

## QK-A032 Manual

### NMEA 2000/0183 Bi-directional Converter



Designed in UK



## Features

- Converts the most common NMEA 0183 sentences into NMEA 2000 PGNs
- Converts the most common NMEA 2000 PGNs into NMEA 0183 sentences
- Galvanic Opto-isolation on NMEA 0183 input
- Galvanic Opto-isolation on NMEA 2000 CAN bus connection
- Compatible with all NMEA 0183 versions without configuring
- Configurable baud rate
- Free firmware updates provided when new features and conversions are added. (Update via USB from Windows PC)
- Pre-fitted cables for a quick and easy installation
- NMEA 0183 sentences can be output through WiFi/USB
- NMEA 2000 PGNs can be output through WiFi/USB (selectable format: NMEA 0183 or PCDIN)
- WiFi supports Ad-hoc, Station and standby mode

\* From 10th Jan 2022, all A032-S will be upgraded to A032-AIS (support AIS sentences) for free and we will only keep one variation in stock. A032-AIS will be simply named A032.

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# 1. Setup Overview

## 1.1. Before leaving home:

Drivers and Configuration software are optional and only needed for specific features. The Configuration Software and specific instructions are included on the FREE CD or can be downloaded from <https://www.quark-elec.com/downloads/>.

Consider if there is a CD reader/internet access on site, if you will use the features below.

### Accessing data on a Mac/Linux/Windows PC

- Device Driver required if a Windows computer is used to access data via USB. Driver should install automatically, if not, it is included on the free CD or it can be downloaded from <https://www.quark-elec.com/downloads/> Drivers are not required for Mac or Linux operating systems.
- The A032 is powered by the NMEA 2000 bus, when connected to a powered NMEA 2000 backbone.

### Connecting wirelessly to the A032 via WiFi, in Station mode (through a router)

- Configuration software (Windows PC Required). Device driver installation may be required
- The A032 is powered by the NMEA 2000 bus.

**Adjusting NMEA 0183 baud rates:** The default NMEA 0183 baud is 4.8kbps for input and 38.4kbps for output. Users can adjust the baud rates using the Configuration software.

- Configuration software (Windows PC Required). Device driver installation may be required
- The A032 is powered by the NMEA 2000 bus.

## 1.2. Installation and Setup

### 1. Mounting: Consider the location...

- Dry, sturdy location 0.5m from other WiFi/VHF equipment.
- Ensure there is the correct length of wires needed. If drilling holes for cabling, seal around any holes to prevent damage to the vessel or equipment. Keep the USB dust cover on if USB is not being used

### 2. Connecting the A032 to the NMEA 2000 backbone (12.0V power)

The A032 is powered by the NMEA 2000 network (a minimum of a 12V DC powered NMEA 2000 backbone and two termination resistors are required).

### 3. Connecting the A032 to an NMEA 0183 device: please follow the colour code below:

Wire Colour	Wire Function
Blue	NMEA out-
White	NMEA out+
Black	NMEA in-
Grey	NMEA in+
Brown	GND

### 4. Checking the LED status lights

- Power: Top LED (red) flashes at 3 second intervals.
  - NMEA 2000 input: Middle LED flashes for each valid message received.
  - NMEA 0183 input: Bottom LED flashes for each valid message received.
- Please note: the NMEA LEDs will flash when their respective data is received, not sent.**

### 5. Connecting mobile device wirelessly to the A032, without using a router (Ad-hoc mode):

- **On the mobile device (phone, laptop etc.):** 15 seconds after the A032 has been powered up, users can scan for a WiFi network with an SSID similar to 'QK-A032xxxx'. Connect mobile device to the 'QK-A032xxxx' network with the default password: '88888888'.
- **In Chart software:** set the protocol to 'TCP', IP address to '192.168.1.100' and the port number to '2000'.

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6. To connect a mobile device wirelessly to the A032 through a router (Station mode) see Wireless Connections chapter.

### 7. Optional: Configuring your device's Baud rates or WiFi settings

- The A032 has been pre-set to frequently used WiFi and Baud rate settings for your convenience. If you wish to change these settings, please use the Configuration tool. For more details, please See the configuration section of the manual and the configuration instructions on the CD provided.

**Default Baud Rate settings:** The default NMEA 0183 input baud rate is 4800bps, the default output baud rate is 38400bps.

**Default WiFi settings:** The A032 is pre-set to connect wirelessly to mobile devices in Ad-hoc mode ('peer-to-peer' without a router or access point). This can be changed to Station mode (connecting to other devices through a router), using the Configuration software. WiFi can be disabled by setting device's WiFi to Standby mode.

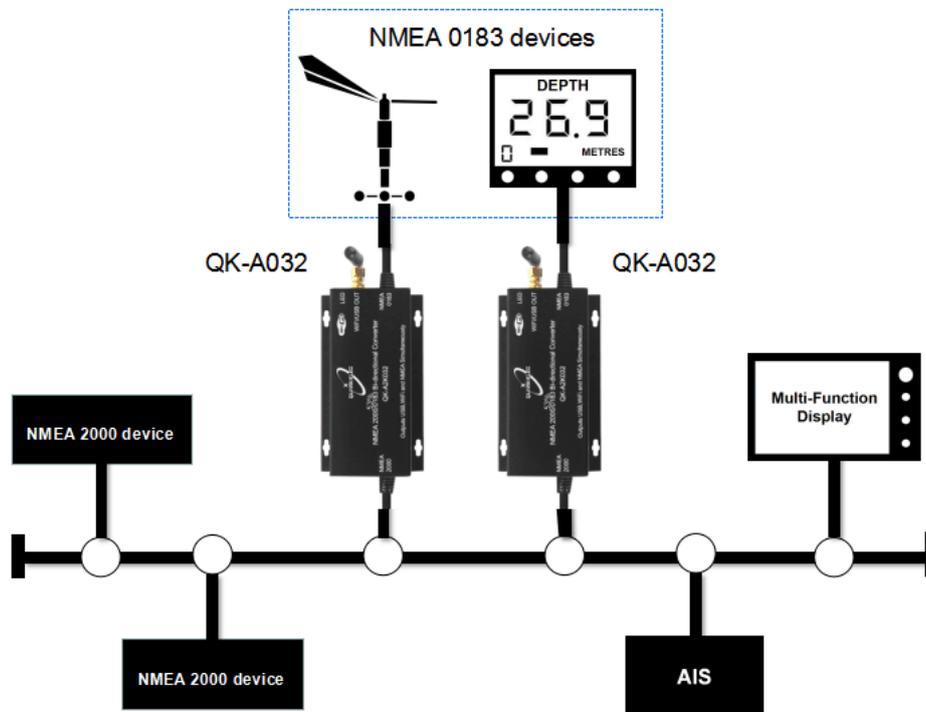


Figure 1: Example setup

## 2. Introduction

The A032 is intended for use in a marine environment. It provides an easy way to link older NMEA 0183 devices to a newer and faster NMEA 2000 marine network. It has a bi-directional converter with a wide support of message types.

