

PROCESSOR REGATTA

Part number: 90-60-384



USER MANUAL AND INSTALLATION GUIDE

Version V4.0

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1. INTRODUCTION

Thank you for purchasing the **nke Processor Regatta**. This processor is the heart of the system and provides the most accurate, dynamic and noise-free information to the autopilot, the navigation programme, the tactician, the crew and of course the skipper.

In this manual you will find all the information necessary to:

- Carry out Installation, configuration and calibration of the **Processor Regatta** and sensors
- Access all the functions offered by the **Processor Regatta**
- Get the best performance from your boat

2. THE TOPLINE NETWORK

The **Topline** system consists of sensors and displays networked with a single 3 wire cable (shield: 0V, white: +12V, black: Data). Data is carried on the black "DATA" wire.

Displays have a variable address ranging from 1 to 20 while the sensors have a fixed address with a value comprised between 21 and 210. The network is managed from one of the displays that will be chosen as "MASTER" during the system commissioning. Its address will be "1".

Once turned on, the "MASTER" will scan all the addresses to discover all the displays and sensors which are connected to the network.

Once the "MASTER" has scanned the network, it will ping only the channels it has identified. Also, the "MASTER" will randomly ping the channel "0" (non identified display). A specific answer from a display will generate an address for that display to integrate dynamically the network.

3. THE PROCESSOR REGATTA

The **Processor Regatta** provides the following:

1. Performance:
 - Accurate measurement of wind speed and angle (true and apparent), boat speed, speed over ground, the boat movements, all with sensitivity to small changes.
 - Accurate measurement of acceleration and the boat's attitude (magnetic heading, angles, acceleration, turn rates, magnetometric vector)
 - Accurate dynamic calculation of true wind as a result of the compensation of measured data from the masthead sensor, the geometry between the mast and the hull and the use of corrections table.

2. Fast data provision:
 - High speed data flow (fast reactivity to the measurements from sensors providing high speed updates to the autopilot and data display).
 - Fast data rate interface with the onboard PCs for the major navigation packages (via the SailNet protocol on IP and various gateways). Compatible with the Proteus communication system.

3. Safe and secure operation:
 - Integrated safety: various safe modes allow use of the main functions without the Processor Regatta.
 - The use of the lightest possible Linux OS ensures real time operation without background task (or virus) and avoiding mechanical moving parts (such as hard disk, fans...)
 - Auto diagnostic log for a good understanding in case of malfunction.

4. Standardisation :

Simple and open formats and protocols specified for:

 - Variables logs
 - Variable exchange protocol via fast RS232/NMEA0183 or IP.
 - Adjustment for the linear calibrations, filtering, alarms and non-linear calibration files, polar tables.
 - Use of one single variable definition base for each level: in the remote Gyropilot Graphic display, the **Processor Regatta**, the variables log, the compatible navigation software (Deckman), the IP broadcast, the post-processing software (Excel..), the diagnostic software (Toplink ...).

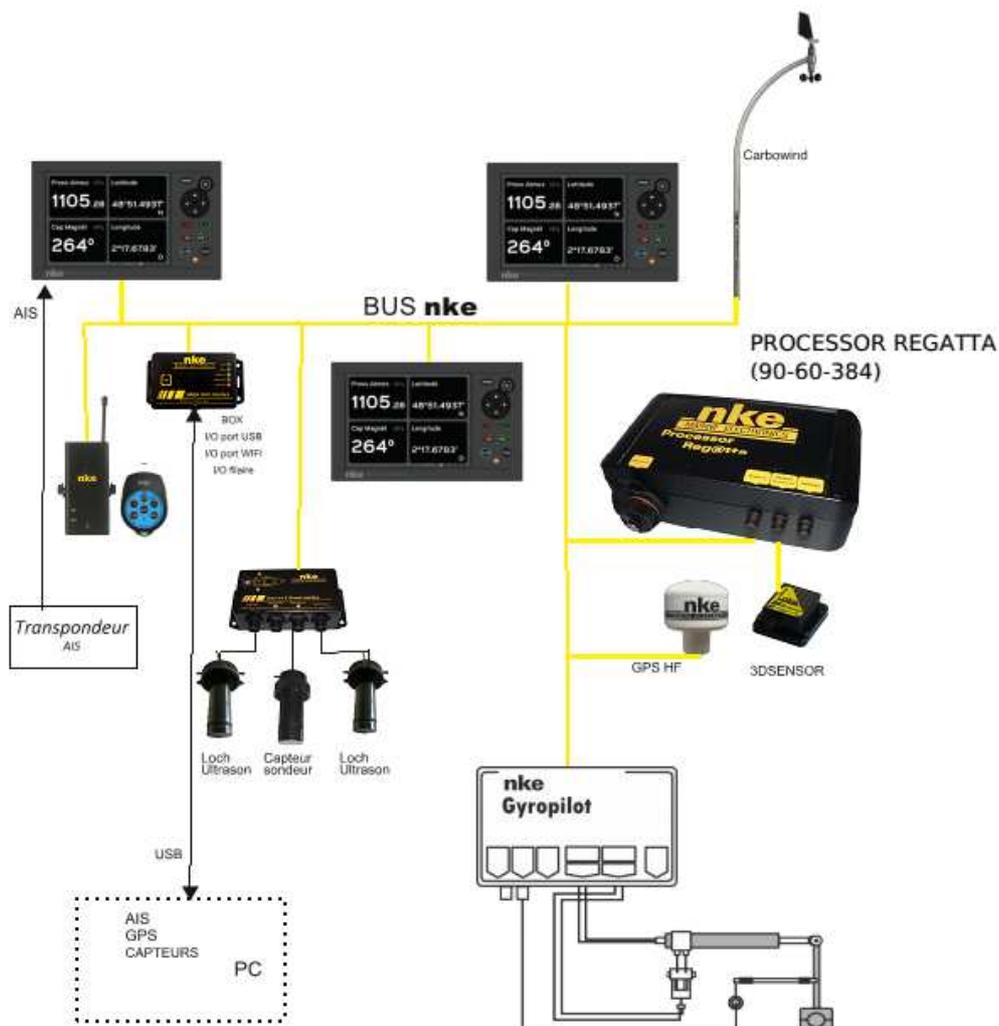
5. Post-processing:
 - Internal communication for diagnostics and modeling.

6. Open data:
 - Functions can be customized or translated (display on the *Gyropilot Graphic*, Deckman, Tools).
 - Open IP protocol for « SailNet » variables exchange (Linux/windows libraries with samples supplied, possibility to use several boats and/or navigation programs simultaneously).

7. Upgrades:
 - Easy **Processor Regatta** update via IP
 - Use of the *Topline* peripherals with a Flash memory for onboard update with PC *Toplink*.
 - **Processor Regatta** interface page on the Gyropilot Graphic display for easy HCI update.

8. Power management:
 - Allows the on board PC to operate in standby mode while getting the performance data on the **nke** displays.
 - The **Processor Regatta** enhances the wind data (faster refresh and less noise). As a consequence, the autopilot steering is optimized and reduces the use of the ram's motor.

4. SYSTEM DESCRIPTION



*The equipment featured in this drawing is for indication only.
It does not reflect your own system.*

5. INSTALLATION OF THE PROCESSOR REGATTA

In this chapter we will cover the installation of the unit and all calibration required in the *Topline* network environment.



IMPORTANT:

- Please take time to read this manual carefully before you start installation
- Any connection to the **TOPLINE bus** must be performed through the specific interface box # 90-60-417 and only with the **TOPLINE bus** cable # 20-61-001
- Any work on the **TOPLINE bus** requires the system to be powered off.

5.1 Installation of a brand new nke system

All units except the **Processor Regatta** must be installed first. Please refer to the manual for each unit (sensors, displays...). We recommend using the **Multigraphic or Gyrographic** as the system's Master.

Once the system is installed, refer to "How to integrate **Processor Regatta** in an existing **nke** system" to complete the installation.

5.2 Installation of the Processor Regatta with an existing nke system

As a first step, you need to update every component connected to the **Topline** network. This is done with the « Toplink2 » software, or alternatively you can send the units to **nke** customer support.

Firmware, database and the Toplink2 software (requires the Topline USB interface 90-60-482) are all available for download at the following address: <http://www.nke-marine-electronics.com> in the technical area (requires a password – access to trade only).

Table of compatibility with the **Processor Regatta**:

Type of unit	Description	Minimum Version required
Display	Multigraphic	All versions
Display	Multidisplay	All Versions
Display	Gyropilot Graphic	V3.1
Display	TL25	V1.5
Display	Display and Pilot PAD	All versions
Interface	Toplink 2	V2.0.11
Interface	Radio receiver	V2.4
Interface	Wifi Box	All versions
Interface	Battery monitor 500	All versions
Interface	Speed and depth Interface	V2.0
Interface	Dual-speed and depth Interface	V2.0
Interface	Interface Loch for paddle wheel	V2.2
Interface	Interface sounder	V2.2
Interface	Analog Monitor	All versions
Interface	Analog Monitor 4X	All Versions
Interface	Load Cell Monitor	All Versions
Interface	Regatta Compass Interface	V1.4
Sensor	Ultrasonic starboard / port	V1.6
Sensor	Fluxgate compass	N.C
Sensor	Carbowind HR	V1.8
Sensor	AG HR	V1.8
Sensor	9X Compass	All versions
Sensor	3D Sensor	V2 & V3
Sensor	HR 100 barometric sensor	V1.0
Autopilot	Pilot processor	V3.0

Once you have ensured that all units are up to date with a compatible version, you can power the system on and check that it works properly. We strongly recommend choosing a

Multigraphic or Multidisplay as Master of the **Topline** network. This will make the integration of the **Processor Regatta** easier to manage.

5.3 Adding the Processor Regatta to your nke system

When all the sensors, displays and interface units are up to date, compatible with the **Processor Regatta** and fully working, you are ready to add the **Processor Regatta** to the network. Once in place, it will become the Master. Therefore, the existing Master has to be deleted so that the **Topline** network is clean of any Master.

You must reset the Multigraphic or Multidisplay master to assign it the 0 address. This change of address is done in the menu, parameter, Maintenance, Topline address. See the Multidisplay or Multigraphic manual to reset the Topline address.



WARNING

The **3D sensor** or **Regatta Compass** sensor must be connected to the « **NMEA1 Compass** » connector before connecting the **PROCESSOR REGATTA** (refer to the unit's manual). The **PROCESSOR REGATTA** will automatically detect those sensors (version 2.4 and up).

You must also connect the HF GPS if the version is lower than 2.2 or another GPS source On the NMEA 2 input of the REGATTA PROCESSOR. In the case of a HF GPS version 2.2 or higher, it is not necessary to connect the NMEA 2 input. The Channels are broadcast directly by Topline Bus by the antenna.

When powering the Topline network on, a blue LED situated on the front face of the **PROCESSOR REGATTA** indicates the working status. The **PROCESSOR REGATTA** always acts as the Master. When the system is powered on, the Master will create 2 « **Lists** ». Allow 30 seconds for boot completion.

LED status	Working status or fault description
LED off	- Processor is powered off or faulty.
Blue Led	
1 blip every 3 seconds ▲ 3s ▲	- Processor Regatta in normal working status - internal auto-check is correct
100ms blip rate ▲▲▲▲▲▲▲	- Processor Regatta is booting
1 blip per second ▲ ▲ ▲ ▲	- The Processor has detected a serious error (lost a sensor, firmware version is not compatible...)
Fixed light	- Processor is out of work or booting.

Once the **PROCESSOR REGATTA** has started (Blue LED blips every 3 seconds), you can give a new node number to the **Multigraphic or Multidisplay** which has been used previously to check the system.

See the Multidisplay or Multigraphic manual to reset the Topline address.



WARNING

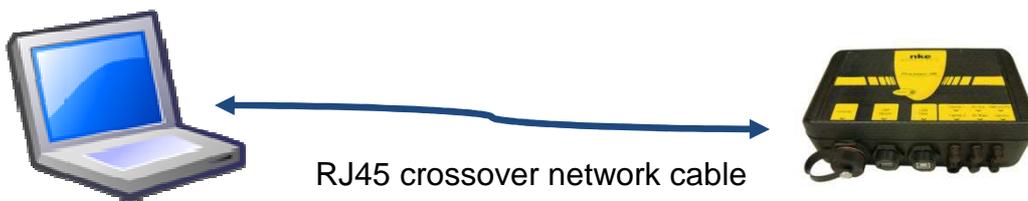
The **List creation** is a long process (30 secondes). Always wait until the **PROCESSOR REGATTA** boot is completed (blue LED = 1 blip every 3 seconds) before asking for a new node number.

5.4 Ethernet configuration

Depending on the network configuration on board your boat, several connection options are possible between your **Processor Regatta** and the PC.

- Direct Ethernet connection:

The network cable is supplied with the **Processor Regatta**. It is a crossover cable that allows direct connection to your PC.



- Ethernet connection via a network:

The cable supplied with your **Processor Regatta** is a crossover cable. It allows connection with the most recent Ethernet Switches. Please check your Ethernet Switch compatibility with crossover cables. If not, you should use a *straight-through* cable.



5.5 Connecting the Processor Regatta :

Prior to connection, you must have configured your PC. The connection will operate via **ftp**, **http**, and the **Sailnet** dll and will allow access to the **calibrations tables**, the log files for trouble-shooting and software updating.

The default address of the **Processor Regatta** is **192.168.0.232** and the connection credential is:

Login: **root**

Password: **pass**

Please check the following points before any connection:

- The blue LED indicates that the **Processor Regatta** works properly
- On the Ethernet RJ45 on: yellow LED indicates activity / green LED indicates physical connection
- Firewall: allow all ports for 192.168.0.232
- If you use a Proxy: in the advanced connection settings of your web browser, add «192.168.0.232» in the section «not use Proxy for the addresses».
- The HR processor does not manage DHCP server. If you use a point to point Ethernet and don't have an IP address automatically attributed by DHCP, you should give your PC a fixed IP address such as **192.168.0.X** where X is different from 232, which is the default address of the **Processor Regatta**. (see **addendum A - Connecting the Processor Regatta**)

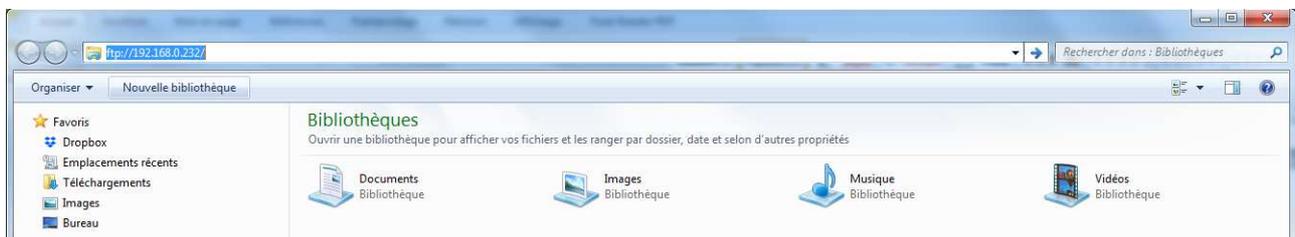
With the http protocol:

Open your Internet browser (Internet explorer, Firefox etc.) and type in the address **http://192.168.0.232** in the address bar and press « Enter » or click on the connection button to accept.

The **Processor Regatta** configuration page will appear.

With the FTP protocol :

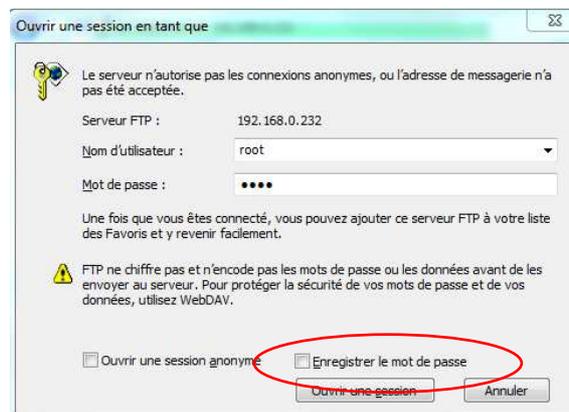
To connect to the FTP server from your PC without having a user name and a password, type in an Explorer window the address <ftp://root:pass@192.168.0.232>



In the above case Windows Explorer will ask for Login and Password.

Once entered they will be saved by Windows if you check “Save password”. In this case you do not need to write root and pass in the ftp address.

<ftp://192.168.0.232>



5.6 Connection to the Topline bus

The Processor Regatta features a **Topline** plug for connection to the **Topline** bus which carries the **12 volts** power supply as well.

Cable: twisted pair with aeronautical type shield.

Connector: Binder 5 pts série 620.

Wire Colour	Function	Termination
Blue	Topline Data	3 and 5 together
White	+12V	4
Shield	Common	1
Not connected	+5V OUT	2

5.7 Connector NMEA1/Compass

Compass Regatta can be powered and communicate with this connector which can also receive data from the **3D Sensor**.

