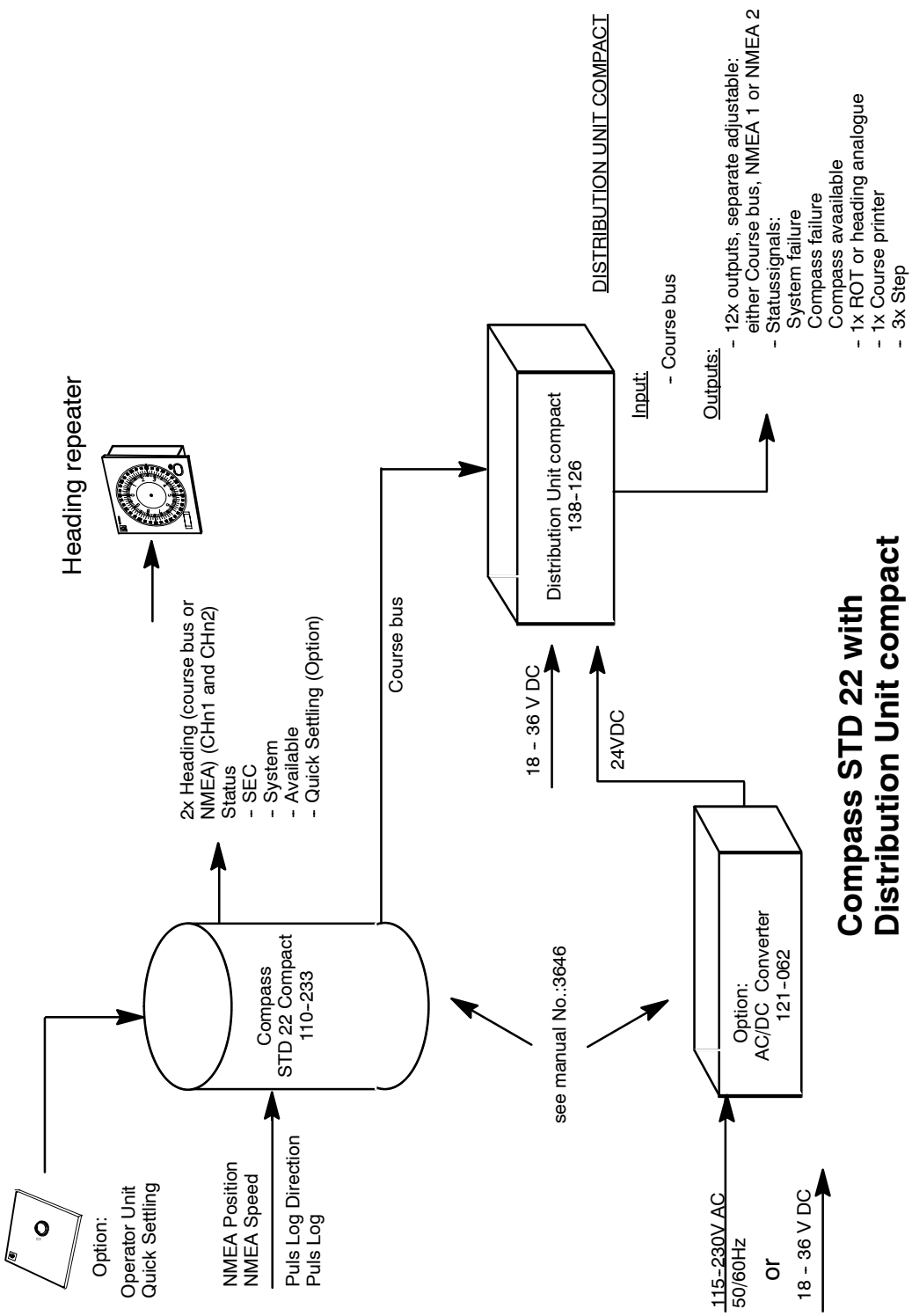
The AC supply voltage (ships mains) may drop out.
This leads to a restart of the gyrocompass and a new settling stage.
The heading information during this settling stage has a reduced accuracy.
Therefore a continously supply with 24VDC should be guaranteed.

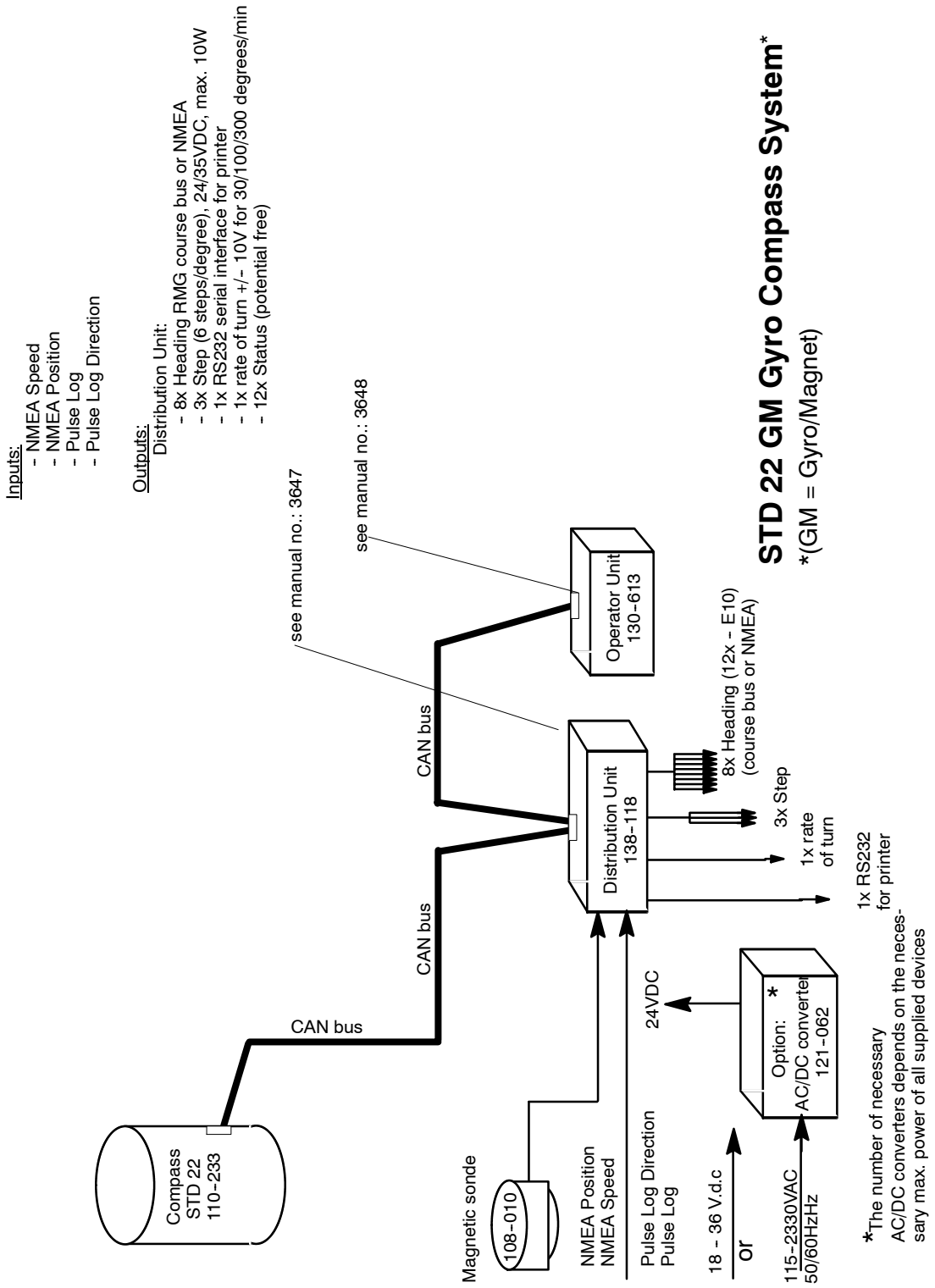
1 General information

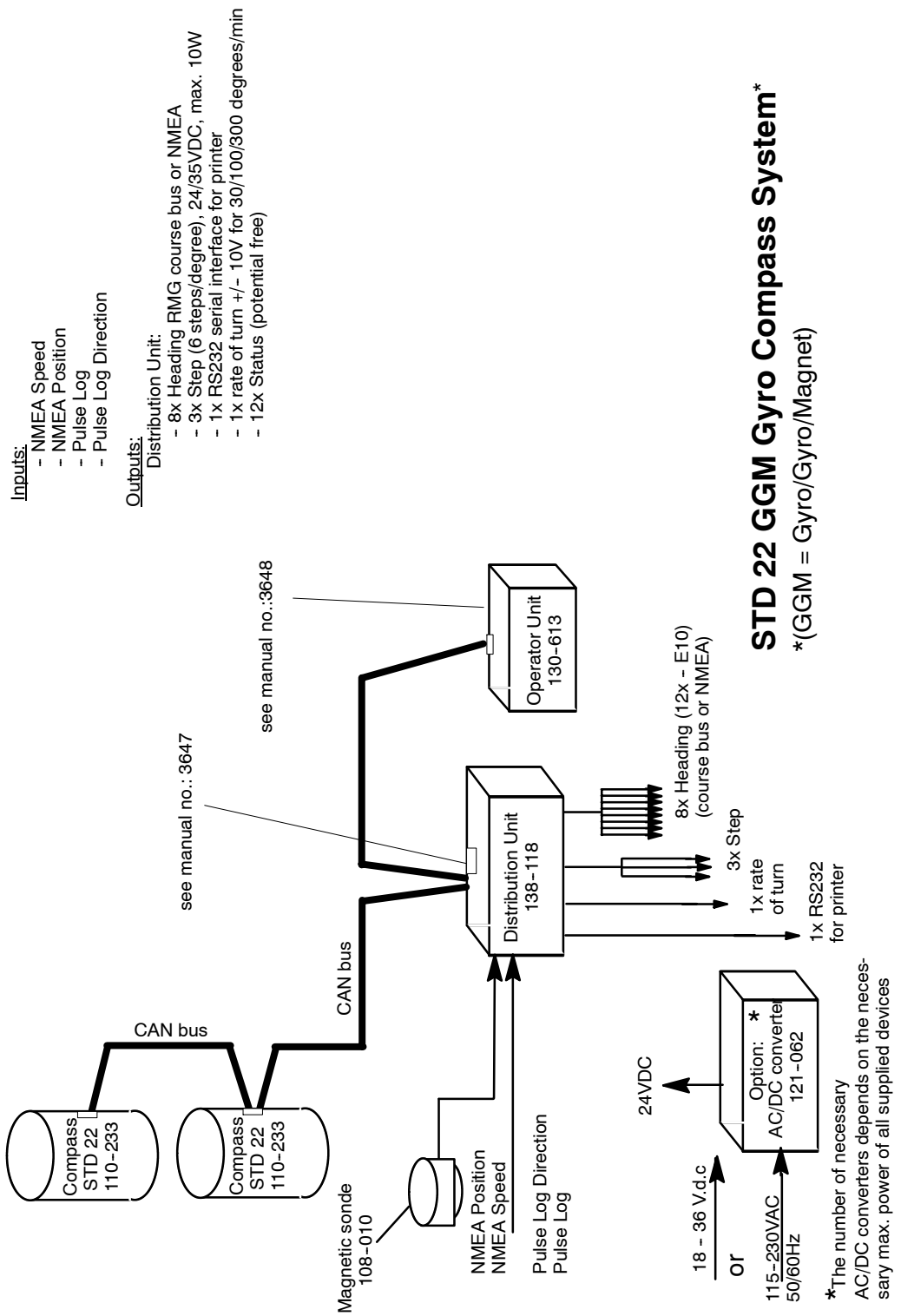
The STD 22 Compact Compass and the STD 22 Compass are identical gyro compasses.
The difference between the two gyro compasses is that the STD 22 Gyro Compass can be operated via a CAN bus system with an Operator Unit and a Distribution Unit.
In the case of the STD 22 Compact Gyro Compass, the CAN bus is not enabled.

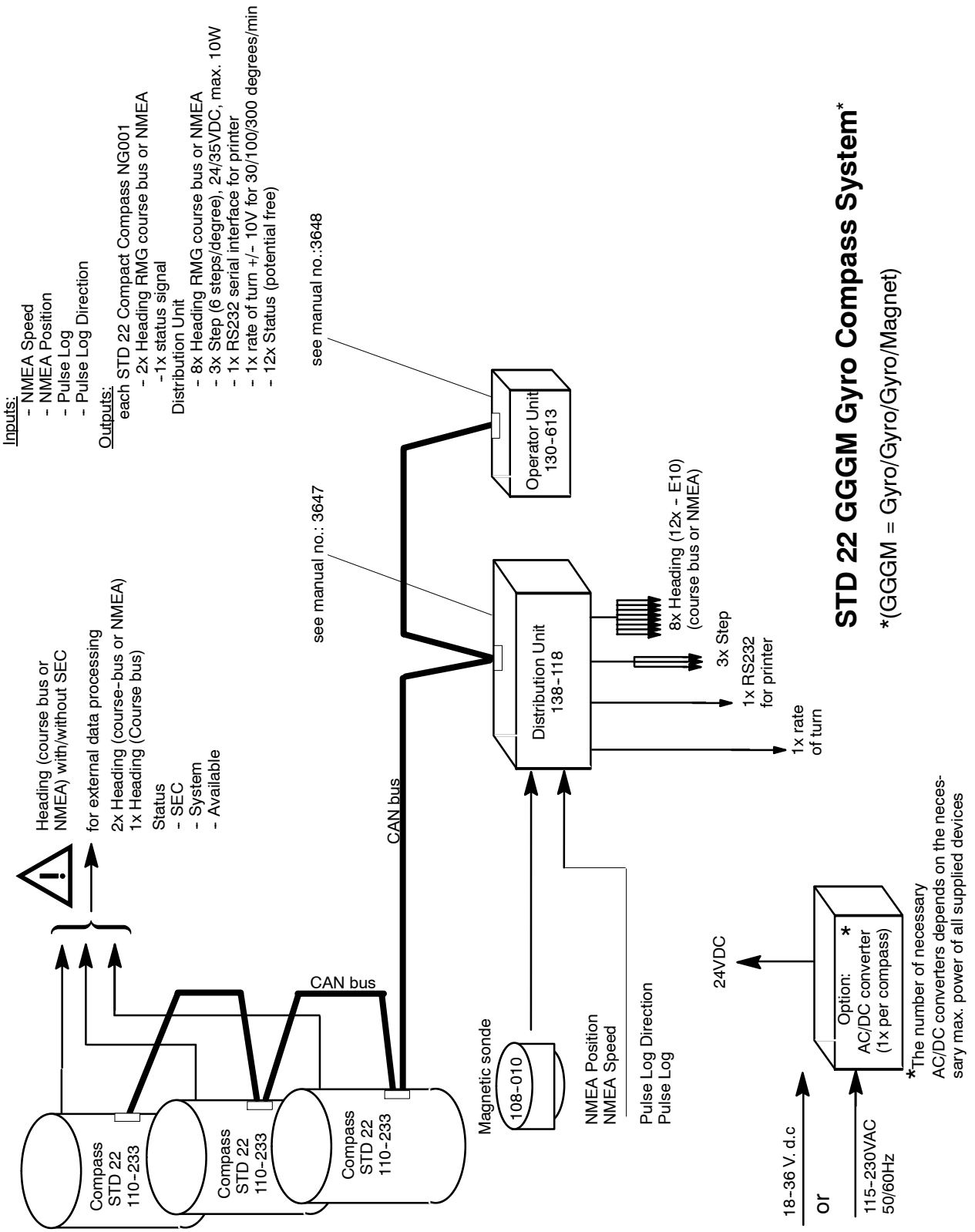
The following diagrams provide an overview of the possible applications of the STD 22 Compact and STD 22 Gyro Compasses.

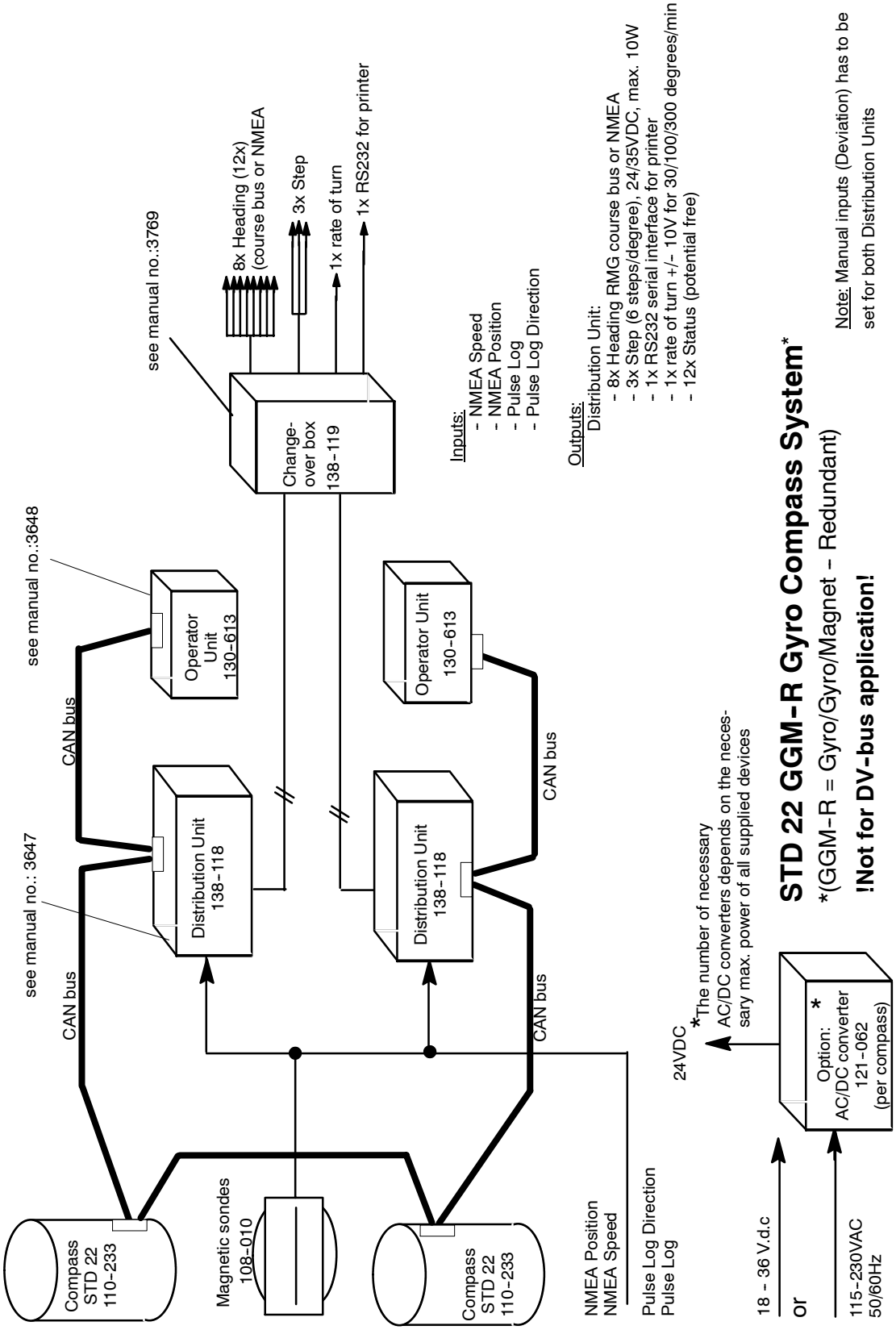

Inputs:
- NMEA Speed
- NMEA Position
- Pulse Log
- Pulse Log Direction
- Status Quick Settling Operator Unit (Option)
Outputs:
STD 22 Compact Compass NG001
- 2x Heading RMG course bus or NMEA
-1x status signal
- 1x RMG Course bus for Output box
Output box
- 1x NMEA 0183 superfast 50Hz
- 1x step (6 steps/degree)
Repeater compass
2x Heading (course bus or NMEA) (CHn1 und CHn2)
Status
- SEC
- System
- Available
- Quick Settling (Option)
Course bus
Option: Additional Output Box 146-103
NMEA 0183 su-perfast 50Hz
Step (6 steps/degree)
Option: Quick Setting Operator unit
NMEA Position
NMEA Speed
Pulse Log Direction
Pulse Log
Compass STD 22 Compact 110-233
24VDC
Option: AC/DC converter 121-062
18 - 36 V DC
or
115-230VAC 50/60Hz
STD 22 Compact Gyro Compass

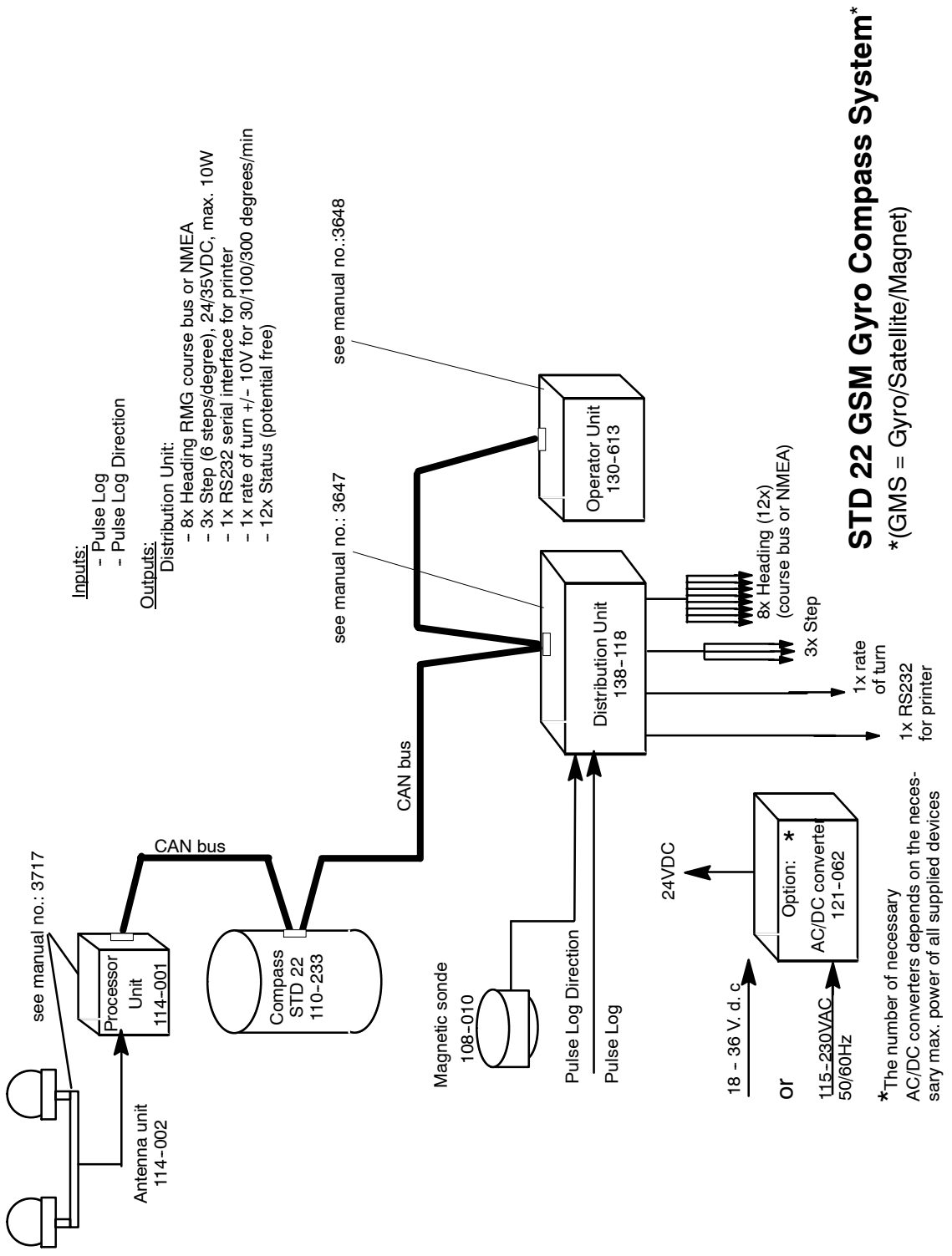

Compass STD 22 with
Distribution Unit compact
Heading repeater
2x Heading (course bus or NMEA) (CHn1 and CHn2)
Status
- SEC
- System
- Available
- Quick Settling (Option)
Course bus
Compass STD 22 Compact 110-233
Distribution Unit compact 138-126
DISTRIBUTION UNIT COMPACT
Input:
- Course bus
Outputs:
- 12x outputs, separate adjustable: either Course bus, NMEA 1 or NMEA 2
- Statussignals:
System failure
Compass failure
Compass avaailable
- 1x ROT or heading analogue
- 1x Course printer
- 3x Step
18 - 36 V DC
24VDC
see manual No.:3646
Option: AC/DC Converter 121-062
Option:
Operator Unit
Quick Settling
NMEA Position
NMEA Speed
Puls Log Direction
Puls Log
115-230V AC
50/60Hz
or
18 - 36 V DC

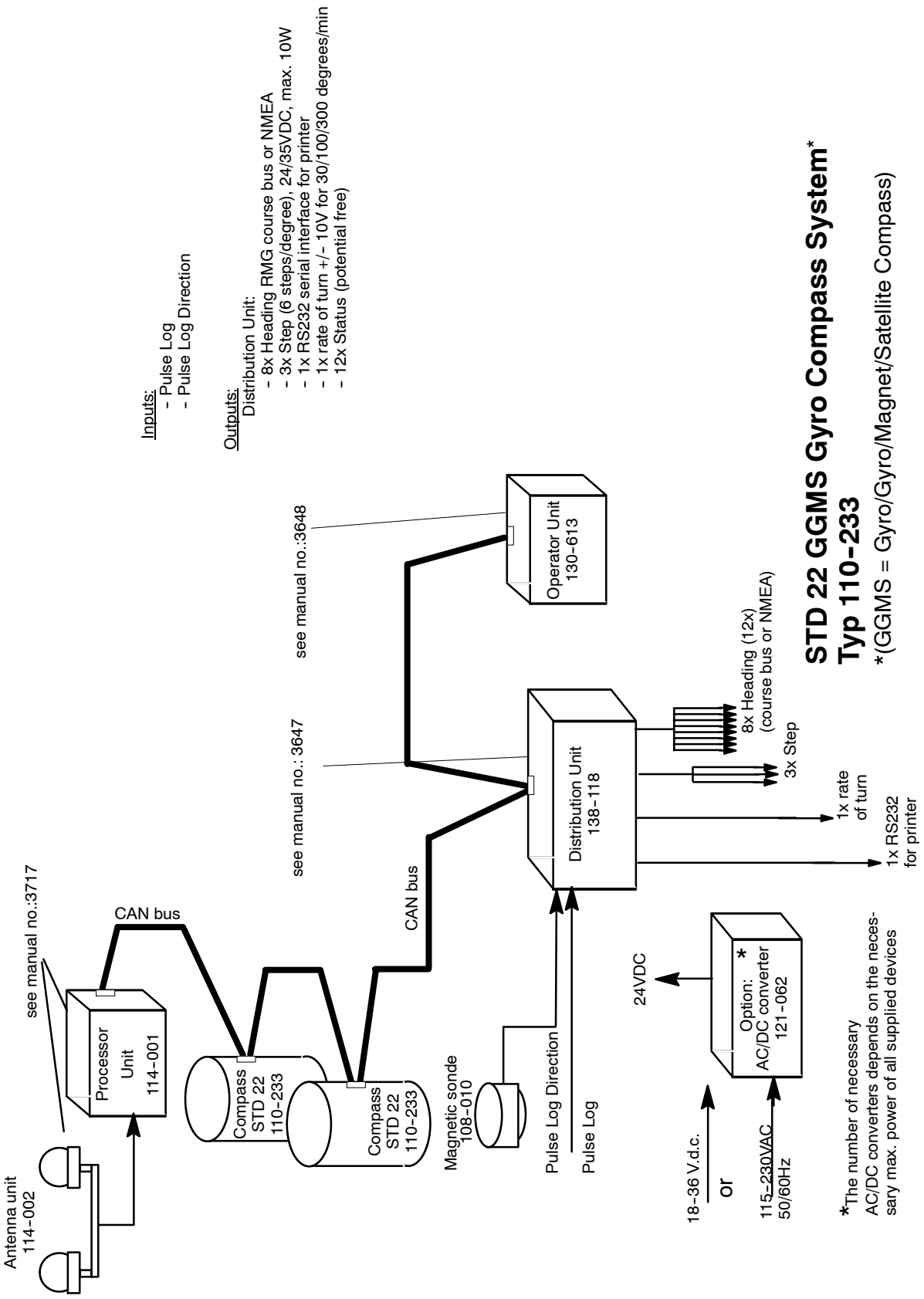

Inputs:
- NMEA Speed
- NMEA Position
- Pulse Log
- Pulse Log Direction
Outputs:
Distribution Unit:
- 8x Heading RMG course bus or NMEA
- 3x Step (6 steps/degree), 24/35VDC, max. 10W
- 1x RS232 serial interface for printer
- 1x rate of turn +/- 10V for 30/100/300 degrees/min
- 12x Status (potential free)
see manual no.: 3647
see manual no.: 3648
STD 22 GM Gyro Compass System*
*(GM = Gyro/Magnet)
Operator Unit 130-613
Distribution Unit 138-118
8x Heading (12x - E10) (course bus or NMEA)
3x Step
1x rate of turn
1x RS232 for printer
CAN bus
CAN bus
CAN bus
Compass STD 22 110-233
Magnetic sonde
108-010
NMEA Position
NMEA Speed
Pulse Log Direction
Pulse Log
24VDC
18 - 36 V.d.c
or
115-2330VAC 50/60HzHz
Option: * AC/DC converter 121-062
*The number of necessary AC/DC converters depends on the neces-sary max. power of all supplied devices

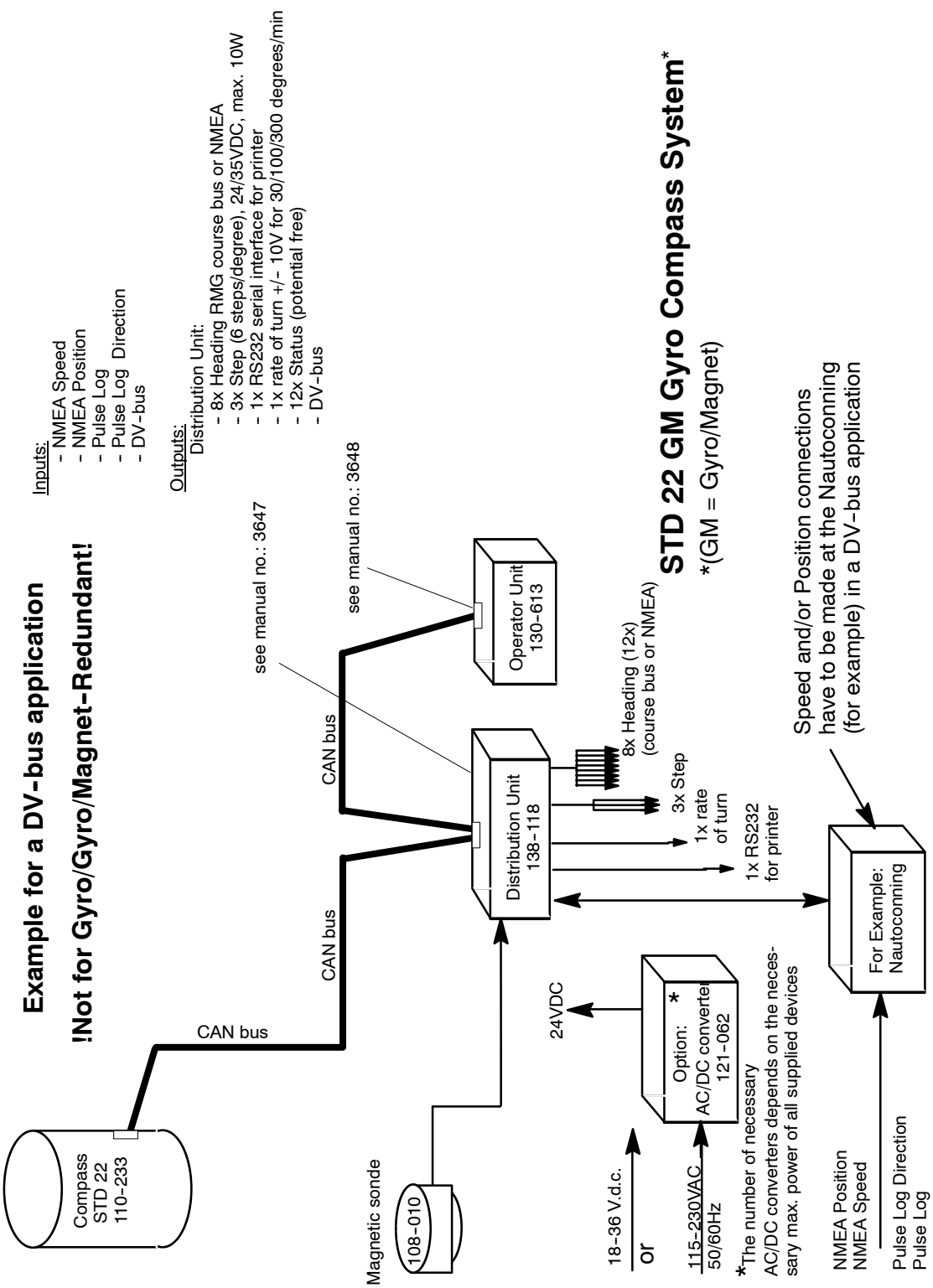

Inputs:
- NMEA Speed
- NMEA Position
- Pulse Log
- Pulse Log Direction
Outputs:
Distribution Unit:
- 8x Heading RMG course bus or NMEA
- 3x Step (6 steps/degree), 24/35VDC, max. 10W
- 1x RS232 serial interface for printer
- 1x rate of turn +/- 10V for 30/100/300 degrees/min
- 12x Status (potential free)
STD 22 GGM Gyro Compass System*
*(GGM = Gyro/Gyro/Magnet)
see manual no.:3648
see manual no.: 3647
Operator Unit 130-613
Distribution Unit 138-118
8x Heading (12x - E10) (course bus or NMEA)
3x Step
1x rate of turn
1x RS232 for printer
CAN bus
CAN bus
Compass STD 22 110-233
Compass STD 22 110-233
Magnetic sonde 108-010
NMEA Position
NMEA Speed
Pulse Log Direction
Pulse Log
24VDC
Option: * AC/DC converter 121-062
18 - 36 V.d.c
or
115-230VAC 50/60Hz
*The number of necessary AC/DC converters depends on the necessary max. power of all supplied devices


Inputs:
- NMEA Speed
- NMEA Position
- Pulse Log
- Pulse Log Direction
Outputs:
each STD 22 Compact Compass NG001
- 2x Heading RMG course bus or NMEA
-1x status signal
Distribution Unit
- 8x Heading RMG course bus or NMEA
- 3x Step (6 steps/degree), 24/35VDC, max. 10W
- 1x RS232 serial interface for printer
- 1x rate of turn +/- 10V for 30/100/300 degrees/min
- 12x Status (potential free)
Heading (course bus or NMEA) with/without SEC
for external data processing
2x Heading (course-bus or NMEA)
1x Heading (Course bus)
Status
- SEC
- System
- Available
see manual no.:3648
see manual no.: 3647
Operator Unit 130-613
Distribution Unit 138-118
8x Heading (12x - E10) (course bus or NMEA)
3x Step
1x RS232 for printer
1x rate of turn
CAN bus
CAN bus
Compass STD 22 110-233
Compass STD 22 110-233
Compass STD 22 110-233
Magnetic sonde 108-010
NMEA Position
NMEA Speed
Pulse Log Direction
Pulse Log
24VDC
Option: * AC/DC converter (1x per compass)
*The number of necessary AC/DC converters depends on the necessary max. power of all supplied devices
18-36 V. d.c
or
115-230VAC 50/60Hz
STD 22 GGGM Gyro Compass System*
*(GGGM = Gyro/Gyro/Gyro/Magnet)


STD 22 GGM-R Gyro Compass System*
*(GGM-R = Gyro/Gyro/Magnet – Redundant)
!Not for DV-bus application!
see manual no.:3769
see manual no.:3648
see manual no.: 3647
Change-over box 138-119
Operator Unit 130-613
Operator Unit 130-613
Distribution Unit 138-118
Distribution Unit 138-118
Compass STD 22 110-233
Magnetic sondes 108-010
Compass STD 22 110-233
CAN bus
CAN bus
CAN bus
CAN bus
8x Heading (12x) (course bus or NMEA
3x Step
1x rate of turn
1x RS232 for printer
Inputs:
- NMEA Speed
- NMEA Position
- Pulse Log
- Pulse Log Direction
Outputs:
Distribution Unit:
- 8x Heading RMG course bus or NMEA
- 3x Step (6 steps/degree), 24/35VDC, max. 10W
- 1x RS232 serial interface for printer
- 1x rate of turn +/- 10V for 30/100/300 degrees/min
- 12x Status (potential free)
Note: Manual inputs (Deviation) has to be set for both Distribution Units
NMEA Position
NMEA Speed
Pulse Log Direction
Pulse Log
24VDC
*The number of necessary AC/DC converters depends on the necessary max. power of all supplied devices
Option: * AC/DC converter 121-062 (per compass)
18 - 36 V.d.c
or
115-230VAC 50/60Hz

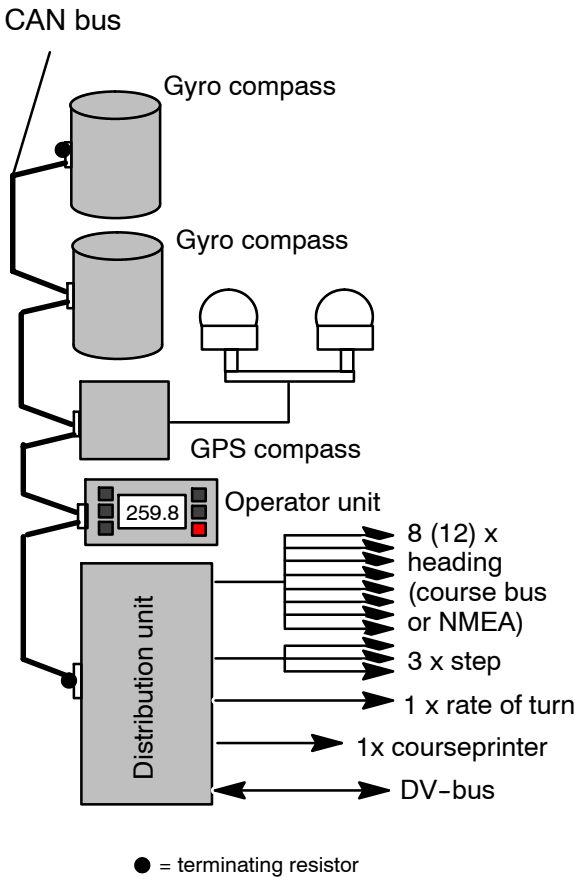

STD 22 GSM Gyro Compass System*
*(GMS = Gyro/Satellite/Magnet)
Inputs:
- Pulse Log
- Pulse Log Direction
Outputs:
Distribution Unit:
- 8x Heading RMG course bus or NMEA
- 3x Step (6 steps/degree), 24/35VDC, max. 10W
- 1x RS232 serial interface for printer
- 1x rate of turn +/- 10V for 30/100/300 degrees/min
- 12x Status (potential free)
see manual no.:3648
see manual no.: 3647
see manual no.: 3717
CAN bus
CAN bus
Operator Unit 130-613
Distribution Unit 138-118
Processor Unit 114-001
Compass STD 22 110-233
Antenna unit 114-002
Magnetic sonde 108-010
8x Heading (12x) (course bus or NMEA)
3x Step
1x rate of turn
1x RS232 for printer
Pulse Log Direction
Pulse Log
24VDC
Option: * AC/DC converter 121-062
18 - 36 V. d. c
or
115-230VAC 50/60Hz
*The number of necessary AC/DC converters depends on the necessary max. power of all supplied devices


Inputs:
- Pulse Log
- Pulse Log Direction
Outputs:
Distribution Unit:
- 8x Heading RMG course bus or NMEA
- 3x Step (6 steps/degree), 24/35VDC, max. 10W
- 1x RS232 serial interface for printer
- 1x rate of turn +/- 10V for 30/100/300 degrees/min
- 12x Status (potential free)
STD 22 GGMS Gyro Compass System*
Typ 110-233
*(GGMS = Gyro/Gyro/Magnet/Satellite Compass)
see manual no.:3648
see manual no.: 3647
see manual no.:3717
Operator Unit 130-613
Distribution Unit 138-118
8x Heading (12x) (course bus or NMEA)
3x Step
1x rate of turn
1x RS232 for printer
CAN bus
CAN bus
Processor Unit 114-001
Compass STD 22 110-233
Compass STD 22 110-233
Magnetic sonde 108-010
Pulse Log Direction
Pulse Log
24VDC
Option: * AC/DC converter 121-062
18-36 V.d.c.
or
115-230VAC 50/60Hz
Antenna unit 114-002
*The number of necessary AC/DC converters depends on the necessary max. power of all supplied devices


Example for a DV-bus application
!Not for Gyro/Gyro/Magnet-Redundant!
Inputs:
- NMEA Speed
- NMEA Position
- Pulse Log
- Pulse Log Direction
- DV-bus
Outputs:
Distribution Unit:
- 8x Heading RMG course bus or NMEA
- 3x Step (6 steps/degree), 24/35VDC, max. 10W
- 1x RS232 serial interface for printer
- 1x rate of turn +/- 10V for 30/100/300 degrees/min
- 12x Status (potential free)
- DV-bus
see manual no.: 3647
see manual no.: 3648
CAN bus
CAN bus
CAN bus
Compass STD 22 110-233
Magnetic sonde 108-010
Operator Unit 130-613
Distribution Unit 138-118
8x Heading (12x) (course bus or NMEA)
3x Step
1x rate of turn
1x RS232 for printer
STD 22 GM Gyro Compass System*
*(GM = Gyro/Magnet)
Speed and/or Position connections have to be made at the Nautoconning (for example) in a DV-bus application
24VDC
Option: * AC/DC converter 121-062
18-36 V.d.c.
or
115-230VAC 50/60Hz
*The number of necessary AC/DC converters depends on the necessary max. power of all supplied devices
For Example: Nautoconning
NMEA Position
NMEA Speed
Pulse Log Direction
Pulse Log

1.1 CAN bus (CAN = Controller Area Network)

(CAN = Controller Area Network)



The CAN bus is a Multi-Master-Bus allowing the connection of all devices and systems regardless of their task and function. This means that any number of devices can be connected. These devices must be designed for CAN bus technology.
For the CAN bus it is essential that every bus user is addressable via a unique address. This address is set within each bus user.
The usable address range is from $01_{(16)}$ to $3F_{(16)}$ (address $00_{(16)}$ is reserved for development purposes).
Each bus user can send and receive data via the CAN bus.

The CAN bus must be terminated at both ends via an ohmic resistor (125 ohms). This terminating resistor is activated by jumpers or switches (E10) on the respective PCB.

There is a redundant bus system (CAN1 and CAN2).

DV-bus:
Connections and settings for a DV-bus application see manuals no.: 3647 “Distribution Unit” and no.: 3648 “Operating Unit”.

Figure1 : Principle of CAN bus

intentionally left blank

2 Preparing to install the STD 22 Compact Gyro Compass

To ensure that the STD 22 Compact Gyro Compass is installed and put into operation correctly, these instructions must be followed in the order in which they appear.
It must not be installed or put into operation whilst at sea.

2.1 STD 22 Compact Compass – Scope of Supply

The scope of supply consists of:

- Compass (110-233)
  - Outer sphere
  - Distilled water
  - Supporting liquid
  - Gyrosphere (111-006)
- User manual for the STD 22 Compass
- Installation and service manual for the STD 22 Compass
- Tools and spare parts pack
  - Sealing rings
  - Suction cup
  - Filling device
  - Injector

Optional:

- AC/DC converter (121-062)
- Quick Settling Operator Unit (130-606)

- Additional Output Box (146-103)
  (Interface extension STEP/SSC)

2.2 General information concerning installation of the STD 22 Compact Compass

When fitting components, observe the following spacing:

Fit the compass enclosure so that the display can be viewed from above and the cover of the enclosure can be removed (see also Dimensional Drawing 110-233.HP005).

To ensure fault-free operation of the STD 22Compact Compass, it is essential to follow these directions, safety notes and installation instructions.

Instructions relating to cable cross-sections and earth connections must be adhered to.

The tools which are specified for installing the compass must be used.

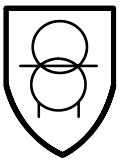
Only original parts or parts approved by the manufacturer may be used in connection with the STD 22 Compact Compass.

See also Cable Connection Diagram 110-233 HP010 for the STD 22 Compact Compass.

Gyro Compass should not be installed in oil-containing ambient air, not in surrounding in vibration and should installed on a vibration-free platform.

Gyro compass should be installed on the ships‘ line (vertical and horizontal).

The installation of the power supply (AC/DC-Converter) should only be performed by an experienced electrician.



The 24 VDC supply voltage should be engineered as a low-security-voltage according to SELV.

2.3 Creating cable connections

2.3.1 General information concerning on-board wiring

The cables which are to be connected to the STD 22 Compact Gyro Compass are led through one of the cable entries at the top of the compass enclosure and fixed in the cable entry with a cable clip suitable for the size of the cable.
The cable entries are supplied with the compass.

Caution:
Ensure that cables are not live before creating cable connections.
It is vitally important to ensure that all cables are free of voltage; where appropriate, carry out voltage measurements beforehand and/or disconnect the relevant distributor from the power supply.

To ensure that the compass functions correctly, it is essential to adhere to the following sequence when creating cable connections.

- Strip the cable over a length of approximately 180 mm
  (depending on the distance of the cable entry from the terminal).
  Be careful not to damage the screening.
- Trim the screening so as to leave approximately 15 mm on the cable.

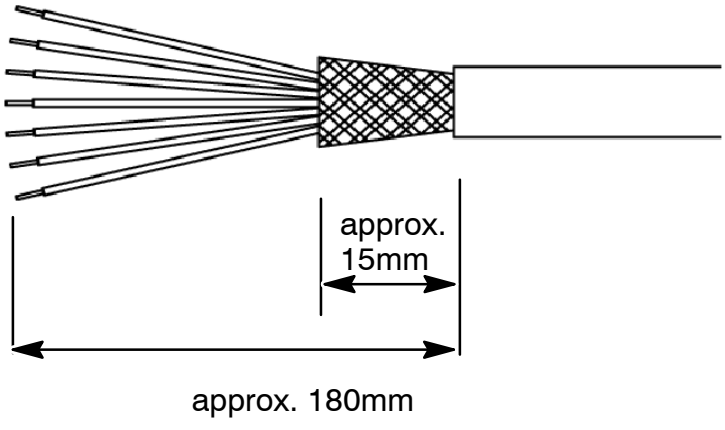


Figure 2: Requirements for stripping the connecting cable

- Push the components of the screw fastening over the cable.
  It is essential to follow the sequence (as shown in Figure 3).
- Check the cone and the mating piece of the earthing insert for corrosion and if necessary remove corrosion with an emery cloth.
- Push the mating piece of the earthing insert to the end of the cable sheath.
- Push the cone inside the screening and against the mating piece. Ensure that the screening is evenly distributed over the cone (see Figure 3).

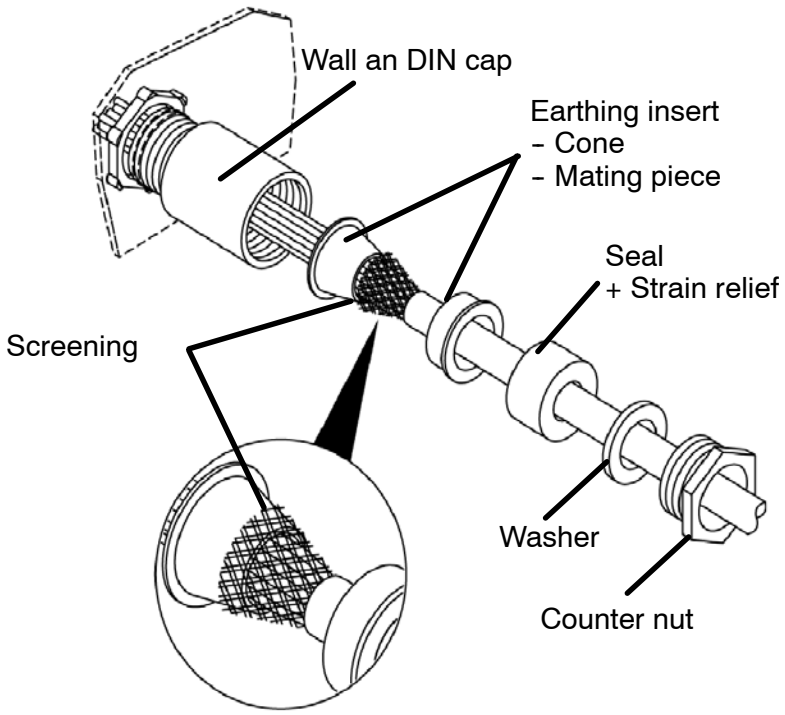
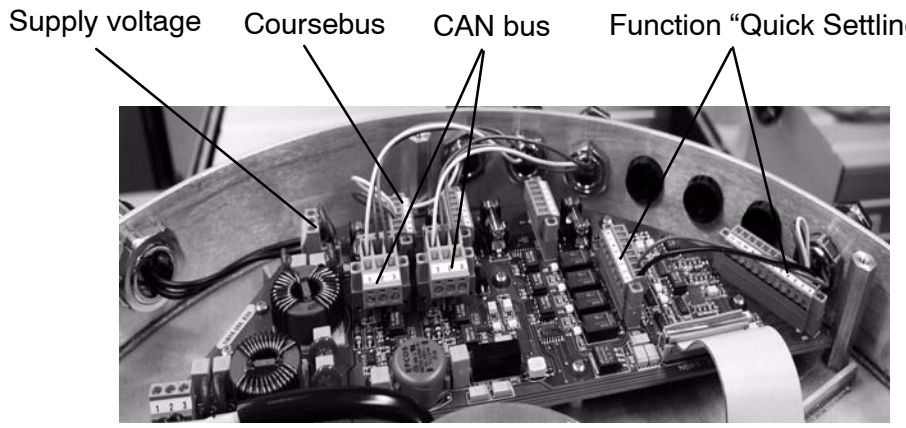


Figure 3: Creating the cable connection



Note: The connection cables should be shortened in that way, that they could be led to the terminal boards without mechanical stress.
Too long connection cables will lead to EMC problems.
For the cable-type see respective drawing at the appendix.

Figure 4: Example of a proper cable connection

- Place the earthing insert, strain relief and washer in the cable entry; fit and tighten the counter nut.
- Strip the cable conductors to a length of about 1.5 cm, lightly twist them and fit cable end sleeves. Connect the cable conductors according to respective drawings and tables. Tighten the terminal screws – check the connection is secure by pulling gently.

2.3.1.1 General information about creating an earth connection

The following instructions relating to the creation of cable connections must be adhered to in order to comply with the stringent EMC requirements.
The specified cable types must be used.

It is vital to ensure that these connections have **a common** reference to ship's earth.
Additional components (optional features) must likewise be connected to the common earth.

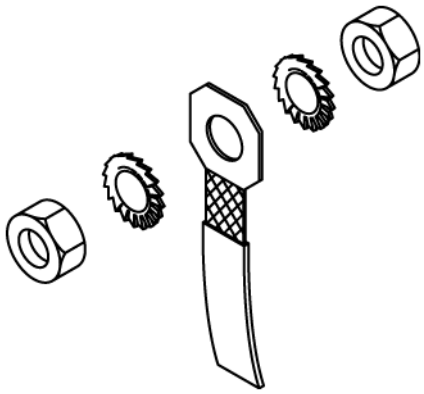


Figure 5: Creating an earth connection

Each earth connection must be made as shown in Figure 5.
The earth cable, to which a cable lug is attached, must have a cross-section of at least 1.5 mm^2.
The cable lug is mounted between a pair of toothed washers.
Earth connections must be free of all corrosion; they must be screwed tight.

2.4 Installing the compass and putting it into operation

2.4.1 Remove the transportation support with outer sphere, supporting liquid and distilled water.

- Undo the 4 screws (Figure 6 /1) at the top and bottom of the enclosure door, lift out the door and detach the earthing strip (Figure 6/2) on the inside of the door.
- Carefully remove the transport packaging with the outer sphere and the two bottles containing supporting liquid and distilled water from the compass enclosure.
- Take the outer sphere out of the transport packaging and place it on the base plate; the outer sphere must be secured to prevent it from tilting

Caution:
Danger of tilting!

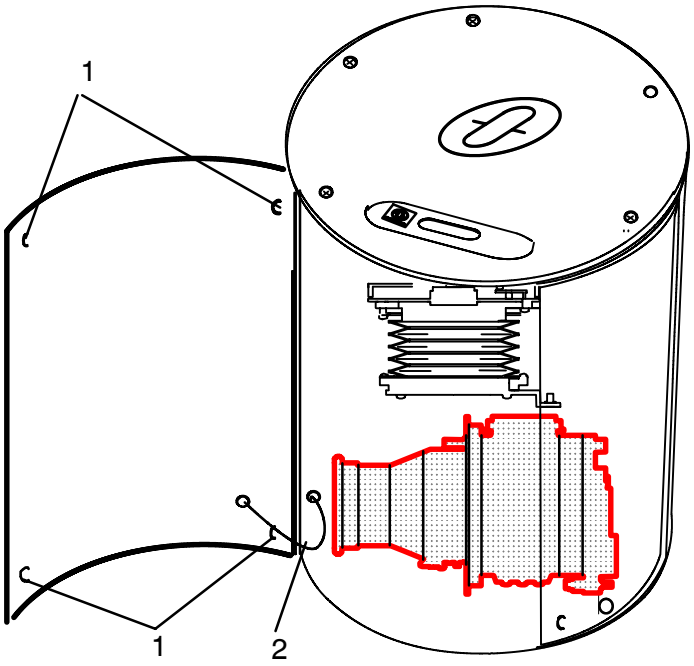


Figure 6: Principle of dismantling the enclosure door

2.4.1.1 Assembling the compass enclosure

Note: It is not necessary to install the compass enclosure with reference to the ship (e.g. in the ship's forward direction). It can be installed in whatever position is most convenient for servicing and operation.
The installation described below is to be regarded as the maker's recommendation.

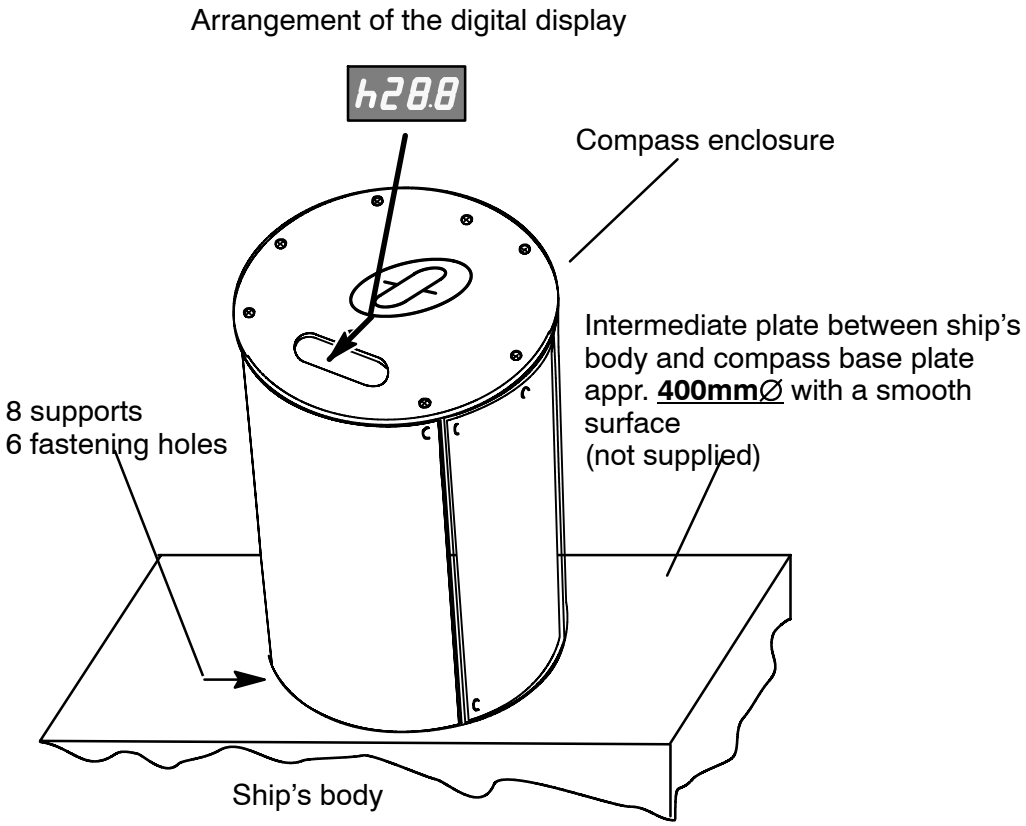


Figure 7: Installation of the compass enclosure

The compass enclosure must be installed in such a way that the following requirements are met:

- The 8 supports must all stand on a flat, firm surface.
  If necessary, the user should himself create an intermediate plate (marine quality hardwood or metal) suited to the local conditions.
- The compass enclosure must be screwed to the intermediate plate in a sea-resistant fashion.
- The intermediate plate must also be screwed to the ship's body in a sea-resistant fashion; this fastening is the responsibility of the user of the STD 22 Compact himself.
- The compass enclosure must be mounted so that the digital display can be seen easily after installation, the door of the compass enclosure can be opened and closed easily and the cover of the compass enclosure can be detached.
- The fastenings of the compass enclosure are indicated in the dimensional drawing "Gyro Compass" (110 D 233 HP005) in the appendix to this manual.

The compass enclosure is fastened to the intermediate plate with 6 screws

- for woodscrews ∅11 x length depending on the thickness of the intermediate plate
- for metal screws M10 x length depending on the thickness of the intermediate plate.

The compass enclosure can also be mounted directly on a flat metal surface; in this case, suitable stud bolts (M10) must be welded on; alternatively the compass housing can be fastened on the underlying surface with threaded holes and screws M10–A4.

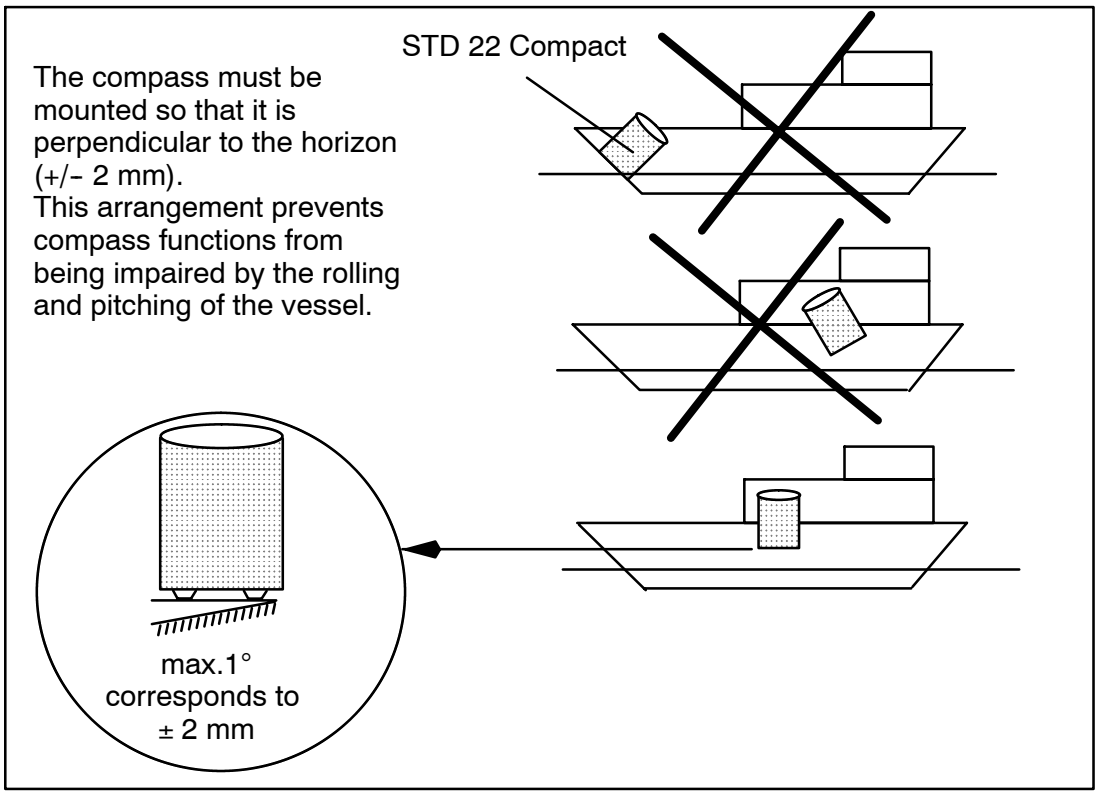


Figure 8: Horizontal alignment for installation of the compass enclosure

2.4.1.2 Installation of the gyrosphere

Special tool required:
Suction cup

Installation procedure:

- Undo the six screws (Figure 9/1) fastening the upper and lower halves of the outer sphere (Figure 9/2 and 3).
- Remove plug B3 (Figure 9/4) from the plug plate.

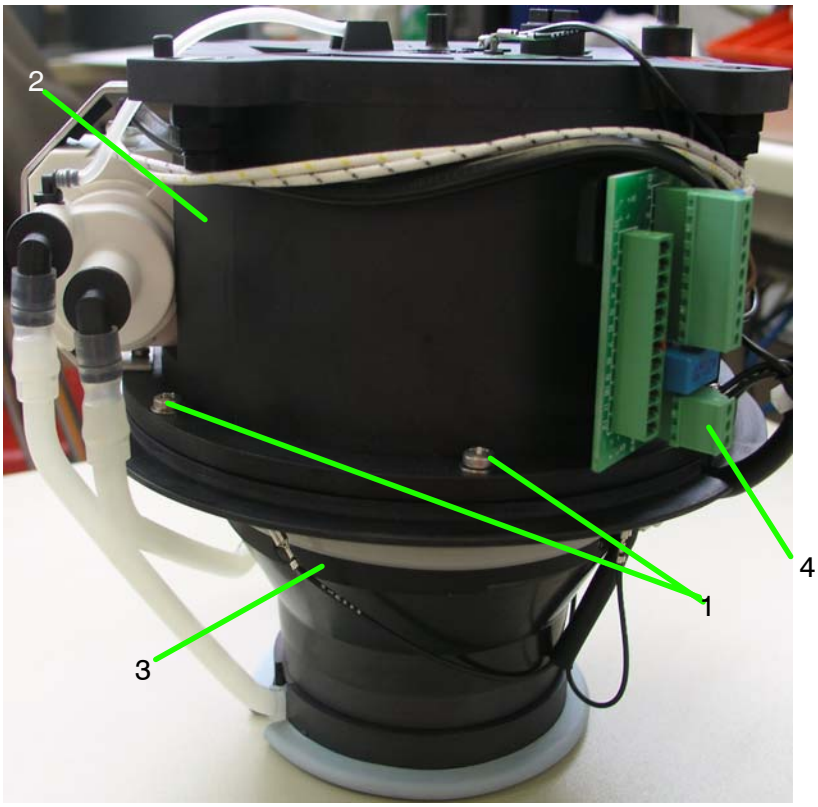


Figure 9: Outer sphere

- Remove the upper half of the outer sphere (Figure 9/2).
  Take the gyrosphere (Figure 10/2) out of the transportation box and carefully insert it using the suction cup (Figure 10/3) in the lower outer sphere (see Figure 10).

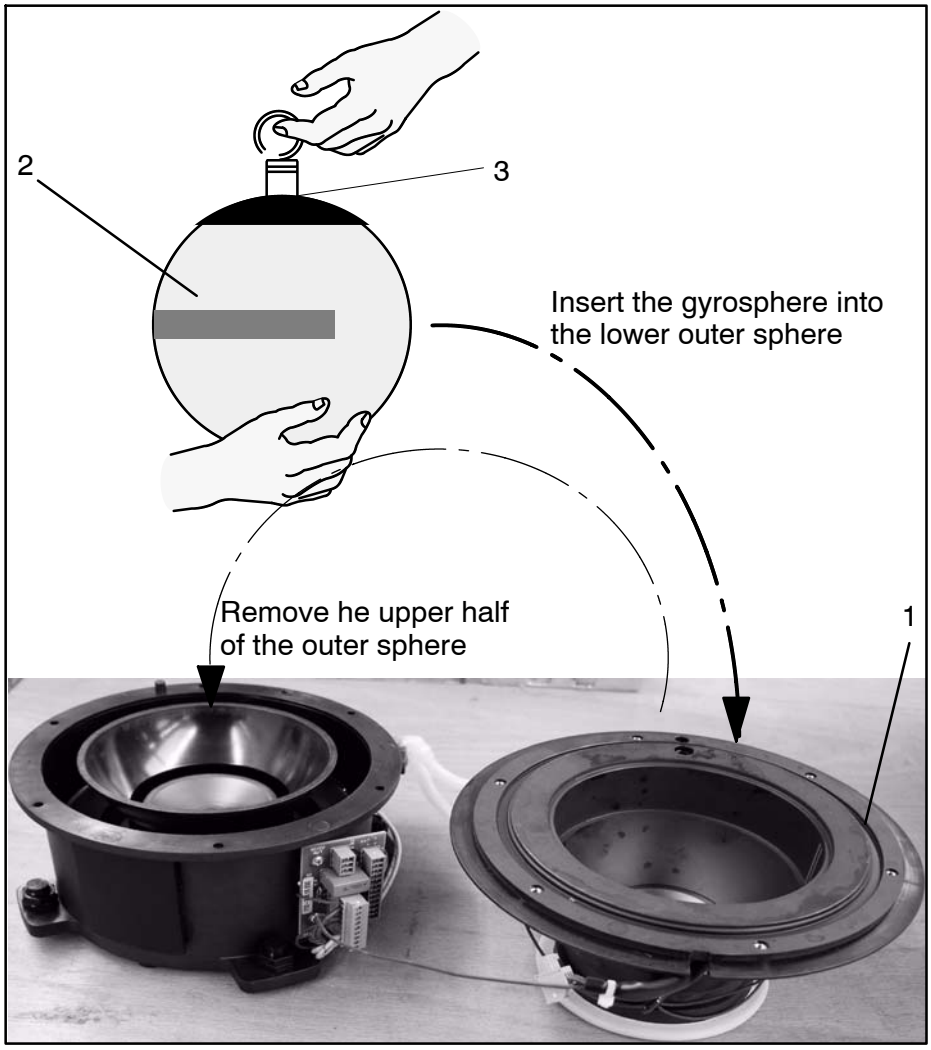


Figure 10: Principle of separating the upper and lower halves of the outer sphere – inserting the gyrosphere

- Replace the upper half of the outer sphere on the lower half.

Check that there is a proper seal between the two halves of the outer sphere (see Figure 10/1)!

- Retighten the six screws (see Figure 9/1).
- Insert plug B3 (Figure 9/4) again.

2.4.1.3 Filling with distilled water and supporting liquid.

(see Figure 11)

- Undo the three plastic screws (Figure 11/1–3) on the upper outer sphere

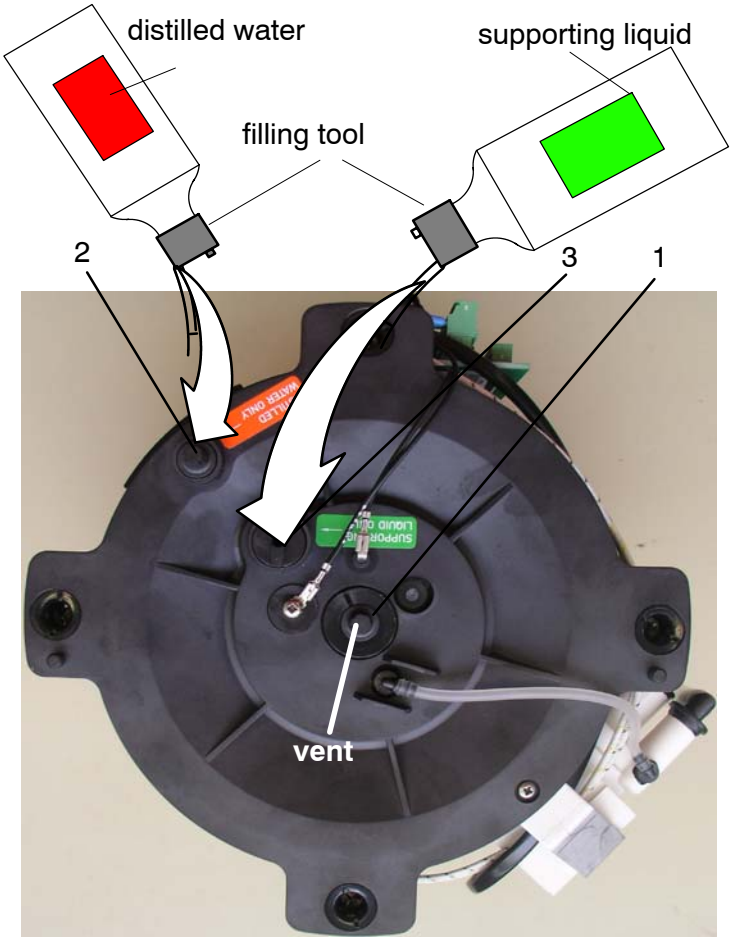
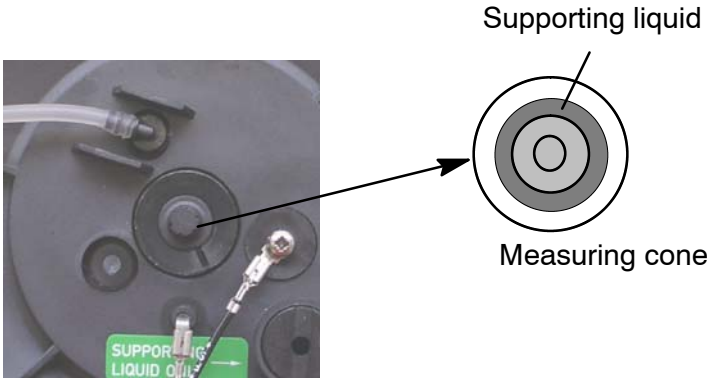


Figure 11: Filling with liquids

- Fit the supplied filling device on the distilled water bottle.
- Pour in <u>all</u> the distilled water (230 cm^3) (look for the identifying label on the outer sphere).
- Re-close the distilled water filling opening with the screw, check that it is properly sealed.
- Remove the filling device from the distilled water bottle and attach it to the supporting liquid bottle.

- Pour approximately 840 cm^3 of supporting liquid in the appropriate filling opening (look for the identifying label).
  The supporting liquid must be at room temperature (over 25° C) and the measuring cone should fill half the measuring range (diameter).
  The following photograph shows the measuring cone for the liquid level.



This picture only shows the situation at the start of operation (after filling for the first time or after changing the supporting liquid -> cold supporting liquid); during operation, the dark circle in the measuring cone is smaller.

Figure 12: Measuring cone for supporting liquid level

- Discard any unused supporting liquid; no special measures are needed for disposal.
- Re-close the filling opening for supporting liquid, check that it is properly sealed.
- Re-insert the ventilation screw, check that it is properly sealed.

2.4.1.4 Inserting the outer sphere in the compass enclosure

(see Figure 13)

- Carefully insert the gyrosphere in the compass enclosure:

> Pay attention to the two locking pins on the closure.

- Using both hands, hold the outer sphere and guide it under the snap closures (Figure 13/1) on the pendulum joint (Figure 13/2).

