



Handling a complex world.

VDO
Ocean Line

**Montage- und Bedienungsanleitung
Installation and Operating Instructions**

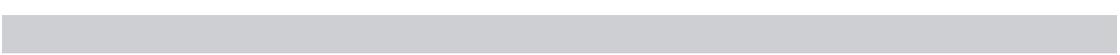
COMPASS



Installation and Operating Instructions
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This document should always stay on board

Preface

With the purchase of an instrument of the VDO Marine program you selected a high-quality product, made to the accepted State of the Art. Advanced production methods and the respect of the applicable quality assurance standards guarantee that our products are shipped in excellent condition.

Thank you for your sound decision. We are certain that this system will provide you with valuable assistance and safety at sea.

You should be familiar with all functions of the unit to guarantee easy and safe use of your VDO Compass.

Please take the time to completely study this manual.

Safety instructions

Please respect all instructions of this manual.

All texts marked with this symbol should have your particular attention.

They are indications of particular importance for the operation of the system and for your safety.



The use of the compass system does not relieve you of the responsibility for your ship, and requires good seamanship. Always rely on your nautical experience for the interpretation of the indicated values.

Safety Instructions concerning the installation:

The compass system should be installed by your shipyard or by a specialist.

Use adequate working clothes if you install it yourself. Avoid loose clothing. Use a hair net if you have long hair. Clothing and hair may be caught by moving parts.

Remove all metallic or electrically conducting jewelry, such as chains, bracelets, rings, etc. when working on the on-board electrical system.

Disconnect the minus polarity of the battery before starting your work to prevent the risk of a short-circuit. Short-circuits can cause harness fires, battery explosions and damages of other electronic memory systems. Please note that all volatile electronic memories will lose their contents, and will have to be re-programmed if you disconnect the battery.

VDO instruments are not equipped with volatile memories.

Risk of explosion! Run the engine blower for a certain time before starting work in a gasoline engine compartment.

Check for sufficient clearance behind the mounting hole when selecting the location for the indicating instrument. Pre-drill the hole and finish with hole or keyhole saw (respect the safety instructions of the tool manufacturer).

SAFETY

Check that no stringers are damaged when selecting the location for the sensor installation. Check for furniture, floor boards, boxes, cables, etc.

Solvent vapors may be produced when working with sealants. Provide sufficient ventilation. Respect the recommendations given by the sealant manufacturer.

Use insulated tools if you must work without disconnecting the power supply.

The electrical connections of the compass indicating instrument and the cables connected to the unit must be protected against direct contact or damage.

Capacitors in the equipment could still be charged, even if the power supply of the unit has been disconnected.

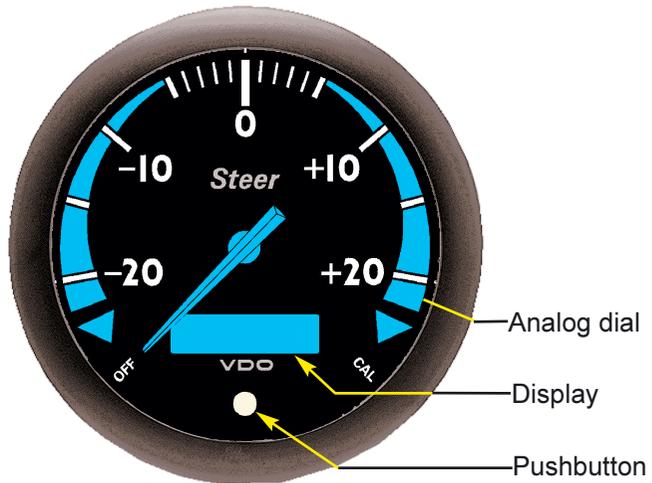
Use cables with sufficient insulation thickness or voltage rating, and protect the connections against direct contact.

Electrically conducting parts of the connected consumers shall also be protected against direct contact by adequate measures. The use of non-insulated wires and contacts is strictly forbidden.