Cable: 3 wires + aeronautical type shield

Connector: Binder 5 pts series 620

Wires Colour	Function	Termination
Blue	TX Processor	5
White	RX Processor	3
Orange	+12V OUT	4
Shield	Common	1

5.8 NMEA 2 connector

This connector can power and receive data from an NMEA device up to 115kb. Refer to **6.1 configure the installation file** for the port configuration.

Cable: 3 wires + aeronautical type shield

Connector: Binder 5 pts series 620

Wire colour	Function	Termination 5pts	Termination DB9pts
Blue	TX Processor = RX NMEA	5	2
White	RX Processor = TX NMEA	3	3
Shield	Common	1	5
Orange	+12V OUT	4	Isolate
Not connected	+5V OUT	2	Not connected

5.9 NMEA input

Below is the list of NMEA sentences accepted by the **Processor Regatta**

Each NMEA sentence matches with channels on the **Topline** bus

Channels are automatically detected. NMEA channels created by the **Gyropilot Graphic** remain as priority input on the NMEA port of the **Processor Regatta**

NMEA Code	Function number	Possible Functions associated
APB	64	Cross track error
	70	Autopilot status
	71	Bearing Origin Waypoint to Destination Waypoint
BOD	71	Bearing Origin Waypoint to Destination Waypoint
BWC	62	Distance to waypoint
	63	Bearing to waypoint
BWR	62	Distance to waypoint
	63	Bearing to waypoint
CUR	76	speed of current
	77	Direction of current
DBT	22	Depth
DPT	22	Depth
GGA	86	Latitude Degrees and Minutes
	87	Latitude Minutes decimals
	88	Longitude Degrees and Minutes
	89	Longitude Minutes decimals
GLL	86	Latitude Degrees and Minutes
	87	Latitude Minutes decimals
	88	Longitude Degrees and Minutes
	89	Longitude Minutes decimals
GNS	86	Latitude Degrees and Minutes
	87	Latitude Minutes decimals
	88	Longitude Degrees and Minutes
	89	Longitude Minutes decimals
HDG	118	True Heading - geographical North
	198	Magnetic Heading – Safe Mode
KVH	198	Magnetic Heading – Safe Mode
	199	Heel Angle – Safe Mode
	200	Trim Angle – Safe Mode
MDA	48	Air Temperature
	49	Water Temperature
	119	Barometric pressure – High resolution
MMB	119	Barometric pressure – High resolution
MTA	48	Air Temperature
MTW	49	Water Temperature
MWV	192	Apparent Wind Speed – High resolution
	193	Apparent Wind Angle – High resolution

RMB	62	Distance to Waypoint
	63	Bearing to Waypoint
	64	Cross track error
	67	VMG to Waypoint
RMC	27	UTC minutes and seconds
	47	UTC Hour and day
	69	UTC Year and month
	86	Latitude Degrees and Minutes
	87	Latitude Minutes decimals
	88	Longitude Degrees and Minutes
	89	Longitude Minutes decimals
	208	Speed Over Ground
209	Heading Over Ground	
ROT	207	Rate of turn and direction of turn.
VBW	21	Boat speed
	42	Dead reckoned drift angle
	208	Speed Over Ground
	209	Heading Over Ground
VDR	76	Speed of Current
	77	Direction of current
VHW	21	Boat speed
	118	True Heading - geographical North
VLW	32	Log
	31	Daily log
VTG	208	Speed Over Ground
	209	Bearing Over Ground
VWR	192	Apparent Wind Speed – High resolution
	193	Apparent Wind Angle – High resolution
WCV	67	VMG to Waypoint
XTE	64	Cross Track Error
	70	Autopilot Status
XTR	64	Cross Track Error
ZDA	27	UTC minutes and seconds
	47	UTC Hour and day
	69	UTC Year and Month
ZDL_R	62	Distance to Waypoint
	222	Time to Waypoint
ZDL_T	225	Distance to Layline
	226	Time to Layline

5.10 NMEA sentences input priority rules

A priority order is given to the data coming from the **Topline** bus on NMEA data. NMEA sentences from the displays have a priority order on those coming from the processor.

Each Function can be fed by several NMEA sentences. The table below indicates priority between NMEA sentences.

Num	Variable	High	Medium High	Medium Low	Low
21	Boat speed	VBW	VHW		
22	Depth	DPT	DBT		
27	UTC minutes and seconds	ZDA	RMC		
32	Log	VLW			
31	Daily Log	VLW			
47	UTC Hour and day	ZDA,	RMC		
48	Air Temperature	MTA	MDA		
49	Water Temperature	MTW	MDA		
62	Distance to Waypoint	BWC	RMB	BWR	ZDL_R
63	Bearing to Waypoint	BWC	RMB	BWR	
64	Cross Track Error	RMB	APB	XTE	XTR
67	VMG to Waypoint	WCV	RMB		
69	UTC Year and Month	ZDA	RMC		
70	Autopilot Status	APB	XTE		
71	Bearing Origin Waypoint to Destination Waypoint	APB	BOD		
76	Speed of Current	VDR			
77	Direction of Current	VDR			
86	Latitude Degrees and Minutes	GNS	GGA	RMC	GLL
87	Latitude Minutes decimals	GNS	GGA	RMC	GLL
88	Longitude Degrees and Minutes	GNS	GGA	RMC	GLL
89	Longitude Minutes decimals	GNS	GGA	RMC	GLL
118	True Heading – geographical North	HDT	HDG	VHW	
119	Barometric pressure – High resolution	MMB	MDA		
192	Apparent Wind Speed – High resolution	MWV	VWR		
193	Apparent Wind Angle – High resolution	MWV	VWR		
198	Magnetic Heading – Safe Mode	KVH	HDG		
199	Heel Angle – Safe Mode	KVH			
200	Trim Angle – Safe Mode	KVH			
207	Rate of turn and direction of turn	ROT			
208	Speed Over Ground	VBW	RMC	VTG	
209	Course over Ground	VBW	RMC	VTG	
225	Distance to Layline	ZDL_T			
226	Time to Layline	ZDL_T			
222	Time to Waypoint	ZDL_R			

5.11 NMEA output

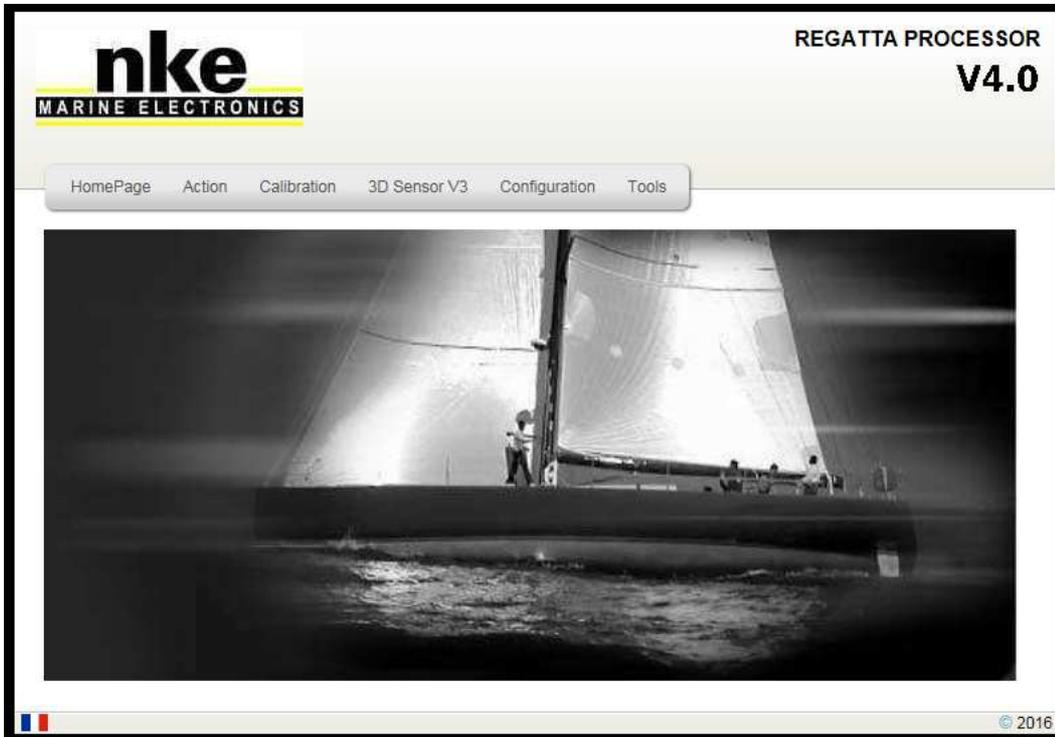
Output frequency is linked to the baud rate selected.

The table below shows all NMEA sentences that can be output from the processor. An NMEA sentence will be available for output if at least one value contained in the sentence is used by the processor.

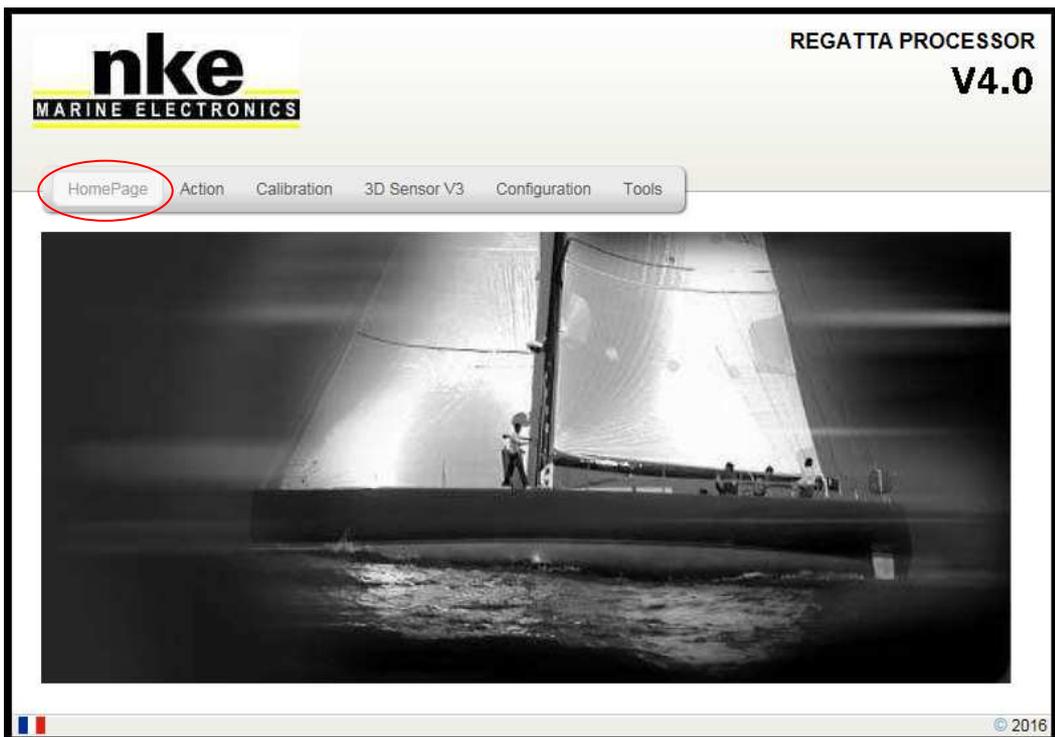
NMEA sentence	Description
\$INDBT ...	Depth below keel
\$INDPT ...	Depth below keel
\$INGGA ...	Global Positioning System Fix Data
\$INGLL ...	Geographic position
\$INHGD ...	Heading – Deviation and Variation
\$INHDT ...	True heading
\$INMTW ...	Sea Temp
\$INMWV,x,x,R ...	Apparent Wind angle and speed
\$INMWV,x,x,T ...	True Wind angle and speed
\$INMWD ...	True Wind direction and speed
\$INRMB ...	Recommended Minimum Navigation
\$INRMC ...	Recommended Minimum GNSS Data
\$INRSA ...	Rudder angle
\$INVDR ...	Set and Drift
\$INVHW ...	Water Speed and heading
\$INVLW ...	Dual Ground/Water Distance
\$INVPW ...	VMG
\$INVTG ...	Course/Speed Over Ground
\$INWCV ...	Waypoint closure velocity
\$INXDR ...,C,x,x,C,AIRT ...	Air Temperature
\$INXDR ...,P,x,x,B,BARO ...	Barometer
\$INXDR ...,N,x,x,N,FRST ...	Forestay
\$INXDR ...,A,x,x,D,ROLL ...	Heel angle
\$INIXDR ...,H,x,x,P,HYGR ...	Humidity
\$INXDR ...,A,x,x,D,KEEL ...	Keel Angle
\$INXDR ...,A,x,x,D,LEEW ...	Leeway angle
\$INXDR ...,A,x,x,D,MAST ...	Mast angle
\$INXTE ...	Cross track error, measured
\$INZDA ...	UTC Time and Date

6. CONFIGURATION OF THE PROCESSOR REGATTA

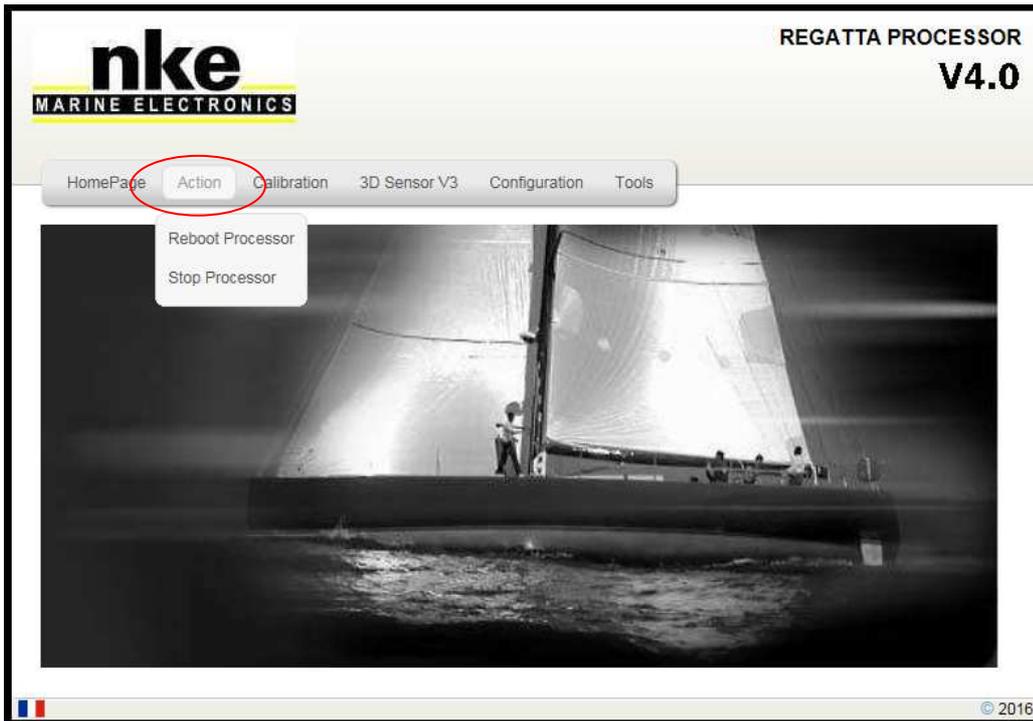
In this chapter we will cover the configuration of the **Processor Regatta** for your system. You can access the **Processor Regatta** home page by typing this address in your Internet browser: <http://192.168.0.232> (refer to addendum A for PC configuration). In this page several buttons link to the calibration tools.



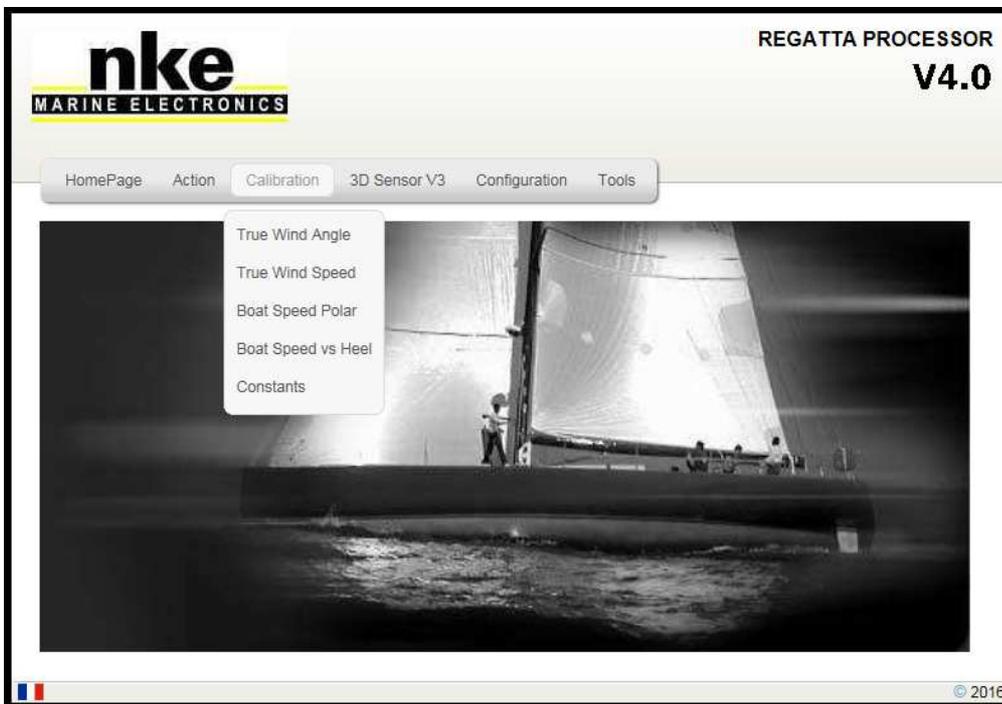
Home Page: bring back to the home page.



