Box N2K

Product reference: 90-60-568

USER GUIDE

&

INSTALLATION SHEET

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nke
MARINE ELECTRONICS

6 Rue de Gutenberg - Zi de Kerandré
56700 Hennebont - France
www.nke-marine-electronics.com

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1. Presentation

The **Box N2K** is a communication gateway between several protocols: Topline, NMEA 0183 and NMEA 2000. It allows you to make the data from all your sensors usable on your Topline, NMEA 0183 and NMEA 2000 installations.

It also allows you to connect to a PC via the USB port with *Toplink* and *TopSailor* softwares to view your Topline bus, configure and update your **nke** products.

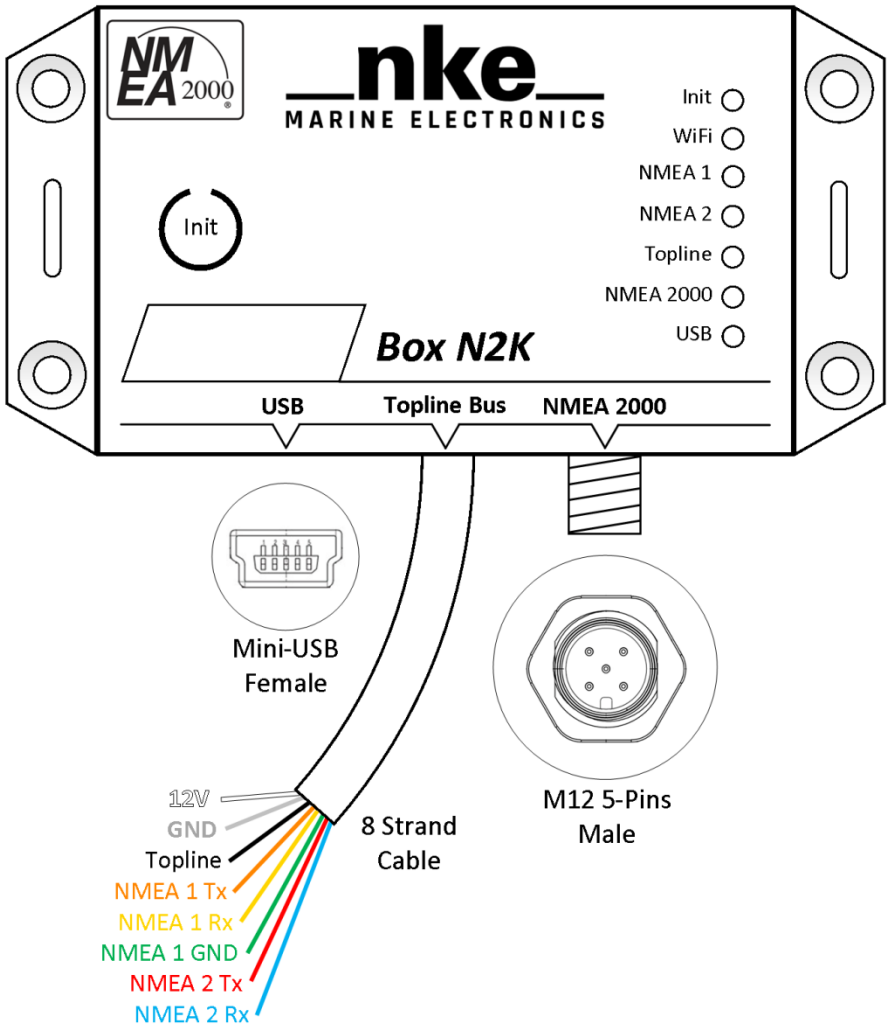
2. Product description

2.1. Technical specifications

Dimensions	110mm x 56.4mm x 26mm (length | height | thickness)
Weight	200g with 3m cable (104g + 32g/m)
Power supply	DC (continuous) | 8V - 32V
Consumption	50 mA @ 12 V
NMEA 0183 wired input	2 wired links: NMEA 1 and NMEA 2 NMEA 1: Galvanically isolated NMEA 0183/RS422 input Non-isolated NMEA 0183/RS422 output NMEA 2: Non-isolated NMEA 0183/RS422 input Non-isolated NMEA 0183/RS422 output Baudrates 1 and 2 detected automatically according to the input, or programmable at 4800, 9600, 14400, 19200 or 38400 bauds
USB connector	Mini-USB female connector with galvanic isolation Serial port - Baudrate fixed at 115200 baud
WiFi link	WiFi 802.11b+g SSID: nke-xxxxxx (6 character string) IP address: 192.168.56.1 Port: 50000 Protocol: TCP + UDP Range in free field ~ 35m
NMEA 2000 connector	Standard 5-pin male M12 connector, isolated 12V power supply Data rate at 250 kbps LEN = 1 (50 mA)
Environment	IP54 sealing (protected against dust and splashing water) Operating temperature: -10°C to +50°C Storage temperature: -20°C to +60°C
Power cable	Ø5.5 mm, 7 wires + ground wire, length 3 m

2.2. Connection ports

- Topline cable
  - Power supply (**White** wire and braid/**ground**)
  - Topline (**Black** wire)
  - NMEA 0183 #1 - Rx - Wires Yellow (+) et Green (-)
    - Tx - Wire Orange (+)
  - NMEA 0183 #2 - Rx - Wire Blue (+)
    - Tx - Wire Red (+)
- Mini-USB port
- NMEA 2000: M12 / 5-pin male connector



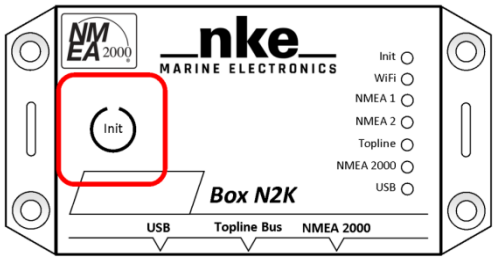
2.3. LED Indicators

The **Box N2K** LEDs can light up in 3 colors: Green 0, Orange 0 and Red 0

Init	0 0	**Steady**: Init button pressed in progress **Flashing** (every second): Counter + beep
WiFi	0 0 0	**Flashing**: Sending data via WiFi **Flashing**: Receiving data via WiFi **Flashing**: Invalid data received via WiFi
NMEA 1	0 0 0	**Flashing**: Transmission of data on the wired link **Flashing**: Receiving valid data on the wired link **Flashing**: Invalid data received on the wired link
NMEA 2	0 0 0	**Flashing**: Transmission of data on the wired link **Flashing**: Receiving valid data on the wired link **Flashing**: Invalid data received on the wired link
TOPLINE	0 0 0 0	**Flashing**: The **Box N2K** has a valid Topline address **Flashing**: The **Box N2K** has a Topline address of 0 **Fixed**: Topline connection disconnected or Topline master lost **Flashing (every second)**: **Box N2K** has a Topline address of 0, and Topline connection disconnected or Topline master lost
NMEA 2000	0 0 0 0	**Flashing**: Transmitting NMEA 2000 data **Flashing**: Receiving NMEA 2000 data **Flashing**: Error detected on the NMEA 2000 bus **Flashing (every second):** No NMEA 2000 network detected
USB	0 0 0	**Flashing**: Transmitting data on the USB link **Flashing**: Receiving valid data on the USB link **Blinking**: Invalid data received on the USB link

2.4. Init button

The Init button is a touch contact on the front of the **Box N2K**. It is not a push button; there is no sensory feedback when pressed.



When the Init button is pressed, the "Init" indicator lights up green and a beep is heard every second to facilitate counting.

Some functions of this key are only available during the first minute after the **Box N2K** is powered on.