Safety instructions concerning the maintenance:

Repairs of the compass system components shall only be made by authorized specialists. The VDO Compass meets the corresponding safety regulations.

The VDO Compass



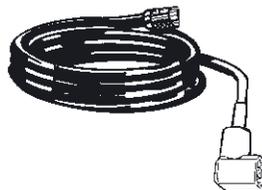
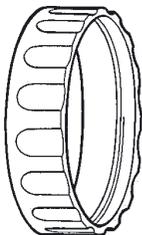
The VDO Compass is an electronic course indicator designed for the use in sports ships.

The unit has a pushbutton on the front. It serves for the activation of the operating modes *course indication* and *desired course with deviation*. In *course indication* mode the display shows the current course, the pointer is in the OFF position.

In *desired course with deviation* mode the display indicates the desired course, the pointer indicates the deviation on the analog dial. The desired mode is selected by pushing the button. The use of the instrument is simple and uncomplicated.

A maximum of two more indicating instruments can be connected. An NMEA Interface VDO Number N01 610 506 is also available as an accessory. This can be used to transmit data to the VDO MAP or to the PC.

Components of the system



The supplied kit contains:

- Indicating instrument
- Union nut for instrument fixation
- Fluxgate compass sensor with connecting cable, length 1 m
- Warning label
- Red connecting cable compass sensor - indicating instrument, length 10 m
- Installation and operation manual

Accessories (must be ordered separately):

- | | | |
|---|---------------------------------------|-------------|
| - | Fixation kit (bracket) | N05 800 792 |
| - | Lighting kit (24 V / 1.2 W) | N05 800 550 |
| - | 2nd indicating instrument VDO Compass | N01 512 002 |

Spare parts:

- | | | |
|---|-----------------------------|-------------|
| - | Lighting kit (12 V / 1.2 W) | N05 800 552 |
| - | Fluxgate compass sensor | N01 530 302 |

Other spare parts are available on request.

The indicating functions of the VDO Compass

The indicating instrument displays the following course information when the power is switched on:

1. *Course indication mode*

The display indicates the steered course (267° in the example). The pointer is in "OFF" position and has no function.

267

or

2. *Desired course with deviation*

The display continuously indicates the desired course.

This course indication (270° in the example) is preceded by a „S“. At the same time the pointer indicates the deviation from the desired course (3° port in this case).



The indication corresponds to the active mode (1 or 2) when the power supply was shut off.

The pushbutton toggles between both indicating modes.

The indicating instrument must be in course indication mode to indicate a specific course as the desired course.

Set the ship to the desired course and push the button. The current course is stored as the desired course, and the pointer moves to center position (deviation 0°).

Each deviation from the desired course is indicated by the analog pointer (3° port in this case).

Automatic compensation of the VDO Compass

All on-board iron masses of a ship are more or less magnetic and influence the compass. This effect must be compensated in a fluid compass as well as in a fluxgate compass.

On conventional fluid compasses this requires the services of a qualified specialist. On the VDO Compass with its automatic deviation compensation you can easily and reliably perform this adjustment yourself. As supplied the VDO Compass behaves like a normal, non-compensated fluid compass.

Perform the automatic compensation during a circular course with calm sea, at a sufficient distance to port installations and magnetic disturbances (such as steel bridges, sheet piling, other ships). The diameter of the circle should be five or six times the ship length, the speed adapted to complete one circle in about 3 minutes.

No valid course is indicated by the instrument during the compensation. Perform the compensation as follows:

Start the circular course and switch the power supply on while keeping the button pushed.

The display indicates „*OFFSET*“.

OFFSET

Release the button when „*OFFSET*“ is displayed. After some seconds the local compass deviation is indicated (setting see page 32).

05 000

After another 5 seconds the display automatically changes to „*CAL*“. Push the button during „*CAL*“ until „*CAL 1*“ is displayed.

The pointer moves to the „*CAL*“ position.

