

SILVA Direction

**DIGITAL KOMPASS • DIGITAL COMPASS
DIGITALER KOMPASS • COMPAS DIGITAL**



**Monterings & Bruksanvisning
Installation & Operating description
Installation & Bedienungsanweisung
Description d'installation et d'utilisé**



SILVA SWEDEN AB, Kuskvägen 4, 191 62 Sollentuna

SILVA 50 DIRECTION DIGITAL COMPASS

1. General description

The SILVA 50 is a high quality precision instrument designed to meet the demands from sailors and powerboat owners. The instrument is very easy to read and to operate.

NOTE: The instrument must be calibrated to your boat. Read the instruction in section 8 carefully and calibrate accordingly.

LIST OF CONTENTS

1. General
2. Contents list
3. Optional accessories
4. Locating the compass transducer
5. Installing the compass transducer
6. Installing the instrument
7. Operation instruction
8. Calibration
9. Connections
10. Fault finding
11. Data
12. Warranty

2. Contents list for the SILVA 50 digital compass

The SILVA 50 comes complete with all necessary fittings and attachments for almost all installations. Included in this box are the following items. Check now to become familiar with each part prior to installation.

1. Instrument
1. gasket
1. cable cover plate
- 2x4 stainless screws and 4 rubber screwcaps
1. ribbon plug cable 5 m.
1. junction box with connection circuit board
1. compass transducer
1. transducer cable 12m.
1. connection cable to log - single wire
1. connection cable to windmeter - two-wire

A two-wire cable from the battery supply is also required.

3. Optional accessories

The following items can be supplied as optional extras:

- Option junction box including ribbon cable (part no. 9612). This box is necessary for the connection of optional extras. See further description in section 9.
- External audible alarm (part no. 8147). An audible alarm is included inside the instrument.
- Paddlewheel transducer (part no. 4001). To obtain the CMG-function in case a log is not already fitted.
- Remote control (part no. 9368) for the TRIM pushbutton.
- Cable for connection to SILVA Thousand/Compact series (part no. 9771).

4. Locating the compass transducer

The transducer must be positioned reasonably well away from magnetic disturbances such as objects containing iron, loudspeakers, cables carrying heavy current, transmitting antennas etc.

The following guidelines apply:

- The transducer must be as close as possible to the boat's centre of gravity.
- The reading error before calibration must not exceed 15 degrees.

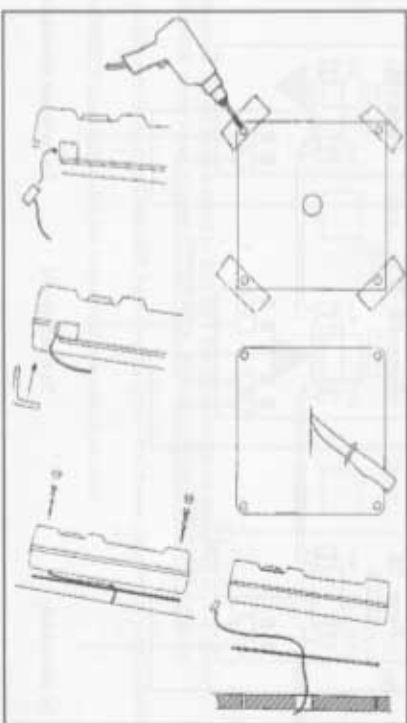
The transducer's position may thus in a GRP boat be on a bulkhead below deck, whereas in a steelboat it may be on the mast, to avoid the disturbances from the hull.