Duration maintained	Operations
1 sec	**Display of** the number of devices connected via WiFi on the **Box N2K**: the number of red flashes indicates the number of active connections. Up to 7 devices can be connected simultaneously.
3 sec	NMEA 0183 and NMEA 2000 **initialization** **Start** a 10-second listening session during which the **Box N2K** scans the NMEA 0183 and NMEA 2000 inputs. Following this listening: **- Creation of the Topline channels** corresponding to the data received during listening. A series of beeps is emitted, corresponding to the number of channels created on the Topline bus. **- Sends** NMEA 0183 and NMEA 2000 **data** according to the data on the Topline bus. - Topline Slave **address being populated** If the Box is **switched off/on** during the 10 seconds of listening: Reset NMEA configuration and Topline address
6 sec	NMEA 0183 and NMEA 2000 **initialization** Same as a 3 second press, but **without deleting** existing **channels**: e.g. adds channels from the NMEA without deleting those of a momentarily missing instrument.
8 sec	**Factory reset** of all the WiFi parameters **without** WPA encryption (Open mode)
9 sec	**Factory reset** of all the WiFi parameters **with** WPA encryption
10 sec	**Within the first minute of powering up** NMEA 0183 and NMEA 2000 **initialization** Same as a 3 second press, but the **Box N2K** can takes a **master Topline address**.
24 sec	**Launch of** NMEA 2000 Network **Scan**
27 sec	Switching the WIFI module **off / on**

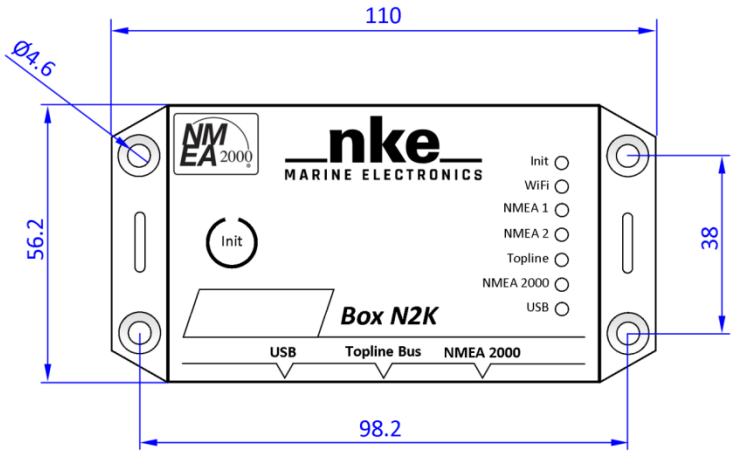
3. Installation

3.1. Installation precautions

The housing of the **Box N2K** has an **IP54** protection rating (protected against dust and water splashing). It must not be immersed, even briefly, and is not resistant to strong weather conditions. It should therefore preferably be installed indoor, in a place where there is no risk of flooding.

Thanks to its holes, the housing can be fixed to a flat panel with 4mm diameter screws.

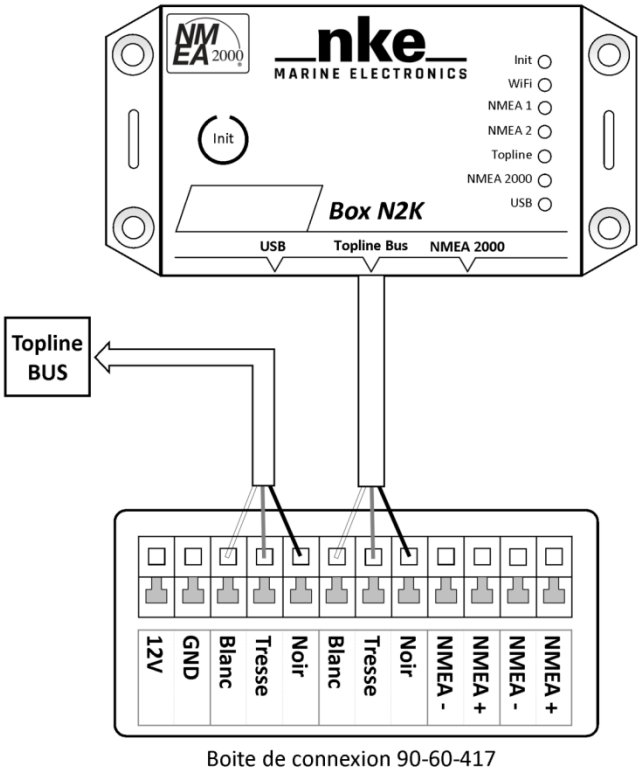
Don't forget to leave room for the cables, especially the NMEA 2000 connector.



3.2. Connection

3.2.1. Topline bus

To connect the **Box N2K** to the Topline bus, connect the White, Black and Braid wires in a junction box connected to the rest of your network.



Boite de connexion 90-60-417

Noir =	*Black*
Blanc =	*White*
Tresse =	*Braid/Ground*
12V =	*12V +*
GND =	*12V -*

3.2.2. NMEA 0183

The **Box N2K** has two wired NMEA 0183 links named NMEA 1 and NMEA 2.

The wired NMEA 1 input is electrically isolated. This input can be used with an instrument connected to a power supply different from the **Box N2K**.

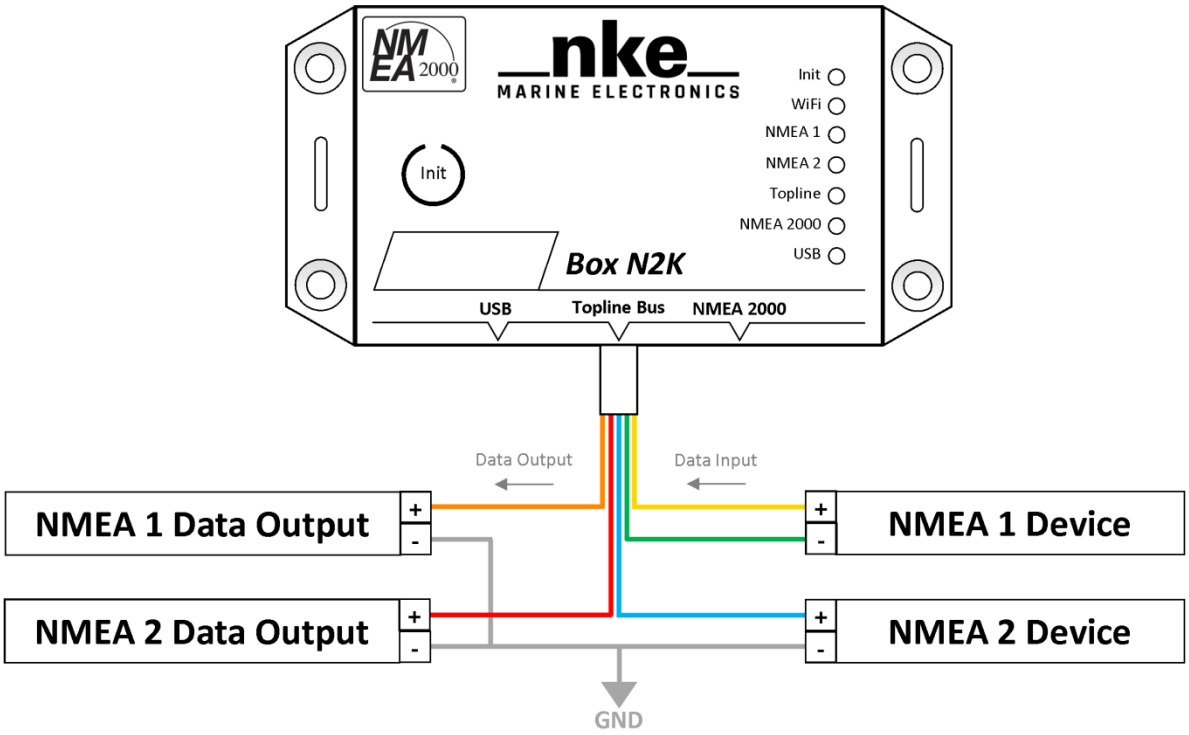
To connect the NMEA 1 input of the **Box N2K**, connect the Yellow wire (Input 1) to the NMEA output, and the Green wire (GND 1) to the ground of your NMEA 0183 instrument.