CAL

Push the button

CAL 1

(Note: you have about 5 seconds to start the “*CAL*” function, as this function is automatically exited after this time.)

COMPENSATION

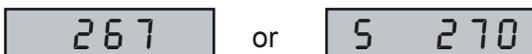
The automatic compensation runs. Continue the circular route until the display indicates " --- ".



Now start another circular route in the opposite sense. Push the button until the display indicates „CAL2“.



Continue the circular route until the compensation is automatically ended. After successful compensation the desired course is indicated (267° or 270° in the example).



For your own safety you should verify the indication by several true observations on various courses (north, east, south, west). Differences between compass indication and true observation must be corrected by adjustment of the compass sensor position (see page 33).

The display shows „FAIL“ in the case of a failure of the automatic compass compensation, or if the compass compensation could not be finished.



In this case exit the failed compensation by switching the power supply off. The pointer returns to its normal operating mode when the power is switched on again. Repeat the automatic compensation.

The following factors may cause a failure of the automatic compensation:

- Excessive speed during the automatic compensation
- Inadequate installation of the sensor (see page 36)
- Mobile phones or radiophones were used during the compensation
- Influence of magnetic disturbances (bridges, pile walls, etc.) or magnetic objects near the sensor.

POSITION-DEPENDENT VARIATION

The automatic compensation should be repeated after compass installation, after slipping, prior to long routes, after welding operations, after the installation of electrical consumers, but at least once a year.

Please also note the „semihard magnetism“ effect on steel ships, which appears when the ship has been exposed to the terrestrial magnetic field without position change for a long time (for instance during winter). After some days in the water this effect has disappeared. This means that after watering a ship the compass compensation should be repeated several days later.

Setting of the position-dependent variation

This operation is necessary to set the valid local variation. The angular variation is found in the nautical map. Setting the variation eases working with the map, and after compensation (see page 30) the compass will indicate the true course.

Enter the variation as follows:

Switch the power on while keeping the button pushed. The pointer is in „OFF“ position, and the display indicates „OFFSET“.



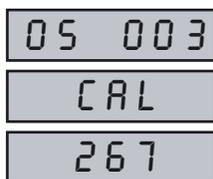
Release the button when „OFFSET“ appears. The local variation is indicated after several seconds. In the system as supplied the indication will be 0.



(Note: You have about 5 seconds to start the „OFFSET“ function, after this time the function is automatically exited). For each button activation the value is incremented by 1°. Hold the button down; the value will increment at increasing speed up to 100°, then it will decrement from -100°. Positive setting = variation in eastern direction. Negative setting = variation in western direction.

Release the button after setting the correct value (3° in the example). After some seconds the display automatically changes to „CAL“. After another 5 seconds a normal course indication is shown (in the ex-

ample steered course 267°), taking the variation into account.



The set variation value remains stored in the VDO Compass, even when it is switched off.

Adjustment of the Compass Sensor

A correct adjustment of the compass sensor is necessary if, after compensation and variation setting, differences are found between the true compass course and the true bearing.

On each course (N, E, S, W) note the measured differences

Difference = true bearing - compass indication.

(e.g. true bearing : 001°, VDO Compass: 002°, difference north: -001°).

Calculate the average of the differences.

The average is the angular value by which the compass sensor must be turned for correct adjustment.

A positive sign (+) means that the sensor should be turned clockwise, a negative sign (-) means counterclockwise.

Trouble shooting

Problem:

- No compass function

- Compensation not possible.
„FAIL“ is displayed, or the compensation cannot be concluded

Cause / Correction:

- Check electrical connections per wiring schematic
- Check voltage. Supply voltage is 10.8 to 32 V

- Check probe installation instructions
- Avoid magnetic disturbances (bridges, sheet pilings, etc.) during the circular course

