# Ocean Racing

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## VELUX 5 OCEANS
## A STORMY OPENING

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**ROUTE DU RHUM**
Lemonchois triumphs

**VENDÉE GLOBE**
Impressive line-up for 2008

**GIANTS**
Banque Populaire unveiled

**TIPS**
Choosing an autopilot

# CHOOSING A PILOT

Sailing singlehanded implies a cautious choice of autopilot.

Are you tempted by single-handed racing and the idea of leaving your crew behind on the quayside next time you sail? All well and good, but who is going to steer the boat, when you are navigating or taking a nap? The pilot, you answer. More than just a simple accessory, this equipment, which is quite complicated, is not easy to choose: we asked Paul Fraisse, the Sales Director of NKE France to share his expertise with you.

## Power requirements

The first stage involves defining the power required according to the size of the rudder, the limit of the steering angles and the maximum speed of the boat – in other words the pressure on the rudder. Choosing the power according to the length or tonnage of the boat is one way of approaching the subject, but is not enough to guarantee that everything works well. To carry out the calculation, do not hesitate to contact a pilot manufacturer. You will need to define the distance between the rudder stock and the ram attachment (on the rudder stock or the wheel mechanism). By reducing this distance, the speed of the rotation of the rudder is faster and so the pilot is more reactive, but it requires a stronger force to move the rudder. On the other hand, the power consumption is higher. The distance will therefore be based on the chosen power level.

To choose the power level, you will need to compare the following characteristics:

- The movement or the length of the rod completely withdrawn: the ram needs to be able to push the rudder +/- 35° from side to side.
- The maximum force that the ram can exert expressed in kg: with the force required for your boat you can calculate the minimum distance from the attachment of your ram to the axis of the rudder.
- The speed at which the rod comes out with or without a load. (To compare, you will need to calculate to and from each stop, for example 35° on each side). With no load, the time should be a maximum of 12 seconds.
- Its consumption (Depends on the power of the electric motor)
- Its weight (The ram is fitted at the stern of the boat.)

## Hydraulic or electric ram?

The ideal solution simply does not exist. You need to weigh up the pros and cons.

The electric ram consumes less than hydraulic units and limits the helm less when it is free. To remove this last objection, the manufacturer of hydraulic rams Lecomble and Schmit has managed to cut in half the frictional force, when the ram is free to move, which has moreover allowed them to offer this type of part to Figaro class boats.

Hydraulic units are more robust and any problems appear in the first few miles in the running in period. As for electric rams, opinions vary. Some people say they have been around the world twice or more without any problem, while others have only managed half a transatlantic crossing. It is difficult to establish any statistics based on this attitude of «everything is fine» or «everything is bad». Let us not forget that the ram is under constant pressure, even when free. In this case, the parts of a hydraulic ram are more resistant than the wheels (nylon or brass) of an electric ram. The hydraulic system guarantees the availability of the pilot. The manufacturers of hydraulic rams advise users to change the brushes after only 2000 mile-hours of use to be on the safe side, or in other words after 83 days of use 24 hours a day. For the electric ram, a service before each transatlantic crossing is recommended.

## The brain of the pilot: the calculator

***Favour a highly reactive device***

The variation compass is a device for detecting the speed of gyration on a given level. It is fitted to

be able to measure the speed of lateral rotation of the boat. With this measurement, it is possible to apply pressure to the helm before the boat hits the wave. It is not a matter of anticipating, but of reacting. All the comparative studies prove that the variation compass is vital to be able to pilot in heavy seas. Downwind, with the absence of a variation compass, the boat can go more than 20° off course. The variation compass allows us to reduce this figure to below 7°. According to the manufacturer, the variation compass is either part of the calculator or in the compass

## The vital sensors

***The compass and variation compass***

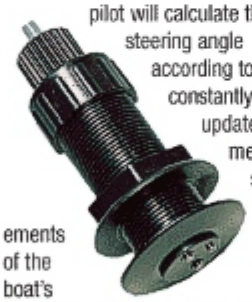
If the variation compass is part of the calculator, a classical compass can suffice. Any rapid movements of the boat will be corrected by using the variation compass. The bearing is applied for longer (a few seconds) and can be filtered, as the compass reacts like a compass with alcohol. To understand this better, turn your compass rapidly in a circle and see how long it takes to settle down. For the FLUXGATE electronic compass, the behaviour is the same. If the variable compass is part of the compass, it is called a gyrocompass. Do not confuse this type of compass with the gyrocompass on trading ships, which indicate geographical north by using gyroscopic motors. It is vital that the pilot is fitted with a variation compass.