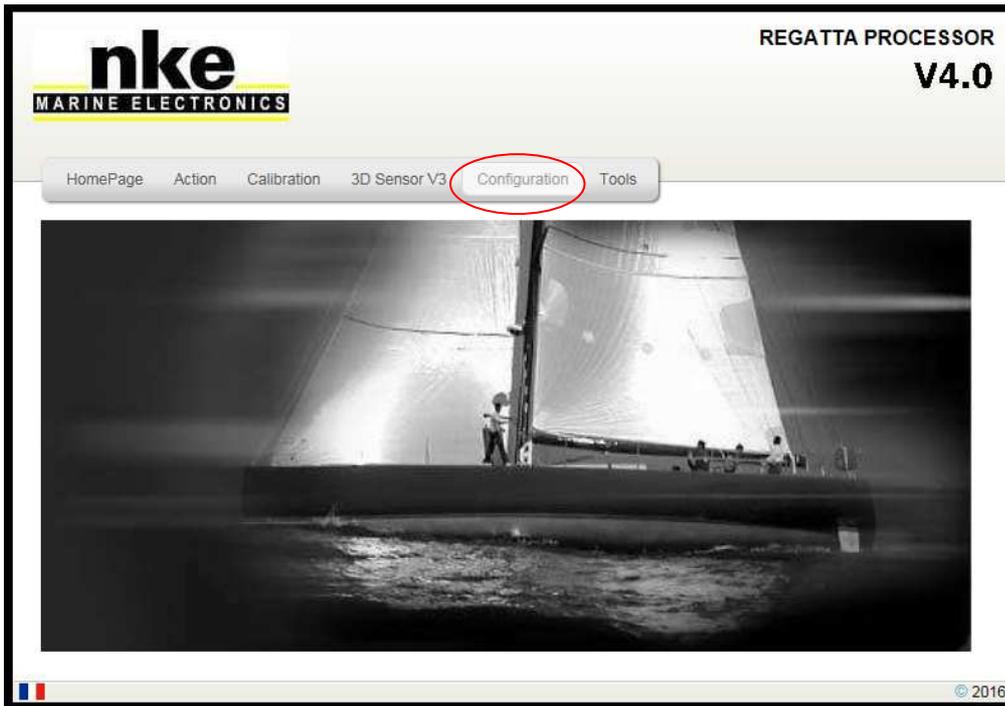
Action: links to the Reboot and Stop buttons



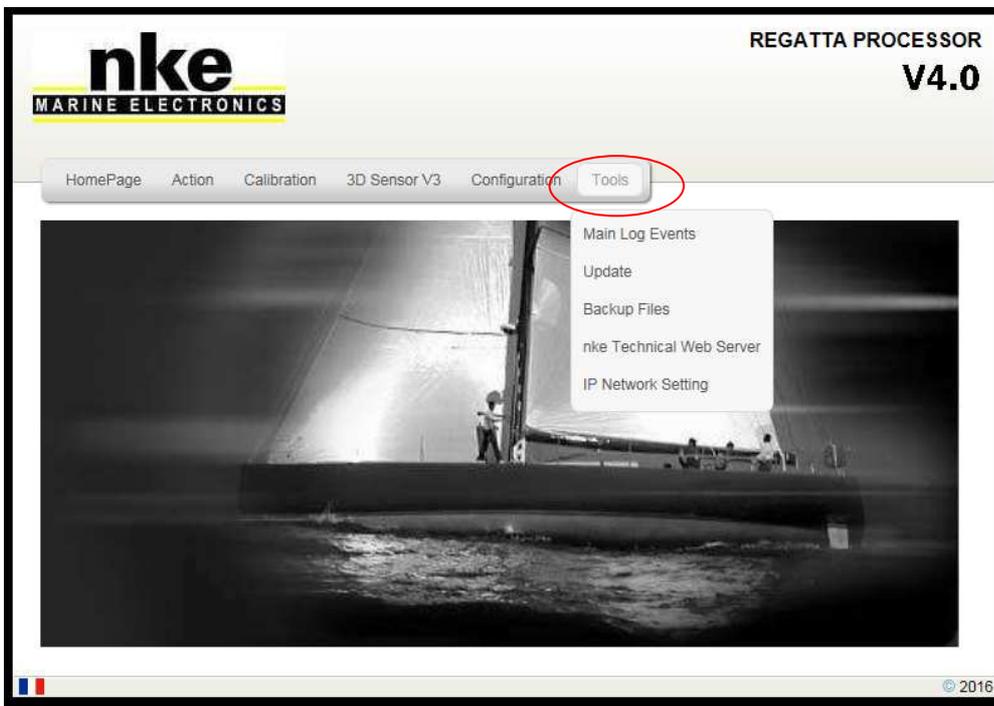
Calibration: links to the true wind correction tables, boat speed correction tables, polar tables and constants tuning.



Configuration: links to the *Processor Regatta* configuration.



Tools: links to various useful tools to get the best of the *Processor Regatta*.



6.1 Configure the installation file

From the **Processor Regatta** home page press «**configuration**» to access the file « Instal.ini ».

The path for this file is: <ftp://root:pass@192.168.0.232/mnt/flash/processor/instal> .

This file controls the configuration of your **Processor Regatta**. It contains two sections.



WARNING

The default configuration of this file is correct but you can apply modifications should you want to customize your system.

Modifications are saved by pressing « **Save File** » and will be applied after you reboot the **Processor Regatta**. This is done by pressing « **Reboot** » in the « **Action** » section.

[Language]

Language = 1 ; Gyropilot Graphic secondary language (0=French
1=English)

Performance = Y ; Performance calculus form polars [Broadcasts the performance data of the polar in processor memory on the Topline Bus.](#)

Declination = Y ; Declination calculus [Calculation of the declination from the table in memory.](#)

[Datalog]

ValidDatalog = Y ; Valid datalog (Y or N) [Data recording on the USB stick.](#)

[NMEA1]

ValidNmea1 = Y ; Valid NMEA1 [Validates the input to which the compass is connected. Automatic detection by default.](#)

InstalNmea1 = 255 ; Type of compass sensor
; 7 = 3D Sensor
; 10 = Regatta Compass
; 11 = KVH Compass
; 13 = 3D Fusion
; 255 = AUTODETECT

BaudrateNmea1 = 4800 ; Baudrate of datas (if AUTODETECT is off)

[NMEA2] [NMEA input output setting](#)

ValidNmea2In = N ; Valid NMEA2 input (serial NMEA0183)

ValidNmea2Out = N ; Valid NMEA2 output (serial NMEA0183)

BaudrateNmea2 = 4800 ; baudrate NMEA183IN&OUT

[NMEAudp] [UDP input output setting](#)

ValidUdpNmeaIn = N ; Valid NMEA183 input on UDP/IP

UdpNmeaInPort = 1001 ; UDP Port number for NMEA183 input on UDP/IP

ValidUdpNmeaOut = N ; Valid NMEA183 output on UDP/IP

UdpNmeaOutPort = 1000 ; UDP Port number for NMEA183 output on UDP/IP

UdpNmeaOutIP = 192.168.0.255 ; Recipient IP address (navigation PC)
(x.x.x.255 to broadcast)

[SailNet]

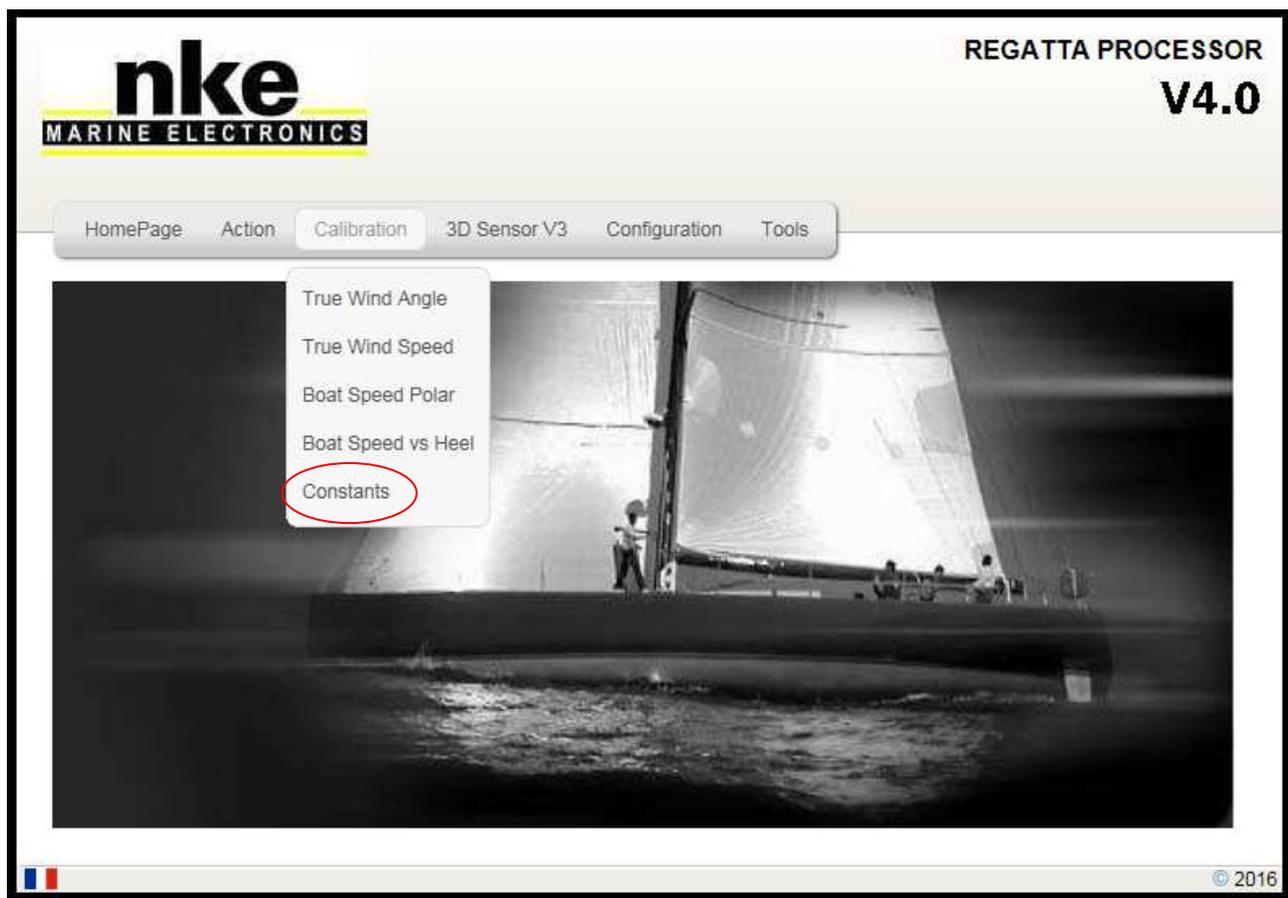
ValidSailNet = N ; Valid SailNet (IP variables synchronisation)

SailNetOutIP = 192.168.0.233 ; Recipient IP address (navigation PC)
SailNetOutPort = 4003 ; UDP Port number for SailNet output
SailNetInPort = 4004 ; UDP Port number for SailNet input

6.2 Configure the constants calibration file

Press « **Calibration** » on the **Processor Regatta** home page, and then on « **Constants** ». It will give you access to the file « Calib.ini », which path is: <ftp://root:pass@192.168.0.232/mnt/flash/processor/constants> .

Some constants, not accessible from a **Multigraphic ou Multidisplay**, can be adjusted here.



```
[Constants];  
HdgOff = 0.0 ; Offset cap additionnel (degrees)  
Magnetic heading offset. It can be added to the one accessible from the Multigraphic or  
Multidisplay. It is useful for adding an offset to the hundredth.  
MastRotOff = 0.0 ; Offset angle de twist de mat (degrees)  
Mast angle Offset. It can be added to the one accessible from the Multigraphic or  
Multidisplay. It is useful for adding an offset to the hundredth.  
MastDefloff = 0.0 ; Offset Bascule/Deflection mat (degrees)  
WindShear = 0.0 ; Cisaillement Vent Reel additionel(degrees)  
Offset which compensates for the actual wind shear angle.  
  
AWSOff = 0.0 ; Offset Vitesse Vent Apparent (noeuds)  
Apparent wind speed Offset.  
FailSafeBS = 6.0 ; Vitesse bateau secours (noeuds)  
Boat speed taken into account in the event of loss of speedometer and speed over ground.
```

MeasLeewayOff = 0.0 ; Offset capteur de derive (degrees)
Offset of the drift sensor in degrees.

[MotionWindComp]
WindVaneHigh = 30.0 ; Hauteur Aerien/Centre Rotation avec gite (metres)
Height in meters of the wind sensor in relation to the center of rotation of the boat.
Coef1 = 6 Wind noise reduction coefficients configured for a sensor 3DV2,
Coef2 = 3 3DV3 and Quadrans. For KVH (Gyrotrack) use coefficients
Coef1 = 4, coef2 = 2.

6.3 Configure the file variable.csv

This file controls the way the functions are displayed on the **Gyropilot Graphic** and sets them for export via the NMEA output port (NMEA2). It must be downloaded via the « ftp » protocol at:

<ftp://root:pass@192.168.0.232/mnt/flash/processor/SailNet/>

Once modified and saved, it has to be uploaded to the same address in the **Processor Regatta**. A « **Reboot** » will be required. This is performed from the home page by pressing the “Action” button.



WARNING

We recommend keeping a copy of the file before doing any modification.

Num: id of the variable.

Help: English description of the variable.

En10Name: English name of variable.

En3Unit: Unit of variable (English).

Aide: French description of the variable.

Fr10Nom: French name of the variable.

Fr3Unit: Unit of variable (French).

View: toggle the variable display on **Gyropilot Graphic**. N = not displayed, Y = displayed.

Group: Name of the group of the variable.

ToplineDef: Name of the **Topline** variable. (**Do not modify. For internal use only**)

IntFormat: Format of the variable in the Topline bus and data log files. (**Do not modify. For internal use only**)

FloatForm: Format of the variable in the Topline bus and data log files. (**Do not modify. For internal use only**)

Zoom: Coefficient used to enhance data presence in data log files. (user can adjust this value)

HzTopline: Definition of variables rate in Topline bus. (**Do not modify. For internal use only**)

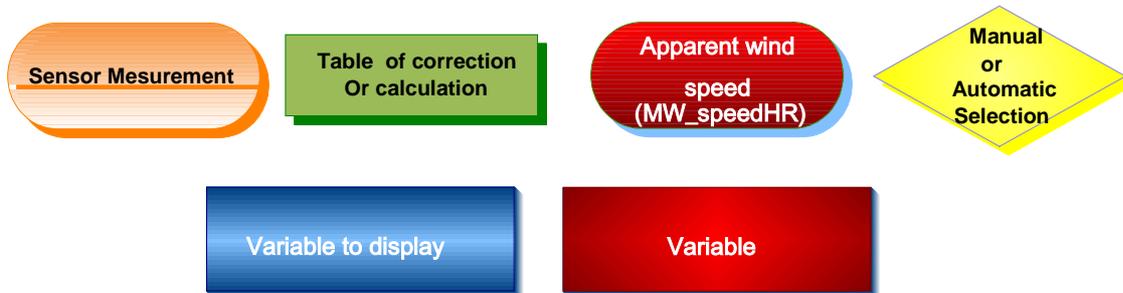
NmealN: This column indicates the NMEA sentences used by the NMEA input.

Custom: Gives authorization for a user's variable coming from a NMEA input and a LUA file.