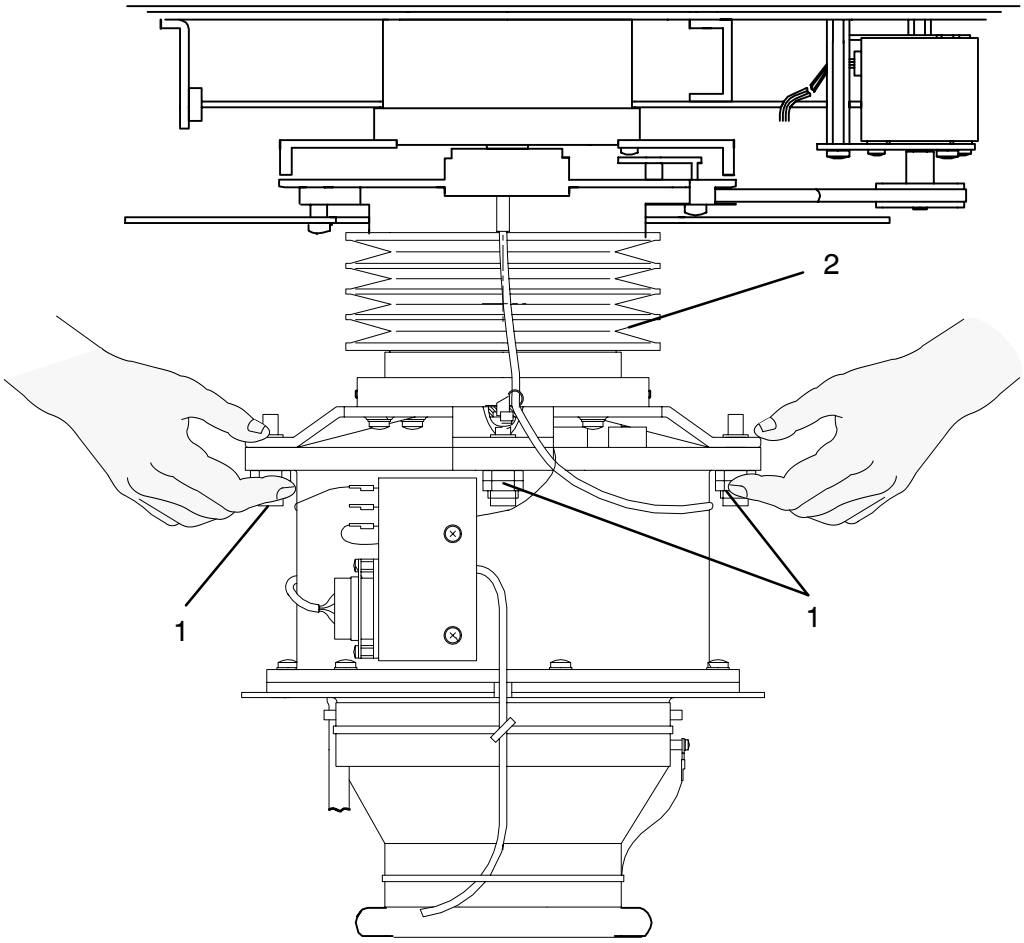


Figure 13: Principle of inserting the outer sphere in the compass enclosure

- Using the thumbs, press down and engage two snap closures (Figure 13/1).
- Turn the outer sphere through 90° and repeat the process with the two other snap closures. The outer sphere is now fastened to the pendulum joint

- Guide the cable around the outer sphere and attach the plugs to the small PCB of the outer sphere, tighten the fastening screws

2.5 Creating cable connections and plug connections

2.5.1 Overview of plug connections and fuses on PCB‘s

(see also section 4 for more information about LED‘s, plugs, push buttons and jumper)

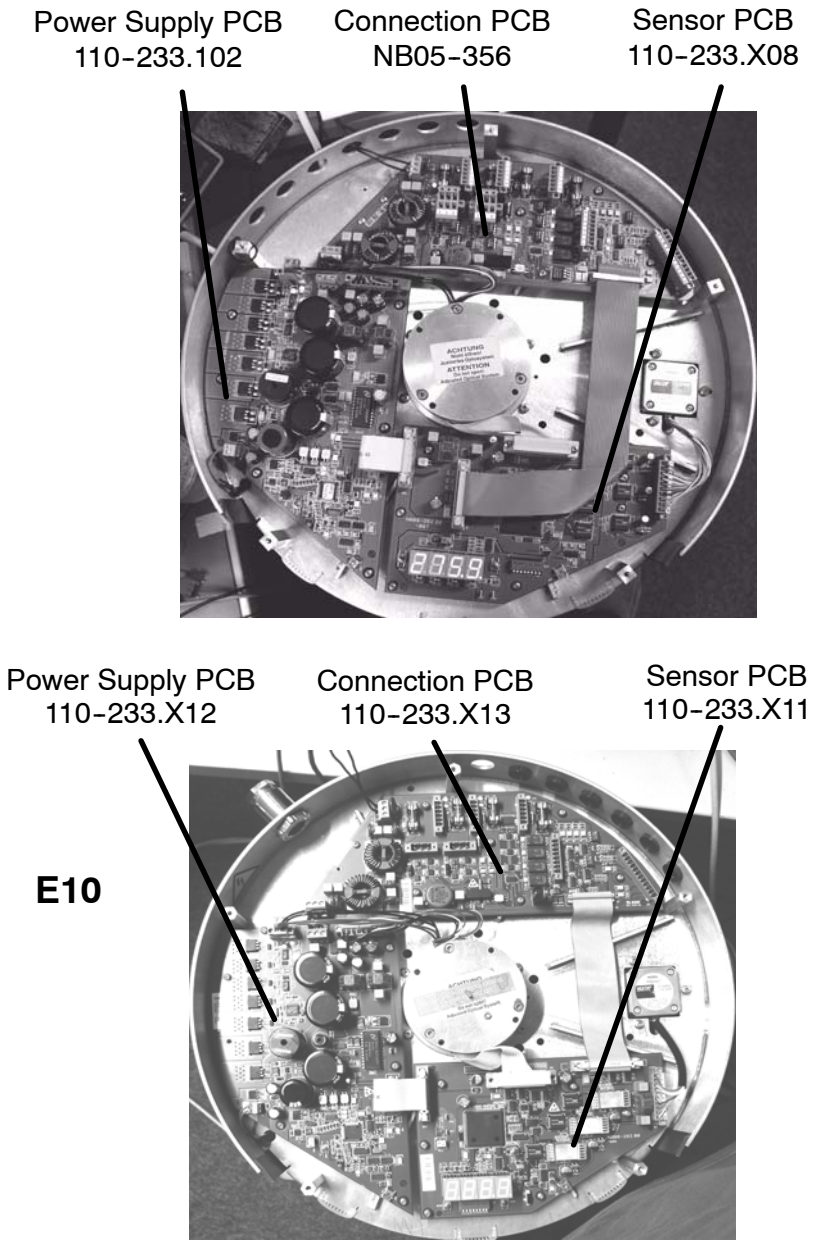


Figure 14: Arrangement of PCB‘s in the STD 22 Compact Compass (cover removed)

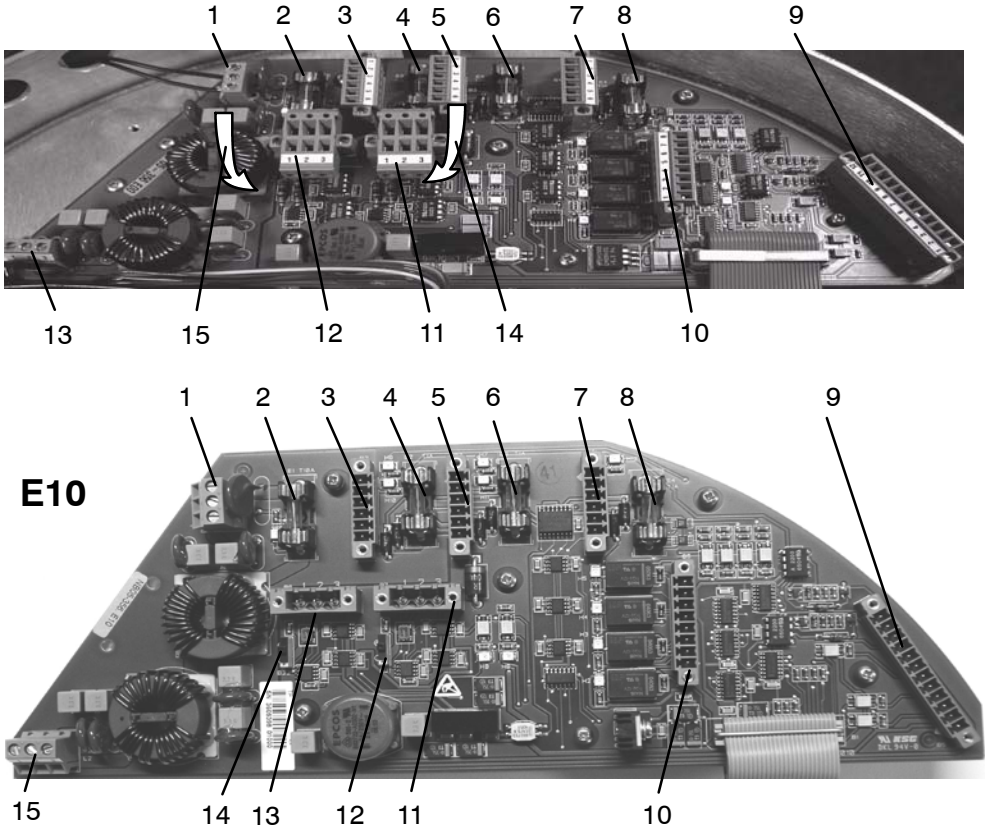


Figure 15: Arrangement of plugs, terminal boards and fuses

1	Terminal L1	Power supply (24VDC)	
2	Fuse E1 (T10A)	Power supply (24VDC)	
3	Plug B2	Output Channel1 Course Bus/NMEA	
4	Fuse E2 (T1A)	Channel1 +24V	
5	Plug B3	Output Channel2 Course Bus/NMEA	
6	Fuse E3 (T1A)	Channel2 +24V	
7	Plug B4	Output Course Bus	
8	Fuse E4 (T1A)	Course Bus +24V	
9	Plug B5	Input (+24V/Set QS/ Pulse Log/Pulse Log Dir./NMEA Log/GPS-receiver)	
10	Plug B6	Output (QS/SEC/System/Available)	
11	Plug B7	CAN1 bus	
12	Plug B8	CAN2 bus	
	Switch B32	for CAN1 bus terminating resistor	E10
13	Terminal Board L2	24V connection to Power Supply PCB	
	Plug B8	CAN2 bus	E10
14	Jumper B31	for the CAN2 bus terminating resistor	
	Switch B31	for the CAN2 bus terminating resistor	E10
15	Jumper B32	for the CAN1 bus terminating resistor	
	Terminal Board L2	24V connection to Power Supply PCB	E10

2.5.1.1 Connecting the course receiver in the STD 22 Compact Gyro Compass

(see also Cable and Connection Diagram 110-233.HP010)

Three outputs are provided on the Connection PCB of the gyro compass for course data:

Output 1 (also Channel 1) for NMEA or Course bus (RS 422)
Output 2 (also Channel 2) for NMEA or Course bus (RS 422)
Output 3 for Course bus only (RS 422)

The setting of output data for Output 1 and Output 2 is described in section 2.6.4.6

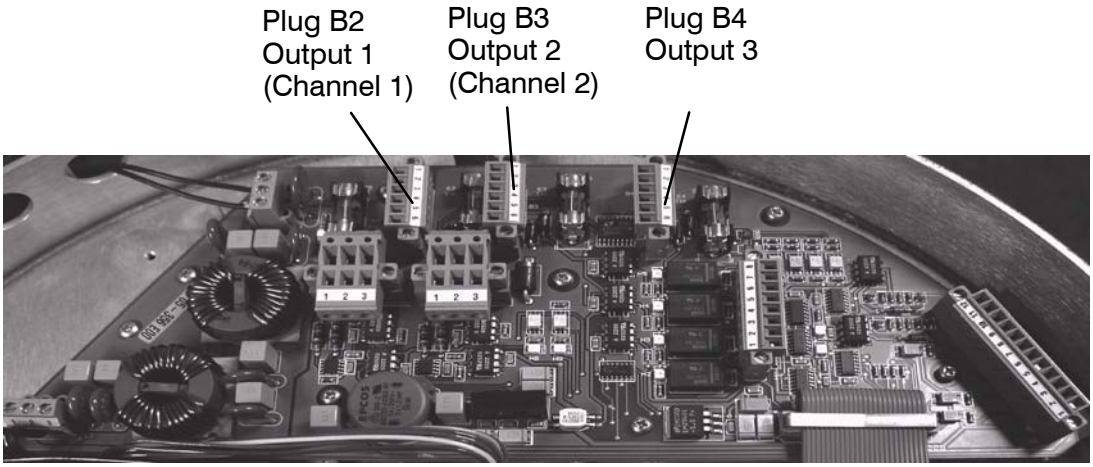


Figure 16: Course receiver connections

Course receivers should be connected with a screened cable having up to 6 poles (appr. 0.5mm^2 per conductor).

Output 1 (Channel 1)	Plug B2	Connection 3 Connection 4 Connection 5 Connection 1 Connection 2 Connection 6	Tx+ Tx– Tx GND 24VDC 0V ⏚
Output 2 (Channel 2)	Plug B3	Connection 3 Connection 4 Connection 5 Connection 1 Connection 2 Connection 6	Tx+ Tx– Tx GND 24VDC 0V ⏚
Output 3	Plug B4	Connection 3 Connection 4 Connection 5 Connection 1 Connection 2 Connection 6	Tx+ Tx– Tx GND 24VDC 0V ⏚

2.5.1.2 Connecting status and control signal outputs in the STD 22 Compact Gyro Compass

The following status signals and signals for external signalling can tapped from the Connection PCB of the Gyro compass.

AVAILABLE	compass data available
SYSTEM	general alarm, system error
QS	Qick Settling status information
SEC	Speed Error Correction status information

A LED is assigned to each of these connections on the Connection PCB.

AVAILABLE	LED lights up green when the gyro compass is ready for use (4 hours after the power supply is switched on QS activated –after appr. 1 h)
SYSTEM	LED lights up red if a fault occurs in the gyro compass
QS	LED flashes green if Quick Settling is possible. LED lights up green during Quick Settling. Led goes off when Quick Settling is completed.
SEC	LED goes off if Speed Error Correction is faulty or is impossible because Pulse Log/GPS–receiver information is unavailable LED lights up green if Speed Error Correction is OK.

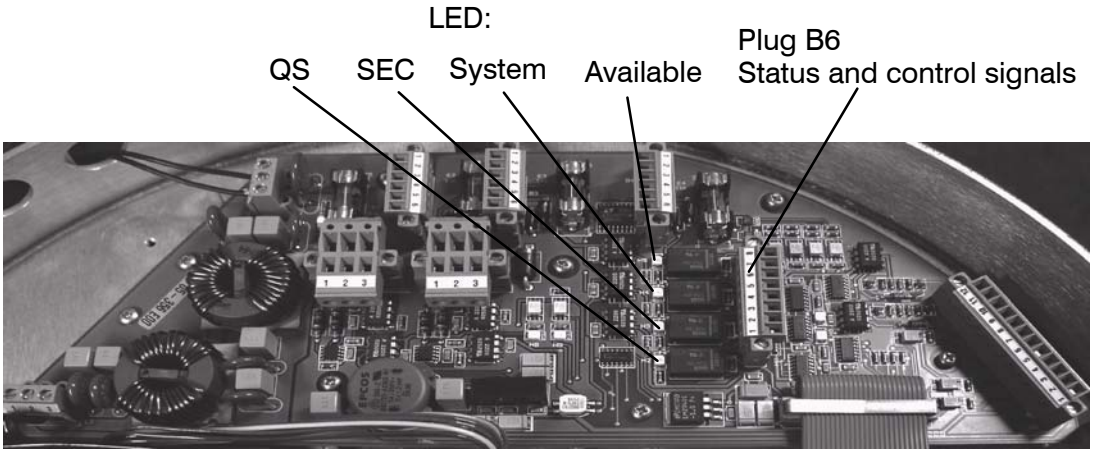


Figure 17: Connection for status and control signals

AVAILABLE	Plug B6	Connection 7 Connection 8	
SYSTEM	Plug B6	Connection 5 Connection 6	
SEC	Plug B6	Connection 1 Connection 2	
QS	Plug B6	Connection 3 Connection 4	see also section 2.6.3.1

2.5.1.3 Connecting signal inputs for QS and SEC in the STD 22 Compact gyro compass

Signal inputs for enabling the Quick Settling function and Pulse Log/GPS-receiver information for Speed Error Correction (SEC) can be connected on the Connection PCB.

The following inputs are available:

SET QS INPUT	for enabling the QS function (via the Quick Settling operator unit)
PULSLOG INPUT	for entering speed information from Pulse Log for the SEC
PULSLOG DIR.INPUT	for entering the direction (forwards/reverse) of the speed information from a Pulse Log for SEC
GPS INPUT	for entering position information and where appropriate the speed input from GPS-receiver for the SEC
NMEA LOG INPUT	for entering speed information from a Log with NMEA format for the SEC

To operate the Speed Error Correction it is necessary to connect a Pulse Log or a GPS-receiver.

Setting the source of the speed sensor for Speed Error Correction is explained in section 2.6.4.7 .

The connecting cable cross section should not be less than 0.5mm^2
(see also drawings: Cable and Connection Diagram 110-233.HP009 ,HP010or HP029).

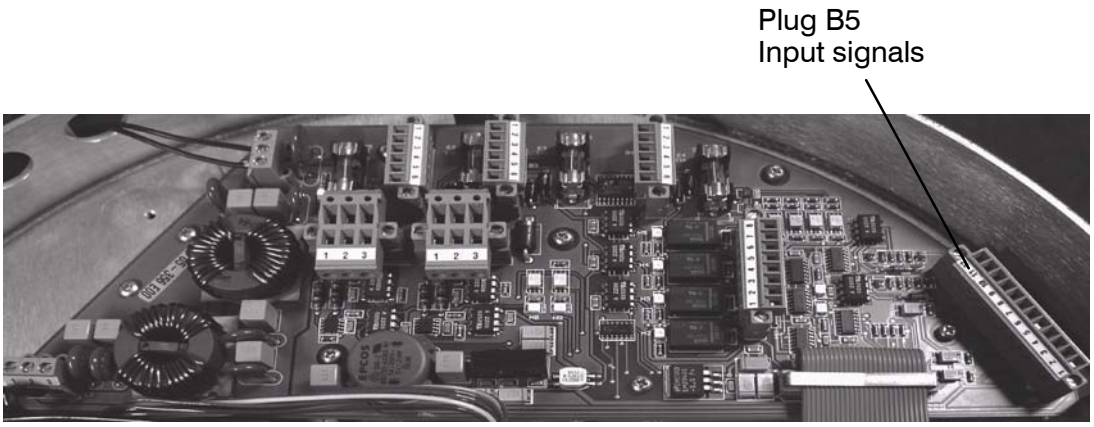


Figure 18: Connection of signal inputs for QS and SEC

SET QS INPUT see also section 2.6.3.1	Plug B5	Terminal 2 Terminal 3	
PULSLOG INPUT	Plug B5	Terminal 4 Terminal 5	
PULSLOG DIR. INPUT	Plug B5	Terminal 6 Terminal 7	
GPS-receiver INPUT	Plug B5	Terminal 12 Terminal 11	Rx+ Rx-
NMEA LOG INPUT	Plug B5	Terminal 10 Terminal 9	Rx+ Rx-

2.5.1.4 Connecting the power supply cable

The STD 22 Compact Compass operates at 24VDC.
This voltage can be generated directly using an AC/DC converter (see section 2.6.2) or fed directly from the 24VDC ship‘s mains to the compass.

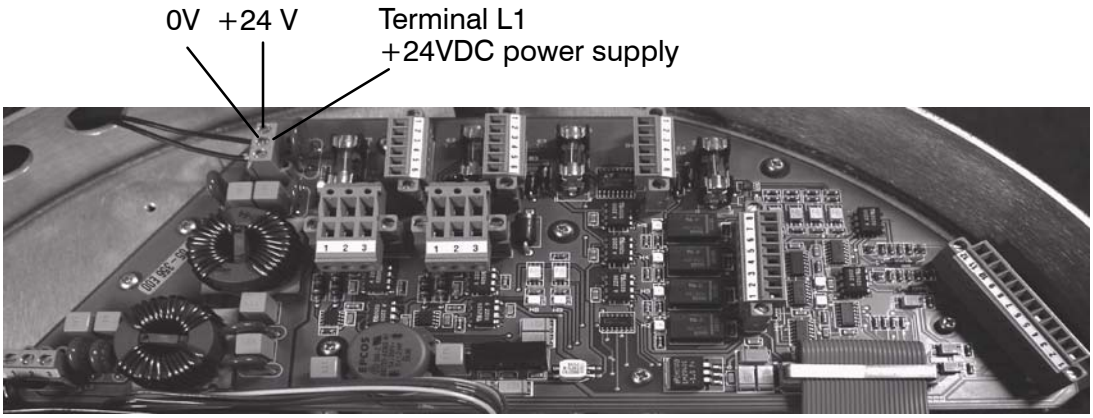


Figure 19: Connection of the +24VDC power supply

The 3-core cable that is used should have a conductor cross-section of ≥2.5mm^2

At terminal L1 (see Figure 19) connect a power supply of
with +24VDC at terminal 1
0V at terminal 2

2.5.1.5 Connecting the compass to earth

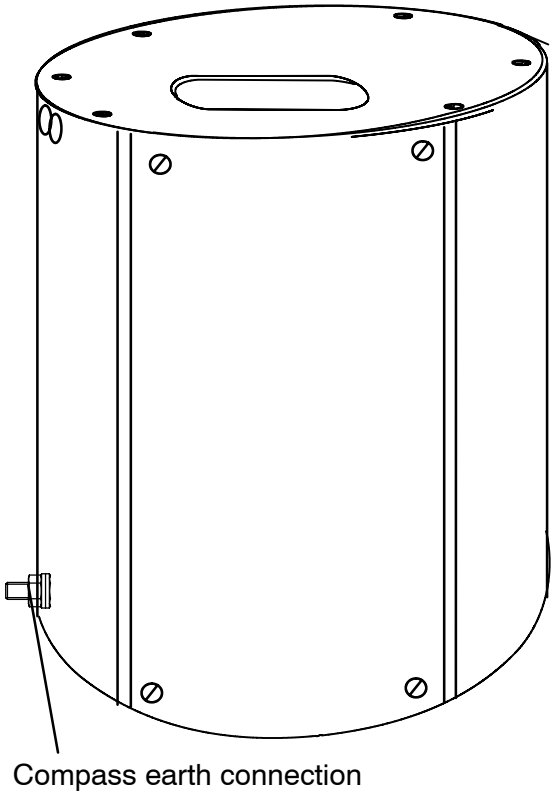


Figure 20: Connection of compass to earth

An earth connection (ship‘s earth) must be made using the earthing shown in Figure 20. The earth connection must have a common reference to the other components!

2.6 Installation and commissioning of optional features

2.6.1 Installation and commissioning of the Additional Output Box 143-103

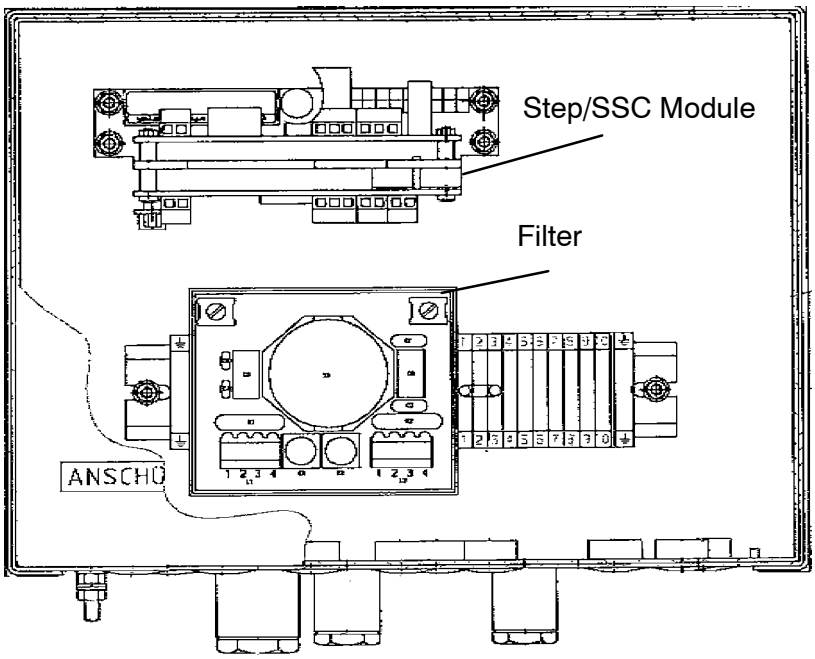


Figure 21: Additional Output Box 146-103 (device open)

Install the Additional Output Box as shown in dimensional drawing 146-103HP005. Ensure that it is proper connected to the ship‘s earth.

Connecting the power supply:

24VDC at terminal L1, terminals 3 (+) und 4(-) of the mains filter.
The power supply can be taken directly from the ship‘s supply (24VDC) or from terminals 6, 7, 8 or 9 (+) und 11, 12, 13 or 14 (-) of the AC/DC-Converters (if supplied) (see also section 2.6.2).

Making a signal connection:
(see also Cable and Connection Diagram 110-233.HP010
and wiring diagram 146-103.HP007)

A 2-core, screened cable with conductor cross-section ≧1mm² is used to create a connection between:

Plug B4 on Connection PCB of the STD 22 Compact Gyro Compass
Terminal 3 (TX+) und 4 (TX-)
and
terminal board L4, terminals 1 (Rx-) und 2 (RX+) of the Step/SSC Modules in the Additional Output Box (siehe Figure 21).

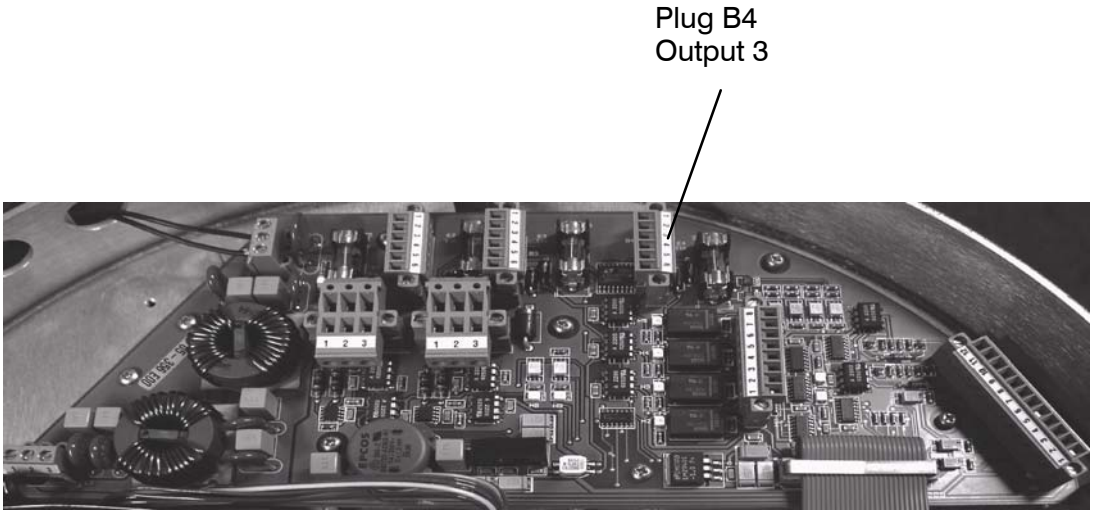


Figure 22: Connection of Course Bus in the STD 22 Compact Gyro Compass

The signal outputs from the Additional Output Box are created as shown in the drawings
- Cable and Connection Diagram 110-233.HP010
and
- Wiring diagram 146-103.HP007.

2.6.2 Installation and commissioning of the AC/DC Converters 121-062

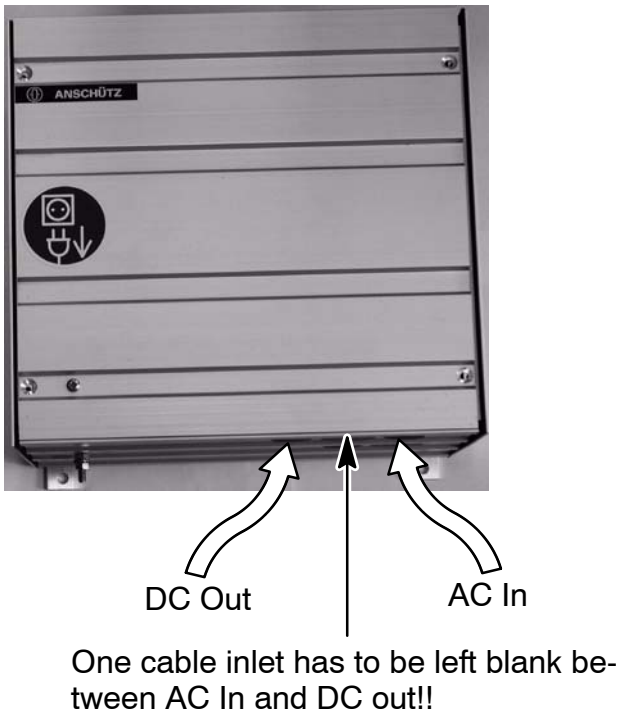


Figure 23: AC/DC Converter

NOTE: Detailed dimensions can be found in drawing 121 D 062.HP005.
For connecting the AC/DC Converter, see also Cable and Connection Diagram STD 22 Compact 11-233.HP010.
and connection diagram on the cover.

Fasten the AC/DC Converter on a firm surface with 4 screws.

The installation of the power supply (AC/DC-Converter) should only be performed by an experienced electrician.

The 24 VDC supply voltage should be engineered as a low-security-voltage according to SELV.

Caution:
Before connecting the cable, the AC/DC Converter must be disconnected from the power supply and safeguarded against reconnecting until it is set into operation.

Take care to ensure that a common earth is used for all components of the STD 22or STD 22 Compact Gyro Compass.

To connect the AC/DC Converter to the ship's mains, use a cable which meets following minimum requirements:

2 x 1,5mm^2 (with screen, single-side connected to the housing)

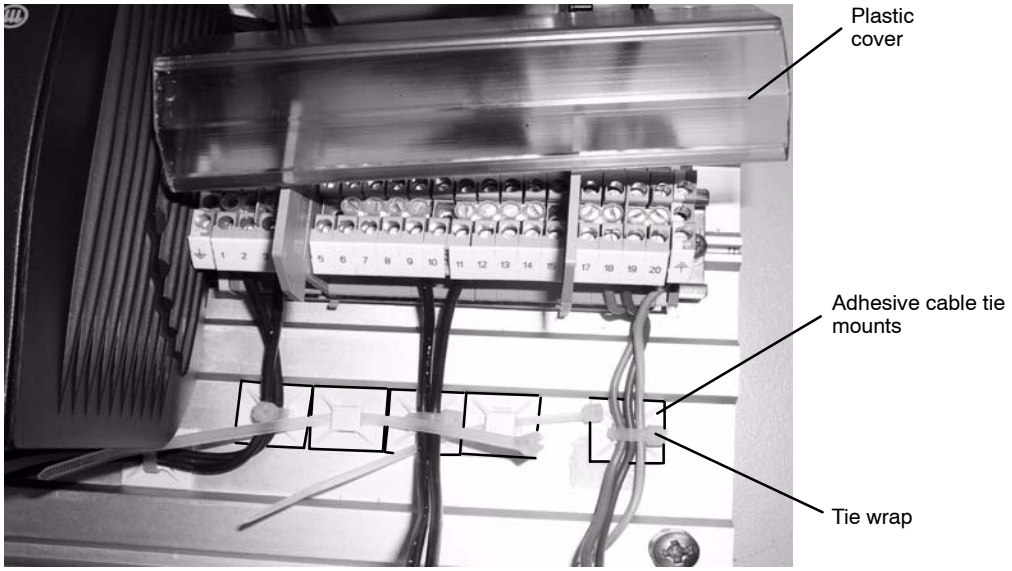


Figure 24: AC/DC Converter (Terminal board)

To connect the cables to the terminal board, the plastic cover has to be pulled off from the terminal board.
Cables should not be lengthened too long, to prevent a short circuit to a neighbour terminal by an inadvertently loosening.
Additionally the cable should be fixed (as shown in Figure 24) with tie wraps and self adhesive tie mounts.
After that the plastic cover has to be pulled on the terminal board.

The ship‘s electrical supply (AC_{IN} = 115...230V, 50/60Hz) must be connected to the terminal board at terminals **17** and **19** or **18** und **20** see Figure 24.

To connect the AC/DC Converter with a 24VDC load, use cables which meet the following minimum requirements:

- 2 x 2,5mm^2 (with screen) gyro compass
- 2 x 0,5mm^2 (with screen) Additional Output Box

The output voltage (24VDC supply) is taken from the terminals:
6(24VDC) and **11**(0V) or
7(24VDC) and **12**(0V) or
8(24VDC) and **13**(0V) or
9(24VDC) and **14**(0V) .

Before connecting the 24VDC load to the AC/DC Converter, the output voltage must be measured. It must be within the tolerance range of 18 VDC to 36 VDC.
After the ship‘s mains is switched on, the AC/DC Converter is supplied at 24VDC.
The AC/DC Converter does not need to be switched on separately.

2.6.3 Installation and commissioning of the Operator Unit Quick Settling (QS) 130-606

Figure 25: Operator Unit Quick-Settling (front view)

2.6.3.1 Installing the Operator Unit Quick-Settling

NOTE: Detailed dimensions can be found in drawing 130 E 606.HP005.
For connecting the Operator Unit Quick Settling, see also Cable and Connection diagram STD 22 Compact 110-233.HP010.

The Operator Unit Quick Settling is designed for desk mounting.

When installing ensure there is sufficient clearance underneath the operator unit (minimum 32mm, see drilling scheme)
The Operator Unit Quick Settling can be fixed in a panel up to 17 mm thick.

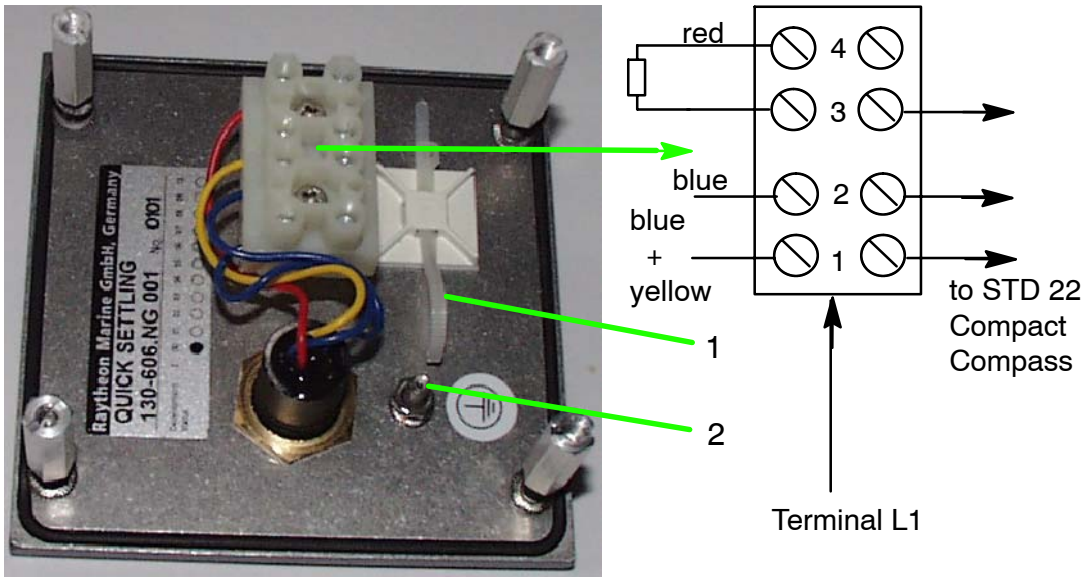


Figure 26: Operator Unit Quick Settling (rear view)

The Operator Unit Quick Settling should be connected to the compass by a cable which meets the following minimum requirements (see also Figure 27).

- 4 x 0,5^{2}mm with screen
- 1 x 0,5^{2}mm (for jumper to be installed)

The screening of the cable is connected to earth in the Operator Unit Quick Settling (Figure 26/2).
The cable is fastened with the strain relief (cable grip) (Figure 26/1) in the Operator Unit Quick-Settling.

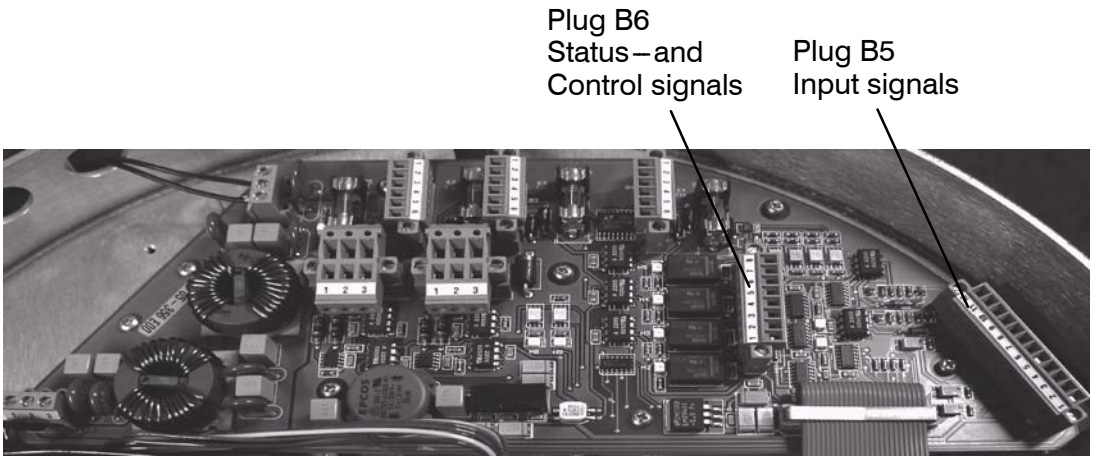


Figure 27: Connecting the Operator Unit Quick Settling in the STD22 Compact Gyro Compass

Operator Unit Quick-Settling	STD 22 Compact Gyro Compass
Terminal L1, connection 1	Plug B5, connection 3
Terminal L1, connection 2	Plug B5, connection 2
Terminal L1, connection 3	Plug B6, connection 2
STD 22 Compact Gyro Compass: jumper from plug B6, Pin 1 to plug B5, Pin 1 (24VDC)	

2.6.4 Switching on, settling and adjustment

2.6.4.1 Switching on the compass

The compass unit switches on when the power supply is activated on the main control panel.

2.6.4.2 Checks on the compass

Measuring the compass power supply voltage (on the compass).
This voltage must be within the tolerance range (18 VDC to 36 VDC).

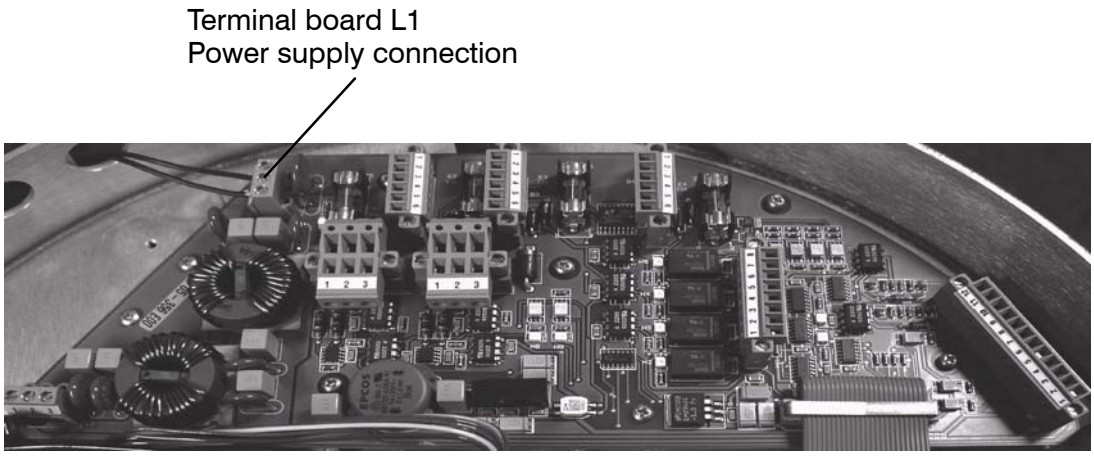


Figure 28: Measuring the compass power supply voltage

Terminal board L1 terminal 1 +24VDC
Terminal board L1 terminal 2 0V

NOTE: The absolute lower limit for the power supply voltage is 18VDC, the absolute upper limit is 36VDC!
When connecting cables, ensure that these values are adhered to.

Checking the DIP switch settings on the compass (see Figure 29):

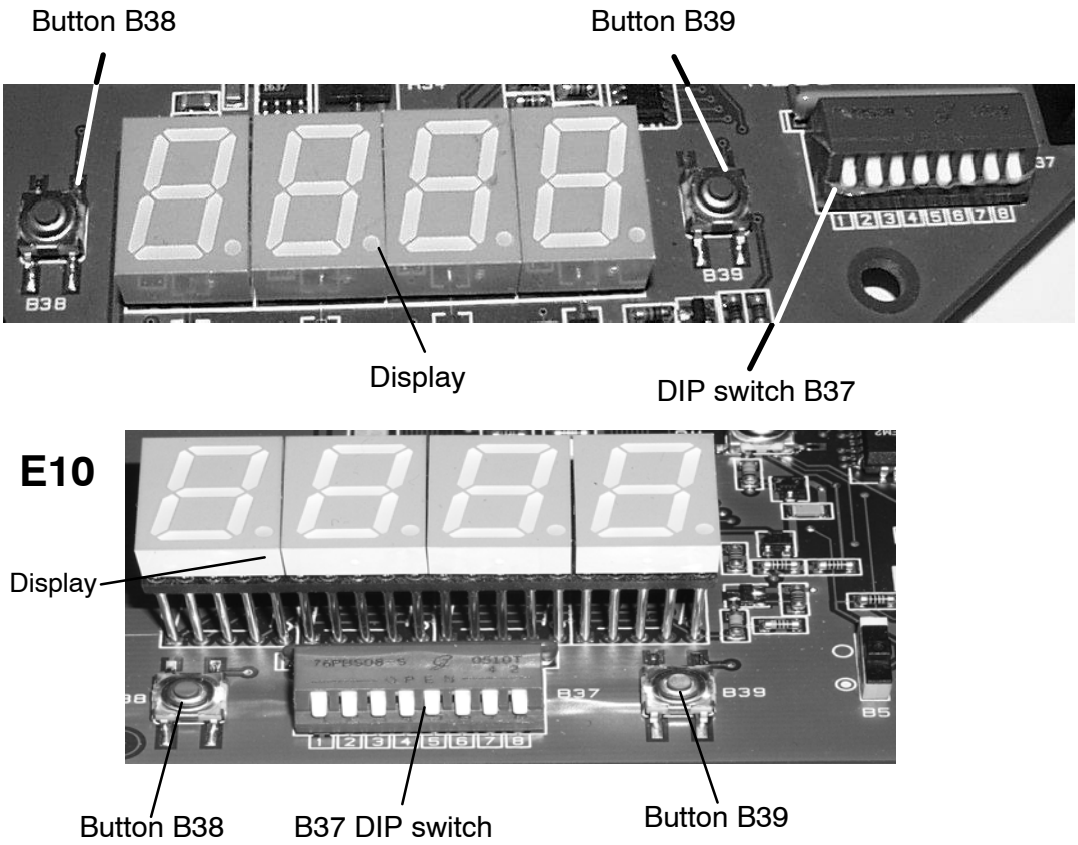
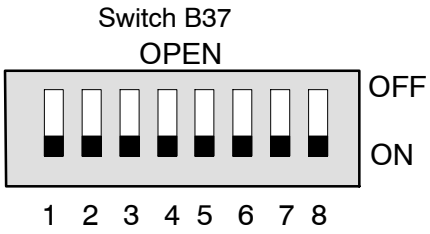


Figure 29: Checks on the compass before setting into operation

All DIP switches in the “ON” position.



2.6.4.3 Setting the STD 22 Compact Compass into operation

The compass goes into heating stage for the first 30 minutes (this period will vary depending on the temperature of the supporting liquid), during which time the course output of the compass should not be used, and the letter “h” is displayed as the leading sign on the digital display (see Figure 30).

During the settling in stage (for 4 hours after switching on), the course output of the compass may be used; **however, the deviation from the actual course may still be considerable (as well as it is at all connected course receivers).**
During this period, an additional dit appears in the digital display of the compass (see Figure 31).

(The “Quick Settling” option reduces the settling in stage to appr. 1 hour).

After 4 hours from switching on, the compass course may be used.
4 hours after switching on, the compass has a accuracy of <2 °.

After appr. 5 hours (after switching on), the compass has an accuracy of 0,1° x $^{1}/_{cos}$ latitude.

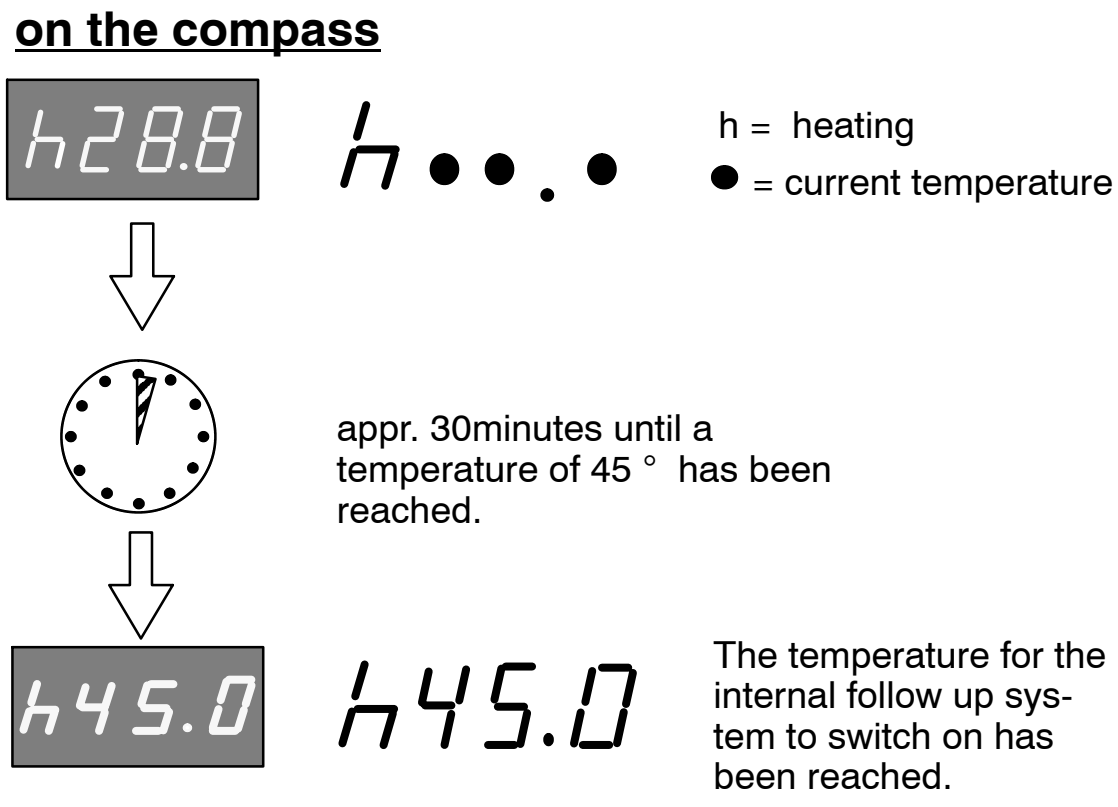


Figure 30: Indications on the compass during the heating stage

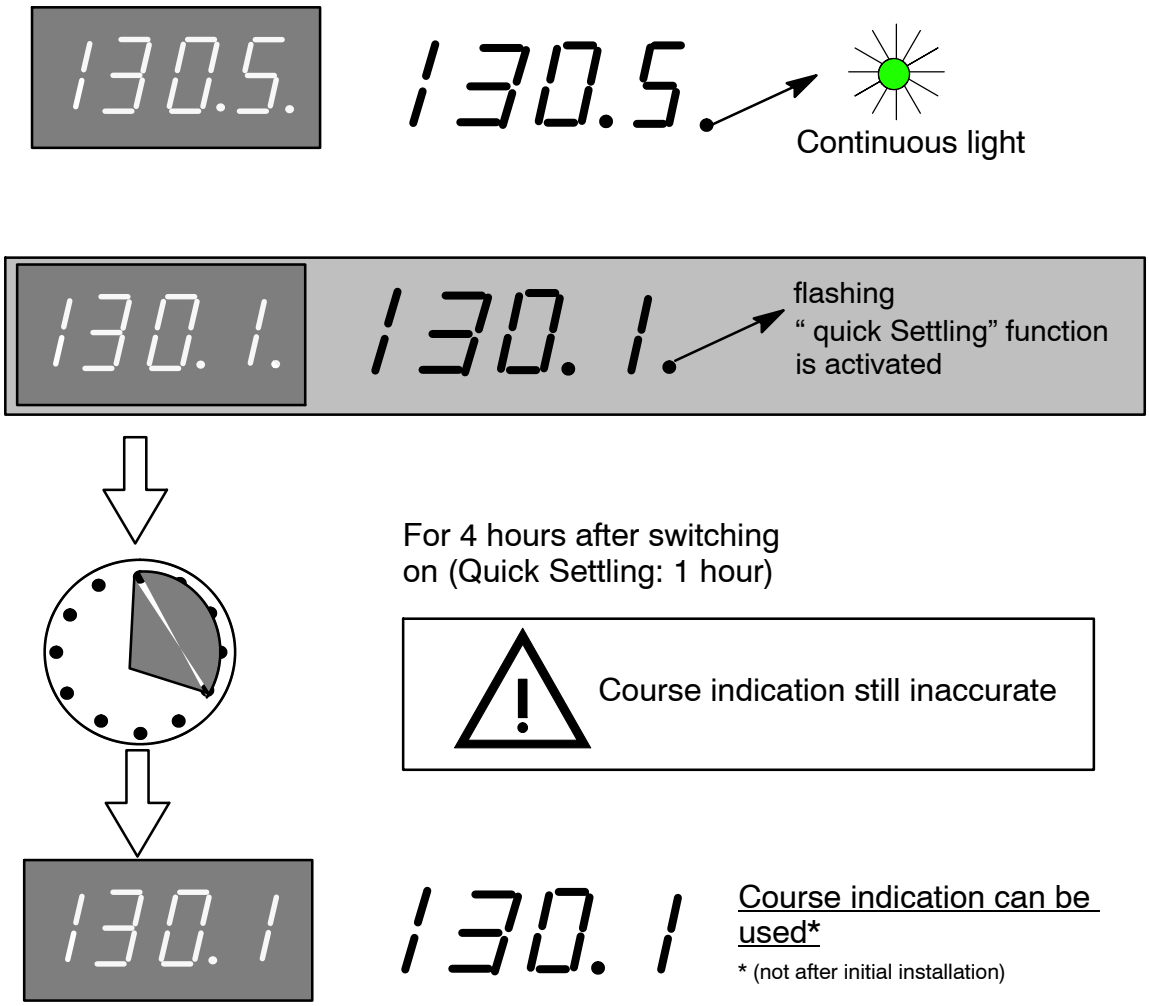


Figure 31: Indications on the compass during the settling stage

2.6.4.4 Setting the compass zero (reference course)

Once the compass has been installed, it must be aligned according to its installation location. The compass zero is set using DIP switch B 37 and buttons B 38 and B 39.
The compass must have been in operation for at least 5 hours before the compass zero is set.

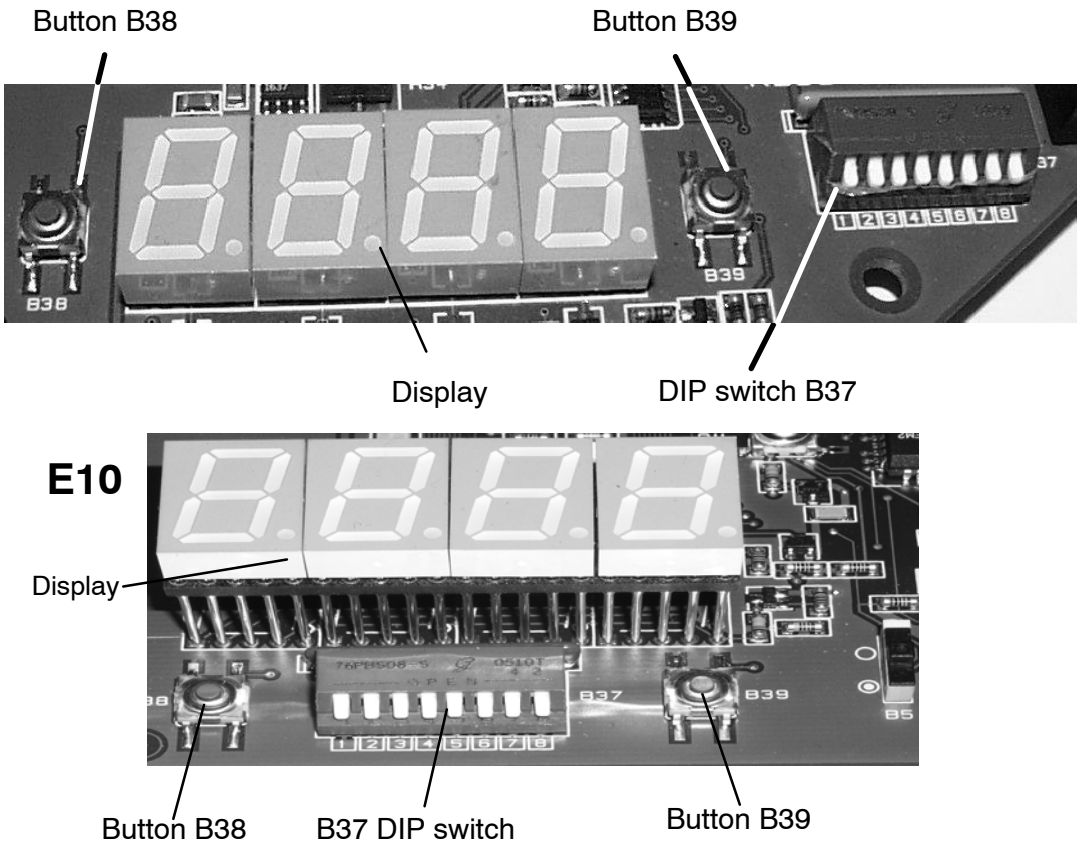


Figure 32: DIP switch B37 and buttons B38/B39

The reference course to be set is determined from the ship's fore-and-aft line (e.g. take a bearing or obtain the pier course from the sea chart).
This reference course is entered according to the following procedure.

- Set DIP switch B37 "1" to the "OFF" position.
  The digital indicator is now indicating "ALEr" = Alignment Error
- Press button B38 or button B39 until the heading you require is displayed (B38 changes the value downwards and B39 changes it upwards).
- If you hold down the button the speed at which it changes will increase.
  Set DIP switch B37 "1" to the "ON" position. This saves the set value in the compass.
- After the reference course has been set, read the alignment error (see next section).(See also Figure 33)

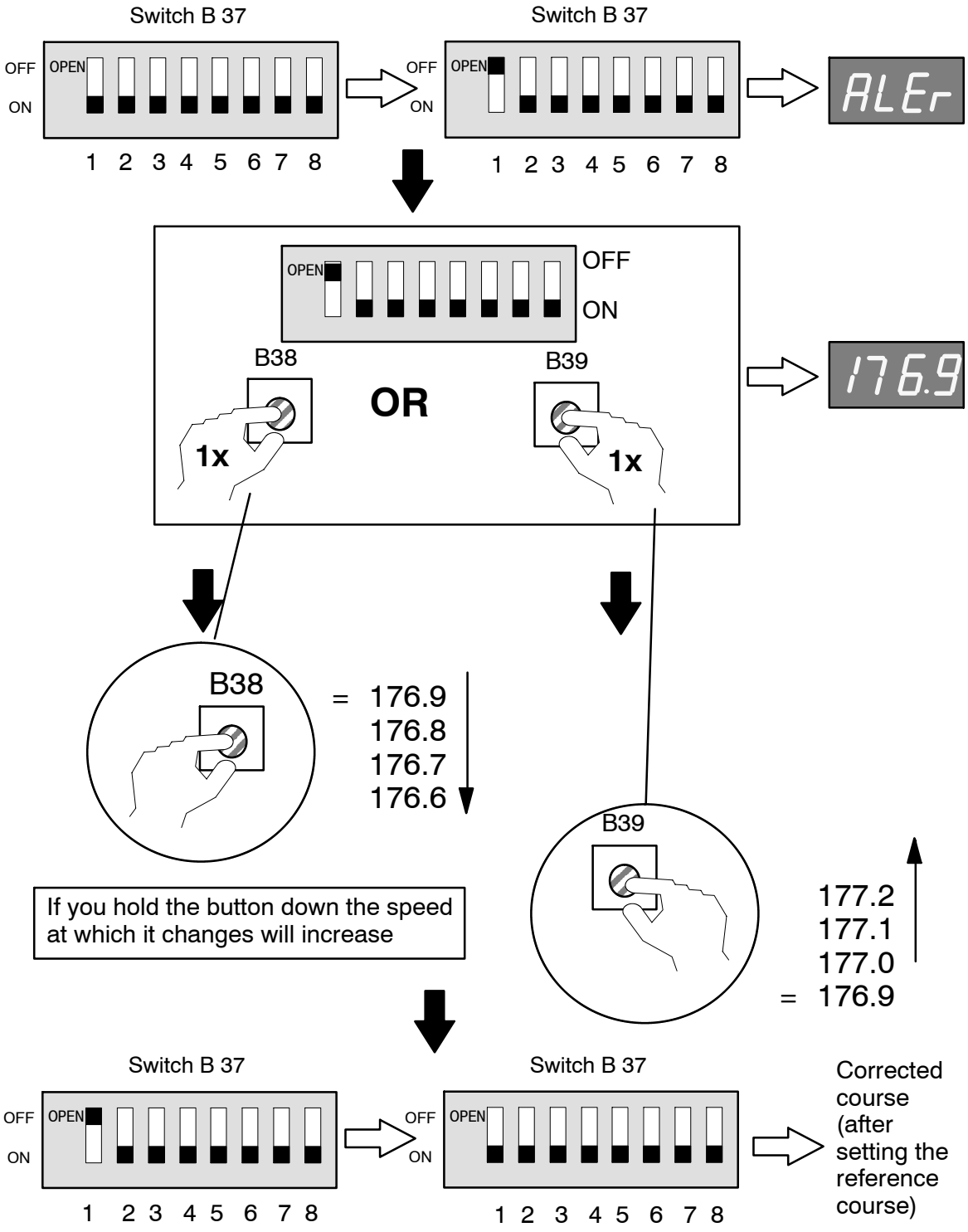


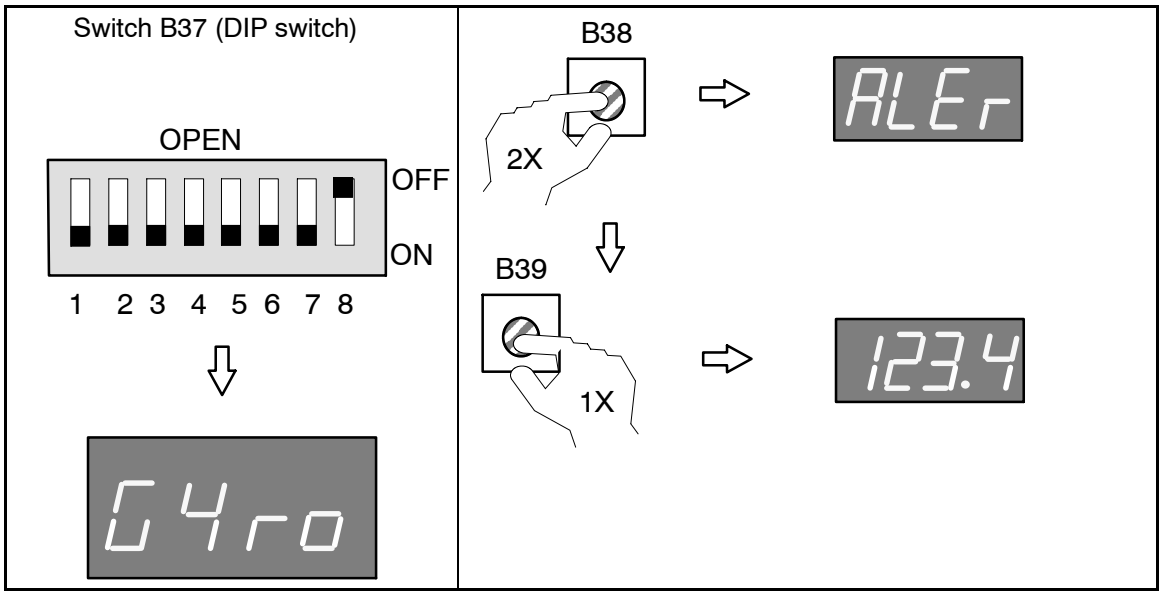
Figure 33: Procedure for setting the compass zero

2.6.4.5 Reading the alignment error

The alignment error must be entered in the table provided for that purpose on the inside of the cover.

Alignment Error	
123.4	

Figure 34: Table at compass cover (inner side)



DIP-switch “8” in “OFF” position.

NOTE: It is essential to enter this value, because the alignment error will be needed if the sensor electronics are replaced, in order to determine the reference course for the new PCB.

DIP switch “8” in “ON” position.

The STD 22 Compass is ready for use.

Replace the cover of the compass and screw it tight.

2.6.4.6 Setting Channel 1 and Channel 2

Unscrew and remove the cover of the compass housing.

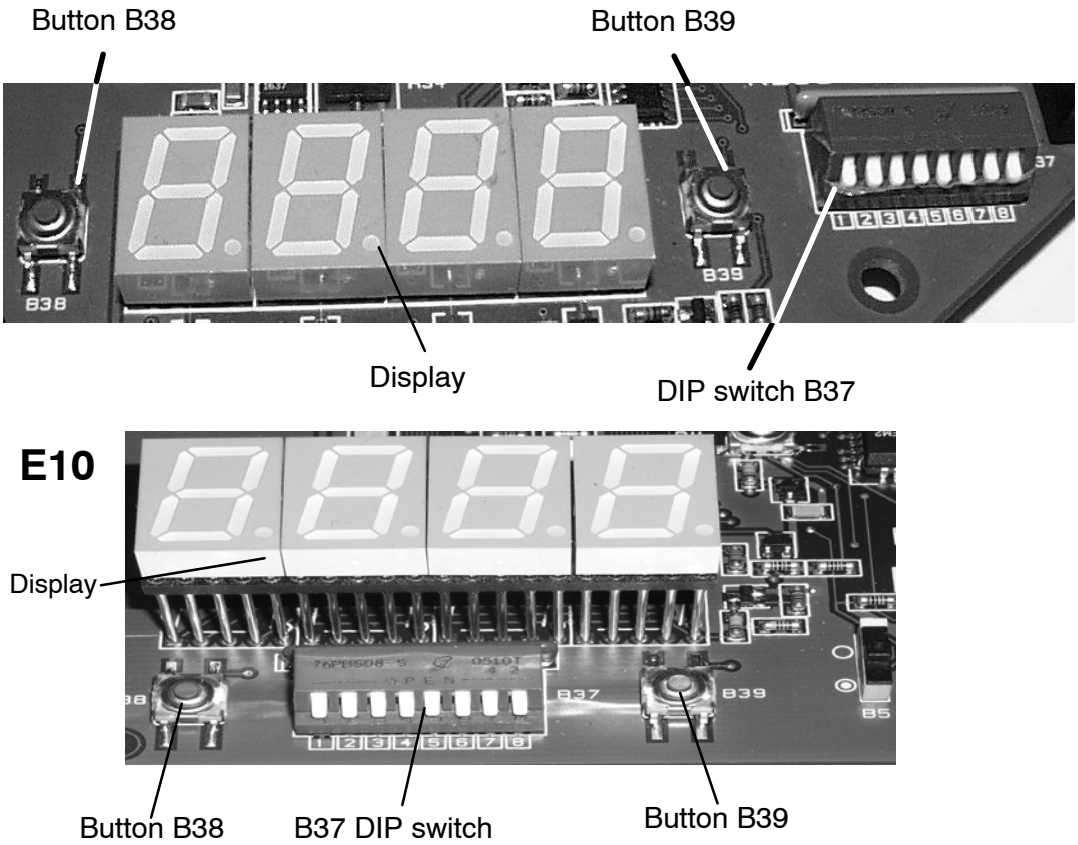
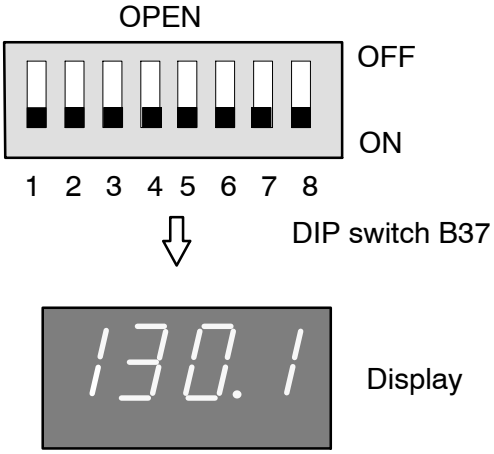
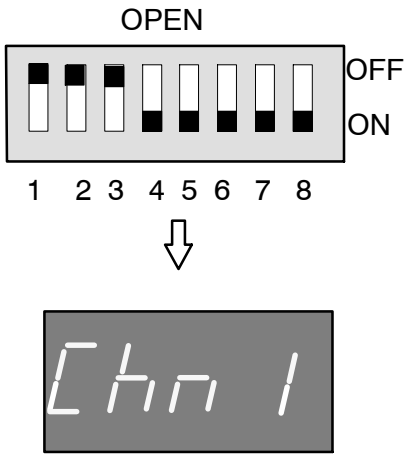
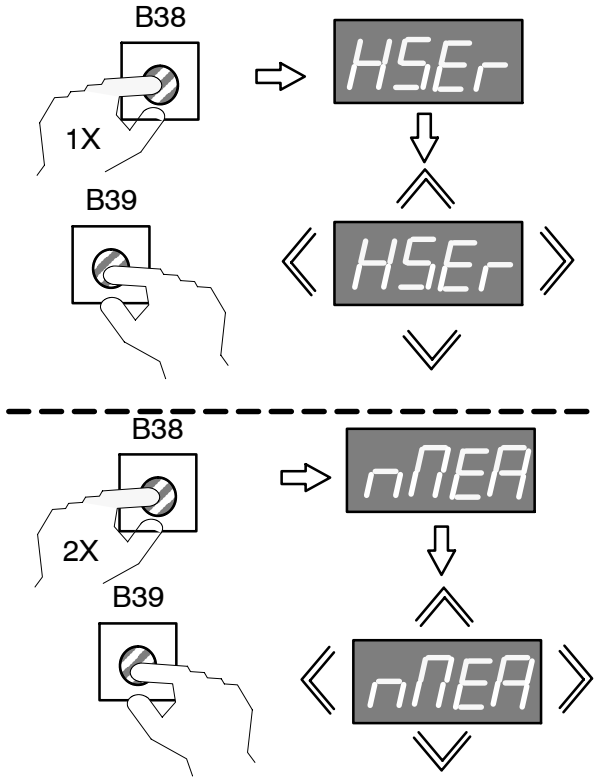
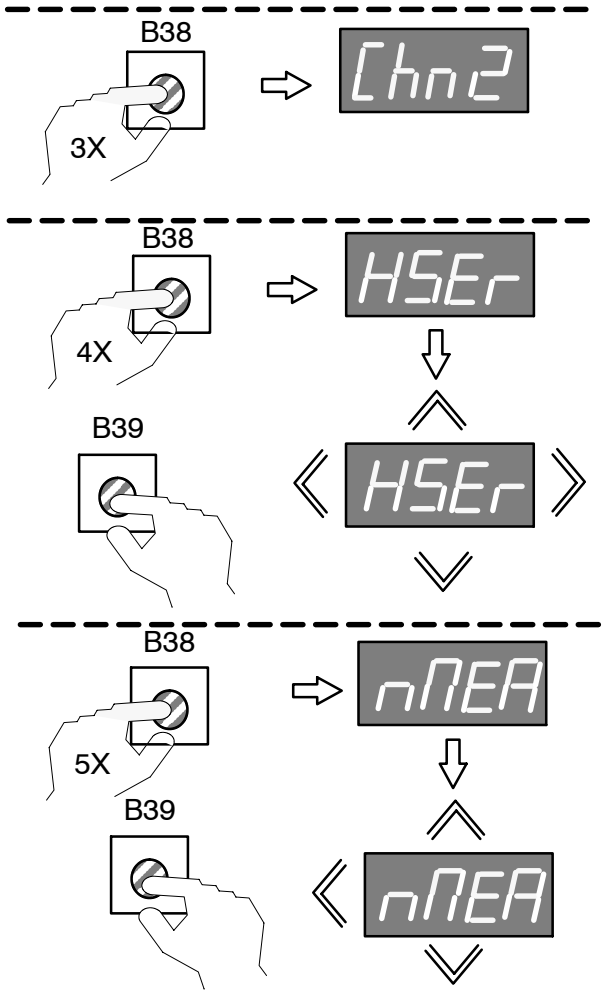
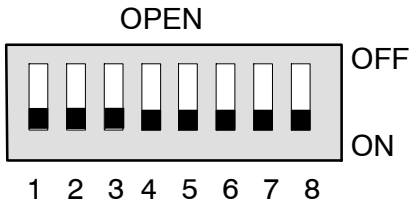


Figure 35: DIP switch B37 and buttons B38/B39

Initial status:



Indications	Comments, Information
Setting the interface for Channel 1 and Channel 2. HSEr = Heading serial (Course Bus) nMEA = NMEA 0183 The “flashing” setting is accepted.	
Switch B37 (DIP switch)  	 Continued on next page

Indications	Comments, Information
from last page	
	 Display

2.6.4.7 Setting the information source for Speed Error Correction

Unscrew and remove the cover of the compass housing.

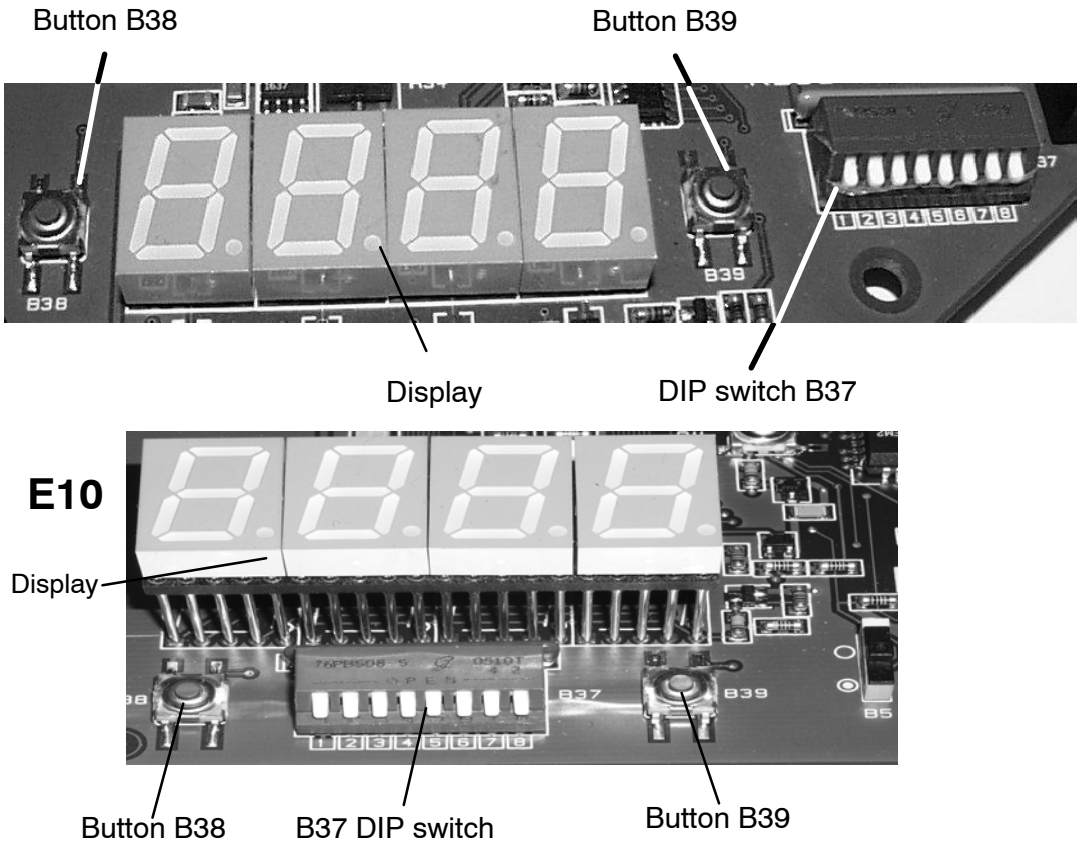
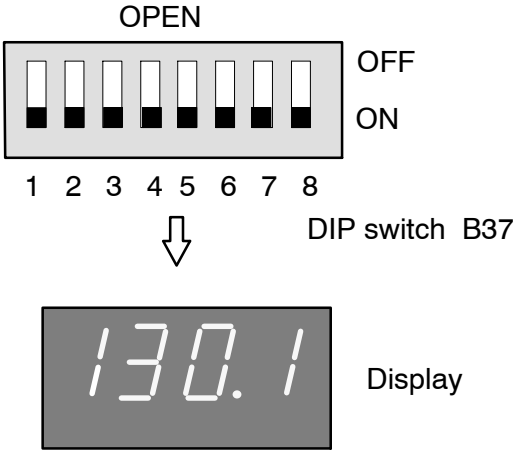


Figure 36: DIP switch B37 and buttons B38/B39

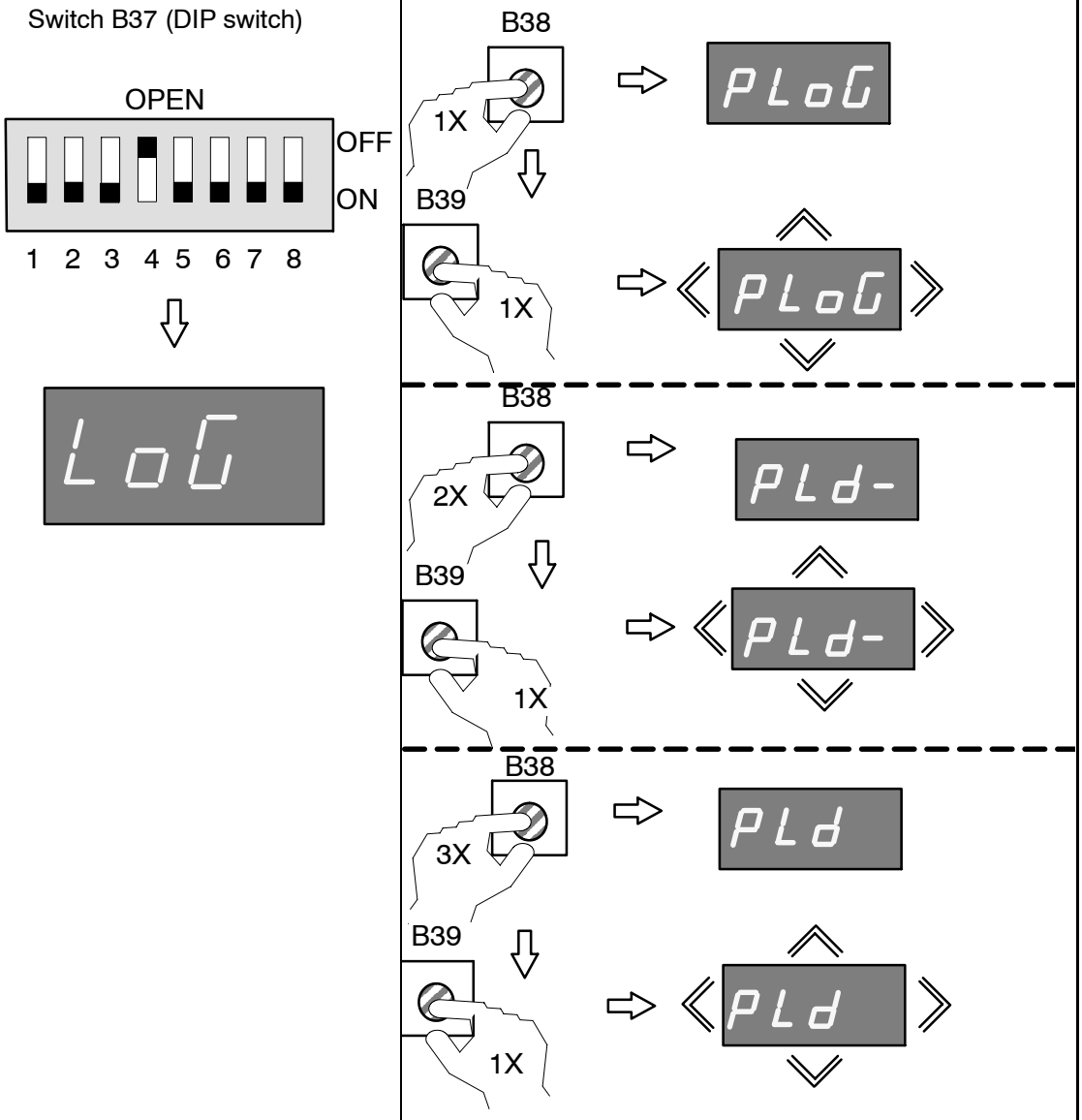
Initial status:



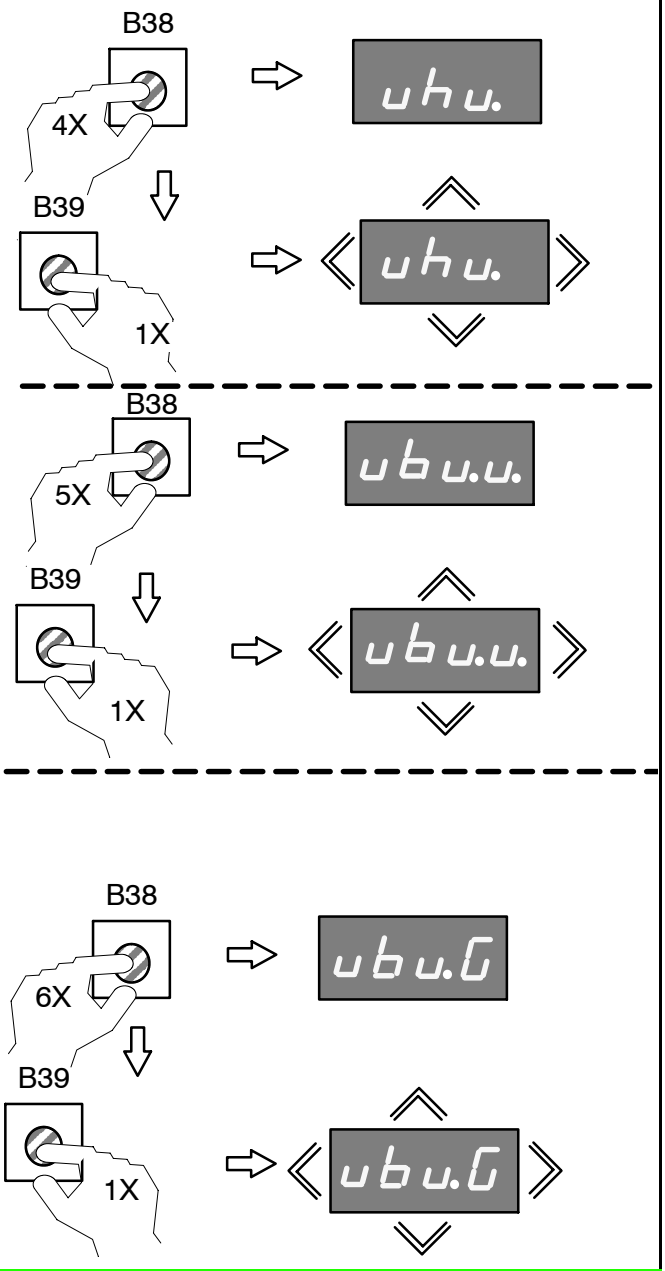
Indications	Comments, Information

PLoG = Pulse-Log
PLd- = Puls-Log (polarity of the input interface inverted)
PLd = Puls-Log (polarity of the input interface not inverted)
uhu. = NMEA-Log (means water speed in general)
ubu.u. = means NMEA Log specified with speed through the water
ubu.G = means NMEA Log specified with speed over ground
GLoG = GPS-receiver-Speed
The indications in the flashing display are selected.