**Please refer to the A032 Conversion List chapter for details of supported (and not supported) conversions.**

The A032 has one NMEA 2000 connection and one NMEA 0183 port which both can transmit and receive data. The configurable baud rate from 4800bps to 38400bps allows connection of standard NMEA 0183 equipment. The A032 is powered by the NMEA 2000 backbone and provides high voltage galvanic isolation between the NMEA 2000 and NMEA 0183 ports.

## 3. NMEA 2000 and NMEA 0183

NMEA 0183 is a serial data interface operating at 4800 bit/second utilizing standard asynchronous communications.

NMEA 2000 is a serial data network operating at 250 Kbit/second utilizing the Controller Area Network (CAN) bus. The CAN bus was originally developed for the automotive industry but is now used in numerous industrial applications.

The key difference, apart from the obvious one of operating speed, is that NMEA 0183 is an interface while NMEA 2000 is a network.

The NMEA 2000 network allows multiple electronic devices to be connected together on a common channel for the purpose of easily sharing information. Because it is a network, and because multiple devices can transmit data, a more comprehensive set of rules is required that dictate the behaviour of the members of the network. The CAN automatically provides some of these rules – mostly for control of access to the network, packet transmission, and for error detection.

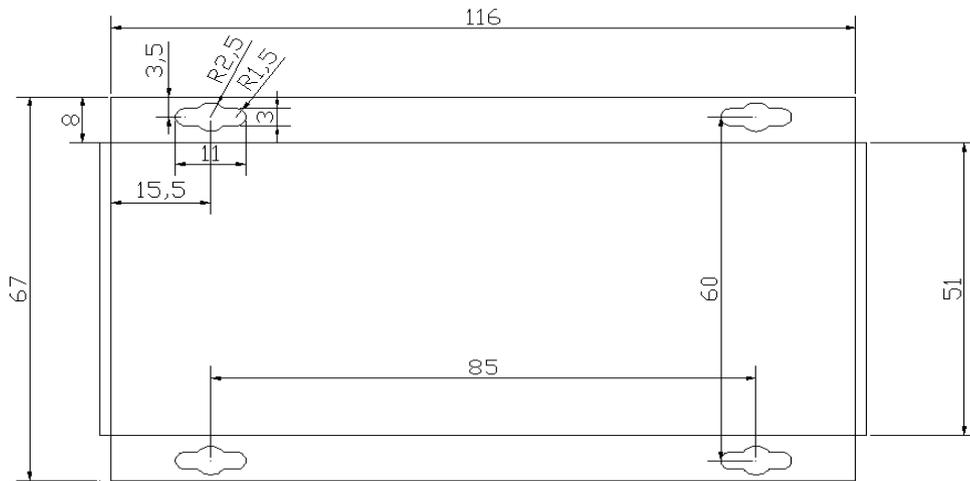
Similar to NMEA 0183, NMEA 2000 defines standard data formats and definitions, but in addition provides more extensive network management rules for identifying nodes on the network, sending commands to devices, and for requesting data. Besides the greater amount of control and integration provided, NMEA 2000 replaces with a single cable the wiring of up to 50 NMEA 0183 interconnections and can handle the data content of 50 to 100 NMEA 0183 data streams.

## 4. Mounting

The A032 is aimed at the commercial, leisure, fishing boat and vessel monitoring markets.

It is not waterproof so should be mounted in a dry place such as behind the instrument panel on a flat surface. **Please allow 0.5m between the A032 and other WiFi devices.** This will help avoid interference problems.

If USB is not being used then please use the USB dust cover provided. This will help keeping the port clean and dust out of the A032.



Tolerance:  $\pm 0.25$

Figure 2: A032 Dimension in mm

## 5. Connecting



**Disconnect all power sources before connecting your equipment!**

### 5.1. Connecting to the NMEA 2000 network

The A032 is pre-fitted with a five-core screened cable for the NMEA 2000 connection, fitted with a male micro-fit connector. Simply connect the cable to the network backbone or using a T-piece connector.



Figure 3: Pin NMEA 2000 male micro-fit connection

The main communication channel of a NMEA 2000 network is a NMEA 2000 backbone to which NMEA 2000 devices connect. The NMEA 2000 backbone must be powered from a stable 12V DC power supply and always requires two termination resistors.

**Please note 12.0V power for the A032 unit comes from the NMEA 2000 backbone.**

### 5.2. Connecting to a NMEA 0183 Device

A pre-fitted five-core screened cable is provided for connecting the A032 to other NMEA 0183 devices. The user can use the configuration tool to setup NMEA 0183 input and output baud rate if required.

Wire Colour	Wire Function
Blue	NMEA OUT -
White	NMEA OUT +
Black	NMEA IN -
Grey	NMEA IN +
Brown	GND



**Default Baud Rate settings:** The A032 is pre-set to frequently used baud rate settings for your convenience. If you wish to use other settings, default settings can be changed using the Configuration tool. See the configuration section of the manual and the configuration instructions on the CD provided.

Connection	Default NMEA 0183 Baud Rate
NMEA Input	4800bps as default
NMEA Output	38400bps as default, adjust if required

Although the A032's NMEA 0183 interface is based on the RS422 communication protocol (differential ends), it also supports NMEA0183-RS232 interface devices (single end). The following tables provide the wiring information for each type.