MAINTENANCE

- Compensation not possible. „*FAIL*“ is displayed, or the compensation cannot be concluded
 - Wrong indication
 - Inclination fault (wrong indication with heeling ship)
 - Display shows 
- Remove magnetic disturbances near the sensor (cans, tools, etc.)
 - Check cable connection between indicating instrument and sensor (bad connections ?)
 - Run automatic compensation
 - Adjust compass sensor correctly
 - Set local variation
 - Magnetic disturbances above or below compass sensor
 - Remove disturbances
 - Select other location of sensor
 - Connection indicator- sensor is broken
 - Sensor is broken
 - Check cable connection between indicating instrument and sensor

Maintenance of the VDO Compass

Indicating instrument and compass sensor are maintenance-free. Clean the indicating instrument with a clean, humid or antistatic cloth. The front lens is plastic. Do not use detergents to prevent scratches and fisheyes.

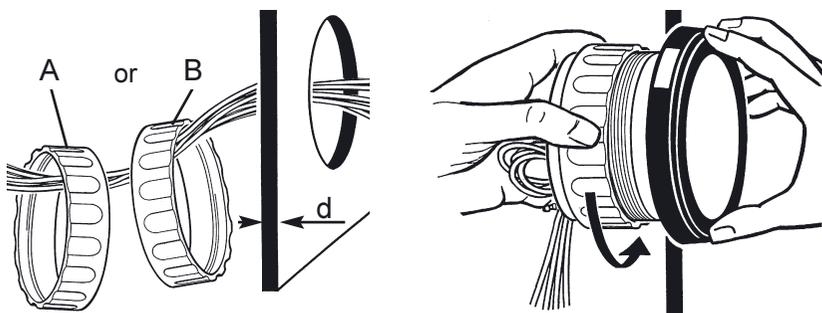
Installation of the VDO Compass



Please read the safety instructions on pages 25 and 26 before starting the installation.

Installation of the indicating instrument

- Make a hole, diameter 86 mm, at an adequate location.
- Clean the surroundings and remove the chips before inserting the indicating instrument.
- Pass the cable connections to the indicating instrument through the mounting hole and the union nut.

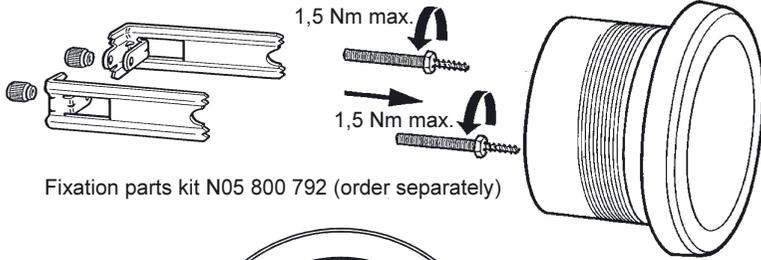


- Place the supplied black rubber washer on the instrument back
- Connect the cables per wiring schematic to the indicating instrument and insert the instrument into the mounting hole (see „the electrical installation“).
- Fix the instrument with the union nut.
Mounting alternative A for wall thicknesses
 $d = 0.5 \text{ mm to } 6.5 \text{ mm}$
Mounting alternative B for wall thicknesses
 $d = 6.5 \text{ mm to } 16.5 \text{ mm}$
- Check that the union nut is only tightened hand-tight.

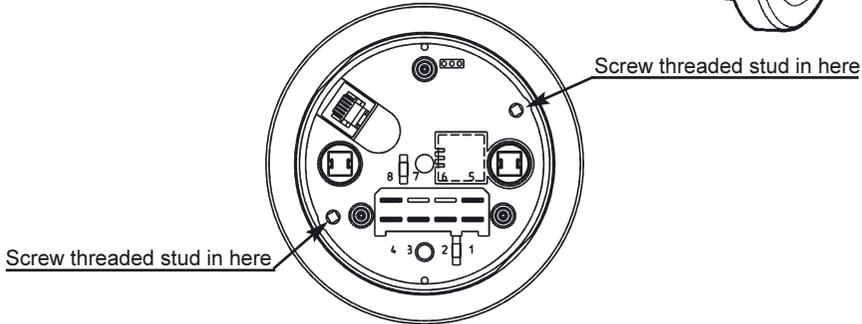


Mount the indicating instrument with threaded studs and bracket (see page 36, top) if strong vibration must be expected at the location of the installation (for instance high-speed boats).