If the setting does not correspond to the connected device, the course correction relay responds and gives an appropriate warning only to devices which are connected to this alarm output.



continued on next page

Indications	Comments, Information
	

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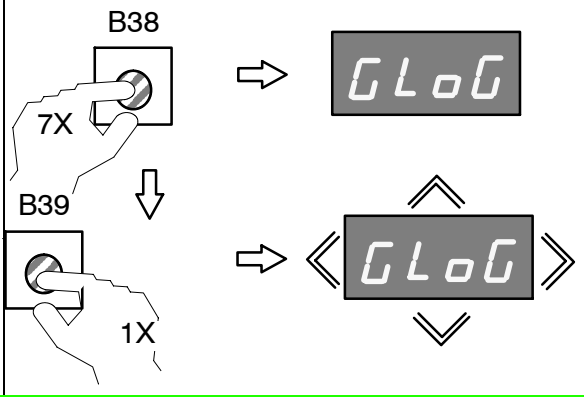
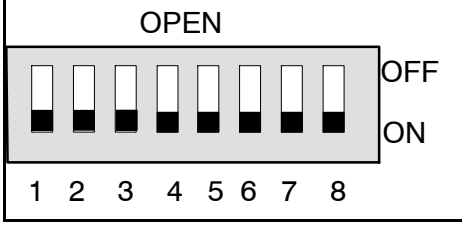
Indications	Comments, Information
	
	 Display

2.6.4.8 Adjustment of essential operating modes

Unscrew and remove the cover of the compass housing.

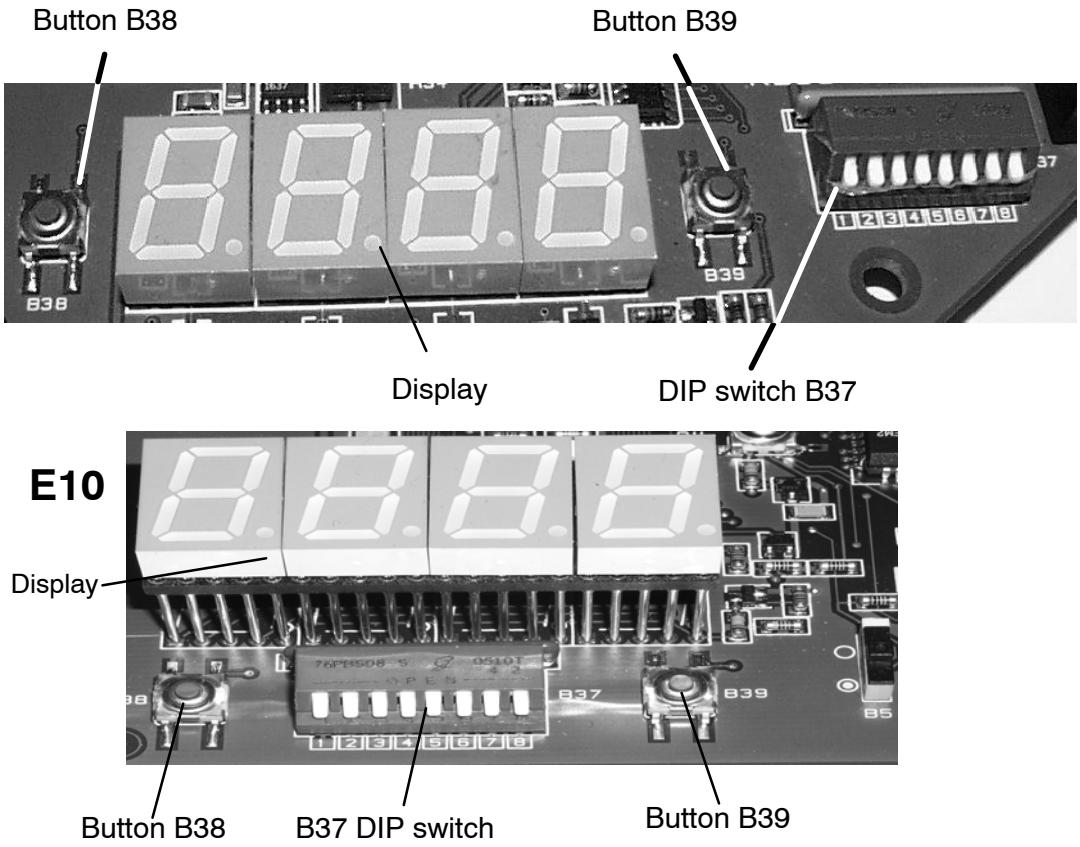
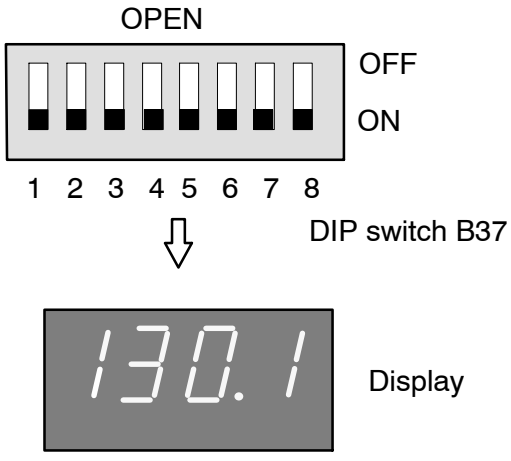


Figure 37: DIP switch B37 and buttons B38/B39

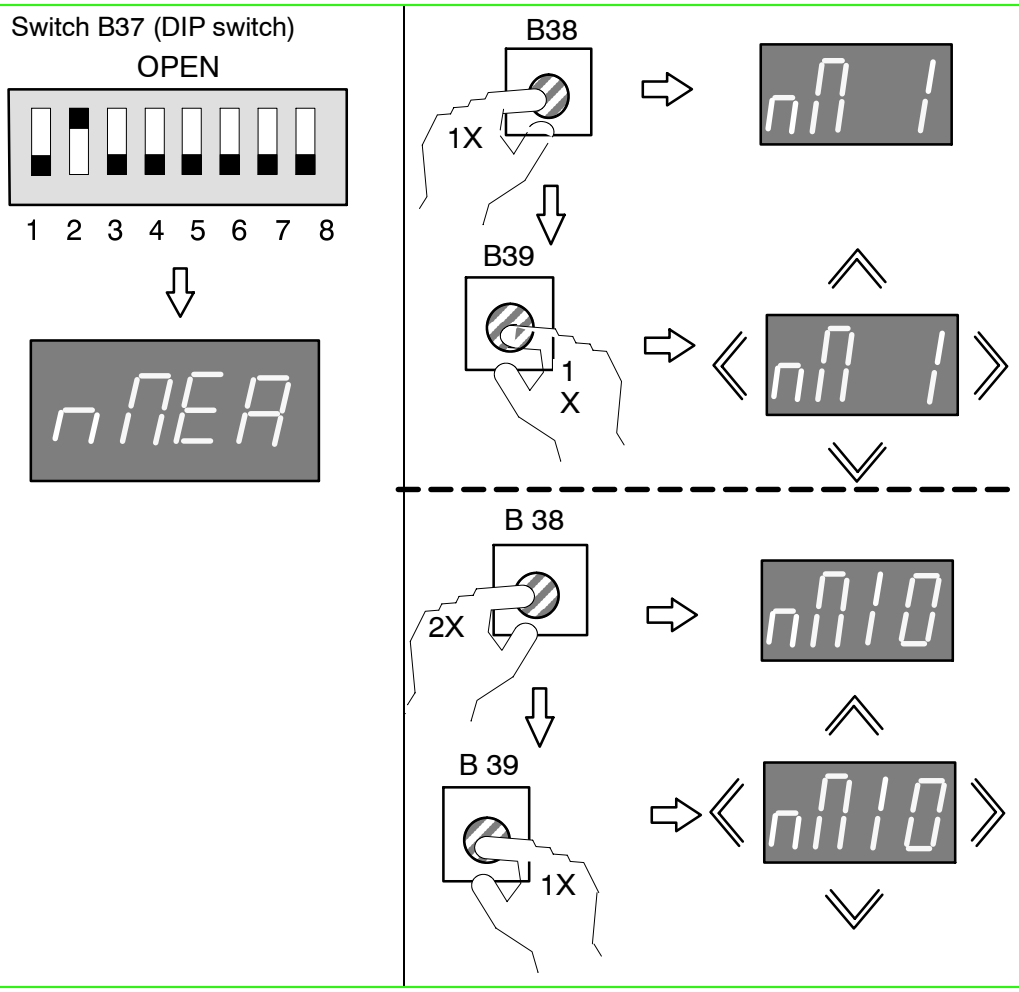
Initial status:



Note: The procedure to adjust essential operating modes is described on the next four pages.

Set the repetition rate of the NMEA heading data output, the output with or without ROT (Rate of Turn), with or without oil residual error for the speed error correction and the setting of a connected Data Distribution Unit **(Data Distribution Unit is not for STD 22 Compact Gyro Compass)**.

1 heading data transmission 1 telegram per second.
10 heading data transmission 10 telegrams per second.
HE.ro heading with ROT.
HE.-- heading only
SECY heading data incorporating Speed Error Correction
SECn heading data without Speed Error Correction
oELY Speed Error Correction with oil residual error **(recommended setting → SEC)**
oELn Speed Error Correction without oil residual error
ddUY with connected Data Distribution Unit **(only for STD 22)**
ddUn without Data Distribution Unit **(for STD 22 Compact absolute necessary)**
nMSY NMEA output with SEC
nMSn NMEA output without SEC
The indications in the flashing display are selected.



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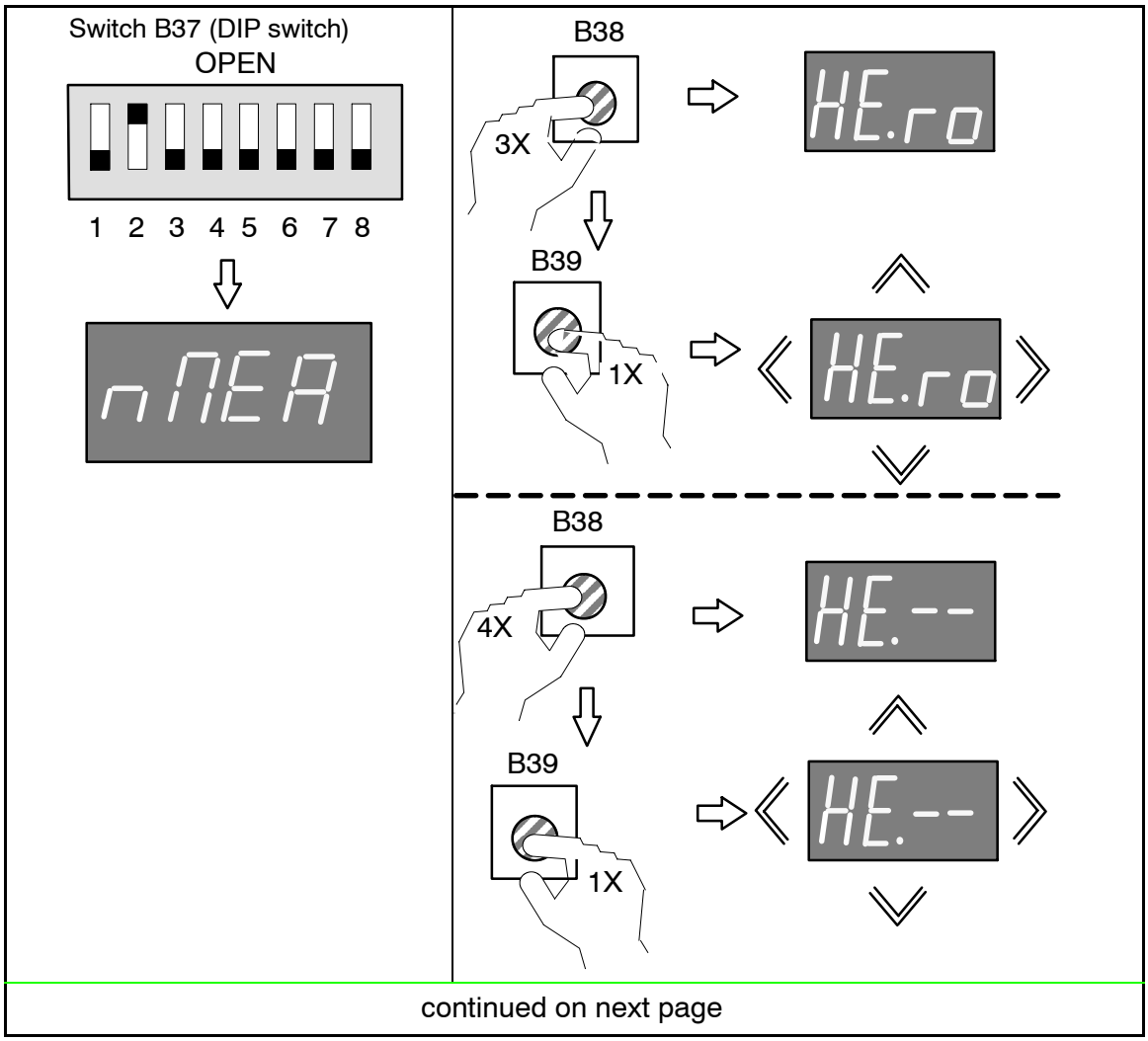

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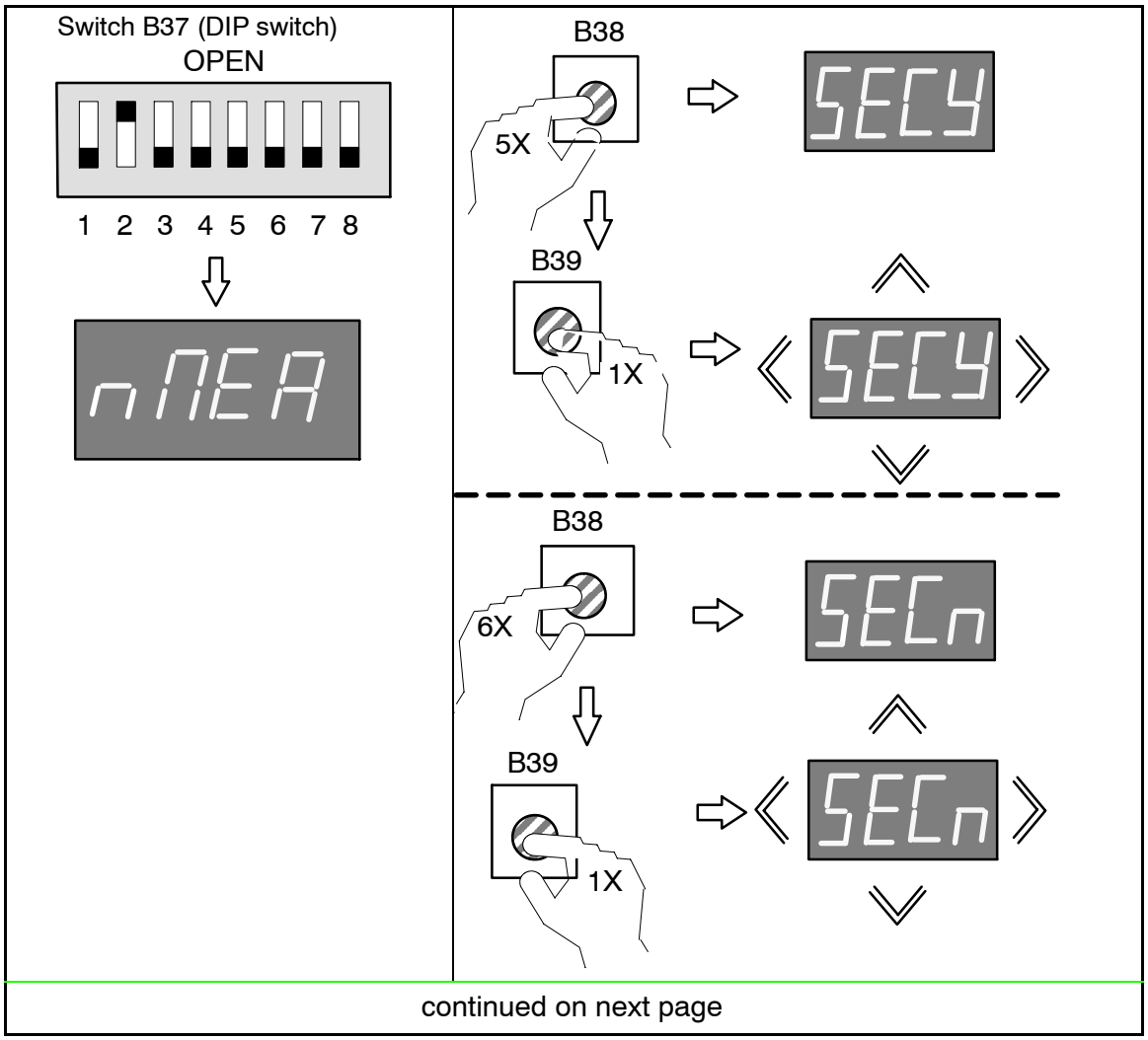

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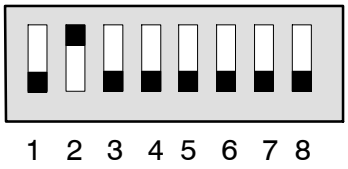
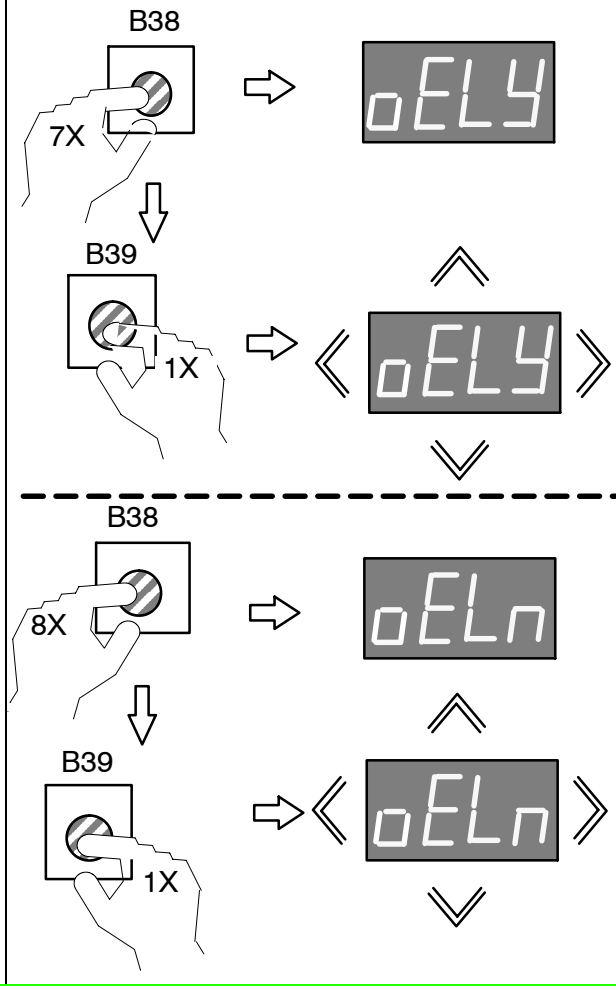
Switch B37 (DIP switch)
OPEN



With Speed Error Correction has to be set always to oELY



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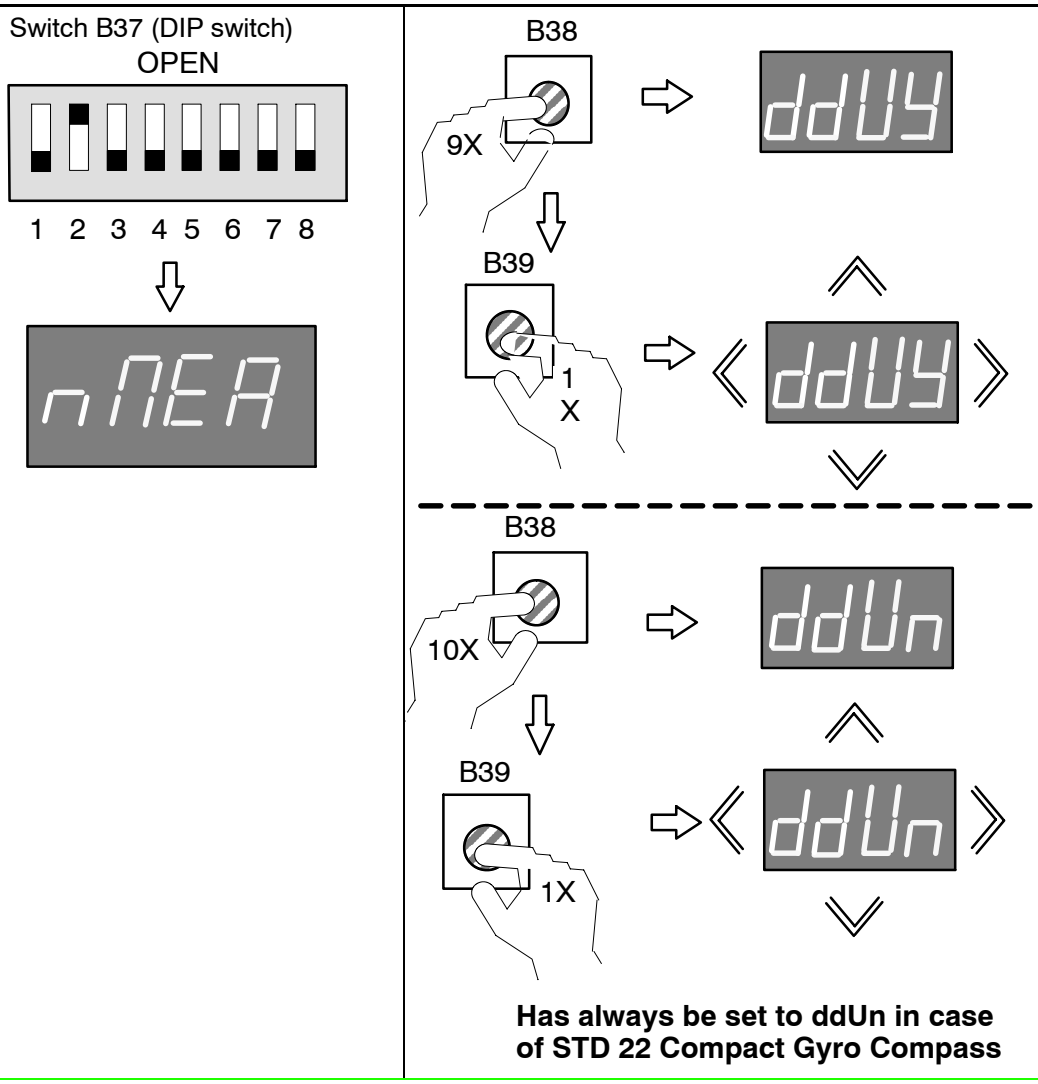

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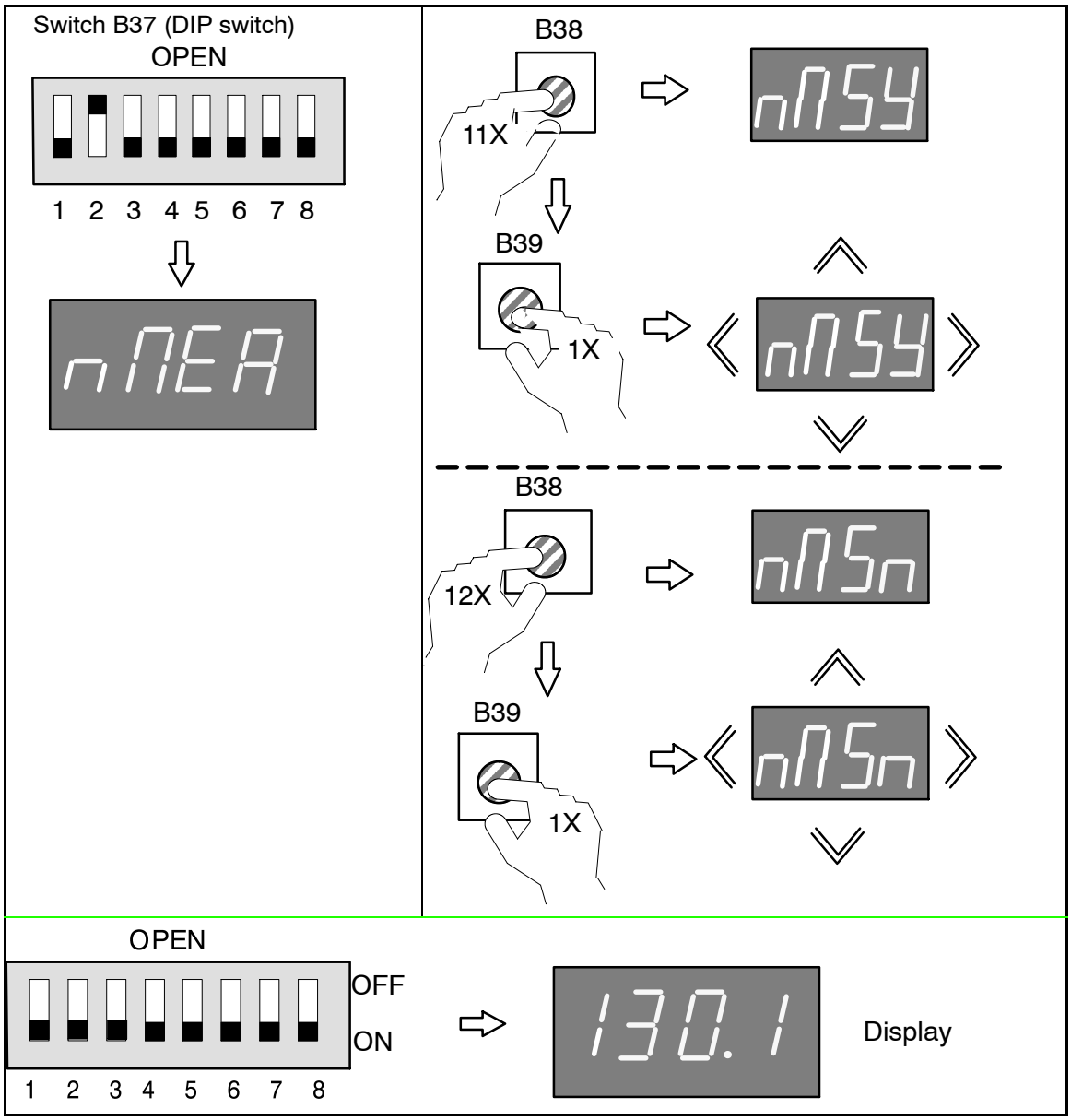

Switch B37 (DIP switch)
OPEN
1 2 3 4 5 6 7 8
nMEA
B38
11X
nMSY
B39
1X
nMSY
B38
12X
nMSn
B39
1X
nMSn
OPEN
OFF
ON
1 2 3 4 5 6 7 8
130.1
Display

2.6.4.9 Function check on externally connected course receivers

Unscrew and remove the cover of the compass housing.

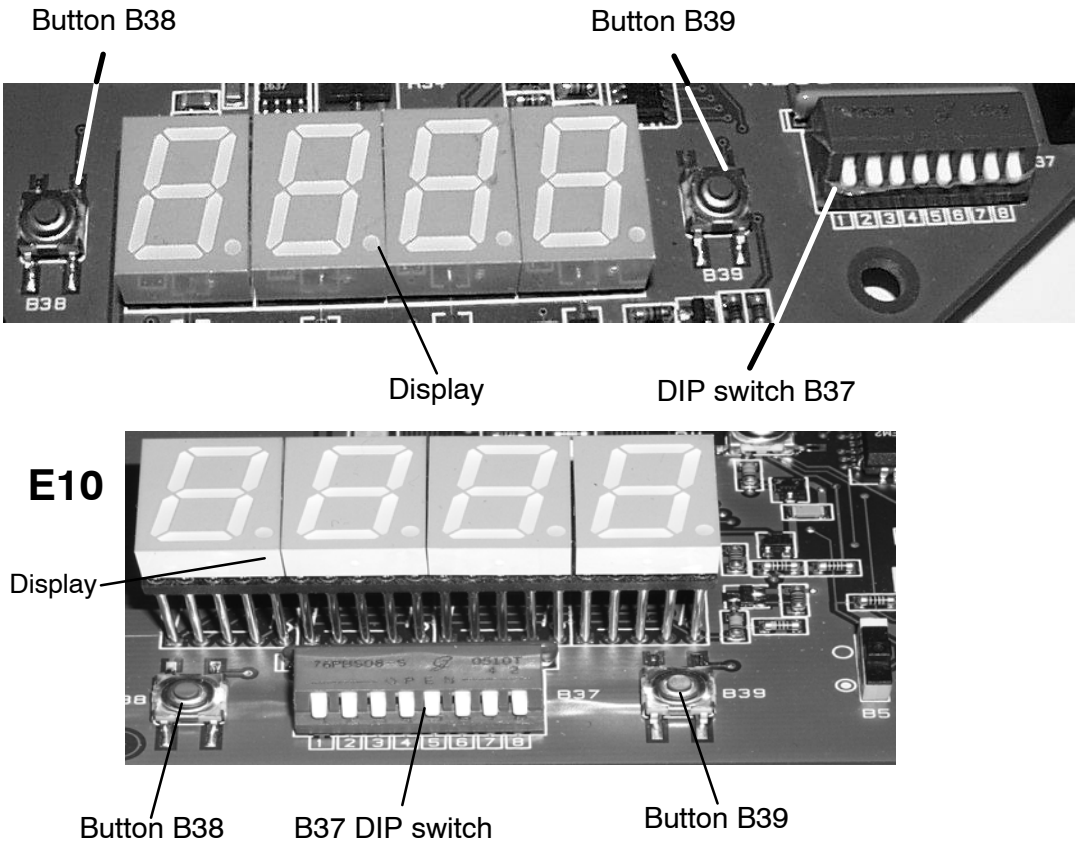
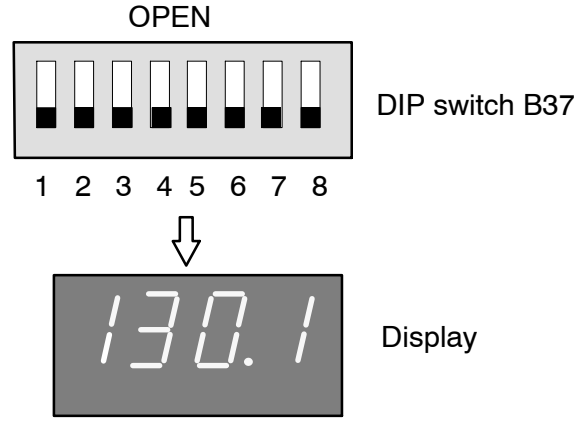
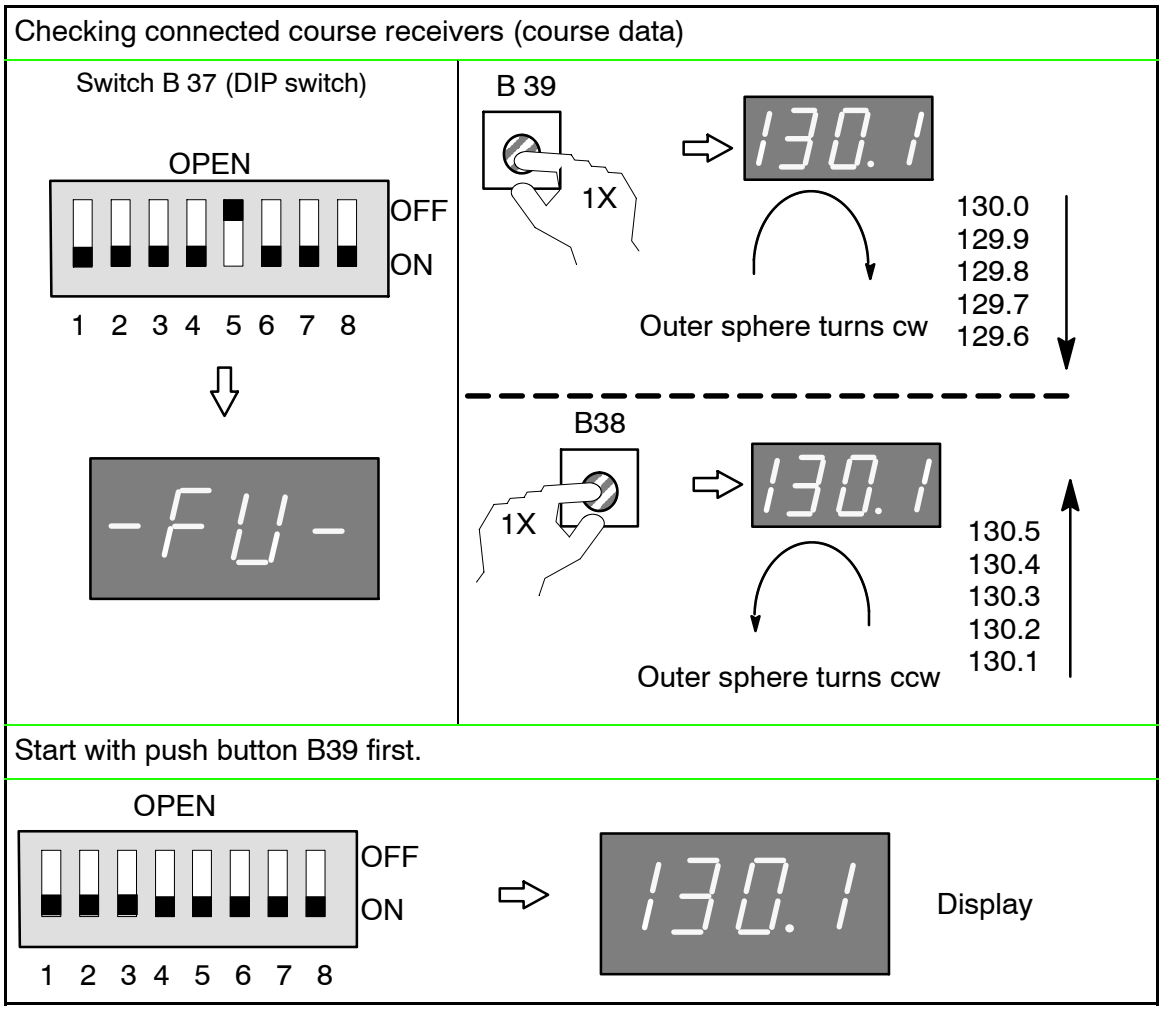


Figure 38: DIP switch B37 and button B38/B39

Initial status:



Checking connected course receivers (course data)



Start with push button B39 first.

intentionally left blank

3 Preparing to install the STD 22 Gyro Compass

To ensure that the STD 22 Gyro Compass is installed and put into operation correctly, these instructions must be followed in the order in which they appear.
It must not be installed or put into operation whilst at sea.

3.1 STD 22 Compass – Scope of Supply

The scope of supply consists of:

- Compass (110-233)
  - Outer sphere
  - Distilled water
  - Supporting liquid
  - Gyrosphere (111-006)
- User manual for the STD 22 Compass
- Installation and service manual for the STD 22 Compass
- Tools and spare parts pack
  - Sealing rings
  - Suction cup
  - Filling device
  - Injector

The STD 22 Gyro Compass is used in conjunction with at least the following items of equipment:

- Distribution Unit 138-118 (separate manual)
- Operator Unit 130-613 (separate manual)

3.1.1 General information concerning installation of the STD 22 Compass

When fitting components, observe the following spacing:

Fit the compass enclosure so that the display can be viewed from above and the cover of the enclosure can be removed (see also Dimensional Drawing 110-133.HP005).

To ensure fault-free operation of the STD 22 Compass, it is essential to follow these directions, safety notes and installation instructions.

Instructions relating to cable cross-sections and earth connections must be adhered to.

The tools which are specified for installing the compass must be used.

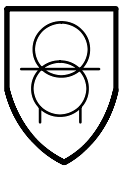
Only original parts or parts approved by the manufacturer may be used in connection with the STD 22 Compass.

See also Cable Connection Diagram 110-233 HP009 or HP0029 for the STD 22 Compass.

Gyro Compass should not be installed in oil-containing ambient air, within surrounding in vibration and should installed on a vibration-free platform.

Gyro compass should be installed on the ships' line (vertical and horizontal).

The installation of the power supply (AC/DC-Converter) should only be performed by an experienced electrician.



The 24VDC supply voltage should be engineered as a low-security-voltage according to SELV.

In some system configurations it is necessary to take off heading information from the compass direct - additional to the heading information on the CAN bus. This heading information is uncorrected (without SEC)!
Corrected heading information (with SEC) can be taken off in these system configurations from the distribution unit only.

3.2 Creating cable connections

3.2.1 General information concerning on-board wiring

The cables which are to be connected to the STD 22 Gyro Compass are led through one of the cable entries at the top of the compass enclosure and fixed in the cable entry with a cable clip suitable for the size of the cable.
The cable entries are supplied with the compass.

Caution:
Ensure that cables are not live before creating cable connections.
It is vitally important to ensure that all cables are free of voltage; where appropriate, carry out voltage measurements beforehand and/or disconnect the relevant distributor from the power supply.

To ensure that the compass functions correctly, it is essential to adhere to the following sequence when creating cable connections.

- Strip the cable over a length of approximately 180 mm
  (depending on the distance of the cable entry from the terminal).
  Be careful not to damage the screening.
- Trim the screening so as to leave approximately 15 mm on the cable.

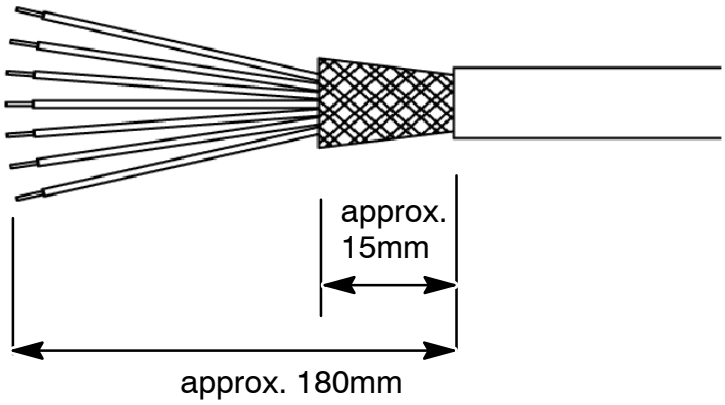


Figure 37: Requirements for stripping the connecting cable

- Push the components of the screw fastening over the cable.
  It is essential to follow the sequence (as shown in Figure 38).
- Check the cone and the mating piece of the earthing insert for corrosion and if necessary remove corrosion with an emery cloth.
- Push the mating piece of the earthing insert to the end of the cable sheath.
- Push the cone inside the screening and against the mating piece. Ensure that the screening is evenly distributed over the cone (see Figure 38).

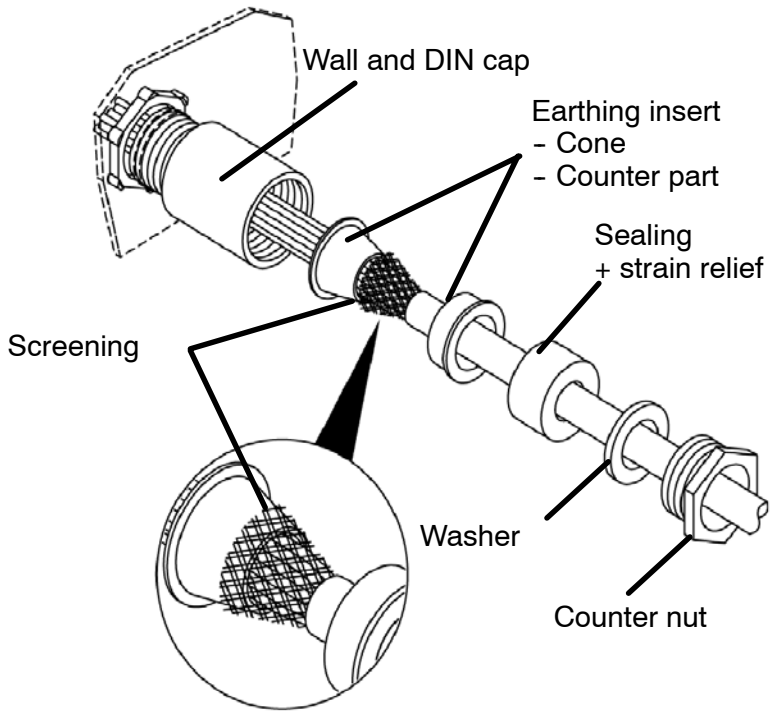
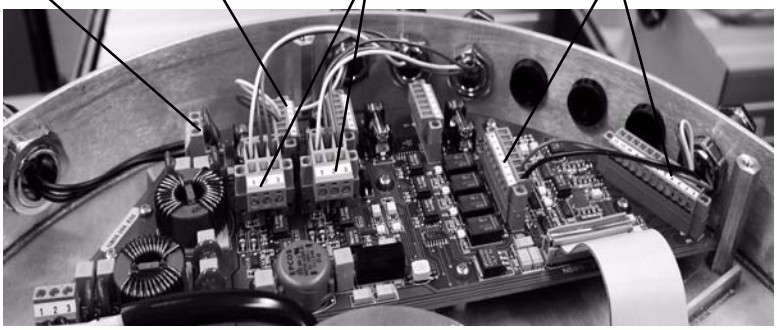


Figure 38: Creating the cable connection



Note: The connection cables should be shortened in that way, that they could be led to the terminal boards without mechanical stress.
Too long connection cables will lead to EMC problems.
For the cable-type see respective drawing at the appendix.

Figure 39: Example of a proper cable connection

- Place the earthing insert, strain relief and washer in the cable entry; fit and tighten the counter nut.
- Strip the cable conductors to a length of about 1.5 cm, lightly twist them and fit cable end sleeves.
  Tighten the terminal screws – check the connection is secure by pulling gently.

3.2.1.1 General information about creating an earth connection

The following instructions relating to the creation of cable connections must be adhered to in order to comply with the stringent EMC requirements.
The specified cable types must be used.

It is vital to ensure that these connections have **a common** reference to ship's earth.
Additional components (optional features) must likewise be connected to the common earth.

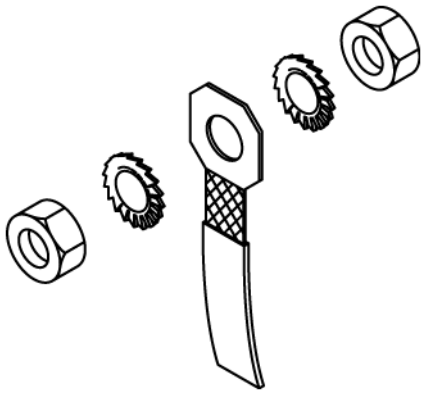


Figure 40: Creating an earth connection

Each earth connection must be made as shown in Figure 40.
The earth cable, to which a cable lug is attached, must have a cross-section of at least 1.5 mm^2.
The cable lug is mounted between a pair of toothed washers.
Earth connections must be free of all corrosion; they must be screwed tight.

3.3 Installing the compass and putting it into operation

3.3.1 Remove the transportation support with outer sphere, supporting liquid and distilled water.

- Undo the 4 screws (Figure 41 /1) at the top and bottom of the enclosure door, lift out the door and detach the earthing strip (Figure 41/2) on the inside of the door.
- Carefully remove the transport packaging with the outer sphere and the two bottles containing supporting liquid and distilled water from the compass enclosure.
- Take the outer sphere out of the transport packaging and place it on the base plate; the outer sphere must be secured to prevent it from tilting

Caution:
Danger of tilting!

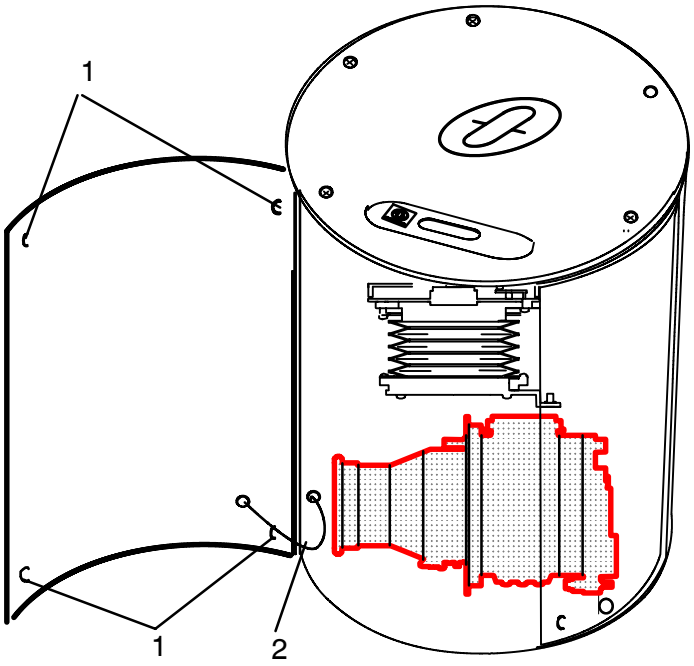


Figure 41: Principle of dismantling the enclosure door

3.3.1.1 Assembling the compass enclosure

Note: It is not necessary to install the compass enclosure with reference to the ship (e.g. in the ship's forward direction). It can be installed in whatever position is most convenient for servicing and operation (compass enclosure removable and it must be possible to open the compass door – observe the size of tools).
The installation described below is to be regarded as the manufacturer's recommendation.

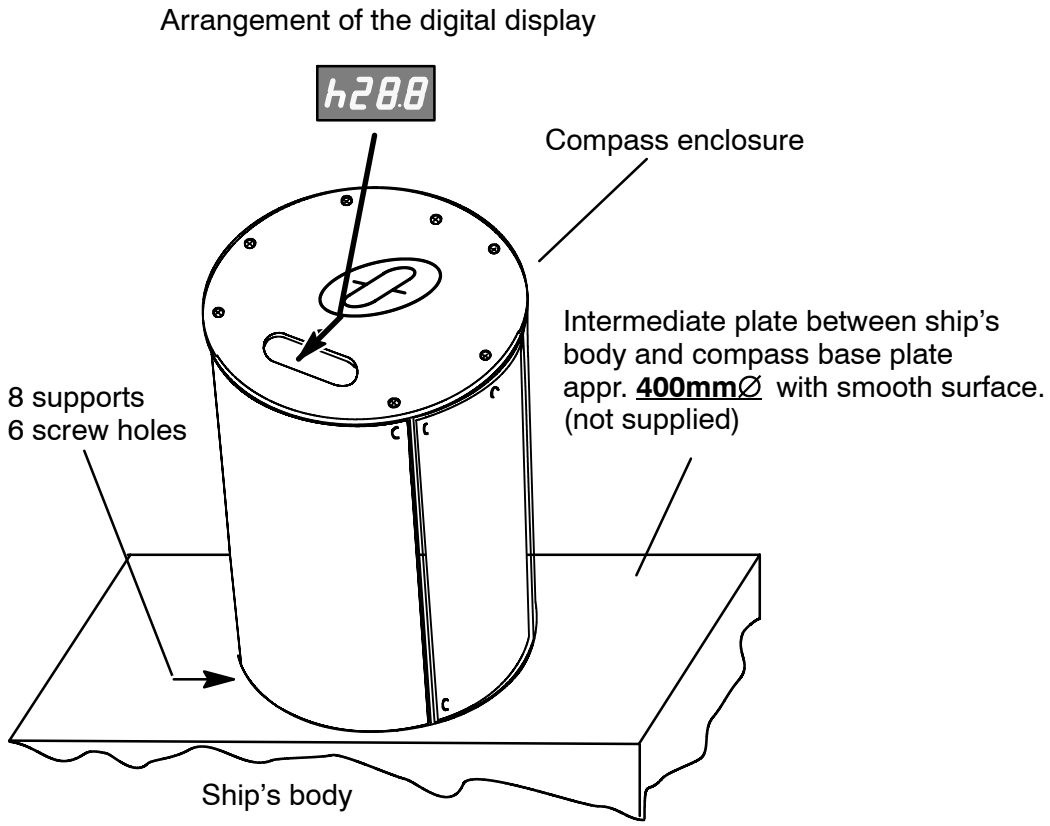


Figure 42: Installation of the compass enclosure

The compass enclosure must be installed in such a way that the following requirements are met:

- The 8 supports must all stand on a flat, firm surface.
  If necessary, the user should himself create an intermediate plate (marine quality hardwood or metal) suited to the local conditions.
- The compass enclosure must be screwed to the intermediate plate in a sea-resistant fashion.
- The intermediate plate must also be screwed to the ship's body in a sea-resistant fashion; this fastening is the responsibility of the user of the STD 22 himself.
- The compass enclosure must be mounted so that the digital display can be seen easily after installation, the door of the compass enclosure can be opened and closed easily and the cover of the compass enclosure can be detached.
- The fastenings of the compass enclosure are indicated in the dimensional drawing "Gyro Compass" (110 D 233 HP005) in the appendix to this manual.

The compass enclosure is fastened to the intermediate plate with 6 screws

- for woodscrews ∅11 x length depending on the thickness of the intermediate plate
- for metal screws M10 x length depending on the thickness of the intermediate plate.

The compass enclosure can also be mounted directly on a flat metal surface; in this case, suitable stud bolts (M10) must be welded on; alternatively the compass housing can be fastened on the underlying surface with threaded holes and screws M10–A4.

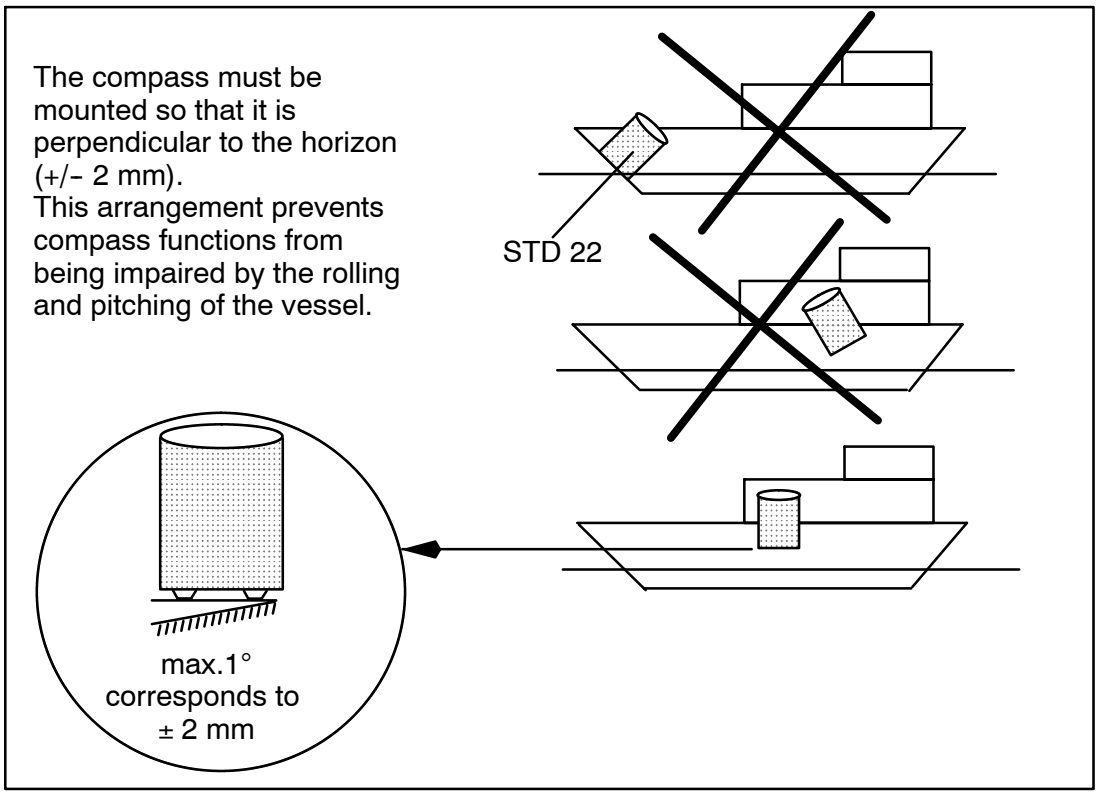


Figure 43: Horizontal alignment for installation of the compass enclosure

3.3.1.2 Installation of the gyrosphere

Special tool required:
Suction cup

Installation procedure:
- Undo the six screws (Figure 44/1) fastening the upper and lower halves of the outer sphere (Figure 44/2 and 3).
- Remove plug B3 (Figure 44/4) from the plug plate.

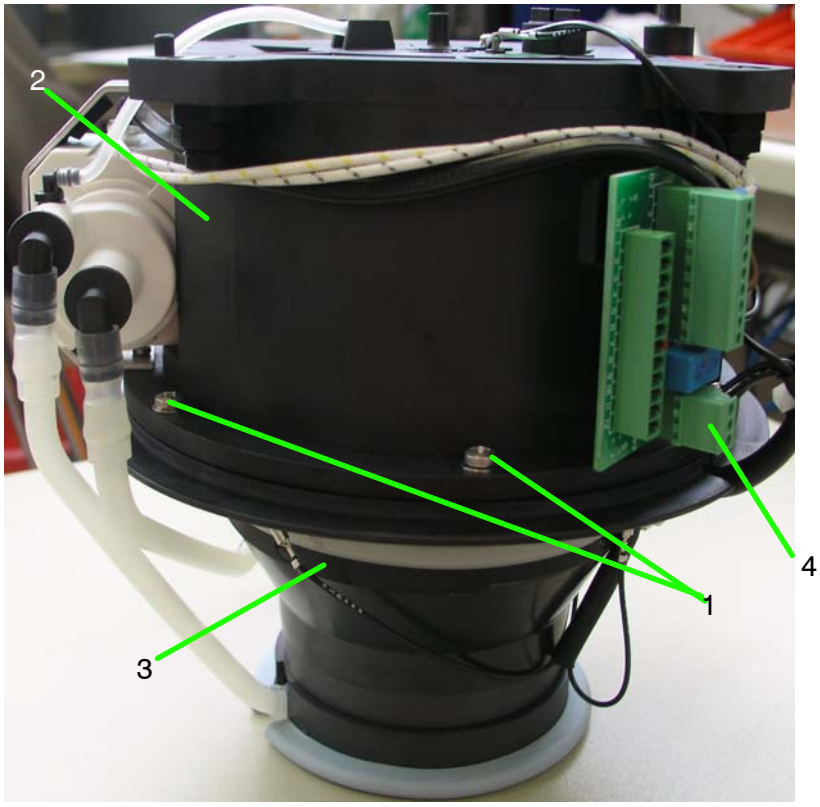


Figure 44: Outer sphere

- Remove the upper half of the outer sphere (Figure 44/2). Take the gyrosphere (Figure 45/2) out of the transportation box and carefully insert it using the suction cup (Figure 45/3) in the lower outer sphere (see Figure 45).

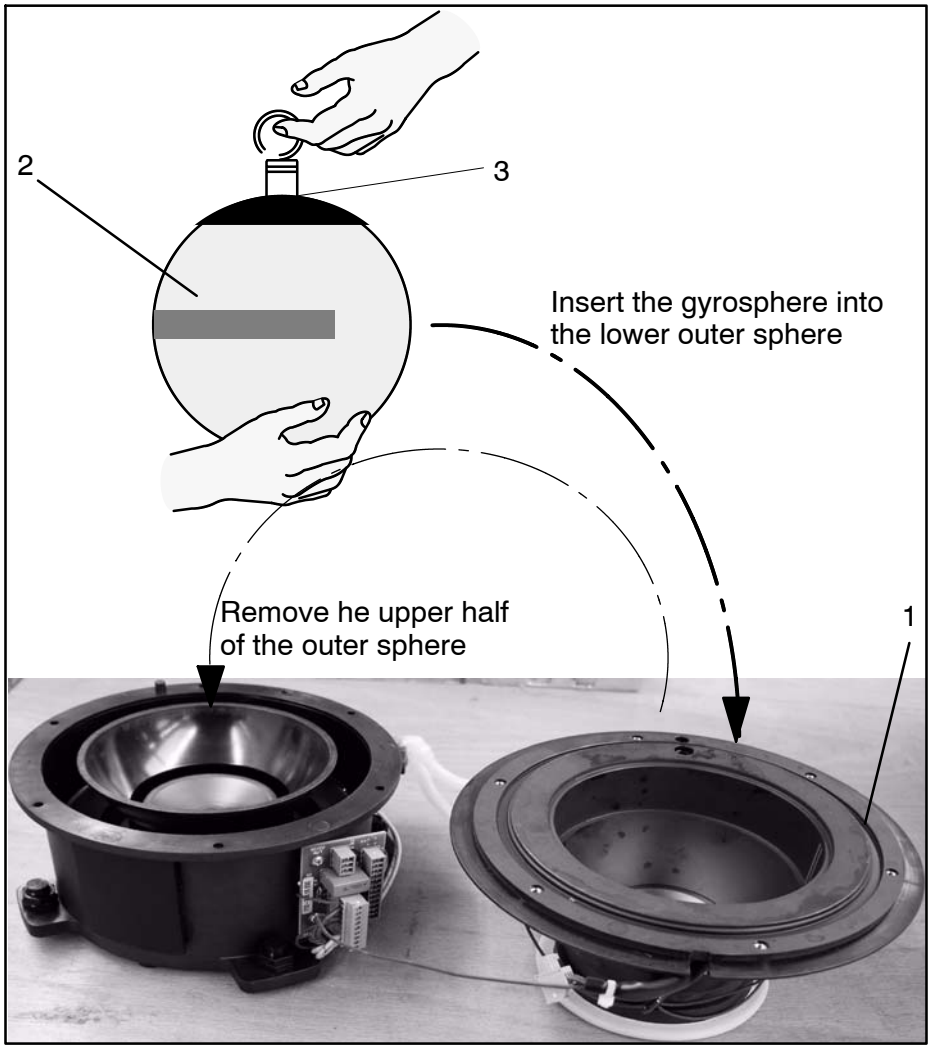


Figure 45: Principle of separating the upper and lower halves of the outer sphere – inserting the gyrosphere

- Replace the upper half of the outer sphere on the lower half.

Check that there is a proper seal between the two halves of the outer sphere (see Figure 45/1).

- Retighten the six screws (see Figure 44/1).
- Insert plug B3 (Figure 44/4) again.

3.3.1.3 Filling with distilled water and supporting liquid.

(see Figure 46)

- Undo the three plastic screws (Figure 46/1-3) on the upper outer sphere

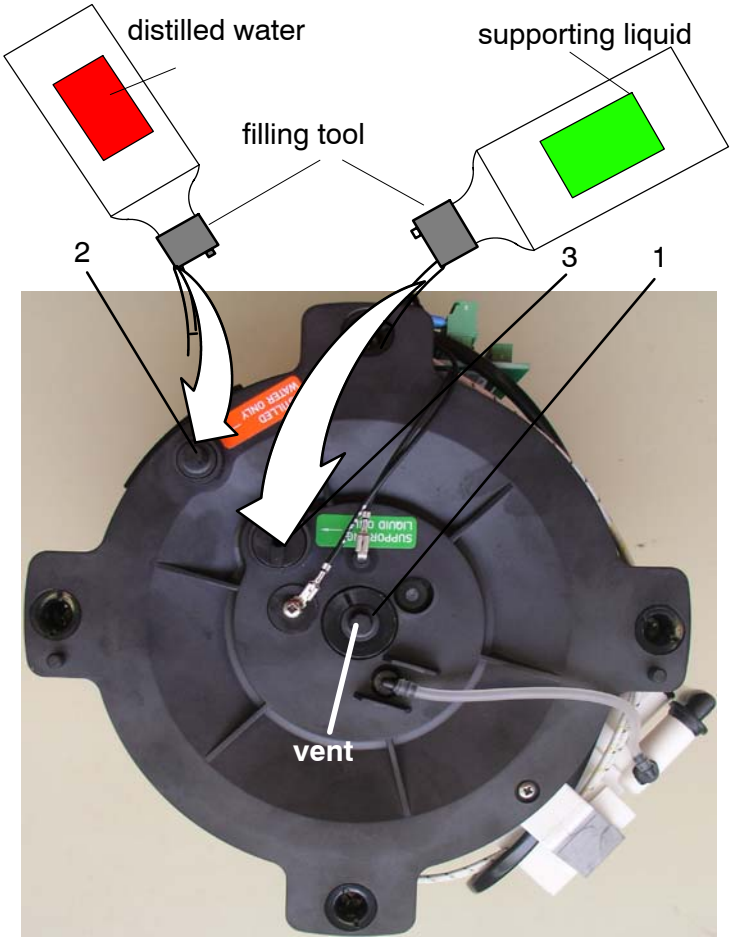
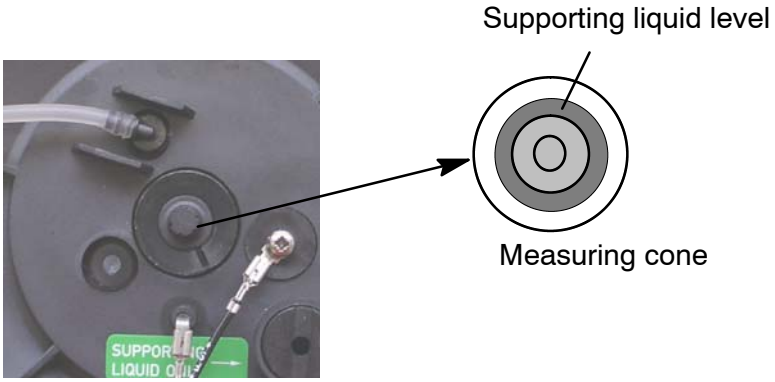


Figure 46: Filling with liquids

- Fit the supplied filling device on the distilled water bottle.
- Pour in all the distilled water (230 cm^3) (look for the identifying label on the outer sphere).
- Re-close the distilled water filling opening with the screw, check that it is properly sealed.
- Remove the filling device from the distilled water bottle and attach it to the supporting liquid bottle.

- Pour approximately 840 cm^3 of supporting liquid in the appropriate filling opening (look for the identifying label).
  The supporting liquid must be at room temperature (over 25° C) and the measuring cone should fill half the measuring range (diameter).
  The following photograph shows the measuring cone for the liquid level.



This picture only shows the situation at the start of operation (after filling for the first time or after changing the supporting liquid –> cold supporting liquid); during operation, the dark circle in the measuring cone is smaller.

Figure 47: Measuring cone for supporting liquid level

- Discard any unused supporting liquid; no special measures are needed for disposal.
- Re-close the filling opening for supporting liquid, check that it is properly sealed.
- Re-insert the ventilation screw, check that it is properly sealed.

3.3.1.4 Inserting the outer sphere in the compass enclosure

(see Figure 48)

- Carefully insert the gyrosphere in the compass enclosure:

> Pay attention to the two locking pins on the closure.

- Using both hands, hold the outer sphere and guide it under the snap closures (Figure 48/1) on the pendulum joint (Figure 48/2).

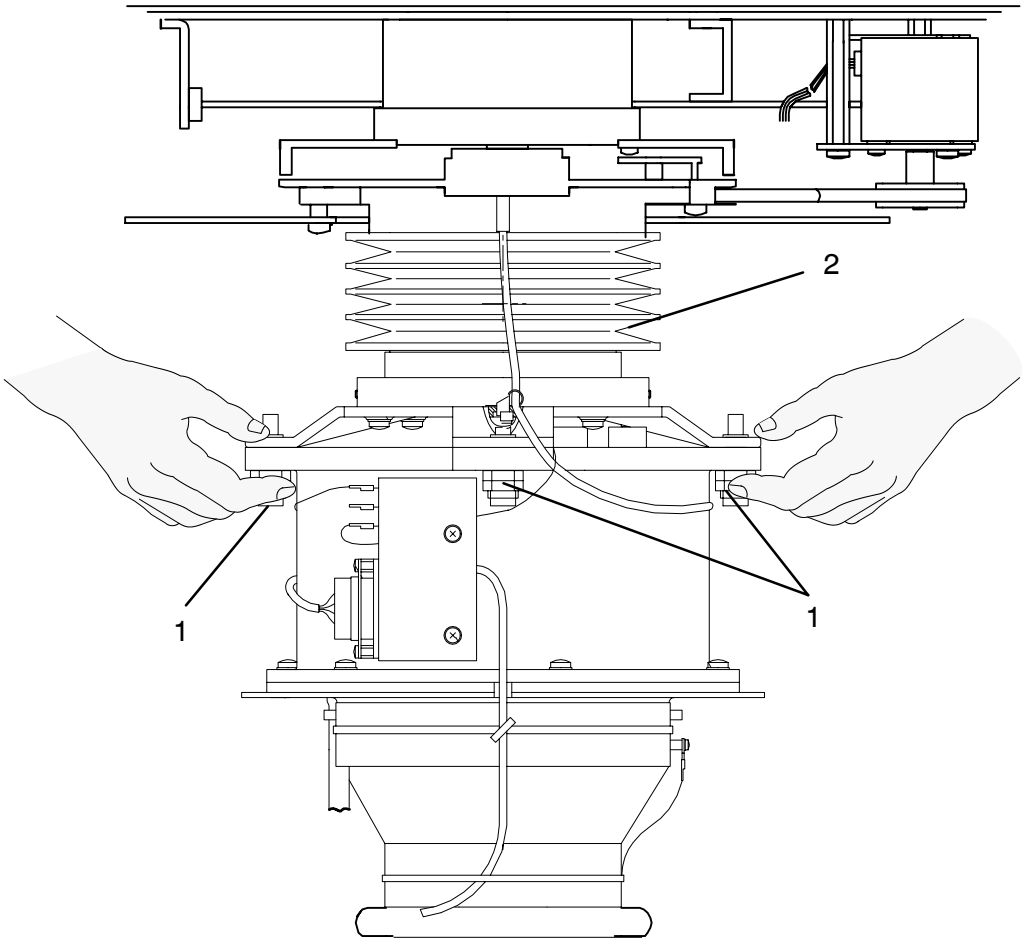


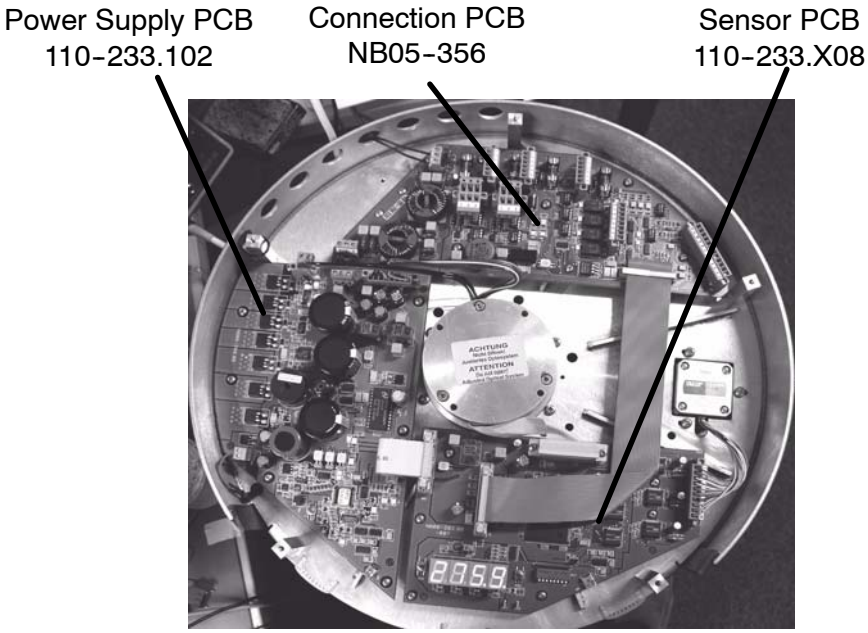
Figure 48: Principle of inserting the outer sphere in the compass enclosure

- Using the thumbs, press down and engage two snap closures (Figure 48/1).
- Turn the outer sphere through 90° and repeat the process with the two other snap closures. The outer sphere is now fastened to the pendulum joint.

- Guide the cable around the outer sphere and attach the plugs to the small PCB of the outer sphere, tighten the fastening screws.

3.4 Creating cable connections and plug connections

3.4.1 Overview of plug connections and fuses on PCB‘s



E10

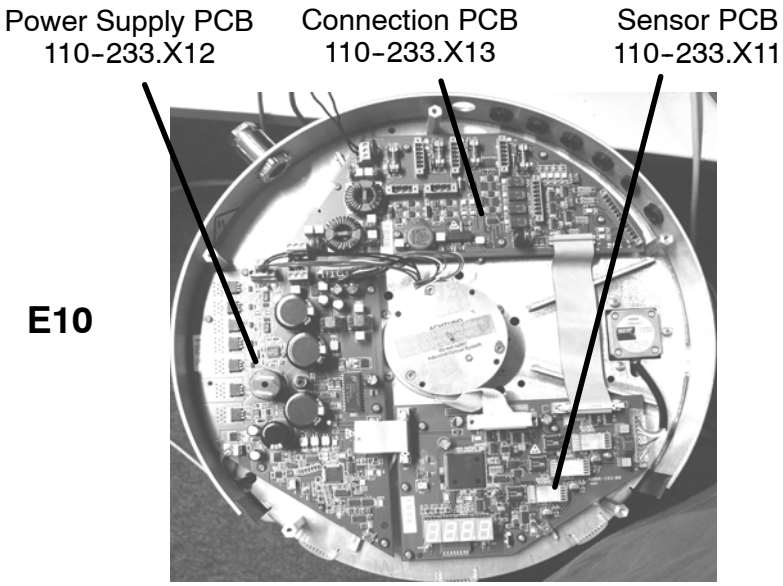


Figure 49: Arrangement of PCB‘s in the STD 22 Compass (cover removed)

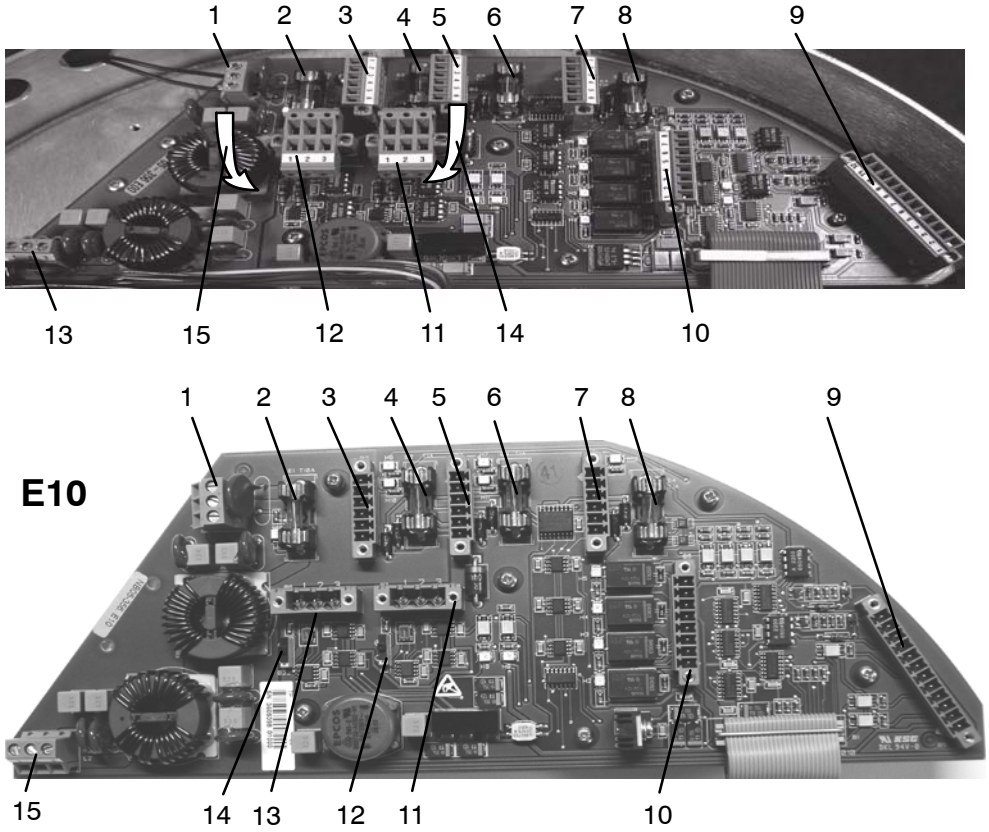


Figure 50: Arrangement of plugs, terminal boards and fuses on the Connection PCB.