	QK-A032 wire	RS422 device terminals
NMEA 0183 Output	NMEA output+	NMEA Input+ *[1]
	NMEA output-	NMEA Input-
NMEA 0183 Input	NMEA input+	NMEA output+ *[1]
	NMEA input-	NMEA output-

\*[1] Swap NMEA + and NMEA- wires if the connection does not work.

	QK-A032 wire	RS232 device terminals
NMEA 0183 Output	NMEA output+	GND *[2]
	NMEA output-	NMEA Input
NMEA 0183 Input	NMEA input+	GND *[2]
	NMEA input-	NMEA Output

\*[2] Swap NMEA input and GND / NMEA output and GND wires if the connection does not work.

## 6. Status LED'S

The A032 features three LEDs which indicate power, NMEA 2000 input and NMEA 0183 input status respectively. The three LEDs turn on and then off after initialization. During normal operation, these LEDs flash as below:

- **Power:** Top LED (red) flashes at 3 second intervals.
- **NMEA 2000 INPUT:** Middle LED (green) flashes for each valid NMEA 2000 PGN input.
- **NMEA 0183 INPUT:** Bottom LED (green) flashes for every valid NMEA 0183 sentence input.

Please note: the NMEA LEDs flash when their respective data is received, not when data is converted or sent.



Figure 4: LED functions

## 7. Configuration

The Windows configuration tool can be used to setup the NMEA 0183 baud rate and to change WiFi settings.

The **Configuration tool** can be found on the free CD or it can be downloaded from our website: <https://www.quark-elec.com/product/qk-a032-nmea-2000-0183-bi-directional-gateway/>

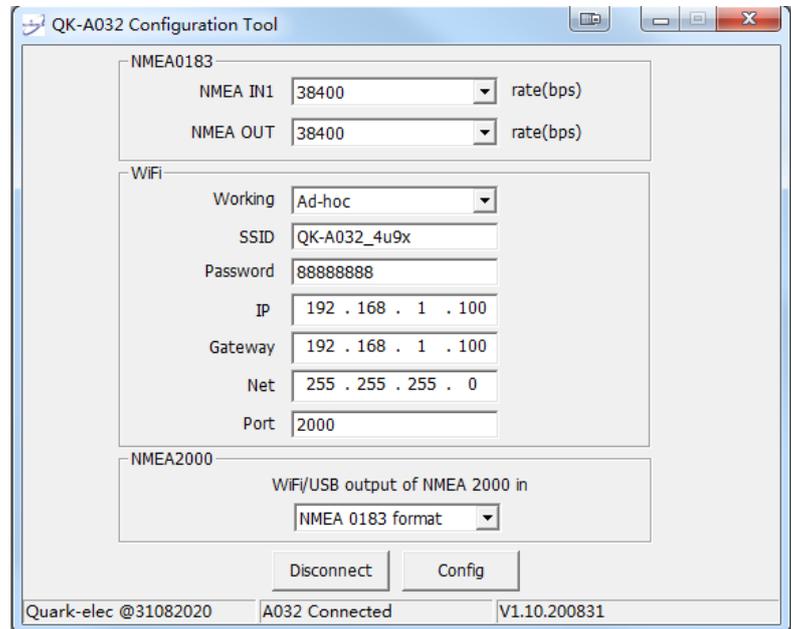
The **configuration tool instructions** can be found on the free CD or it can be downloaded from our website: [http://www.quark-elec.com/doc/QK-A0xx\\_GUI\\_application\\_note.pdf](http://www.quark-elec.com/doc/QK-A0xx_GUI_application_note.pdf)

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When the A032 is connected to a Windows PC and powered up, the 'A032 connected' status message will be displayed at the bottom of the Configuration software window. The firmware version will be shown in bottom right-hand corner.

### NMEA 0183

The required NMEA 0183 input and output baud rates can be selected from the drop-down list. The A032 can communicate with high-speed NMEA 0183 devices (38.4kbps), or slower NMEA 0183 devices (4.8kbps) if no high-speed data transfer is required. As NMEA 2000 runs at 250kbps, while the standard NMEA 0183 port runs at 4.8kbps or 38.4kbps, data overflow on NMEA 0183 output port cannot be completely avoided. If there are a few of NMEA 2000 devices on the backbone please be aware of the possibility of the overflow.



### WiFi

The A032 can be set up in either Ad-hoc (p2p), Station mode (Access Point) or Standby (disabled). See wireless connections chapter for details.

### NMEA 2000

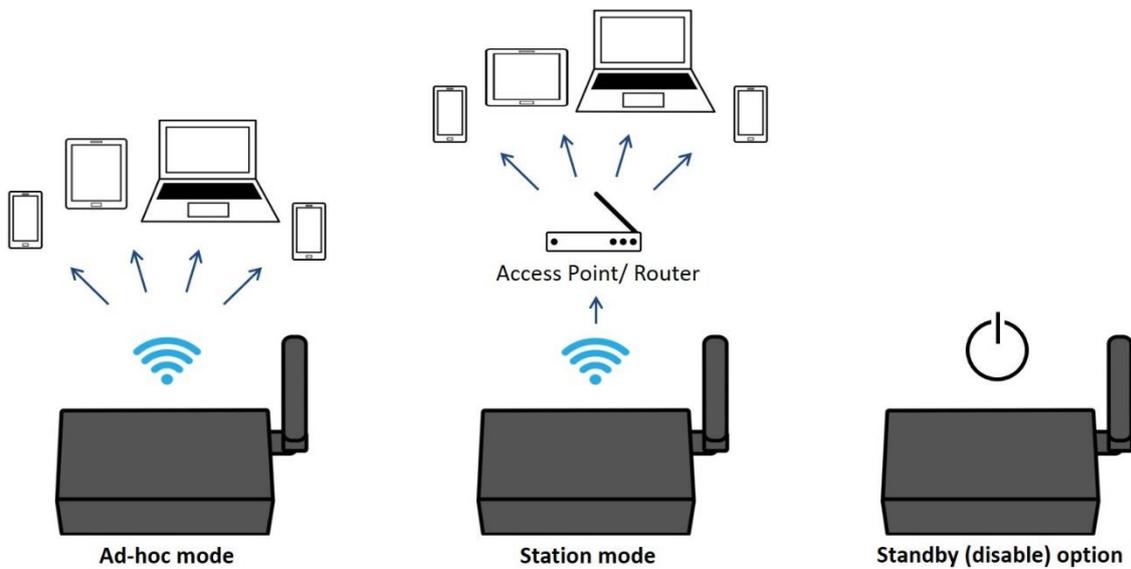
NMEA 2000 bus data can also be sent out via WiFi and USB. Operator can set up the output format using the configuration tool. This can be PCDIN (Raw NMEA 2000 data in NMEA 0183 format), NMEA 0183 (converted PGNs) or it can be disabled by choosing standby mode.