NMEA 2 input and NMEA 1 and 2 outputs are not isolated.

To connect the NMEA 2 input, connect the Blue wire (Input 2) to the NMEA output of your instrument.

To connect the NMEA outputs 1 and 2, connect the Orange (Output 1) / Red (Output 2) wire to the input of your NMEA receiving instrument.

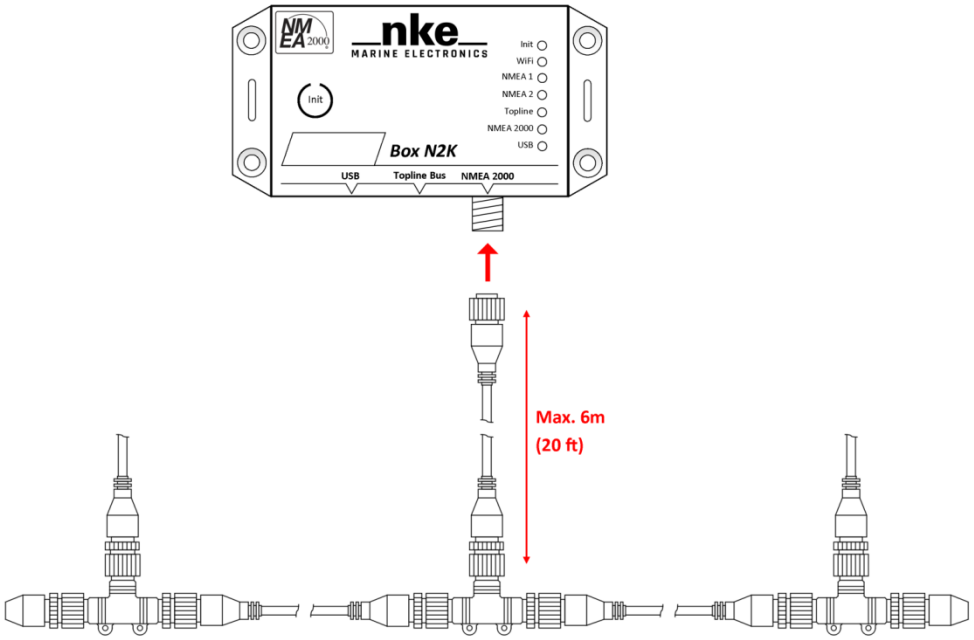
Warning: for the NMEA links to work correctly, make sure that the NMEA instruments and the **Box N2K** are connected to the same ground (except for the NMEA 1 input).



3.2.3. NMEA 2000

The **Box N2K** connects to a NMEA 2000 bus via its dedicated connector; this is a standard 5-pin male NMEA 2000 connector.

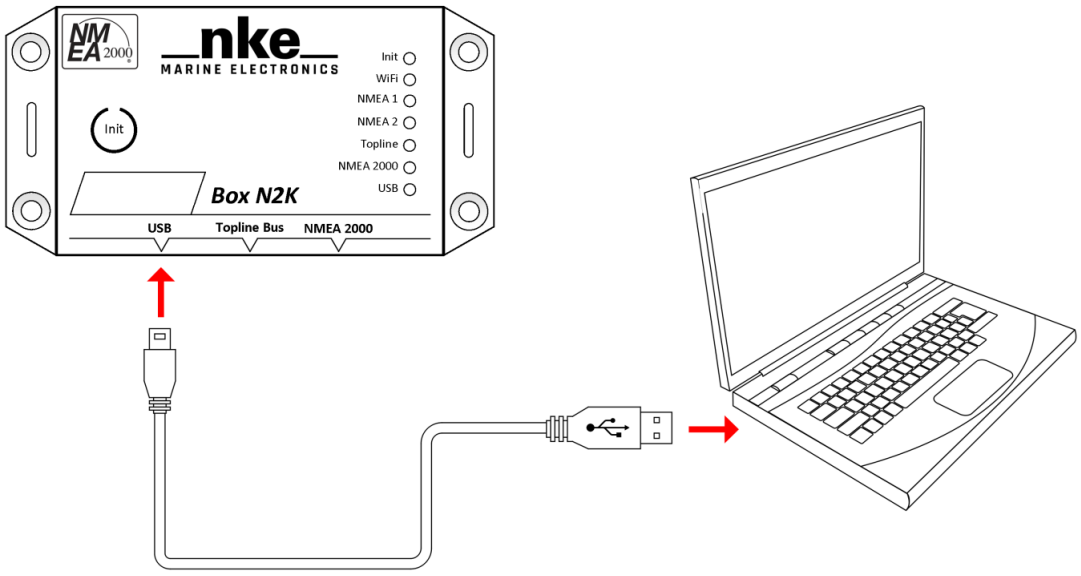
According to the NMEA 2000 standard, the cable from the **Box N2K** to the backbone should not be longer than 6 meters (20 feet).



3.2.4. USB

The USB connection of the **Box N2K** is via a Mini-USB port.

A 0.8m USB / Mini-USB cable is supplied with your **Box N2K**.



3.3. Initialization

When the **Box N2K** is connected for the first time to your Topline bus, it is by default at address 0. To initialize it, press the Init button for 3 seconds. The **Box N2K** will take a free address on the Topline bus after 10 seconds.

4. Features

4.1. NMEA 0183

4.1.1. Reception/Transmission of data

There are four ways to send and receive NMEA 0183 data from the Box N2K:

- NMEA 1 wired input/output
- NMEA 2 wired input/output
- USB port
- WiFi socket (UDP ou TCP connection)

The **Box N2K** creates on Topline the channels corresponding to the data it receives from NMEA 0183, if these do not already exist.

In addition, the **Box N2K** sends on its NMEA 0183 outputs the data exchanged on the Topline bus.

The NMEA input baud rate is set automatically: the **Box N2K** detects the transmission speed of the incoming data. The NMEA output baud rate must be set manually. The Box supports a range of the most used reference baud rates.

Baudrates supported by NMEA 1 & NMEA 2

Baudrate	Input	Output
4800 baud	X	X
9600 baud	X	X
14400 baud	X	X
19200 baud	X	X
38400 baud	X	X

➔ Note that the baudrate of the USB link is fixed at 115200 baud.

4.1.2. Initialization of incoming and outgoing data

Follow the steps below to configure NMEA 0183 data flow through the **Box N2K**:

1. Connect your NMEA 0183 instruments to the NMEA inputs of the **Box N2K** (Wired, WiFi, USB)
2. Power up the Topline bus and your NMEA 0183 instruments; make sure the data is being sent
3. Press the Init button on the Box N2K for 3 seconds
   - If you want to keep the existing channels, press for 6 seconds
4. Wait 10 seconds for the listening process.

After 10 seconds, the **Box N2K** will create the Topline channels corresponding to the NMEA 0183 data received **if they do not already exist**; it will emit a long beep followed by several beeps equal to the number of Topline channels created.

It will also send the data on the Topline bus to its wired, WiFi and USB outputs in NMEA 0183. The initialization allows the **Box N2K** to determine which NMEA 0183 sentences to send on its outputs.

The channels and phrases created in this way will be restored each time your system is switched on. This procedure also causes a slave address to be taken from the Topline bus.

By default, the **Box N2K** will use its internal priority table (below) to define the origin of the data published on the Topline bus. It is however possible to configure the NMEA 0183 sentence of origin of the data via the *TopSailor* software.