1	Terminal L1	Power supply (24VDC)	
2	Fuse E1 (T10A)	Power supply (24VDC)	
3	Plug B2	Output Channel1 Course Bus/NMEA	
4	Fuse E2 (T1A)	Channel1 +24V	
5	Plug B3	Output Channel2 Course Bus/NMEA	
6	Fuse E3 (T1A)	Channel2 +24V	
7	Plug B4	Output Course Bus	
8	Fuse E4 (T1A)	Course Bus +24V	
9	Plug B5	Input (+24V/Set QS/ Pulse Log/Pulse Log Dir./NMEA Log/GPS-receiver)	
10	Plug B6	Output (QS/SEC/System/Available)	
11	Plug B7	CAN1 bus	
12	Plus B8	CAN2 bus	
	Switch B32	for CAN1 bus terminating resistor	E10
13	Terminal Board L2	24V connection to Power Supply PCB	
	Plus B8	CAN2 bus	E10
14	Jumper B31	for the CAN2 bus terminating resistor	
	Switch B31	for the CAN2 bus terminating resistor	E10
15	Jumper B32	for the CAN1 bus terminating resistor	
	Terminal Board L2	24V connection to Power Supply PCB	E10

3.4.2 Creating a cable connection from STD 22 Compass → Distribution Unit

NOTE: The installation and commissioning of the Distribution Unit are described in the Distribution Unit manual.
To create cable connections to the Distribution Unit, see also Cable and Connection Diagram 110-233. HP009 or HP029.

This connection is made using cables with CAN bus plugs at both ends
(see also section 3.4.2.2 - Connecting the CAN bus plug).
For each CAN bus, a screened 2-core twisted cable with a conductor cross-section of $\geq 0.5mm^2$ must be used.

There is a redundant CAN bus:
- CAN1 bus
- CAN2 bus

Each CAN bus must be connected.
Missing or disconnected plug connections will cause an error message to be sent to the Operator Unit (see manual 3648, Operator Unit 130-613).

The plugs must be inserted on the Connection PCB as shown in Figure 50.

If several STD 22 gyro compasses are combined with one another, they are connected to each other from compass to compass via the CAN bus.
For this purpose, each device is equipped with 2 sockets (CAN1 = B7 and CAN2 = B8) (e.g. CAN1 and CAN 1 OUT), whereby CAN OUT does not have to be connected if the compass in question is installed virtually as a terminal device.
The compass or compasses can also be connected via any other CAN bus user.

When inserting plugs, be sure not to get the plugs mixed up.
The CAN1 bus must always be connected to the CAN1 bus of the subsequent device.

If a compass is operated within a CAN bus configuration as a terminal device on the CAN bus, terminating resistors must be activated for each CAN bus
(see section 3.4.2.3).

The total length of the CAN bus cable must not exceed a length of 300 m.

3.4.2.1 Connecting to the power supply (Distribution Unit)

The STD 22 Compact Compass operates at 24VDC.
This voltage is generated via the Distribution Unit or fed directly to the compass.

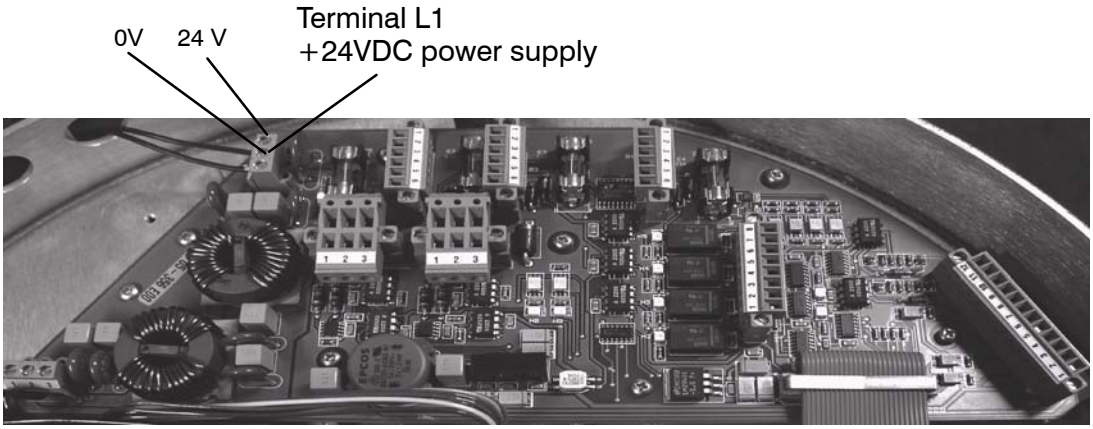


Figure 51: Connection of the +24VDC power supply

The 2-core cable that is used should have a conductor cross-section of $\geq 2.5mm^2$.

At terminal L1 (see Figure 51), connect a power supply
of +24VDC at terminal 1
0V at terminal 2.

3.4.2.2 Connecting the CAN bus plug

For each CAN bus, a screened 3-core twisted cable with a conductor cross-section of $\geq$ 0.5mm^2 must be used.
All the CAN bus connections to be used are identical.

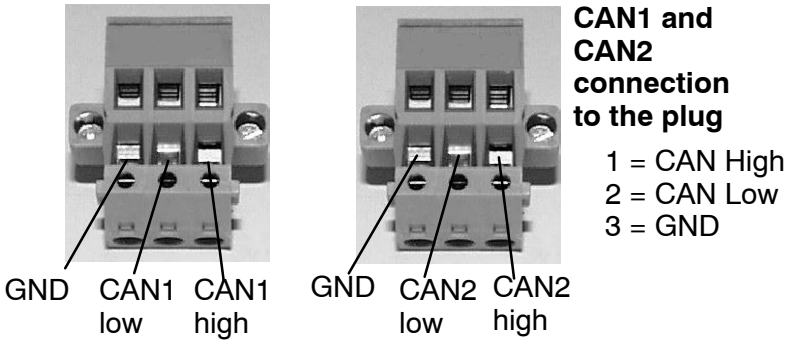


Figure 52: CAN bus plug

The screening of the cable is connected to the enclosure earth.

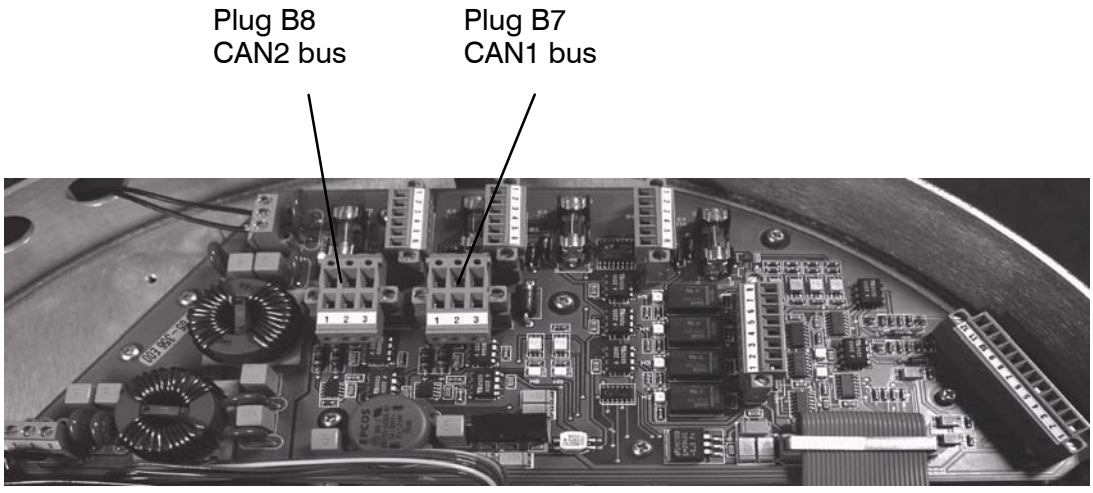


Figure 53: CAN1 and CAN2 connections in the STD 22 Gyro Compass

3.4.2.3 Setting the jumpers for the CAN bus

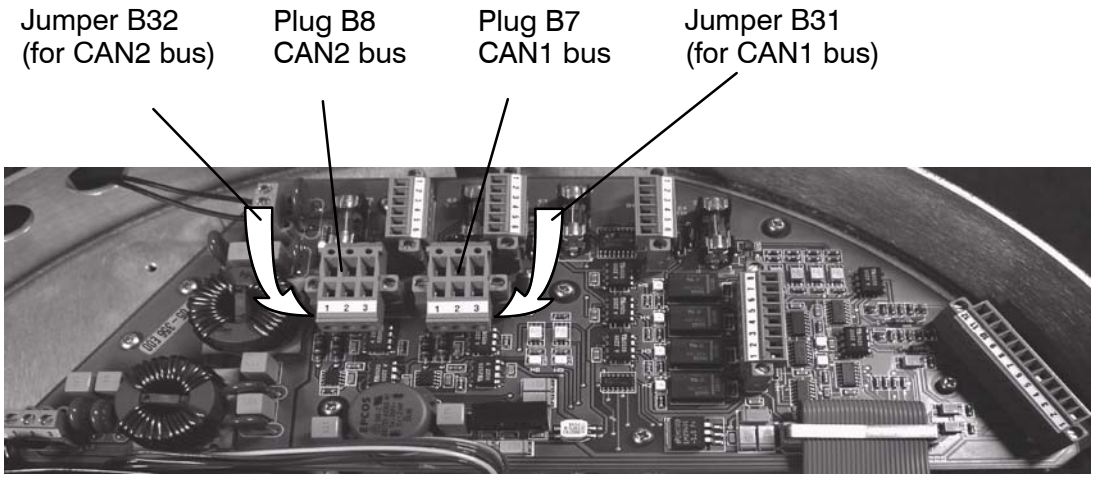


Figure 54: Jumpers B32 and B31 for CAN1 and CAN2 in the STD 22 Gyro Compass

If a compass is to be used as a terminal device in a CAN bus application, both jumpers (B32 and B31) must be inserted. These jumpers activate the terminating resistor at the end of each CAN bus.
Each end of the CAN busses must be terminated with a terminating resistor.

Failure to insert jumpers (open bus) will cause sporadic error messages from the bus concerned (see also manual 3648, Operator Unit 130-613).

3.4.2.4 Switching the termination resistors for the CAN bus (E10 only)

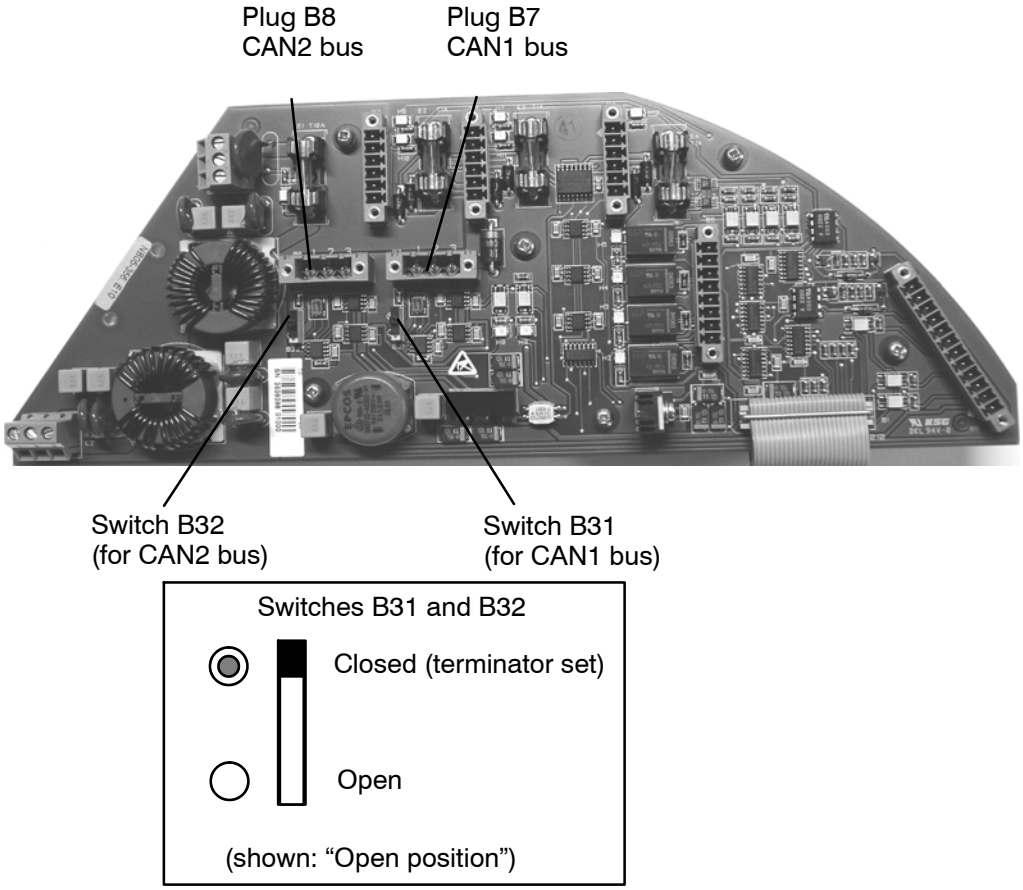


Figure 55: Switches B32 and B31 for CAN1 and CAN2 termination resistors

If a compass is to be used as a terminal device in a CAN bus application, both switches (B32 and B31) must be set to the closed position. This position activates the terminating resistors at the end of each CAN bus.
Each end of the CAN busses must be terminated with a terminating resistor.

Failure not to set termination resistors (open bus) will cause sporadic error messages from the bus concerned (see also manual 3648, Operator Unit 130-613).

3.4.2.5 Connecting the compass to earth

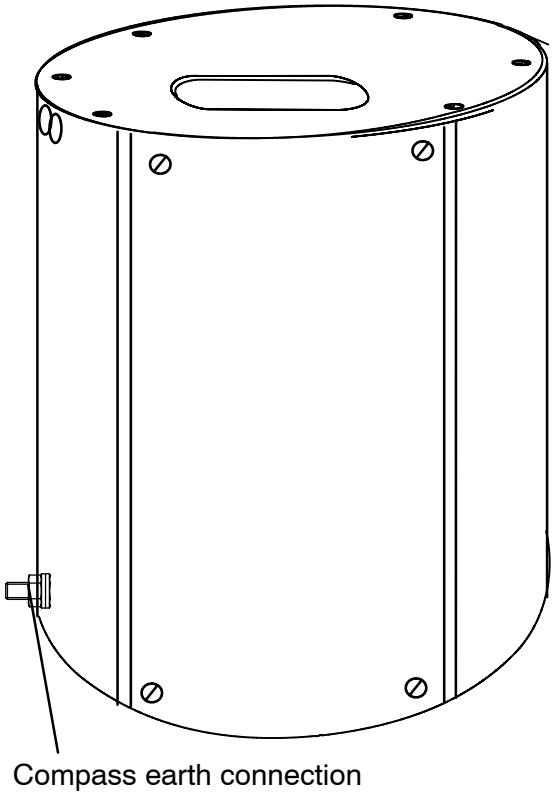


Figure 56: Connection of compass to earth

An earth connection (ship's earth) must be made using the earthing screw shown in Figure 56.
The earth connection must have a common reference to the other components (Operator Unit, Distribution Unit and repeater compasses).

3.4.3 Switching on, settling and adjustment

The STD 22 Compass switches on when the power supply is activated on the main control panel for the Distribution Unit (once the Distribution Unit has been connected to the STD 22 Compass).

3.4.3.1 Checks on the compass

Measuring the compass power supply voltage (on the compass).
This voltage must fall within the tolerance range (18 VDC to 36 VDC).

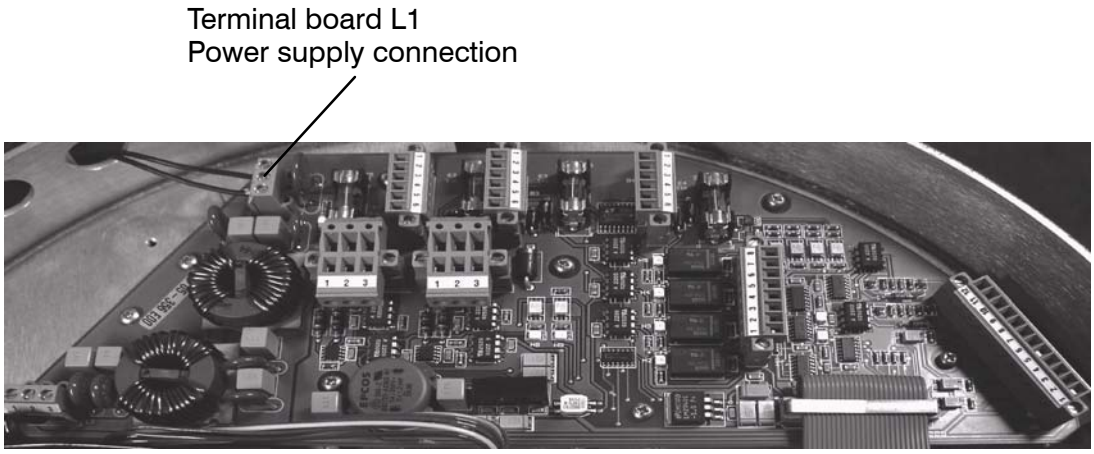


Figure 57: Measuring the compass power supply voltage

Terminal board L1	terminal 1	+24VDC
Terminal board L1	terminal 2	0V

Note: The absolute lower limit for the power supply voltage is 18VDC, the absolute upper limit is 36VDC!
When connecting cables, ensure that these values are adhered to.

Checking the DIP switch settings on the compass (see Figure 58):

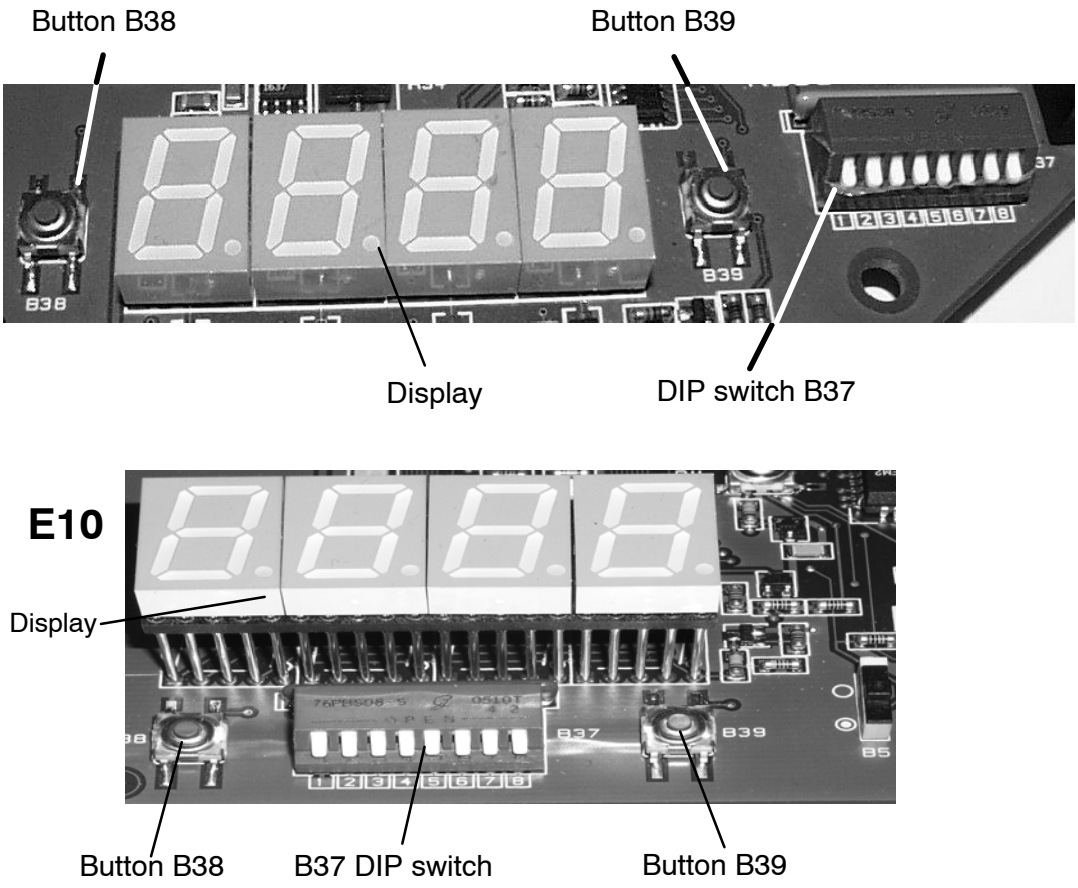
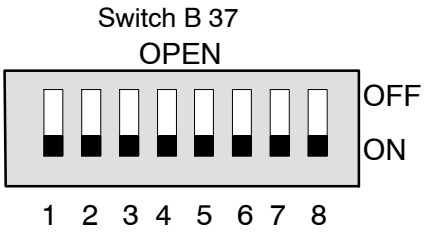


Figure 58: Checks on the compass before putting into operation

All DIP switches in the “ON” position



3.4.3.2 Switching on the compass

The compass goes into the heating stage for the first 30 minutes (this period will vary depending on the temperature of the supporting liquid), during which time the course output of the compass is unavailable and the letter “h” is displayed as the leading sign on the digital display (see Figure 59).

During the settling in stage (for 4 hours after switching on), the course output of the compass may be used; **however, the deviation from the actual course may still be considerable (as well as the connected course receiver)**.
During this period, an additional dot appears in the digital display of the compass (see Figure 60).
(The “Quick Settling” option reduces the settling in stage to approximately 1 hour).

After 4 hours from switching on, the compass course may be used.
4 hours after switching on, the compass has a accuracy of <2 °.

After appr. 5 hours (after switching on), the compass has an accuracy of von 0,1° x $^{1}/_{\cos}$ latitude.

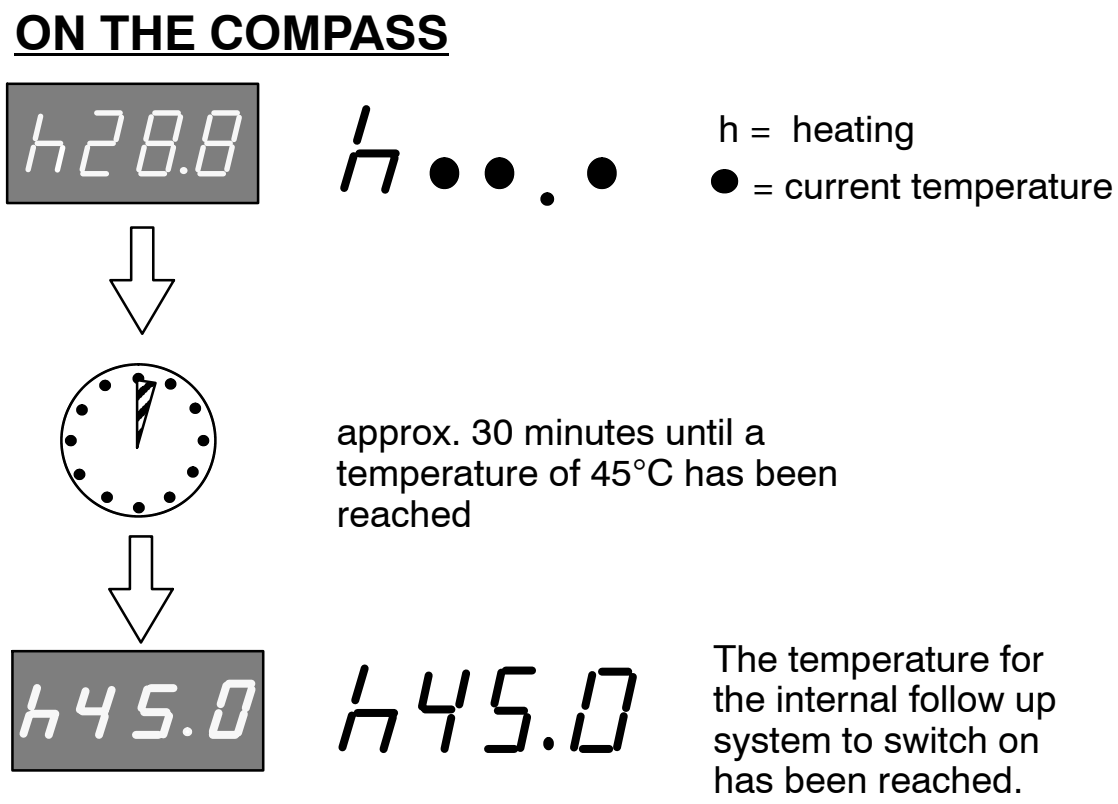


Figure 59: Indications on the compass during the heating stage

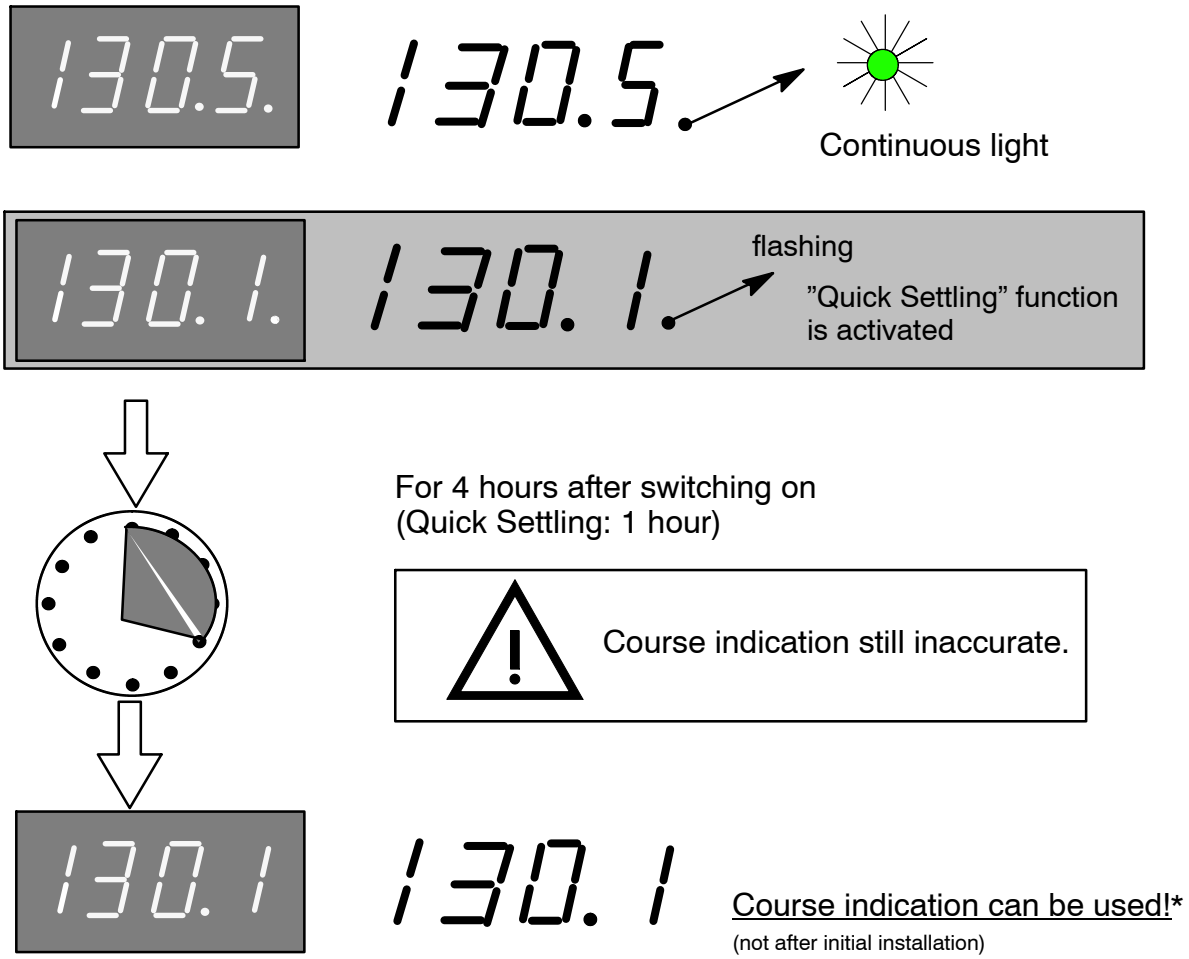


Figure 60: Indications on the compass during the settling in stage

3.4.3.3 Setting the compass zero (reference course)

Once the compass has been installed, it must be aligned according to its installation location. The compass zero is set using DIP switch B 37 and buttons B 38 and B 39.
The compass must have been in operation for at least 5 hours before the compass zero is set.

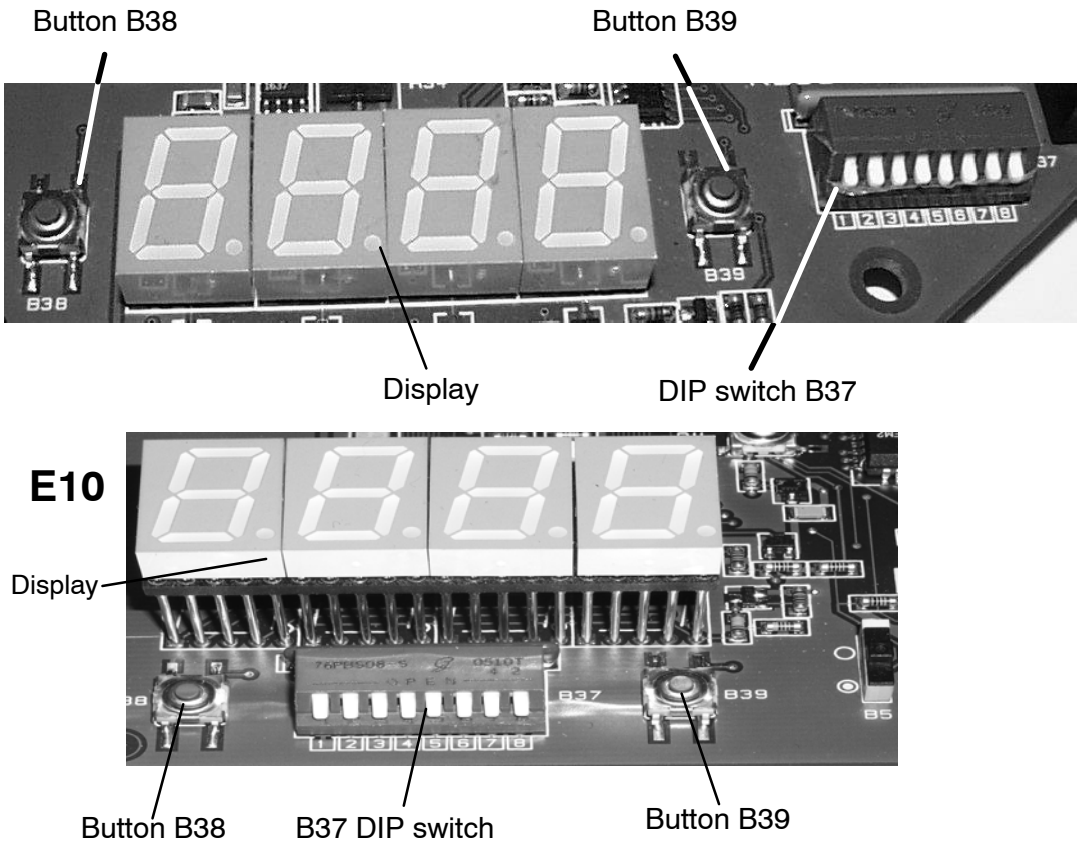


Figure 61: DIP switch B37 and buttons B38/B39

The reference course to be set is determined from the ship's fore-and-aft line (e.g. take a bearing or obtain the pier course from the sea chart).
This reference course is entered according to the following procedure.

- Set DIP switch B37 "1" to the "OFF" position.
  The digital indicator is now indicating "ALEr" = Alignment Error
- Press button B38 or button B39 until the heading you require is displayed (B38 changes the value downwards and B39 changes it upwards).
- If you hold down the button the speed at which it changes will increase.
  Set DIP switch B37 "1" to the "ON" position. This saves the set value in the compass.
- After the reference course has been set, read the alignment error (see next section) (See also Figure 62)

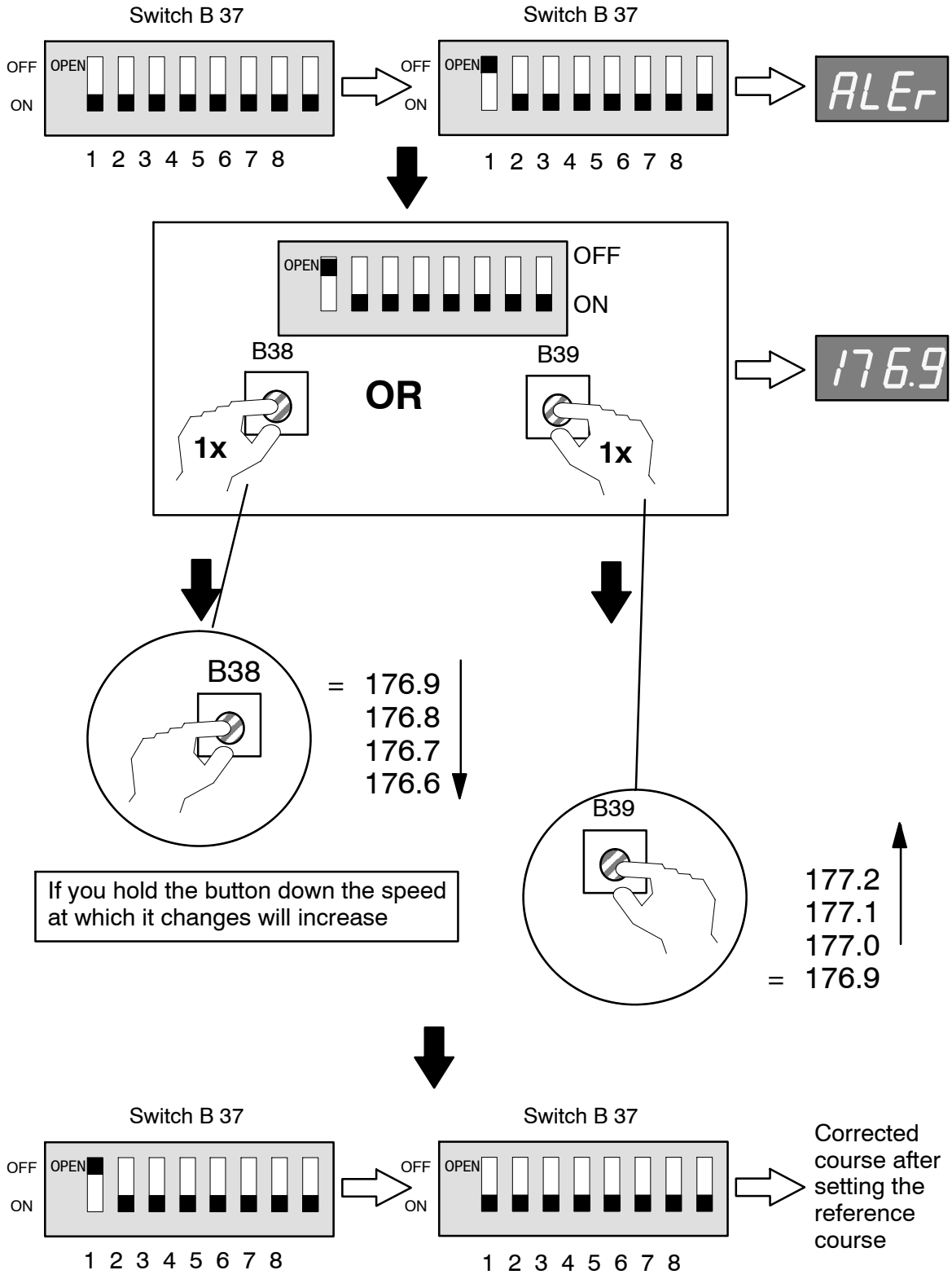


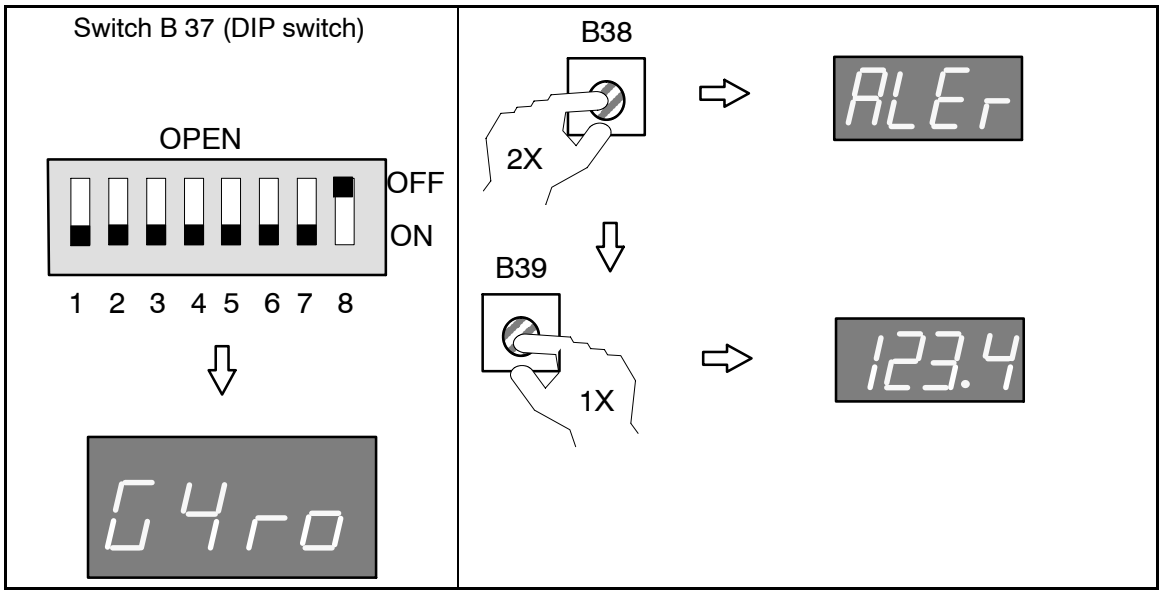
Figure 62: Procedure for setting the compass zero

3.4.3.4 Reading the alignment error

The alignment error must be entered in the table provided for that purpose on the inside of the cover.

Alignment Error	
123.4	

Figure 63: Table at the cover (inner side)



DIP switch “8” in “OFF” position.

NOTE: It is essential to enter this value, because the alignment error will be needed if the sensor electronics are replaced, in order to determine the reference course for the new PCB.

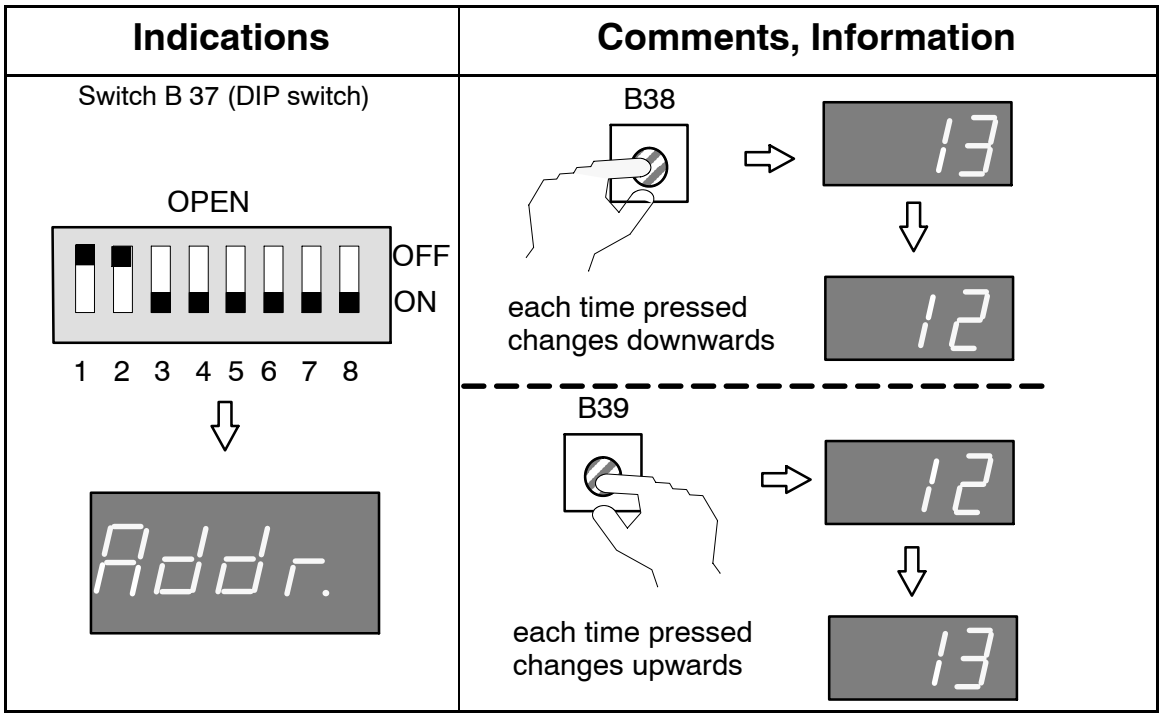
DIP switch “8” in “ON” position.

The STD 22 Compass is ready for use.

Replace the cover of the compass and screw it tight.

3.4.3.5 Setting the CAN bus address

Every CAN bus user must be reachable via an address.
This address may be assigned in the CAN bus system only once.
In the gyro compass, this address is set with the DIP switch.
The CAN bus address for compasses can be set within a range from $10_{(10)}$ to $19_{(10)}$.
The address $00_{(10)}$ may not be used.



Below mentioned table shows the agreement for the CAN bus addresses within a compass system.

Device(s)	CAN-Bus-Address
Operator Units	01 to 09
Sensors (GPS-compass)	10 to 13
Sensors (Gyro Compass)	14 to 19
Distribution Units	20 to 29

3.4.3.6 Adjustment of essential operating modes

Unscrew and remove the cover of the compass enclosure.

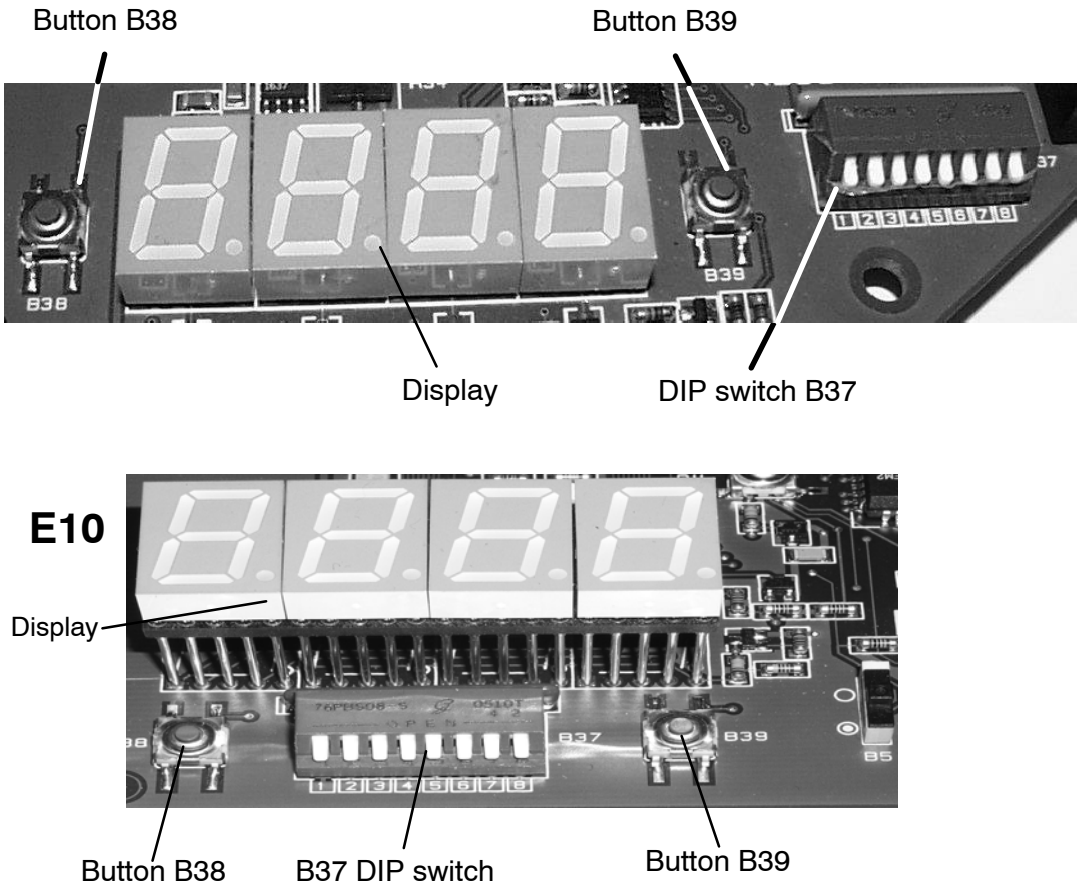
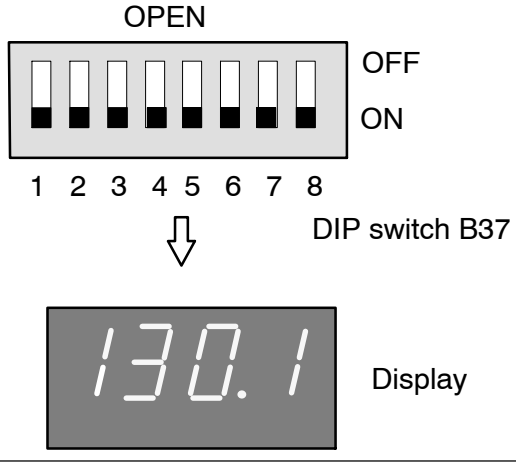


Figure 64: DIP switch B37 and button B38/B39

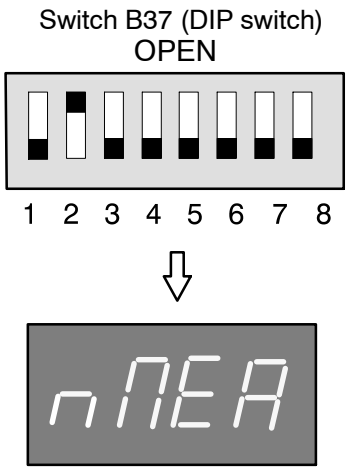
Initial status:

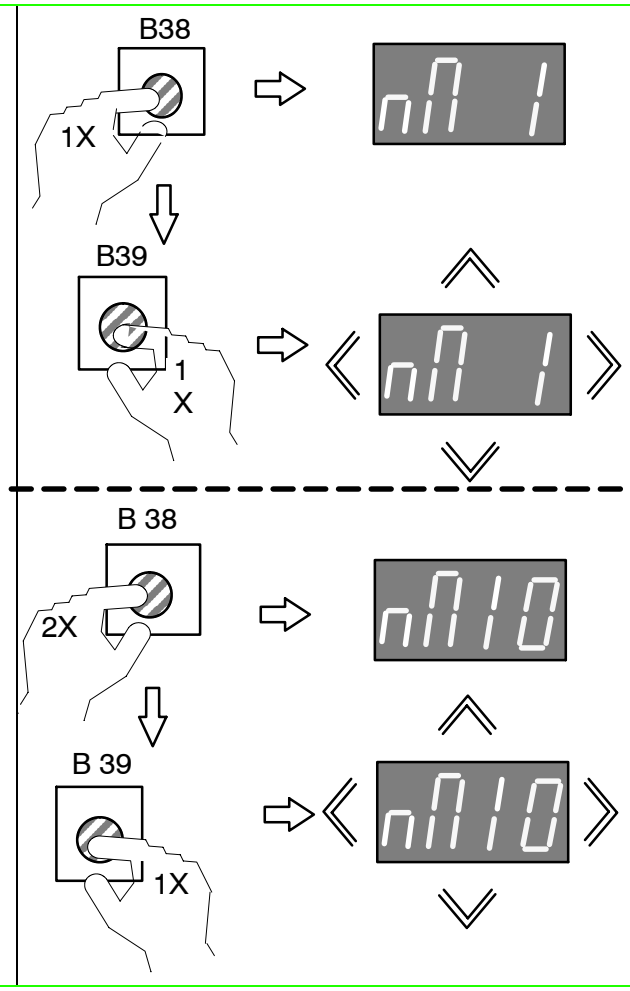


Note: The procedure to adjust essential operating modes is described on the next four pages.

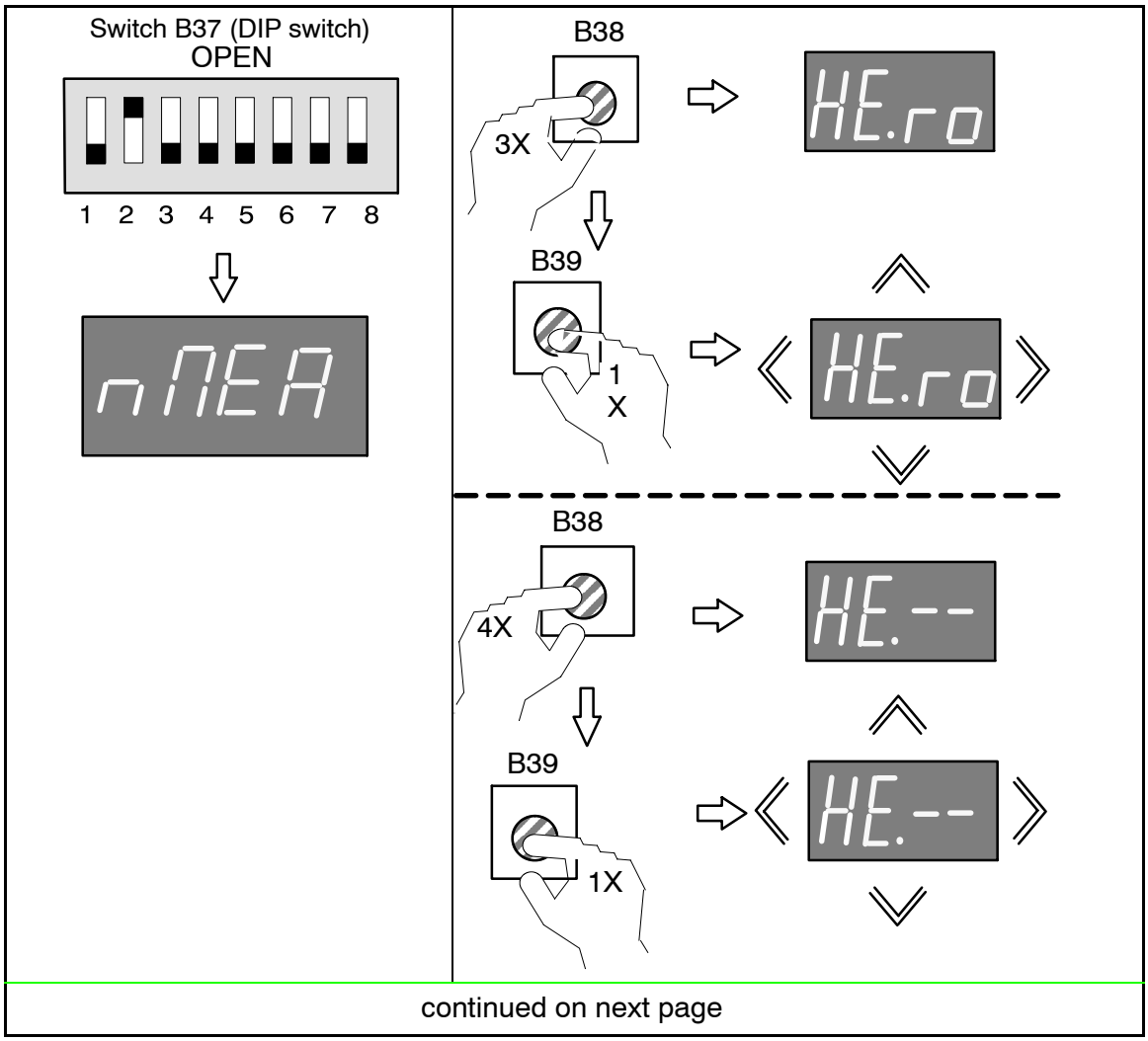
Set the repetition rate of the NMEA heading data output, the output with or without ROT (Rate of Turn), with or without oil residual error for the speed error correction and the setting of a connected Data Distribution Unit (not for STD 22 Compact Gyro Compass).

1 heading data transmission 1 telegram per second
10 heading data transmission 10 telegrams per second
HE.ro heading with ROT.
HE.-- heading only
SECY heading data incorporating Speed Error Correction
SECn heading data without Speed Error Correction
oELY Speed Error Correction with oil residual error **(recommended setting)**
oELn Speed Error Correction without oil residual error
ddUY with connected Data Distribution Unit
ddUn without Data Distribution Unit **(setting for STD 22 Compact Gyro Compass absolute necessary)**
nMSY NMEA output with SEC
nMSn NMEA output without SEC
The indications in the flashing display are selected.

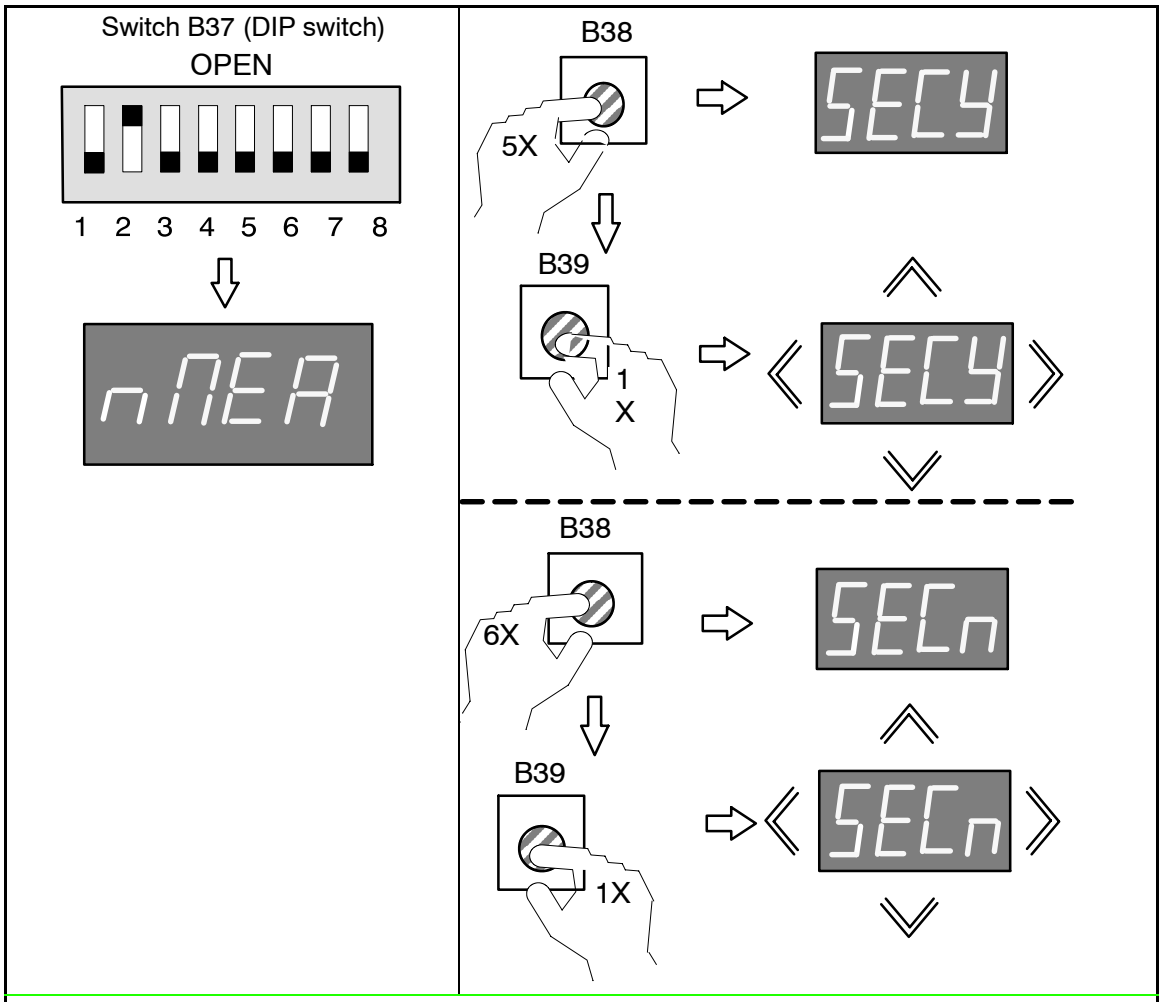




continued on next page

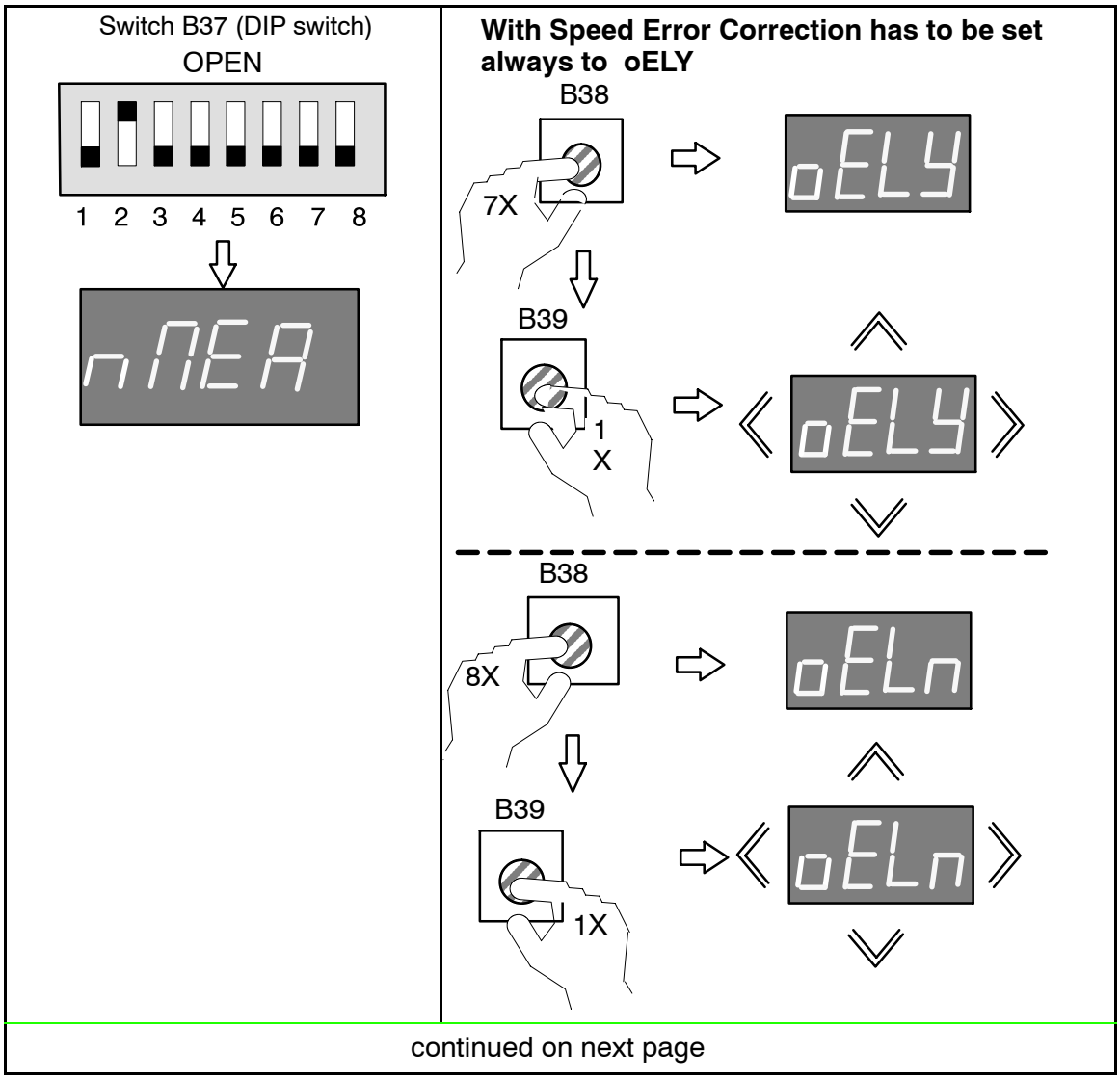


continued on next page

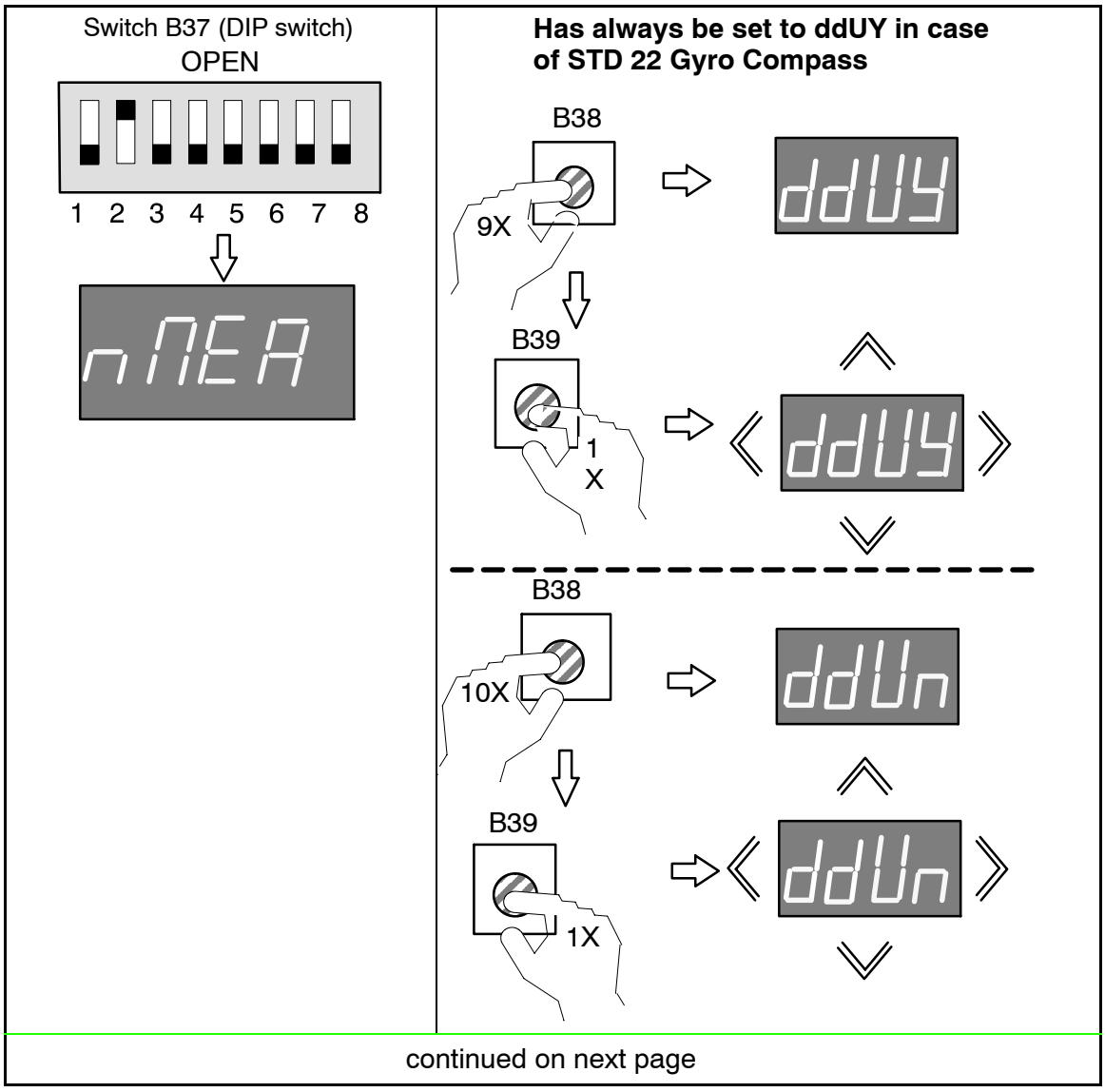


On adjustment **SECY**:
In some system configurations it is necessary to take off heading information from the compass direct – additional to the heading information on the CAN bus. This heading information is uncorrected (without SEC)!
Corrected heading information (with SEC) can be taken off in these system configurations from the distribution unit only.

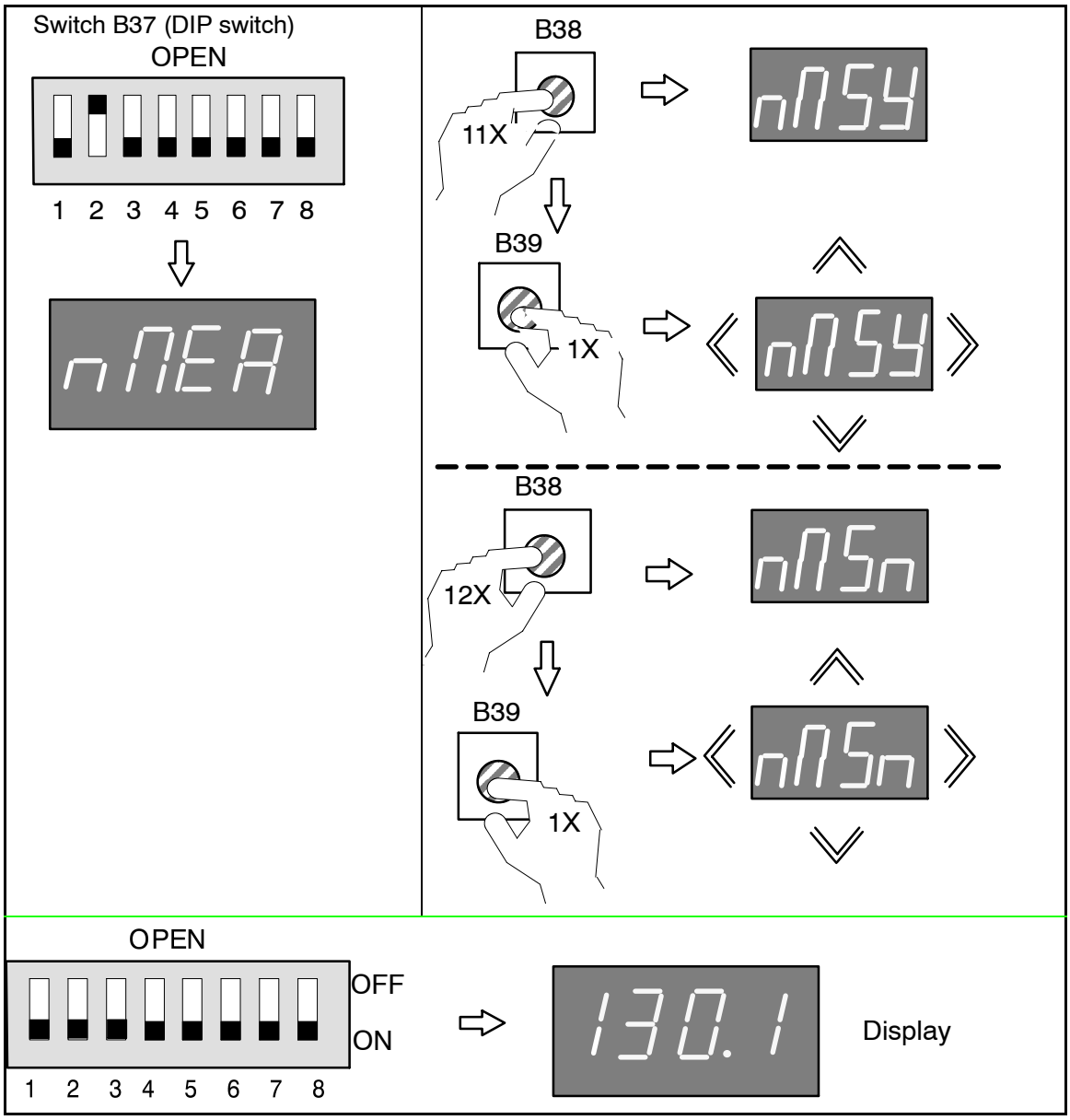
continued on next page



continued on next page



continued on next page


Switch B37 (DIP switch)
OPEN
1 2 3 4 5 6 7 8
nMEA
B38
11X
nMSY
B39
1X
nMSY
B38
12X
nMSn
B39
1X
nMSn
OPEN
OFF
ON
1 2 3 4 5 6 7 8
130.1
Display

3.4.3.7 Function check on externally connected course receivers, Function check of RoT

Unscrew and remove the cover of the compass enclosure.

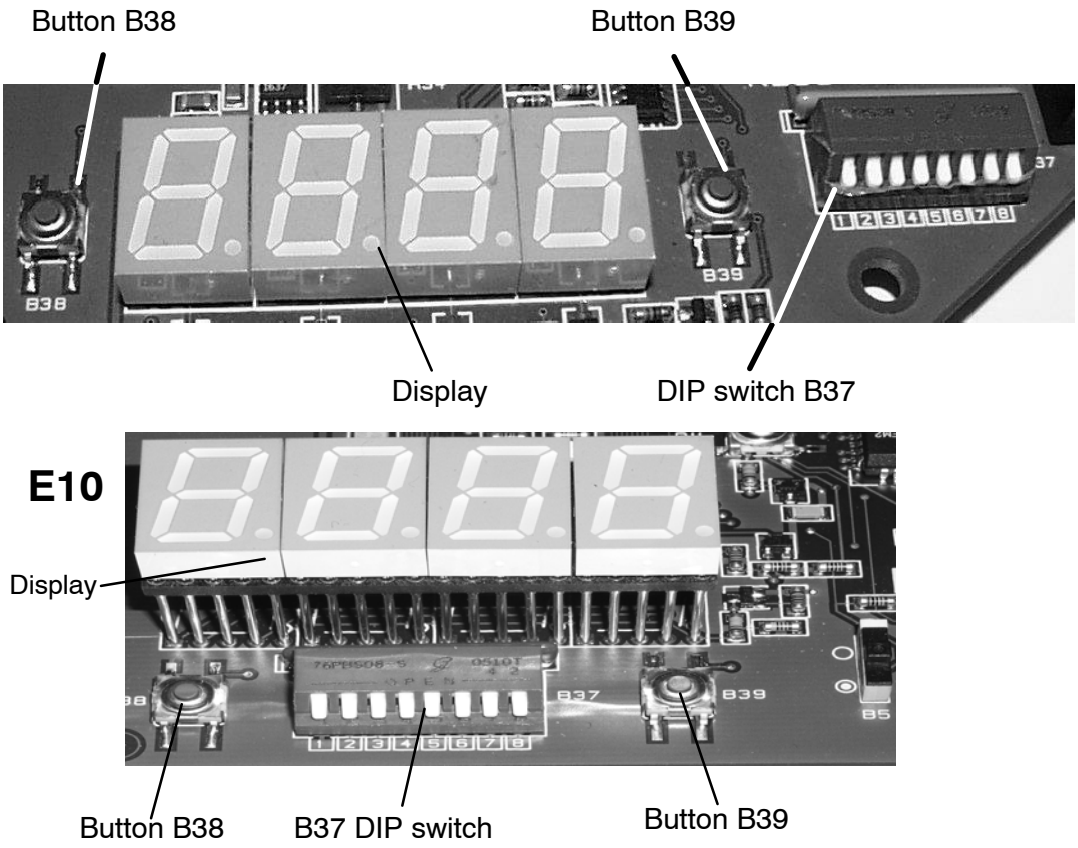
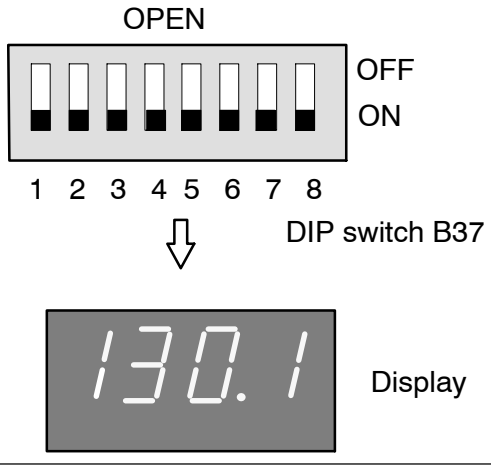


Figure 65: DIP switch B37 and button B38/B39

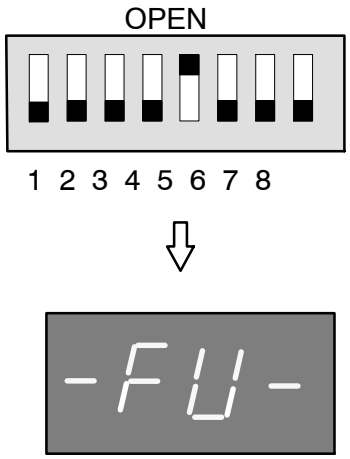
Initial status:

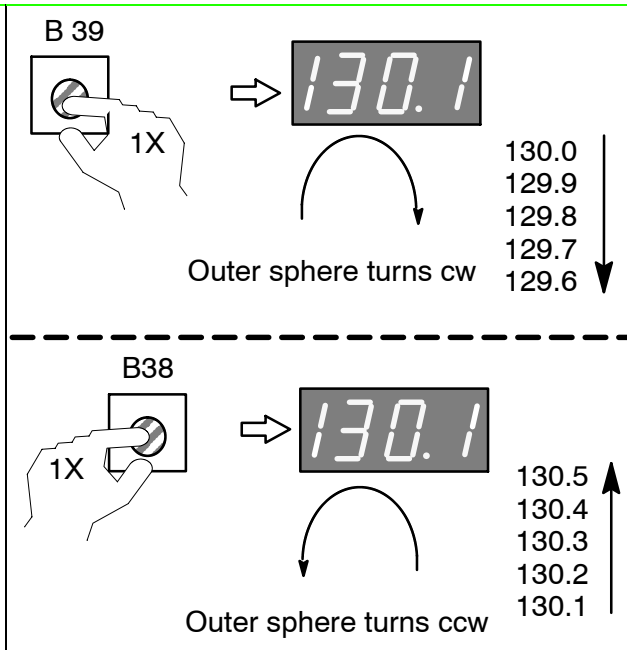


Checking connected course receivers (course data).

With this function the RoT of connected RoT-Indicators* can be tested as well (the rate of turn which is generated by this DIP switch position is 20° per minute.

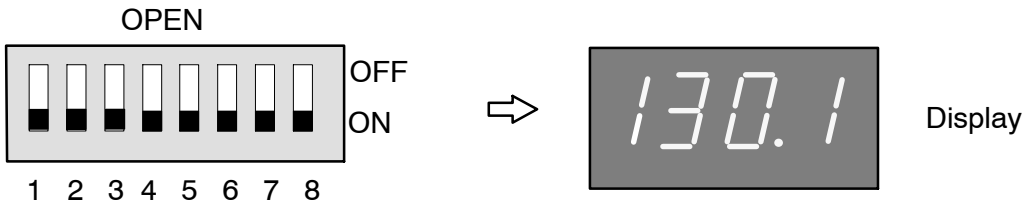
Switch B 37 (DIP switch)





*Remark: Only for RoT-Indicators which are connected to the Distribution Unit.

Note: A clockwise (cw) rotation of the outer sphere refers to a ships turn direction counterclockwise.



intentionally left blank

4 Fuses, jumper, LED‘s, buttons and plugs

The meaning and the location of fuses, jumper LED‘s, buttons and plugs of the 3 PCB‘s: is given in the annex.

PCB	Part no.	Part no. (E10)
Connection PCB	NB05-365	110-233.X13
Power Supply PCB	110-233.102	110-233.X12
Sensor PCB	110-233.X08	110-233.X11
Outer Sphere PCB	110-233.101	110-233.X10

After removal of the cover this information can be helpful to locate a fault.