**Once settings have been changed, please click 'Config', wait for 30 seconds, and click 'Disconnect'. Please reboot device by disconnecting and re-connecting it to the power source. Your device is now ready for use.**

## 8. Wireless Connections

The A032 allows users to view data on a PC, tablet, smartphone or other compatible WiFi enabled device. Users can view marine network data including vessel course, speed, position, wind speed, direction, water depth etc in a chart software (see chapter [chart software](#)).

The IEEE 802.11b/g/n wireless standard has three basic modes of operation: Ad-hoc mode (peer to peer), Station mode (also called infrastructure mode) and Standby (WiFi disabled).



The A032's WiFi adapter supports both:

- In **Ad-hoc mode**, mobile devices connect directly (peer to peer) to another device, without a router or access point. For example; PC, tablet or smartphone can connect directly to the A032 to receive marine data.
- In **Station mode**, wireless devices communicate through an access point (AP) such as a router that serves as a bridge to other networks (such as the Internet or LAN). This allows the router to handle the data and traffic from the device. This data can then be picked up through the router anywhere on the local area network. This is similar to plugging the device directly into the router by wire, but instead using wireless technology. This way, the mobile devices receive both the marine data and data from other AP connections, for example Internet.

**The A032's WiFi adapter is set to Ad-hoc mode as a default setting but can be easily set to station mode using the configuration tool.**

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8.1. WiFi Ad-hoc mode

ON YOUR DEVICE (phone, laptop etc.):

About 15 seconds after the A032 has been powered up, a WiFi network with an SSID similar to 'QK-A032xxxx' will appear in the available WiFi networks list.

Connect your device to the 'QK-A032xxxx' WiFi network with the default password: '88888888'.

Device SSID	Similar to 'QK-A032xxxx'
WiFi password	88888888

IN THE CHART SOFTWARE:

Set the protocol to 'TCP', IP address to '192.168.1.100' and the port number to '2000'.

Protocol	TCP
IP address	192.168.1.100
Data Port	2000

With the above settings, a wireless connection should be established, and the user should be able to receive and view data in the chart software.

**Note:** In Ad-hoc mode, the IP address should not be changed.

SSID and password can be changed using the configuration software; the password should be between 8 to 12 characters long.

Data received through the wireless connection can be monitored using TCP/IP port monitoring software as shown below:

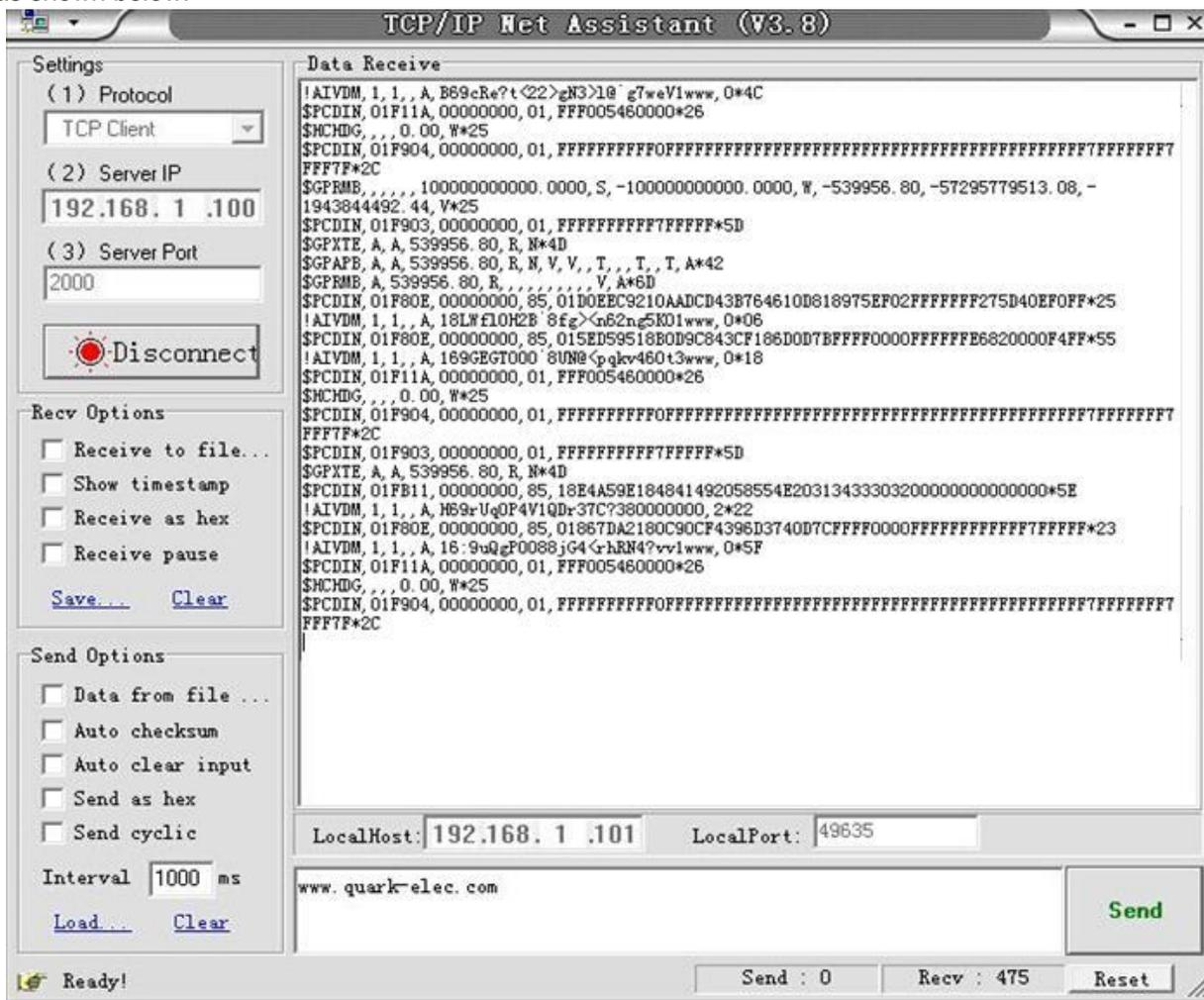


Figure 5: TCP/IP Net Assistant

## 8.2. WiFi Station mode

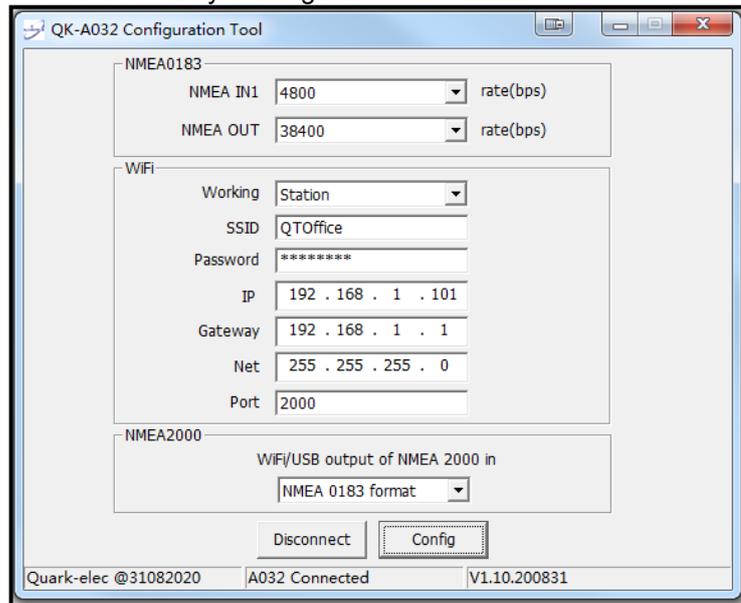
Station mode WiFi allows the router to handle the data traffic sent from the device. This data can then be shared on the local area network. It is similar to connecting device directly to the router by wire, but instead using wireless technology.

This allows the main mobile device can be connected to the internet and also receiving marine navigation data.

To set up station mode, please follow the steps below:

1. Connect A032 to a Windows computer using a micro-USB cable.
2. Run the Configuration tool and connect it to the A032 by clicking 'Connect'.
3. Change WiFi working mode to 'Station mode'

4. Enter the router's **SSID**.
5. Enter the WiFi network **password** (the A032 accepts passwords between 8 and 12 characters long).
6. Enter an **IP address** to assign it to the A032. This should Start with 192.168. The third number depends on the router's configuration (Commonly 1 or 0). The fourth group number must be a unique number between 0 and 255. This must not be used by any other equipment connected to the router.



7. Enter the **router's IP address** in the **Gateway** section. This can usually be found on a label on the router. Leave the other settings as they are.
8. Click '**Config**' in the bottom right-hand corner and wait for about 60 seconds. After 60 seconds click '**Disconnect**'.
9. Repower the A032. The A032 will now attempt to connect to the router.

10. In the chart software set the protocol to '**TCP**'  
 Insert the **IP address** that was assigned to the A032.  
 Enter the Port number '**2000**'.

<b>Protocol</b>	TCP
<b>IP address</b>	(check the router)
<b>Data Port</b>	2000

The A032 should now be connected to the access point and the user should see the marine data displayed in the chart software.

If not, check the router's **IP address list** and check the **IP address** that the router has given the A032. Occasionally, a router assigns a different **IP address** to a device than the one chosen by the user. If this is the case, use the A032's **IP address** from the router with the chart software. If no data is displayed by the chart software, please repeat the steps from above and check if all data has been input correctly.

If the A032 is connected to the AP via WiFi in station mode and there is no data displayed by the chart software, the likely cause is either the data has been input incorrectly, or the IP address is different in the chart software to that of the router.

### 8.3. WiFi Standby

Selecting Standby will disable the WiFi module in the A032. This helps to reduce the power consumption.

## 9. USB connection

The A032 features an USB connection, which can be used for updating device firmware or forwarding marine navigation data to a computer, laptop or other mobile device.

**Windows 7, 8, 10:** To enable the USB data connection between your computer and the A032 hardware drivers may have to be installed on your computer. The driver can be found on the CD or it can be downloaded from <https://www.quark-elec.com>

The drivers usually install automatically to the computer if it is running Windows 10 (non-upgraded version). The A032 registers itself to the computer as a virtual serial COM port. A new COM port will appear in device manager after connecting the A032 via USB.

**Mac:** For Mac OS X, the A032 will be recognized and shown as a USB modem. The ID can be checked by following the steps below:

1. Connect the A032 to a USB port and launch Terminal.app.
2. Type: `less /dev/*sub*`
3. The Mac system will return a list of USB devices. A032 will displayed as - `"/dev/tty.usbmodemXYZ"` where XYZ is a number. Nothing further needs to be done if it is listed.

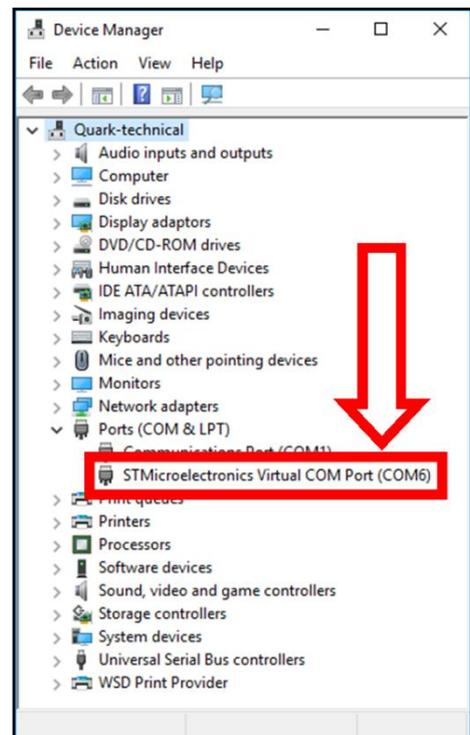
**Linux:** No driver is required for Linux. When connected to the computer, A032 will show up as a USB CDC device, on `/dev/ttyACM0` or similar.