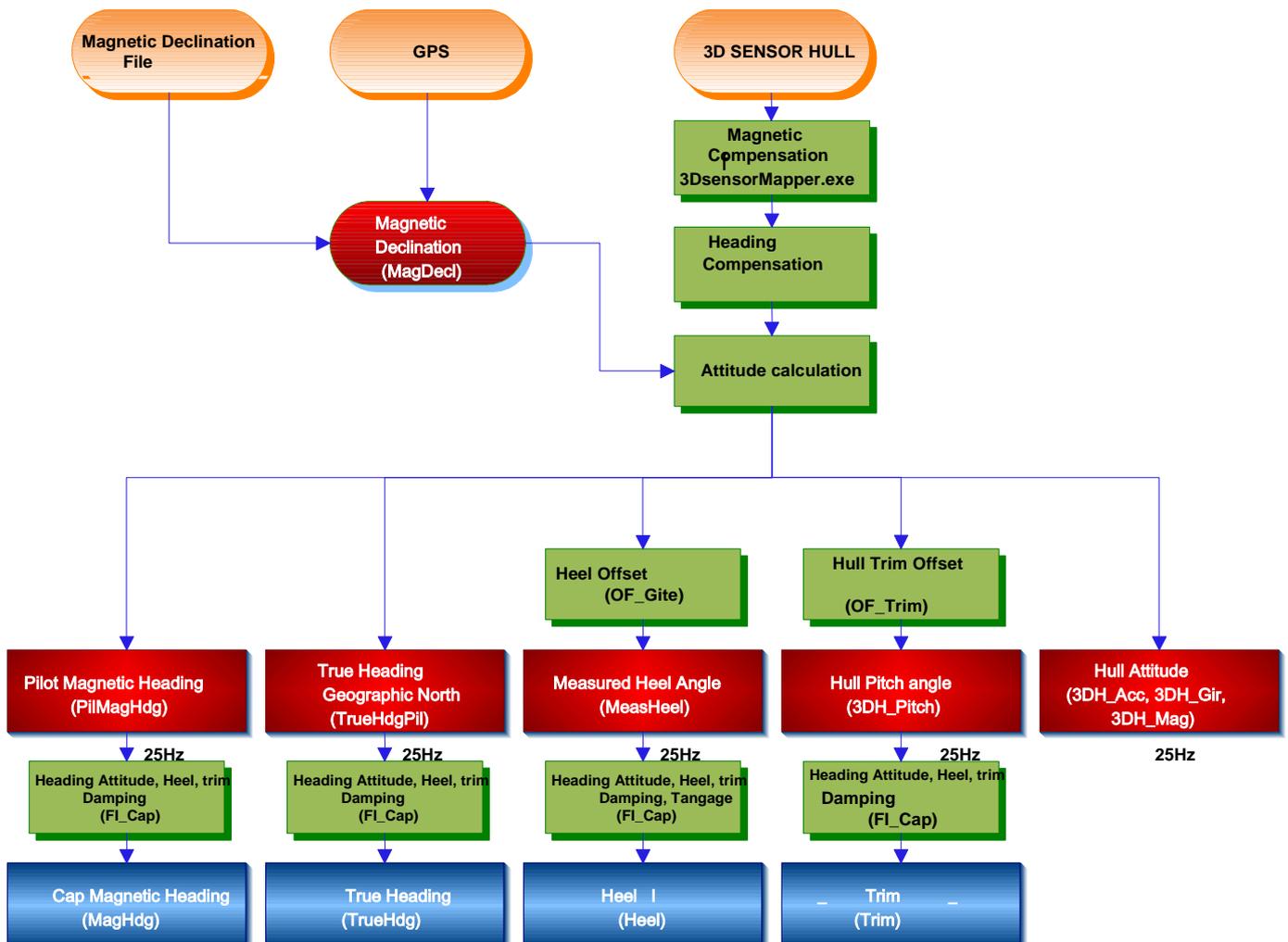
7. ALGORITHM FOR THE PROCESSED FUNCTIONS

This section describes the algorithms used to process the main functions used for the true wind calculation and data for the autopilot. The following diagrams will help you understand the system.

The following symbols will be used:



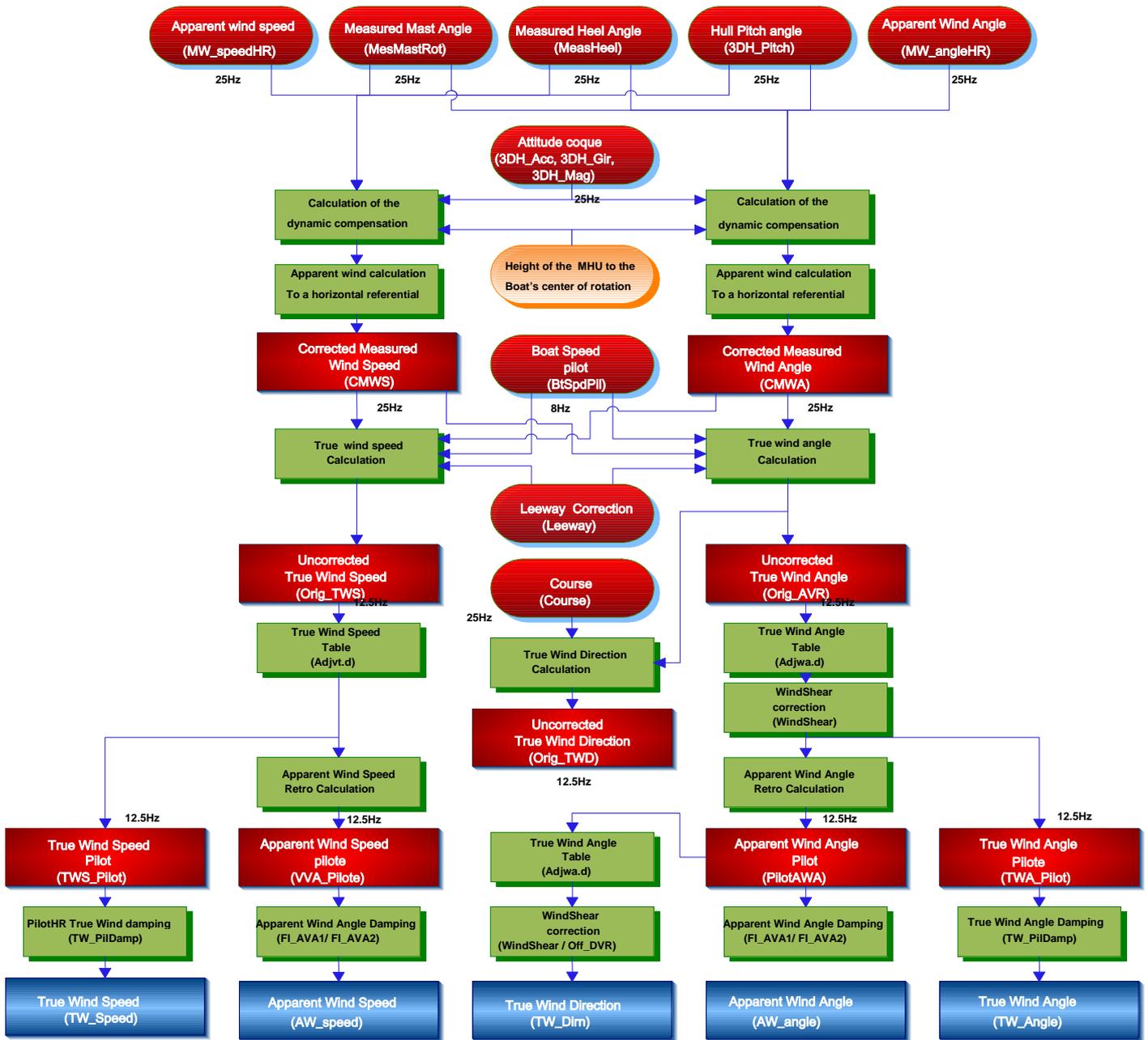
7.1 Functions for boat motion



7.2 Functions for boat speed



7.3 Function for wind data



8. CALIBRATING YOUR SYSTEM

8.1 Introduction

Performance data is calculated and displayed using the polar table in the **Processor Regatta**. It is important that wind, speed and compass sensors are correctly calibrated to achieve accurate data for true wind direction and speed, target boat speed, VMG...

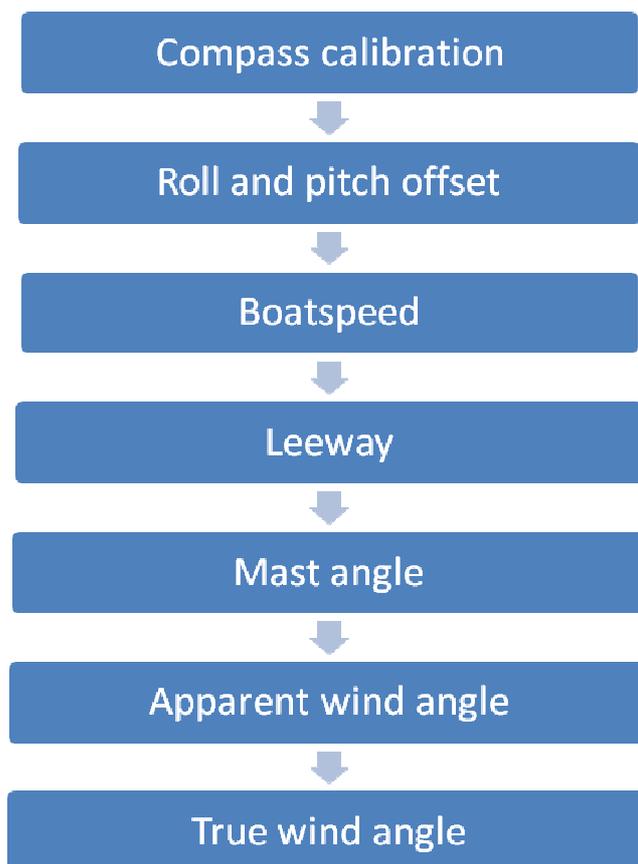
Wrong calibration may cause mistakes in tactical decisions.

8.2 Calibration order

Prior to typing values in the true wind angle table, all calibrations for the primary sensors must have been achieved:

- Compass
- Speed sensors
- Wind sensors

We recommend processing the calibrations in the following order:



8.3 Calibrating the compass

Please refer to the calibration section in the sensor's manual.

8.4 Roll and pitch calibration

The calibration of these parameters can be achieved using a digital or laser level. Place the level on the reference surface indicated by the architect. The **3D Sensor** or **Compass Regatta** must be free from any heavy metal presence such as a pontoon or a cargo ship within a 20 meters radius. The boat must be well balanced. Check that the weight distribution is normal on board. Ideally, the boat should be empty of all sails, anchors, safety equipment, food, etc... Run this operation in calm water.

The calibration values will be typed in the following **Multigraphic or Multidisplay** menu:

Menu ► Sensors ► Heel angle ► Offset

Menu ► Sensors ► Trim angle ► Offset

8.5 Calibrating boat speed

Boat speed is measured in the boundary layer which varies from one boat to another.

Paddlewheel sensors measure boat speed inside a disrupted and accelerated water flow. The measurement is not linear and the resulting error may vary against the heel angle.

The water speed measurement by ultrasonic speed sensors is about ten centimetres away from the hull. The water flow is much less disrupted and the measure is linear. Nevertheless, these measurements tend to be 1 or 2% optimistic when the boat is strongly heeling. This is due to the growth of the boundary limit and the calibration being made with the boat not heeling.

Calibration can be done in two different ways:

Consecutive runs on a given course:

With this method you need to choose a course with known distance, for example between two buoys. Reset the log at the starting point, and motor between the two points. Note the log once reaching the second point. Repeat the run in the opposite way, and note again the log's value.

Example:

Run 1: measured log 1,05

Run 2: measured log 1,09

The true distance between the two buoys is 0.97 miles.

$$\text{Run 1: } \frac{0.97}{1.05} = 0.92$$

$$\text{Run 2: } \frac{0.97}{1.09} = 0.88$$

The calibration adjustment is: $\frac{0.88 + 0.92}{2} = 0.9$

Calibration using SOG as the reference:

With this method you need to motor at ten knots on two consecutive runs at opposite headings (in order to eliminate the effect of the current). Both runs must be of equivalent distance. SOG from the GPS will be the reference speed. The calibration adjustment will be the result from averaged boat speed and averaged Speed Over Ground.

The calibration adjustment value can be calculated from the data logged in the internal USB key. Useful data will be extracted for use with the formula below. Navigation software which features a boat speed calibration tool can also be used.

$$\text{GainVs} = \frac{\frac{\text{VitesseFondMoy1}}{\text{VitesseSurfMoy1}} + \frac{\text{VitesseFondMoy2}}{\text{VitesseSurfMoy2}}}{2}$$

Useful tip:

If the boat's system has two **ultrasonic sensors** connected to an **Interface Dual**, you can proceed as follows:

The calibration adjustment value will be entered for each sensor by identifying the correct side and by forcing the heel with an offset greater than 3° for each. Heel values are negative on the **Multigraphic or Multidisplay** for a starboard side heel.

Menu ► Sensors ► Boat speed ► Calibration

8.5.1 Linear boat speed response against boat's heel angle

Modern monohull designs such as the Open 60, with flat bottoms and a hard chine, have a wetted area where the longitudinal axis is different when heeling (such as a catamaran with asymmetric hulls). Therefore the speed sensor cannot be aligned correctly when the boat is flat or heeling. You may have to adjust the boat speed against the heel angle.

For that purpose, a table « BtSpdHeel.txt » is available in the **Processor Regatta** at the following address: <ftp://root:pass@192.168.0.232/mnt/flash/processor/tables>

It can also be accessed from the home page by pressing the « **Calibration** » button, and further the « **Boat Speed vs Heel** » button.

- True Wind Angle
- True Wind Speed
- Boat Speed Polar
- Boat Speed vs Heel**
- Constants



Heel	BsCal
-40.0	0.960
-25.0	0.980
-10.0	0.990
0.0	1.000
10.0	0.990
25.0	0.980
40.0	0.960

Apply the same method as described for the boat speed calibration adjustment for each heel angle (several runs at constant speed and heel angle). Enter the values in the « BsCal » of the table.



WARNING

Always save the modifications by pressing « **Save File** ». Once the file has been saved, you must reboot the **Processor Regatta** for the changes to be taken in account. This is done by pressing « **Reboot** » accessible from the « **Action** » section.

8.6 Calibrating for drift

Drift angle is not easy to evaluate, calculate or measure. It is linked to the hull shape, the design and presence of centerboards, foils, canting keel... Current is also a factor to consider.

The drift angle is determined between the longitudinal axis of the boat and the progression vector over the water surface. The issue being that the boat progresses on the longitudinal axis of the wetted area, which makes an angle with the longitudinal axis of the boat when heeling.

There are two methods to adjust the calibration for drift.

8.6.1 *Using a drift calibration adjustment value:*

This value is found on the *Multigraphic or Multidisplay*

Menu ► Sensor ► Leeway angle ► Calibration

The drift formula is as below:

$$\text{Drift} = \frac{\text{Drift adjustment} \times \text{Heel angle}}{\text{Boat speed}^2}$$

Where drift unit is degrees, heel angle unit is degrees, boat speed unit is knots and drift will be °/nd². Drift adjustment is a global value applying to any navigation conditions. You can either use an average value for any conditions or change that value for each wind force. The drift angle against boat speed and heel angle can be found in the polar provided by the architect. The drift adjustment values can be recalculated with the formula below, and averaged.

$$\text{Drift adjustment} = \frac{\text{Drift} \times \text{Boat speed}^2}{\text{Heel angle}}$$

8.7 Calibrating Apparent Wind Angle

Calibrating the Apparent Wind Angle will adjust the mast alignment error and apply corrections for the wind shear effects.

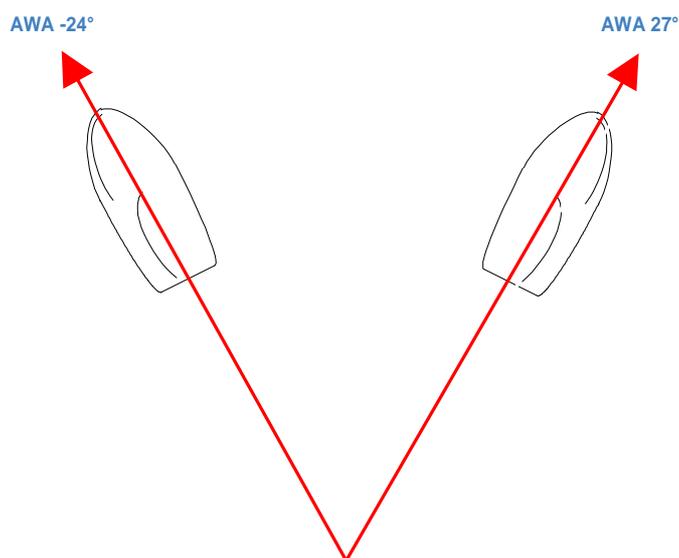
This can be done only if the rig (backstays, headstay, kicker...) and sail tuning is absolutely identical on port and starboard whilst sailing and carrying out the calibration. The helmsman must keep focused on the telltales and completely ignore any information coming from electronic instruments to avoid influences. Boat speed and heel must also be identical from one side to the other. Set the correct sails for the weather conditions. We recommend at least four legs are sailed in order to compare the readings and determine an offset value to apply.