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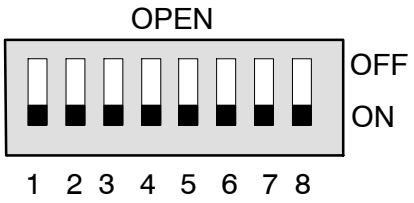
5 DIP SWITCH settings

The facilities described below for entering settings and obtaining status information may only be used by suitably trained staff.
In particular, information and settings which are clearly identified as “service only” are only to be used by appropriately trained personnel.
Following adjustments and settings refer to the STD22 Compact Gyro Compass as well as for the STD 22 Gyro Compass.
Exceptions are marked.

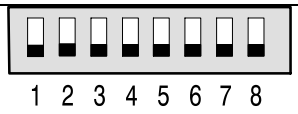
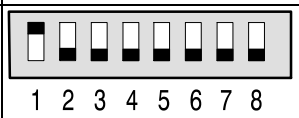
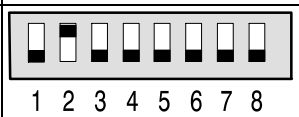
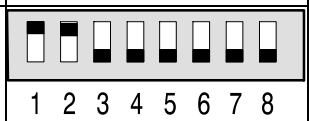
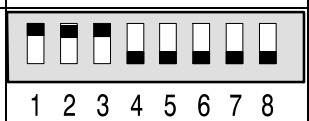
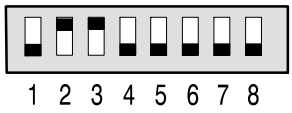
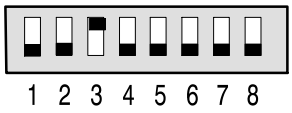
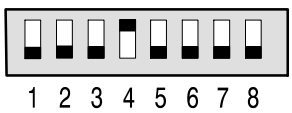
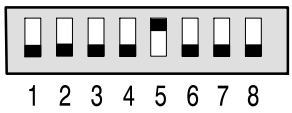
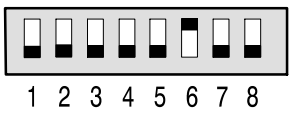
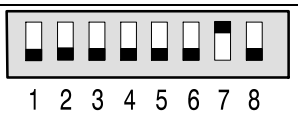
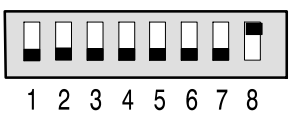
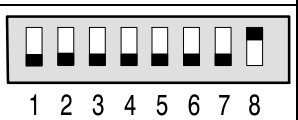
With all DIP switches set to the “ON” position, the current heading is displayed again and all settings that have been made are stored in the compass.

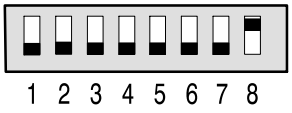
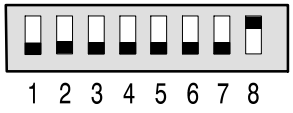
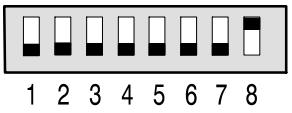
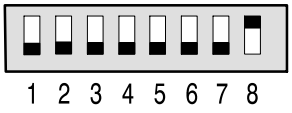
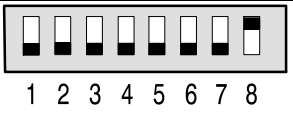
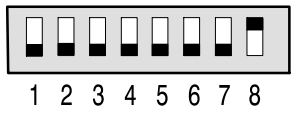
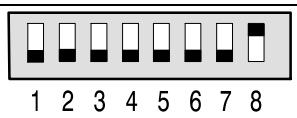
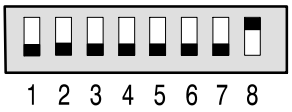
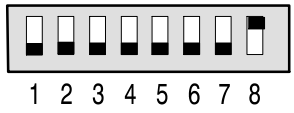
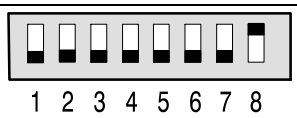
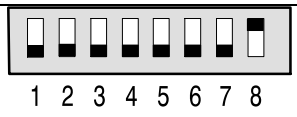
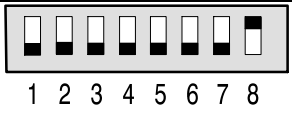
Switch B 37 (DIP switch)

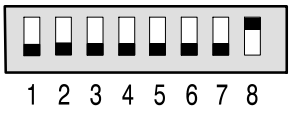
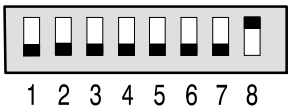
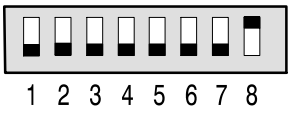
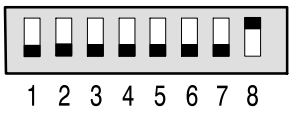
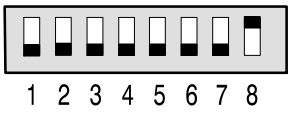
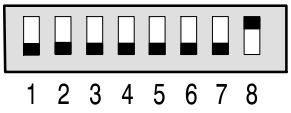
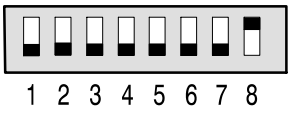
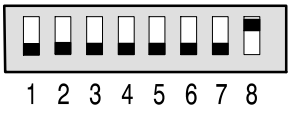
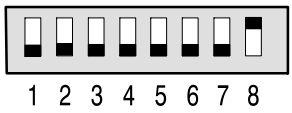
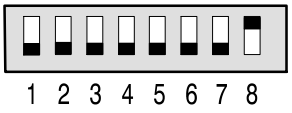
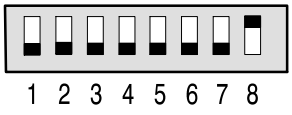
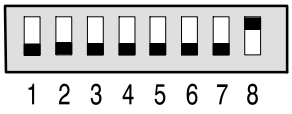


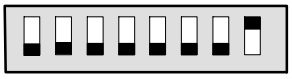
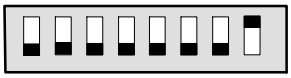
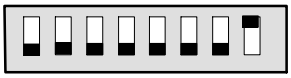
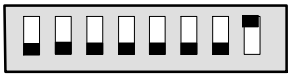
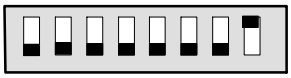
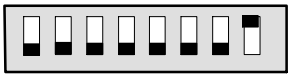
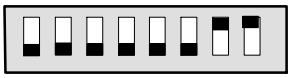
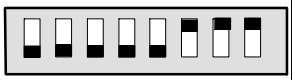
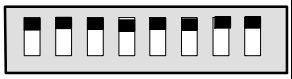
The individual switches are moved up to turn them “OFF” and down to turn them “ON”.

5.1 Overview of functions of all DIP switch settings

Serial no.	DIP switch setting	Function
1		Normal operation
2		Setting compass zero (Alignment error)
3		Set the repetition rate (1s/100ms) of the NMEA heading data output and the output with or without ROT
4		Set the CAN bus address (for gyro compass STD 22 only)
5		Set the interfaces for Channel 1 and Channel 2 (compass outputs)
6		Set the ROT turning direction (Port +; STB –)
7		Bypass the settling phase **(Service only)**
8		Set the speed source for SEC
9		Check connected course receivers (course data) (follow up turning) Function check of RoT
10		Check the fan, the display and the follow-up. DO NOT PERFORM DURING THE HEATING PHASE!!
11		Turn off the follow-up system (**Service only**)
12		Adjustments to read-out of data. see following steps.
12 Step 1		Indicate encoder heading

Serial no.	DIP switch setting	Function
12 Step 2		Indicate alignment error
12 Step 3		Indicate SEC (Speed Error Correction)
12 Step 4		Indicate ship's mains input voltage (24VDC) Nominal value: 18.0....36.0V
12 Step 5		Indicate internal operating voltage of Power Supply PCB (14VDC) Nominal value: 14.0...16.0V
12 Step 6		Indicate encoder supply voltage (15VDC) Nominal Value: 14.5...15.5V
12 Step 7		Indicate inductive DC transmission supply voltage (60VDC) Nominal value: 58.0....62.0V
12 Step 8		Indicate internal operating voltage of Power Supply PCB (19VDC) Nominal value: 18.0...22.0V
12 Step 9		Indicate present current due to inductive transmission Nominal value: 0.05...4.0A typical: 2.0 A
12 Step 10		Indicate operating voltage of heating Nominal value: 27.0...32.0V
12 Step 11		Indicate heating voltage at heating element Nominal value: 0...23.5V
12 Step 12		Indicate temperature of the supporting liquid in °C Nominal value: Operating temperature 49.4...50.1°C
12 Step 13		Indicate supporting liquid 2.0 – 1.6 = level OK 0.1 – 0.0 = level too low

Serial no.	DIP switch setting	Function
12 Step 14		Indicate operating voltage (73VAC) Nominal Value: <65.0...79.0V
12 Step 15		Indicate DC operating voltage for 400Hz (78 - 79.5VDC) Nominal value: 78V Tolerance: <77.0...79.5V
12 Step 16		Indicate gyro supply 54-56V_{EFF} Nominal value: During "start-up" 45...60V During operation 53...58V
12 Step 17		Indicate gyro current 160-250mA_{EFF} Nominal value: During "start-up" 150...400mA During operation 120...350mA
12 Step 18		Indicate operating voltage (13-17VDC) Nominal value: <15.5V
12 Step 19		Indicate internal operating voltage 15VDC (14.5-15.5VDC)
12 Step 20		Indicate internal operating voltage 24VDC (23-35 VDC)
12 Step 21		Indicate pump voltage 24V 50Hz (24V +/- 1V, 50 Hz) Nominal value: 23.5...24.5V
12 Step 22		Indicate pump current (150mA) Nominal value: 140...180mA
12 Step 23		Indicate pick-up voltage (coded) <5mV
12 Step 24		Indicate program number and software version of the program for the microprocessor on the sensor PCB.
12 Step 25		Indicate program number and software version of the program for the microprocessor on the Power Supply PCB.

Serial no.	DIP switch setting	Function
12 Step 26		Indicate program number and software version of the program for microprocessor MC 1 on the outer sphere PCB.
12 Step 27		Indicate program number and software version of the program for microprocessor MC 2 on the outer sphere PCB.
12 Step 28		Operating time (years)
12 Step 29		Operating time (hours)
12 Step 30		Future purpose
12 Step 31		Future purpose
13		Error logbook
SEC 1 to 35		DIP switch settings, Speed Error Correction (SEC) (for development purposes only see section 5.1.5)
14		Delete: - Error logbook complete - Operating hours (years and hours)

5.1.1 Adjustments of parameters (in ascending order of function)

DIP-switch	Step	Display	Function	Push button B38 (left)	Push button B39 (right)
1	0	ALEr	Alignment error setting	decrease	increase
1+2	0	Addr.	Address setting CAN bus	downwards	upwards
1 to 8	0	Fr.Cl	Clearing Logs		
	1	E.L.Ci	Error Log Clear, whole log will be cleared	choose	hold to 0 to clear
	2	Y.h.Cl	Years, hours Clear	choose	hold to 0 to clear
6	0	130.1	Fan, display and follow-up test	------	--------
5	0	-FU-	Follow-up system manual operation, Function check of RoT	turns cw	turns ccw
7	0	FUoF	Follow-up system turn off for service	------	activate
2	0	nNEA	NMEA telegram setting		
	1	nN1	NMEA telegram repetition 1Hz	choose	set
	2	nN10	NMEA telegram repetition 10Hz	choose	set
	3	HE.ro	Heading telegram with ROT	choose	set
	4	HE.--	Heading telegram without ROT	choose	set
	5	SECY	Activate SEC	choose	set
	6	SECn	Deactivate SEC	choose	set
	7	oELY	SEC with oil residual error	choose	set
	8	oELn	SEC withot oil residual error	choose	set
	9	ddUY	System with DU	choose	set
	10	ddUn	System without DU	choose	set
	11	nMSy	NMEA with SEC	choose	set
	12	nMSn	NMEA without SEC	choose	set
1+2+3	0	Chn1	Output channel 1, type of telegram		
	1	HSEr	Select for heading serial	choose	set
	2	nNEA	Select for NMEA	choose	set
	3	Chn2	Output channel 2, type of telegram		
	4	HSEr	Select for heading serial	choose	set
	5	nNEA	Select for NMEA	choose	set
2+3	0	P ro	ROT polarity setting	choose	set
	1	ro	Positive polarity for ROT	choose	set
	2	ro -	Negative polarity for ROT	choose	set
3	0	A180	Settling phase bypass	choose	set

DIP-switch	Step	Display	Function	Push button B38 (left)	Push button B39 (right)
4	0	LOG	Speed log settings		
	1	PLoG	Select for Puls log input	choose	set
	2	PLd-	Select for Puls log input (input interface inverted)	choose	set
	3	PLd	Select for Puls log input (input inteface not inverted)	choose	set
	4	uhu.	Select for NMEA speed input	choose	set
	5	ubu.u	Select for NMEA speed input, speed though the water	choose	set
	6	ubu.G	Select for NMEA speed input, speed over ground	choose	set
	7	GLoG	select for GPS speed input	choose	set

5.1.2 Adjustments of parameters (in ascending order of their appearance)

DIP-switch	Step	Display	Function	Push button B39 (right)	Push button B38 (left)
8	0	GYro	Reading measured data of the gyro		
	1	Enco	Encoder value	choose	display
	2	ALEr	Alignment error	choose	display
	3	SEC	SEC value	choose	display
	4	Pbor	24 V ships mains after input filter 12-32 V	choose	display
	5	Co14	14 V for 60 V inverter	choose	display
	6	P-En	15 V for encoder supply	choose	display
	7	P-60	60 V stabilized / ferrite transformer bridge	choose	display
	8	Co19	19 V from ferrite transformer	choose	display
	9	IndA	Current of ferrite transformer bridge	choose	display
	10	Co31	Voltage for heating circuit	choose	display
	11	C°-U	Voltage on heater element	choose	display
	12	-C°-	Supporting liquid temperature	choose	display
	13	Li-U	Supporting liquid level	choose	display
	14	Co73	73 V from ferrite transformer	choose	display
	15	78-U	78 V stabilited for gyro AC converter	choose	display
	16	GY-U	Gyro supply voltage	choose	display
	17	GY-A	Gyro supply current	choose	display
	18	Co15	15 V from ferrite transformer	choose	display
	19	P-15	15 V stabilized	choose	display
	20	P-24	24 V for pump AC converter	choose	display
	21	U-Pu	24 V AC pump voltage	choose	display
	22	A-Pu	Pump current	choose	display
	23	Ab9r	Follow up voltager W1/W2	choose	display
	24	Pr-S	Software sensor pcb	choose	display
	25	Pr-P	Software Power Supply PCB	choose	display
	26	Pr61	Software MC1 outer sphere pcb	choose	display
	27	Pr62	Software MC2 outer sphere pcb	choose	display
	28	runY	Operating years	choose	display
	29	runh	Operating hours	choose	display
	30	0007	future purpose		
	31	0008	future purpose		
7+8	0	E.L.01	Errors according to error logbook	choose	number of errors
	1	E.L.02-24	Errors according to error logbook	choose	number of errors
		Clear selected error logbook		Hold 10s to clear	

DIP-switch	Step	Display	Function	Push button B38 (left)	Push button B39 (right)
6+7+8	0	UnCo	Uncorrected heading	choose	display
	1	FF	Correction value SEC	choose	display
	2	SPD	Speed input value	choose	display
	3	Br10	Latitude input	choose	display
	4	Corr	Corrected heading	choose	display
	5	_roh	Rough heading	choose	display
	6	o_FF	Correction value SEC with acc error	choose	display
	7	_FF	Correction value SEC without acc error	choose	display
	8	_oF	Acceleration error	choose	display
	9	SCi	Telegram traffic on serial interface	choose	display
	10	SrCS	Speed information source	choose	display
	11	PULS	Value from puls log	choose	display
	12	vtG.S	Value from GPS speed	choose	display
	13	vtG.h	Heading from GPS	choose	display
	14	uhu	Speed from NMEA telegram	choose	display
	15	SPd.L	Speed data transfer	choose	display
	16	PoS	Latitude in degrees	choose	display
	17	ASPd	Speed alarms	choose	display
	18	PoSn	Latitude data transfer	choose	display
	19	APoS	Latitude alarm	choose	display
	20	nAUC	Number of telegrams with checksum	choose	display
	21	nAn1	1st table of NMEA requests	choose	display
	22	nAn2	2nd table of NMEA requests	choose	display
	23	nSGG	Strings of GGA telegram	choose	display
	24	nSGL	Strings of GLL telegram	choose	display
	25	nSLL	Strings of SLL telegram	choose	display
	26	nShu	String of VHW telegram	choose	display
	27	nStG	String of VTG telegram	choose	display
	28	nSbu	String of VBW telegram	choose	display
	29	Fb10	Software component SEC: Latitude	choose	display
	30	FS10	Software component SEC: Speed	choose	display
	31	FnSP	Software component SEC: Ships speed vector	choose	display
	32	FuTG	Software component SEC: Speed over ground	choose	display
	33	tiNE	Time since activating SEC	choose	display
	34	SCI	Display serial communication interface	choose	display

5.1.3 7 segment displays and their meaning


= A


= B


= C


= D


= E


= F


= G


= H


= I


= J


= K


= L


= M


= N


= O


= P


= Q


= R


= comma


= point


= S


= T


= U


= V


= W


= X


= Y


= Z


= 1


= 2


= 3


= 4


= 5


= 6


= 7


= 8


= 9

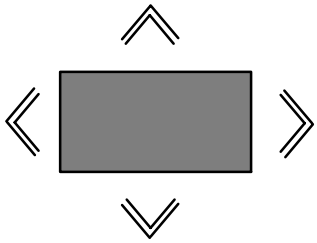

= 0

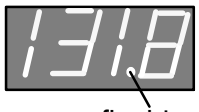
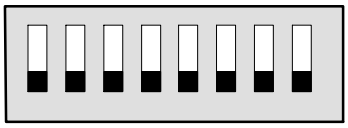
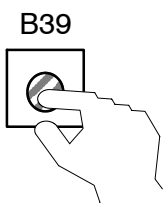
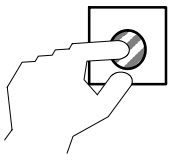

= *


= LF (Line Feed)

5.1.4 Functional description of DIP switch settings (for general use)

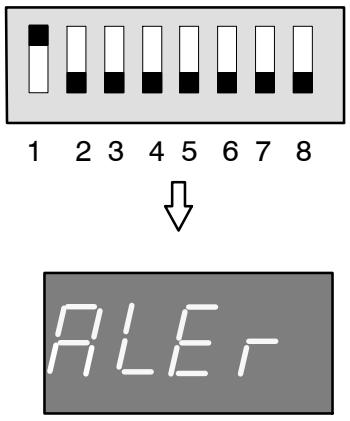
Note: In the following tables, a flashing display on the compass is represented like this.

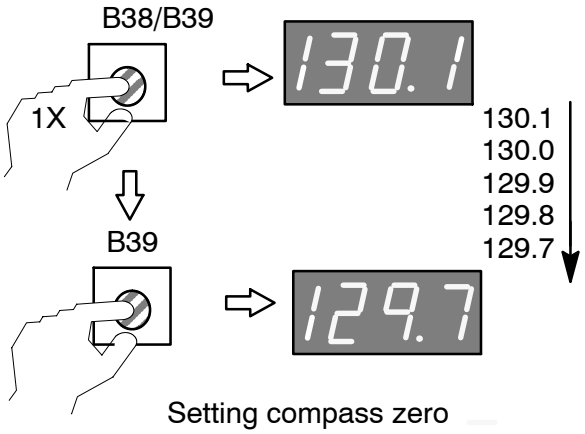


Serial No.	Indications	Comments, Information
1	Normal operation If the decimal point flashes during normal operation, a warning can be displayed by means of the following procedure.	
	 flashing Switch B 37 (DIP switch) OPEN  1 2 3 4 5 6 7 8	B39   Indicate warning 4 to 8 (if a warning appears, refer to operator manual) B38   Indicate warning 1 to 4 (if a warning appears, refer to operator manual)

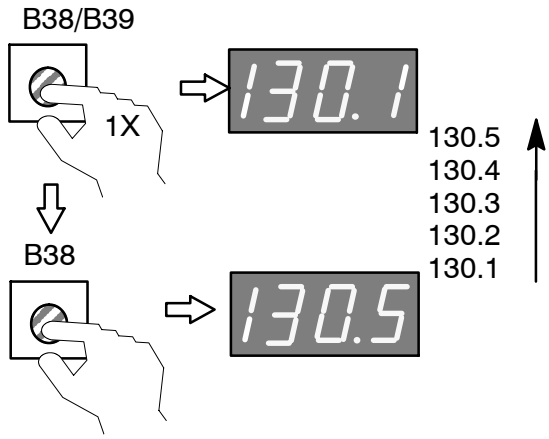
Serial No.	Indications	Comments, Information
2	Setting compass zero The compass zero must be set following installation. Use the pier course from the sea chart as reference.	

Switch B 37 (DIP switch)



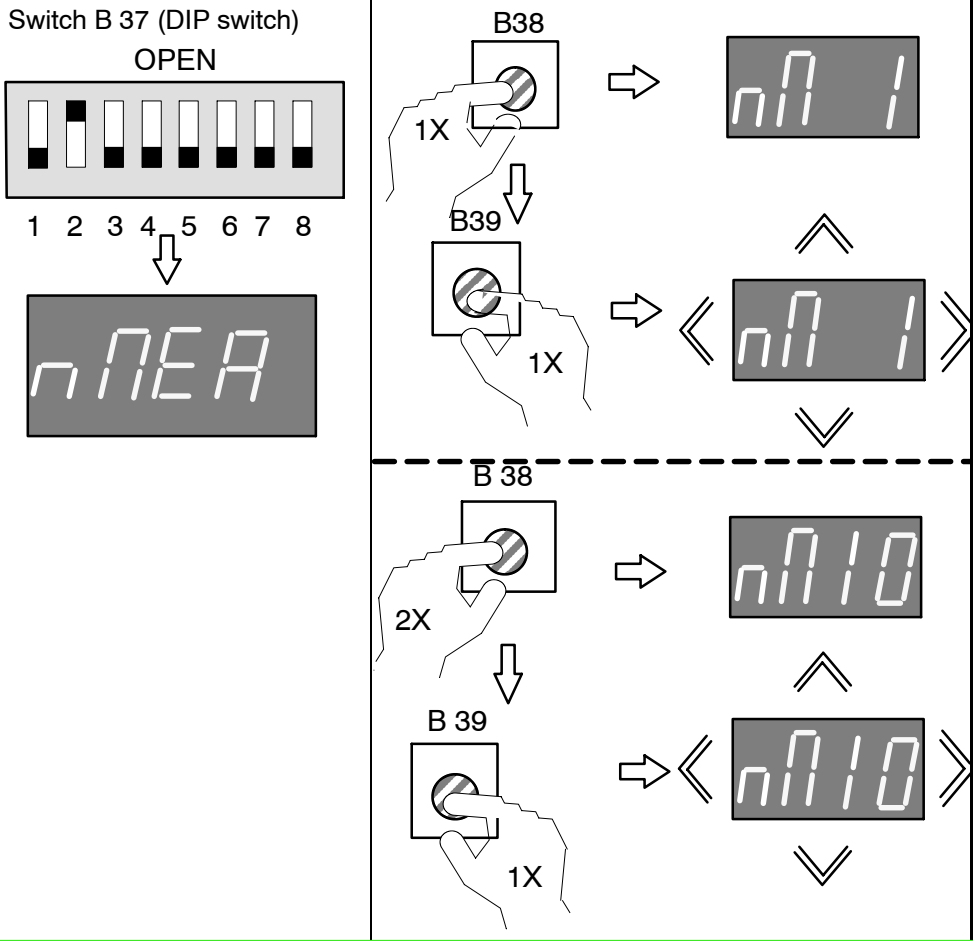


Setting compass zero

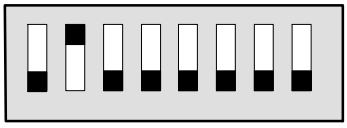
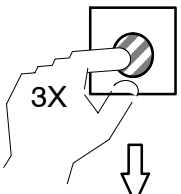
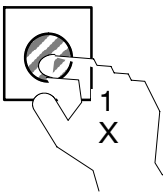
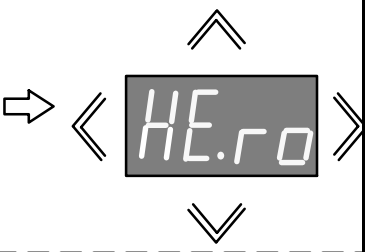
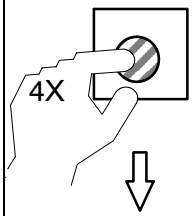
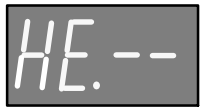
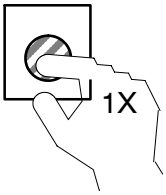
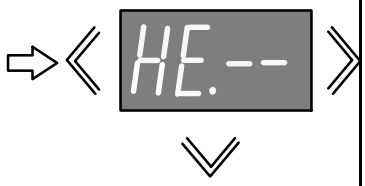


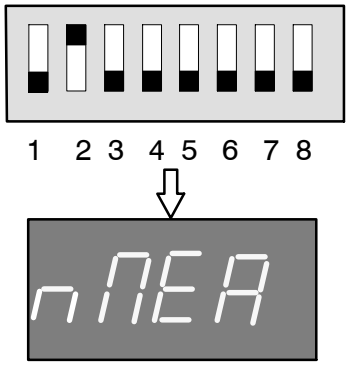
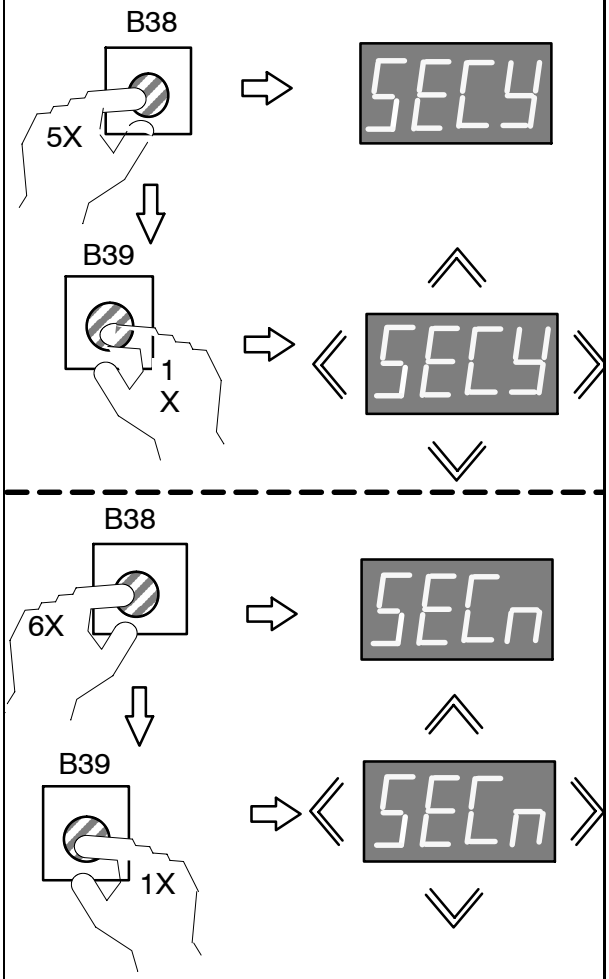
Setting compass zero

Serial No.	Indications	Comments, Information
3	Set the repetition rate of the NMEA heading data output, the output with or without ROT (Rate of Turn), with or without oil residual error for the speed error correction and the setting of a connected Data Distribution Unit (not for STD 22 Compact Gyro Compass). 1 heading data transmission 1 telegram per second 10 heading data transmission 10 telegrams per second HE.ro heading with ROT. HE.-- heading only SECY heading data incorporating Speed Error Correction SECn heading data without Speed Error Correction oELY Speed Error Correction with oil residual error (recommended setting) oELn Speed Error Correction without oil residual error ddUY with connected Data Distribution Unit ddUn without Data Distribution Unit (setting for STD 22 Compact Gyro Compass absolute necessary) nMSy NMEA with SEC nMSn NMEA without SEC The indications in the flashing display are selected.	

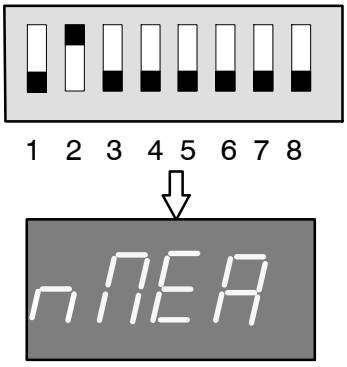
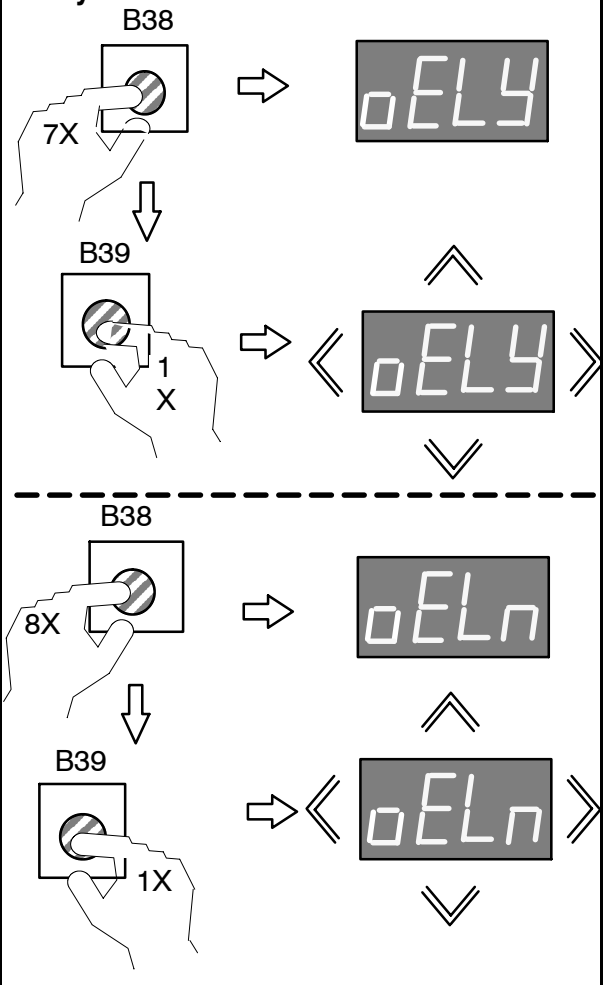


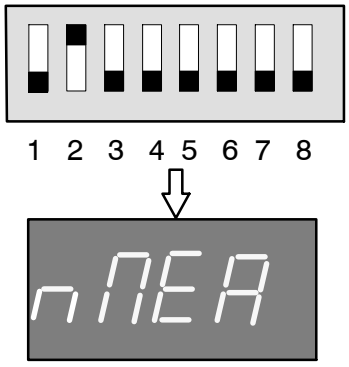
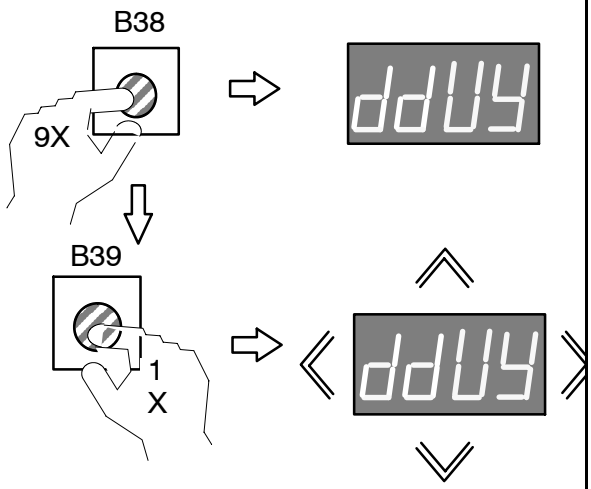
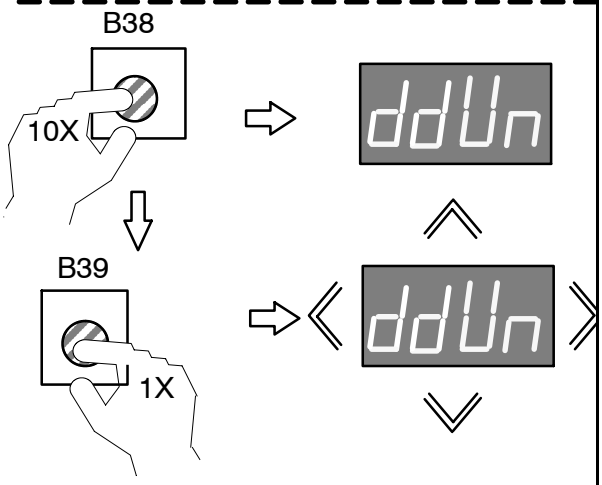
continued on next page

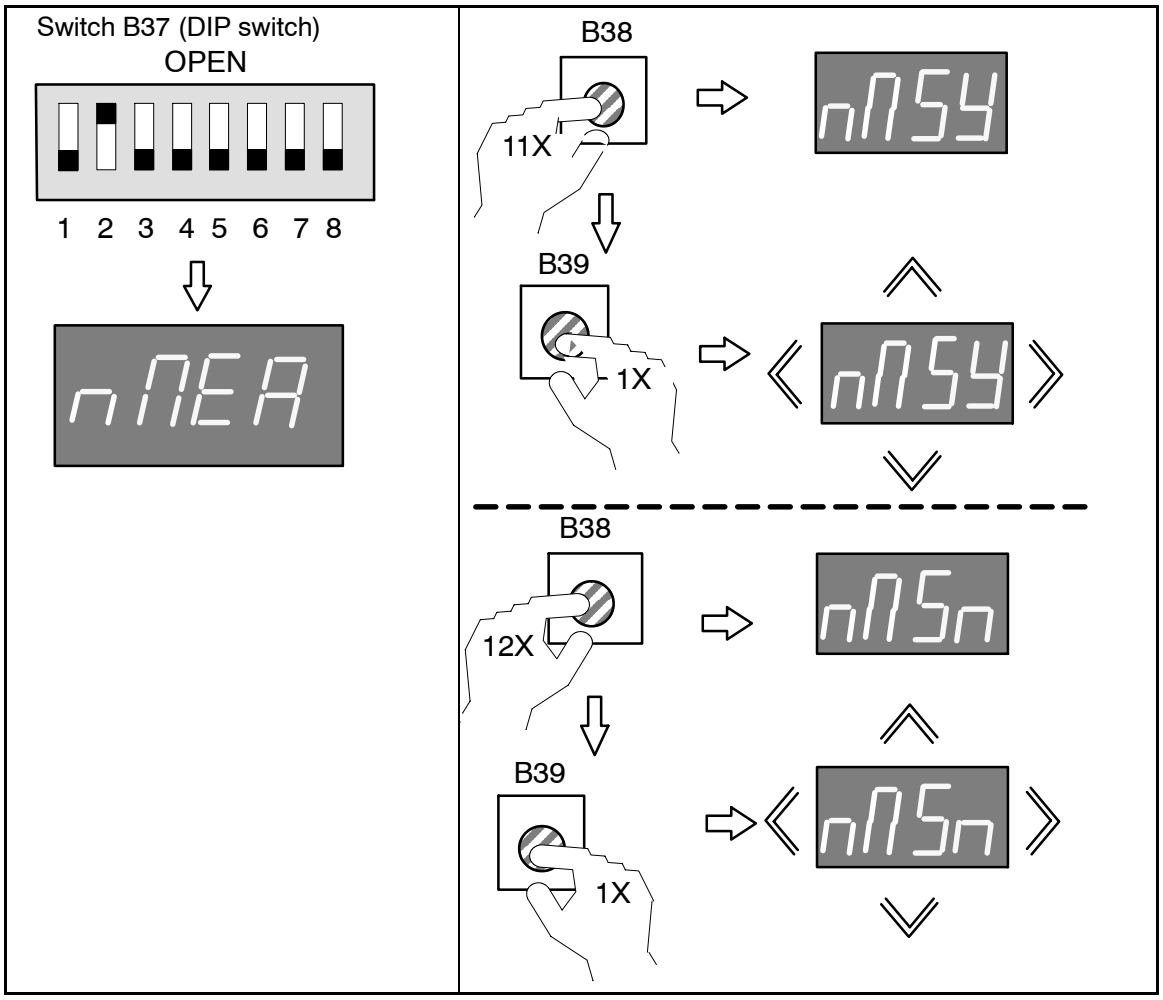
Serial No.	Indications	Comments, Information
3 cont.	Switch B 37 (DIP switch) OPEN  1 2 3 4 5 6 7 8  	B38   B39   B38    B39  
	continued on next page	

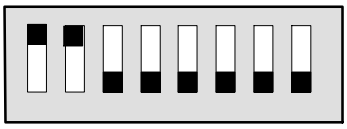
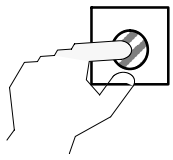
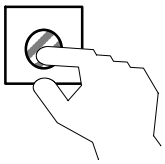
Serial No.	Indications	Comments, Information
3 cont.	Switch B 37 (DIP switch) OPEN  	
	On adjustment **SECY**: In some system configurations it is necessary to take off heading information from the compass direct – additional to the heading information on the CAN bus. This heading information is uncorrected (without SEC)! Corrected heading information (with SEC) can be taken off in these system configurations from the distribution unit only.	

continued on next page

Serial No.	Indications	Comments, Information
3 cont.	Switch B 37 (DIP switch) OPEN  	**With Speed Error Correction has to be set always to oELY**  continued on next page

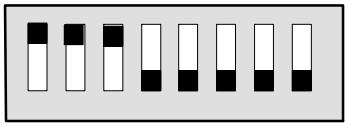
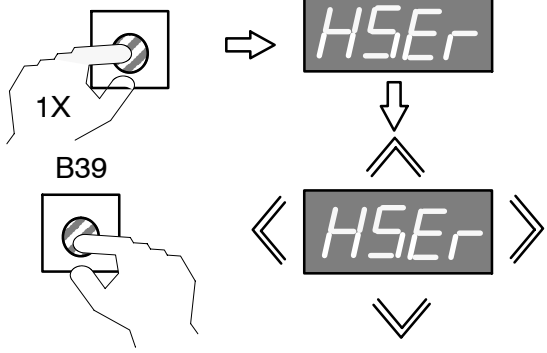
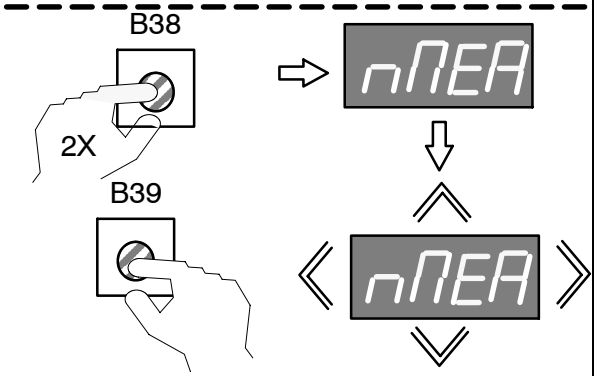
Serial No.	Indications	Comments, Information
3 cont.	Switch B 37 (DIP switch) OPEN  	**Has always be set to ddUY in case of STD 22 Gyro Compass**   **Has always be set to ddUn in case of STD 22 Compact Gyro Compass** continued on next page

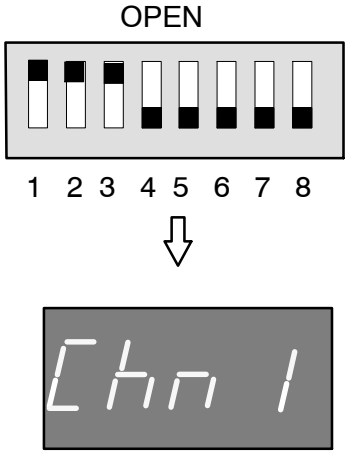
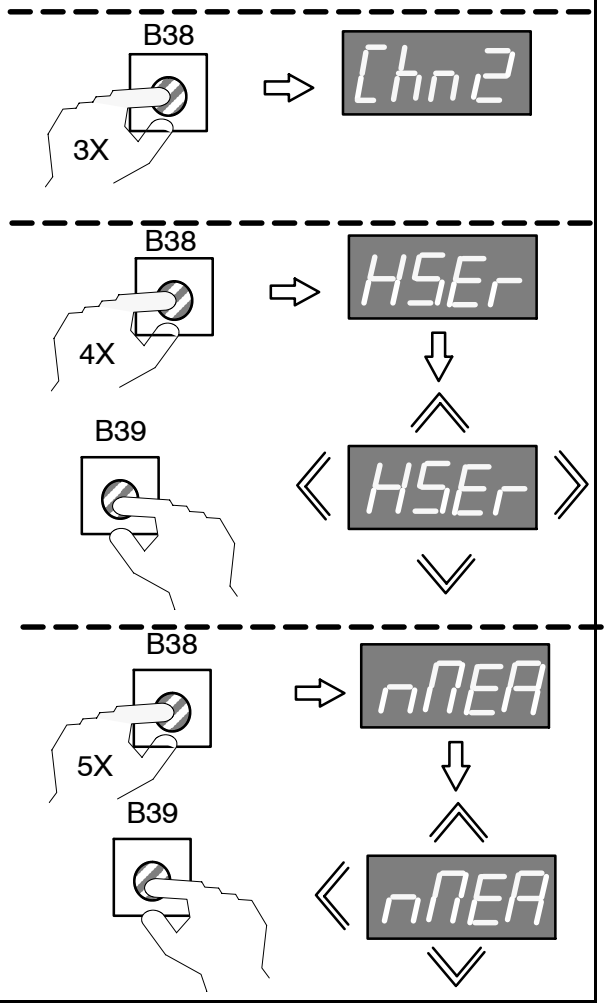

Switch B37 (DIP switch)
OPEN
1 2 3 4 5 6 7 8
nMEA
B38
11X
nMSY
B39
1X
nMSY
B38
12X
nMSn
B39
1X
nMSn

Serial No.	Indications	Comments, Information
4	Set the CAN bus address of the compass **For STD 22 Gyro Compass only** (only with Distribution Unit, Operation Unit and for further CAN bus users) Every CAN bus user has an address. This address may be assigned within the system only once. The CAN bus address for compasses (in general) can be set within a range from 10 to 19 (se table below). The address 00 may not be used.	
	Switch B 37 (DIP switch) OPEN  1 2 3 4 5 6 7 8   	B38    each time pressed changes downwards  B39    each time pressed changes upwards  	

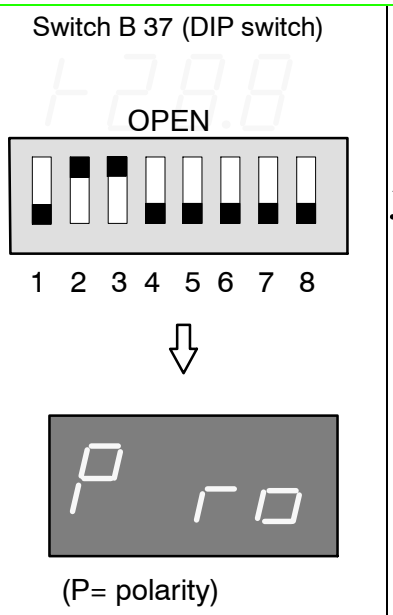
Example

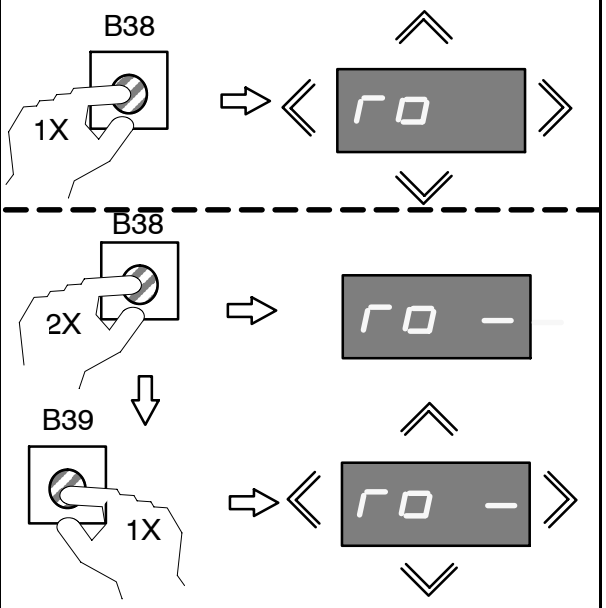
	Devices	CAN bus address
1	Operator Units	01 to 09
2	Sensors (GPS compass)	10 to 13
	Sensors (Gyro compass)	14 to 19
3	Distribution Units	20 to 29

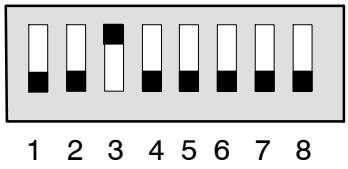
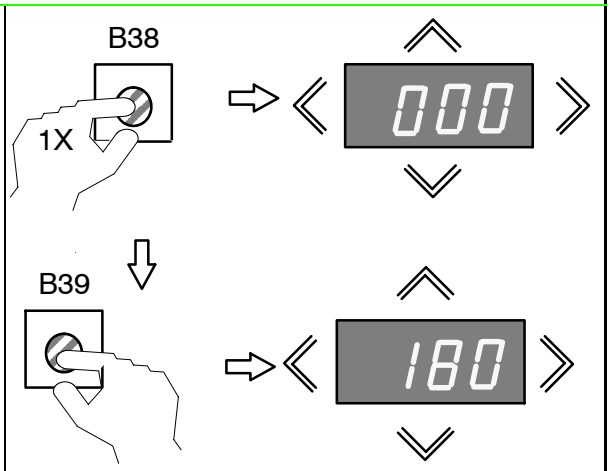
Serial No.	Indications	Comments, Information
5	Set the interfaces for Channel 1 and Channel 2. **For STD 22 Compact Compass only** HSEr = Heading serial (Course bus) nMEA = NMEA 0183 The “flashing” setting is accepted.	
	Switch B 37 (DIP switch) OPEN  1 2 3 4 5 6 7 8  	B38   continued on next page

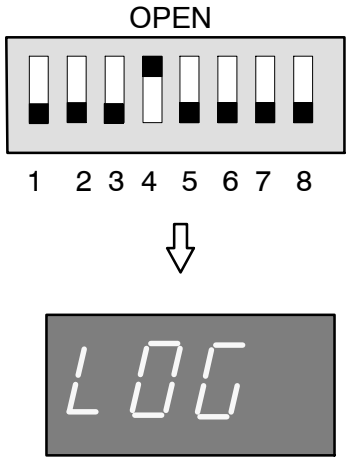
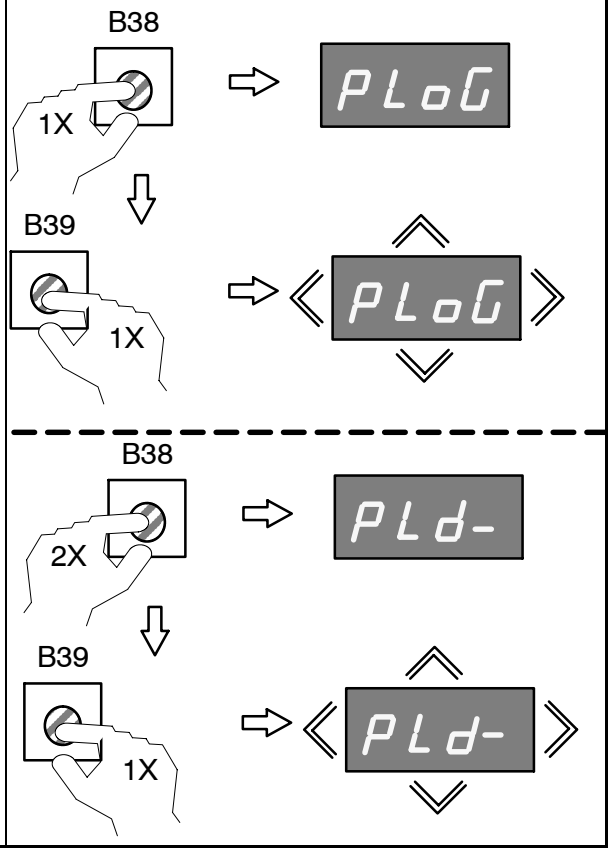
Serial No.	Indications	Comments, Information
cont. No. 5	Switch B 37 (DIP switch) 	

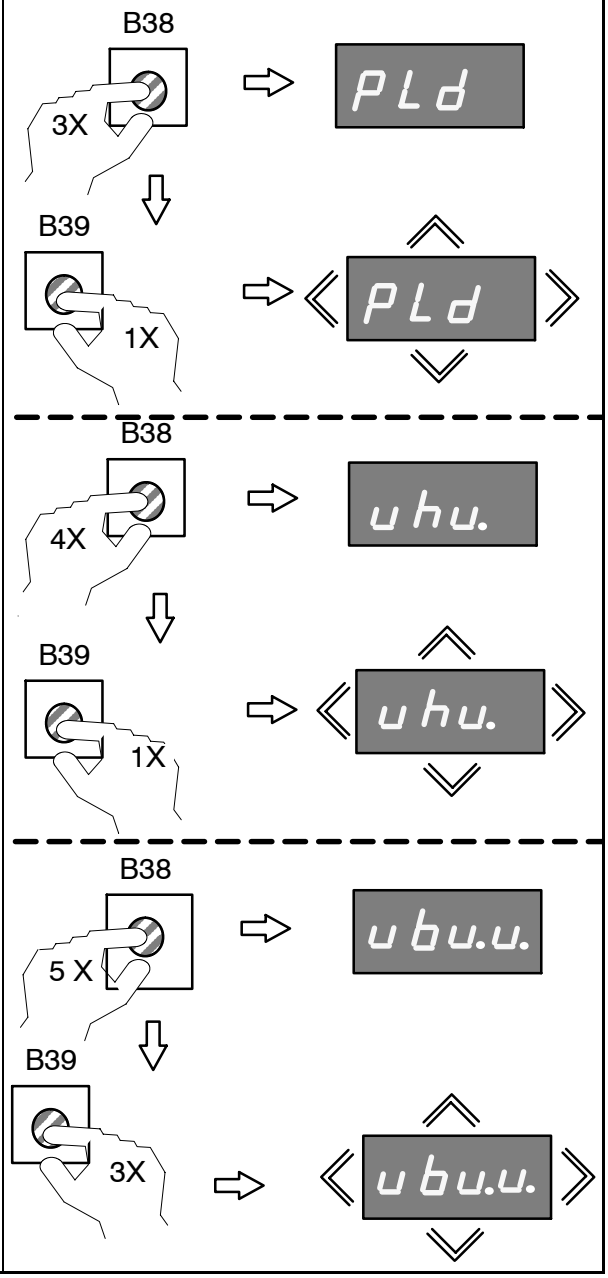
Serial No.	Indications	Comments, Information
6	Set the polarity of ROT turning direction This information is supplied together with the course data to connected course receivers. Press button B38 to toggle between the two possible polarities. Press button B39 to select the polarity of the rate of turn. The indications in the flashing display are selected. A positive rate of turn is indicated by the absence of a minus sign.	

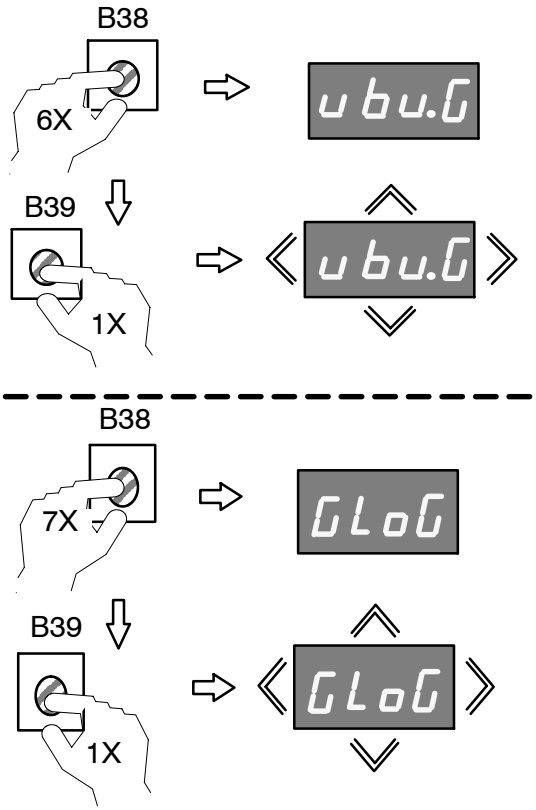


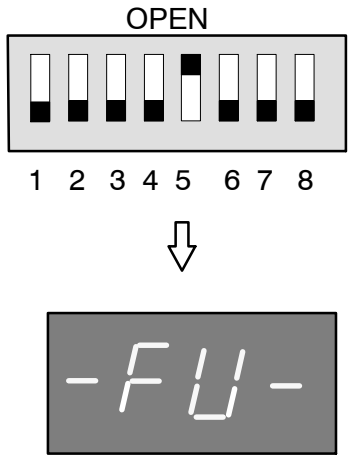
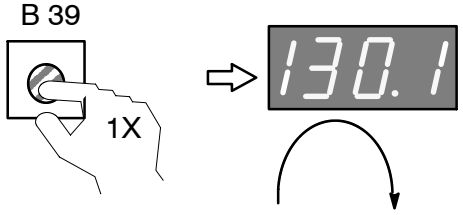
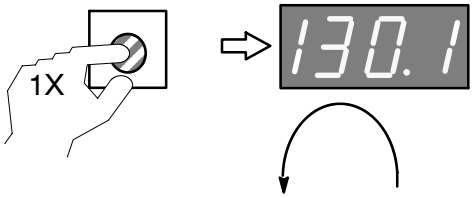
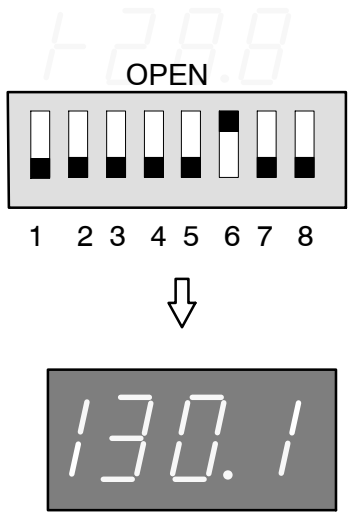
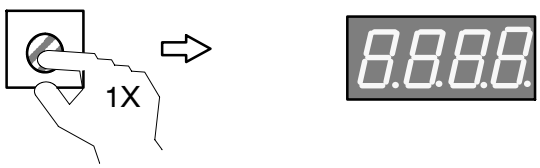


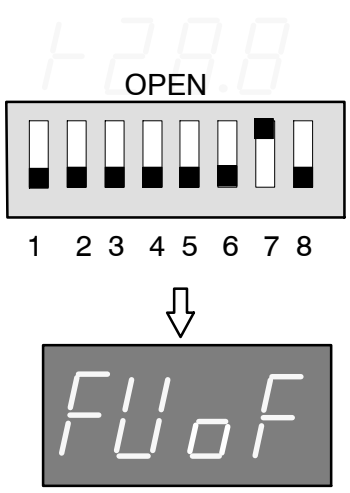
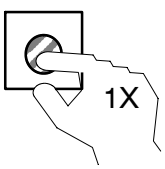
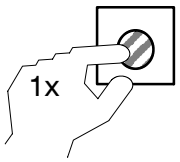
Serial No.	Indications	Comments, Information
7	Bridging over settling time **CAUTION! When the settling in stage is by-passed, the display and all connected course receivers indicate that the course data is usable, even though there may be significant deviations.** **FOR SERVICE PURPOSES ONLY**	
	Switch B 37 (DIP switch) OPEN  Example:  	 After the DIP switch is set into zero position the settling stage is by-passed

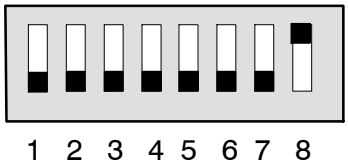
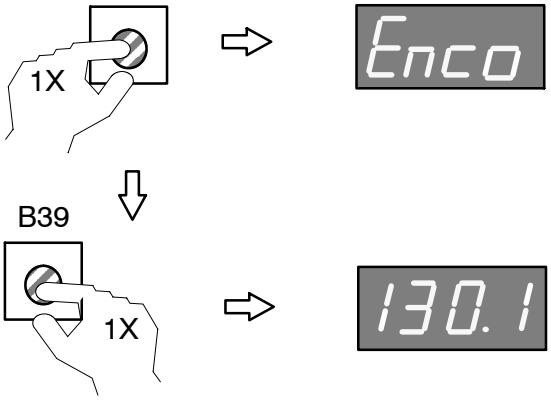
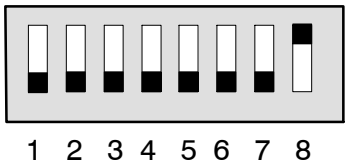
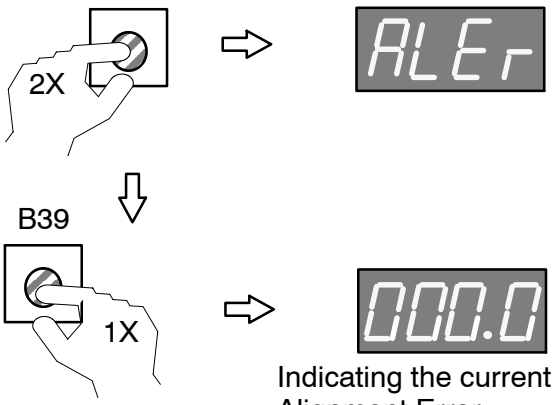
Serial No.	Indications	Comments, Information
8	Set the speed source for SEC **(STD22 Compact only)** This setting is used to select the source of the speed information for automatic Speed Error Correction. PLoG = Pulse Log PLd- = Puls Log (polarity of the input interface inverted) PLd = Puls Log (polarity of the input interface not inverted) uhu. = NMEA Log (means water speed in general) ubu.u = means NMEA Log specified with speed through the water ubu.G = means NMEA Log specified with speed over ground GLoG = GPS-receiver speed The indications in the flashing display are selected. If the setting does not correspond to the connected device, the course correction relay responds and gives an appropriate warning only to devices which are connected to this alarm output.	
	Switch B 37 (DIP switch) 	

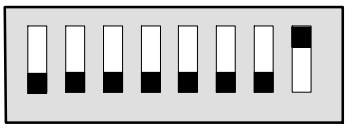
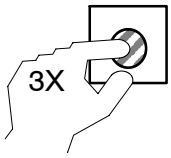
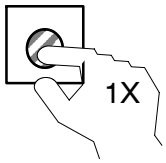
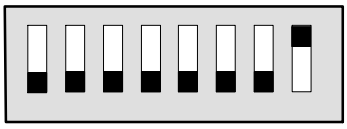
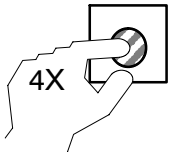
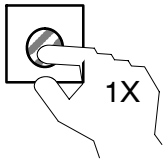
Serial No.	Indications	Comments, Information
cont. No. 8		

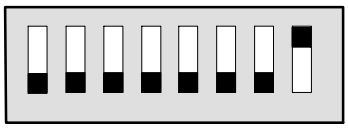
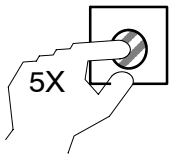
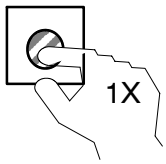
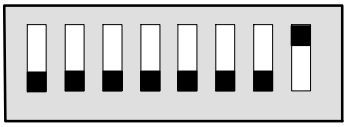
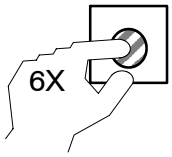
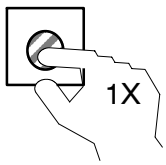
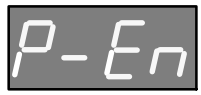
Serial No.	Indications	Comments, Information
cont. No. 8		

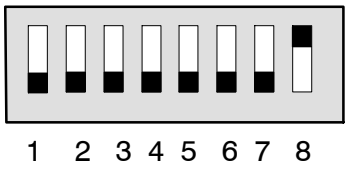
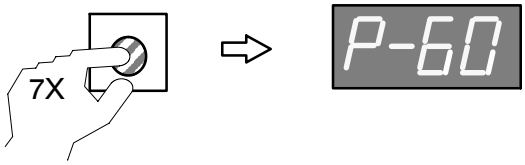
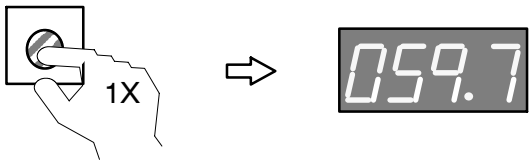
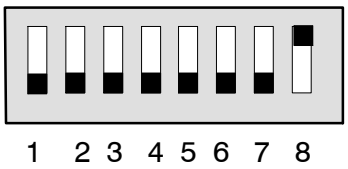
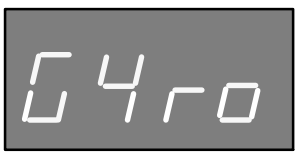
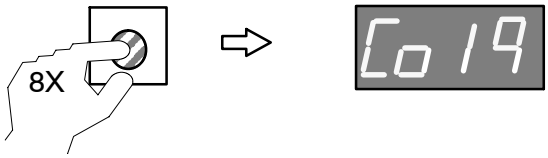
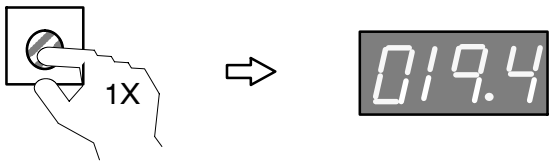
Serial No.	Indications	Comments, Information
9	Check connected course receivers (check of follow-up function) and check of RoT. The check of RoT is only possible at RoT-Indicators which are connected to the Distribution Unit.	
	Switch B 37 (DIP switch) 	B 39  130.1 129.9 129.8 129.7 129.6 Outer sphere turns cw B38  130.1 130.2 130.3 130.4 130.5 Outer sphere turns ccw
10	Check the fan, the display and the follow-up. DO NOT PERFORM DURING HEATING STAGE! **<u>The current course is displayed on the connected course receivers.</u>**	
	Switch B 37 (DIP switch) 	B39  <u>NOTE:</u> If this function is activated during the heating stage inadvertently, the compass must switched OFF and -ON again.

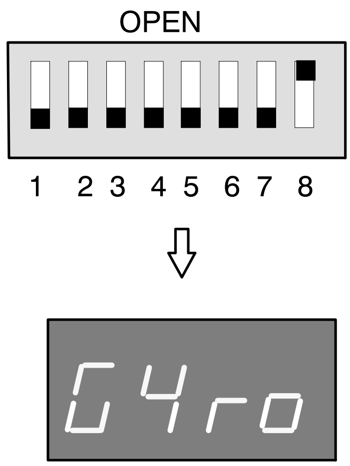
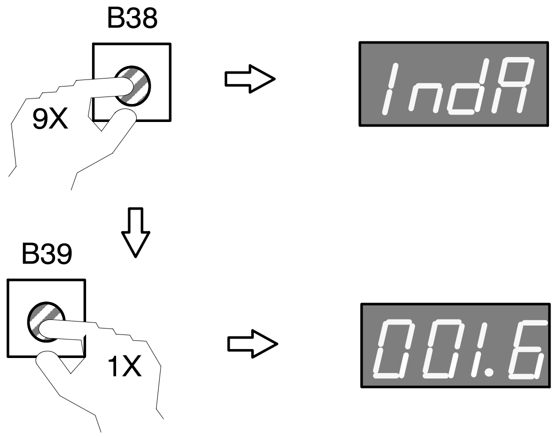
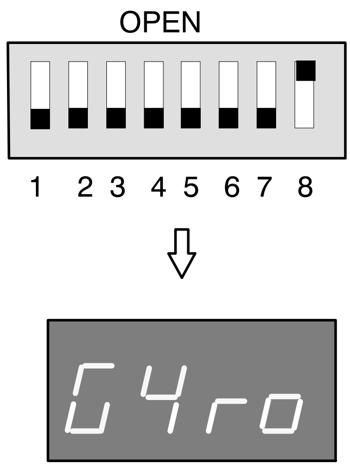
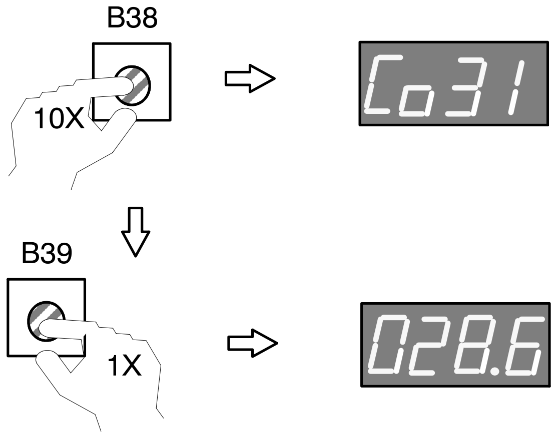
Serial No.	Indications	Comments, Information
11	Turn off the follow-up system **(SERVICE ONLY)** These switches turn off the follow-up system of the compass, in other words, the display no longer follows the course. Caution: The displayed course and the course for all connected course receivers do not correspond to the ship's course.	
	Switch B 37 (DIP switch)  	B39   **F**ollow **U**p **oF**F Follow-up system turned off B38  The displayed value is exclusively for development purposes.