***The wind-gauge detector: The ability to steer according to the wind***

The calculator needs to receive information from the wind vane at a frequency of at least 5 pieces of information per second. If the wind information reaches the pilot too late, it can steer the wrong way. If the information arrives too soon, it is better to steer in compass mode, but any advantages from following wind changes to ensure the best speed are lost. For the reasons given above, you cannot read the wind data using a NMEA link (a link, which allows two devices from different makers to communicate). The NMEA speed is too slow arriving, and so the wind mode on the pilot cannot react quickly enough. Wind-vanes using ultrasounds are to be avoided, as it is in their nature to supply wind direction data too slowly. In order to ensure the necessary reaction time in wind mode piloting, it is preferable to fit the pilot with a wind gauge and vane from the same maker.

***Speed detector***

When you steer, the steering angle you give is inversely proportional to the speed. To put it more simply, the faster the boat is sailing, the smaller the movement of the helm needs to be to produce the same result. A good pilot will calculate the steering angle according to constantly updated measurements of the boat's speed. Some pilots only offer two settings, «fast boat» or «slow boat». In this case, it is clear that the steering angle is not inversely proportional to the boat's speed. To check to see whether a pilot takes the boat's speed into account all the time, watch the helm movements at low and high speed for the same required change. Some pilots offer an interesting option by a selection between surface speed and deep speed to calculate this angle.



***The mode, which makes all the difference downwind: real wind mode***

Au portant, en mode vent apparent, le pilote suit un cap qui est fonction du vent apparent. When you dive down off a wave, the boat accelerates, so the apparent wind increases and comes around closer to the axis of the boat. In this case, the wind comes towards the boat's trajectory and the boat bears away. When the boat climbs a wave, she slows down, and the apparent wind drops off, while the apparent wind angle increases. In this case, the boat luffs to maintain the same angle. If you tend to bear away at the helm going down a wave, and luff when climbing up, you are not exactly following the apparent wind angle and tend to tack, in order to accelerate on your trajectory. By piloting in apparent wind mode the boat moves too far off its course, and it is preferable to switch to compass mode, which means losing speed. The boat goes straight and no longer follows any wind changes. By choosing real wind mode, the boat will not luff or bear away with speed changes, but will maintain the best angle and follow wind fluctuations. To use real wind mode requires apparent wind data and boat speed data to be supplied at a sufficient pace to calculate real wind almost instantaneously.

***Power supply study: are my batteries going to be enough?***

The selected pilot reacts quickly and can steer in all or almost all conditions. It can steer with a larger sail area and work more. In this case, power consumption will of course increase. You will need to check the battery capacity is sufficient. Energy requirements can double when using a pilot in heavy seas, in comparison to one being used in calm waters. You will need to estimate the number of hours per day you intend to use the pilot based on an average consumption of 4 to 5 Amps. The useful capacity of the batteries is equal to 50% of their nominal capacity. With this information, you need to calculate the capacity of all your batteries in order to ensure a reasonable recharge rate. A battery checker, showing the strength and voltage is useful, if you are going to be using a pilot frequently. It allows you to control its load range. When the batteries are beginning to lose their power, and if there is only one set of batteries to power the electronic systems and the ram, turning the latter on can cause occasional voltage drops leading to electronic failure. In these cases, it is recommended that a 12volts / 12volts converter be fitted, which allows the power supply to be set at the right voltage for the electronic systems. Moreover, this solution allows you to delay recharging. Some pilots were designed originally for motor boats, where power consumption was not a consideration. For a sailing boat, the situation is different. For example 1 A of current throughout a Vendée Globe corresponds to 90 days x 24 hours X 1 A = 2160 Ah. That means several hours of engine use. It is useful to find out the consumption on Stand By (pilot set to STOP). This consumption varies according to the maker from 50 mAh to 1 Ah). When it consumes 1Ah, it is better to turn it off from the electrical circuit board. In this case, the pilot is not so readily available, but it reduces the need for the engine to be used by an hour a day.

## The budget

As for the budget required to fit a pilot for a boat taking part in the Transquadra or a Class 40 boat, you should reckon on at least 6000 for a pilot satisfying the aforementioned criteria and more if you need to change the wind gauge. To compare, the pilot budget for a 60-foot Open for the last Vendée Globe was 9000 (Pilot + electronic Gyrocompass for the south). The budget for a pilot for a 60-foot multihull is around 20,000 with real wind calculators and the relevant detectors.

# Victory, performance and safety !!!


**Roland Jourdain**

FIRST IN THE IMOCA CLASS IN LA ROUTE DU RHUM - LA BANQUE POSTALE 2006 IN 12 DAYS 11 HOURS, 58 MINUTES WITH AN AVERAGE SPEED OF 11,81 KNOTS



FLUXGATE COMPASS SENSOR

LOG/SPEEDO ELECTROMAGNETIC

BATTERIES CONTROLLER SENSOR

THE TL 25


THE GYROPILOT GRAPHIC


## Congratulations to all...

*The first five 60' multihulls were equipped with nke Gyropilot2* **nke** *!*

*The first 50' multihull sailed with* **nke**.

**nke** *equipped 85% of Class 40, including the top 2 finishers : Phil Sharp and Gildas Morvan.*

**nke** MARINE ELECTRONICS

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