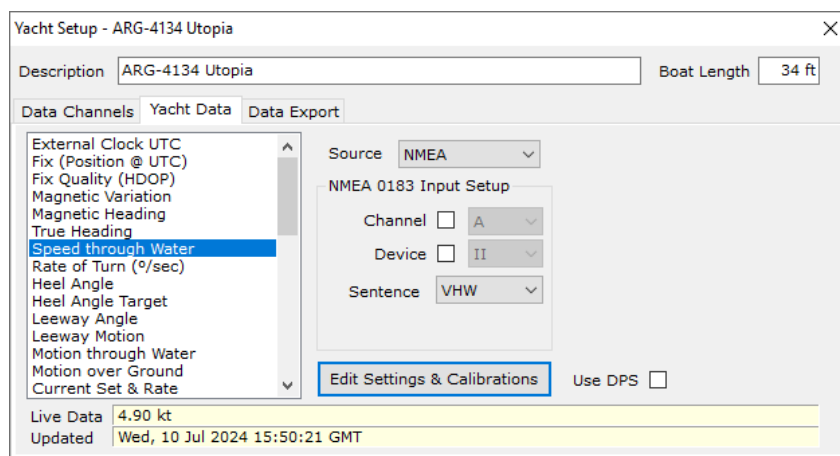


Speed Sensor Calibration – B&G H3000 Version

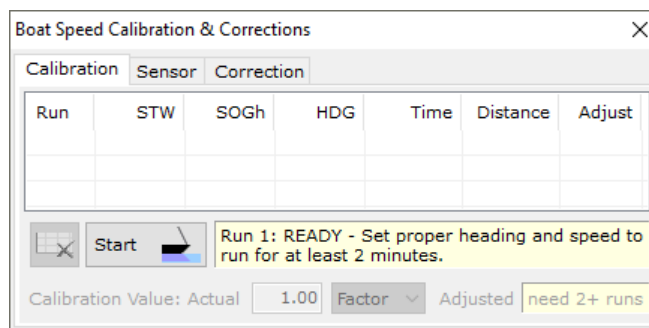
The following procedure is used to calibrate the speed sensor, obtaining the adjustment factor to be entered into a B&G H3000 instrument system for a typical boat speed, such as 6 knots.

Method

You perform these procedures by navigating, powered by the engine, using the speed calibration tool in the menu "Evolution > Yachts > Setup Active [Yacht Data] Speed Through Water" and the "Edit Settings & Calibrations" button.



The system will display a specific form for calculating speed sensor settings.



The procedure is straightforward: motor at 6 knots on a fixed heading for at least two minutes. Then, without changing speed, turn in the opposite direction (180°) for a second run. The system will average the adjustment in both directions, canceling out the effect of the current.

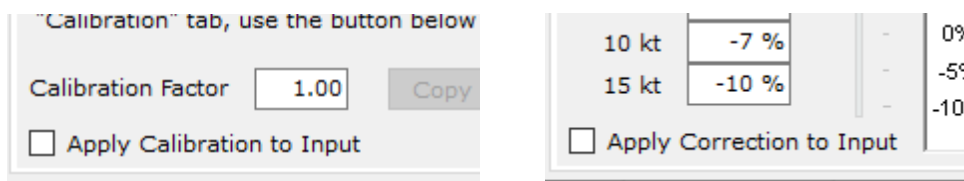
Preparation

On the B&G H3000 processor.

1. Write down the current calibration value. On one of the B&G GFD displays, press [$\leftarrow$ Menu], select "Setup > Calibration", and to the right of "Boatspeed", you will find the current value in Hz/Kt.
2. Set the "Heel Correction" table to 0, making a note of the current values first. Check the B&G H3000 operation manual, specifically the section on "Speed Linearity Correction Table."

In EVOLUTION

1. In the "Boatspeed Calibration & Corrections" form, on the "Sensor" and "Corrections" tabs, ensure that the "Apply..." options are unchecked.



These factors should NEVER be checked, as it is the H3000 processor that makes corrections to the sensor and applies the linearity adjustments (Heel Correction). EVOLUTION assumes that the speed it receives is that of the instruments and that no additional adjustments are necessary.

Acceptable Conditions for Calibration

1. Clean the speed sensor thoroughly, removing any organic growth and ensuring it is in perfect physical condition.
2. Clean the hull, particularly in the area around and in front of the sensor.
3. Select a day with stable sea conditions, light winds, and smooth waves whenever possible.

Calculation of a New Value of Hz/Kt.

This method compares the boat's speed over the ground (as measured by GPS) with its speed over the water from the speed through the water sensor.

To eliminate the influence of the current, two runs are navigated in opposite directions to average the adjustment values recorded for each run.