INSTALLATION



Fixation parts kit N05 800 792 (order separately)



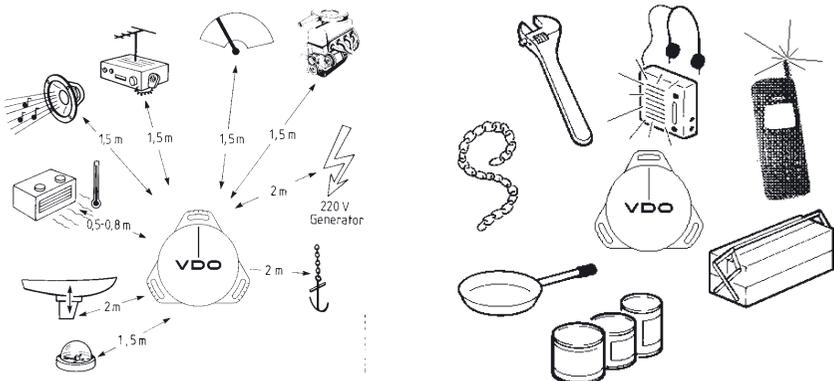
Installation of the compass sensor

Using the fluxgate principle the terrestrial magnetic field direction and strength are measured by two crossed coils. In the case of hulls made of wood, reinforced polyester, Kevlar or aluminium the sensor can be installed in the hull; in the case of steel or steel-reinforced concrete the probe must be installed at least 1 m above deck, but not higher than 5 m.



When installing the sensor check for sufficient distance to fixed metal parts, electrical cables and other objects creating magnetic fields.

Check for sufficient distance to all portable disturbance sources, such as cans, pans, radios, mobile phones in operation, etc.

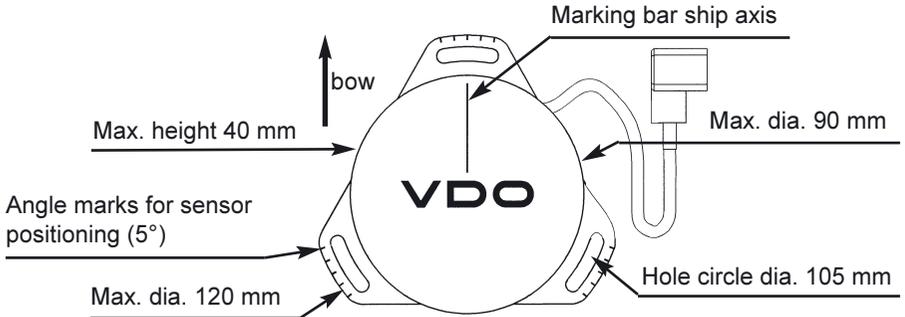


INSTALLATION

Temporarily install the sensor and make the first compensation run. A different location must be selected if several trials are not successful. After finding an adequate location fix the sensor with three brass or stainless steel screws to allow a rotation of the sensor for adjustment at a later time (see page 33).

Mark the location of the sensor with the supplied warning label.