5. Installing the compass transducer

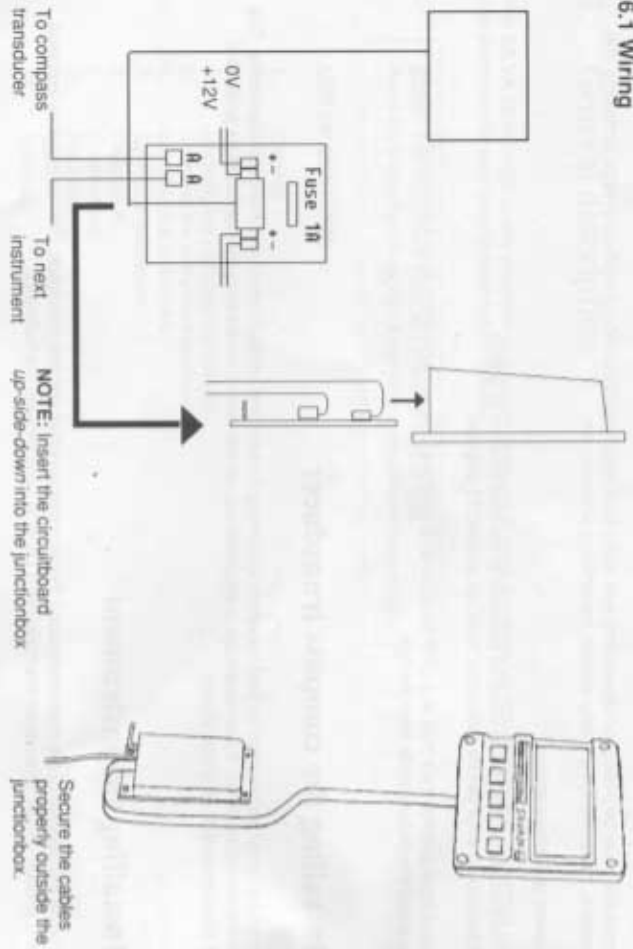
The transducer must be mounted so that the arrow is pointing forward and perfectly parallel to the boat's centreline. The cable outlet should be down. If the transducer is mounted e.g. on the mast it must be rigidly supported for protection against vibration and mechanical abuse.

6. Installing the instrument

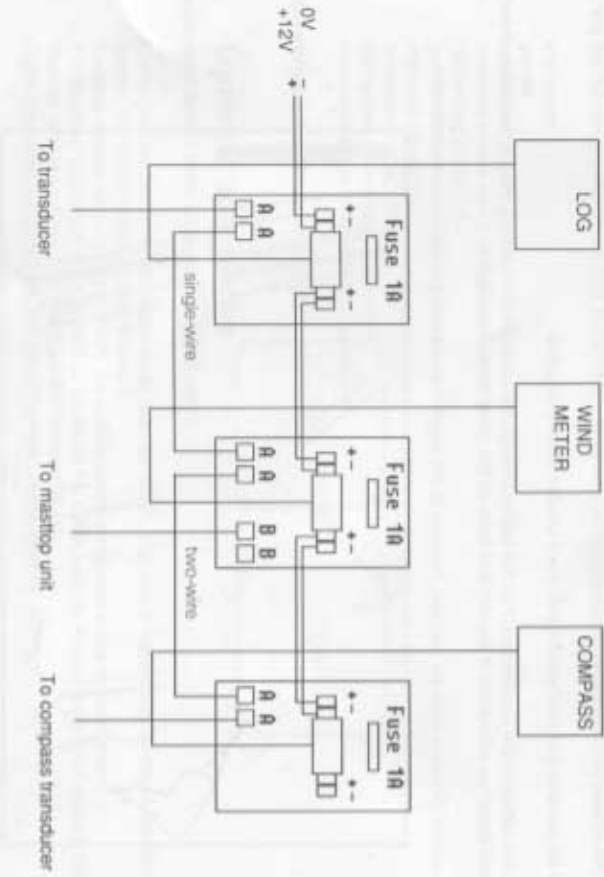
1. Locate the position of the instrument using the template supplied with this handbook. Drill the holes as indicated, one in each corner and one for the instrument cable to pass through the bulkhead.
2. Pass the instrument cable through the bulkhead and the gasket and connect it to the instrument as illustrated. Mount the cable cover.
3. Use the 4 larger screws supplied to attach the instrument and gasket onto the bulkhead. Alternatively machine type screws and nuts can be used if it is preferred to screw the instrument from the inside (anti-theft reason). Cover the screws with the rubber caps.
4. Locate the junction box and fasten it with the 4 smaller screws supplied.
5. Attach the cables to the junction box. Pull the cables through the cover plate's opening, plug in the cables, insert the circuit board up-side-down in the slot and snap on the cover plate. See fig. 6.1.
6. When several Direction units are installed, marking of the junction boxes and the cables is recommended.