Inhibit the true wind correction table and reset the wind shear adjustment value. This can be done from the home page by pressing on the « **Calibration** » button, and then choose « **Constants** » (refer to § 6.2).

To measure the Apparent Wind Angle you can use the tools of performance software or achieve the calculation on your own using the data logged on the USB key embedded in the **Processor Regatta**, or alternatively use the application of the **Gyropilot Graphic**.

Warning! If you work with software such as « **Tactique** » from **Adrena**, the offset is calculated from the function « Apparent Wind Angle ». This function is reverse calculated from the true wind angle and damped for display. Therefore the true wind table needs to be reset as well as the wind shear and you have to apply the offset to the existing value if different from 0.

The **nke** calibration wizard uses the raw data



Apply the offset with the **Multigraphic or Multidisplay** :

Page ► Sensors ► App wind angle ► Offset

AWA port > AWA starbord :

Add half the difference between the two values

If AWA port < AWA starboard:

Substract half the difference between the two values

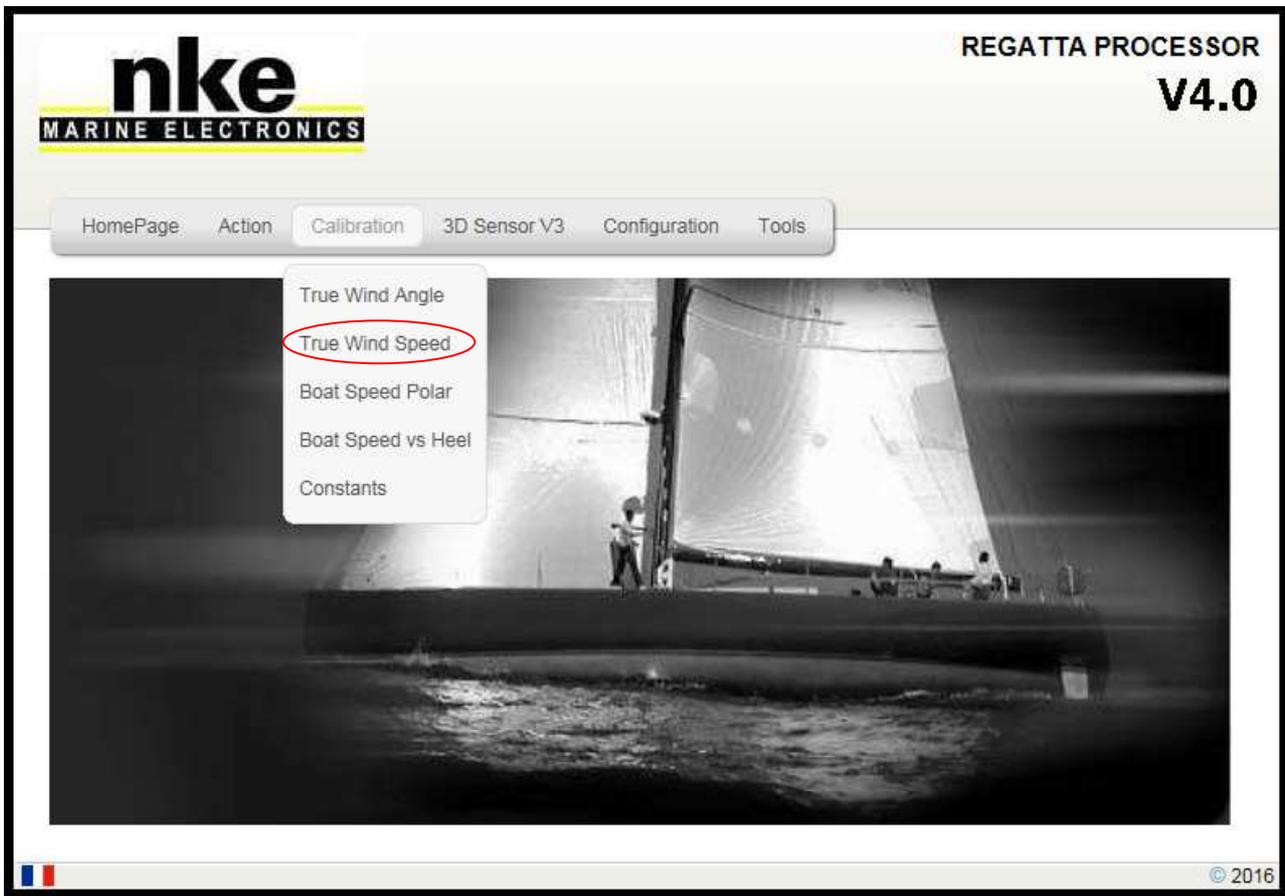
8.8 Calibrating true wind speed

Even placed a meter away from the mast head on top of a carbon arm, the measure made by the aerial sensor may suffer from disruption. When sailing downwind, the mainsail creates an acceleration of the wind. Heel angle also has an influence on wind speed measurement. For all these reasons we recommend calibrating for wind speed.

The correction table « Adjvt.d » is available in the **Processor Regatta** at the following address: <ftp://root:pass@192.168.0.232/mnt/flash/processor/tables>

It can also be accessed from the home page by pressing the « **Calibration** » button, and further the « **True Wind Speed** » button.

If the table is already filled with values, the corrections will have to be added to the existing values.



Measurement procedure:

First, place the boat upwind and average the value read for wind speed.

Then, measurements have to be made in various wind strengths ranging from 5 to 30 knots. It is a continuous process. Note the wind speed values as you sail upwind, reaching and downwind. You may find it useful to populate the correction table with the results from averaging these values.

An example of the wind speed correction table is shown below. The column on the left shows the wind speed. For each wind speed there are correction factors at various wind angles, where V is the correction (in knots) and A is the wind angle (in degrees).

	v1	a1	v2	a2	v3	a3
5.0	0.0	44	-0.3	93	-0.6	141
10.0	0.0	38	-0.6	96	-1.2	153
15.0	0.0	36	-0.9	95	-1.8	154
20.0	0.0	37	-1.2	93	-2.4	148
25.0	0.0	39	-1.5	96	-3.0	152
30.0	0.0	41	-1.8	98	-3.6	155
35.0	0.0	42	-2.1	100	-4.2	158
50.0	0.0	42	-3.0	100	-6.0	158



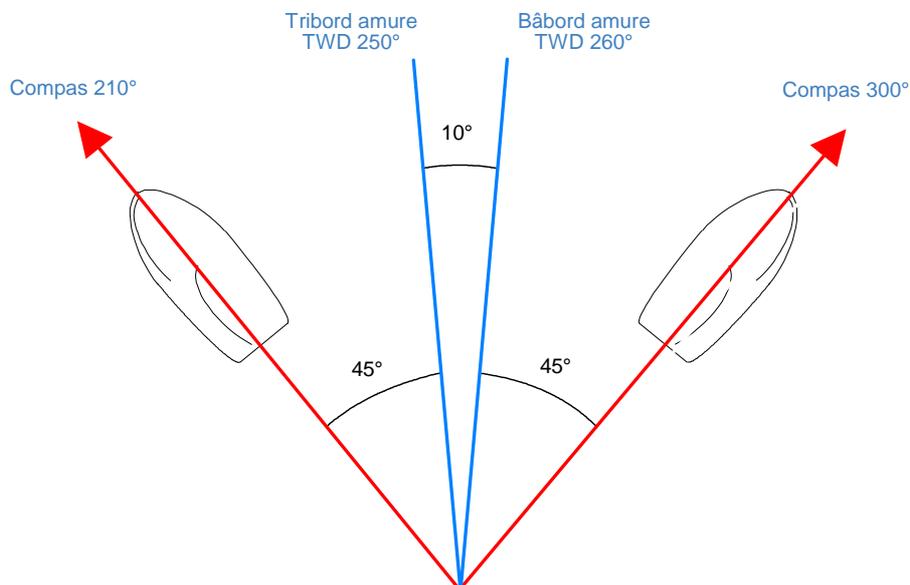
IMPORTANT

This is a very sensitive table and we recommend you use with the highest care. Always save the modifications by pressing « **Save File** ». Once the file has been saved, you must reboot the **Processor Regatta** for the changes to be taken in account. This is done by pressing « **Reboot** » accessible from the « **Action** » section.

8.9 Calibrating True Wind Angle

The True Wind Angle table allows correction of the True Wind Angle without exploring the causes of the angles discrepancies. This method is a global correction of all repeatable errors (twist, flow acceleration downwind, sensor).

To complete the true wind calibration, it is necessary to tack often and record the True Wind Direction values. We recommend running these measures with a fairly stable wind, on several navigation sessions with wind speed ranging from 5 to 30 knots.



TWD port > TWD starbord :

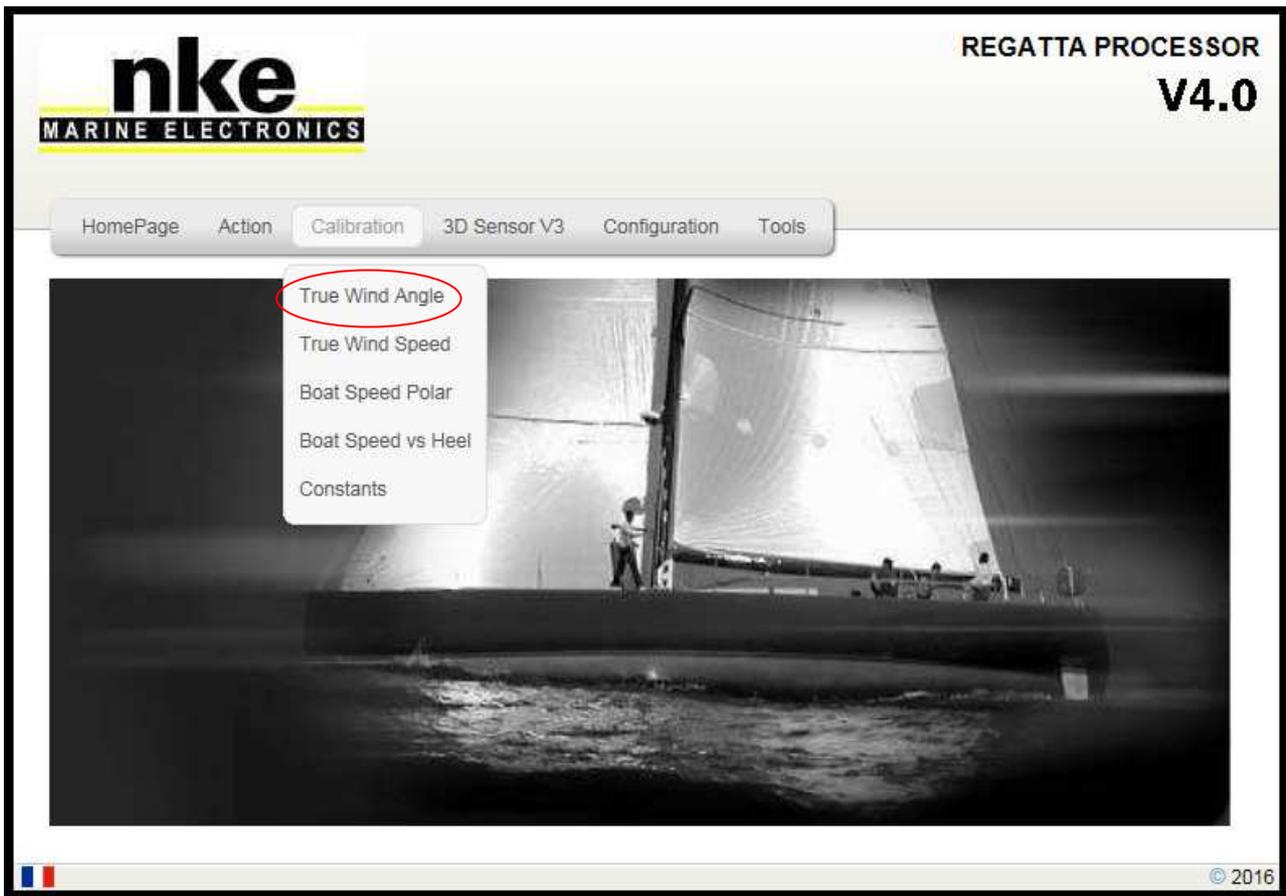
Add half of the difference between both values.

For this purpose a correction table « Adjwa.d » is available at the following address in the **Processor Regatta:**

<ftp://root:pass@192.168.0.232/mnt/flash/processor/tables> ,

Alternatively, you can access that table from the home page under « **Calibration** » and then « **True Wind Angle** ».

If the table already contains values, the corrections will be added to the existing entries.



The table below is a True Wind Angle correction example. The column on the left shows true wind speed in knots. V1 is the correction in degrees. A1 is the angle for which the correction is applied. Same for V2 and A2 (reaching) ; and V3 and A3 (downwind).

	v1	a1	v2	a2	v3	a3
0.0	-7.0	44	-2.0	93	4.0	141
5.0	-7.0	44	-2.0	93	4.0	141
10.0	-3.0	38	-1.0	96	3.0	153
15.0	-2.5	36	0.0	95	1.0	154
20.0	4.5	37	1.0	93	-1.0	148
25.0	6.5	39	1.0	96	-1.0	152
30.0	8.0	41	1.5	98	-2.0	155
35.0	8.0	42	1.5	100	-2.0	158
50.0	8.0	42	1.5	100	-2.0	158



WARNING

Always save the modifications by pressing « **Save File** ». Once the file has been saved, you must reboot the **Processor Regatta** for the changes to be taken in account. This is done by pressing « **Reboot** » accessible from the « **Action** » section.

9. PERFORMANCE AND POLAR TABLES

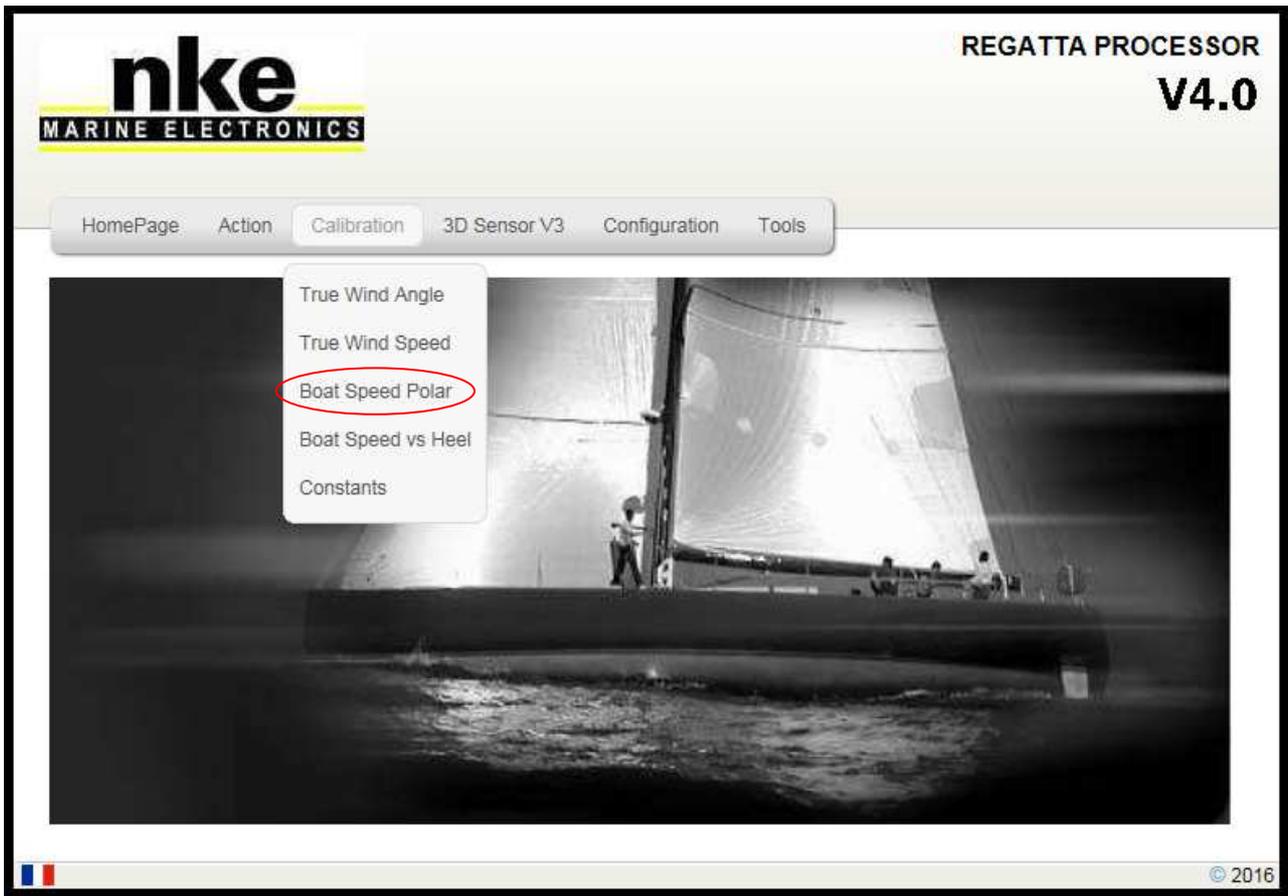
To optimize the boats performance it is essential to constantly understand the theoretical optimum speed of the boat against the wind speed and angle. The target boat speed is a guide to fine tuning the sails and determining the optimum wind angle upwind as well as downwind.