4.1.3. Topline / NMEA 0183 connection tables

Priority list of NMEA 0183 input sentences for each Topline channel

Channels created		NMEA sentences used		
N°	Label	Priority 1	Priority 2	Priority 3
1	R_SPEEDO	VHW	--	--
2	PROF	DPT	DBT	--
3	R_ANG_VENT_APP	MWV	VWR	--
4	R_COMPAS	HDG	VHW	HDM
5	MINSEC	ZDA	RMC	--
6	LOCHJ	VLW	--	--
7	LOCHT	VLW	--	--
8	VMG	VPW	--	--
9	TEN_ETAIS	XDR	--	--
10	HEUJOUR	ZDA	RMC	--
11	TEMP_AIR	MTA	XDR	--
12	TEMP_EAU	MTW	--	--
13	D_HOMMER_MER	WPL	--	--
14	A_HOMME_MER	WPL	--	--
15	SPEEDO	VHW	--	--
16	ANEMO	MWV	VWR	--
17	ANG_VENT_APP	MWV	VWR	--
18	COMPAS	HDG	VHW	HDM
19	DIST_WPT	BWC	RMB	ZDL
20	CAP_WPT (vrai)	BWC	RMB	
21	ECART_ROUTE	APB	RMB	XTE
22	V_FOND	VTG	RMC	--
23	CAP_FOND (vrai)	VTG	RMC	THS
24	V_WP	WCV	RMB	--
25	ANNMOIS	ZDA	RMC	--
26	B_PILOT	APA	APB	XTE
27	C_WP_OD	APA	APB	--
28	BARO	MMB	XDR	--
29	LAT_DEGMIN	GGA	GLL	RMC
30	LAT_MILMIN	GGA	GLL	RMC
31	LON_DEGMIN	GGA	GLL	RMC
32	LON_MILMIN	GGA	GLL	RMC
33	TENSION_B1	PNKEP,11	--	--
34	COURANT_B1	PNKEP,11	--	--

Channels created		NMEA sentences used		
N°	Label	Priority 1	Priority 2	Priority 3
35	CAPACITE_B1	PNKEP,11	--	--
36	CAPA_PCENT_B1	PNKEP,11	--	--
37	TENSION_B2	PNKEP,12	--	--
38	COURANT_B2	PNKEP,12	--	--
39	CAPACITE_B2	PNKEP,12	--	--
40	CAPA_PCENT_B2	PNKEP,12	--	--
41	VIT_CIBLE	KEP	--	--
42	CAP_AUTRE_BORD	KEP	--	--
43	ANGLE_OPT_VENT	KEP	--	--
44	REND_PRES	KEP	--	--
45	REND_POLAIRE	KEP	--	--
46	ANGLE_OPT_CMG	KEP	--	--
47	ANGLE_OPT_VMG	KEP	--	--
48	GAIN_ROUTE_CMG	KEP	--	--
49	GAIN_ROUTE_VMG	KEP	--	--
50	DIREC_COURANT	KEP	VDR	--
51	VITES_COURANT	KEP	VDR	--
52	PRESS_ATMOS	MMB	XDR	--
53	DYN1	PNKEA,,1	--	--
54	DYN2	PNKEA,,2	--	--
55	DYN3	PNKEA,,3	--	--
56	DYN4	PNKEA,,4	--	--
57	DYN5	PNKEA,,5	--	--
58	DYN6	PNKEA,,6	--	--
59	DYN7	PNKEA,,7	--	--
60	DYN8	PNKEA,,8	--	--
61	TENSION_B3	PNKEP,13	--	--
62	COURANT_B3	PNKEP,13	--	--
63	CAPACITE_B3	PNKEP,13	--	--
64	CAPA_PCENT_B3	PNKEP,13	--	--
65	TENSION_B4	PNKEP,14	--	--
66	COURANT_B4	PNKEP,14	--	--
67	CAPACITE_B4	PNKEP,14	--	--
68	CAPA_PCENT_B4	PNKEP,14	--	--
69	DERIVE_MES	LWY	NLA	--
70	CAP VRAI	HDT	VHW	--
71	MARK_TIME	ZDL	--	--
72	LAY_DIST	ZDL	--	--
73	LAY_TIME	ZDL	--	--
74	DECL_MAG	RMC	--	--
75	Waypoint name	RMB et BWC		

List of NMEA 0183 sentences sent out for each Topline channel

	Topline Channels	XDR	RSA	DBT	DPT	VLW	VHW	MWV	VWR	VWT	MWD	MTW	MMB	HDG	HDM	HDT	VTG	VPW	ZDA	GLL	XTE	RMB	RMC	PNKEP,01	PNKEP,02	PNKEP,03	PNKEP,04	PNKEP,05	CUR	WPL	LWY	PNKEP,11	PNKEP,12	PNKEP,13	PNKEP,14	ZCD
1	ANG_INCI	X																																		
2	BARRE		X																																	
3	PROFONDEUR			X	X																															
4	LOCH1					X																														
5	LOCHT					X																														
6	SPEEDO						X																													
7	CHRONO																																			X
8	GIR_MP							X	X																											
9	ANG_VENT_APP							X	X																											
10	ANEMO							X	X																											
11	ANG_VENT_VRAI							X		X																										
12	VIT_VENT_VRAI							X		X	X																									
13	DIR_VENT_VRAI										X																									
14	DIR_VENT_REEL										X																									
15	VMG																	X																		
16	DERIVE																														X					
17	TEMP_AIR	X																																		
18	TEMP_EAU											X																								
19	MOTEUR	X																																		
20	PRESS_ATMOS	X											X																							
21	BARO2	X											X																							
22	COMPAS						X							X	X																					
23	CAP_FOND																X						X													
24	V_FOND																X						X													
25	ANNMOIS																		X	X			X													
26	HEUJOUR																		X	X			X													
27	MINSEC																		X	X			X													
28	LAT_DEGMIN																			X			X													
29	LAT_MILMIN																			X			X													
30	LON_DEGMIN																			X			X													
31	LON_MILMIN																			X			X													
32	ECART_ROUTE																				X	X														
33	D_WP																					X														
34	A_WP																					X														
35	V_WP																					X														
36	DECL_MAG																						X													
37	R_GITE	X																																		
38	ANGLE_TRIM	X																																		
39	VITESSE_CIBLE																							X												
40	CAP_AUTRE_BORD																								X											
41	ANGLE_OPT_VENT																									X										
42	REND_PRES																									X										
43	REN_POLAIRE																									X										
44	ANGLE_OPT_CMG																										X									
45	GAIN_ROUTE_CMG																										X									
46	ANGLE_OPT_VMG																										X									
47	GAIN_ROUTE_VMG																										X									
48	ANGLE_QUILLE	X																																		
49	DIREC_COURANT																											X								
50	VITES_COURANT																											X								
51	C_COURANT																												X							
52	V_COURANT																												X							
53	A_HOMME_MER																													X						
54	TENSION_B1																															X				
55	COURANT_B1																															X				
56	CAPACITE_B1																															X				
57	CAPA_PCENT_B1																															X				
58	TENSION_B2																																X			
59	COURANT_B2																																X			
60	CAPACITE_B2																																X			
61	CAPA_PCENT_B2																																X			
62	TENSION_B3																																	X		
63	COURANT_B3																																	X		
64	CAPACITE_B3																																	X		
65	CAPA_PCENT_B3																																	X		
66	TENSION_B4																																		X	
67	COURANT_B4																																		X	
68	CAPACITE_B4																																		X	
69	CAPA_PCENT_B4																																		X	
70	CAP_VRAI						X									X																				

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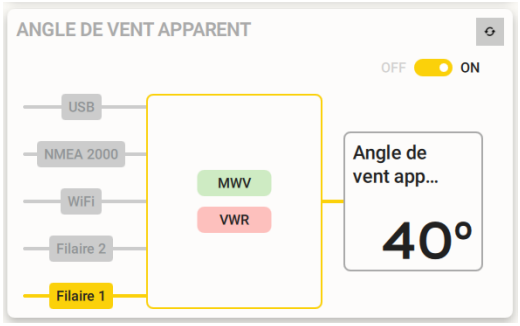
4.1.4. Configuration with TopSailor

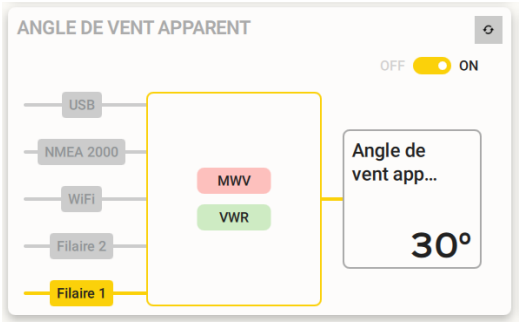
4.1.4.1. Reception

TopSailor allows you to configure the NMEA 0183 phrase you want to use to feed a Topline channel.