6.1 Wiring



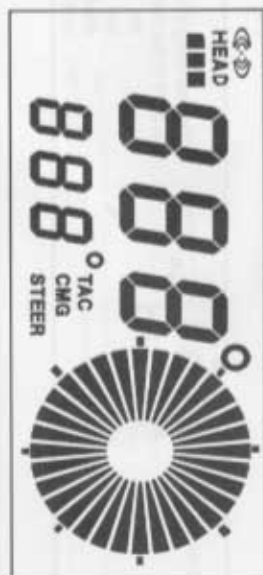
Interfacing of log, windmeter and compass



7. Operation instruction for the SILVA 50

7.1 Functional description

Display



The display's upper part always indicates heading. The lower part indicates functions as selected by the pushbuttons. These are:

- Required course
- CMG
- Tactical reference

The analogue scale indicates:

- Heading
- Steering error
- CMG
- Header lift (tactical function)

Pushbuttons:

TRIM	HD/TAC	SEA	ST/CMG	SET	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	upper case
<input type="checkbox"/>	<input type="checkbox"/>	C	<input type="checkbox"/>	<input type="checkbox"/>	lower case
<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	LIGHT	

The pushbuttons' upper case is used to **SELECT** the functions to be indicated on the display. The pushbuttons' lower case is used to **CONTROL** the functions indicated on the display.

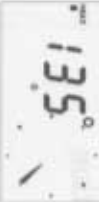
The **SET** pushbutton is used to **CHANGE** between the upper and lower case of the pushbuttons.

The **TRIM DIRECT** pushbutton can be connected to a remote control.

7.2 Operation

HEADING

Press **HD/TAC** until **HEAD** appears



The analogue scale indicates the actual heading. North is straight up. This is the instrument's start-up mode.

SEA

Press **SEA**



The damping is indicated by dots in front of the heading display.

no low medium high

STEER

Press **ST/CMG** until **STEER** appears



The display enters steering mode. The lower display indicates the required course. The analogue scale's upper arm indicates the steering error.

set course
Press **SET** **SET**



The required course is updated.

or
set course direct
Press **SET DIRECT** **SET**



The actual heading is set directly as the required course.

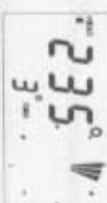


Scale's upper arm is vertical when the heading is correct. Arm goes left for port error and right for starboard error. One step equals 1 degree. Total scale is +/- 15 degrees.

OFF-COURSE ALARM is given audibly when the boat is steered outside the set limit. For setting of the limit, see section 7.3. The alarm stays on until the boat is steered back to course, the instrument is set to another indication mode, the required course is updated or the off-course limit altered or disengaged.

CMG

Press **ST/CMG** until **CMG** appears



Analog scale and lower display indicate the total steering error since the course was set or **CMG** was reset.

Reset

Press **SET C SET**



CMG value is reset.

TACTIC

Press **HD/TAC** until **TAC** appears



"TAC" and possible previously set tactical references are shown on the display.

Set starboard (port)

Press **TRIM**



Actual heading is used as reference. Headers cause the scale to grow away from the mark. Ifts cause the scale to grow towards the mark.

Set port (starboard)

Press **TRIM**



As above.

NOTE:

Once both tacking references are set, the instrument automatically changes over to the correct reference when the boat is tacked. Settings can be updated at any time using the **TRIM** pushbutton as described above. If other functions are used, the references are brought back by entering the **TAC** mode again.