#### 9.1. Checking the USB connection (Windows)

After the driver is installed, run the Device Manager and check the **COM port number** (This is the number associated with the USB port being used. The port number is the number that Windows assigns to a device. These can be generated randomly by the computer, but they can be changed by the user if required.). The chart software may require the COM number in order to access the data.

The port number for the A032 can be found in Windows 'Control Panel->System->Device Manager' under 'Ports (COM & LPT)'. To change this number, double click the A032 and select the 'Port Settings' tab. Click the 'Advanced' button and change the port number to the one required.

**Checking the USB data flow:** If desired, the USB data can always be monitored with a port monitoring application, like Putty or HyperTerminal. To do this, please enter the following into the COM port settings: **Bits per second: 38400bps, Data bits: 8, Parity: None, and Stop bits: 1**



## 10. Chart Software

A wide range of free and paid chart software is available.

We will use OpenCPN for our example chart software; other software will require similar setup.

OpenCPN (Open Chart Plotter Navigator) is a free software project creating concise chart plotter and navigation software, for use underway or as a planning tool. OpenCPN is developed by a team of active sailors using real world conditions for program testing and refinement. <https://opencpn.org/>

### 10.1. OpenCPN example USB setup

1. When OpenCPN is first opened, the software will greet users with a page similar to the one below.

This is the main view of openCPN software. Users now need to feed data to openCPN via the Quark-elec instruments. Click on the 'Options' tab at the top. The 'Options' tab looks like a spanner as seen below in the highlighted image.



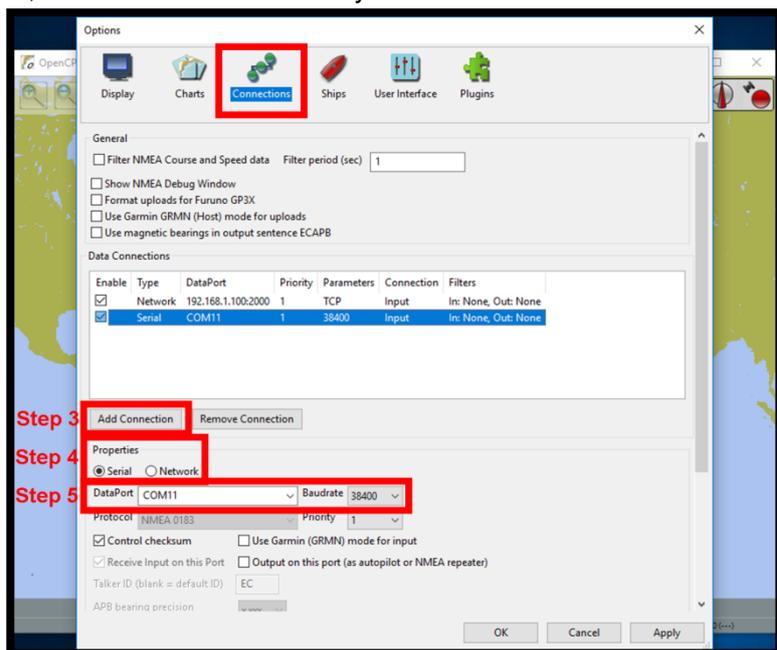
2. In options, at the top of the window, will be a tab/button that says 'Connections'. Click on this.

3. Click on 'Add Connection' button highlighted in the picture below.

4. Select 'Serial'

5. Select from the drop down list the COM number assigned to A032 (See [connecting via USB](#) to find COM port in device manager). Adjust the Baud rate to match your default or configured baud rate.

6. Click 'Apply' and then 'OK'



### 10.2. OpenCPN example Network setup (WiFi)

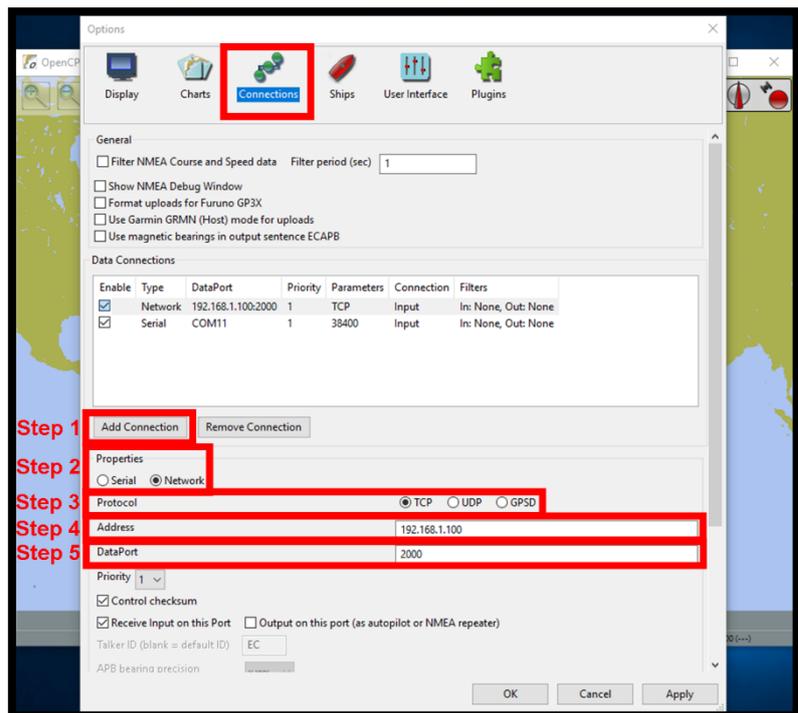
Using the same options tab as above we can set up a wireless network connection via Ad-hoc or station mode. Click on the 'Connections' tab at the top of the options menu.