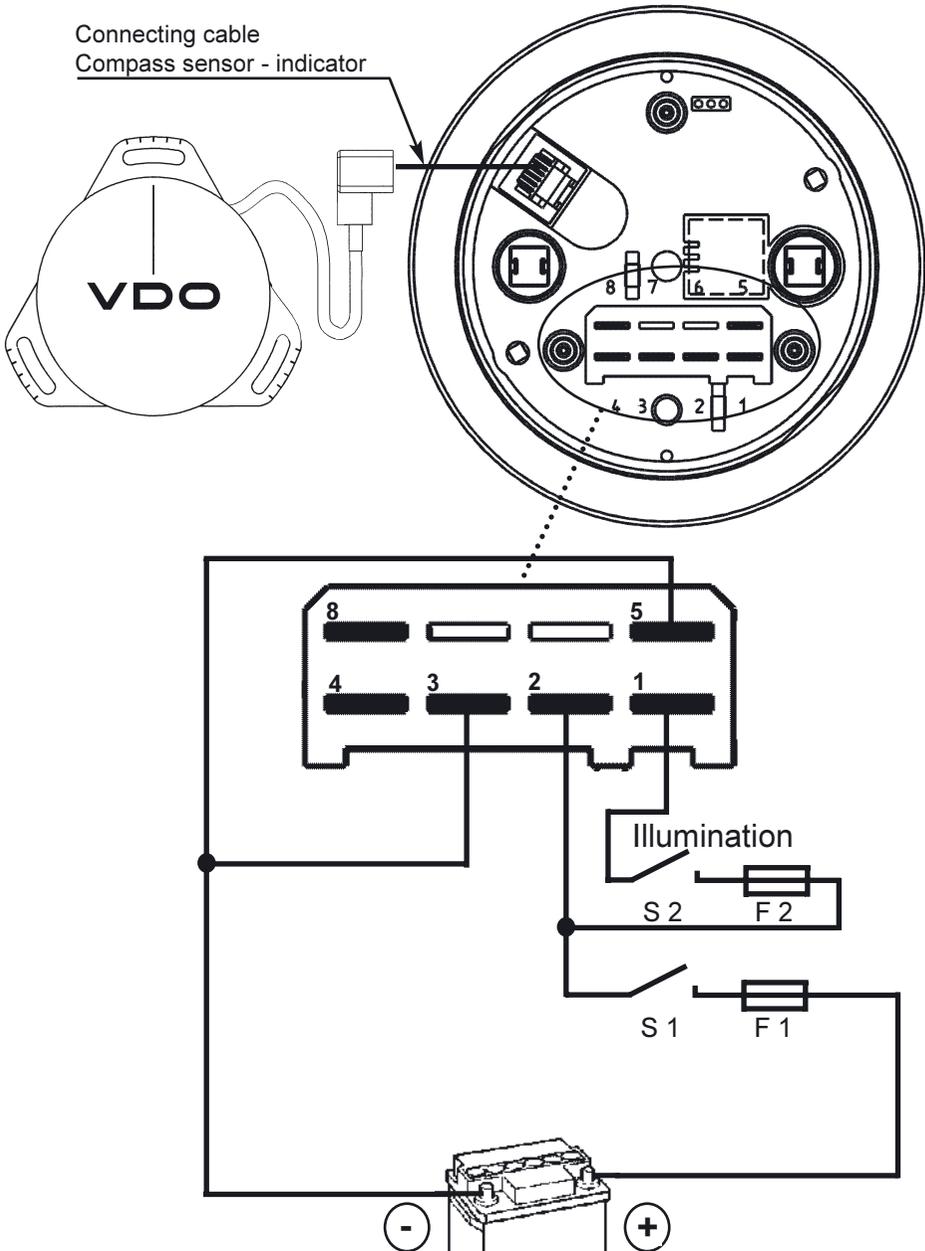
View from above:



Never use steel screws for the installation (magnetism).
The sensor must be installed on a horizontal surface in horizontal position.
The marking bar must be parallel to the ship axis, directed to the bow.
The automatic compensation must be repeated after changing the cargo.