The polar table enables you to display the « Performance » functions. It can be loaded in the Processor Regatta via a ftp link or the **nke** calibration wizard.

Polar tables are supplied by the architect or the boat builder. You can build your own by recording the boat speed against wind angle for each wind speed.

The polar table is stored in the « **Processor Regatta** » at the following address:
<ftp://root:pass@192.168.0.232/mnt/flash/processor/Tables/SpeedPolar.pol>

Alternatively, you can access that table from the home page under « **Calibration** » and then « **Boat Speed Polar** ».



A default polar table is stored in the *Processor Regatta*. It needs to be updated for your boat.



WARNING

Always save the modifications by pressing « **Save File** ». Once the file has been saved, you must reboot the *Processor Regatta* for the changes to be taken in account. This is done by pressing « **Reboot** » accessible from the « **Action** » section.

9.1 Reading a polar table

The table below is an example of a polar table in the *Processor Regatta*. The index on the top line shows the true wind speed in knots. The column on left shows the true wind angles in degrees. Boat speeds are in knots.

TWA	4	6	8	10	12	14	16	20	25	30
33	2.761	4.076	5.08	5.624	5.904	6.044	6.107	6.104	5.84	5.176
36	3.043	4.448	5.475	5.975	6.23	6.354	6.422	6.446	6.28	5.802
39	3.302	4.782	5.806	6.259	6.477	6.587	6.654	6.694	6.594	6.277
50	4.07	5.688	6.572	6.882	7.052	7.172	7.26	7.361	7.368	7.256
60	4.541	6.156	6.918	7.251	7.437	7.581	7.695	7.85	7.932	7.899
70	4.821	6.383	7.107	7.542	7.762	7.942	8.101	8.352	8.534	8.583
80	4.925	6.456	7.206	7.708	8.063	8.308	8.524	8.876	9.223	9.434
90	4.974	6.664	7.422	7.796	8.253	8.662	8.949	9.526	10.134	10.566
105	5.055	6.682	7.495	8.106	8.559	8.962	9.404	10.567	11.631	12.578
120	4.695	6.456	7.339	7.943	8.679	9.454	10.104	11.327	13.237	15.149
135	4.085	5.849	6.926	7.676	8.433	9.235	10.102	12.202	14.791	17.174
140	3.805	5.538	6.723	7.491	8.213	9.048	10.07	11.912	15.335	17.898
150	3.246	4.833	6.166	7.019	7.683	8.373	9.187	11.582	15.493	18.583
165	2.494	3.77	4.988	6.076	6.876	7.511	8.122	9.662	12.464	16.247

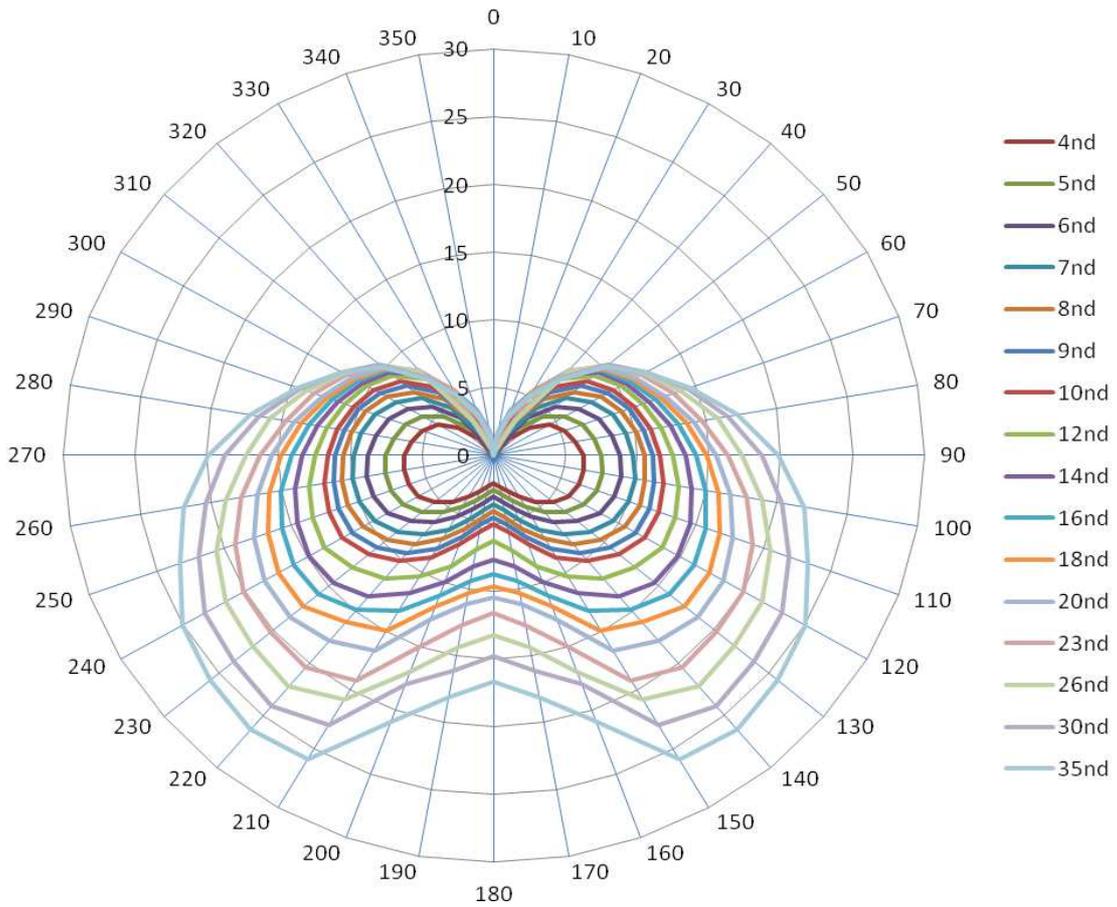
The polar table file has the « .pol » extension. **The maximum format is 32 lines for 17 columns**, tabulation separator and point decimal sign.

If that format is not followed, an error message will appear in the log file of the **Regatta Processor**.

9.2 Reading a polar diagram

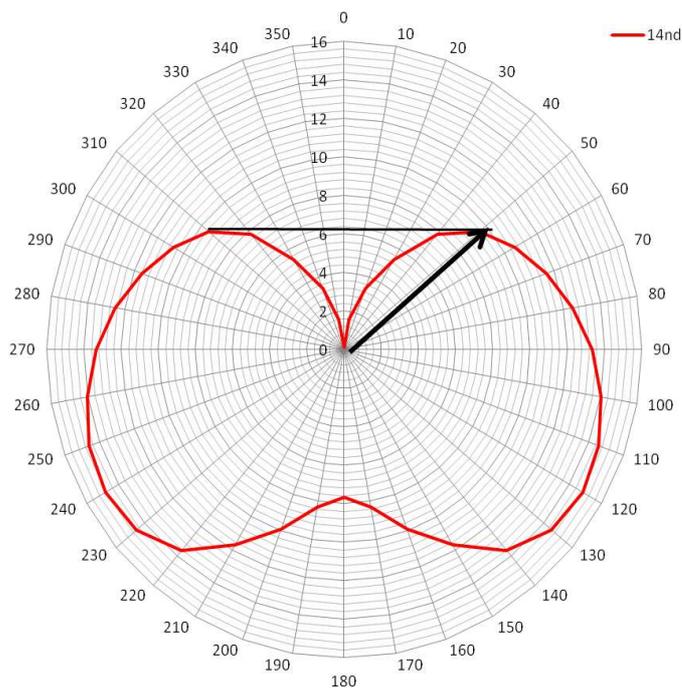
The diagram below shows both sides, but usually, only the port side is shown, as both tacks should be same.

The boat line is vertical, with the bow on the top. The radiuses feature the true wind angle. Each curve represents the boat speed for a given wind speed.



The diagram shows the target boat speed against wind speed and wind angle.

As shown on the picture below, a target boat speed upwind is determined with a line perpendicular to the boat speed axis and tangential to the highest point of the curve.

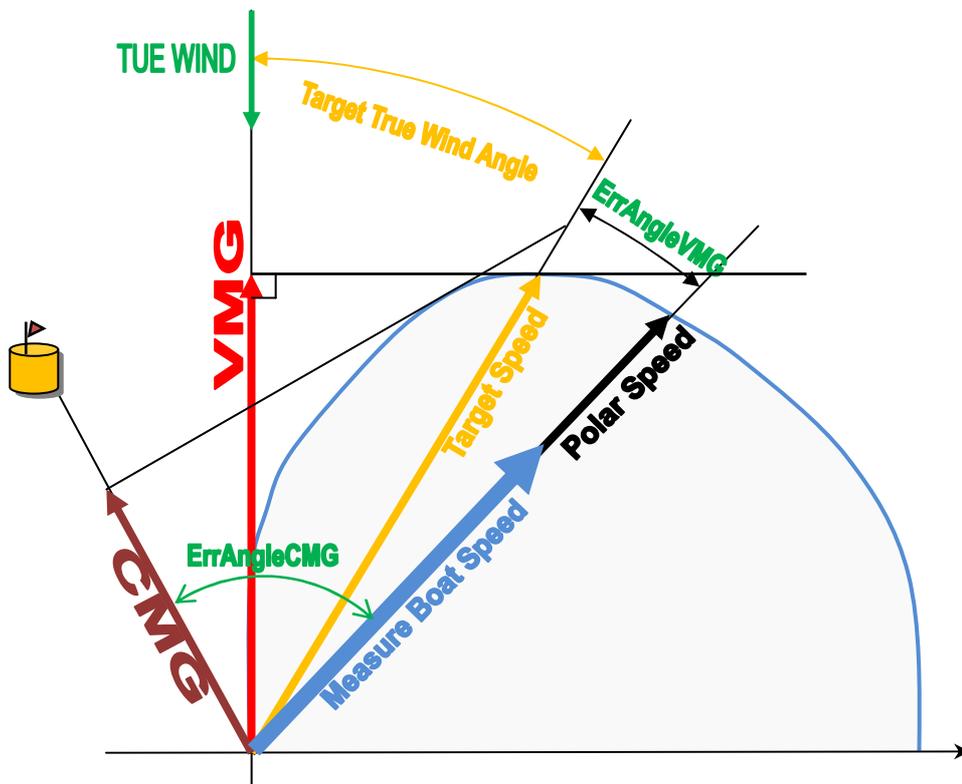


9.3 Performance functions

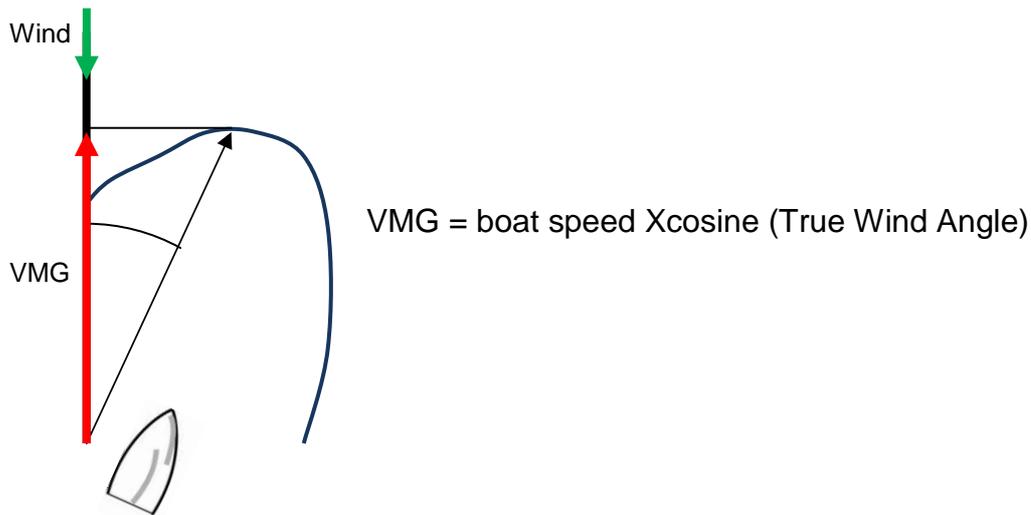
The **Processor Regatta** generates performance functions from the polar table. They are displayed on the following **nke** displays:

**Multigraphic
Multidisplay**

These functions are a guide for fine tuning. Displaying these data in real time gives information about boat speed and wind angle against the target (theoretical values)..



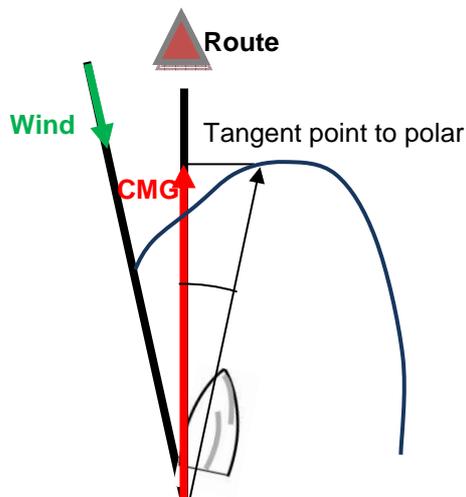
- **VMG :**
Stands for Velocity Made Good.
It is the component of velocity that is in the direction of the mark, should it be upwind or downwind. In the case of sailing upwind, it is actually the speed towards the wind. It is a useful indication



- **CMG :**

Stands for Course Made Good.
It is the speed towards the mark.

Upwind and downwind it is not very relevant, while sailing reaching it is a very valuable data.



CMG = Boat speed * cosine (Heading - Marks bearing)

- **Target boat speed:**

It is the theoretical best VMG. Useful information when sailing downwind or upwind. For other conditions it is better to use the polar speed.

- **Target true wind angle :**

It is the optimum wind angle for a given wind speed. This angle gives the best VMG

- **Polar speed :**

This function is calculated from the polar table against the wind speed and wind angle. It shows the optimum speed for the wind conditions.

- **% target boat speed :**

It is the ratio between the actual boat speed and the target boat speed

- **% Polar speed :**

- It is the ratio between the actual boat speed and the polar boat speed

-

- **Angle error VMG :**

It is the error between the actual wind angle in degrees and the angle at VMG.

- **Angle error CMG :**

It is the error between the actual wind angle in degrees and the angle at CMG.