Serial No.	Indications	Comments, Information
12	Indicate Encoder heading	
	Switch B 37 (DIP switch) OPEN   	B38 
12.1	Indicate Alignment Error	
	Switch B 37 (DIP switch) OPEN   	B38  Indicating the current Alignment Error

<table>
<tr><th>Serial No.</th><th>Indications</th><th>Comments, Information</th></tr>
<tr><td>12.2</td><td colspan="2">Indicate SEC (Speed Error Correction) value
The heading indication already takes this value into account.</td></tr>
<tr><td></td><td>Switch B 37 (DIP switch)
OPEN
 
1 2 3 4 5 6 7 8
 
  </td><td>B38
 
 
 
B39
 
  </td></tr>
<tr><td>12.3</td><td colspan="2">Indicate supply voltage DC (P = Power)
(input operating voltage 24VDC)</td></tr>
<tr><td></td><td>Switch B 37 (DIP switch)
OPEN
 
1 2 3 4 5 6 7 8
 
  </td><td>B38
 
 
 
B39
 
  </td></tr>
</table>

Serial No.	Indications	Comments, Information
12.4	Indicate: Internal operating voltage of Power Supply PCB	
	Switch B 37 (DIP switch) OPEN  1 2 3 4 5 6 7 8  	B38  5X  B39  1X  
12.5	Indicate: Encoder supply voltage	
	Switch B 37 (DIP switch) OPEN  1 2 3 4 5 6 7 8  	B38  6X  B39  1X  

Serial No.	Indications	Comments, Information
12.6	Indicate: Inductive DC transmission supply voltage	
	Switch B 37 (DIP switch) OPEN   	B38  B39 
12.7	Internal operating voltage of Power Supply PCB	
	Switch B 37 (DIP switch) OPEN   	B38  B39 

<table>
<tr><th>Serial No.</th><th>Indications</th><th>Comments, Information</th></tr>
<tr><td>12.8</td><td colspan="2">Indicate: Operating current (inductive transmission)
<u>(for development purposes only)</u></td></tr>
<tr><td></td><td>Switch B 37 (DIP switch)
  </td><td>  </td></tr>
<tr><td>12.9</td><td colspan="2">Indicate: operating voltage of heating</td></tr>
<tr><td></td><td>Switch B 37 (DIP switch)
  </td><td>  </td></tr>
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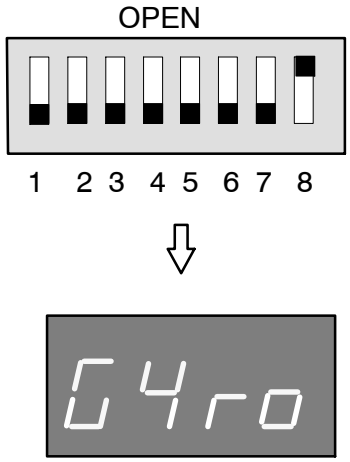
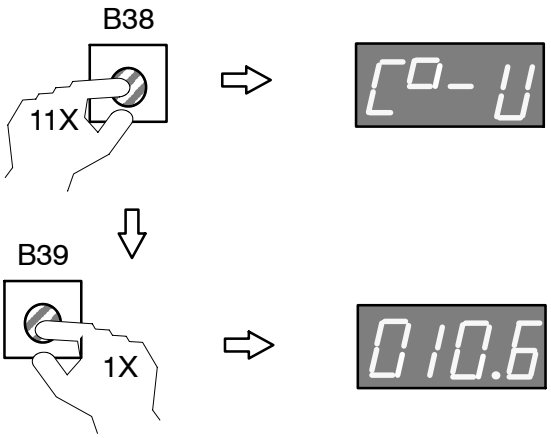
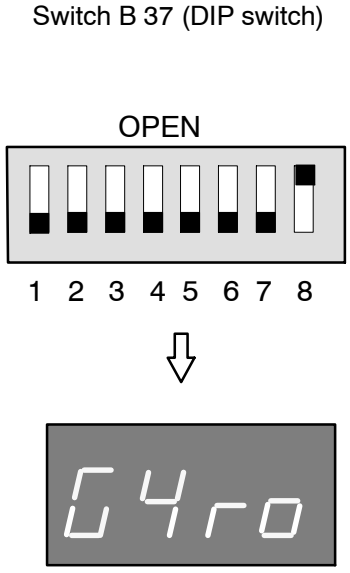
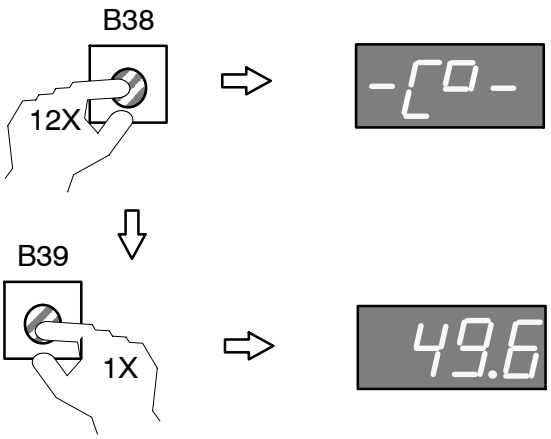
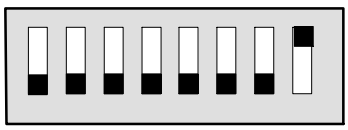
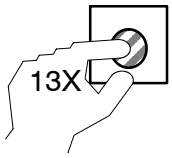
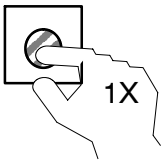
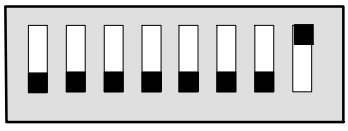
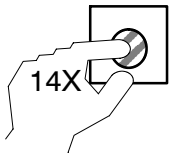
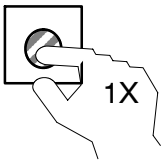
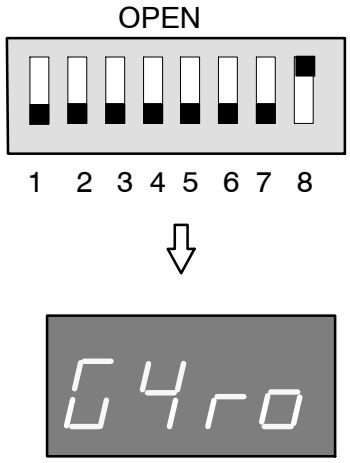
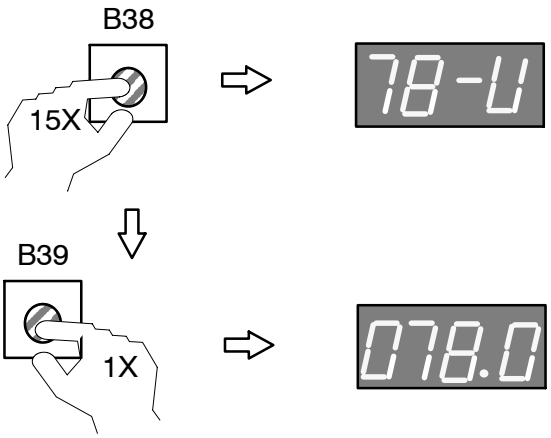
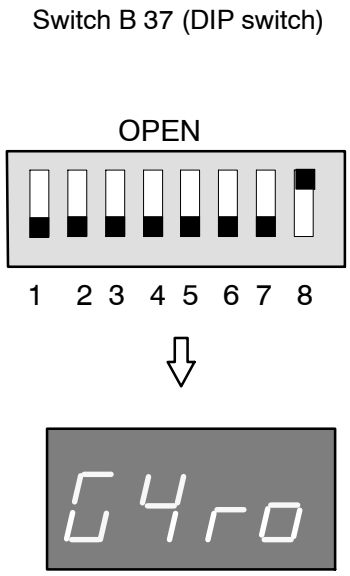
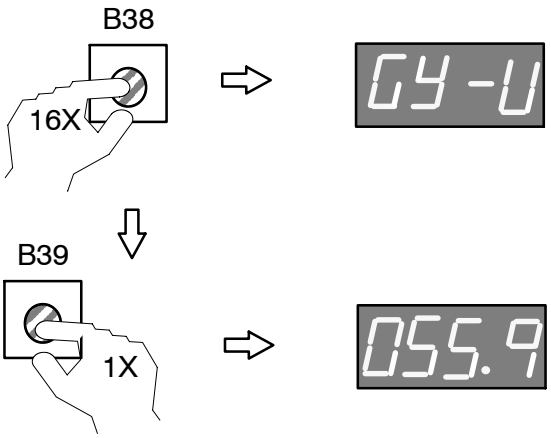
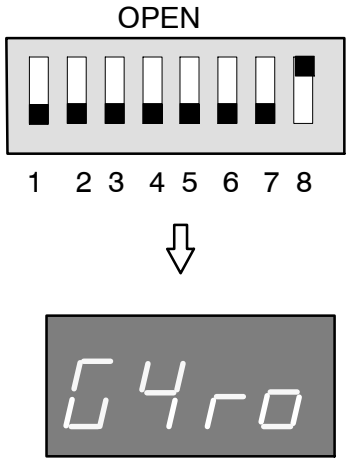
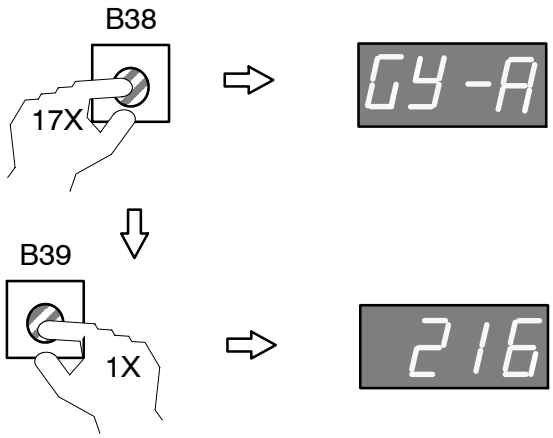
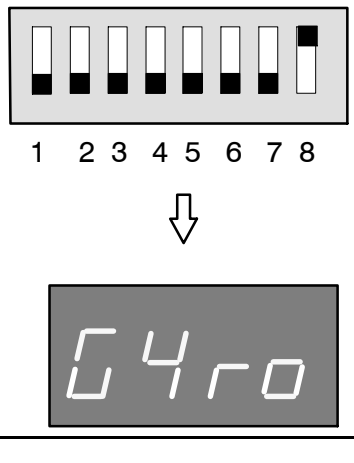
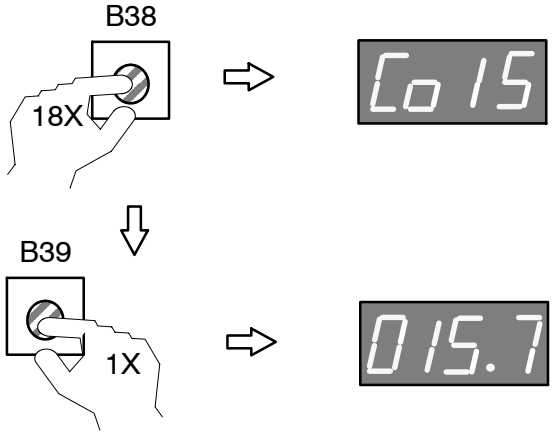
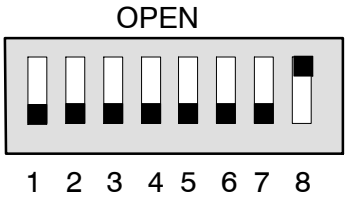
Serial No.	Indications	Comments, Information
12.10	Heating voltage at heating element	
	Switch B 37 (DIP switch) 	
12.11	Indicate temperature of the supporting liquid in °C Nominal value: 49.4°C to 51.1°C	
	Switch B 37 (DIP switch) 	

Serial No.	Indications	Comments, Information
12.12	Indicate supporting liquid level Indication “2.2” = liquid level OK Indication “0” = liquid level not OK	
	Switch B 37 (DIP switch) OPEN  1 2 3 4 5 6 7 8 ⇩ 	B38  ⇨  (Li = Liquid) ⇩ B39  ⇨ 
12.13	Indicate operating voltage	
	Switch B 37 (DIP switch) OPEN  1 2 3 4 5 6 7 8 ⇩ 	B38  ⇨  ⇩ B39  ⇨ 

Serial No.	Indications	Comments, Information
12.14	Indicate DC operating voltage for 400Hz	
	Switch B 37 (DIP switch)  	
12.15	Indicate gyro supply	
	Switch B 37 (DIP switch)  	

Serial No.	Indications	Comments, Information
12.16	Indicate gyro current in mA	
	Switch B 37 (DIP switch) 	
12.17	Indicate operating voltage 15VDC	
	Switch B 37 (DIP switch) 	

<table>
<tr><th>Serial No.</th><th>Indications</th><th>Comments, Information</th></tr>
<tr><td>12.18</td><td colspan="2">Indicate internal operating voltage 15VDC</td></tr>
<tr><td></td><td>Switch B 37 (DIP switch)
 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 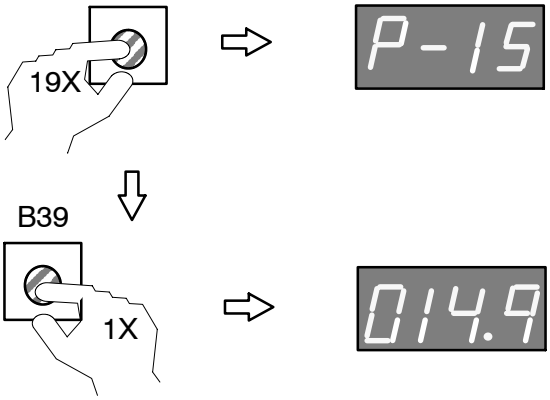
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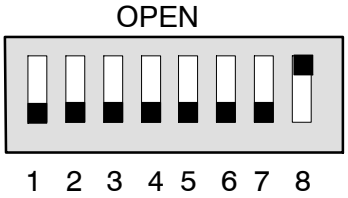
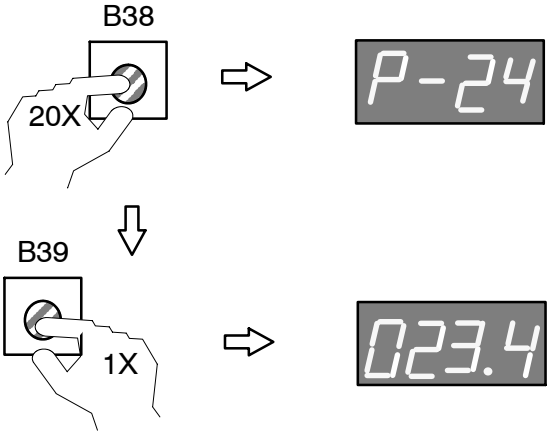
<tr><td>12.19</td><td colspan="2">Indicate internal operating voltage 24VDC</td></tr>
<tr><td></td><td>Switch B 37 (DIP switch)
 

 
</td><td>B38
 
</td></tr>
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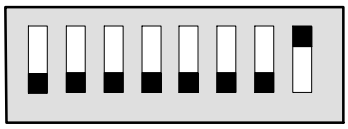
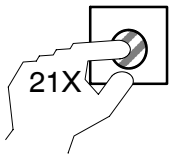
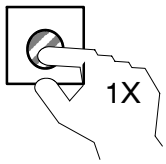
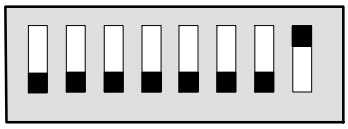
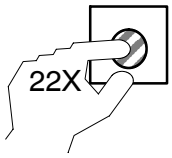
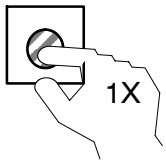
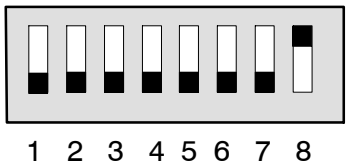
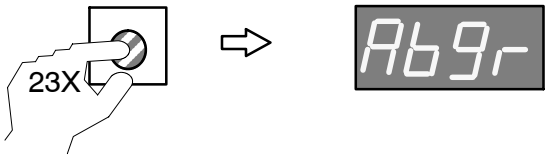
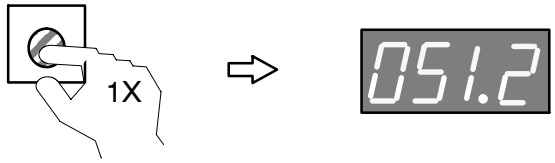
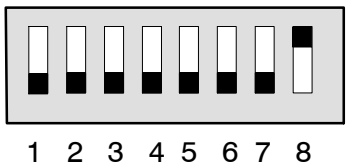
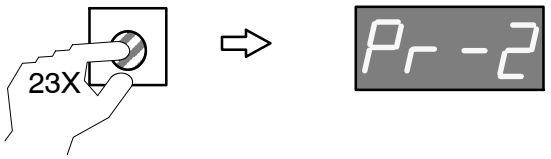
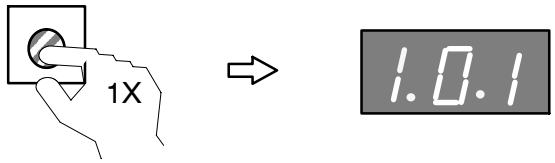
Serial No.	Indications	Comments, Information
12.20	Indicate pump voltage 24V 50Hz	
	Switch B 37 (DIP switch) OPEN  1 2 3 4 5 6 7 8  	B38    B39  
12.21	Indicate pump current	
	Switch B 37 (DIP switch) OPEN  1 2 3 4 5 6 7 8  	B38    B39  

<table>
<tr><th>Serial No.</th><th>Indications</th><th>Comments, Information</th></tr>
<tr><td>12.22</td><td colspan="2">Indicate tap voltage (direct encoder voltage)
Balancing voltage indication: approx. 512 (= approx. 5mV)</td></tr>
<tr><td></td><td>Switch B 37 (DIP switch)
OPEN
 
1 2 3 4 5 6 7 8
 
  </td><td>B38
 
23X
B39
 
1X
Button B39 hold down: display in degree
Button B39 released again: display in a coded value (appr. 182 per degree)</td></tr>
<tr><td>12.23</td><td colspan="2">Indicate program number and software version of the program for the microprocessor on the sensor PCB.</td></tr>
<tr><td></td><td>Switch B 37 (DIP switch)
OPEN
 
1 2 3 4 5 6 7 8
 
  </td><td>B38
 
23X
B39
 
1X</td></tr>
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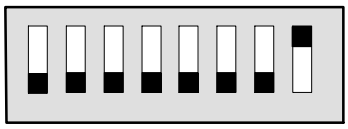
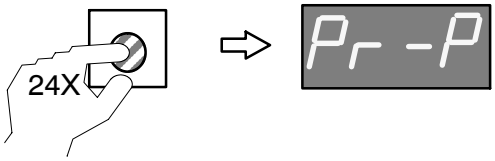
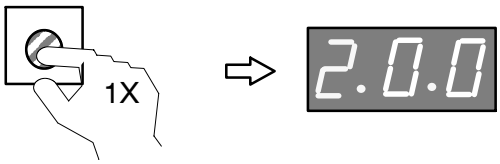
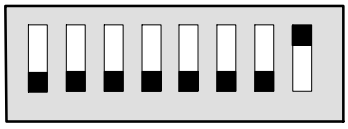
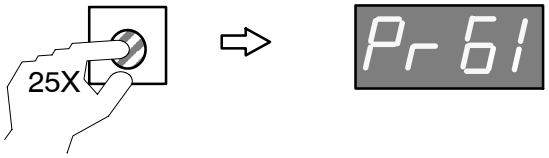
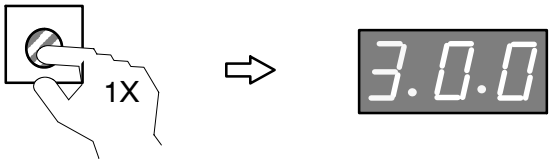
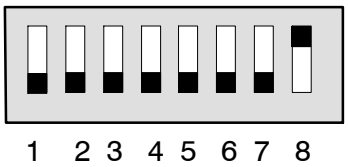
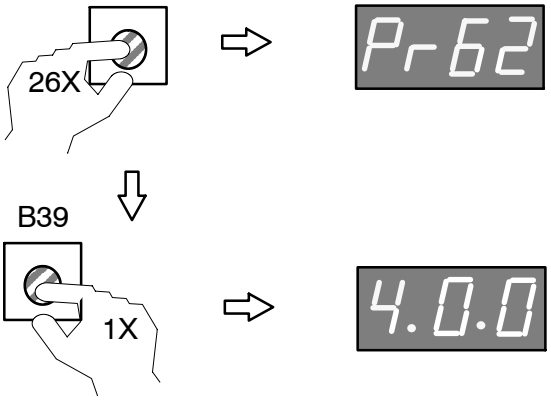
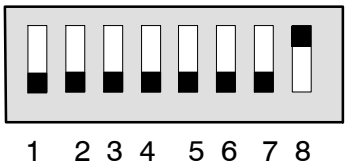
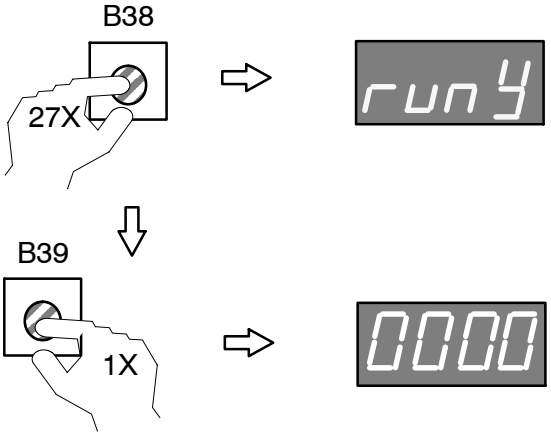
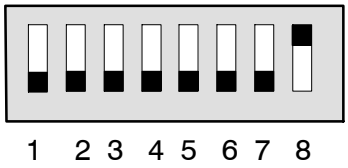
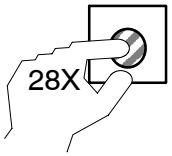
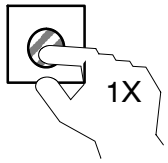
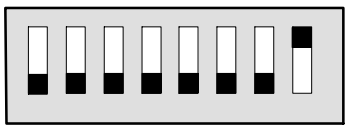
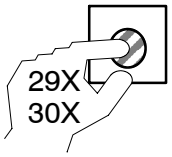
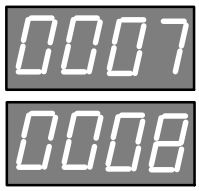
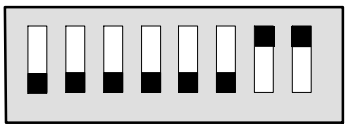
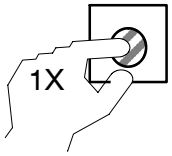
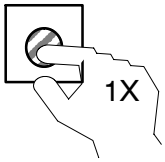
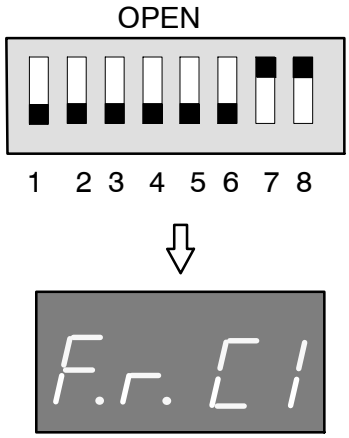
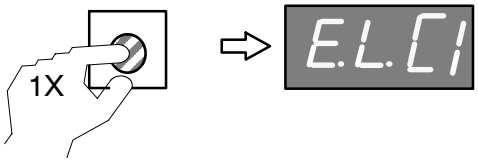
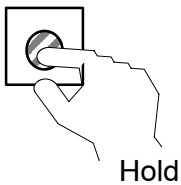
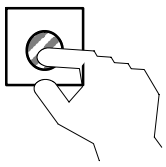
Serial No.	Indications	Comments, Information
12.24	Indicate program number and software version of the program for the microprocessor on the sensor PCB.	
	Switch B 37 (DIP switch) OPEN  1 2 3 4 5 6 7 8  	B38  B39 
12.25	Indicate program number and software version of the program for microprocessor MC 1 on the outer sphere PCB.	
	Switch B 37 (DIP switch) OPEN  1 2 3 4 5 6 7 8  	B38  B39 

Serial No.	Indications	Comments, Information
12.26	Indicate program number and software version of the program for microprocessor MC 2 on the outer sphere PCB.	
	Switch B 37 (DIP switch) OPEN  1 2 3 4 5 6 7 8 ⇩ 	B38 
12.27	Operating hours meter (years)	
	Switch B 37 (DIP switch) OPEN  1 2 3 4 5 6 7 8 ⇩ 	B38 

Serial No.	Indications	Comments, Information
12.28	Operating hours meter (hours)	
	Switch B 37 (DIP switch) OPEN  1 2 3 4 5 6 7 8  	B38    B39  
12.29 12.30	In F7 In F8 Both functions are for future purpose	
	Switch B 37 (DIP switch) OPEN  1 2 3 4 5 6 7 8  	B38  

Serial No.	Indications	Comments, Information
13	Error logbook. Indication of errors and warnings, stating the frequency of occurrence.	
	Switch B 37 (DIP switch) OPEN  1 2 3 4 5 6 7 8   	B38   B38 2x↓ E.L. 3 B38 3x↓ E.L. 4 B38 4x↓ E.L. 5 B38 5x↓ E.L. 6 B38 6x↓ E.L. 7 .....24 Number of errors/warnings occurring B39   
To delete error logbook:	press button B39 for approximately 10 seconds. the actual indicated line is deleted.	

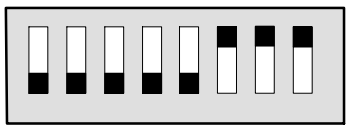
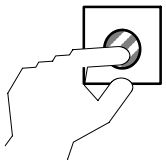
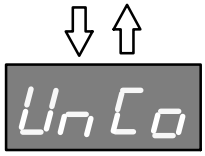
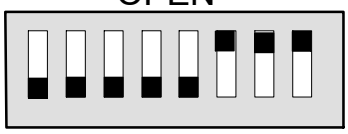
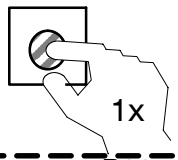
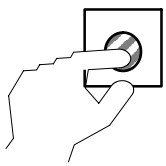
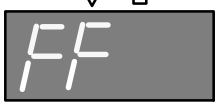
Serial No.	Indications	Comments, Information
14	Delete Error logbook complete. Delete hours meter complete (hours and years)	
	Switch B 37 (DIP switch)  	B38  Delete Error log complete B39  Hold, until Error log is deleted complete
		B38  Delete hour meter complete B39  Hold, unitil hour meter is deleted complete

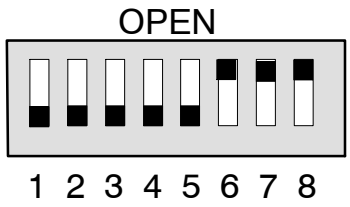
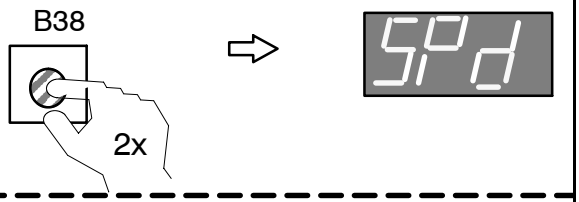
Information concerning the error logbook (see also section 7.1):

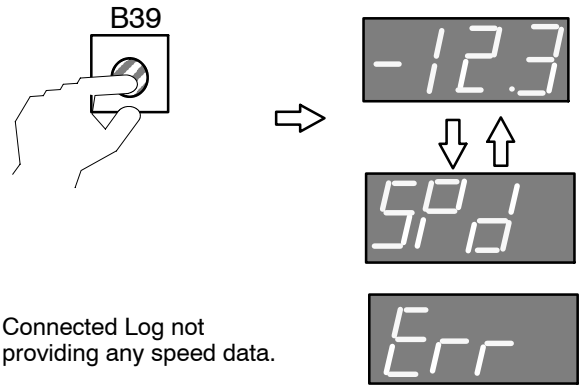
Error-code	Comment	Error group
E.L.01	Serial connection of sensor card to Power Supply PCB faulty	PCbP
E.L.02	Inductive transmission faulty	PCbP
E.L.03	System voltage (B5.5 ⇒ B5.8) on Power Supply PCB faulty	PCbP
E.L.04	Encoder voltage faulty	PCbP
E.L.05	System voltage (B5.1 ⇒ B5.4) on Power Supply PCB faulty	PCbP
E.L.06	Encoder faulty	PCbS
E.L.07	CAN dialogue from outer sphere PCB to sensor PCB faulty	PCbS
E.L.08	Follow-up system faulty	PCbS
E.L.09	CAN1 and CAN2 operating voltage faulty	PCbC
E.L.10	Supporting liquid error	PCbG
E.L.11	System voltage (B21.5 ⇒ B21.8) on outer sphere PCB faulty	PCbG
E.L.12	Operating voltage 24V faulty	PCbG
E.L.13	Operating voltage 15V faulty	PCbG
E.L.14	Heating operating voltage (B21.1 ⇒ B21.4) faulty	PCbG
E.L.15	Operating voltage 72V faulty	PCbG
E.L.16	Operating voltage 78V faulty for 400 Hz	PCbG
E.L.17	Gyro supply $55V_{eff}$ faulty	PCbG
E.L.18	Gyro current faulty	PCbG
E.L.19	Pump voltage faulty	PCbG
E.L.20	Pump current faulty	PCbG
E.L.21	Temperature sensor faulty	PCbG
E.L.22	Serial interface MC1 to MC2 faulty	PCbG
E.L.23	CAN interface from sensor card to outer sphere PCB faulty	PCbG
E.L.24	Heating system faulty	PCbG

5.1.5 Functional description of DIP switch settings (SEC)

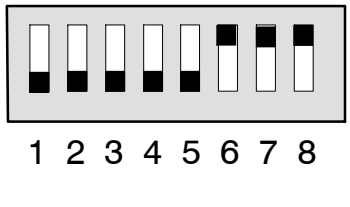
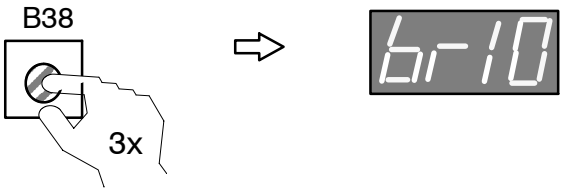
All data stated below should be selected and read out for servicing purposes only.
In standard operation the following data has no significance.

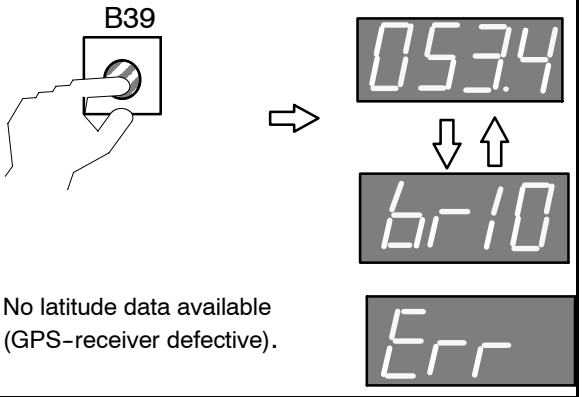
<table>
<tr><th>Seq. no.</th><th>Indications</th><th>Comments, Notes</th></tr>
<tr><td rowspan="2">1</td><td colspan="2">UnCo = (Uncorrected Compass) = course without speed error correction value.</td></tr>
<tr><td>Switch B37 (DIP switch)
OPEN
 
1 2 3 4 5 6 7 8
 
  </td><td>Displays the uncorrected gyro course.
B38
 
 
 
Identical with Seq.no. 6</td></tr>
<tr><td rowspan="2">2</td><td colspan="2">FF = FahrtFehler (Speed error) = the value by which the compass course is to be corrected (result from SEC), displayed in degrees, display value approx. max. 10° (see also number 3).</td></tr>
<tr><td>Switch B37 (DIP switch)
OPEN
 
1 2 3 4 5 6 7 8</td><td>B38
 
 
1x
B39
 
 
 
The automatic Speed Error Correction function is defective. Speed or/and position faulty.
  </td></tr>
</table>

<table>
<tr><th>Seq. no.</th><th>Indications</th><th>Comments, Notes</th></tr>
<tr><td>3</td><td colspan="2">SPd = Speed = Ship's speed. This speed is provided from the connected and selected Log.
(see also number 5).
Displayed in knots, astern sped (- knots) is also possible.</td></tr>
<tr><td></td><td>Switch B37 (DIP switch)
 
</td><td> 

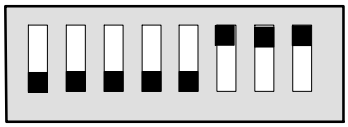
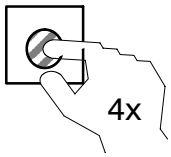
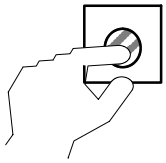
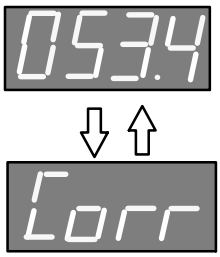
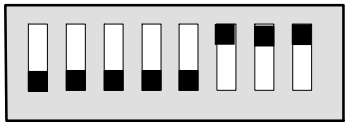
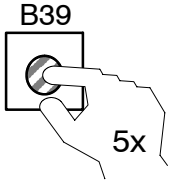
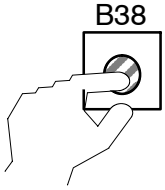
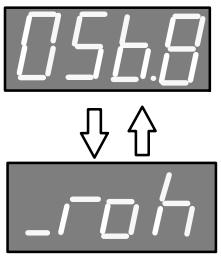
Connected Log not providing any speed data.

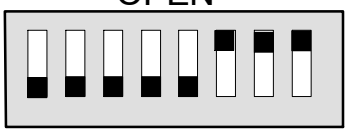
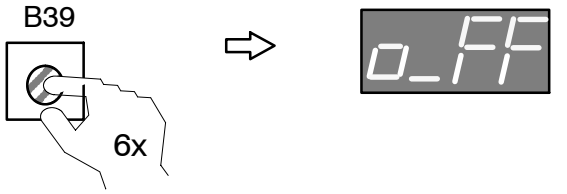
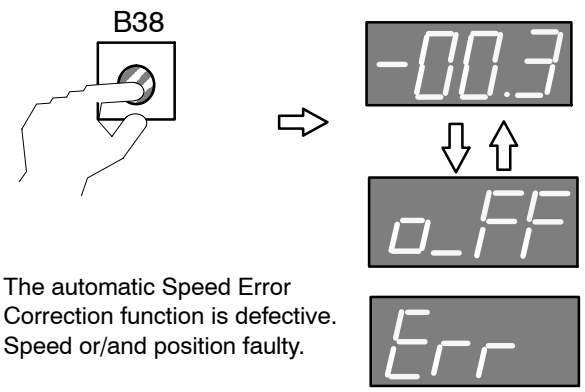
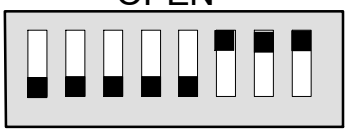
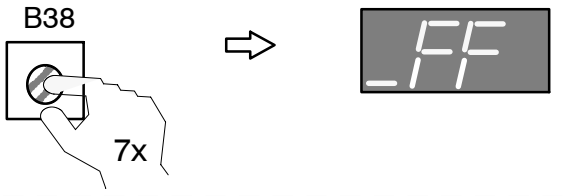
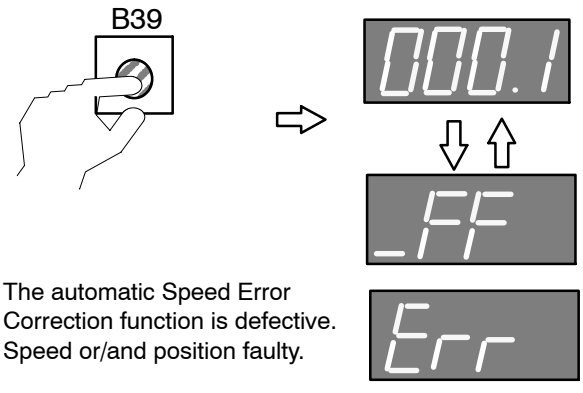
</td></tr>
<tr><td>4</td><td colspan="2">br 10 = Latitude (Breite) at a resolution of $^{1}/_{10°}$.</td></tr>
<tr><td></td><td>Switch B37 (DIP switch)
 
</td><td> 

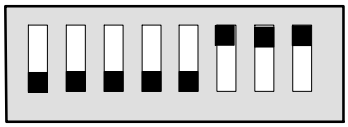
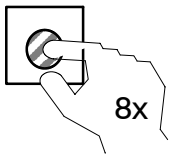
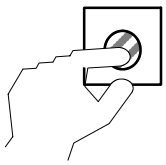
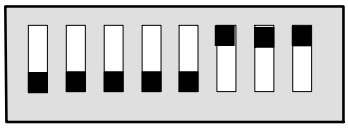
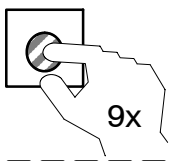
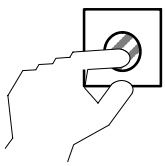
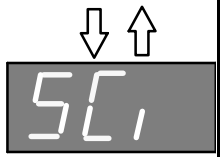
 

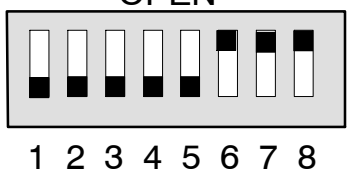
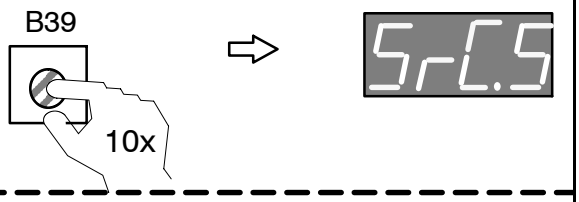
No latitude data available (GPS-receiver defective).

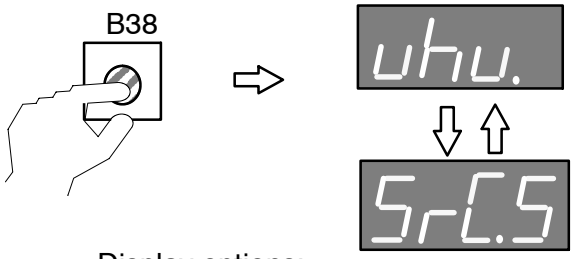
</td></tr>
</table>

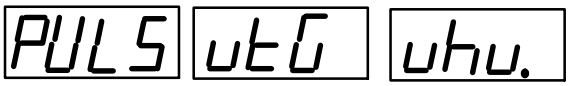
Seq. no.	Indications	Comments, Notes
5	Corr = Corrected course (course taking SEC into account).	
	Switch B37 (DIP switch) OPEN  1 2 3 4 5 6 7 8	B38  4x  B39   The automatic Speed Error Correction function is defective. Speed or/and position faulty. 
6	_roh = Rough course (course without SEC).	
	Switch B37 (DIP switch) OPEN  1 2 3 4 5 6 7 8	B39  5x  B38   Identical with Seq.no. 1

Seq. no.	Indications	Comments, Notes
7	o_FF = Speed Error (FahrtFehler) + acceleration error. Indicated in degrees.	
	Switch B37 (DIP switch) OPEN  1 2 3 4 5 6 7 8	 
8	_FF = Speed Error (FahrtFehler) without acceleration error. Indicated in degrees.	
	Switch B37 (DIP switch) OPEN  1 2 3 4 5 6 7 8	 

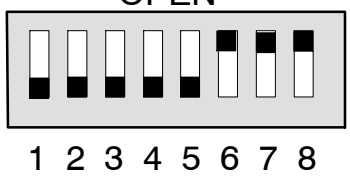
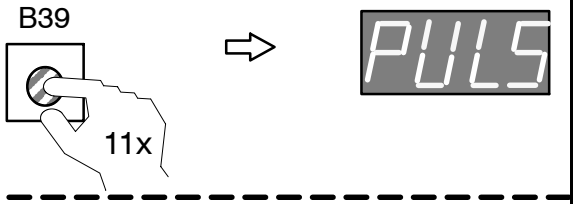
Seq. no.	Indications	Comments, Notes
9	_oF = Acceleration Error (Oelrestfehler) (no speed error components).	
	Switch B37 (DIP switch) OPEN  1 2 3 4 5 6 7 8	B39  8x  B38    The automatic Speed Error Correction function is defective. Speed or/and position faulty. 
10	Sci = Serial Interface (Schnittstelle), telegram traffic on serial interface.	
	Switch B37 (DIP switch) OPEN  1 2 3 4 5 6 7 8	B39  9x  Contents alternate B38     Digit 2: NMEA interface (Speed in) Digit 1: GPS-reciver interface Digit 0: Sum of all telegrams on both interfaces

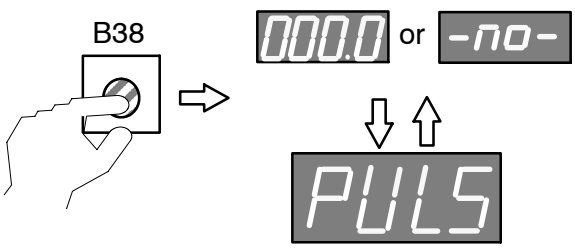
<table>
<tr><th>Seq. no.</th><th>Indications</th><th>Comments, Notes</th></tr>
<tr><td>11</td><td colspan="2">SrC.S = Source Speed Information.
Data about the source providing the speed value.</td></tr>
<tr><td></td><td>Switch B37 (DIP switch)
 
</td><td> 

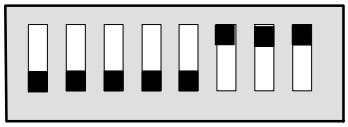
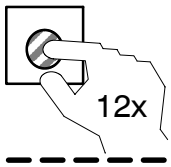
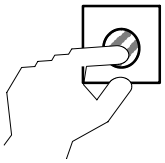
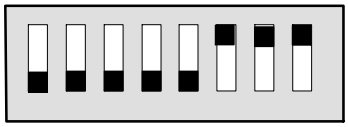
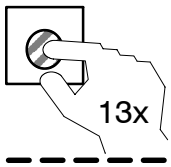
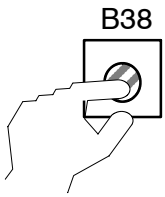
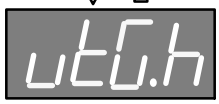
 

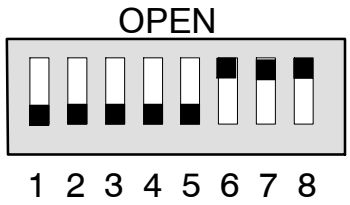
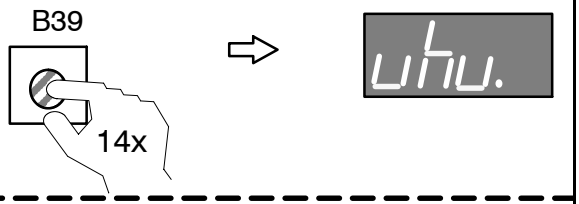
Display options:
 

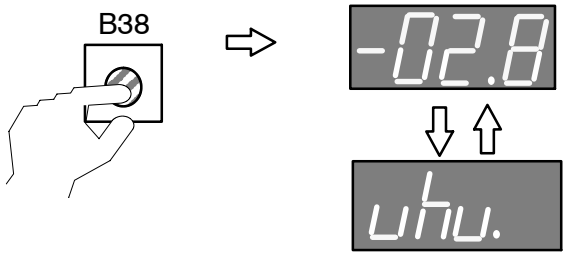
PULS = Pulse Log
vTg = Speed over ground
vhW = Speed trough water

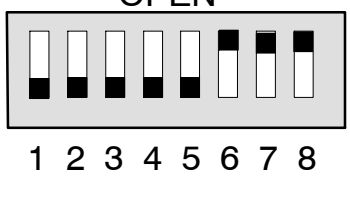
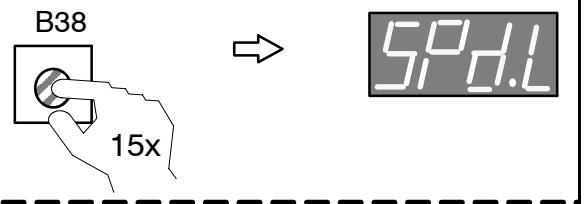
(vTg and vhW corresponds to NMEA 0183)</td></tr>
<tr><td>12</td><td colspan="2">PULS = Speed value from Pulse Log.
Indicated in Kts.
Displays -no- if no Pulse Log selected or connected.
Displays 0000 if there is no input from selected source.
Display range –80 Kts to +80 Kts (astern and ahead)</td></tr>
<tr><td></td><td>Switch B37 (DIP switch)
 
</td><td> 

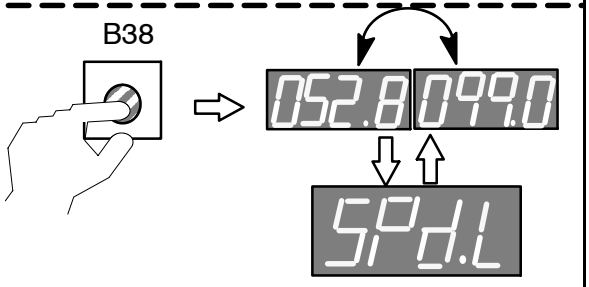
 
</td></tr>
</table>

Seq. no.	Indications	Comments, Notes
13	vtG.S = Speed from GPS-receiver telegram (speed over ground).	
	Switch B37 (DIP switch) OPEN  1 2 3 4 5 6 7 8	B39  12x  B38    No, or faulty data from GPS-receiver (vTg- telegram). 
14	vtG.h = Course value from GPS-receiver telegram	
	Switch B37 (DIP switch) OPEN  1 2 3 4 5 6 7 8	B39  13x  B38    No, or faulty data from GPS-receiver (vTg- telegram). 

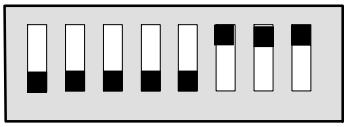
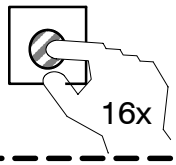
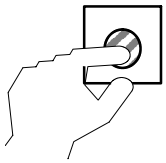
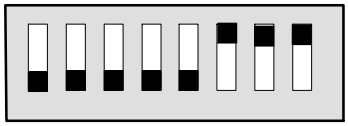
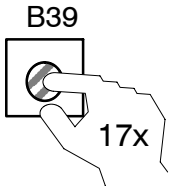
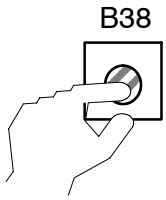
<table>
<tr><th>Seq. no.</th><th>Indications</th><th>Comments, Notes</th></tr>
<tr><td>15</td><td colspan="2">vhw = Speed value in knots from NMEA telegram VHW (speed through water).</td></tr>
<tr><td></td><td>Switch B37 (DIP switch)
 
</td><td> 

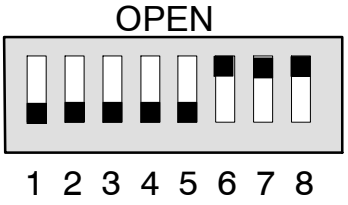
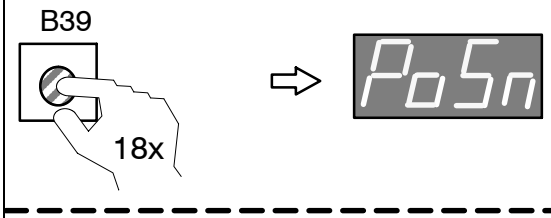
 

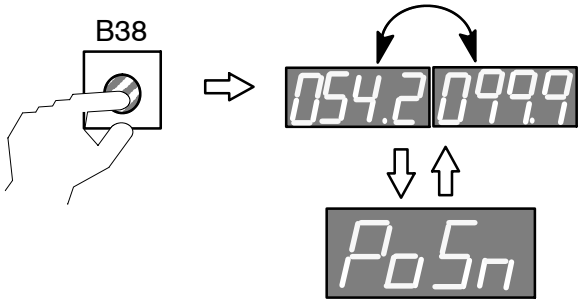
No, or faulty serial speed data (vHw– telegram).
 
</td></tr>
<tr><td>16</td><td colspan="2">SPd.L = Speed in knots (from Log).
The speed for which the source has been selected, is displayed. The display alternates between 099.0 (=accepting value) and, say, 052.8 (speed in knots). If no value is accepted (transferred) the display stays at 099.0.</td></tr>
<tr><td></td><td>Switch B37 (DIP switch)
 
</td><td> 

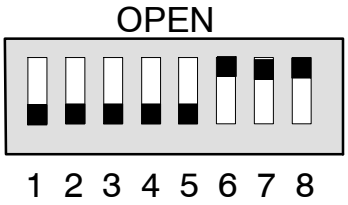
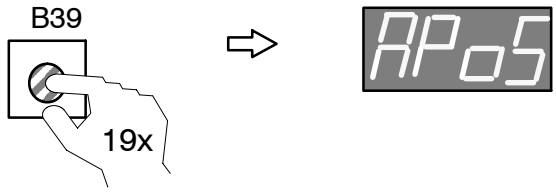
 

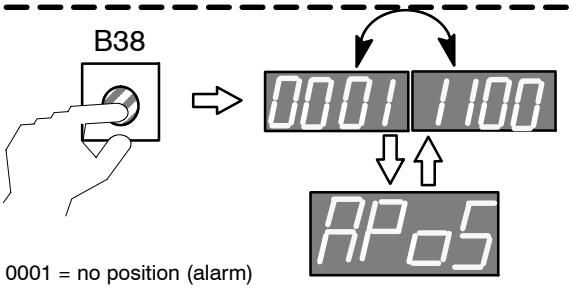
If the display changes value (similar as shown), there is a data transfer on this interface. No change (constant 99.0) means there is no data transfer</td></tr>
</table>

Seq. no.	Indications	Comments, Notes
17	PoS = Position – latitude in degrees.	
	Switch B37 (DIP switch) OPEN  1 2 3 4 5 6 7 8	B39  16x  B38    No latitude data available (GPS-receiver defective). 
18	ASPd = Alarm “speed”	
	Switch B37 (DIP switch) OPEN  1 2 3 4 5 6 7 8	B39  17x  B38   3 2 1 0 
	Digit 3 “Speed OK” Display 1 Speed OK Display 0 Speed not OK Digit 2 “Speed Alarm Display 1 Speed Alarm Display 0 No Speed Alarm Digit 1 “Auto Speed OK” Display 1 Auto Speed OK Display 0 Auto Speed not OK Digit 0 “Auto Alarm” Display 1 Auto Speed Alarm Display 0 No Auto Speed Alarm	

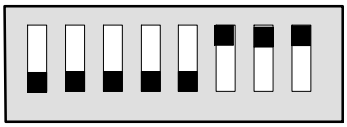
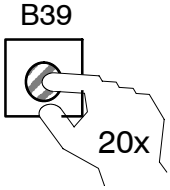
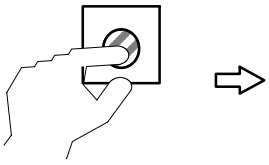
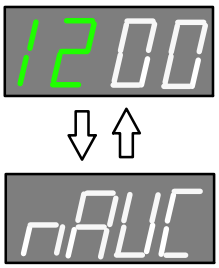
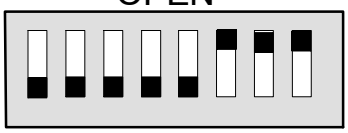
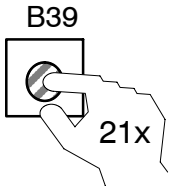
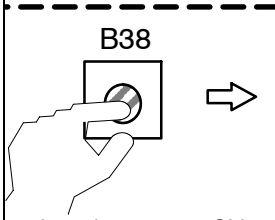
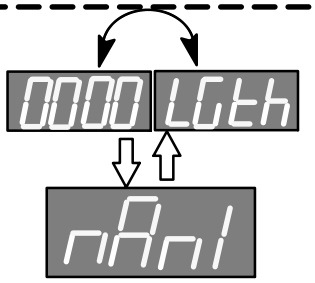
<table>
<tr><th>Seq. no.</th><th>Indications</th><th>Comments, Notes</th></tr>
<tr><td>19</td><td colspan="2">PoSn = Latitude value derived from automatic latitude input.
Indicated in degrees.</td></tr>
<tr><td></td><td>Switch B37 (DIP switch)
 
</td><td> 

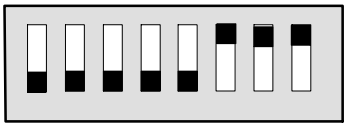
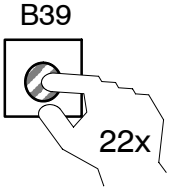
 

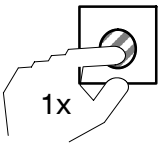
If the display changes value (similar as shown), there is a data transfer on this interface. No change (constant 099.9) means there is no data transfer</td></tr>
<tr><td>20</td><td colspan="2">APoS = Alarm position input</td></tr>
<tr><td></td><td>Switch B37 (DIP switch)
 
</td><td> 

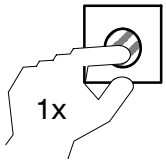
 

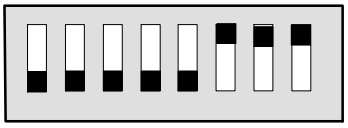
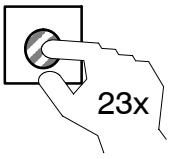
0001 = no position (alarm)
1100 = positon o.k.</td></tr>
</table>

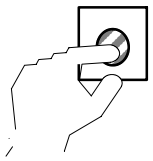
Seq. no.	Indications	Comments, Notes
21	nAUC = Number of telegrams with checksum.	
	Switch B37 (DIP switch) OPEN  1 2 3 4 5 6 7 8	B39   B38   1st digit = number of decoder requests 2nd digit = number of read-in NMEA-telegrams with correct check sum
22	nAn1 = 1st table for NMEA-requests	
	Switch B37 (DIP switch) OPEN  1 2 3 4 5 6 7 8	B39   B38   L = telegram type GLL G = telegram type GGA t = telegram type VTG h = telegram type VHW 1st digit = number of L-types 2nd digit = number of G-types 3rd digit = number of t-types 4th digit = number of h-types

<table>
<tr><th>Seq. no.</th><th>Indications</th><th>Comments, Notes</th></tr>
<tr><td>23</td><td colspan="2">nAn2 = 2nd table for NMEA-requests</td></tr>
<tr><td></td><td>Switch B37 (DIP switch)
OPEN
 
1 2 3 4 5 6 7 8</td><td>B39
 
22x
⇨ nAn2

B38
 
1x
⇨ bL

B38
 
1x
⇨ 0000

b = telegram type VBW
l = telegram type SLL
1st digit = number of b-types
2nd digit = number of l-types</td></tr>
<tr><td>24</td><td colspan="2">nSGG = NMEA-telegram (Strings of the GGA-telegram)</td></tr>
<tr><td></td><td>Switch B37 (DIP switch)
OPEN
 
1 2 3 4 5 6 7 8</td><td>B39
 
23x
⇨ nSGG

B38
 
⇨ 0000
Number of ASCII-characters per telegram
0000 = no telegram

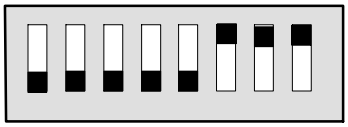
The number of operations depends on the number of characters.
(1 display content = max. 4 ASCII-character)

See sequ. no 25</td></tr>
</table>

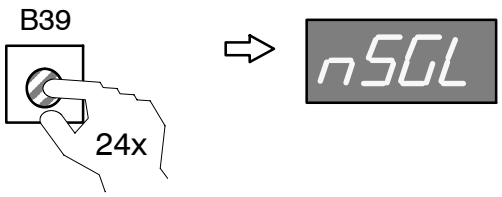
Seq. no.	Indications	Comments, Notes
25	nSGL = NMEA-telegram (Strings of the GLL-telegram)	

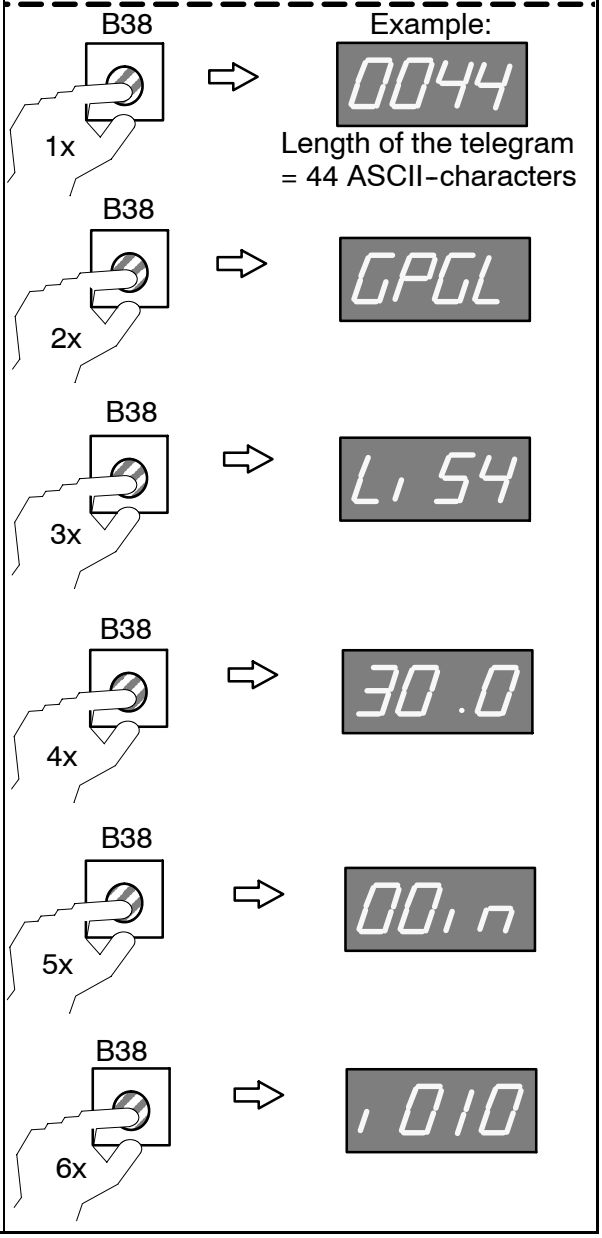
Switch B37 (DIP switch)

OPEN



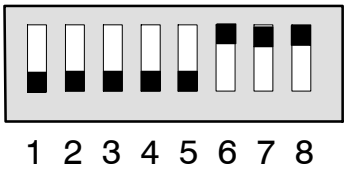
1 2 3 4 5 6 7 8

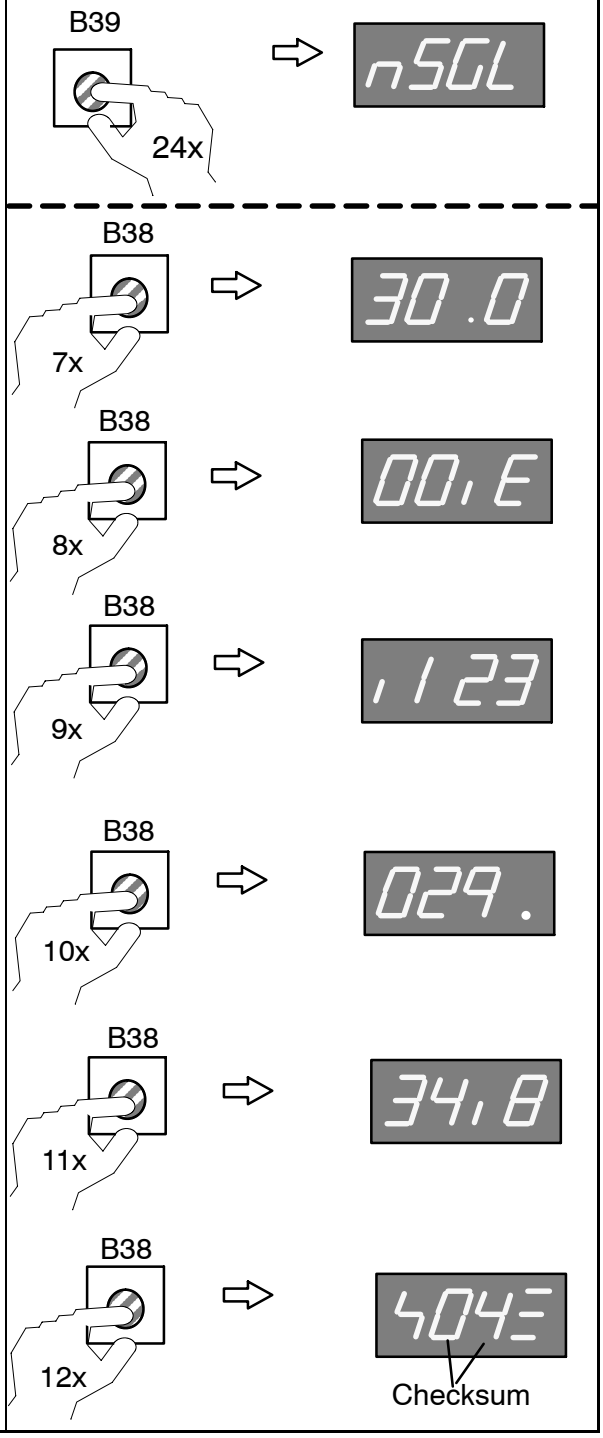


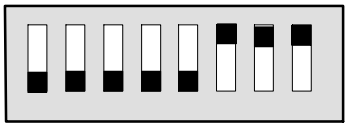
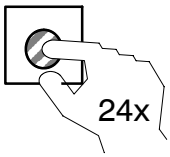
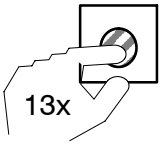
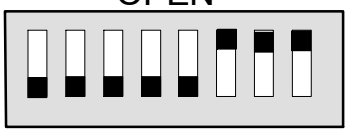
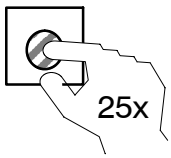
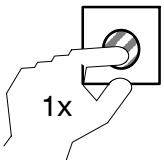


Seq. no.	Indications	Comments, Notes
cont. 25	nSGL = NMEA-telegram (Strings of the GLL-telegram)	

Switch B37 (DIP switch)

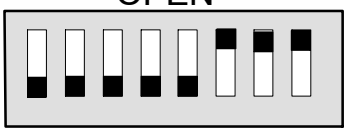
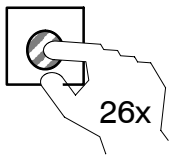
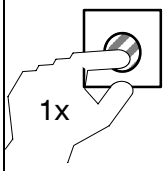
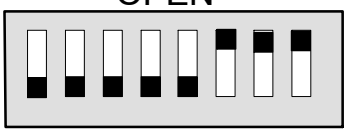
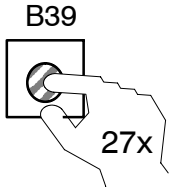
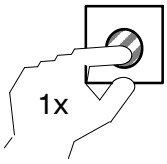


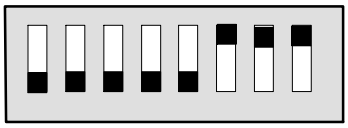
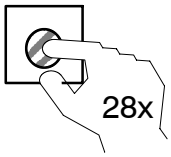
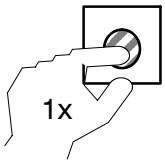


<table>
<tr><th>Seq. no.</th><th>Indications</th><th>Comments, Notes</th></tr>
<tr><td>cont.
25</td><td colspan="2">nSGL = NMEA-telegram (Strings of the GLL-telegram)</td></tr>
<tr><td></td><td>Switch B37 (DIP switch)
OPEN
 
1 2 3 4 5 6 7 8</td><td>B39
 
24x
 
B38
 
13x
  </td></tr>
<tr><td></td><td colspan="2">With the 1st operation of the contact switch B38, the number of ASCII-characters is displayed.
If the display shows “0000”, no telegram-output took place.
With every further operation of contact switch B38, 4 consecutive ASCII-characters are displayed.</td></tr>
<tr><td>26</td><td colspan="2">nSLL = NMEA-telegram (Strings of the SLL-telegram)</td></tr>
<tr><td></td><td>Switch B37 (DIP switch)
OPEN
 
1 2 3 4 5 6 7 8</td><td>B39
 
25x
 
B38
 
1x
 
Number of ASCII-characters per telegram
0000 = no telegram

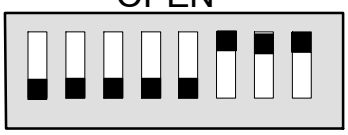
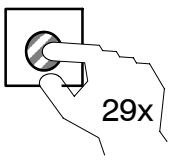
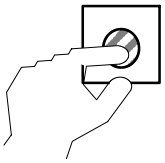
The number of operations depends on the number of characters.
(1 display content = max. 4 ASCII-characters)

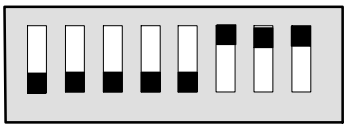
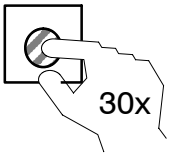
See seq. no. 25</td></tr>
</table>

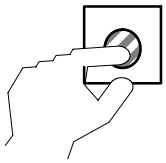
Seq. no.	Indications	Comments, Notes
27	nShw = NMEA-telegram (Strings of the VHW-telegram)	
	Switch B37 (DIP switch) OPEN  1 2 3 4 5 6 7 8	B39   B38   Number of ASCII-characters per telegram 0000 = no telegram The number of operations depends on the number of characters. (1 display content = max. 4 ASCII-characters) **See seq. no. 25**
28	nStG = NMEA-telegram (Strings of the VTG-telegram)	
	Switch B37 (DIP switch) OPEN  1 2 3 4 5 6 7 8	B39   B38   Number of ASCII-characters per telegram 0000 = no telegram The number of operations depends on the number of characters. (1 display content = max. 4 ASCII-characters) **See seq. no. 25**

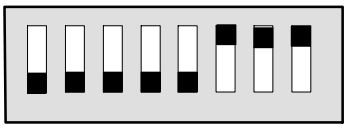
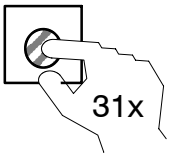
<table>
<tr><th>Seq. no.</th><th>Indications</th><th>Comments, Notes</th></tr>
<tr><td>29</td><td colspan="2">nSbw = NMEA-telegram (String of the VBW-telegram)</td></tr>
<tr><td></td><td>Switch B37 (DIP switch)
OPEN
 
1 2 3 4 5 6 7 8</td><td>B39
 
28x
 
B38
 
1x
 
Number of ASCII-characters per telegram
0000 = no telegram

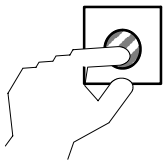
The number of operations depends on the number of characters.
(1 display content = max. 4 ASCII-characters)

See seq. no. 25</td></tr>
<tr><td>30</td><td colspan="2">Development only!
Fb10 = Software component of speed error correction: Latitude</td></tr>
<tr><td></td><td>Switch B37 (DIP switch)
OPEN
 
1 2 3 4 5 6 7 8</td><td>B39
 
29x
 
B38
 
 
Latitude</td></tr>
</table>

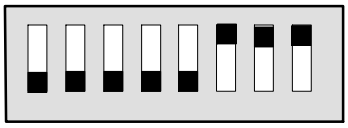
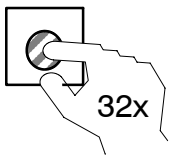
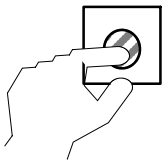
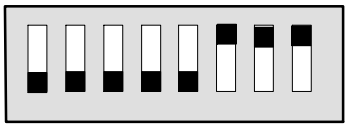
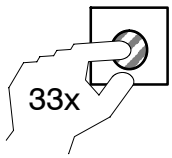
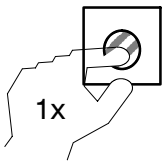
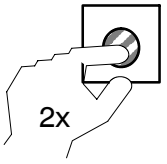
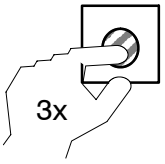
<table>
<tr><th>Seq. no.</th><th>Indications</th><th>Comments, Notes</th></tr>
<tr><td>31</td><td colspan="2">Development only!
FS10 = Software component speed error correction: Ship‘s speed
Switch B37 (DIP switch)
OPEN
 
1 2 3 4 5 6 7 8
B39
 
30x

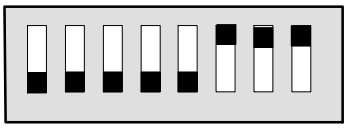
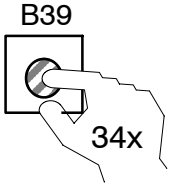
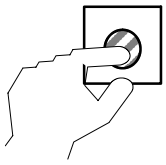
B38
 

Ship‘s speed (kn)</td></tr>
<tr><td>32</td><td colspan="2">Development only!
FnSP = Software component speed error correction: North-component of the ship‘s-speed-vector
Switch B37 (DIP switch)
OPEN
 
1 2 3 4 5 6 7 8
B39
 
31x

B38
 

North-component of the ship‘s-speed-vector (with negative sign = south component)</td></tr>
</table>

<table>
<tr><th>Seq. no.</th><th>Indications</th><th>Comments, Notes</th></tr>
<tr><td>33</td><td colspan="2">Development only!
FutG = Software component speed error correction: Course over ground
(Value of the VTG-telegram)</td></tr>
<tr><td></td><td>Switch B37 (DIP switch)
OPEN
 
1 2 3 4 5 6 7 8</td><td>B39
 
32x
 
B38
 
 
0000 = no telegram
123.4 = course value</td></tr>
<tr><td>34</td><td colspan="2">tIME = Time since activating speed error correction.
(Reset with power-off)</td></tr>
<tr><td></td><td>Switch B37 (DIP switch)
OPEN
 
1 2 3 4 5 6 7 8</td><td>B39
 
33x
 
B38
 
1x
 
days (max. 99) hours
B38
 
2x
 
minutes seconds
B38
 
3x
  </td></tr>
</table>

Seq. no.	Indications	Comments, Notes
35	**Development only!** SCI . = Serial Communication Interface (NMEA Log / GPS input)	
	Switch B37 (DIP switch) OPEN  1 2 3 4 5 6 7 8	B39   B38   The content of the two digits is during a data transfer unrecognisable. Just the digits $1_{(16)}$ and $0_{(16)}$ are visible for a short moment; $10_{(16)}$ means line feed. All other sequentially indicated values are for development purpose only.

6 Tasks to be performed regularly

A task to perform regularly is to clean the internal of the gyro compass time by time. Especially the bottom filter has to be cleaned.

6.1 Changing the supporting liquid and distilled water

At 18 months intervals the supporting liquid and distilled water must be changed.

The supporting liquid and distilled water must not be changed whilst at sea
(except in the case of dual systems).

Tools/special tools required:
- Filling device
- Injector

Spare parts required:
- Supporting liquid
- Distilled water

If required:
- Screw (distilled water)
- Screw (supporting liquid)
- Screw (ventilation)

6.1.1 Removing the outer sphere from the compass enclosure

- Wait min. 15 minutes until the gyrosphere does not turn any more.
- Turn off the 24V power supply of the gyro compass and secure it against reconnecting.
- Undo the two screws at the top and bottom of the door of the gyro compass enclosure and lift out the door, paying attention to the earthing strip.
- Remove the plug from the outer sphere (see Figure 66/2).

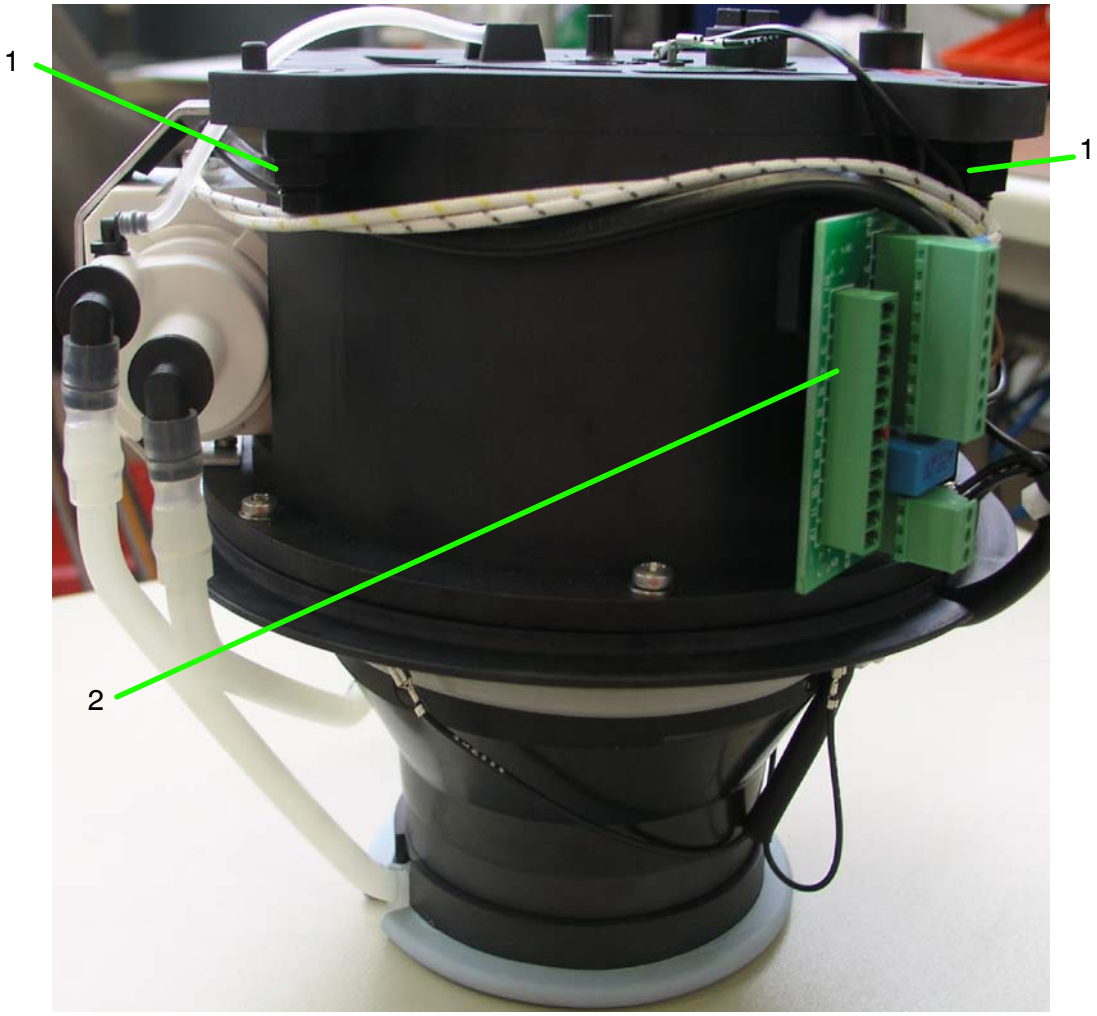


Figure 66: Dismantling the outer sphere

- Place both hands (see Figure 66/1) under 2 of the 4 snap closures and release them by pressing with the thumbs.
- Carefully turn the outer sphere through 90° and repeat the process with the other two snap closures. The outer sphere is now free and can be removed.
- Still holding the outer sphere with both hands, lower it slightly (this releases the locking device), carefully remove it from the compass enclosure and set it down.

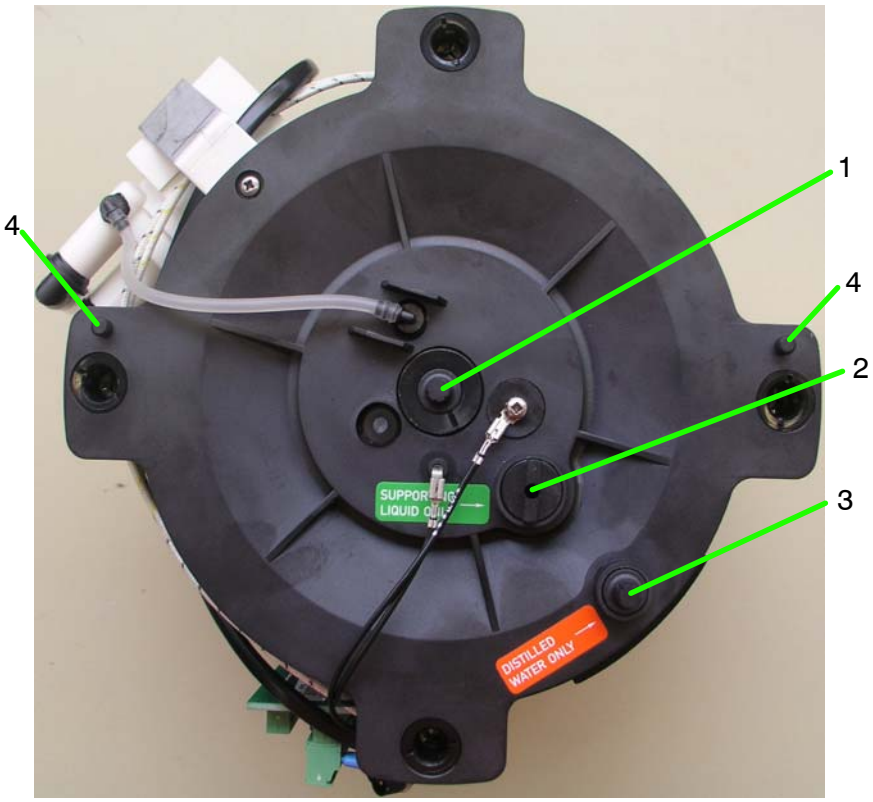


Figure 67: Dismantled outer sphere (overhead view)

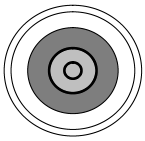
6.1.1.1 Draining the supporting liquid and distilled water

(see Figure 67)

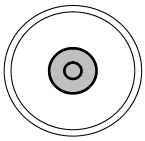
- Remove the ventilation screw (Figure 67/1) to vent the system
- Remove the supporting liquid screw (Figure 67/2) so that the supporting liquid can be poured out
- Holding the outer sphere with both hands, pour out the supporting liquid and throw it away (no special measures are needed for disposal).
- Remove the distilled water screw (Figure 67/3), so that the distilled water can be poured out. Remove the remaining distilled water from the outer sphere with the injector.

- Used supporting liquid and used distilled water must not be reused.
- All the following tasks on the outer sphere must be carried out slowly. On no account do them jerkily. Slow handling is necessary, because otherwise the gyrosphere will fail to float in the supporting liquid, and jerky movements will cause it to strike against the inner wall of the outer sphere. There is a risk of damage. Continue to handle in this way until you have finished filling with the new liquids.

- After pouring out the liquids (distilled water and supporting liquid) for the first time, **slowly** return the outer sphere to the initial position.
- Wait approximately 3 to 5 minutes (until the remaining content of the distilled water container has flowed into the outer sphere) and then carefully repeat the pouring out process. If necessary, use the injector to suck out the remaining distilled water through the distilled water filling opening.
- Attach the filling device to the distilled water bottle and pour the entire contents (230cm^3) into the distilled water filling opening (look for the identifying label).
- Close the distilled water filling opening with the screw. Use a new sealing ring.
- Attach the filling device to the supporting liquid bottle and pour the supporting liquid (840cm^3) into the supporting liquid filling opening (look for the identifying label).
- Check the liquid level at the measuring cone (Figure 67/1).
- Using the injector, top up or suck out supporting liquid (check via the measuring cone) until the “liquid level: OK” is reached.
- Close the distilled water filling opening with the screw. Use a new sealing ring.



Liquid level: OK
(cold supporting liquid)



Liquid level: too low

Figure 68: Measuring cone (top view)

- Close the distilled water filling opening with the screw.
  Use a new sealing ring.
- Place the outer sphere in the compass enclosure.

- Pay attention to the two locking pins (Figure 67/4) on the closure.

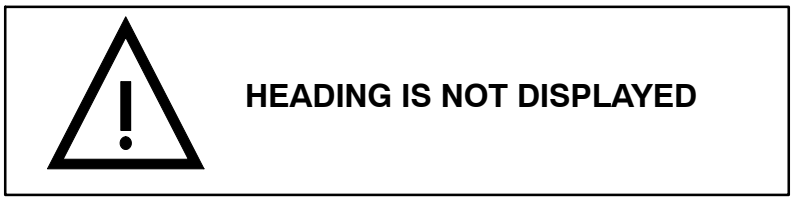
- Hold the outer sphere with both hands and guide it under the snap closures on the pendulum joint.
- Using the thumbs, press down and engage the two snap closures.
- Carefully turn the outer sphere through 90° and repeat the process with the other two snap closures. The outer sphere is now fastened to the pendulum joint.
- Guide the cable with the plug to the left around the outer sphere and plug it in as shown in (Figure 66/2).
- Close the door of the enclosure and fasten it with screws, paying attention to the earthing strip.

When the power supply is switched on, the compass is ready for use again. Run the heating and settling in stage as described in section 3.4.3.2.

7 Error messages and warnings

7.1 Error messages

An error is indicated in the digital display of the compass by a flashing “Erro” (for error).



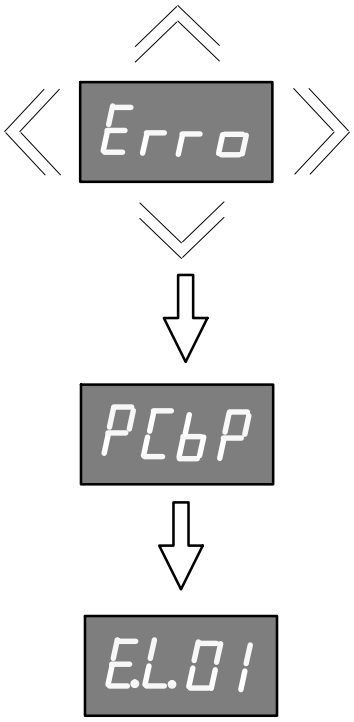


Figure 69: “Error message” in digital display

Following error groups can be displayed:

PCbP = Error on Power Supply PCB
PCbS = Error on sensor PCB
PCbC = Error on connection PCB
PCbG = Error on outer sphere PCB

Following error codes are possible (refering to their error group):

Error-log	Comment	Error group
E.L.01	Serial connection of Sensor PCB to Power Supply PCB faulty	PCbP
E.L.02	Inductive transmission faulty	PCbP
E.L.03	System voltage (B5.5 ⇒ B5.8) on Power Supply PCB faulty	PCbP
E.L.04	Encoder voltage faulty	PCbP
E.L.05	System voltage (B5.1 ⇒ B5.4) on Power Supply PCB faulty	PCbP
E.L.06	Encoder faulty	PCbS
E.L.07	CAN dialogue from outer sphere PCB to sensor PCB faulty	PCbS
E.L.08	Follow-up system faulty	PCbS
E.L.09	CAN1 and CAN2 operating voltage faulty	PCbC
E.L.10	Supporting liquid error	PCbG
E.L.11	System voltage (B21.5 ⇒ B21.8) on sensor PCB faulty	PCbG
E.L.12	Operating voltage 24V faulty	PCbG
E.L.13	Operating voltage 15V faulty	PCbG
E.L.14	Heating operating voltage (B21.1 ⇒ B21.4) faulty	PCbG
E.L.15	Operating voltage 72V faulty	PCbG
E.L.16	Operating voltage 78V faulty for 400 Hz	PCbG
E.L.17	Gyro supply $55V_{eff}$ faulty	PCbG
E.L.18	Gyro current faulty	PCbG
E.L.19	Pump voltage faulty	PCbG
E.L.20	Pump current faulty	PCbG
E.L.21	Temperature sensor faulty	PCbG
E.L.22	Serial interface MC1 to MC2 faulty	PCbG
E.L.23	CAN interface from outer sphere PCB to sensor PCB faulty	PCbG
E.L.24	Heating system faulty	PCbG

To delete the content of the error log book, see section 5.1.4 Nr. 14

7.2 Warnings

Warning indicate a malfunction during operational use.
The heading continues to be displayed.
A warning is indicated by a flashing decimal point.