To erase all previously set tactical references, press

SET C SET

LIGHT

Press **LIGHT** and hold



Instrument light is switched strong-medium-off. Power consumption is only 45 mA when light is off.

7.3 Start up procedure

Your instrument must be set up with certain values to operate with the best possible accuracy. The following routine need only be done once. Once inserted, the values are stored permanently even when the power is shut off.

Press **TRIM** and **SET** simultaneously until the upper display indicates a code. The lower display indicates the value to be altered.

- **C0: Off-course alarm (0 - 99 degrees)**
 press **SET** → new off-course alarm is indicated to disengage, press **C SET**
- If the value should not be altered, only press **SET** to step to the next code.

- **C1: Compass deviation**
 Insert values as per section 8 by

pressing **SET** → **Note:** This adjustment is repeated for each 45 degree step, as described in section 8.

- **C2: Local variation (+/-99 degrees)**
 press **SET** → Adjust to agree with the local magnetic variation.

The values are now stored permanently and the instrument reverts to normal operation.

7.4 Description

The **SILVA DIRECTION** digital compass has four basic functions:

- Heading
- Steering
- CMG
- Tactical function

Heading

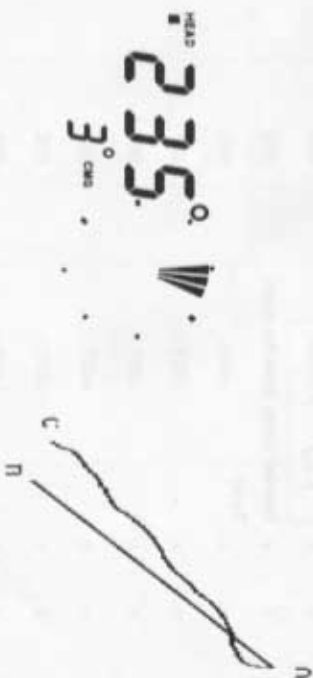
The heading is always indicated on the display. The indication can be compensated for the boat's magnetic disturbance and adjusted for local magnetic variation. An adjustable damping ensures smooth readings in all sea conditions.

Steering

The steering function allows the boat to be steered with great precision. The analogue scale indicates the steering error and the lower display indicates the required course. The required course can either be predetermined or set to the actual heading. Alarm is given if the steering error exceeds the set limits.

CMG (Course Made Good)

CMG is calculated as the total steering error taking both heading and distance travelled into account. The calculation does however not include errors due to current and wind. A **SILVA** log must be connected to obtain the CMG-function.



A-B = required (set) course
 A-C = actually steered course

Tactical function

This function is used mainly to track windshifts. Port and starboard optimum tacking angles are frozen before starting a race. When sailing, the analogue scale indicates the windshifts. A header is indicated by segments growing away from the mark to leeward. A lift is indicated by segments growing towards the mark, to windward. When tacking the instrument automatically changes reference to the new tack.

See illustration overhead.

MARK



8. Calibration

Calibration of the compass is made in order to correct errors from magnetic disturbance, i.e. deviation or possible misalignment of the transducer.

- A) Calibrating according to the certificate issued with the transducer. This method is recommended only when one is certain that no magnetic disturbance occurs.
- B) Calibration with a sighting compass. See the description below.
- C) Calibration by an authorized compass adjuster. An authorized adjuster is able to assist in finding the best transducer position. His knowledge and experience guarantees that the compass is perfectly calibrated.

B) is executed by comparing with the readings of a sighting compass for each the eight cardinal courses. The sighting compass must be held true of any magnetic disturbance and perfectly aligned with the boat's fore-and-aft direction. If the boat is moored it may be best to get off the boat and sight on the stay and the mast. If the boat is sailing, sighting can be done by standing by the mast and sighting the forestay. In this case make sure your eye is absolutely aridships. The boat is steered (moored) so that the sighting compass reads the following courses steadily: 0, 45, 90, 135, 180, 225, 270 and 315 degrees. The SILVA 50 readings are noted in the deviation table below. The adjustment values are calculated and entered into the instrument as described in section 7.3.

