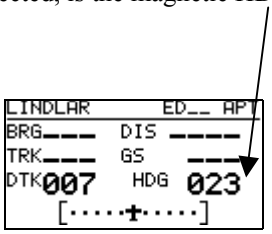
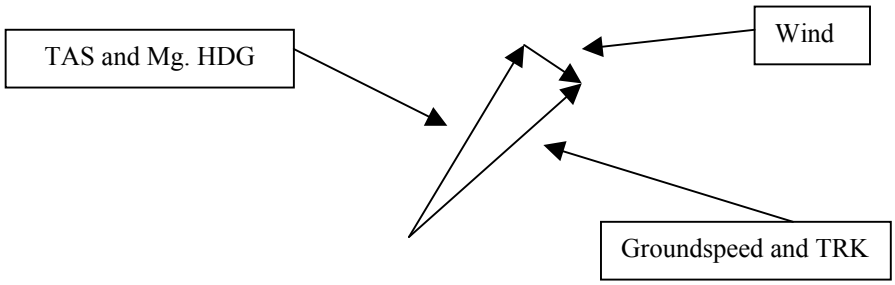
LX 5000
Compass Module

1 General

The compass module is an electronical compass (magnetic field sensor) , which was devloped for the LX5000. The LX5000 recognizes the compass module automatically, therefore only the compensation procedure but no additional settings in the LX5000 are needed.
A typical sign that the compass is connected, is the magnetic HDG status line on the navigation page 3 of the LX5000.



The compass module is commonly not only used for displaying mag. heading. In most cases it is installed for the **windvector calculation in straight flight.** The windvector is calculated following the well known triangle method, where the vectors of groundspeed with track and TAS with compass-HDG and the windvector together are a triangle.



The angle difference between HDG and TRK sizes the wind course (strictly speaking: the difference of the vectors mentioned above gives the wind in direction and strength). The angle difference between HDG and TRK is quite small, what means that the measurement has to be quite exact. The GPS-data (TRK and GS) are that exact. If the compass is now uncertain (about 5^0), it can cause errors up to 25km/h in the wind strength.

This method only works during straight flight. The algorithm is stopped, as soon as HDG and TAS vary too much.

2 Installation of the compass module

The device comes in a plastic housing (80 x 60 x 40mm). On the cover one will find the type label with serial number and flight direction (arrows. The type label shall always be upside!). The connection to the RS485-bus of the LX5000 is done directly by a 9-pin SUB D connector with 3m of cable. The optimal connection is a free RS485 ports on the back side of a LCD varioindicator, where two of these ports are located. If there are no more free RS485 ports, a splitting unit can be ordered from Filser Electronic.

2.1 where to install:

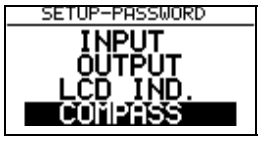
The compass module should be installed as far as possible away from magnetical, elektrical and iron parts (speaker and anolog varios are very interfering). Even the mechanical compass should be far away. Minimum distance is 20cm. As mentioned above, the arrows shall look forward into flight direction (parallel to pitch attitude). For a proper installation a plane area parallel to the horizontal plane is needed.

2.2 First test after installation:

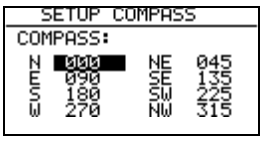
This a test for proofing the proper installation. Therefore a reference compass is required (either a master compass or a compassplane on the airfield ground). With the referene compass one should be able to mark the eight main directions (360°, 45°, 90°, 135°, 180°, 225°, 270°and 335°). Now the plane shall be oriented into north direction, while doing that watch the HDG displayed on Nav.-page 3 of the LX5000 (do not try to compensate the compass yet!). If HDG varies more than $\pm 5^0$, turn the compass so ,that the variation decreases below $\pm 5^0$.
Now turn the aircraft into the other directions and read the displayed values. If they vary more than $\pm 10^0$ one has to find another place for the compass module

2.3 Adjusting the compass module:

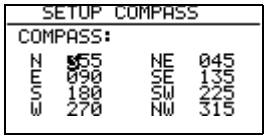
The compensation of the compass is done in the SETUP after entering the password (96990).



pressing ENTER



1. Orientate the aircraft again to 360^0.
2. Set the cursor on N and press ENTER (actual HDG is displayed).
3. Press ENTER again (storing the measured value)
4. Set the cursor on 45°, orientate the aircraft to 45° and again store the measured value.
5. Repeat the procedure for the rest of the directions



The compensation table will look similar to that above when you have finished the pocedure. Leave the menu with ESC.

2.4 final test:

Switch the LX5000 back to Nav.-Page 3 and proof again all 8 directions. The error should now be less than $1^0 – 2^0$ (better to have 1^0 !!). If the errors are bigger, then one should search for failts in istallation or in the adjustment procedure. When the final test has been positiv, your LX5000 is ready to calculate the wind with the compass method.

Please note:!
The calibration is specific for your combination of aircraft and compass, that means you can not transfer the compass to another aircraft while using the same calibration values.
The parameters are stored in an EEPROM, so they won´t get lost when a memory init is performed or the internal Li-battery is exchanged.
It is recommended to repeat the calibration procedure every year.

3 Windcalculation during flight

For the windcalculation a certain time is needed (length of the corresponding vectors). **This time (given in sec.) until one receives a result** shall be entered in the **INIT-menu under WIND/COMPASS**. Longer times produce more exact results and vice versa.

If the pilot intends to use the windcalculation with the compass module, he has to select in one of the three Nav.-Pages the wind menu (just press ENTER when you are on one Nav.-Page, move the cursor onto WIND and press ENTER again) and choose the item **COMPASS**.

Please note !
- Windcalculation with compass works exclusively in straight flight.
- The calculation is started, when the following conditions are fulfilled for at least 5 sec.:

  Speed should be constant – It should vary not more than ± 10km/h
  Flight direction should be constant, variation should be less than ± 5°
  The measurement takes that amount of time (in sec.), that was defined in the INIT-menu
  The produced result is the new wind vector
  If the limits given above are exceeded during the measurement, the procedure will be stopped and started again as soon as the condition are fulfilled again.

  The higher the speed, the bigger the uncertainty in the result will be.

What the pilot should do during windcalculation:

-keeping speed and flight direction as constant as possible
-watch the winddisplay on one main Nav.-page (lower left corner)
-WAIT means that now the conditions for the measurement were fulfilled for more than 5 sec.
-When the measurement is started a time counter will start counting backwards (like 15, 14, 13, ...). That is the time until receiving a result.
-When the procedure has run without problems, a new wind will be calculated and displayed.