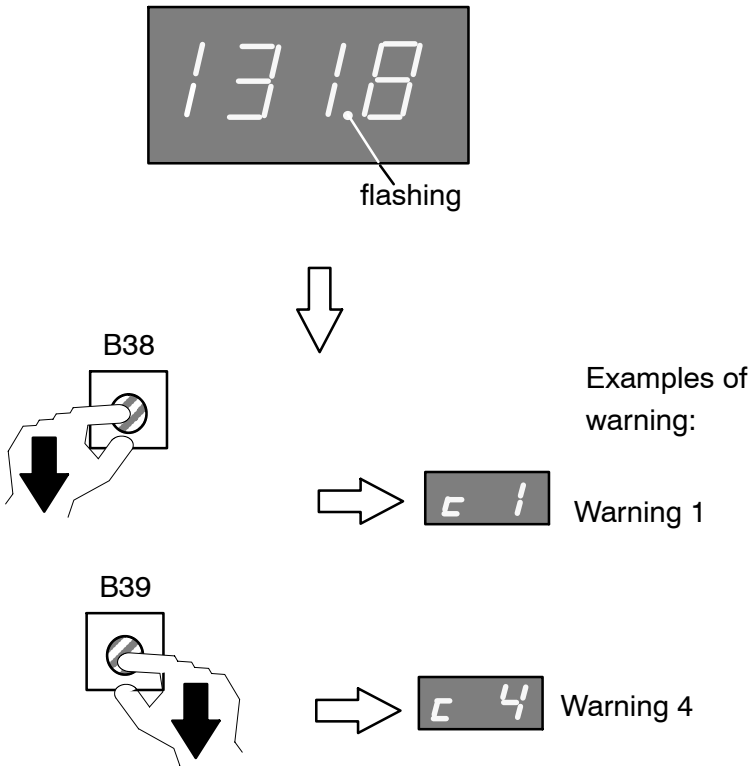


Figure 70: DIP switch B37 and button B38/B39

The following warnings may appear:

C1= Fan failure
C2= Heater failure
C3= Supporting liquid > 60°C
C4= Supporting liquid level too low
C5= Voltage cut-off

7.2.1 Warning 1 “Fan failure”

This warning is generated if the fan does not switch itself on as a result of the temperature of the supporting liquid (it should switch on when the supporting liquid reaches 51°C).
Whether the fan is operational or not is registered from the fan’s current consumption; it therefore follows that the fan is defective if this warning is displayed.
To prevent overheating due to fan failure, it is recommended that you do the following:

- Check whether the fan screen is covered and check to see that air can enter the enclosure unhindered at the base.
- Open the door on the compass
- If necessary cool the outer sphere using an external fan.

These measures should be continued until warning 1 stops.

It is essential that the fan be replaced at the earliest opportunity.

NOTE: A critical situation occurs, if the ambient temperature is extremely high and warning 3 is displayed “Temperature of supporting liquid more than 60°C”. Constant high temperature may effects to the life cycle of the gyro compass. A higher temperature for a short moment has no importance.

7.2.2 Warning 2 “Heater failure”

This warning is output when the heater (≥45°C) has failed.

Compass operation is not restricted if the temperature is more than 45°C (see also warning “fan failure”.

A temperature drop down below 45°C leads to an error message “Error” and the heading information will not longer displayed (as well as the heading information to the connected heading receivers).

To prevent the supporting liquid from cooling further, it is recommended that to do the following:

- Close the door on the compass, or
- introduce warm air.

These measures should be continued until warning 2 stops.

It is essential that the heater be repaired at the earliest opportunity.

7.2.3 Warning 3 “Supporting liquid > 60°C”

This warning is output when the temperature of the supporting liquid is higher than 60°C.

To prevent the temperature from rising further, it is recommended that you do the following:

- Open the door on the compass
- If necessary cool the outer sphere using an external fan.
- Check the ambient temperature. If the ambient temperature is higher than 60°C steps should be taken to cool it down.

These measures should be continued until warning 3 stops.

If warning 3 is displayed in combination with warning 1, the fan must be replaced at the earliest opportunity.

See also warning “fan failure”

7.2.4 Warning 4 “Supporting liquid level too low”

This warning is output when the level of the supporting liquid in the outer sphere is too low. The supporting liquid is determined by an immersion probe installed in the upper part of the outer sphere.

You must check the supporting liquid immediately and if necessary top up with distilled water – only distilled water – (one 240cm^2 bottle) in to the ventilation outlet until the measuring cone shows the desired level, the remaining content of the bottle has to be filled into the inlet for distilled water, see service manual).

This measure does not compensate the planned replacement of the supporting liquid!!!

In certain circumstances (if the level of the supporting liquid falls suddenly) you must establish the cause (possibly a leak) and correct the fault.

If the level of supporting liquid is too low, the gyro-current is interrupted and an Error is displayed,the heading information will not longer displayed (as well as the heading information to the connected heading receivers).

Please note: At the Operator Unit for Gyro compass STD 20 this warning is shown as C4 “Temperature”.

7.2.5 Warning 5 “Voltage cut-off”

This warning is output if the supply voltage is cut off for a short time. The cut-off period is determined by the fall in supporting liquid temperature. If the temperature falls below 45°C the compass recognises that the voltage supply has been switched off in the conventional way.

In the case of a voltage cut-off (supporting liquid temperature does not fall to below 45°C) and the voltage supply has been restored, the settling stage in indicated again (see also section 3.4.3.2 “Compass indications during the settling stage”).

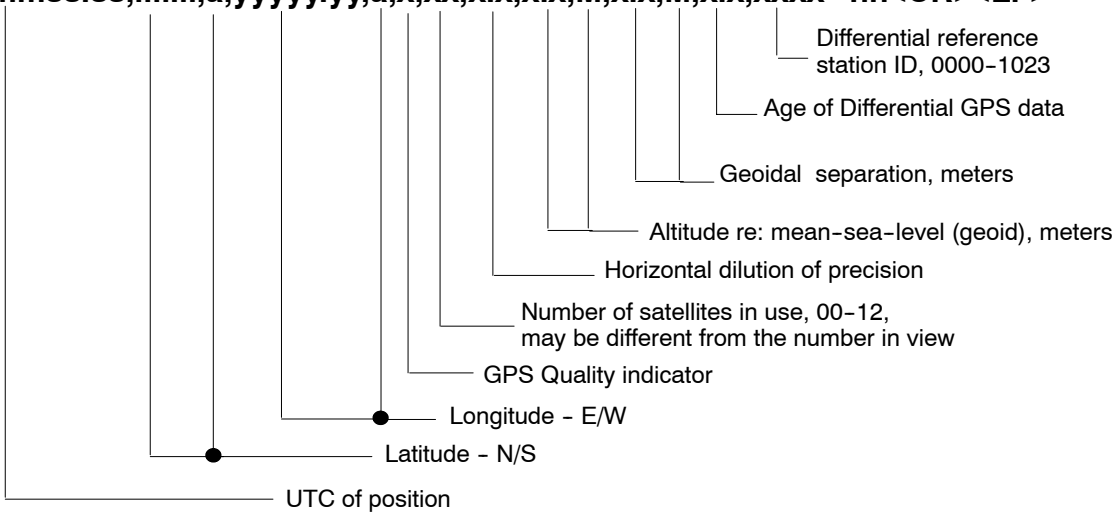
Note: Heading indication can be incorrect. Wait for a complete follow up,
Check voltage supply to the gyro compass!

8 NMEA-Formats

- **NMEA 0183 Format GGA**

  GGA⇒Global Positioning System Fix Data

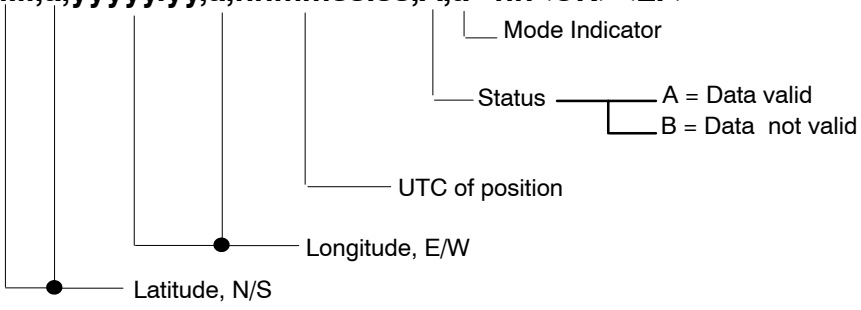
$--GGA,hhmmss.ss,llll.ll,a,yyyyy.yy,a,x,xx,x.x,x.x,M,x.x,M,x.x,xxxxhh<CR><LF>**



- **NMEA 0183 Format GLL**

  GLL ⇒ Geopgrphic Position - Latitude/Longitude

$--GLL,llll.ll,a,yyyyy.yy,a,hhmmss.ss,A,ahh<CR><LF>**



- **NMEA 0183 Format ROT**

ROT ⇒ Rate of Turn

$--ROT,x.x,A*hh<CR><LF>

Staus A = Data valid

Rate of Turn, degrees/minute, "-" bow turns to port

- **NMEA 0183 Format HDT**

HDT ⇒ Heading, True

$--HDT,x.x,T*hh<CR><LF>

reading, degrees True

- **NMEA 0183 Format HDG**

HDG ⇒ Heading, Magnetic

$--HDG,x.x, , , , *hh<CR><LF>

Magnetic sensor heading, degrees

- **NMEA 0183 Format VTG**

VTG⇒ Velocity Through Ground

$--VTG,x.x,T,x.x,M,x.x,N,x.x,K*hh<CR><LF>

Speed, km/hr

Speed, knots

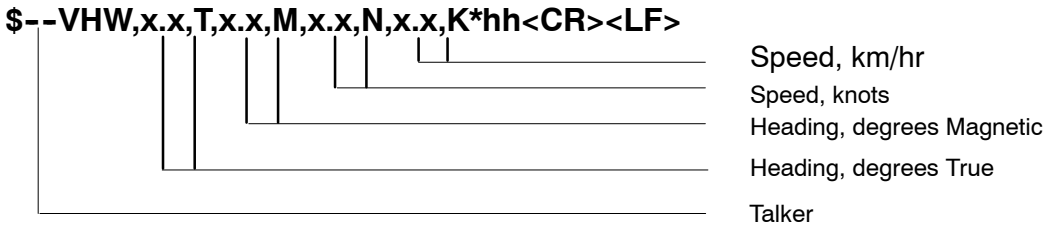
Heading, degrees Magnetic

Heading, degrees True

Talker

- **NMEA 0183 Format VHW**

  VHW⇒ Water Speed and Heading



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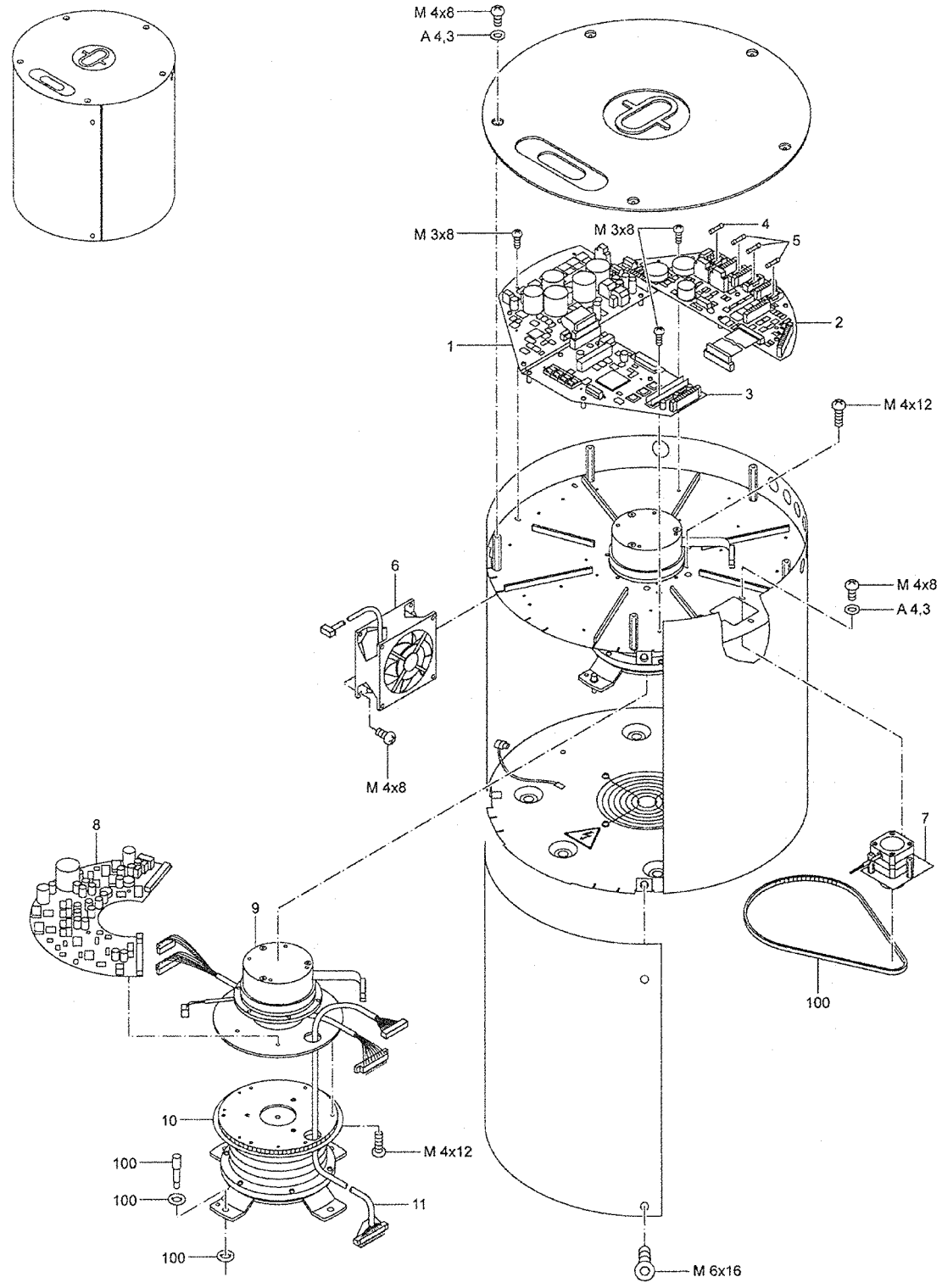
Kreiselkompaß STD.22
Gyro Compass STD.22
Type 110-233.NG001

Ersatzteilkatalog
SPARE PARTS
CATALOGUE



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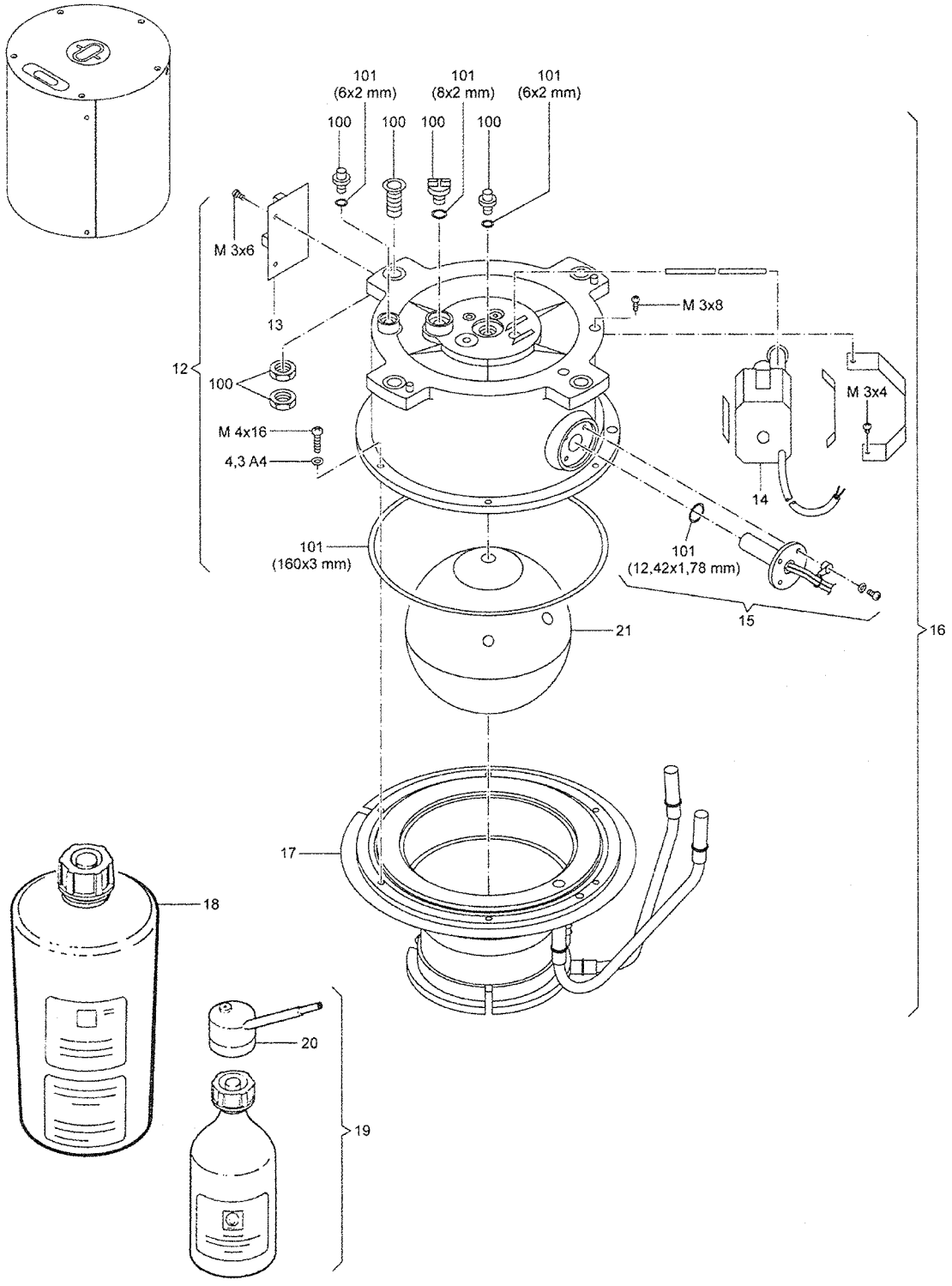
Kreiselkompaß STD.22
Gyro Compass STD.22
Type 110-233.NG001

ANSCHÜTZ

Ersatzteilkatalog
SPARE PARTS
CATALOGUE



Kreiselkompaß STD.22
Gyro Compass STD.22
Type 110-233.NG001

Ersatzteilkatalog
SPARE PARTS
CATALOGUE

Pos.	Lager-Nr. Stock-No.	Benennung	Designation	Zeichnungs-Nr. Part-No.	Stck. Qty.	Herst.-Code MFRC	Versorgungs-Nr. NSN
1	3604361	SPG-Versorgung	Power Supply PCB	110-233.102	1	D2865	
2	3604352	Anschluss-PCB	Connection PCB	NB 05-356	1	D2865	
3	3604660	Sensor-PCB	Sensor PCB	110-233.X08	1	D2865	
4	1762140	G-Sicherungseinsatz	Fuse	T 10 A L 250V 19195	1	D8882	5920-12-314-2556
5	1762017	G-Sicherungseinsatz	Fuse	T 1 A L 250V IEC 127-2	3	D8882	5920-12-167-4252
6	1504226	Lüfter	Fan	110-233.00-002	1	D2865	
7	3604068	Schrittmotor, vollst.	Step Motor, compl.	110-233.47	1	D2865	
8	3604360	Hüllkugel-PCB	Outer Sphere PCB	110-233.101	1	D2865	
9	3604567	Encoder, kompl.	Encoder, compl.	110-233.X01	1	D2865	
10[1]	3604060	Gelenk	Hinge	110-233.11	1	D2865	
11	3604090	Kabelstamm	Cable Loom	110-233.28	1	D2865	
12	3604569	Obere Hüllkugel	Upper Hemisphere	110-233.X07	1	D2865	
13	3604661	Klemmenleiste mit Temperatursensor	Terminal PCB with Temperature Sensor	110-233.X09	1	D2865	
14	3602315	Pumpe	Pump	110-231.40	1	D2865	
15	3602608	Heizung, kompl.	Heater, compl.	110-231.X01	1	D2865	
16	3604568	Hüllkugel, kompl.	Outer Sphere, compl.	110-233.X04	1	D2865	
17	3604571	Untere Hüllkugel	Lower Hemisphere	110-233.X02	1	D2865	
18	1502254	Tragflüssigkeit	Supporting Liquid	148-162 E01	1	D2865	6810-12-160-1000
19	1508499	Destilliertes Wasser	Distilled Water	148-398	1	D2865	
20	1507674	Kappe	Filler Pipe	148-398.00-002	1	D2865	5340-12-349-9869
21	4004566	Kreiselkugel, neu	Gyrosphere, new	111-006.E01	1	D2865	6605-12-349-5847
	4004792	Kreiselkugel, AT	Gyrosphere, Reconditioned	111-006.E01 AT		D2865	
100	3604573	Kleinteile-Satz	Set of small Parts	110-233.X50		D2865	
101	3608939	Satz Dichtungen	Set of Gaskets	110-222.X01		D2865	5330-12-343-3789
	3604572	Schraubensatz	Set of Screws	110-233.X03		D2865	

[1] incl. Pos. 11

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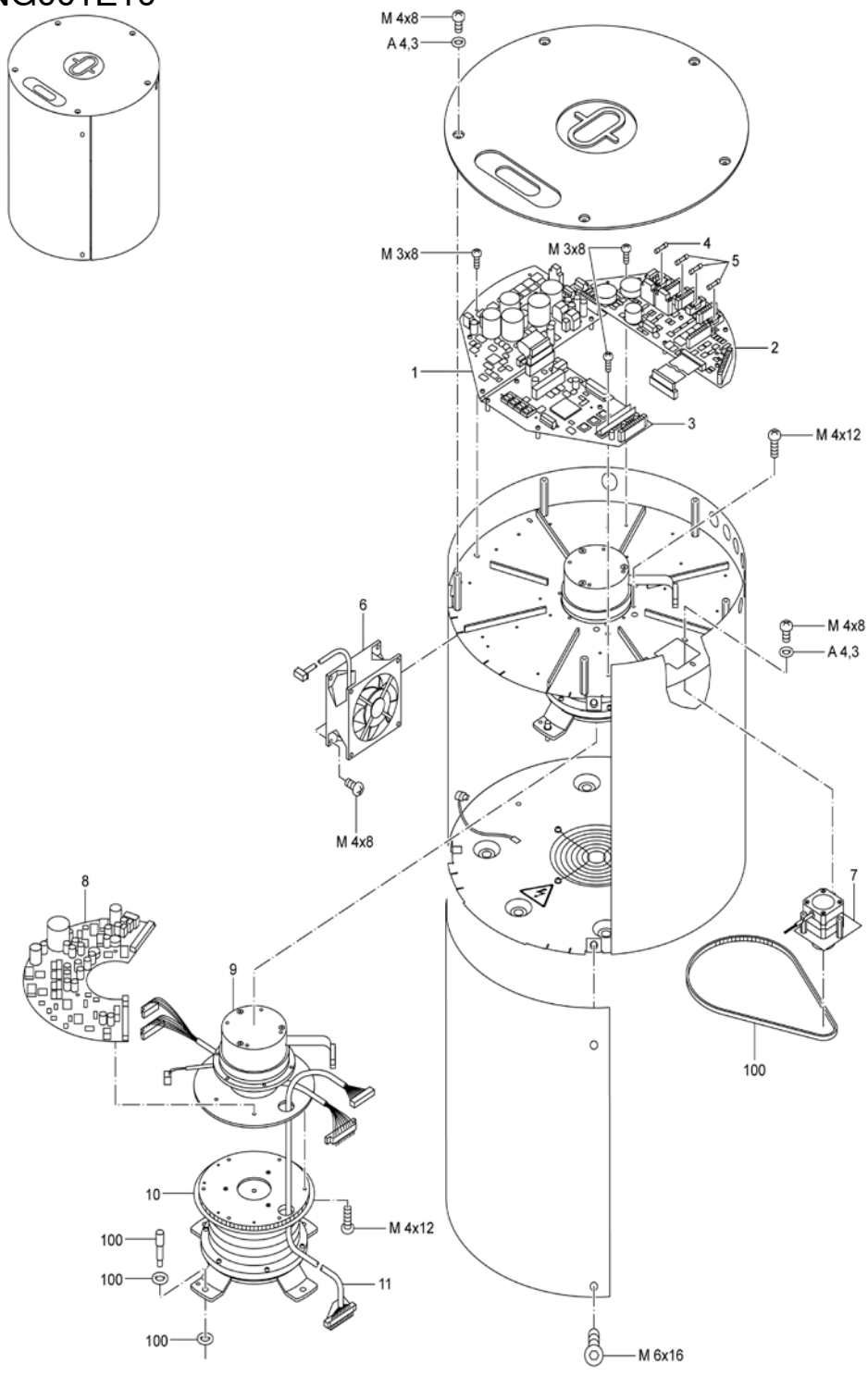
Kreiselkompaß STD.22
Gyro Compass STD.22
Type
110-233.NG001E10

ANSCHÜTZ
Ersatzteilkatalog
SPARE PARTS
CATALOGUE



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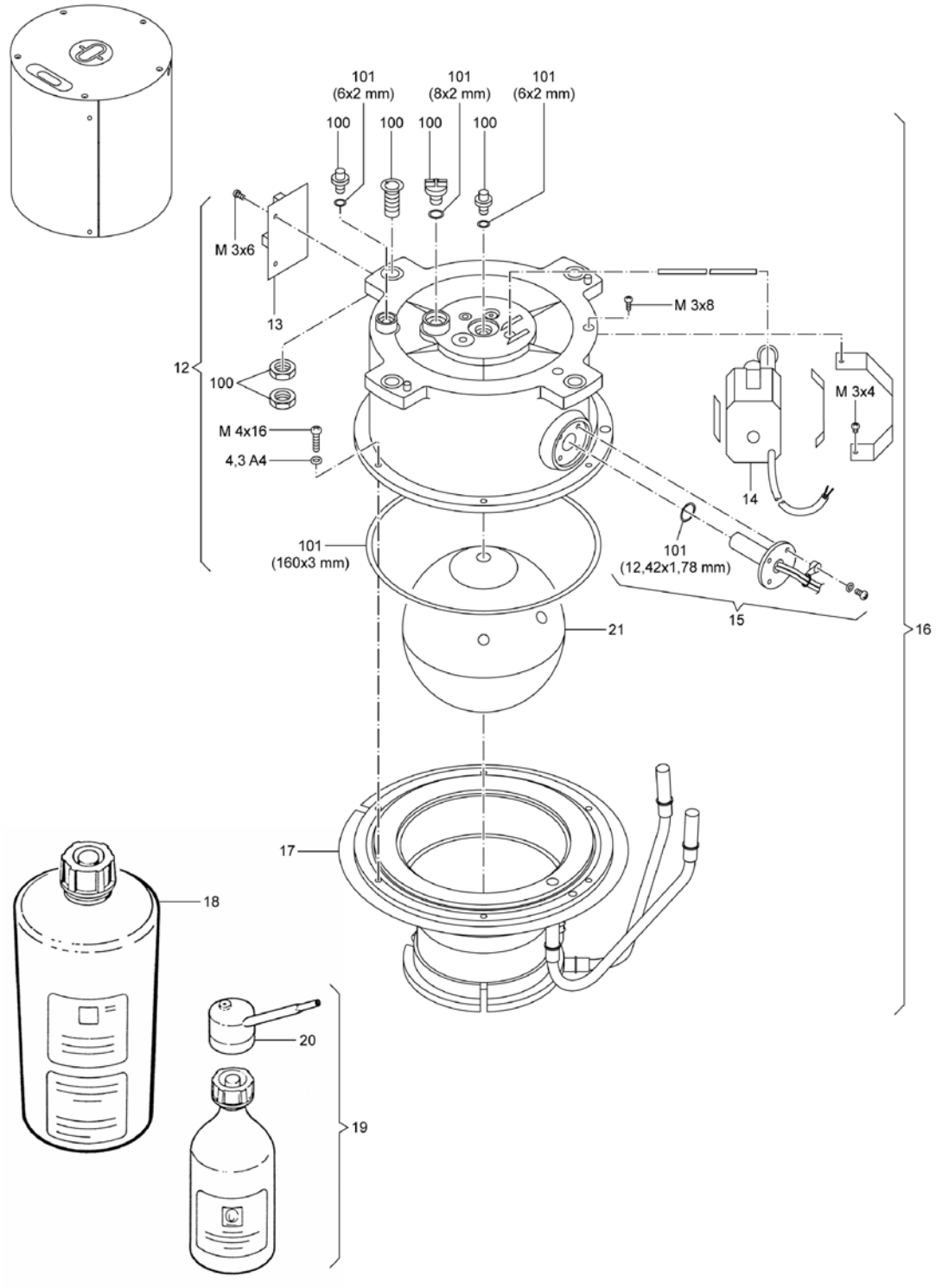
Kreiselkompaß STD.22
Gyro Compass STD.22
Type
110-233.NG001E10

ANSCHÜTZ

Ersatzteilkatalog
SPARE PARTS
CATALOGUE



Kreiselkompaß STD.22
Gyro Compass STD.22
Type
110-233.NG001E10

Ersatzteilkatalog
SPARE PARTS
CATALOGUE

Pos.	Lager-Nr. Stock-No.	Benennung	Designation	Zeichnungs-Nr. Part-No.	Stck. Qty.	Herst.-Code MFRC	Versorgungs-Nr. NSN
1	3609658	SPG-Versorgung	Power Supply PCB	110-233.X12	1	D2865	
2	3609659	Anschluss-PCB	Connection PCB	110-233.X13	1	D2865	
3	3609657	Sensor-PCB	Sensor PCB	110-233.X11	1	D2865	
4	1762140	G-Sicherungseinsatz	Fuse	T 10 A L 250V 19195	1	D8882	5920-12-314-2556
5	1762017	G-Sicherungseinsatz	Fuse	T 1 A L 250V IEC 127-2	3	D8882	5920-12-167-4252
6	1504226	Lüfter	Fan	110-233.00-002	1	D2865	
7	3604068	Schrittmotor, vollst.	Step Motor, compl.	110-233.47	1	D2865	
8	3609386	Hüllkugel-PCB	Outer Sphere PCB	110-233.X10	1	D2865	
9	3604567	Encoder, kompl.	Encoder, compl.	110-233.X01	1	D2865	
10[1]	3604060	Gelenk	Hinge	110-233.11	1	D2865	
11	3604090	Kabelstamm	Cable Loom	110-233.28	1	D2865	
12	3604569	Obere Hüllkugel	Upper Hemisphere	110-233.X07	1	D2865	
13	3604661	Klemmleiste mit Temperatursensor	Terminal PCB with Temperature Sensor	110-233.X09	1	D2865	
14	3602315	Pumpe	Pump	110-231.40	1	D2865	
15	3602608	Heizung, kompl.	Heater, compl.	110-231.X01	1	D2865	
16	3604568	Hüllkugel, kompl.	Outer Sphere, compl.	110-233.X04	1	D2865	
17	3604571	Untere Hüllkugel	Lower Hemisphere	110-233.X02	1	D2865	
18	1502254	Tragflüssigkeit	Supporting Liquid	148-162 E01	1	D2865	6810-12-160-1000
19	1508499	Desitlliertes Wasser	Distilled Water	148-398	1	D2865	
20	1507674	Kappe	Filler Pipe	148-398.00-002	1	D2865	5340-12-349-9869
21	4004566	Kreiselkugel, neu	Gyrosphere, new	111-006.E01	1	D2865	6605-12-349-5847
	4004792	Kreiselkugel, AT	Gyrosphere, Reconditioned	111-006.E01 AT		D2865	
100	3604573	Kleinteile-Satz	Set of small Parts	110-233.X50		D2865	
101	3608939	Satz Dichtungen	Set of Gaskets	110-222.X01		D2865	5330-12-343-3789
		Schraubensatz	Set of Screws	110-233.X03		D2865	

[1] incl. Pos 11

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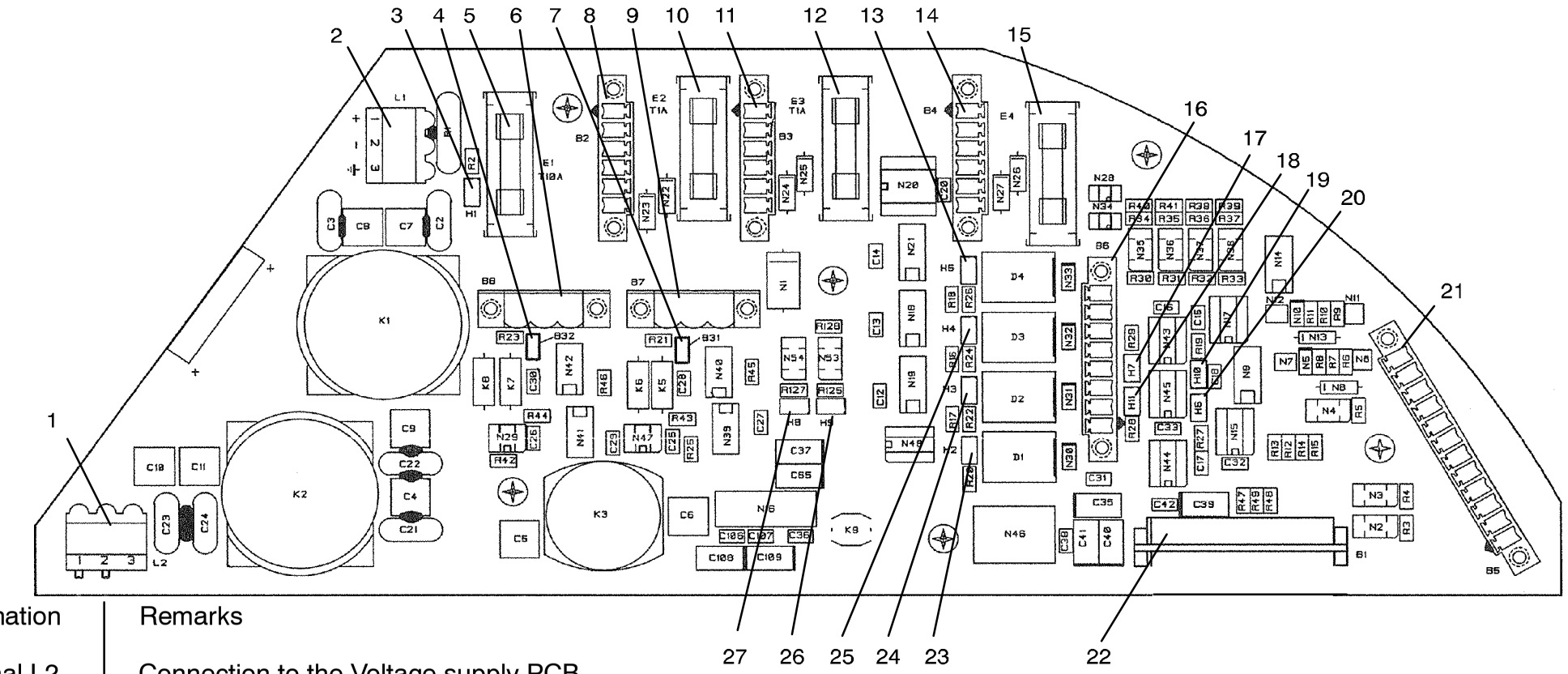
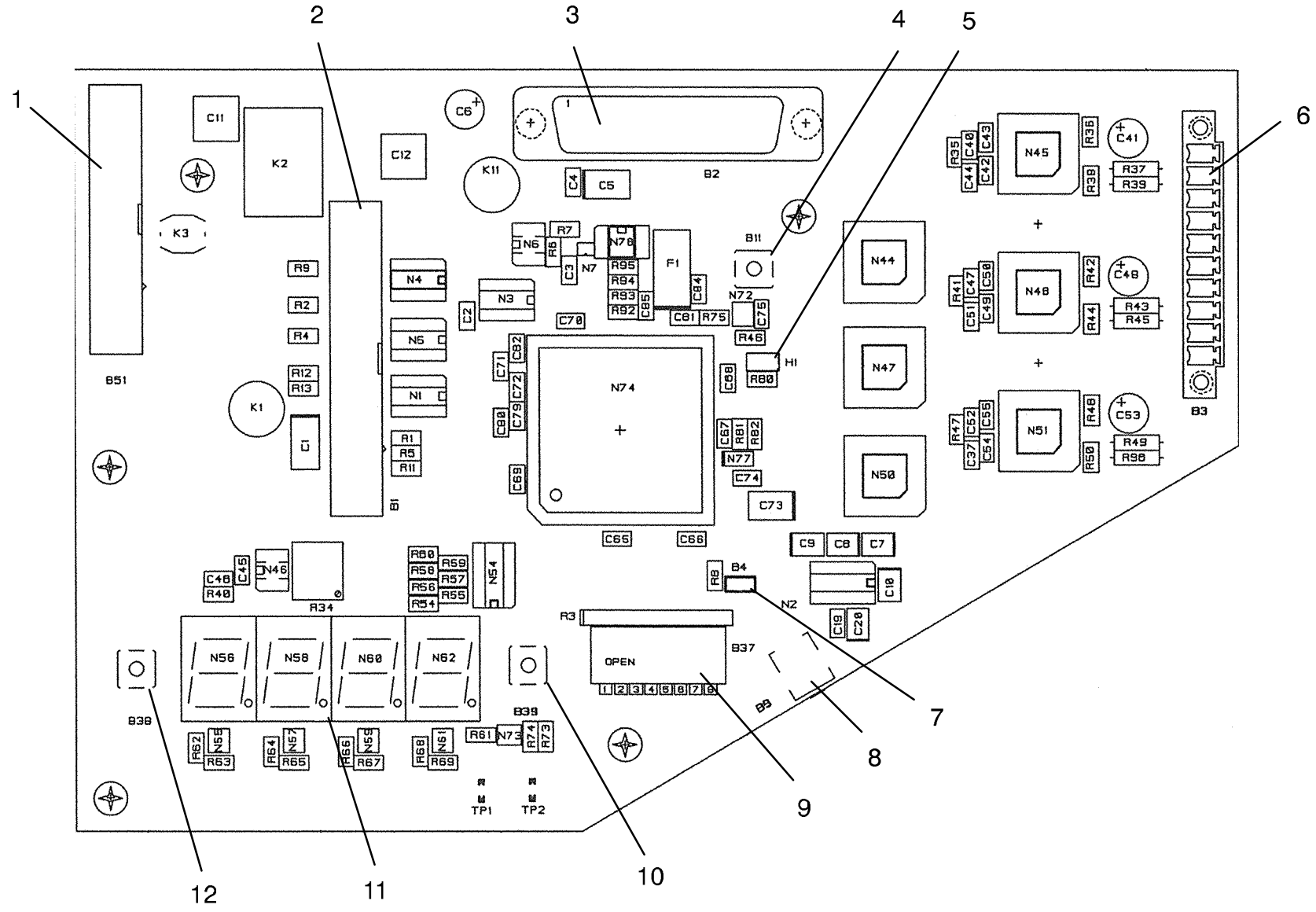


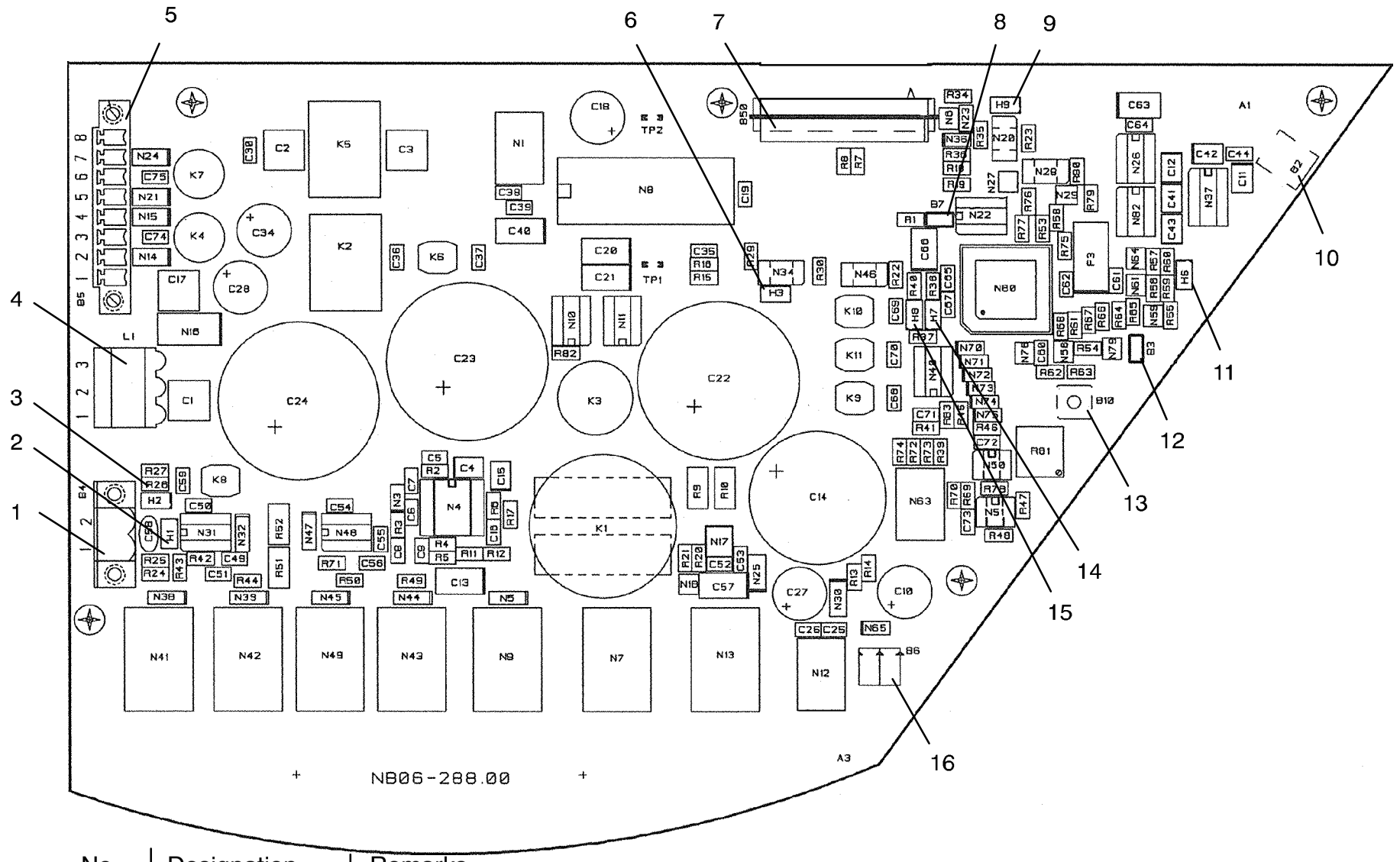
No.	Designation	Remarks
1	Terminal L2	Connection to the Voltage supply PCB
2	Terminal L1	Connection Supply Voltage 24VDC
3	LED H1	Indication Supply Voltage 24VDC
4	Jumper B32	Terminator for für CAN1
5	Fuse E1	Compass, 10A, T
6	Plug B8	CAN-bus, CAN1
7	Jumper B31	Terminator for CAN2
8	Plug B2	serial Interface NMEA/Coursebus Channel1
9	Plug B7	CAN-Bus, CAN2
10	Fuse E2	Channel1, 1A, T
11	Plug B3	serial Interface NMEA/Coursebus Channe2
12	Fuse E3	Channel2, 1A, T
13	LED H5	Function indicator of relay D4, AVAILABLE
14	Plug B4	Output Coursebus
15	Fuse E4	Coursebus output, 1A, T
16	Plug B6	Statussignals
17	LED H7	Output Channel2 (lights up red = Coursebus)
18	LED H11	Output Channel2 (lights up green = NMEA)
19	LED H10	Output Channel1 (lights up green = NMEA)
20	LED H6	Output Channel1 (lights up red = Coursebus)
21	Plug B5	NMEA In, Puls Log In, QS (STD 22C)
22	Plug B1	Connection to the Sensor PCB
23	LED H2	Function indicator of relay D1, QS
24	LED H3	Function indicator of relay D2, SEC
25	LED H4	Function indicator of relay D3, System error
26	LED H9	CAN2 Supply Voltage +5VDC
27	LED H8	CAN1 Supply Voltage +5VDC

NB05-356
Connection PCB



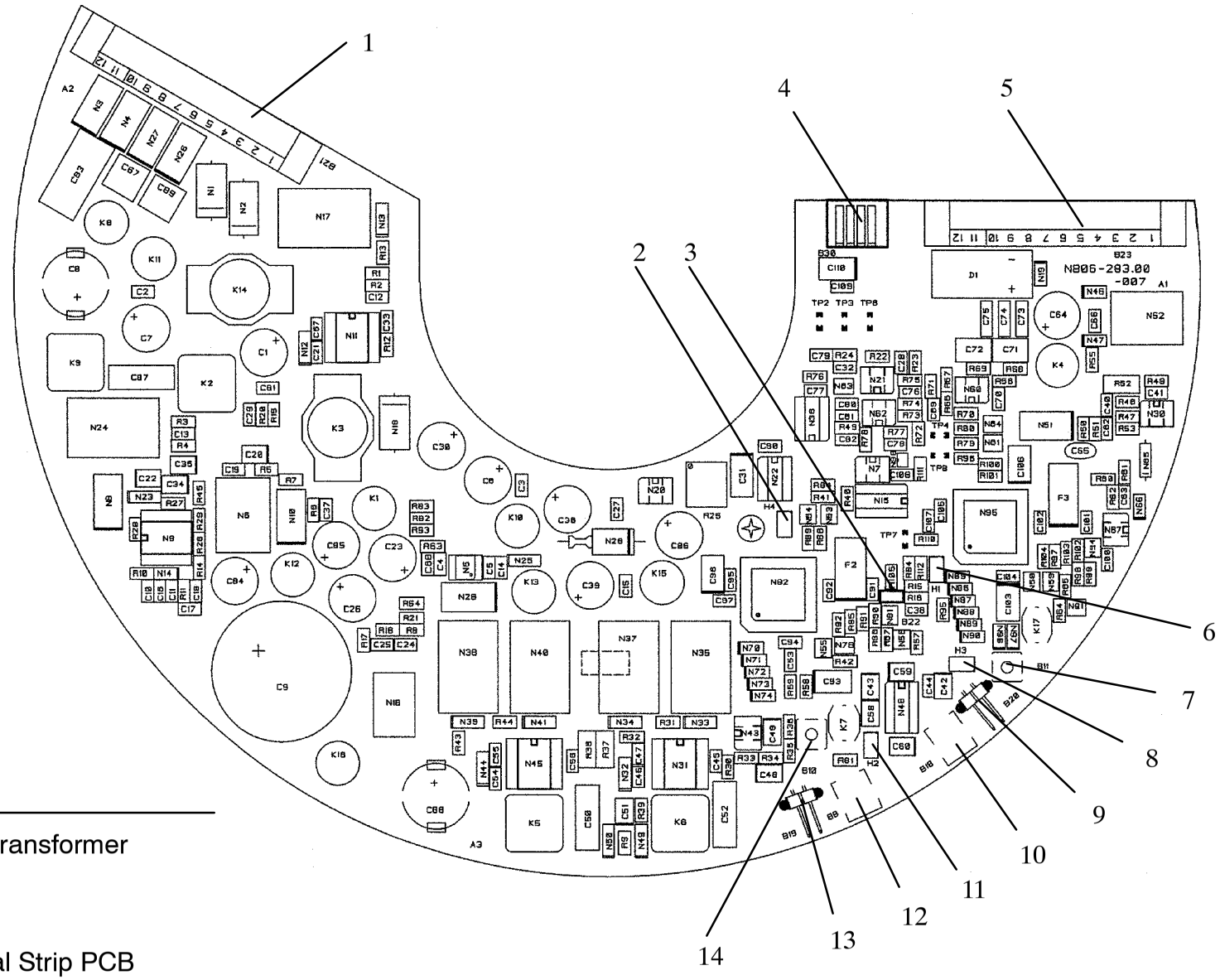
No.	Designation	Remarks
1	Plug B51	Connection to Supply PCB (STD 22)
2	Plug B1	Connectio to the NMEA-THREESTATE-MODUL
3	Plug B2	Connection to the Shaft-Encoder
4	Push button B11	Processor Reset
5	LED H1	Processor monitoring
6	Plug B3	Connection to the step motor
7	Jumper B4	Testpurpose only, Output Coursebus or NMEA
8	Plug B9	Connection for programming FLASH-PROM
9	DIP switch B37	Setting of parametrs and operation modes, read-out of Compass information
10	Push button B39	Selection and setting in combination with DIP switch
11	Display	Selection and setting in combination with DIP switch
12	Push button B38	Selection and setting in combination with DIP switch

110-233.X08
Sensor PCB



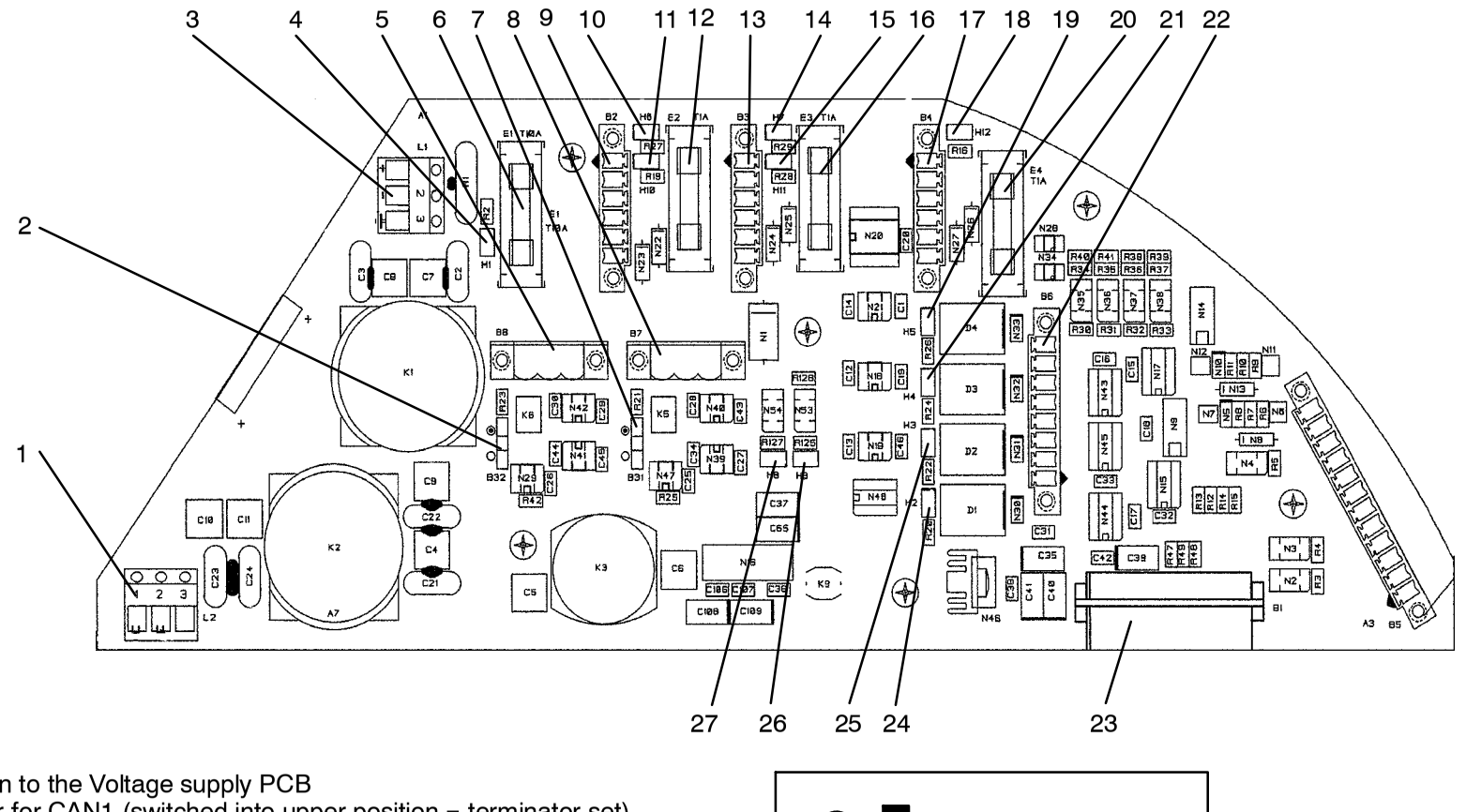
No.	Designation	Remarks
1	Plug B4	Connection inductivity primary coil
2	LED H1	Output voltage for inductie transmission
3	LED H2	Output voltage for inductie transmission
4	Terminal L1	Connection for Ship‘s supply 24VDC
5	Plug B5	Connection inductivity secondary coil
6	LED H3	Operating voltage relay-supply 12VDC
7	Ülug B50	Connection to the Sensor PCB
8	Jumper B7	Only for manufacturers application
9	LED H9	Operating voltage Shaft-Encoder 15VDC
10	Plug B2	Connection for programming FLASH-PROM
11	LED H6	lights up (red) while programming
12	Jumper B3	Must be set to FLASH the processor
13	Push button B10	Prozessor Reset
14	LED H7	lights up (red) on malfunction of the supply PCB
15	LED H8	Procerssor monitoring
16	Plug B6	Connection for the fan

110-233.102
Power Supply PCB

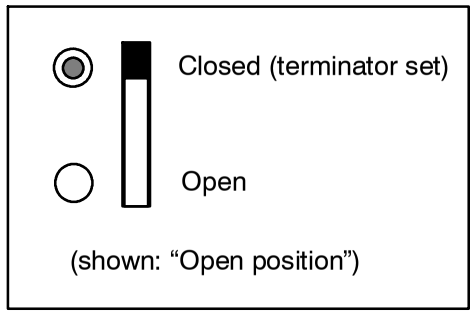


No.	Designation	Remarks
1	Plug B21	Connection to the ferrite transformer
2	LED H4	Processor clock MC2
3	Jumper B22	Developement only
4	Plug B30	Internal CAN bus
5	Plug B23	Connection to the terminal Strip PCB
6	LED H1	Processor clock MC1
7	Push button B11	Reset function (after flashig of MC1)
8	LED H3	Flashing MC1 (lights up when jumper B20 is insterted)
9	Jumper B20	Has to be inserted to flash MC1
10	Plug B18	Connection to flash MC1
11	LED H2	Flashing MC2 (lights up when jumper B 19 is inserted)
12	Plug B8	Connection to flash MC2
13	Jumper B19	Has to be inserted to flash MC2
14	Push button B10	Reset function (after flashing of MC2)

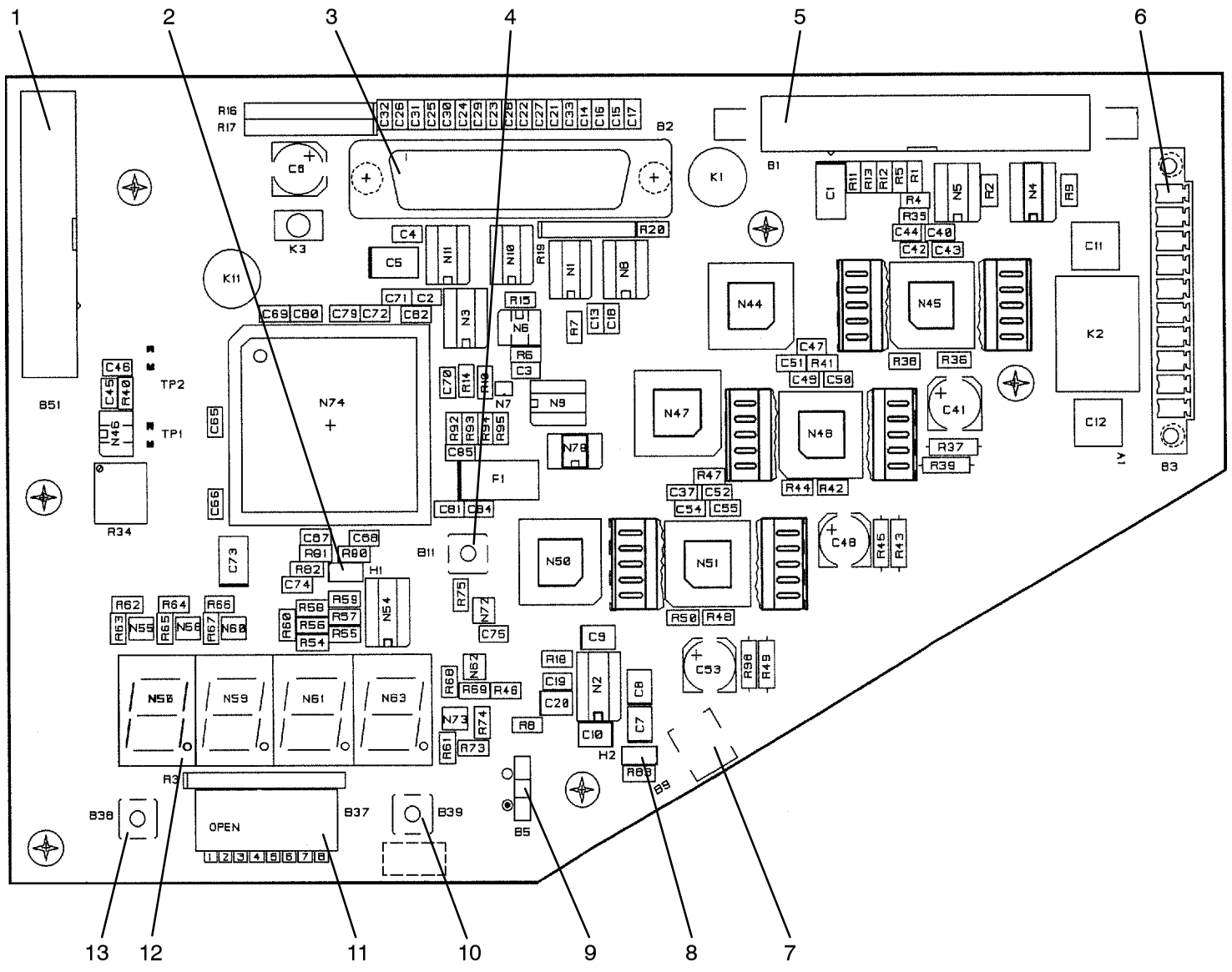
110-233.101
Outer Sphere PCB



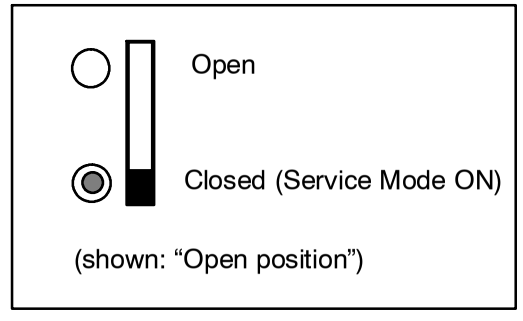
No.	Designation	Remarks
1	Terminal L2	Connection to the Voltage supply PCB
2	Switch B32	Terminator for CAN1 (switched into upper position = terminator set)
3	Terminal L1	Connection Supply Voltage 24V DC
4	LED H1	Indication Supply Voltage 24V DC
5	Plug B8	CAN-bus, CAN1
6	Fuse E1	Compass, 10A, T
7	Switch B31	Terminator for CAN2 (switched into upper position = terminator set)
8	Plug B7	CAN-bus, CAN2
9	Plug B2	serial Interface NMEA/Coursebus Channel 1
10	LED H8	CAN1 Supply Voltage +5V DC
11	LED H10	Output Channel1 (lights up green = NMEA)
12	Fuse E2	Channel1, 1A, T
13	Plug B3	serial Interface NMEA/Coursebus Channel2
14	LED H7	Output Channel2 (lights up red = Coursebus)
15	LED H11	Output Channel2 (lights up green = NMEA)
16	Fuse E3	Channel2, 1A, T
17	Plug B4	Output Coursebus
18	LED H12	Output Coursebus (B4) (lights up red = Coursebus)
19	LED H5	Function indicator of relay D4, AVAILABLE
20	Fuse E4	Coursebus output, 1A, T
21	LED H4	Function indicator of relay D3, SYSTEM ERROR
22	Plug B6	Statussignals
23	Plug B1	Connection to Sensor PCB
24	LED H2	Function indicator of relay D1, QS
25	LED H3	Function indicator of relay D2, SEC
26	LED H9	CAN2 Supply Voltage +5VDC
27	LED H8	CAN1 Supply Voltage +5VDC



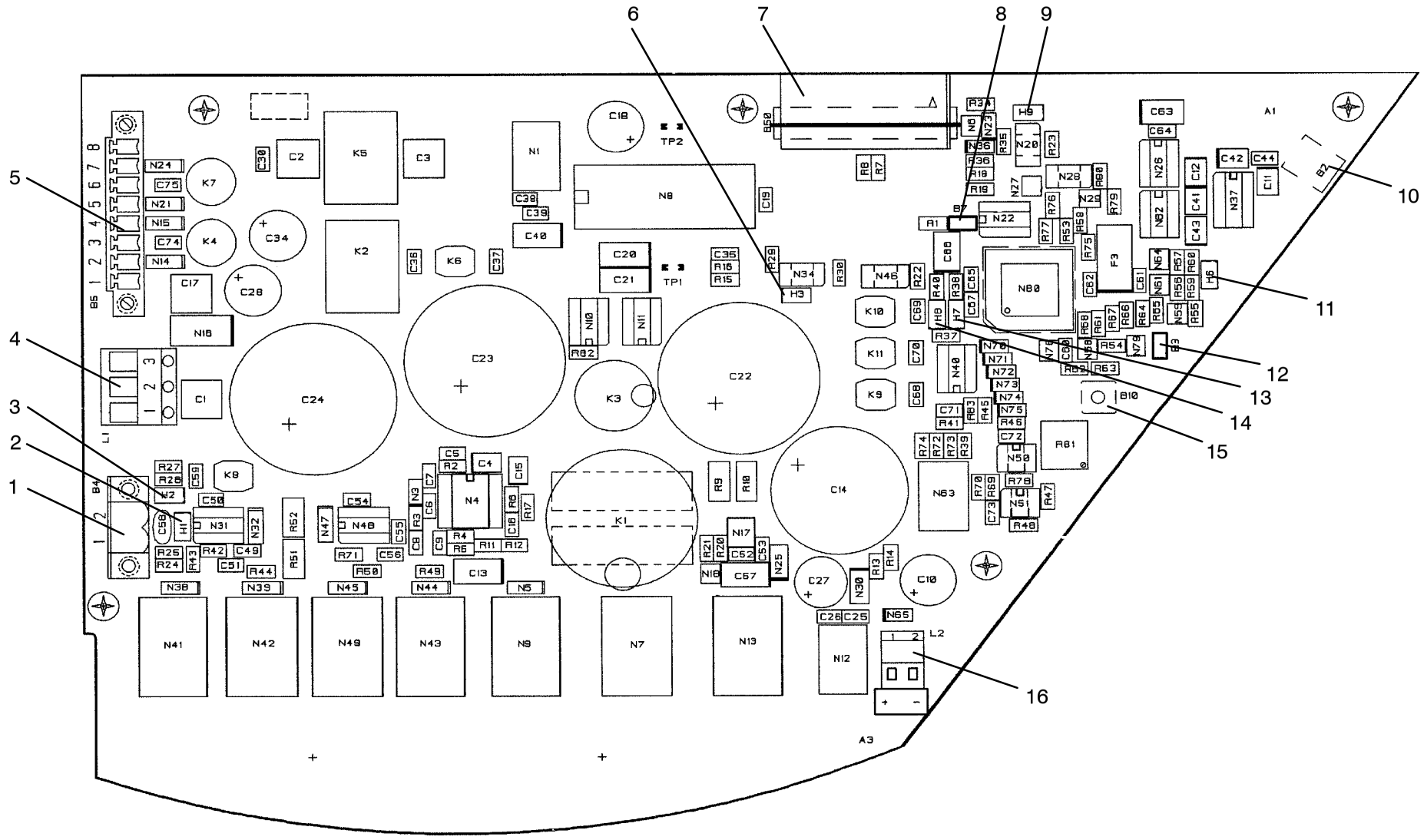
E10 110-233.X13
Connection PCB



No.	Designation	Remarks
1	Plug B51	Connection to Supply PCB (STD 22M)
2	LED H1	Processor monitoring
3	Plug B2	Connection to the Shaft-Encoder
4	Push button B11	Processor Reset
5	Plug B1	Connection to the NMEA-THREESTATE-MODUL
6	Plug B3	Connection to the step motor
7	Plug B9	Plug to connect external devices in the Service Mode
8	LED H2	Blinking while “Service Mode”
9	Switch B6	Switschin on into Service Mode
10	Push button B39	Selection and setting in combination with DIP switch
11	DIP switch B37	Selection and setting in combination with DIP switch
12	Display	
13	Push button B38	Selection and setting in combination with DIP switch

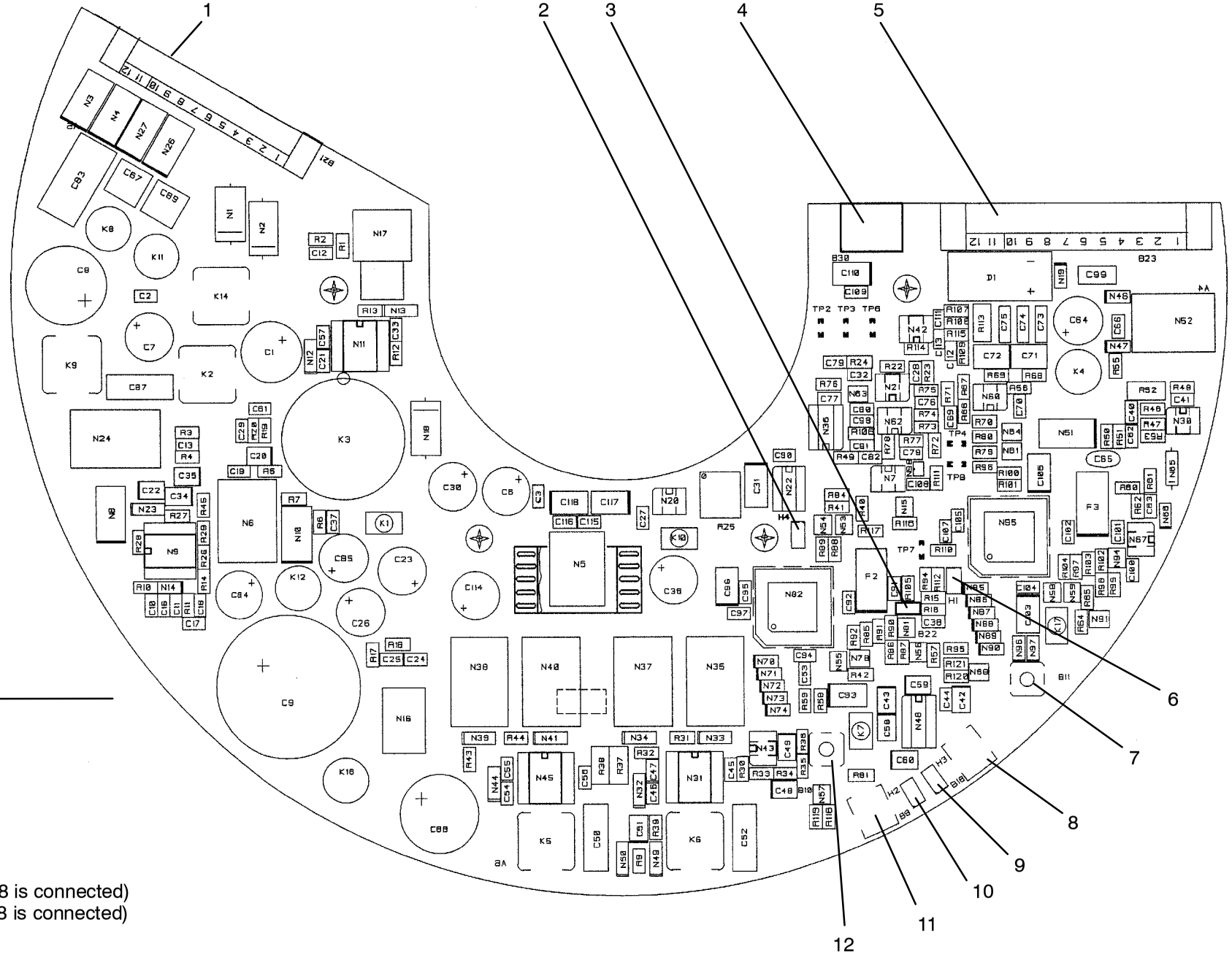


E10 110-233.X11
Sensor PCB



No.	Designation	Remarks
1	Plug B4	Connection inductivity primary coil
2	LED H1	Output voltage for inductie transmission
3	LED H2	Output voltage for inductie transmission
4	Terminal L1	Connection for Ship‘s supply 24VDC
5	Plug B5	Connection inductivity secondary coil
6	LED H3	Operating voltage relay-supply 12VDC
7	Ülug B50	Connection to the Sensor PCB
8	Jumper B7	Only for manufacturers application
9	LED H9	Operating voltage Shaft-Encoder 15VDC
10	Plug B2	Connection for programming FLASH-PROM
11	LED H6	lights up (red) while programming
12	Jumper B3	Must be set to FLASH the processor
13	Push button B10	Prozessor Reset
14	LED H7	lights up (red) on malfunction of the supply PCB
15	LED H8	Procerssor monitoring
16	Terminal L2	Connection for the fan

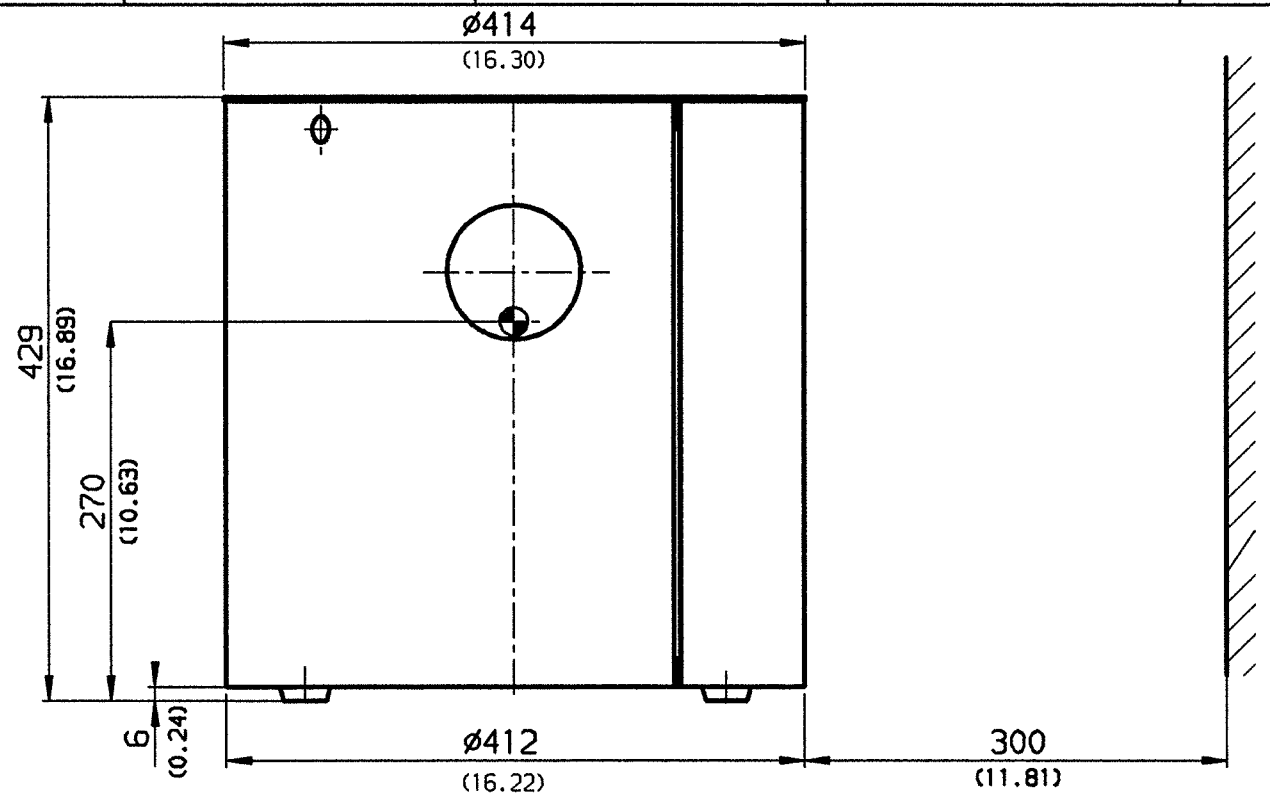
E10 110-233.X12
Power Supply PCB



No..	Designation	Remarks
1	Plug B21	Connection to the ferrite transformer
2	LED H4	Processor clock MC2
3	Jumper B22	Developement only
4	Plug B30	Internal CAN bus
5	Stecker B23	Connection to the terminal Strip PCB
6	LED H1	Processor clock MC1
7	Push button B11	Reset function (after flashig of MC1)
8	Plug B18	Connection to flash MC1
9	LED H3	Flashing MC1 (light up when Plug B18 is connected)
10	LED H2	Flashing MC2 (lights up when Plug B8 is connected)
11	Plug B8	Connection to flash MC2
12	Push button B10	Reset function (after flashing of MC2)

E10 110-233.X10
Outer Sphere PCB

A3 - D

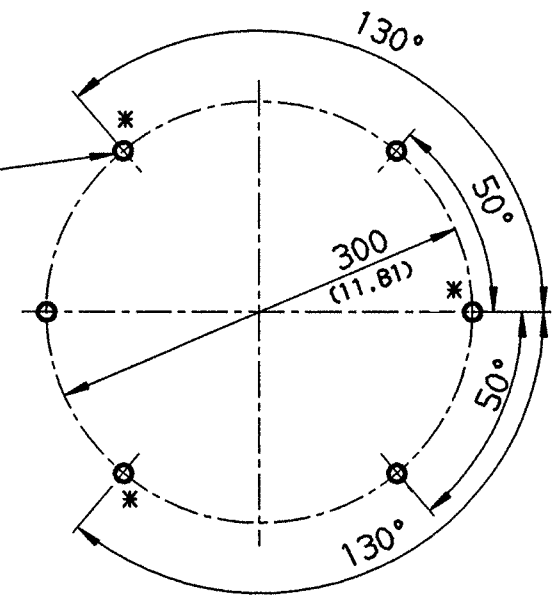


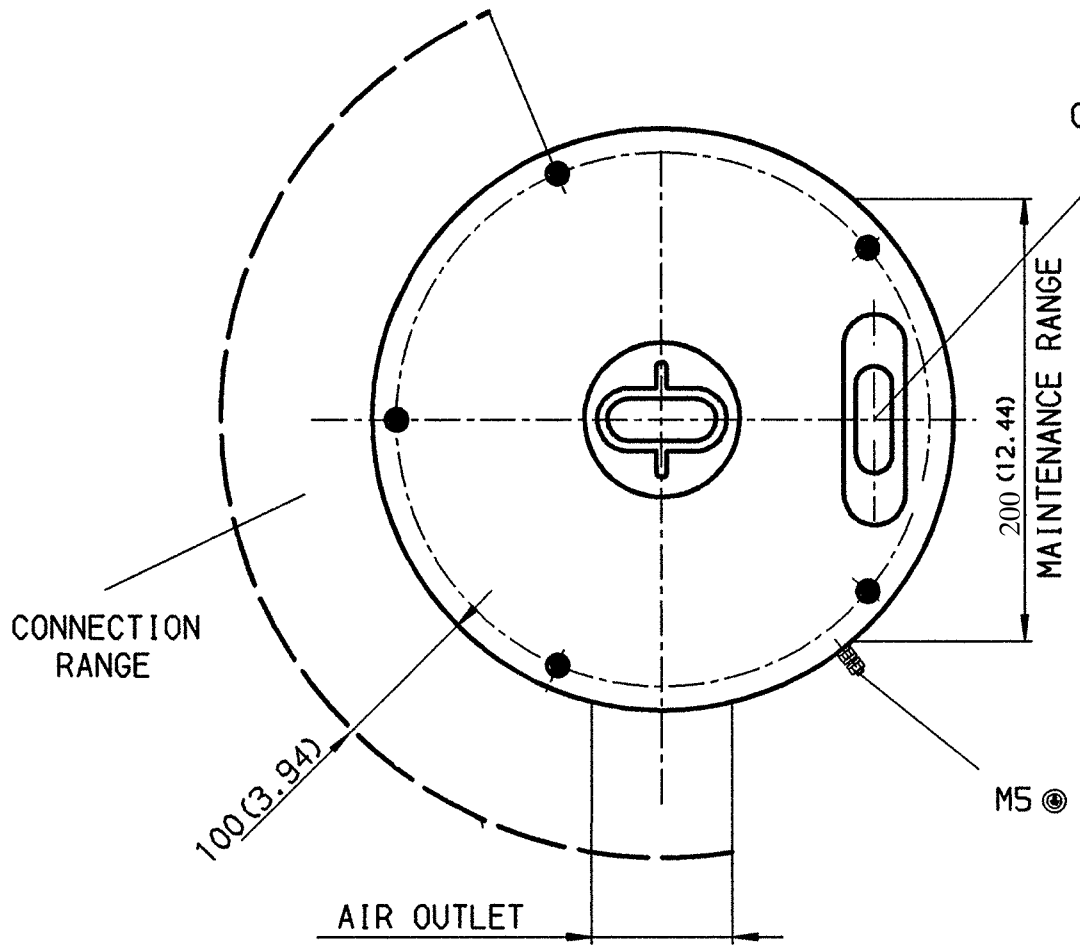
ø12,5(ø0.49) FOR M10 OR
MAX. ø11(ø0.43)
FOR WOOD SCREW MAX.