True bearing	SILVA	Correction = SILVA - true bearing	Adjust value = Previous value* + correction
000		- 000=	+ =
045		- 045=	+ =
090		- 090=	+ =
135		- 135=	+ =
180		- 180=	+ =
225		- 225=	+ =
270		- 270=	+ =
315		- 315=	+ =



Example:

045	044	044 - 045 = -1	043	+(-1)	= 042
090	093	093 - 090 = +3	091	+(+3)	= 094

* set at factory to 000, 045 etc

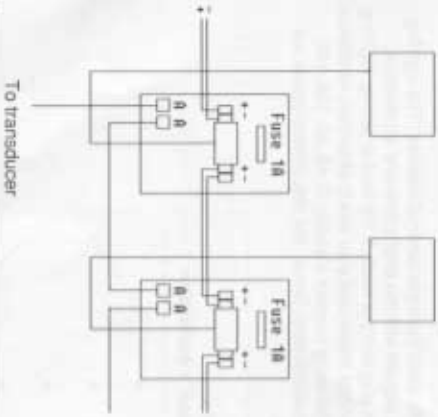
9. Electrical connections / circuit diagrams

When installed according to section 6, the instrument operates without any further precautions.

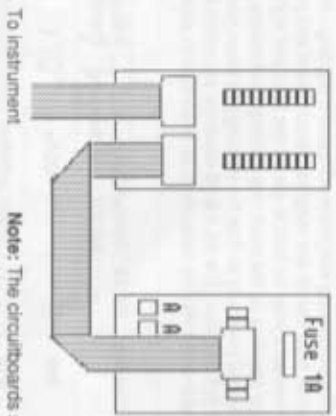
Please note that the compass should be connected to the log or windmeter by means of the plug cable supplied. The connection is shown in fig. 6.1. If both log and windmeter are fitted, the compass is connected to the windmeter.

NB1 The single wire cable must be used for the connection to the log and the two-wire cable for the windmeter.

9.1 Connection of additional Direction compasses as repeaters



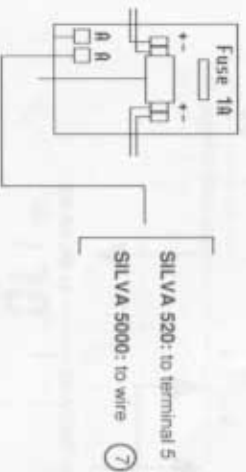
If optional extras are required, an **option junctionbox** (part no. 9612) is required. The connection is shown below.



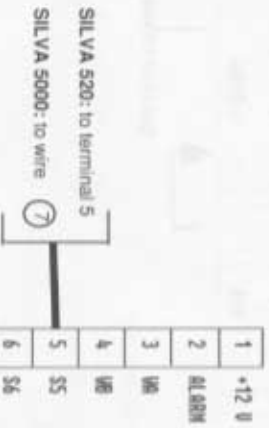
Note: The circuitboards should be inserted up-side-down into the boxes as shown in 6.1.

9.2 Connection of other Silva compasses as repeaters

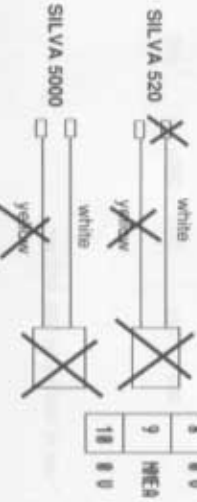
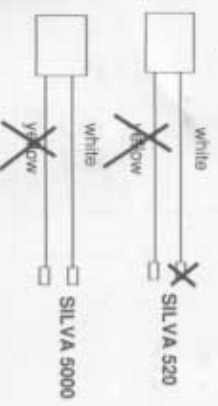
A: If an A-plug in your junctionbox is free, connect to this plug (cable no. 9771).



B: If no A-plug is available, connect to the option junctionbox (cable no. 9771).