On the **Box N2K** page, each channel is represented in a sentencework. When NMEA 0183 is selected, it is possible to choose from different sentences containing this data.

For example, for the Apparent Wind Angle channel, it is possible to select MWV or VWR sentences. It is thus possible to select the sentence containing the most precise data, or the fastest.

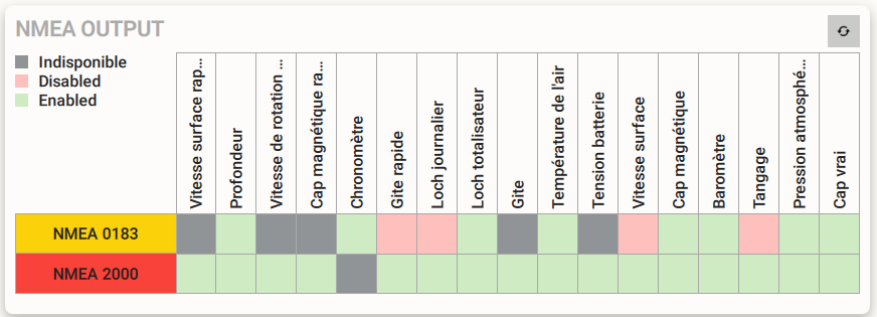




4.1.4.2. Transmission

TopSailor lets you choose the Topline channels to transmit on NMEA 0183 outputs. This feature allows you to disable unused data and save bandwidth. This setting is done by clicking on the boxes of the table in the "NMEA Output" section, in the row corresponding to NMEA 0183, each column corresponding to a Topline channel. Only valid Topline channels are displayed.

Warning: Some channels are linked together and will only be sent if all are active. For example: Date and Time channels, or Latitude and Longitude.



4.2. NMEA 2000

4.2.1. Reception/transmission of data

The **Box N2K** can be connected to a NMEA 2000 bus via its dedicated connector. It allows to create on Topline the channels corresponding to the data it receives from NMEA 2000, if they do not already exist.

On the other hand, the **Box N2K** sends the data it receives from the Topline bus on the NMEA 2000 bus.

It is possible to configure the source address, instance and information fields of the **Box N2K** from the *TopSailor* software, or with a dedicated tool from the NMEA 2000 bus.

4.2.2. Initialization of incoming and outgoing data

Follow the steps below to configure NMEA 2000 data flow through the **Box N2K**:

1. Connect the **Box N2K** to the NMEA 2000 bus
2. Power up the Topline bus and the NMEA 2000 bus; ensure that all instruments are sending data
3. Press the Init button on the **Box N2K** for 3 seconds
   - If you want to keep the existing channels, press for 6 seconds
4. Wait 10 seconds until initialization is complete.

After 10 seconds, the **Box N2K** will create the Topline channels corresponding to the received NMEA 2000 data **if they do not already exist**; it will emit a long beep, followed by several beeps equal to the number of Topline channels created.

It will also send the Topline bus data to the NMEA 2000 bus. The initialization determines which PGNs can be fed by your Topline instruments (see table next page).

The channels and PGNs created in this way will be restored each time your system is switched on. This procedure also causes a slave address to be taken from the Topline bus.

By default, the **Box N2K** will use its internal priority table to define the origin of the data published on the Topline bus. However, it is possible to configure the instrument and the PGN NMEA 2000 of origin of the data via the *TopSailor* software.

4.2.3. Topline / NMEA 2000 connection tables

Data PGNs supported by the Box N2K

	PGN	Parameter Group	TX	RX
1	59392	ISO Acknowledgment	●	●
2	59904	ISO Request	●	●
3	60160	ISO Transport Protocol, Data Transfer	●	●
4	60416	ISO Transport Protocol, Connection Management	●	●
5	60928	ISO Address Claim	●	●
6	65240	ISO Commanded Address		●
7	126208	NMEA – Request Group Function		●
8	126464	PGN List – Transmit PGN's Group Function	●	●
9	126992	System Time	●	●
10	126993	Heartbeat	●	●
11	126996	Product Information	●	●
12	126998	Config Information	●	●
13	126992	System Time	●	●
14	127245	Rudder	●	●
15	127250	Vessel Heading	●	●
16	127251	Rate of Turn	●	●
17	127257	Attitude	●	●
18	127258	Magnetic Variation	●	●
19	127505	Fluid Level	●	●
20	127506	DC Detailed Status	●	●
21	127508	Battery Status	●	●
22	128000	Nautical Leeway Angle	●	
23	128259	Speed Water Referenced	●	●
24	128267	Water Depth	●	●
25	128275	Distance Log	●	●
26	129025	Position Rapid Update	●	●
27	129026	COG & SOG Rapid Update	●	●
28	129029	GNSS Position Data	●	●
29	129033	Time &Date		●
30	*129038*	*AIS Class A Position Report*	●	
31	*129039*	*AIS Class B Position Report*	●	
32	*129040*	*AIS Class B Extended Position Report*	●	
33	*129041*	*AIS Aids To Navigation (AtoN) Report*	●	
34	129283	Cross Track Error	●	●
35	129284	Navigation Data	●	●
36	129291	Set & Drift Rapid Update	●	●
37	*129793*	*AIS UTC and Date Report*	●	
38	*129794*	*AIS Class A Static and Voyage Related Data*	●	
39	*129809*	*AIS Class B "CS" Static Data Report, Part A*	●	
40	*129810*	*AIS Class B "CS" Static Data Report, Part B*	●	
41	130306	Wind Data	●	●
42	130310	Environmental parameters 1	●	●
43	130311	Environmental parameters 2	●	●
44	130312	Temperature	●	●
45	130314	Actual Pressure	●	●
46	130316	Temperature Extended	●	●
47	130577	Direction Data	●	●
48	130322	Current Station Data		●
49	130323	Meteorological Station Data		●
50	130324	Moored buoy Station Data		●

List of PGNs used as input and output for each Topline channel.