1. Click the 'Add connection' button.

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2. Select 'Network'
3. Choose the Protocol: TCP
4. Insert IP address. In Ad-hoc mode this is 192.168.1.100. In Station mode this will be a different IP address.
5. Input the Dataport: 2000
6. Click 'Apply' and then 'OK'

<b>Protocol</b>	<b>TCP</b>
<b>IP address</b>	<b>192.168.1.100</b> This is the IP address for Ad-hoc WiFi. In Station mode, simply replace with the relevant IP (See Station mode.).
<b>Data Port</b>	<b>2000</b>



## 11. Updating/ upgrading Firmware

From time to time, Quark-elec provides new firmware updates to support additional NMEA 2000 PGNs and NMEA 0183 messages. Users can update the firmware on their devices to the latest available version.



**Before starting the firmware update, please ensure all your other devices are disconnected from your NMEA 2000 backbone. During this process, only the QK-A032 should be connected to the backbone, as data sent to the network by other devices, might cause damage to the A032 during the update.**

The firmware can be upgraded through the following process:

1. **Power OFF** the A032 (**Disconnect it from NMEA 2000 network**).
2. Connect the NMEA 0183 NMEA IN – (black) and NMEA 0183 NMEA OUT – (blue) wires. Ensure the correct cables are connected before continuing.



Figure 6: Blue and black wires joined together

3. Connect NMEA 0183 NMEA IN + (Gray) and NMEA 0183 NMEA OUT + (White) wires.

Ensure the correct cables are connected before continuing.

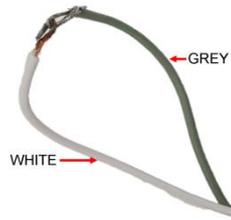


Figure 7: Grey and white wires joined together



**Check you have connected the correct wires before powering the A032 up. Connecting the wrong wires will damage your device! Again, please double check there is no any other NMEA 2000 devices on the N2K backbone!**

4. Connect A032 to a Windows PC via USB cable.
5. **Power ON** the A032 (**by connecting it to the NMEA 2000 network**).

In 'My computer' 2 new drives, 'STM32 APP' and 'STM32 WiFi' will appear.



**WARNING: The firmware must be placed in 'STM32 APP' folder, NOT any other folder/window/drive that appears. Saving to the wrong location will damage the device.**

6. Copy the new firmware to the 'SMT32 APP' folder.
7. **Once copied successfully, Power OFF** the A032 (**disconnect it from NMEA 2000 network**)
8. Remove the short connections. (disconnect the wires you connected in step 2 and 3) and **Power ON** the A032 (**connect to NMEA 2000 network**)
9. Wait at least 10 seconds and **Power OFF** A032 (**disconnect from NMEA 2000 network**)
10. Finally, **POWER ON** the A032 (**connect to NMEA 2000 network**) (This final step ensures settings are stored).

The upgrading process is complete.

## 12. Conversion Lists

The following tables list the supported NMEA 2000 PGN's (parameter group numbers) and NMEA 0183 sentences. It is important to check the table to confirm that the A032 will convert the sentences/PGNs required.

### 12.1. A032 NMEA 0183 to NMEA 2000 conversions

The following NMEA 0183 to NMEA 2000 conversions are currently supported.

NMEA 0183 sentence	Function	Converted to NMEA 2000 PGNs
AAM	Waypoint Arrival Alarm	129284
ABM	AIS Addressed binary and safety related messages	129795,129801
APB	Heading/Track Controller (Autopilot) Sentence "B"	129283,129284
DBT	Depth Below Transducer	128267
DPT	Depth	128267
DSC	Digital Selective Calling Information	129808
DSE	Expanded Digital Selective Calling	129808
GGA	Global Positioning System Fix Data	126992, 129025, 129029
GLL	Geographic Position Latitude/Longitude	126992, 129025
GSA	GNSS DOP and Active Satellites	129539
GSV	GNSS Satellites in View	129540

HDG	Heading, Deviation & Variation	127250
HDM	Heading, Magnetic	127250
HDT	Heading, True	127250
HSC	Heading Steering Command	127237
MTW	Water Temperature	130311
MWD	Wind Direction & Speed	130306
MWV	Wind Speed and Angle (True or relative)	130306
RMB	Recommended Minimum Navigation Information	129283,129284
RMC*	Recommended Minimum Specific GNSS Data	126992, 127258, 129025, 12902
ROT	Rate Of Turn	127251
RPM	Revolutions	127488
RSA	Rudder Sensor Angle	127245
THS	True Heading and Status	127250
VDR	Set and Drift	129291,130577
VHW	Water Speed and Heading	127250, 128259
VLW	Dual Ground/Water Distance	128275
VTG*	Course Over Ground and Ground Speed	129026
VWR	Relative (Apparent) Wind Speed and Angle	130306
XDR	Battery information(Voltage ,current and status)	127506,127508
XTE	Cross Track Error, Measured	129283
ZDA	Time & Date, Local Time Offset	126992,129033
VDM/VDO	AIS Message 1,2,3	129038
VDM/VDO	AIS Message 4	129793
VDM/VDO	AIS Message 5	129794
VDM/VDO	AIS Message 9	129798
VDM/VDO	AIS Message 14	129802
VDM/VDO	AIS Message 18	129039
VDM/VDO	AIS Message 19	129040
VDM/VDO	AIS Message 21	129041
VDM/VDO	AIS Message 24	129809. 129810

\*please note: some PGN sentences that are received require additional data before being send.

## 12.2. A032 NMEA 2000 to NMEA 0183 conversions

The following NMEA 2000 to NMEA 0183 conversions are currently supported.

NMEA 2000 PGN	HEX code	Function	Converted to NMEA 0183 Sentences
126992	1F010	System Time	ZDA
127237	1F105	Heading/Track Control	HSC
127245	1F10D	Rudder	RSA
127250	1F112	Vessel Heading	HDG, VHW,THS
127251	1F113	Rate of Turn	ROT
127258	1F11A	Magnetic Variation	HDG
128259	1F503	Speed, Water referenced	VHW
128267	1F50B	Water Depth	DBT, DPT
128275	1F513	Distance Log	VLW
129025	1F801	Position, Rapid Update	GLL
129026	1F802	COG & SOG, Rapid Update	VTG
129029	1F805	GNSS Position Data	GGA, GLL, GSA, RMC, ZDA
129033	1F809	Time & Date	ZDA
129044	1F814	Datum	DTM
129283	1F903	Cross Track Error	APB, RMB, XTE
129284	1F904	Navigation Data	AAM, APB, RMB
129291	1F90B	Set & Drift, Rapid Update	VDR
129539	1FA03	GNSS DOPs	GSA
129540	1FA04	GNSS Sats in View	GSV
129795	1FB03	AIS Addressed Binary Message	ABM
129801	1FB09	AIS Addressed Safety Related Message	VDM, VDO (AIS VHF Data-link message 12)
129808	1FB10	DSC Call Information	DSC, DSE