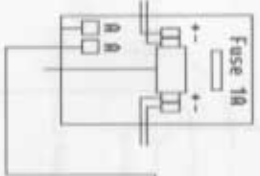


Adaptation of cable 9771:



9.3 Connection of log-signal from other Silva logs

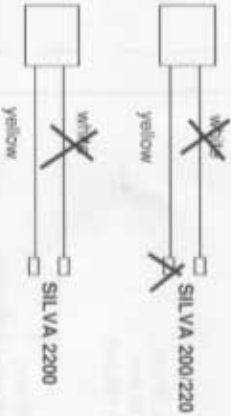
A: If an A-plug in your junctionbox is free, connect to this plug (cable no. 9771).



SILVA 2000: from terminal 4
SILVA 220: from terminal 5
SILVA 2200: from white wire

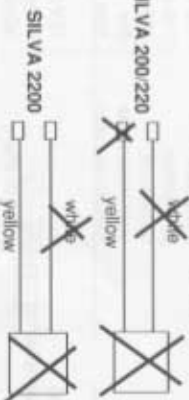
B: If no A-plug is available, connect to option junctionbox (cable no. 9771).

Adaptation of cable 9771

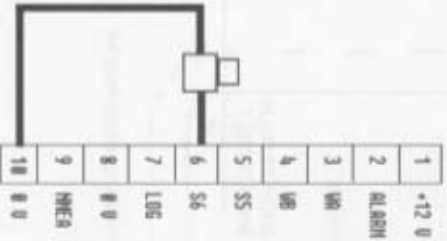


SILVA 2000: from terminal 4
SILVA 220: from terminal 5
SILVA 2200: from white wire

Adaptation of cable 9771



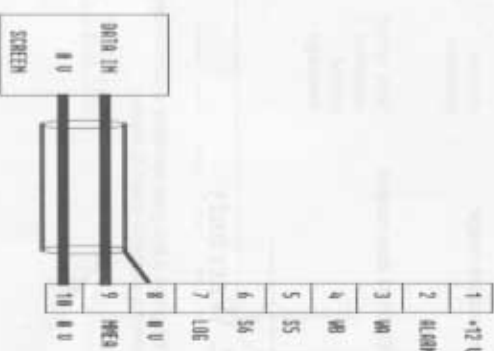
9.4 Remote control



9.5 External alarm



9.6 NMEA dataline



10. Fault finding

Most faults on electronic equipment can be found in the outer wiring and this should always be checked first if a fault arises.

Check that:
no cables are squashed or worn.
the screw terminals are tight.
the connection is made properly as per the wiring diagram.

A self checking routine is built into the instrument. If a fault is found, an error code is displayed:

- Error code: **E08** = Magnetic disturbance or faulty transducer.
Check that no sources of magnetic disturbance are too close to the transducer.
Relocate if necessary!
- E09** = Faulty data line between the transducer and the instrument. Check the cable connection!
- E10** = Low battery voltage.

11. Data

Dimensions:

Instrument
junctionbox
transducer
instrument cable
transducer cable

125 x 125 x 30 mm
140 x 68 x 42 mm
125 x 140 x 120 mm
5m
12m

Power supply:
Current consumption:
Output:

external alarm

12V DC (10-18V)
45mA (55mA with illumination)
open collector transistor, max 250 mA

Accuracy:
Calibration:

± 1 degree
 ± 20 degrees in each 45 degree step.

Temperature range:

storage
operation

-30 to $+85^{\circ}$ C
 -10 to $+70^{\circ}$ C

NMEA 0183 data output:

data format
repetition
output
message

8 data bits (D7=0), no parity, 2 stopbits
1/second
0 - 10 V DC, sink/source 25 mA,
when local variation is not set: \$HCHDM,000,M
when local variation is set: \$HCHDT,000,T

12. Warranty

SILVA gives a two year warranty against manufacturing faults or faulty components. A purchasing receipt must be shown if a warranty claim is made.