- **% target VMG:**

It is the ratio between the component of the velocity towards the wind and the target VMG

- **% target CMG :**

- It is the ratio between the component of the velocity towards the wind and the target CMG

-

10. ADDEDUM A

10.1 Configuring the PC for the first connection to the *Processor Regatta*

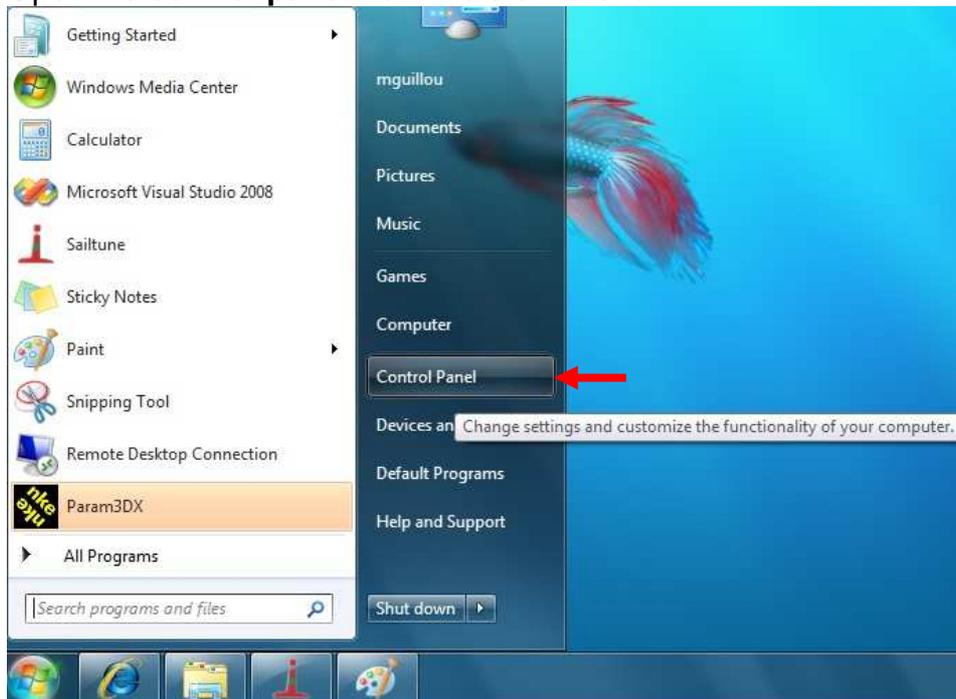
10.1.1 Connecting the *Processor Regatta* to the PC

Connect the *Processor Regatta* to your PC with the crossover cable

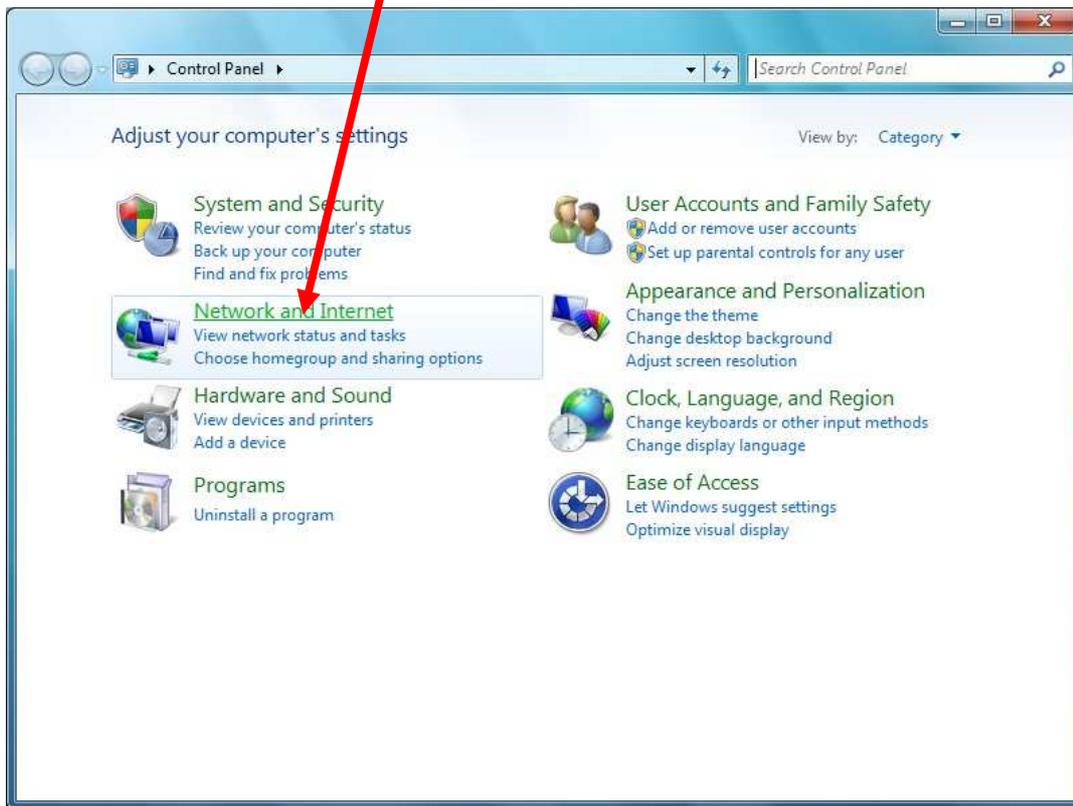
10.1.2 Configuring the network connection with *Windows Seven*

Set a local fixed IP for your PC:

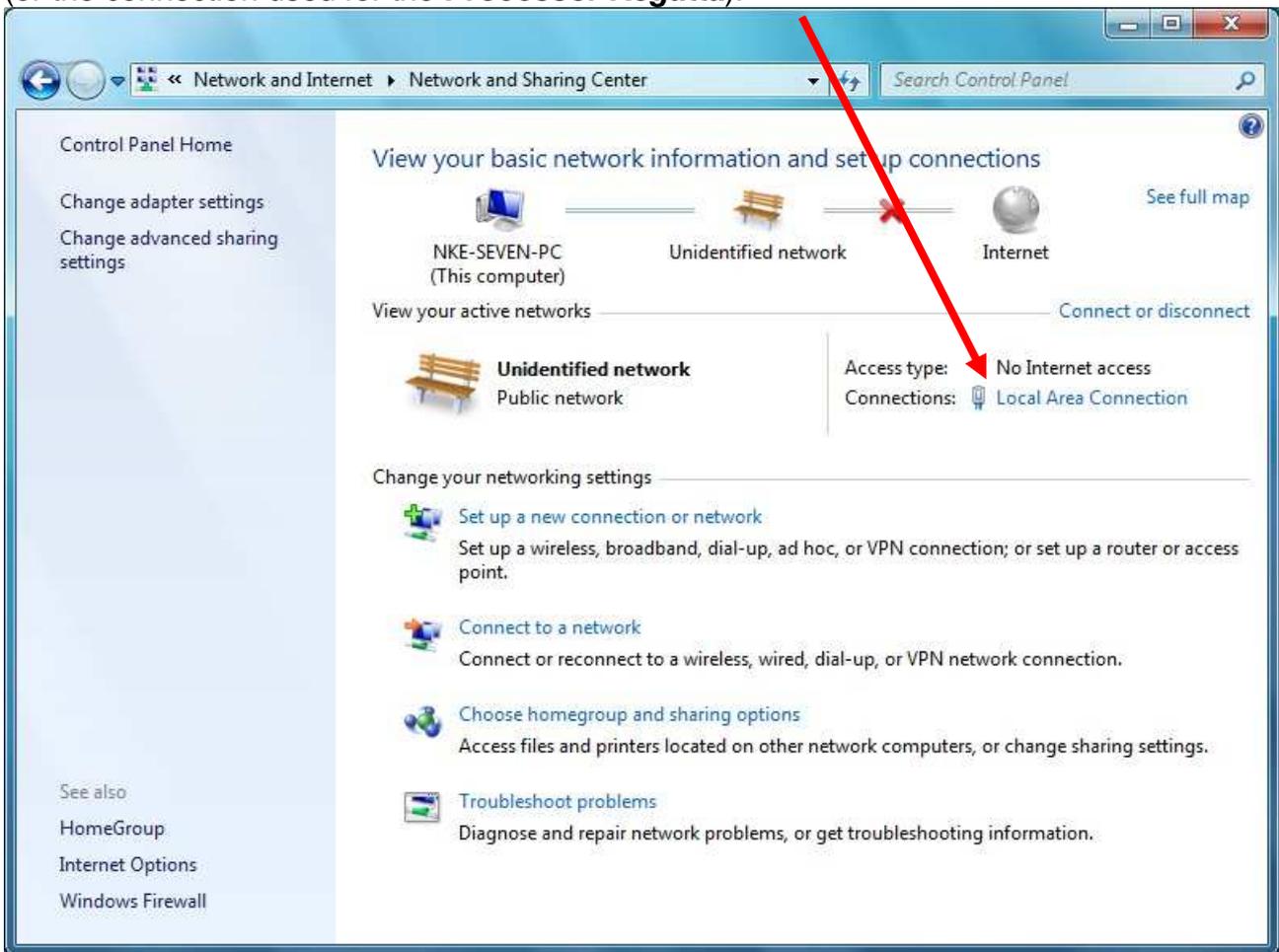
Open the **control panel** from the **start menu**



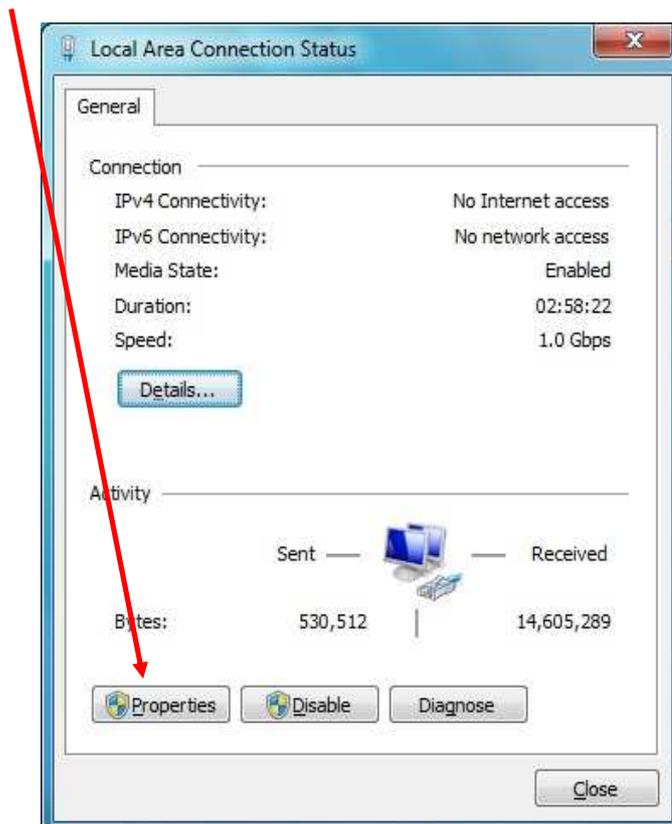
Click on « View Network status and tasks»

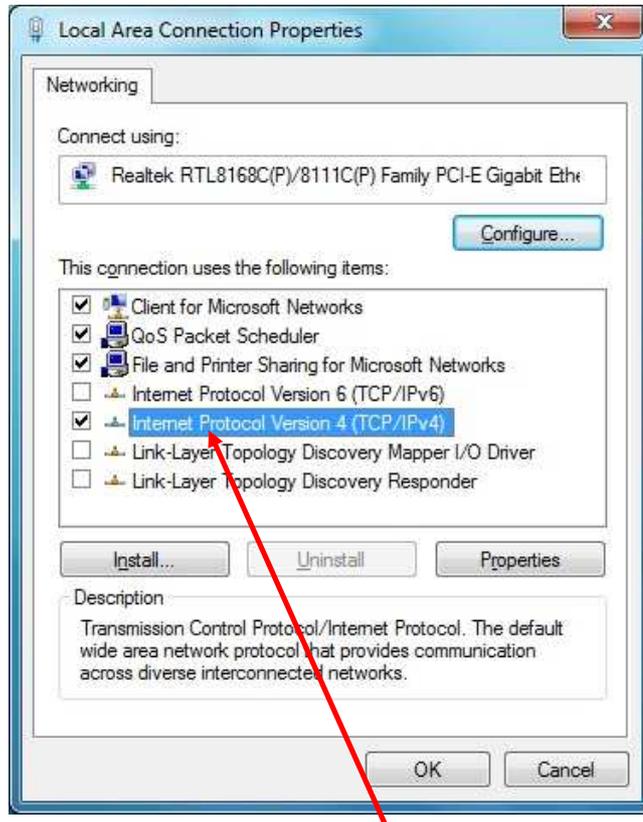


On the right side, click on « Local area Connection »:
(or the connection used for the **Processor Regatta**).

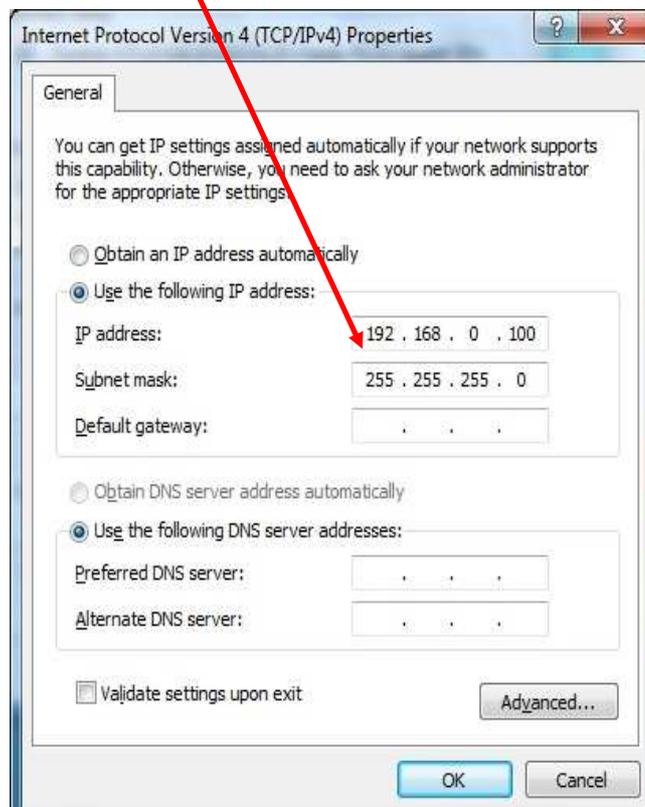


Click on Local area **Connection** and choose **Properties**.





Double-click on Internet Protocol version 4 (TCP/IPv4). Tick the box, use the following IP address and enter 192.168.0.233 ((where 233 can be replaced by any number between 2 et 254, except 232), and **Subnet Mask** = 255.255.255.0

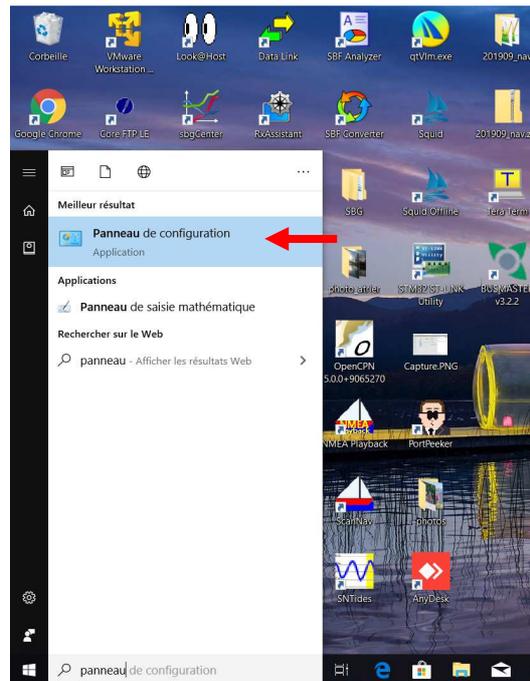


Click **OK**.

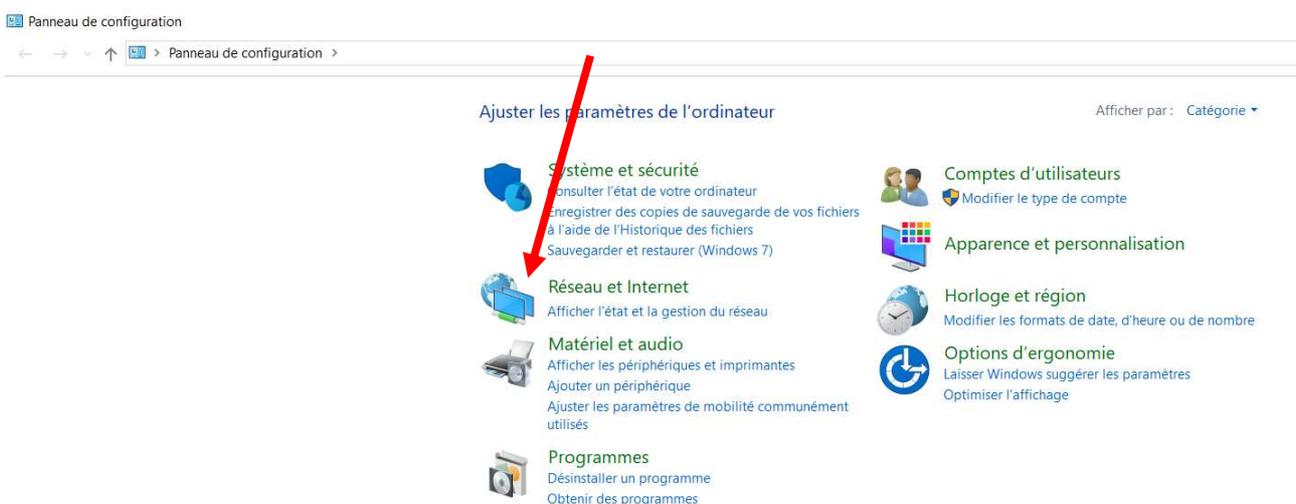
10.1.3 Configuring the network connection with Windows 10™

Here, the computer and the HR Processor are networked by an RJ-45 cable. They each have an IP address that allows them to communicate with each other. The local network IP address can be fixed or dynamic. Since neither your computer nor the processor has a DHCP server allowing dynamic addresses to be delivered, your connection will be in fixed IP.