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130306	1FD02	Wind Data	MWV
130310	1FD06	Environmental Parameters	MDA, MTW
130311	1FD07	Environmental Parameters	MDA
130312	1FD08	Temperature	MDA, MTW
130577	1FE11	Direction Data	THS, VDR
129038	1F80E	AIS Message 1,2,3	VDM/VDO
129793	1FB01	AIS Message 4	VDM/VDO
129794	1FB02	AIS Message 5	VDM/VDO
129798	1FB06	AIS Message 9	VDM/VDO
129039	1F80F	AIS Message 18	VDM/VDO

\*please note: some of the NMEA 0183 sentences that are received require additional data before being sent.

Through USB and WiFi, the A032 will output data including the NMEA 0183 input messages and messages from the NMEA 2000 network. The user can choose the output format to be the raw data (in PCDIN format) or the converted NMEA 0183 format for the messages received from NMEA 2000 network (it can be easily set up using the configuration tool). Providing output raw data allows user to be able to directly access the boat's NMEA 2000 network and perform any diagnostic or analytical work.

The following is a typical PCDIN message format outputted through WiFi and USB. The chart software will convert this into more meaningful information.

---Received message: \$PCDIN, 01F119, 00000000, 16,0064050800FFFF0C\*5B---

Header	PGN	Time Stamp	Source ID	Data	Termination	Check Sum
\$PCDIN	01F119	00000000	16	0064050800FFFF0C	*	5B

## 13. Specification

Item	Specification
DC supply	12.0V (+/-10%)
Average supply current	55mA
Maximum supply current	95mA
NMEA data format	ITU/ NMEA 2000 and 0183 format
NMEA 0183 port baud rate	4800bps,38400bps baud
NMEA 2000 port baud rate	250kbps
NMEA 2000 Compatibility	Fully NMEA 2000 certified
LEN	1
WiFi mode	Ad-hoc and Station modes on 802.11 b/g/n
Security	WPA/WPA2
Network Protocols	TCP
Cable Length NMEA 2000	1.0m
Cable Length NMEA 0183	0.5m

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Operating Temperature	-20°C to +55°C
Storage Temperature	-30°C to +70°C
Recommended Humidity	0 - 93% RH

## 14. Limited Warranty and Notices

Quark-elec warrants this product to be free from defects in materials and manufacture for one year from the date of purchase. Quark-elec will, at its sole discretion, repair or replace any components that fail in normal use. Such repairs or replacement will be made at no charge to the customer for parts and labour. The customer is, however, responsible for any transportation costs incurred in returning the unit to Quark-elec. This warranty does not cover failures due to abuse, misuse, accident or unauthorized alteration or repairs. A returns number must be given before any unit is sent back for repair. The above does not affect the statutory rights of the consumer.

### Disclaimer

This product is designed to aid navigation and should be used to augment normal navigational procedures and practices. It is the user's responsibility to use this product prudently. Neither Quark-, nor their distributors or dealers accept responsibility or liability either to the products user or their estate for any accident, loss, injury or damage whatsoever arising out of the use or of liability to use this product.

Quark- products may be upgraded from time to time and future versions may therefore not correspond exactly with this manual. The manufacturer of this product disclaims any liability for consequences arising from omissions or inaccuracies in this manual and any other documentation provided with this product.

### Document history

Issue	Date	Changes / Comments
1.0	27-02-2018	Initial release
4.1	10-10-2019	Support 129041,129802 PGNs on AIS version.
4.2	13-08-2020	Support disabling WiFi/GPS and NMEA 2000 output format.
4.3	15-09-2020	Support disabling NMEA 0183 output.
4.31	28-09-2020	Approved by NMEA 2000(NMEA 2000 certification)
4.33	09-01-2022	All variations will support AIS sentences.
4.34	21-06-2022	Add a warning for upgrading the firmware process(no any other devices should be connected on the NMEA 2000 backbone).
4.4	19-07-2022	Support AAM、ABM、APB、HSC、VDR、THS、DSC、DSE NMEA 0183 sentences; Support 127237、129795、129801、129808、130577 PGNs.
4.41	17-08-2022	Support ZDA< ---> 129033PGN
4.42	15-01-2023	Support XDR(U,I,G) -> 127508 and 127506 PGNs(battery information(Voltage, current, status)).

## 15. Glossary

- **Ad-hoc WiFi, also known as ‘peer-to-peer’:** devices communicate directly with each other without a router.
- **IP:** internet protocol (ipv4, ipv6)- explains which version
- **IP Address:** is a numerical label assigned to each device connected to a computer network.
- **NMEA 0183:** is a serial data interface operating at 4.8 Kbit/second utilizing standard asynchronous communications. It is an electrical and data standard for communication between marine electronics.
- **NMEA2000 / N2K:** is a serial data network operating at 250 Kbit/second utilizing the Controller Area Network (CAN). The CAN bus was originally developed for the automotive industry but is now used in numerous industrial applications. It is a communications standard used for connecting marine sensors and display units within ships and boats and is generally plug-and-play.
- **NMEA2000 / N2K backbone:** Used with NMEA 2000, the backbone is the main BUS supplying data and power to all the devices on the boat.
- **PGN:** Packet group number – used in the NMEA 2000 protocol instead of sentences
- **Router:** A router [https://en.wikipedia.org/wiki/Router\\_\(computing\) - cite\\_note-2](https://en.wikipedia.org/wiki/Router_(computing) - cite_note-2) is a networking device that forwards data packets between computer networks. Routers perform the traffic directing functions on the Internet.
- **Sentences:** Used in NMEA 0183 protocol to transfer data between marine equipment.
- **Station mode WiFi:** devices communicate by going through an Access Point (AP) or router. This allows the user to view data while accessing other router functions such as other devices or internet.
- **USB:** cable for communication and power supply between devices.

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