(Reception priority order from left to right)

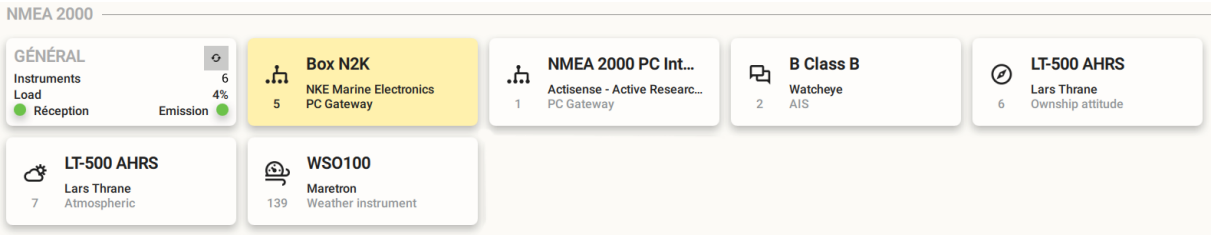
Légende : ▼NMEA Input ▲NMEA Output PGNs Obsolètes	PGN	128259	128267	127251	130306	127250	126992	127257	127245	130316	127508	129284	129283	129026	130314	129025	127506	127505	129291	128000	130577	129029	127258	129033	128275	130312	130310	130311	130322	130323	130324
	Groupe de donnée NMEA 2000	Speed, Water referenced	Water Depth	Rate of Turn	Wind Data	Vessel Heading	System Time	Attitude	Rudder	Temperature, Extended Range	Battery Status	Navigation Data	Cross Track Error	COG & SOG, Rapid Update	Actual Pressure	Position, Rapid Update	DC Detailed Status	Fluid Level	Set & Drift, Rapid Update	Nautical Leeway Angle	Direction Data	GNSS Position Data	Magnetic Variation	Time & Date	Distance Log	Temperature	Environmental Parameters 1	Environmental Parameters 2	Current Station Data	Meteorological station data	Moored buoy station data
Canal TOPLINE																															
R_SPEEDO		▼▲																			▼▲										
PROF			▼▲																										▼		
R_VROT				▼▲																											
R_ANG_VENT_APP					▼▲																									▼	▼
R_COMPAS						▼▲															▼▲										
MINSEC							▼▲															▼▲		▼	▼▲				▼	▼	▼
R_GITE								▼▲																							
R_BARRE									▼▲																						
LOCHJ																									▼▲						
LOCHT																									▼▲						
VIT_VENT_VRAI					▲																										
ANG_VENT_VRAI					▲																										
DERIVE																				▲											
GITE								▼▲																							
HEUJOUR							▼▲															▼▲		▼	▼▲				▼	▼	▼
TEMP_AIR										▼▲																▼▲	▼▲	▼▲		▼	▼
TEMP_EAU										▼▲																▼▲	▼▲	▼▲	▼		▼
BATTERIE											▼▲																				
SPEEDO		▼▲																			▼▲										
ANEMO					▼▲																									▼	▼
ANG_VENT_APP					▼▲																									▼	▼
COMPAS						▼▲															▼▲										
D_WP											▼▲																				
A_WP											▼▲																				
ECART_ROUTE												▼▲																			
V_FOND													▼▲								▼▲										
CAP_FOND													▼▲								▼▲										
V_WP											▼▲																				
ANNMOIS						▼▲																▼▲		▼	▼▲				▼	▼	▼
C_WP_OD											▼▲																				
GIRMP					▲																										
BARO_2														▼▲													▼▲	▼▲		▼	▼
V_COURANT																			▲		▲										
C_COURANT																			▲		▲										
BARRE									▼▲																						
LAT_DEGMIN																▼▲						▼▲							▼	▼	▼
LAT_MILMIN																▼▲						▼▲							▼	▼	▼
LON_DEGMIN																▼▲						▼▲							▼	▼	▼
LON_MILMIN																▼▲						▼▲							▼	▼	▼
TENSION_B1											▼▲																				
COURANT_B1											▼▲																				
CAPA_PCENT_B1																	▼▲														
TENSION_B2											▼▲																				
COURANT_B2											▼▲																				
CAPA_PCENT_B2																	▼▲														
CAPA_PCENT_R1																		▼▲													
CAPA_PCENT_R2																		▼▲													
CAPA_PCENT_R3																		▼▲													
CAPA_PCENT_R4																		▼▲													
ANGLE_TRIM								▼▲																							
DIREC_COURANT																			▼▲		▼▲								▼		
VITES_COURANT																			▼▲		▼▲								▼		
PRESS_ATMOS															▼▲												▼▲	▼▲		▼	▼
TENSION_B3											▼▲																				
COURANT_B3											▼▲																				
CAPA_PCENT_B3																	▼▲														
TENSION_B4											▼▲																				
COURANT_B4											▼▲																				
CAPA_PCENT_B4																	▼▲														
DERIVE_MES																				▼▲											
CAP_VRAI						▼▲															▼▲										
DECL_MAG						▼▲																	▼▲								

4.2.4. Configuration with TopSailor

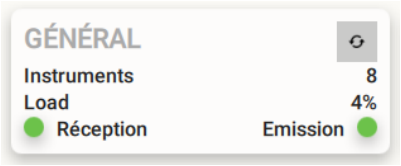
4.2.4.1. Visualization of the NMEA 2000 bus

TopSailor allows, with the **Box N2K**, to visualize your NMEA 2000 bus, and to configure the data transmitted to your Topline installation.

On the **Box N2K** page, there is a tab listing all the instruments detected on the NMEA 2000 bus.

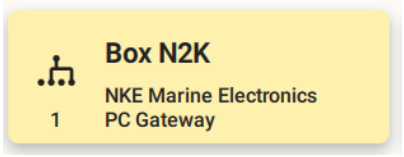


The first sentence is a summary of the status of your NMEA 2000 bus:

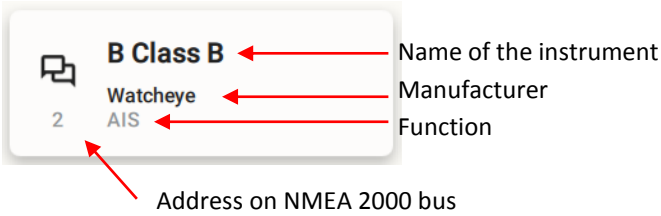


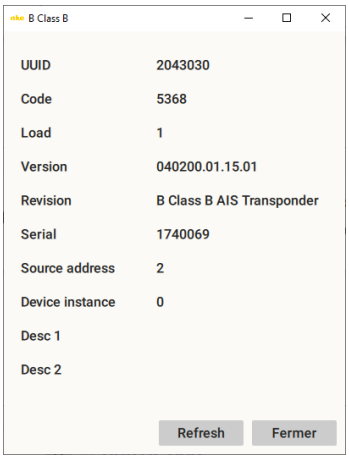
Instruments: Total number of instruments detected on the bus
Load: Percentage of bus bandwidth occupied
Reception/Transmission: NMEA 2000 bus status, represented as colored dots:
0 : Bus OK 0 : Minor errors detected 0 : Errors detected 0 : Bus stopped

The second (colored) group box represents the currently selected **Box N2K**:



The following sentences correspond to other instruments detected on the NMEA 2000 bus:





By clicking on an instrument, you have access to more detailed information about it. For the **Box N2K**, it is possible to modify some parameters: NMEA 2000 address, Instance, and description fields.

4.2.4.2. Reception

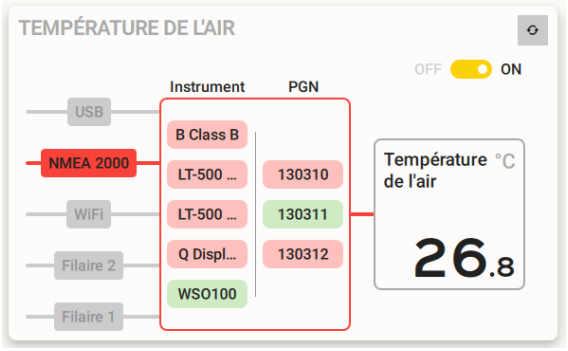
TopSailor also allows you to configure the instrument and the NMEA 2000 PGN you wish to use to feed a Topline channel.

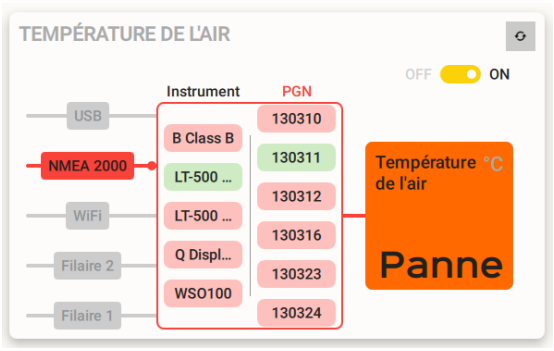
On the **Box N2K** page, each channel is represented by a sentence. When NMEA 2000 source is selected, it is possible to choose the instrument desired, then the PGN to consider for feeding this Topline channel.