To complete the runs smoothly, steer the boat at engine power to a calm water area where it can travel for at least 0.5 miles and maintain a steady speed and course for a minimum of 2 minutes. It's best to avoid areas with swirling currents.

Step 1 – Open the Calibration Tool.

1. In EVOLUTION, use the menu option "*Evolution > Yacht > Setup Active*" to open the "*Yacht Setup*" form. In this form, select the [*Yacht Data*] tab and, from the list on the left, select the item "*Speed through Water*".
2. Finally, use the "*Edit Settings & Calibrations*" button to open the "*Boat Speed Calibration & Corrections*" form.

Step 2 – Navigate each Run.

Each run must last at least 2 minutes; extending the runs to 3 or 4 minutes improves the final result. It is necessary to conduct at least two runs in opposite directions to eliminate any effect of the current. Completing a third run is optional and only recommended if the current is changing.

1. With the boat sailing at the desired speed and course, use the "*Start*" button to start the leg. During navigation, this button is labeled "*Cancel*" and allows you to cancel the current run.
2. After sailing for more than 2 minutes, this button will display "*Done*" and is used to complete the run.

The form contains information about the current run, including speed values from the speed sensor (STW) and GPS (SOGh), the heading, and the run time. The right-hand column (Adjust) displays the adjustment value as it is calculated.

EVOLUTION will monitor the quality of the data during the navigation of each leg. If the heading or speed is not constant, the data quality will drop from "*Excellent*" to "*Good*", "*Poor*", or "*Failed*". The first column (*Run*) displays the corresponding icons: 😊, 😐, 😞, and ☹️.

When a leg fails, the system displays a message with the problem. The run can be deleted immediately using this button. The system will not allow it to continue as long as the failed section remains.

The figure on the left illustrates an example where you only need to complete the navigation of the second section by using the "*Done*" button.

Both sections must have the best possible data quality. If conditions are not ideal, it is advisable to postpone calibration for a better time.

Practical Tips

- Choose to calibrate at a speed of 6 knots, which will simplify the loading of other calibrations.
- To enhance the similarity of both legs, set the engine RPM for the proper speed and run the legs perpendicular to the wind and waves.

- The opposing sections must be conducted in the same area and immediately after the previous ones, while avoiding the turbulent path left by the navigation of the last section.
- Select an area with relatively constant currents, steering clear of regions with eddies.
- For each leg, the "Adjust" column will indicate the discrepancy factor between the GPS (land speed) and the speed sensor. A value of 1 signifies no discrepancy, while a value of 1.1 indicates a 10% discrepancy.

Step 3 – Calculate a New Hz/Kt Value

After making two successful runs, the bottom of the form is enabled.

1. In the left box, enter the current Hz/Kt value obtained in Step 1. In the example on the right, it is 3.45 Hz/Kt.
2. Then, from the selection list, choose "Hz/Kt," which is the B&G H3000 calibration units. Now, the reading that appears in the box on the right will be the correct value in Hz/Kt. In this case, you have obtained a new calibration value of 3.52 Hz/Kt.

Run	STW	SOGh	HDG	Time	Distance	Adjust
1	6.20 kt	6.85 kt	157° M	2m 22s	0.28 nm	1.105
2	6.30 kt	5.88 kt	339° M	2m 02s	0.20 nm	0.934

Run 3: READY - Set heading to 159° M, speed to 6 kt and run for at least 2 minutes.

Calibration Value: Actual 3.45 Factor Adjusted 3.52 Factor

Step 4 – Enter the New Hz/Kt Value into the Instrumentation.

1. On one of the B&G GFD displays, press [$\curvearrowright$ Menu], select "Setup > Calibration", and to the right of "Boatspeed", you will find the current value in Hz/Kt; replace it with the new calibration value. And use the [$\curvearrowright$ Menu] key again to confirm the value.
2. If you have chosen to calibrate at 6 knots, you can load the following correction table on the H3000. To perform this operation, please refer to the B&G H3000 operating manual in the "Speed Linearity Correction Table" section.

Heel Correction	En kt de corrección en referencia a una calibracion base a 6 kt					
STW/HEEL	5.0 kn	10.0 kn	15 kn	20.0 kn	15 kn	30 kn
Heel 0º	0.15	-0.70	-1.30	-1.80	-2.30	-2.80
Heel 10º	0.13	-0.80	-1.50	-2.10	-2.60	-3.30
Heel 20º	0.10	-0.90	-1.70	-2.40	-3.00	-3.80

Step 5: Final Check

Close the speed calibration tool form and repeat the entire process (Steps 1 and 2) to validate and refine the calibration until the average adjustment value of both runs is between 0.98 and 1.02, indicating a minimum acceptable accuracy of +/-2 %.