BEARING SURFACE DIAMETER
MIN. 400MM,(15.75)
EVENNESS 1MM (0.04)

*WITH CIVILIAN APPLICATION
SUFFICIENTLY

DRILLING SCHEME





⊕-CENTRE OF GRAVITY

TYPE OF ENCLOSURE: IP 23

DIMENSIONS WITHOUT TOLERANCES ARE
MAXIMUM DIMENSIONS

+0,5 -0,5
DIN 6784

CAD

DISTANCE FROM MAGNETIC COMPASS
STANDARD TYPE: m STEERING TYPE: m

mm
(INCH)

REV.	REVISIONS	DATE	NAME
B	6491.110	26.09.03	Kop
A	.	14.05.03	Kop

	DATE	NAME
2003		
DR.	07.05.	Kop
APPR.	1.10.03	
CHK.	09.10.03	Kum
RELEASE:	A/16.06.03	

Raytheon
Raytheon Marine GmbH
Germany

SCALE –
WEIGHT: 16 kg

DRAWING TITLE:
GYRO COMPASS
DIMENSIONAL DRAWING

DRAWING NO.: 110 - 233 HP005
SH. 1
OF 1

110-233.HP005
05014915

DISTRIB. UNIT STD22
138-118 NG001

U2
I/O PCB
138-118.101

STEP OUTPUT (6ST/1*)

SERIEL OUTPUTS (COURSE BUS H SER/NMEA)

STATUS/ALARM

SYSTEMALARM
SENSORALARM G1
SENSORALARM G2
SENSORALARM G3/GPS
SENSORALARM TMC
MONITORALARM GYRO/TMC
SENSOR-DIFF. ALARM
TMC SELECTED
GYRO SELECTED
GPS COMPASS SELECTED
CAN DISTURBED
RESERVE
R.o.T
COURSE PRINTER
MAGN. SENSOR (TMC)

U1
INTERFACE PCB
138-118.100

U3
VOLTAGE DISTRIBUTION
138-118.02

U4 FILTER 1
U5 FILTER 2
U6
HFA75M40C

PULSE LOG INPUT
PULSE LOG DIR. INPUT
STATUS TWIN EQUIPMENT INPUT
400 HZ
BOOSTER
SYSTEM
COURSE BUS
J1V-BUS
CAN 1
CAN 2

SHIELDED CABEL
TWISTED 1/2
CROSS SECTION
≥ 0,5 ²

STRANDED WIRES TWISTED

PULSLOG
200 OD 400 P/NM
INPUT

NMEA
GPS
INPUT

0183
LOG
INPUT

NB60-043/3,0M LG

GYRO 1

GYRO 2

* BUILD LOOP THROUGH FERRITE CORE (FERRITE CORES ARE-DELIVERED WITH THE DISTRIBUTION UNIT)

ID.-NR.: 5015898

CAD B 4521 G

02. Okt. 2003

						2003	DATUM	NAME
						BEARB	13.06.03	ARENDT/KE
1-3	F	6537.110	290905	STE	GEPR	10.05.05	
1	E	6562.110	10.05.05	STE	NORM	6.10.05	
3	D	6494.110	10.10.03	KE	FREIG	B / 18.06.03	
1-3	C	6477.110	030903	KE			
	B		170603	ADT			
1+2+3	A		130603	ADT			
BLATT	ZUST	ANDERUNG	DATUM	NAME				

Raytheon
Raytheon Marine GmbH
Germany

BENENNUNG
GYRO COMPASS STD.22
CABLE AND CONNECTION DIAGRAM

ZEICHNUNGSNUMMER
110-233.HP009

BL. 1
VON 3

ERS FÜR | ERS DURCH

U3.L1 U1.B7 U1.B6 U3.L1

U7 OPERATOR UNIT 130-613

B7: ⏚ U3.L1.⏚ · 0V U3.L1.16 · +24V U3.L1.11

CAN 2: 1 CAN L · 2 CAN H · 3 GND — U1.B7.1 U1.B7.2 U1.B7.3 — B2: U8.B5.1 U8.B5.2 U8.B5.3

CAN 1: 1 CAN L · 2 CAN H · 3 GND — U1.B6.1 U1.B6.2 U1.B6.3 — B1: U8.B4.1 U8.B4.2 U8.B4.3

SHIELDED CABEL TWISTED 1/2 CROSS SECTION ≥ 0.5 ²

NB60-043/3.0M LG

U8 REPEATER 133-560

⏚ · 0V · +24V · COURSE BUS/NMEA RX+ RX- — L1: U3 L1.⏚ · U3 L1.17 · U3 L1.12

CAN 2: 1 CAN L · 2 CAN H · 3 GND — U7.B2.1 U7.B2.2 U7.B2.3 — B5

CAN 1: 1 CAN L · 2 CAN H · 3 GND — U7.B1.1 U7.B1.2 U7.B1.3 — B4

110-233 GYRO COMPASS STD.22 — U9

N805-356 CONNECTION PCB

OUTPUT (CHN 1) COURSE BUS (H SER) / NMEA — E2 T1A — 24V 0V TX+ TX- TX GND

OUTPUT (CHN 2) COURSE BUS (H SER) / NMEA — E3 T1A — 24V 0V TX+ TX- TX GND

OUTPUT COURSE BUS — E4 T1A — 24V 0V TX+ TX- TX GND

H1 GN — E1 T10A

OUTPUT — H2 GN · H3 GN · H4 RD · H5 GN — OS · SEC · SYSTEM · AVAILABLE

INPUT — +24V · SET OS INPUT · PULSLOG INPUT · PULSLOG DIR INPUT · RX+ RX- NMEA LOG INPUT · RX+ RX- GPS INPUT

CAN 1: 1 CAN L · 2 CAN H · 3 GND — B7 — U1.B6.3 U1.B6.2 U1.B6.1

CAN 2: 1 CAN L · 2 CAN H · 3 GND — B8 — U10.B6.1 U10.B6.2 U10.B6.3

L1 (24V 0V ⏚) — B2 — B3 — B4 — B6 — B5

U3.L1.3 U3.L1.5 — CROSS SECTION ≥ 2.5 ²

U1.B6 U1.B7

SHIELDED CABEL TWISTED 1/2 CROSS SECTION ≥ 0.5 ²

110-233 GYRO COMPASS STD.22 — U10

N805-356 CONNECTION PCB

OUTPUT (CHN 1) COURSE BUS (H SER) / NMEA — E2 T1A — 24V 0V TX+ TX- TX GND

OUTPUT (CHN 2) COURSE BUS (H SER) / NMEA — E3 T1A — 24V 0V TX+ TX- TX GND

OUTPUT COURSE BUS — E4 T1A — 24V 0V TX+ TX- TX GND

H1 GN — E1 T10A

OUTPUT — H2 GN · H3 GN · H4 RD · H5 GN — OS · SEC · SYSTEM · AVAILABLE

INPUT — +24V · SET OS INPUT · PULSLOG INPUT · PULSLOG DIR INPUT · RX+ RX- NMEA LOG INPUT · RX+ RX- GPS INPUT

CAN 1: 1 CAN L · 2 CAN H · 3 GND — B7 — U11.B7.3 U11.B7.2 U11.B7.1

CAN 2: 1 CAN L · 2 CAN H · 3 GND — B8 — U9.B8.1 U9.B8.2 U9.B8.3

L1 (24V 0V ⏚) — B2 — B3 — B4 — B6 — B5

U3.L1.8 U3.L1.10 — CROSS SECTION ≥ 2.5 ²

SHIELDED CABEL TWISTED 1/2 CROSS SECTION ≥ 0.5 ²

U11.87 · U11.88

ID.-NR.5015898

CAD

F	6597.110	290905	STE		
E	6580.110	100505	STE		
D	6494.112	101003	KE		
C	6477.110	030903	KE		
B		170603	ADT		
A		130603	ADT		
BLATT	ZUST	ÄNDERUNG	DATUM	NAME	

CAD B 4521 G

	DATUM	NAME
2003		
BEARB	13.06.03	ARENDT/KE
GEPR	10.05.05	
NORM	6.10.05	
FREIG	B / 18.06.03	

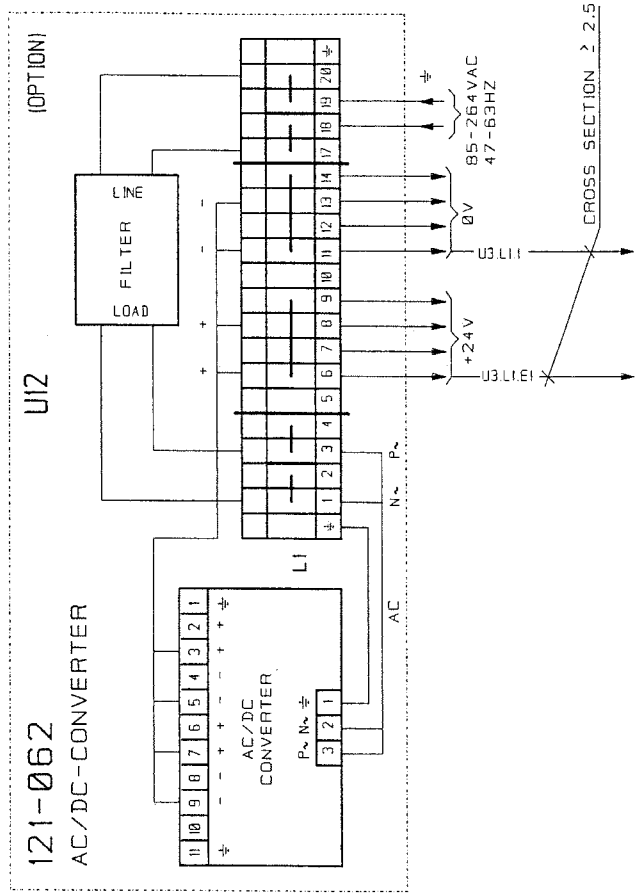
Raytheon
Raytheon Marine GmbH
Germany

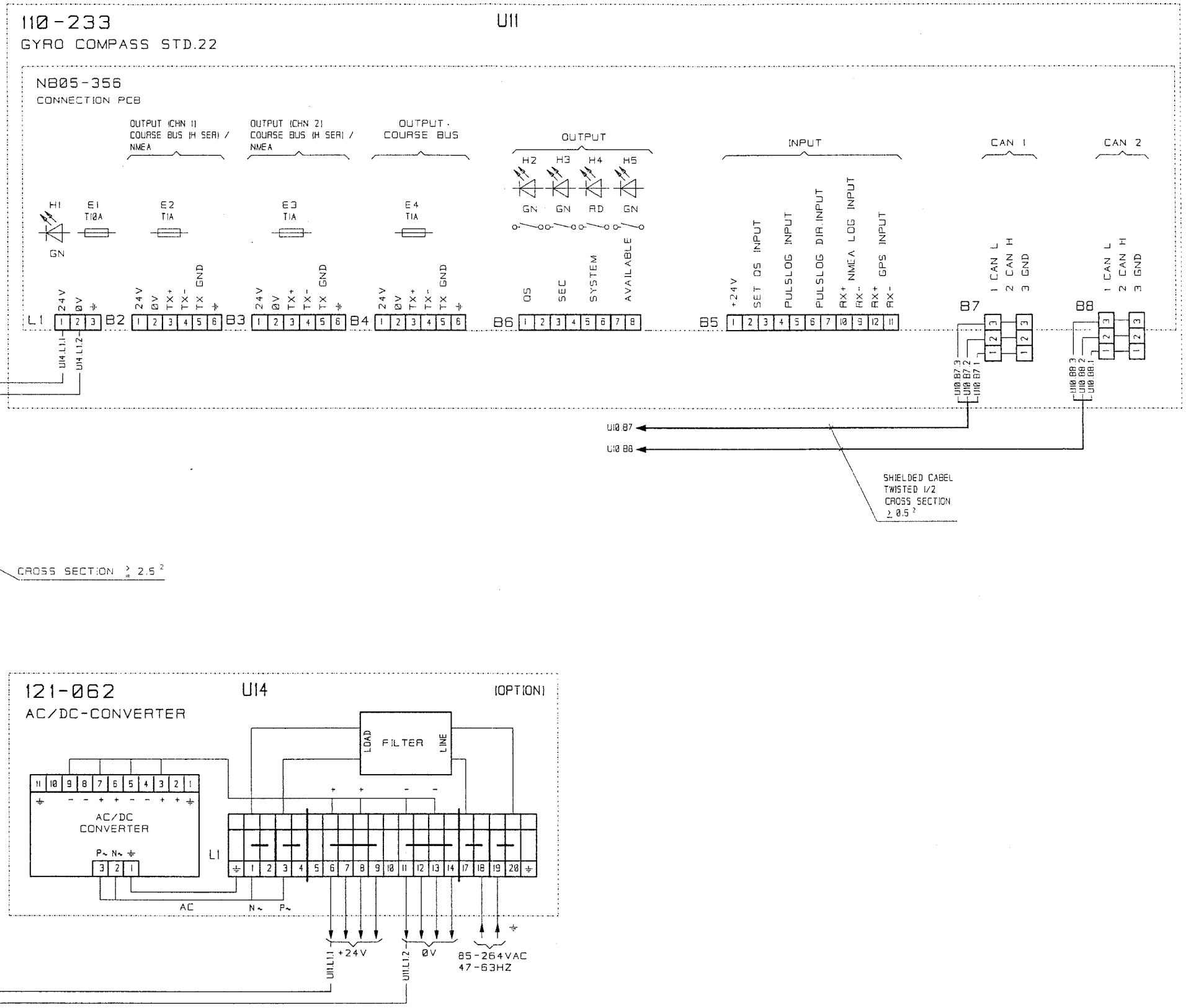
BENENNUNG
GYRO COMPASS STD.22
CABLE AND CONNECTION DIAGRAM

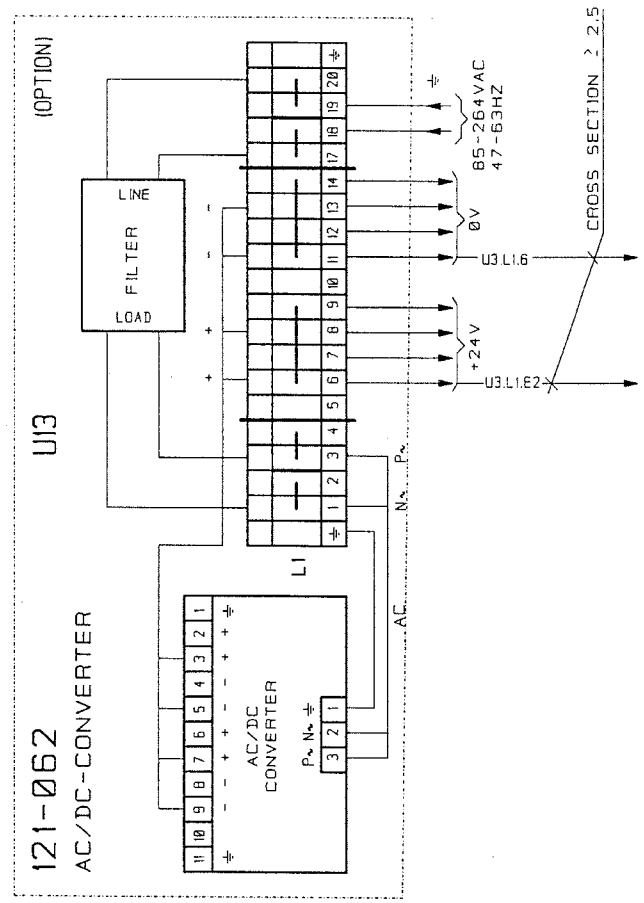
ZEICHNUNGSNUMMER
110-233.HP009

BL. 2 VON 3

ERS. FÜR | ERS. DURCH







ID.-NR.: 5015898

CAD B 4521 F

					2003	DATUM	NAME
					BEARB	13.06.03	ARENDT/KE
	F	6597.110	290905	STE	GEPR	10.05.05	
	E	6580.110	100505	STE	NORM	6.10.05	
	D	6494.110	101003	KE	FREIG	B / 18.06.03	
	C	6477.110	030903	KE			
	B		170603	ADT			
	A		130603	ADT			
BLATT	ZUST	ANDERUNG	DATUM	NAME			

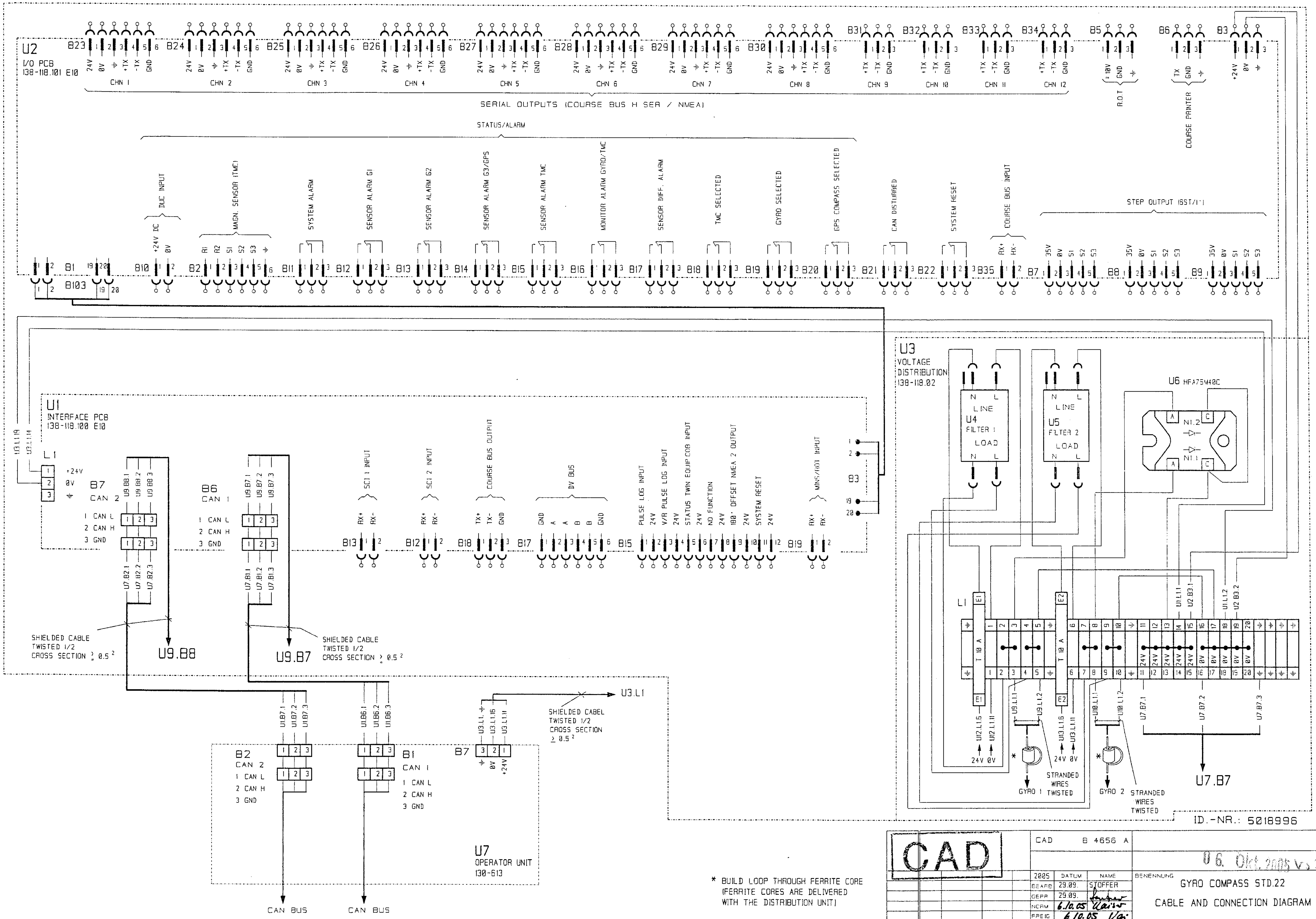
Raytheon
Raytheon Marine GmbH
Germany

BENENNUNG
GYRO COMPASS STD.22
CABLE AND CONNECTION DIAGRAM

ZEICHNUNGSNUMMER
110-233.HP009

BL. 3
VON 3

ERS. FÜR | ERS. DURCH



* BUILD LOOP THROUGH FERRITE CORE (FERRITE CORES ARE DELIVERED WITH THE DISTRIBUTION UNIT)

ID.-NR.: 5018996

CAD	B 4656 A	
2005	DATUM	NAME
BEARB	29.09.	STOFFER
GEPR	29.09.	
NORM	6.10.05	
FREIG	6.10.05	

BENENNUNG: GYRO COMPASS STD.22

CABLE AND CONNECTION DIAGRAM

Raytheon
Raytheon Marine GmbH
Germany

ZEICHNUNGSNUMMER: 110-233.HP029

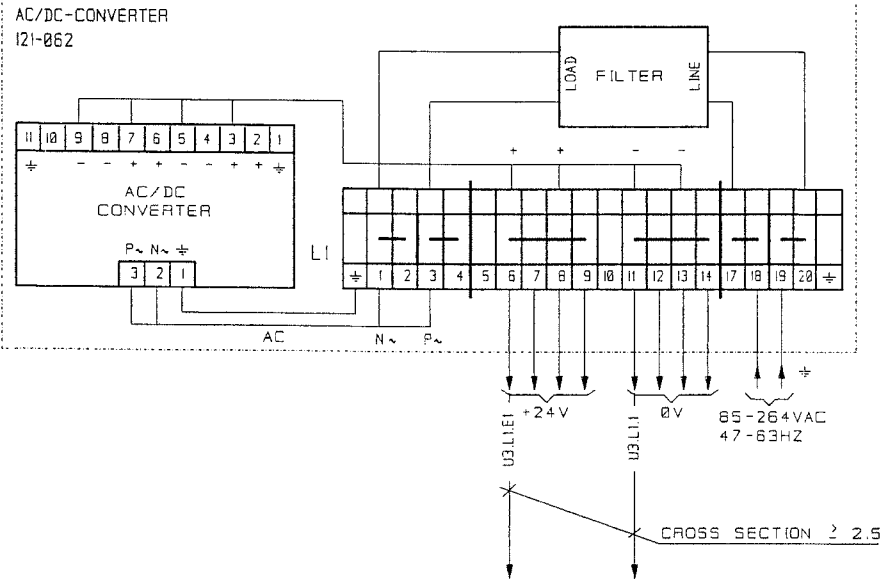
BL. 1 VON 3

06. Okt. 2005

U12

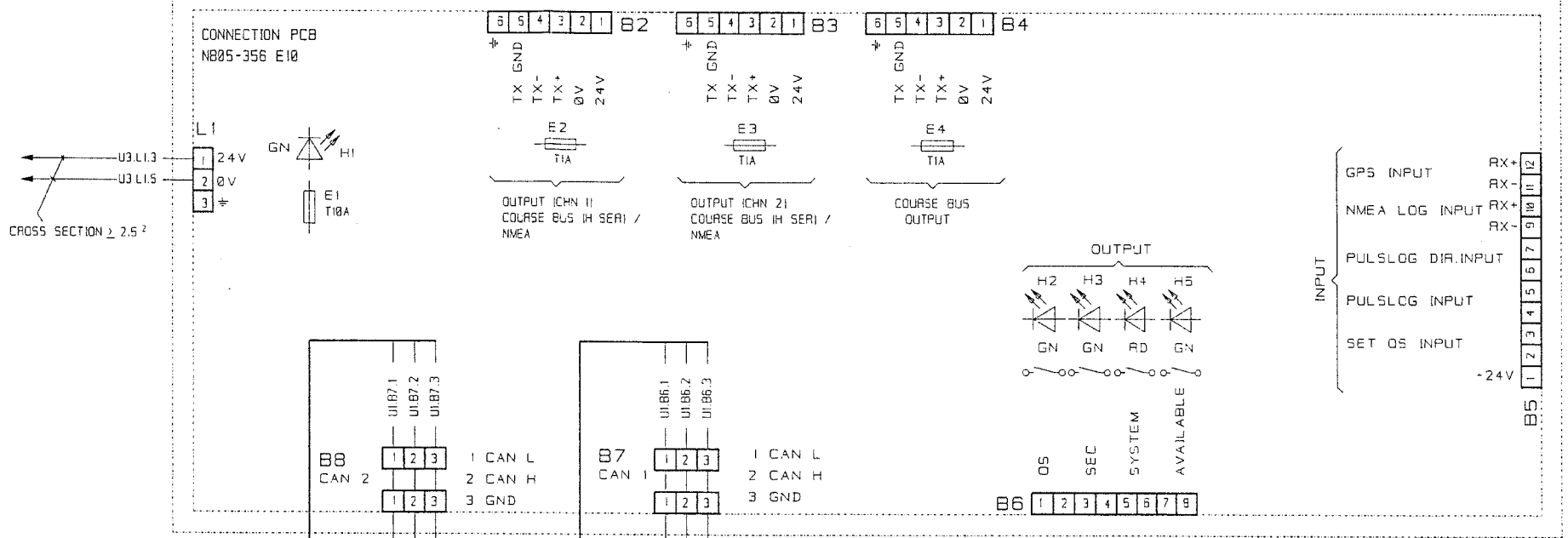
AC/DC-CONVERTER
121-062

(OPTION)



U9 GYRO COMPASS STD.22

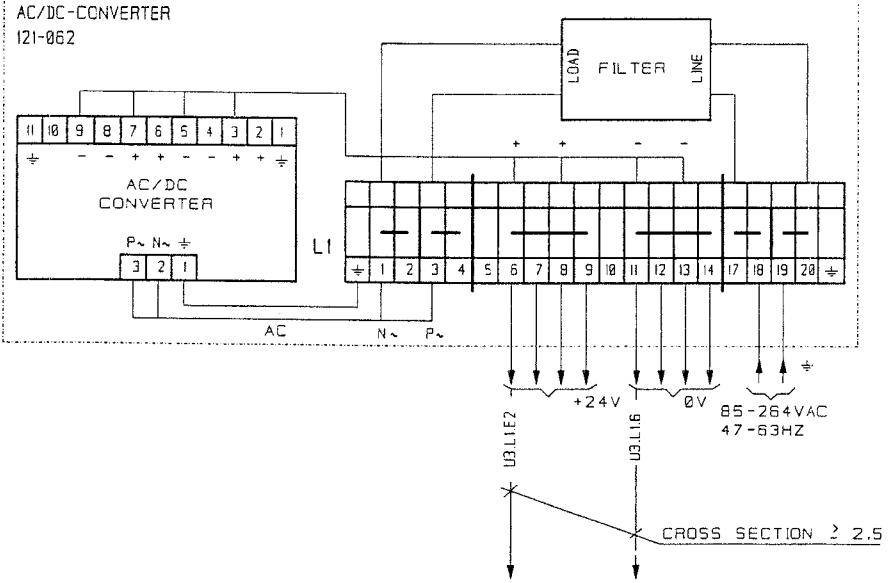
110-233



U13

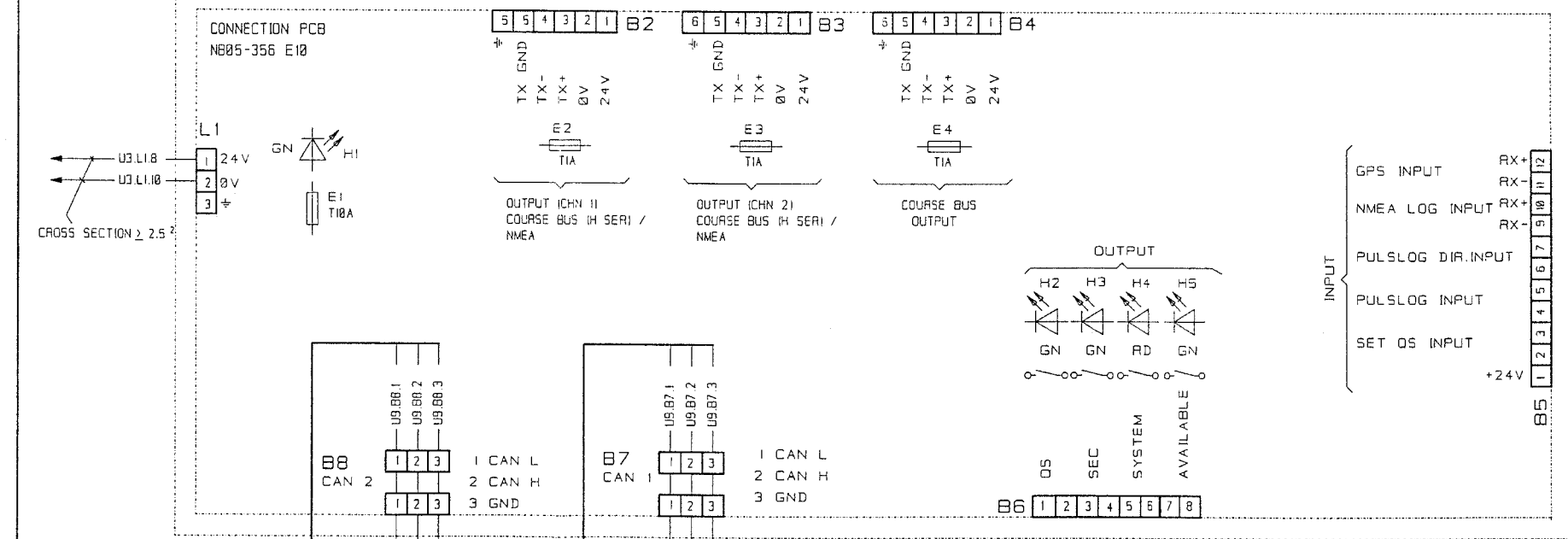
AC/DC-CONVERTER
121-062

(OPTION)



U10 GYRO COMPASS STD.22

110-233



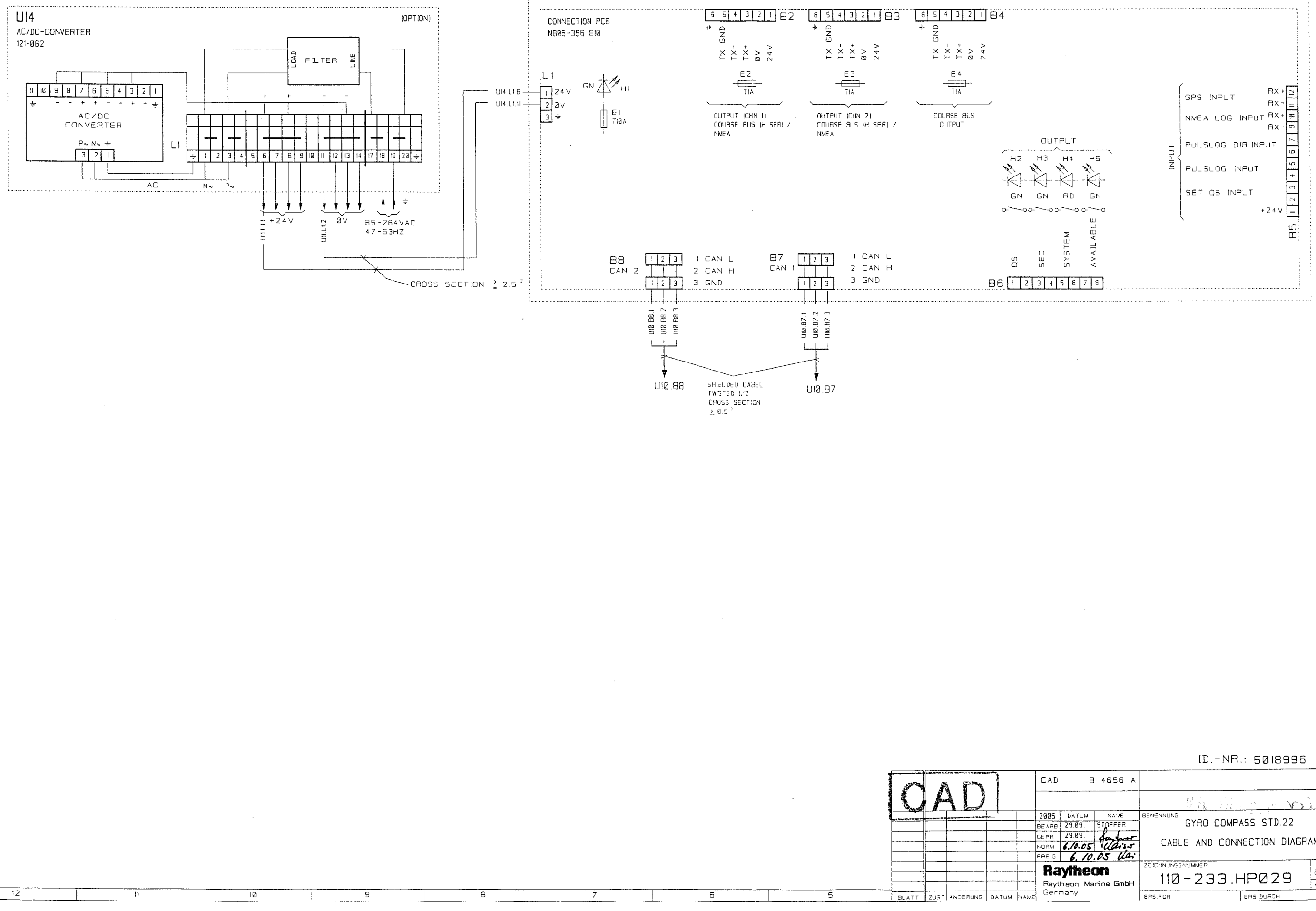
ID.-NR.: 5018996

BLATT	ZUST	ÄNDERUNG	DATUM	NAME	CAD	B 4656 A			
						2005	DATUM	NAME	BENENNUNG
					BEARB		29.09.	STOFFER	GYRO COMPASS STD.22
					GEPR		29.09.		CABLE AND CONNECTION DIAGRAM
					NORM		6.10.05		
					FREIG		6.10.05		

Raytheon
Raytheon Marine GmbH
Germany

ZEICHNUNGSNUMMER: 110-233.HP029 BL 2 VON 3

ERS FÜR | ERS DURCH



ID.-NR.: 5018996

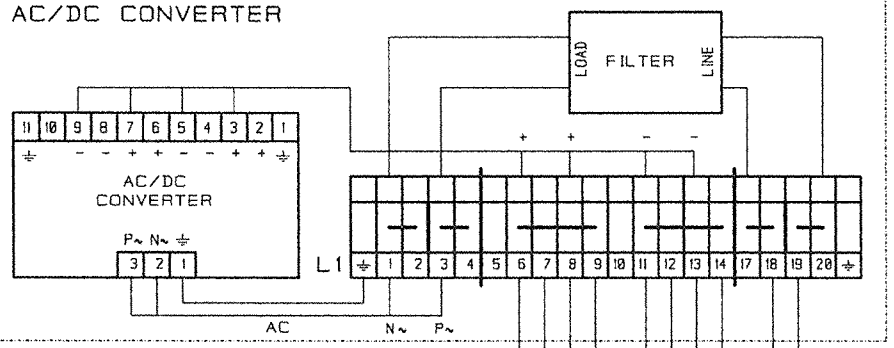
CAD

CAD	B 4656 A		
2005	DATUM	NAME	BENENNUNG
BEARB	29.09.	STOFFER	GYRO COMPASS STD.22
GEPR	29.09.		CABLE AND CONNECTION DIAGRAM
NORM	6.10.05	Klais	
FREIG	6.10.05	Klais	ZEICHNUNGSNUMMER 110-233.HP029 BL. 3 VON 3

Raytheon
Raytheon Marine GmbH
Germany

BLATT | ZUST | ÄNDERUNG | DATUM | NAME | ERS.FÜR | ERS.DURCH

121-062 (OPTION)
AC/DC CONVERTER



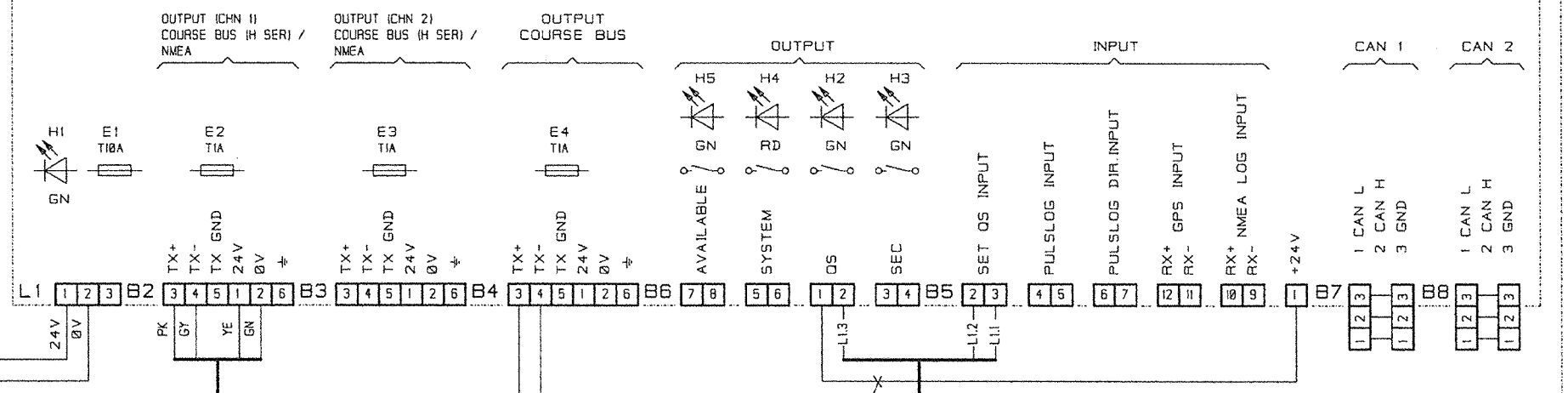
(OR SHIP'S MAINS)

CROSS SECTION ≥ 2.5 ²

CROSS SECTION ≥ 0.5 ²

110-233
GYRO COMPASS STD.22

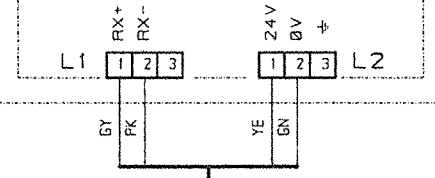
NB05-356
CONNECTION PCB



CROSS SECTION ≥ 0.5 ²

133-558 (OPTION)
STEERING REPEATER

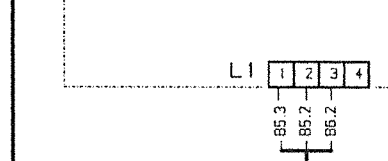
NB06-256
REPEATER COMPASS PCB



NB60-043
3.0M LG.

SHIELDED CABLE
CROSS SECTION ≥ 0.5 ²

130-606 (OPTION)
OPERATOR UNIT QUICK SETTLING

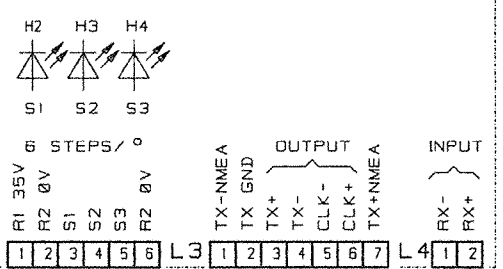


SHIELDED CABLE
CROSS SECTION ≥ 0.5 ²

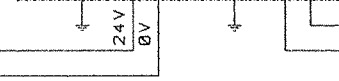
AWD-110-105-0-500 (OPTION)
CONNECTION BOX

148-487
STEP/SSC MODULE

NB06-261
STEP/SSC PCB



NB03-930
MAINS FILTER



110-233.HP010

05015859

CAD

CAD	B 4516 D			
2003	DATUM	NAME	BENENNUNG	
BEARB	10.10.	KEMPMANN	GYRO COMPASS STD.22 COMPACT	
GEPR	10.10.		CABLE AND CONNECTION DIAGRAM	
NORM	10.10.03			
FREIG	A / 16.06.03		ZEICHNUNGSNUMMER	BL. 1
C	6494.110	10.10.03 KE	110-233.HP010	VON 1
B	6477.110	01.09.03 KE		
A		12.06.03 KE		
ZUST	ANDERUNG	DATUM NAME	ERS FÜR	ERS DURCH

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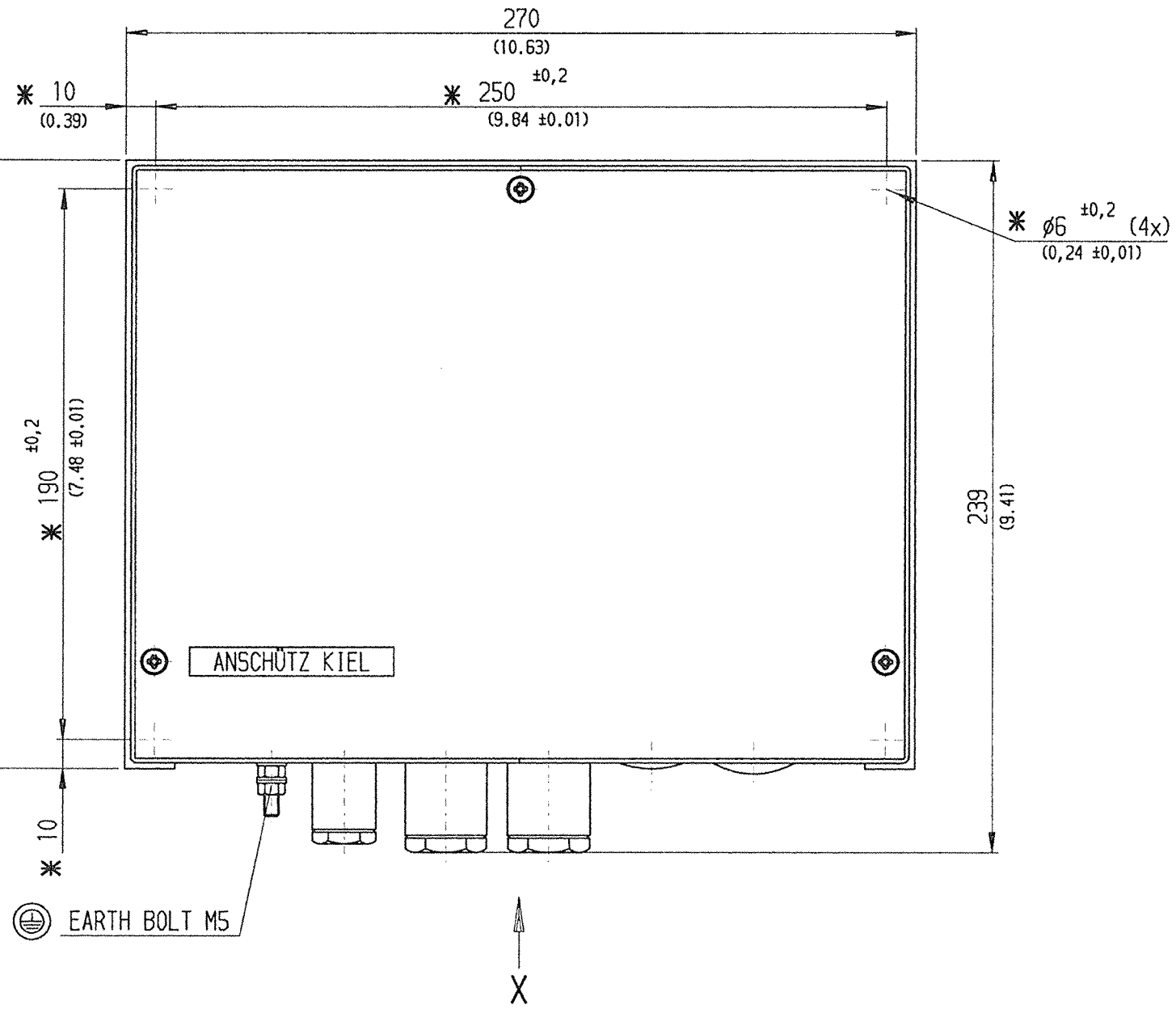
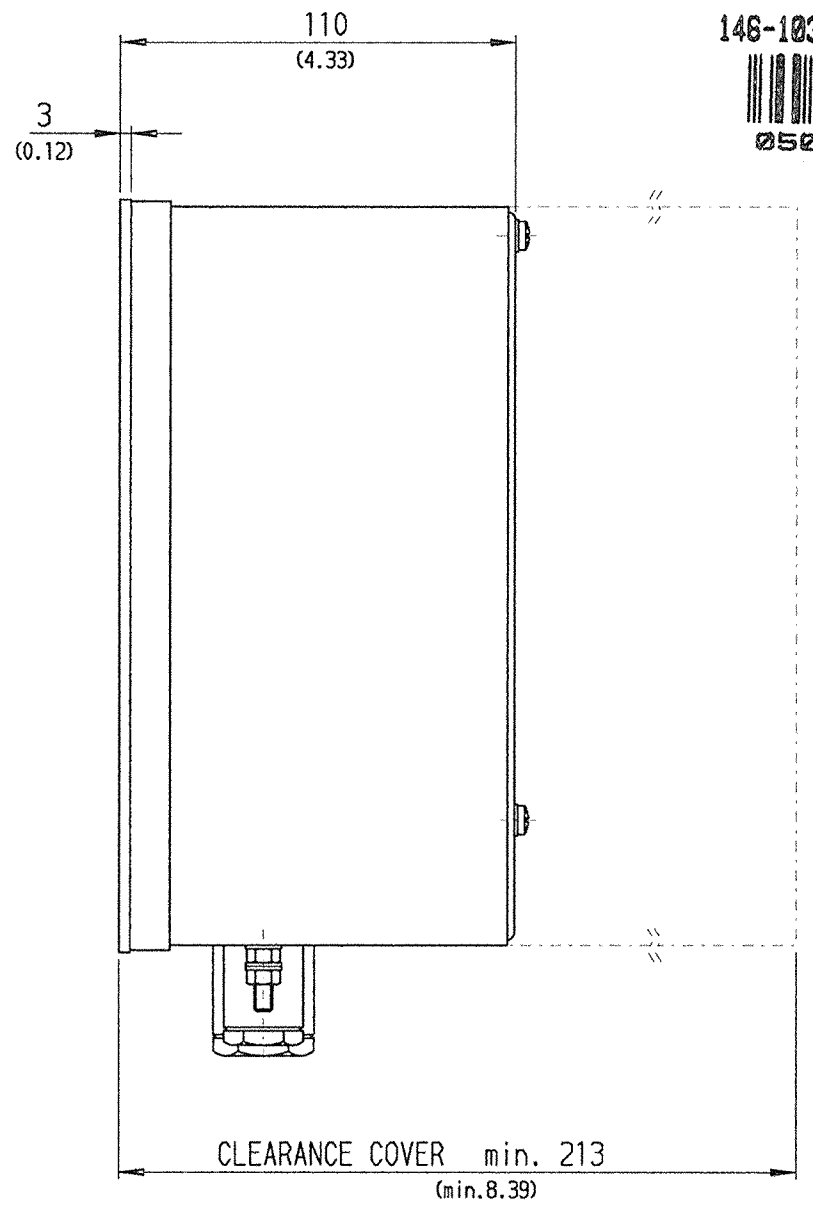
Germany

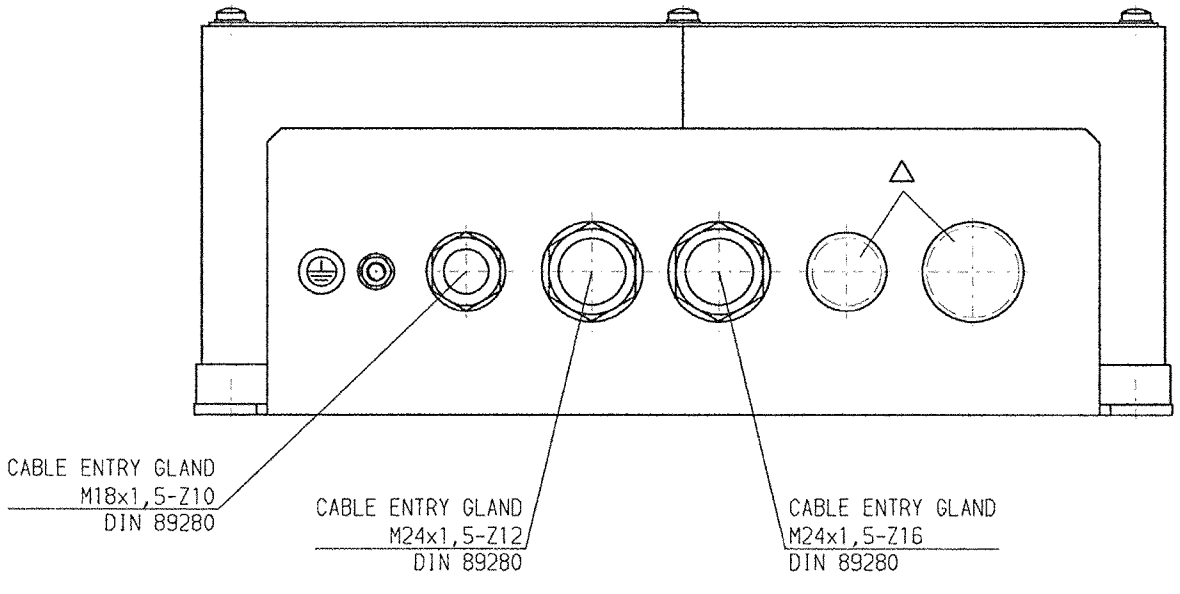




146-103.HP005

050164O9

VIEW X



△ AS ACCESSORIES CAN BE COMPLETED

*REFERRING TO DRILLING SCHEME ON BOARD SHIP

TYPE OF ENCLOSURE : IP 22 EN 60529

ALL DIMENSIONS WITHOUT TOLERANCES ARE MAXIMUM DIMENSIONS

REV.	REVISIONS	DATE	NAME

CAD

mm
(INCH)

	DATE	NAME
2003		
DR.	17.9.	Haf
APPR.	19.9.	
CHK.	29.9	
RELEASE:	02.10.03	

Raytheon
Raytheon Marine GmbH
Germany

CAD / APK

SCALE –

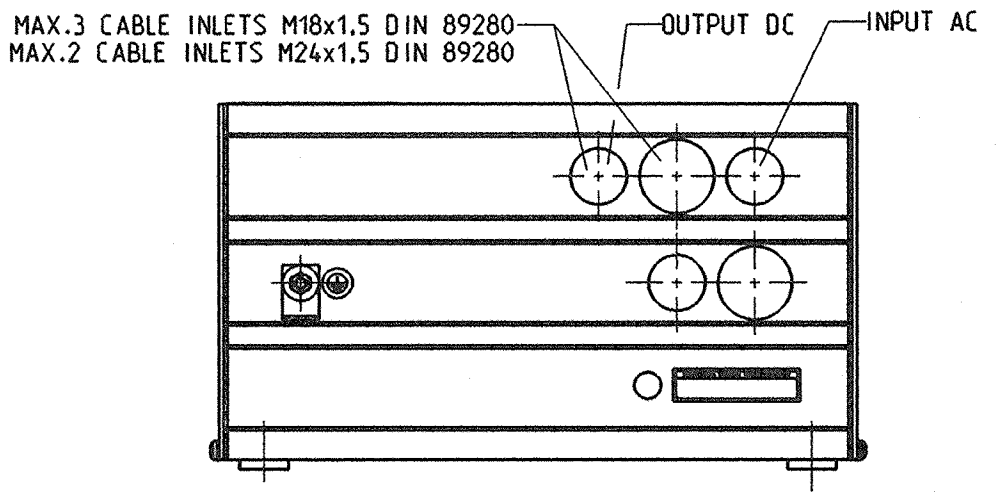
WEIGHT: ≈2 Kg

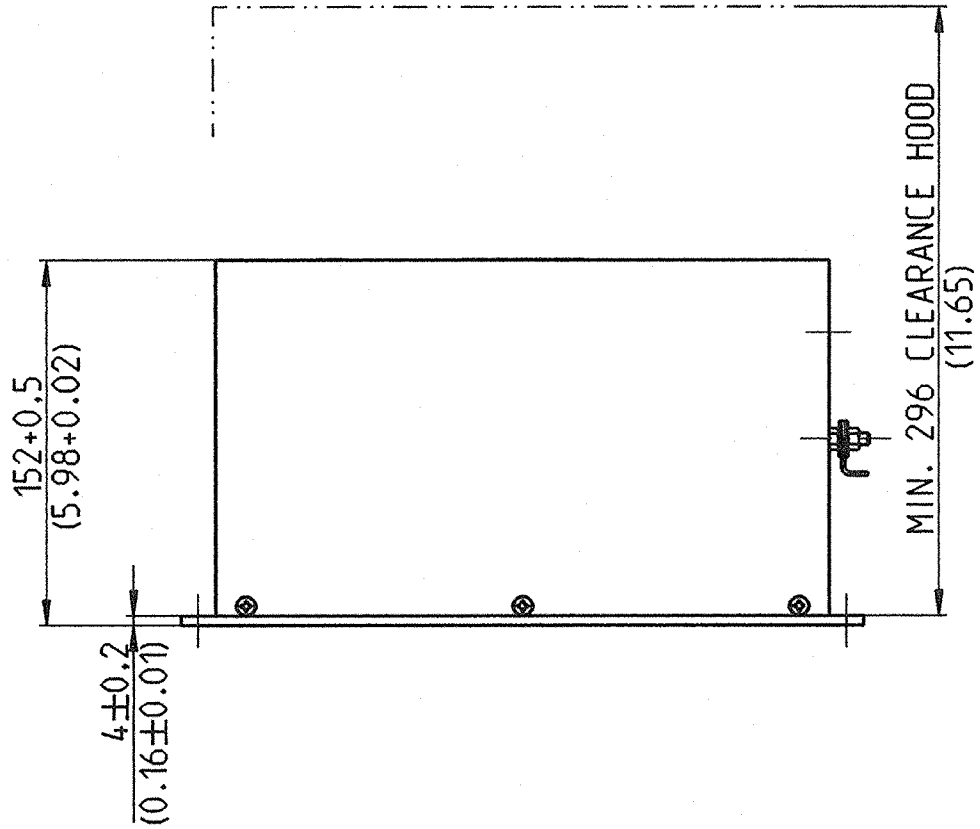
DRAWING TITLE:

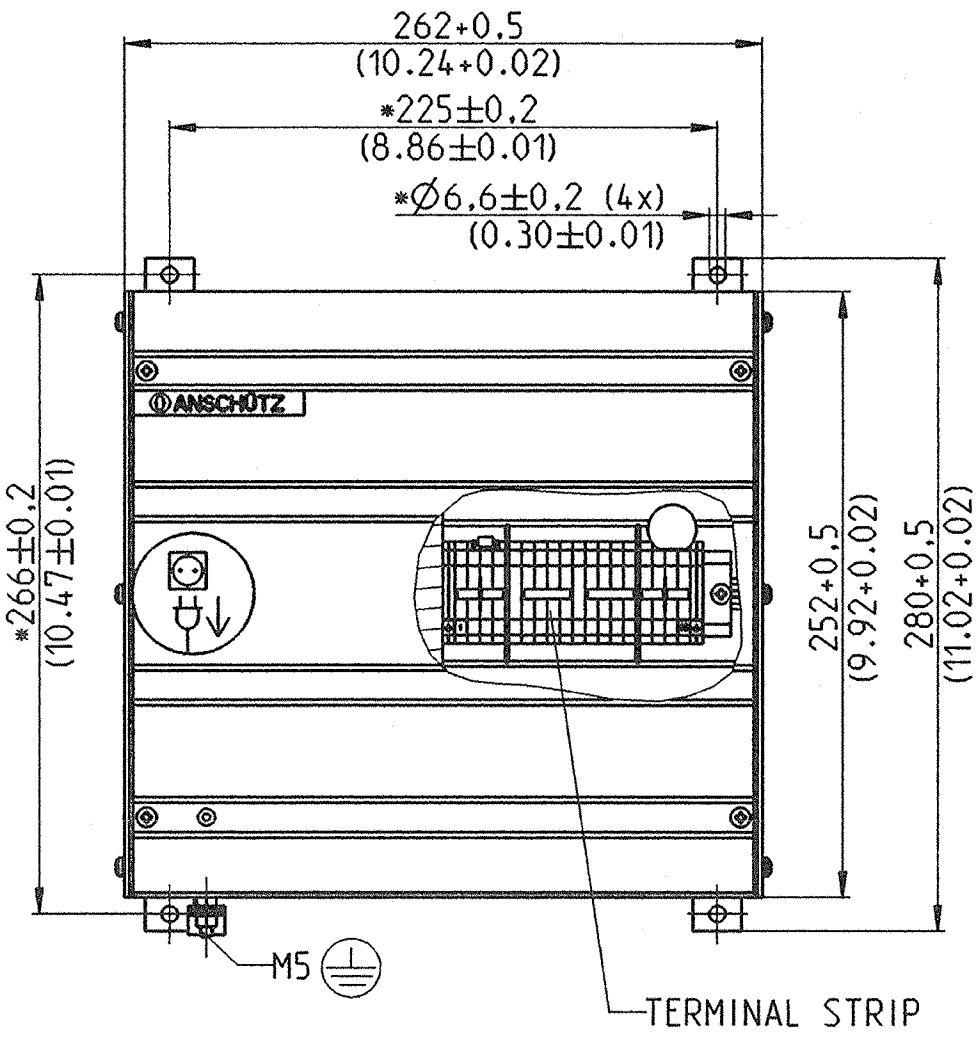
ADDITIONAL OUTPUT BOX
DIMENSIONAL DRAWING

DRAWING NO.: 146-103.HP005

SH. 1
OF 1







121-062.HP005

05014438

TYPE OF ENCLOSURE: EN 60529 IP22

* REFERRING TO DRILLING SCHEME ON BOARD

DIMENSIONS WITHOUT TOLERANCES ARE MAXIMUM DIMENSIONS

REV.	REVISIONS	DATE	NAME
A	1156.121	06.10.03	Zm

	DATE	NAME
DR.	15-Jul-02	Zm
APPR.	9.10.03	
CHK.	13.10.03	
RELEASE:	12.04.03	

CAD

mm / (INCH)

SCALE

WEIGHT: ca. 5 Kg

DRAWING TITLE:

AC/DC-Converter
DIMENSIONAL DRAWING

DRAWING NO.: 121-062.HP005

SH. 1 OF 1

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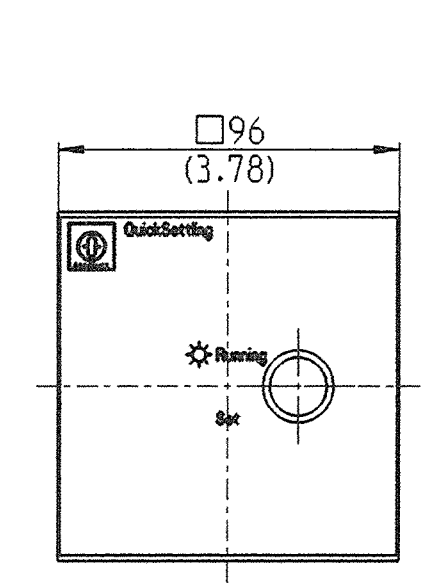
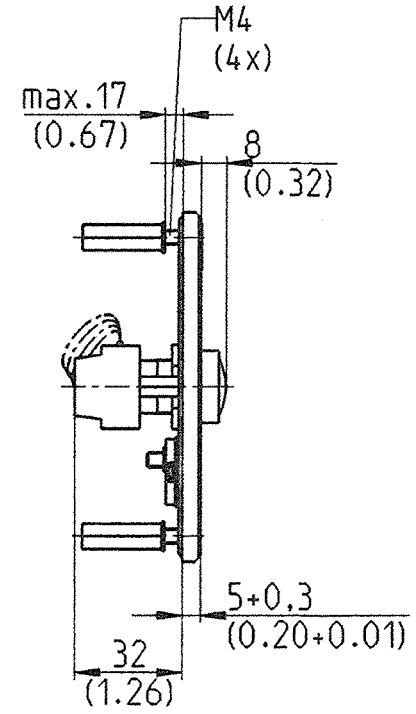
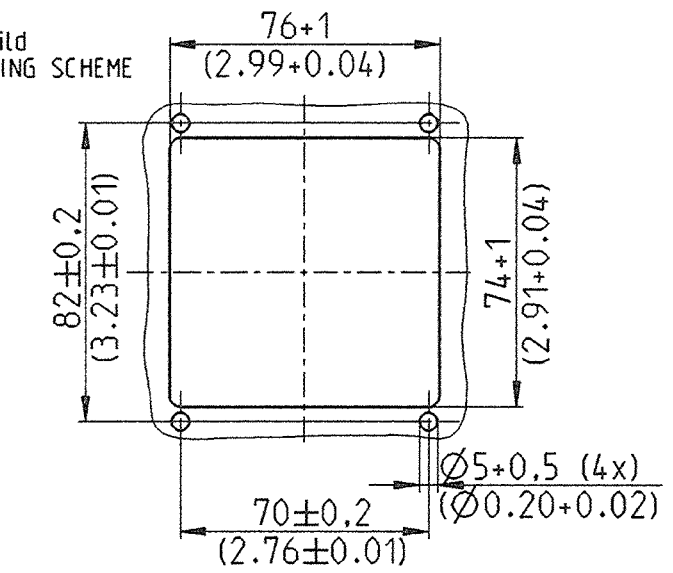
Germany





Bohrbild
DRILLING SCHEME

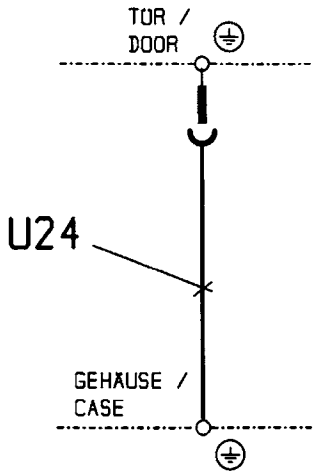


130-606.HP005

Schutzart EN 60529 IP23
TYPE OF ENCLOSURE

Maße ohne Toleranzangabe sind Größtmaße
DIMENSIONS WITHOUT TOLERANCES ARE MAXIMUM DIMENSIONS

							CAD	.
				mm / (INCH)		Arbeitspause	Maßstab	Gewicht: WEIGHT: ca. 0.5 kg
.	.	.	.	.	Datum	Name	Benennung:	
.	.	.	.	Bearb.	28-Apr-00	Zm	Bedienergerät Quick Settling/OPERATOR UNIT Q. S.	
.	.	.	.	Gepr.	.		Maßzeichnung/DIMENSIONAL DRAWING	
.	.	.	.	Norm	25.05.00	Hol.St		
.	.	.	.	Freigabe	06.07.00	Pfl		
.	.	.	.	Raytheon Raytheon Marine GmbH Germany			Zeichnungsnummer: 130 E 606.HP005	Bl. 1 von 1
Zust.	Änderung	Datum	Name				Ers. für .	Ers. durch .



110-233.HP008
05815982

DIN CODE	BENENNUNG DENOMINATION	TYP-/ZEICHNUNGS-NR. TYPE NO./DRAWING NO.	POS.NR. POS.NO.	AUS STÜCKLISTE FROM PARTS LIST	GILT FÜR APPLIES TO
U1	SENSOR PCB	110-233.100	6	110-233.NG001	
U2	HÖLLKUGEL-PCB / OUTER SPHERE PCB	110-233.101	2	110-233.01	
U3	SPG-VERSORGUNG / POWER SUPPLY	110-233.102	7	110-233.NG001	
U4	HÖLLKUGEL / OUTER SPHERE	110-233.20	3	110-233.NG001	
U5	KLEMMENLEISTEN-PCB/TERMINAL STRIP PCB	110-233.15	3	110-233.20	
U6	ANSCHLUSS-PCB / CONNECTION PCB	NB05-356	8	110-233.NG001	
U10	ELEKTR.-OPT. WINKELCODIERER / ELECTR.-OPT. ANGLE CODER	CSA 964096 GF04	5	110-233.01	
U11	SCHRITTMOTOR / STEPPING MOTOR	110-233.47	5	110-233.NG001	
U12	LÜFTER / FAN	110-233.00-002	4	110-233.NG001	
U13	PRIMÄRSPULE / PRIMARY COIL	110-233.02	3	110-233.01	
U14	SEKUNDÄRSPULE / SECONDARY COIL	110-233.03	4	110-233.01	
U15	HEIZPATRONE / HEATING CARTRIDGE	110-231.22	12	110-233.20	
U16	PUMPE / PUMP	110-231.40	2	110-233.20	
U17	OBERE HÖLLKUGEL / UPPER HEMISPHERE	110-233.25	1	110-233.20	
U18	LAGERSCHALE / BEARING BOWL	110-233.37	4	110-233.20	
U21	KABEL / CABLE	NB06-288.11	11	NB06-288	
U22	KABEL / CABLE	NB05-356.11	11	NB05-356	
U23	KABELSTAMM / CABLE LOOM	110-233.28	35	110-233.11	
U24	SCHUTZLEITER / PROTECTIVE CONDUCTOR	110-231.13	25	110-233.07	

BL.2 : A2 - C

CAD

CAD B 4511 C

M 1:1

ALLGEMEINTOLERANZ
ISO 2768 - mK

2003	DATUM	NAME
BEARB	01.09.	KEMPMANN
GEPR	01.09.	
NORM	1.10	
FREIG	07.07.03	

BENENNUNG

GYRO COMPASS STD.22

BAUSCHALTPLAN / WIRING DIAGRAM

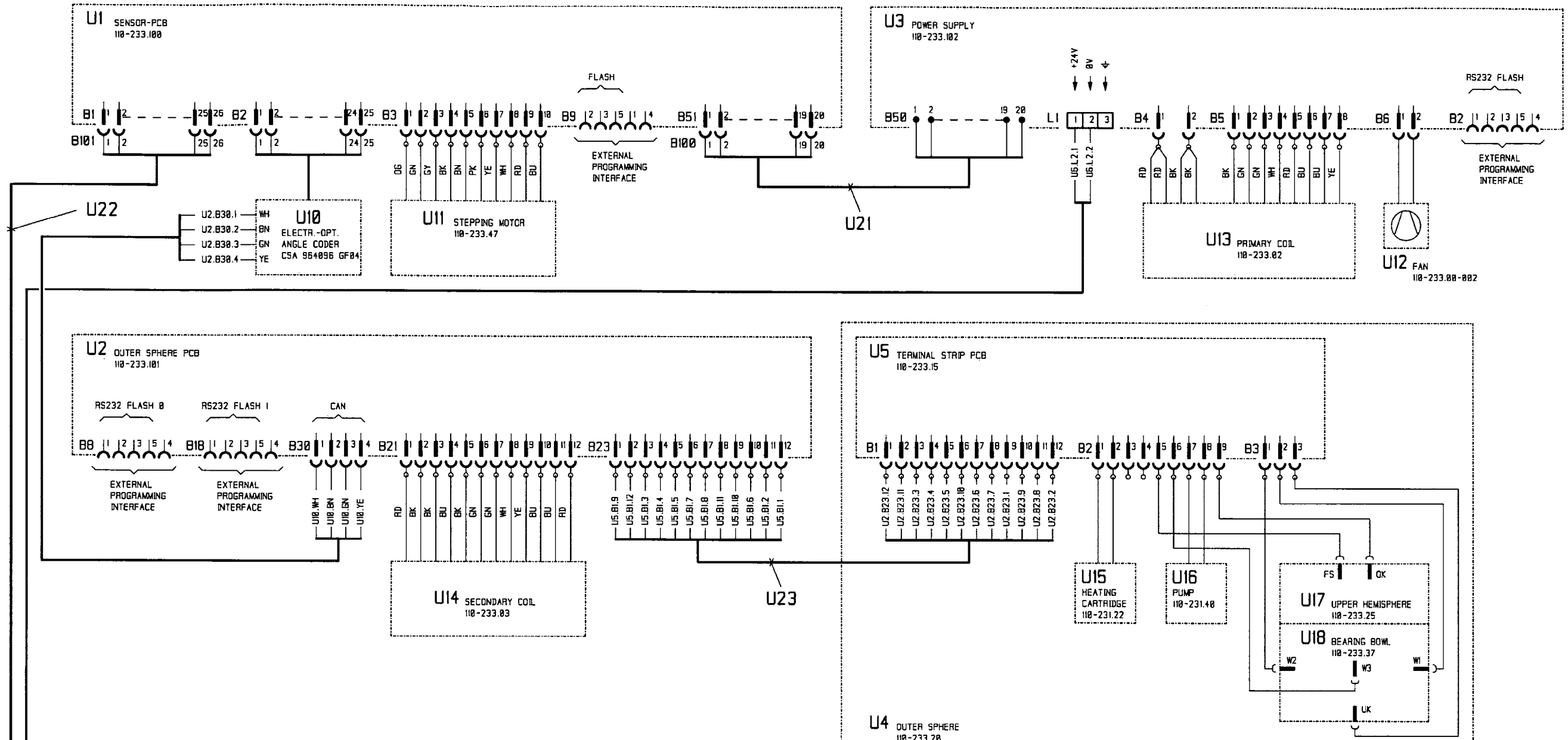
BLATT	ZUST	ÄNDERUNG	DATUM	NAME
2	B	6477.110	01.09.03	KE
2	A	6470.110	10.07.03	KE

Raytheon
Raytheon Marine GmbH
Germany

ZEICHNUNGSNUMMER
110-233.HP008

BL. 1
VON 2

ERS.FÜR | ERS.DURCH



A2-C

CAD

B	6477.110	01.09.03	KE	
A	6470.110	10.07.03	KE	
ZUST	ÄNDERUNG	DATUM	NAME	

CAD B 4511 C

2003	DATUM	NAME
BEARB	01.09.	KEMPMANN
GEPR	01.09.	
NORM	1.10	
FREIG	07.07.03	

Raytheon Marine GmbH Germany

BENENNUNG

GYRO COMPASS STD.22

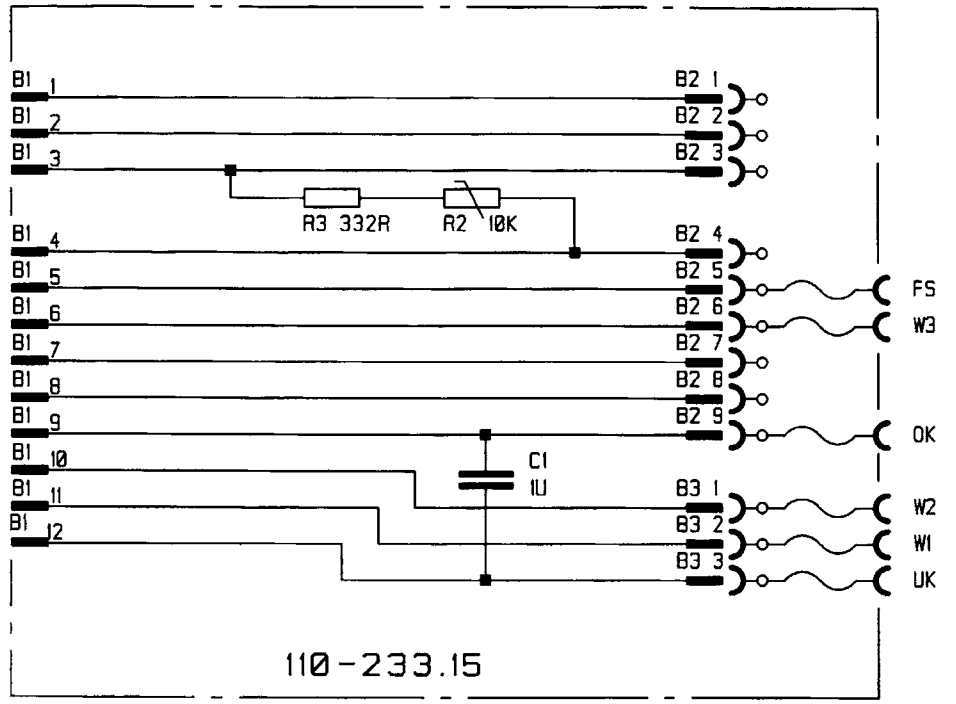
BAUSCHALTPLAN / WIRING DIAGRAM

ZEICHNUNGSNUMMER 110-233.HP008

BL. 2 VON 2

ERS.FÜR | ERS.DURCH

A4-E



110-233.HP016

05015310

CAD

A	6476.110	26.08.03	KE	
ZUST	ANDERUNG	DATUM	NAME	

CAD S 4097 1BA

M 1:1

ALLGEMEINTOLERANZ
ISO 2768 - mK

2003	DATUM	NAME
BEARB	26.08.	KEMPMANN
GEPR	26.08.	Ramm
NORM	12.9.	Sta
FREIG	- / 11.03.03	

BENENNUNG

KLEMMENLEISTEN-PCB
TERMINAL STRIP PCB
STROMLAUFPLAN / CIRCUIT DIAGRAM

Raytheon
Raytheon Marine GmbH
Germany

ZEICHNUNGSNUMMER
110-233.HP016

BL. 1
VON 1

ERS.FÜR | ERS.DURCH