When the bus starts, the **Box N2K** asks to the NMEA 2000 instruments wich PGNs they can send. This filters the instruments and PGNs displayed for each Topline channel and provides relevant options.

However, some instruments may not respond to this request; the **Box N2K** cannot then know what data the instrument is likely to send. In this case, the instrument is displayed by default with all the PGNs available in reception, and you must refer to the instrument manual for more information.

Example with the Air Temperature channel: on the left, the WSO100 instrument has sent its list of PGNs; the choice is restricted to what the instrument sends. On the right, the LT-500 did not send its PGN list; all choices for that channel are available.



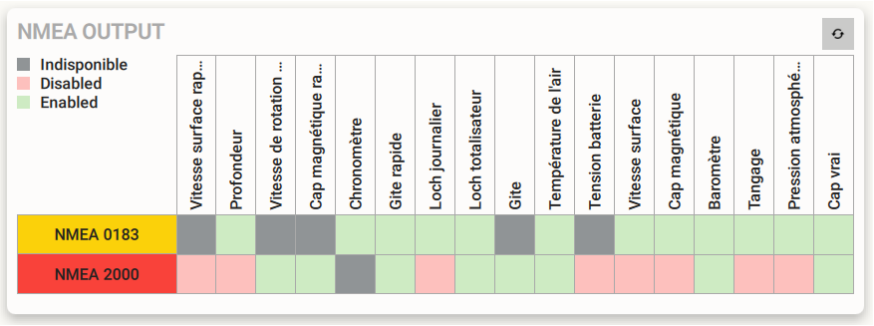


4.2.4.3 Transmission

TopSailor lets you choose the Topline channels to transmit on the NMEA 2000 bus. This allows you to disable non-essential data and save bandwidth.

This setting is done by clicking on the boxes of the table in the "NMEA Output" section, in the row corresponding to NMEA 2000, each column corresponding to a Topline channel. Only available Topline channels are displayed.

Warning: Some channels are linked together and will only be sent if all are active. For example: Date and Time channels, or Latitude and Longitude.



4.3. USB

The Mini-USB port on the **Box N2K** is a serial port that allows you to connect it to a computer. It has two main functions:

- Send and receive NMEA 0183 stream

NMEA 0183 data can be exchanged via the USB port of the **Box N2K**. This allows some software such as *Adrena* to connect to the **Box N2K** to retrieve navigation data from the Topline bus. The USB port operates only at 115200 baud.

- Connecting to the Topline bus with **nke** software

The **nke** *Toplink* and *TopSailor* software can connect to the **Box N2K** on its USB port. This allows them to access the Topline bus directly, to visualize it and to set up the instruments connected to it.

4.4. WiFi

The **Box N2K** provides a wireless access point via its 802.11b+g socket with the following parameters:

- SSID: nke-xxxxxx
- WPA: 21xxxxxxxxxxx (corresponding to the serial number of the **Box N2K** which is indicated on the label stuck on the side of the box)
- IP address: 192.168.56.1
- Port: 50000
- TCP + UDP protocols
- DHCP server active

This WiFi link can be used to send or receive NMEA 0183 sentences to a wireless device and publish this data on the Topline bus.

TCP mode is more reliable than UDP mode but limits the connection to a single device. In UDP mode, the **Box N2K** allows up to 7 WiFi devices to be connected simultaneously.

The WiFi also allows you to connect through the **nkeDisplay** application on your smartphone.

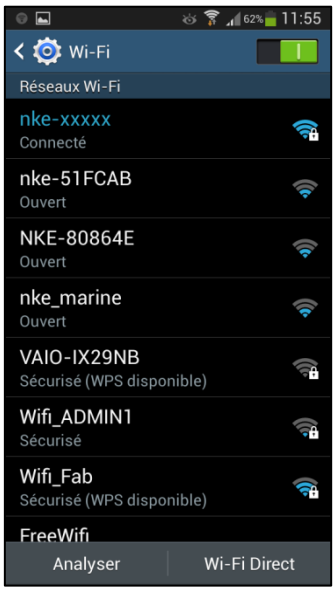
Warning: For use with a PC running Windows 10 or 11, it is recommended to disable WPA security and use WiFi link in Open mode. To do this, you must hold the Init Key for 8 seconds to configure the **N2K Box** with these new parameters.

4.4.1. Configuration from a display

If your **Box N2K** is connected to a Topline bus equipped with a display, you can modify the SSID and the WiFi channel.

Configuration from a *Multigraphic* :

4.4.2. Connecting to the WiFi network from a smartphone



Go to the WiFi settings of your smartphone, and select the WiFi network of your **Box N2K**. The name is written on the label on the side of the **Box N2K**.

If WPA is enabled, enter the password (also shown on the label).

Then press "connect".

Once connected, launch the software you wish to use (here *nkeDisplay*).

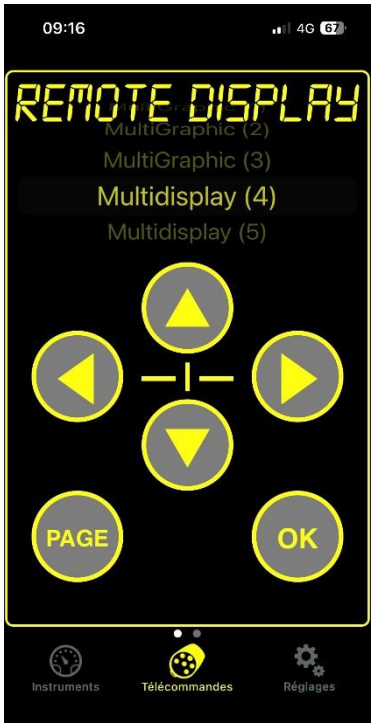
In the parameters, enter the IP address of the **Box N2K**: "192.168.56.1", the port "50000", and the protocol (UDP or TCP)

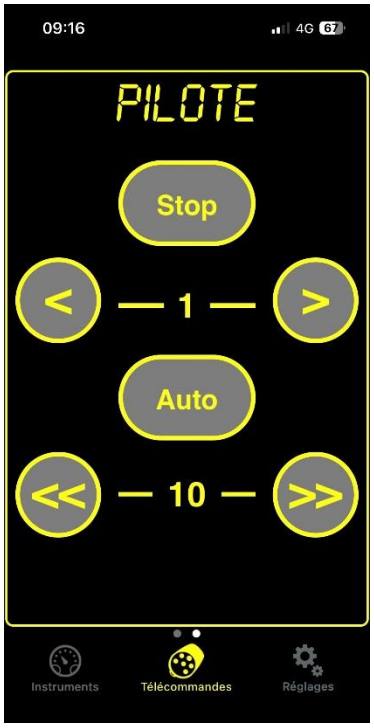
Warning: If your device uses a firewall, check that port 50000 is free and open.

4.4.3. nkeDisplay application

The *nkeDisplay* app is available for Smartphone and tablet on *Android* and *iOS*.

This application allows you to retrieve data from the Topline bus and display it on your smartphone or tablet. Two options are available separately: The Multifunction remote control and the Pilot remote control.





4.5. Priority of data source

If a Topline channel has the possibility of being fed by several different sources, a default priority will be applied during initialization (from left to right):

NMEA 1 Wired > NMEA 2 Wired > WiFi > NMEA 2000 > USB

However, it is possible to choose the desired origin of the data after the initialization with the *TopSailor* software.

4.6. AIS

The **Box N2K** processes the AIS sentences it receives in NMEA 0183 format and redirects them.