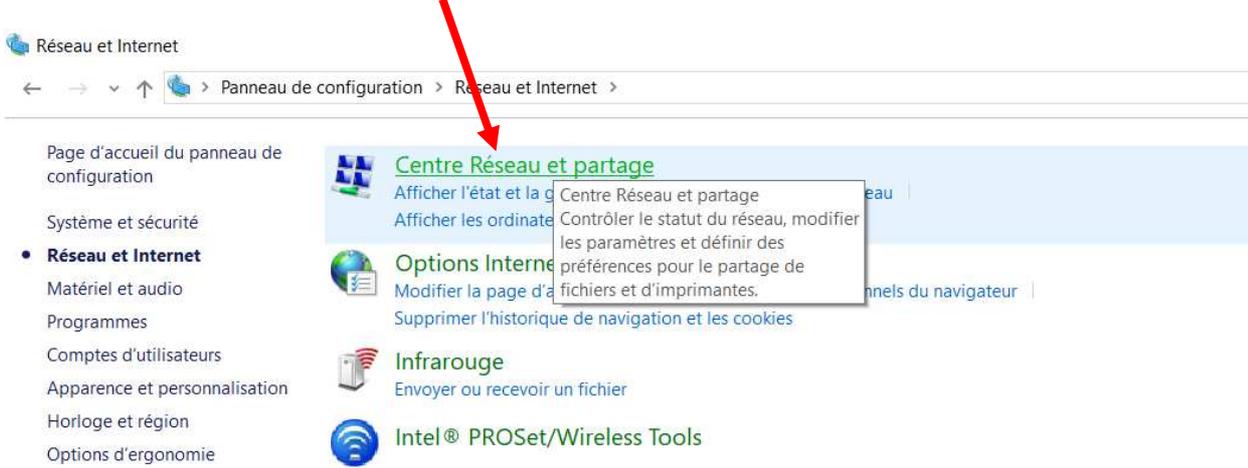
The first task is to define a fixed local IP address on the PC concerned. To get started, type control panel, then ENTER.



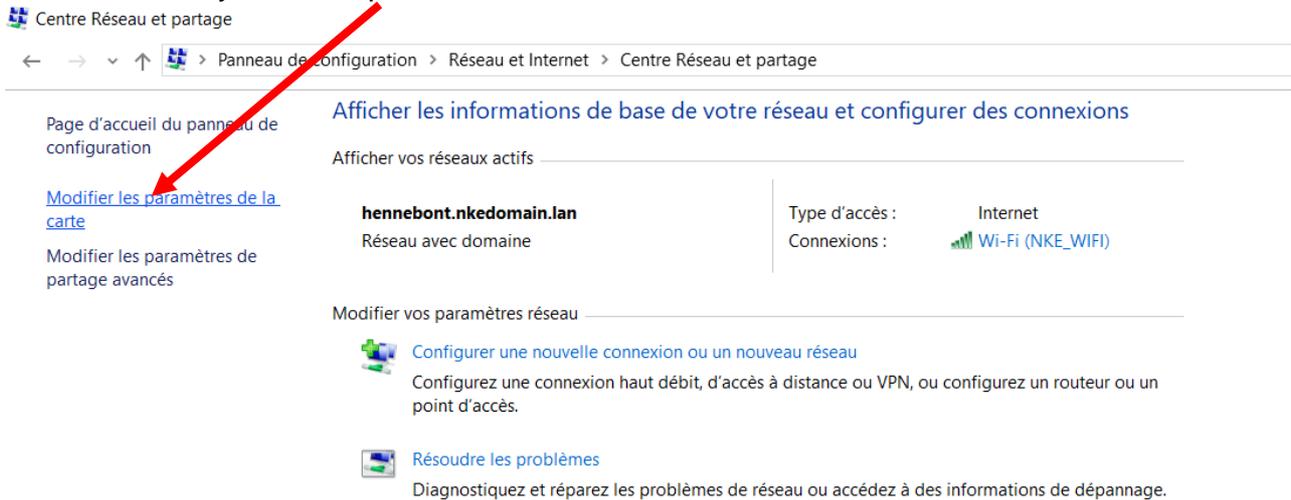
Click on the link "network and Internet"



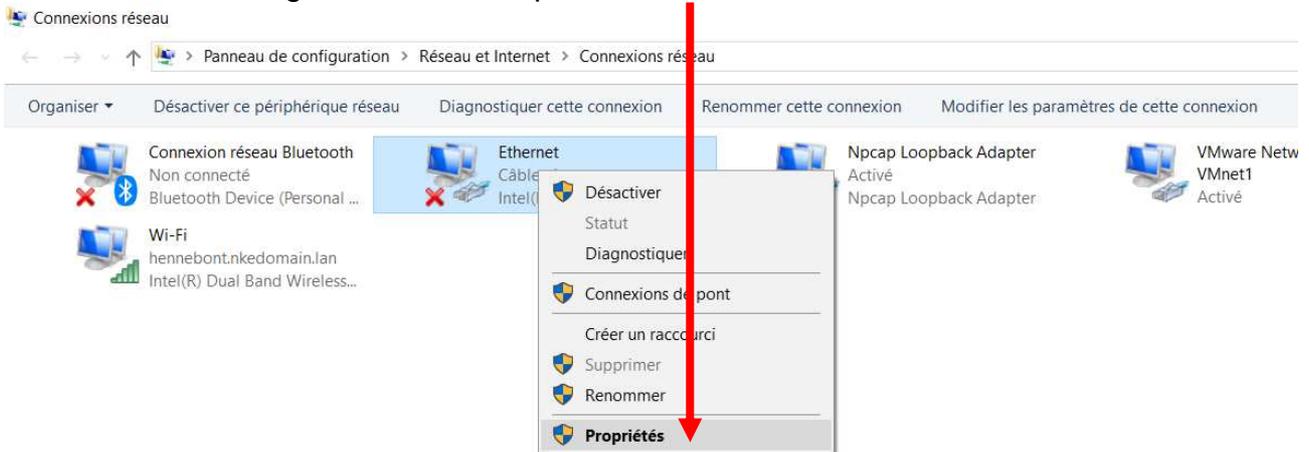
Select the "network and sharing center"



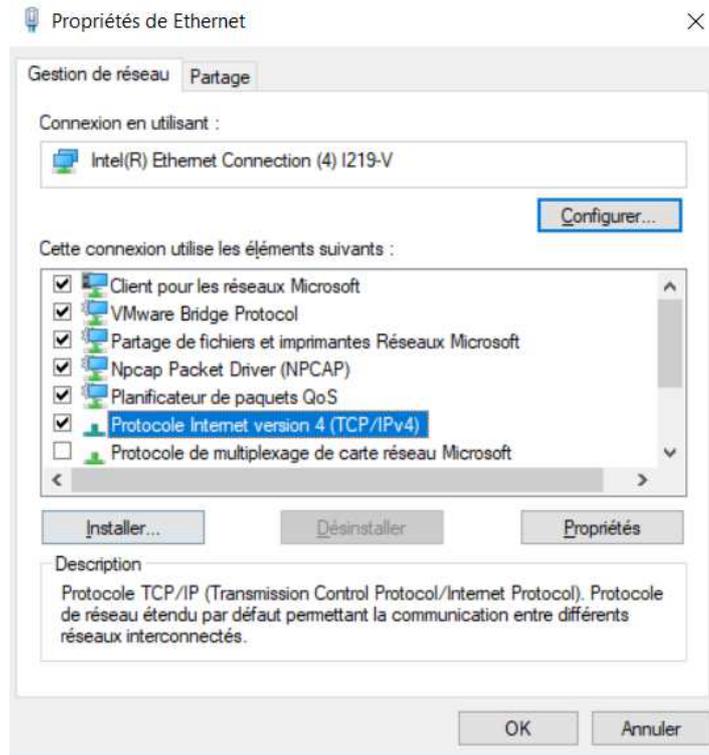
Click on "modify the card parameters"



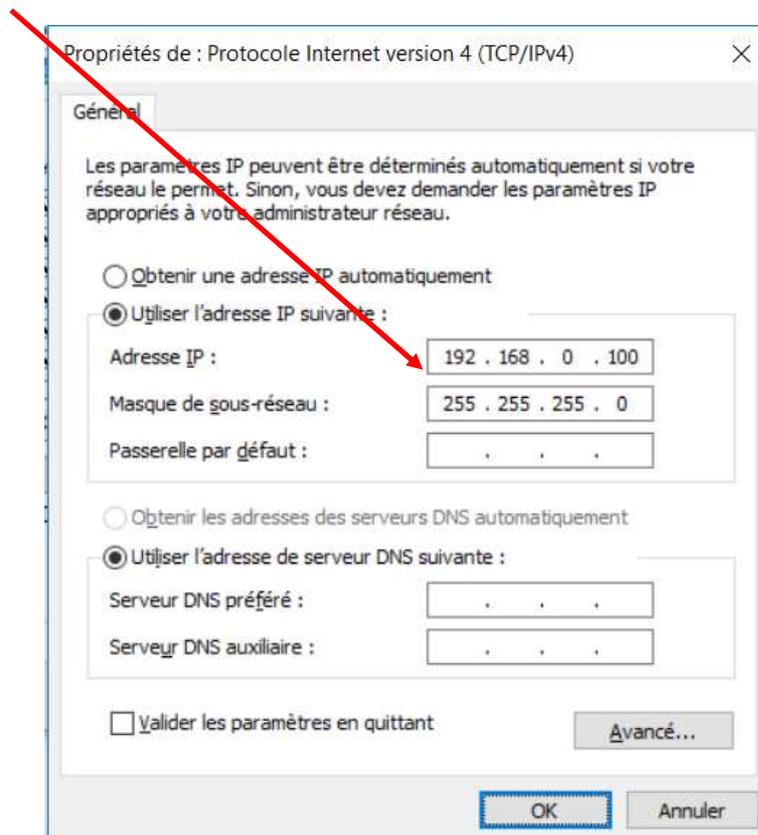
On Ethernet card, right click and "Properties"



Double-click on the “Internet Protocol version 4 (TCP / IPv4)”



A new window appears. Check Use the following IP address. IP address put 192.168.0.233 * (you can replace 233 with any number between 2 and 254, except 232), at Subnet mask enter 255.255.255.0



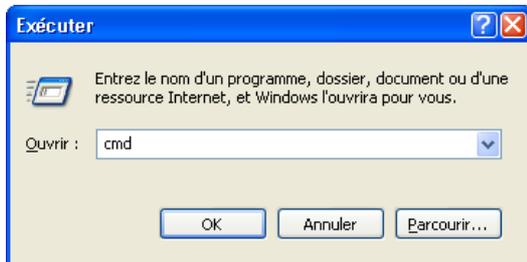
* By default, the Processor HR is configured to work with a PC at this address. Click on OK to validate.

10.1.4 Testing the connection with the Processor Regatta

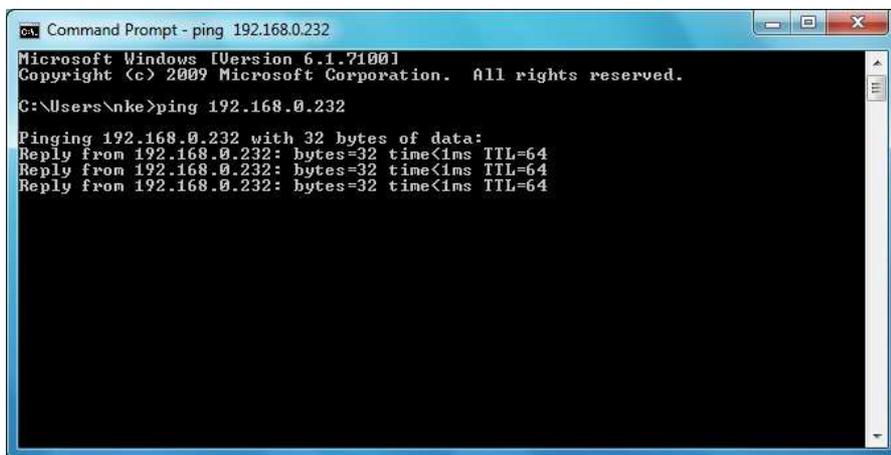
We shall run a PING command to check the connection.

Start \ Programs \ Accessories \ Run

The following window opens:



Enter **cmd** and clic **OK**. A DOS prompt will open in which you type **ping 192.168.0.232**



The **Processor Regatta** is now connected

11. FREQUENTLY ASKED QUESTIONS

1. Message on Gyropilot Graphic « Trop d'erreur sur le bus » or on Multigraphic, Multidisplay « Bus en collision »

There may be a conflict between addresses on the Topline bus. Disconnect the Processor and check each node address. Make sure there is no master on the bus. You should see the message « Master missing» on each display. Then reconnect the Processor.

2. Message on display « Maitre absent»

There is no Master. Check the data wire connections.

3. No deviation and / or the time is different from UTC

The deviation value is 0. Check the deviation on local official charts or navigation aids. The deviation is a calculated value resulting from GPS data. Check that the Processor receives all GPS data correctly and particularly that the status of position in the GPGLL sentence is « A » (valid data)

4. The control led flashes once per second

Error mode. Disconnect all the elements from the bus, leaving only the Processor. Power off the system again. If the led keeps on flashing, contact your dealer.

5. Boat speed shows « panne »

The Ultrasonic speed sensor cannot read flow (happens when the boat does not move). In the event that boat speed is not available, the wind data will be calculated using over ground speed if available on the bus. If not, a boat speed will be simulated (see 6.3 « FAIL SAFE BS »).

6. No compass data

This data comes from the Topline compass or from the 3D Sensor. Check the sensor's parameters (see the sensors manual).

7. No True Wind data

Running safe mode, if the apparent wind data are correct, check boat speed. If boat speed is correct reset the true wind calibration.

8. Message on Gyropilot Graphic « Défaut capteur 59 178 »

Apparent wind damping is over 32. Change it to a better value.

9. The Gyropilot Graphic does not accept a node address

With the Processor connect the Gyropilot Graphic on the Topline bus with the address 0. If it rejects the address given by the Processor and automatically turns Master, there is a Topline bus reading error. Check errors in the log file. If there is no Topline bus error, the file mvn.cfg is probably broken

10. Is it possible to export log files while the pilot is on?

In theory, yes. But this requires all the Processor's resources. Therefore, the Processor may slow down and this would disrupt the autopilot. To avoid any risk, we recommend not doing this operation while the pilot is on.

11. Target boat speed function displays erratic values such as 300%...

The polar file is corrupted. Check the format (see 9.2 Reading a polar)

12. I cannot download the new firmware with Toplink

Downloading the firmware with toplink requires disconnecting the *Processor Regatta*

13. The *Gyrographics* display sounds continuously for 30 seconds when powered on

Critical data is missing. It could be boat speed, speed over ground, wind data or compass data.

12. PROCESSOR REGATTA SOFTWARE EVOLUTION

REV	Date	Information
V1.9	30/03/2010	- Addition of the True heading and True true wind direction channels
V2.0		- Calculation of the direction of the bottom wind - Calculation of bottom wind speed - Auto-detection of 3D hull sensor (V1, V2, Compas Regatta, KVH) - Management of offsets in CAP MAG2 emergency magnetic heading mode (KVH or NMEA) - Addition of the autocompensation function of the Regatta compass - Added management of offset heading, list and pitch in the Regatta compass - Added heading, heel and pitch filtering in the Regatta compass
V2.1		- Bug fixes
V2.2		- Modification Management of degraded water speed mode. If US speedo not hooked, calculation on speed over ground and "Pan" display. - Authentication of the elements of the bus when the list is created. If the firmware is not up to date, the Processor does not start. - Modification of the management of the blue control led
V2.3		- Limitation of heel angle calculation to a maximum of 60 ° - Limitation of the pitch angle calculation to a maximum of 40 ° - Added error message when 3DH data is outliers
V2.4	12/07/2011	- Compatibility with Topline GPS
V2.5	15/10/2012	- Compatibility with the latest 3DH V2 firmware - Correction of sign error on pitch - Addition of the Graphic Multifunction authentication
V2.6		- Correction of the loss of an NMEA source after a timeout (example during a GPS stall)
V2.7		- Addition of identifiers of wifi interfaces - Quick scan of the Multifunction graphic for the pilot
V3.2	28/10/2013	- Fixed a bug on wind noise reduction. - Wind noise reduction coefficients, to be set in "Constants" according to the compass sensor:
V3.7	14/09/2015	- Compatibility with 3D Fusion - Fixed Processor crash when NMEA baudrate is incorrectly configured - Not compatible with Saitune V2.1
V3.9	12/09/2016	- Compatibility with 3D sensor V3 - Compensation available from the processor web page (for 3D Sensor V3) - Compatibility with Loch paddle wheel
V4.0	07/02/2019	- Compatibility with Multidisplay and Pad - Compatibility with the latest 3D Sensor V3 in automatic detection