Electrical Installation

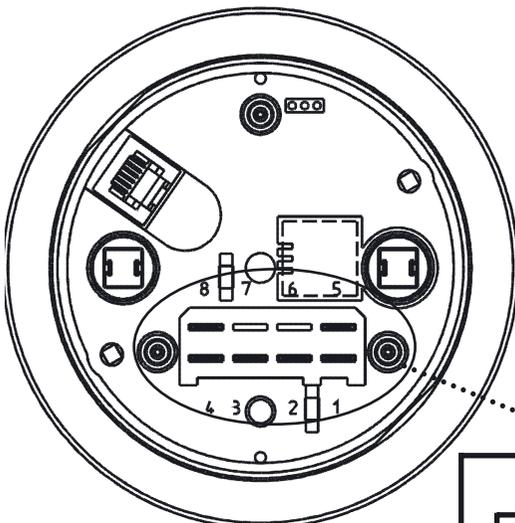
System power supply



Legend of the circuit schematic
page 20

Connection of a secondary indicating instrument

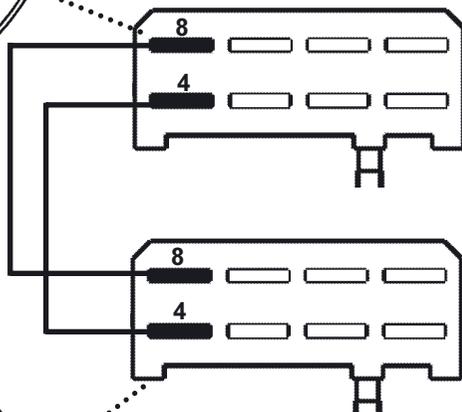
Install the power supply to the second instrument in the same way as for the first one (see page 38). The power supply of both indicating instruments must be switched on at the same time.



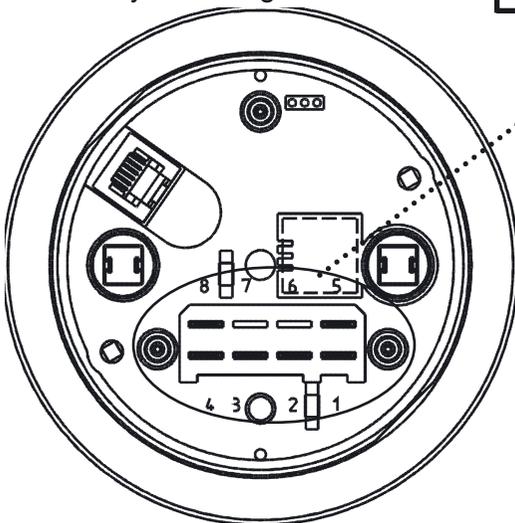
Main indicating instrument

The sensor can be connected to any of both indicating instruments

The connection between main indicator and secondary indicator is made as shown below.



Secondary indicating instrument



Perform the automatic compensation „CAL“ on one indicating instrument only. This also applies for later installation of a second or a third instrument.

Legend of the circuit schematic

- S1 On/Off switch for navigation instruments
- S2 On/Off switch for instrument lighting
- F1 Fuse for navigation instruments (5 A)
- F2 Fuse for instrument lighting (5 A)

Recommended cable section: 1.5 mm²

Cable lengths

Compass sensor - indicating instrument	20 m max.
Indicating instrument - second instrument	10 m max.
Second instrument - third instrument	10 m max.

Technical data

Measuring principle:	Fluxgate magnetic field measurement liquid-damped coils
Accuracy:	+ 3° after compensation
Application:	Field strength: 8 to 50 A/m
Max. inclination angle:	in pitch and roll direction: + 30°
Supply voltage:	10.8 to 32 V DC
Current consumption:	Indicating instrument: about 90 mA at 12 V DC without lighting about 250 mA with lighting Sensor: about 50 mA at 12 V DC
Operating temperature:	-10 to + 60 °C
Type of protection:	Indicating instrument: DIN 40050 - IP 65 at front Compass sensor: DIN 40050 - IP 65
EMC protection:	CE: EN 50081-1, EN 50082-1
Dimensions:	Indicating instrument: Front ring dia.: 105 mm Installation dia.: 86 mm Installation depth (with union nut): 56 mm Installation depth (with bracket): 90 mm Compass sensor: See figure page 37



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Stand 12/03

Siemens VDO Trading GmbH

**Kruppstrasse 105
60388 Frankfurt am Main
Germany**