4.6.1. NMEA 0183

The **Box N2K** transmits the received NMEA 0183 AIS sentences to all NMEA outputs: an AIS sentence received on the wired input will be redistributed on the wired, WiFi and USB NMEA output. The **Box N2K** thus acts as a gateway to NMEA 0183 AIS data.

4.6.2. NMEA 2000

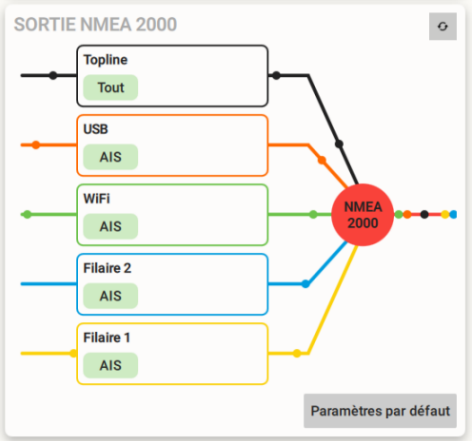
The **Box N2K** also provides real-time translation of AIS data received in NMEA 0183 to the NMEA 2000 bus.

This translation will be automatic if the **Box N2K** receives a valid AIS sentence on one of its NMEA 0183 inputs: wired, USB or WiFi, and does not require initialization. The **Box N2K** supports the most common AIS sentences.

AIS sentences supported by the Box N2K

PGN	PG	Original NMEA 0183 sentence
129038	Class A Position Report	IADLM Messages 1, 2 & 3
129039	Class B Position Report	AIVDM Message 18
129040	Class B Extended Position Report	AIVDM Message 19
129041	Aid to Navigation (AtoN) Report	AIVDM Message 21
129793	UTC and Date Report	AIVDM Message 4
129794	Class A Static and Voyage related Data	AIVDM Message 5
129809	Class B Static Data (Part A)	AIVDM Message 24
129810	Class B Static Data (Part B)	AIVDM Message 24

The transmission of AIS sentences from NMEA 0183 to NMEA 2000 can be configured via *TopSailor*, in the "NMEA 2000 output" box. It is possible to activate or deactivate the sources of the AIS NMEA 0183 sentences to be converted.



4.7. Adrena® compatibility

To meet the needs of our customers, the **Box N2K** has an additional NMEA 0183 input/output to communicate with the *Adrena* navigation software. Datas calculated by Adrena becomes accessible from **nke** displays. And conversely, the data from your sensors (Wind vane, GPS, Speedo, etc.) appear on your PC screen.

Signal from Box N2K	Wire colors	
	NMEA 1	NMEA 2
RX (in)	Yellow	Blue
TX (out)	Orange	Red
GND	Green Shield	Shield

This table summarizes the wire colors corresponding to the NMEA 1 or NMEA 2 link. The **Box N2K** will automatically detect the communication speed used by *Adrena* software.

Some features available:

- Sends Performance data to the **nke** displays (target speed, upwind performance, ...),
- Fix the starting line from *Adrena* or from a **nke** display,
- Launch the Chrono Regatta from *Adrena* or from a **nke** display,
- Auto Sail/Engine detection (requires a Baro HR 100 **nke** with engine wire connected).

4.8. watt&sea® compatibility

The **Box N2K** can read the sentences provided by the *Watt&Sea* energy converter and display the data provided on all your **nke** displays with dynamic channels.

To set up this link, connect the Watt&Sea converter RS485 bus to wired NMEA 0183 input #1 (Yellow wire on **Data A** and Green wire on **Data B**), then perform an initialization of the **Box N2K**.

4.9. HLA Diverse Yachts compatibility

The **Box N2K** allows the interpretation of NMEA 2000 loadcell sentences (proprietary PGN 65293) provided by *Diverse Yachts* Hybrid Loadcell Amplifier (HLA). Compatibility extends to all instruments broadcasting these sentences. The load measurements are thus available for display on all your **nke** displays.

The **Box N2K** offers support for up to 8 simultaneous sensors, over a measurement range from 1 gram to 2000 tons. To set up this link, simply connect your **Box N2K** and your HLA (or equivalent instrument) to the same NMEA 2000 network, then initialize the **Box N2K**.

NOTE: It is not possible to simultaneously display Watt&Sea **AND** LoadCell data on your **nke** bus. Watt&Sea data takes priority. It is also not possible to access this data if you have a **nke** Analog Monitor configured on dynamic channels 9 to 16 on your Topline bus.

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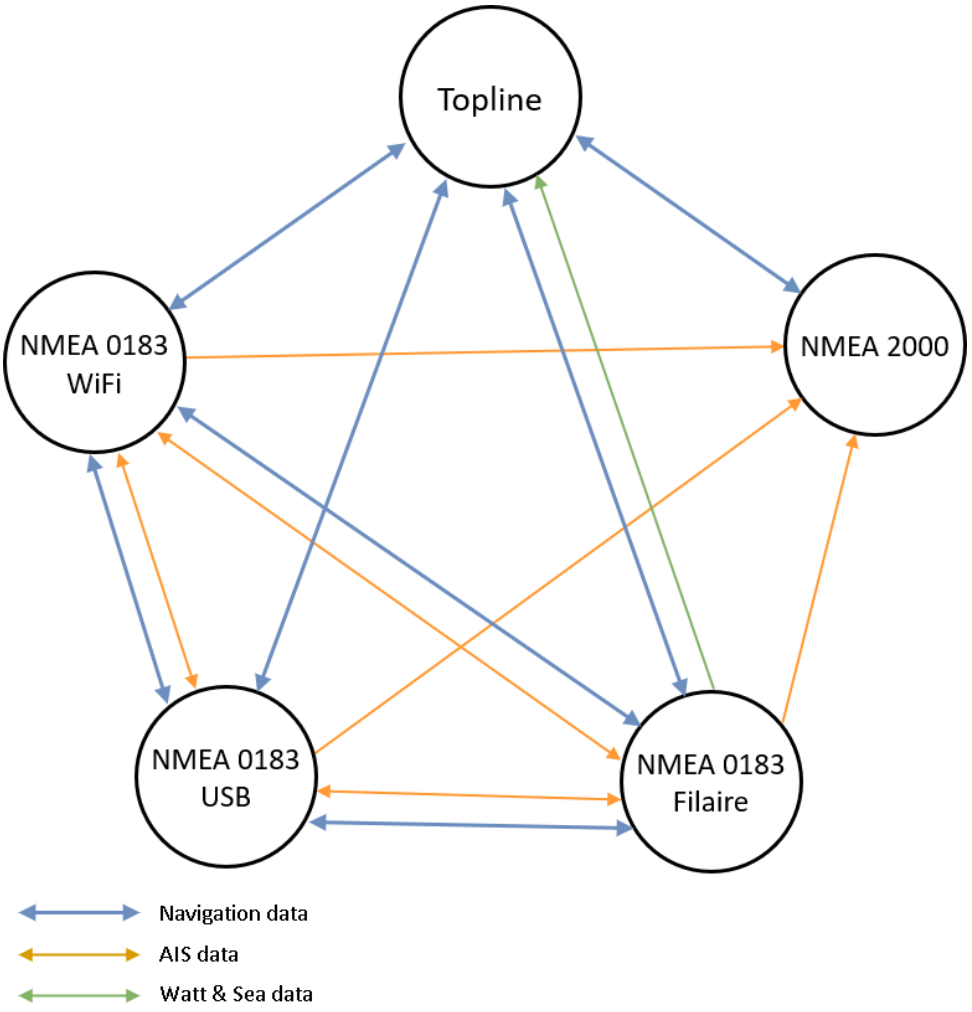
4.10. Data flow diagram



5. Firmware revision history

Date	Version	Commentaires
03/29/2023	V1.0	Release version RC0