QK-A012 Wireless GPS Receiver Manual

Designed in UK

Features

- 50 Channels “All-In-View” Tracking
- Position accuracy of 2.5 meters 2D RMS
- Cold/Warm/Hot Start Time: 26/26/1 Seconds
- Reacquisition Time: 1.5 second
- Standard NMEA 0183 output through WiFi and USB
- Supports WiFi in Ad-hoc and Station mode
- Two LEDs indicate power and GPS activity
- USB 2.0 powered (<50mA@5.0V)
- BNC connector for 50 Ohm VHF antenna
- Powered SMA connector for 50 Ohm GPS antenna
- The internal WiFi access point connects up to 4 devices simultaneously
- Compatible with Windows 7,8,10,Mac OS X, Linux systems, Android and iOS

1. Contents

2. Set up Overview

Before you leave your home:

Drivers and Configuration software are optional and only needed for specific features.
To access your data on a Mac/Linux/Windows PC
Driver required if using Windows and should install automatically, if not, it is included on the FREE CD and Quark-elec.com. Drivers not required for Mac or Linux.

To connect wirelessly to the A012 through Station mode WiFi (through your router, not just peer-to-peer directly from your device).
Configuration software (Windows PC Required)
Driver required as above

Consider if you have a CD reader/internet access on site if you want to use the above features.

Installation

1. Mounting: Consider your location…
Dry, sturdy location 0.5m from other WiFi equipment.
Ensure you have the correct length of cables needed for GPS and the 5.0V power via micro USB. If drilling holes for your cabling, seal around any holes to prevent damage to your vessel or equipment.

2. Connect your Antennas: GPS
Connect GPS if desired: The GPS antenna should be located outside where the sky is visible for best results.

3. Connect Power. The A012 uses 5.0V power. This is connected via a micro USB. USB cable is provided. This can connect to a mobile or PC. If a mobile electronic device isn't available then we recommend using your vessels battery power. The power must be 5.0V, any higher will damage the A012.

4. Check LED lights are working on the A012. Flashing green lights indicate a valid signal is coming through the A012 from GPS satellites.

6. Need to connect wirelessly?
On your device (phone, laptop etc.): 15 seconds after the A012 has powered up, you can scan for a WiFi network with an SSID similar to 'QK-A012xxxx'. Connect the device to '**QK-A012xxxx**' with the default password: '**88888888**'.
Chart software: set the protocol as '**TCP**', IP address as '**192.168.1.100'** and the port number as '**2000**' in the chart software.

7. Need to WiFi settings?
The device is set to connect wirelessly in Ad-hoc mode (with no need for a router or access point). If you want to change to Station mode (connecting through a router) or adjust other setting, see the Configuration software and configuration instructions on the CD provided.

3. Introduction

A012 is a compact GPS receiver which receives information from GPS satellites. The A012 was originally designed for accessing location data for use in marine technology. The A012 can be used for many different applications including automotive and recreational uses.

The A012 receives and processes GPS signals from satellites, this means that with a power supply (even a power bank) and GPS antenna, the A012 can calculate its location anywhere in the world. The antennas must have 4 out of a possible 33 satellites available in order to triangulate the data and calculate the antenna's location.

With added WiFi functionality, the GPS data can be accessed wirelessly through peer to peer (Ad-hoc) or station mode WiFi connection.

4. Mounting

A012 is designed to be securely positioned in an indoor environment and needs to be placed where it is well protected from humidity and water.

A012 is **not** supplied with GPS antenna. An active GPS antenna with a female SMA connector should be mounted and ideally spaced 0.5 metres from other antenna.

Although A012 comes with an extruded aluminium enclosure to shield it from external RF interference, it should not be fitted close to generators or compressors (e.g. refrigerators) as they can generate substantial RF noise. It is designed to be installed in a protected indoor environment. So generally a suitable placement of A012 is together with other navigation equipment and the PC or chart plotter that will be used to display the location data.

5. Connecting

The A012 is typically powered by PC, laptop, tablet or other devices with 5.0V USB micro B connector. If USB data output isn't required (if accessing GPS data through WiFi), a power bank or other 5.0V supply (greater than 500mA current) power source can be used.

We recommend not using a cigarette lighter as they frequently provide an unstable current, which could damage the A012. Check that the power source is 5.0V volts only. Excess power or power surges/fluctuations can damage the A012.

If you have an unstable power source, we can recommend the A013; this is a dedicated 12.0V/24.0v to 5.0V power converter for marine and automotive purposes that will supply a stable power source. See link below.
https://www.quark-elec.com/product/qk-a013-12v-to-5v-low-interference-converter/

The A012 has the following electrical connections/indicators:

- **USB connector**. A USB micro B connector provides the 5.0V power source for the product and also outputs data.
- **GPS connector.** Standard SMA male 50 Ohm connector. (required a GPS antenna)
- **WiFi connection:** WiFi connectivity in both Ad Hoc and Station modes.

6. Wireless Connections

The A012 allows users to view their data through WiFi on a PC, tablet, smartphone or other WiFi enabled device. Users can access marine network data including vessel course, speed, position, wind speed, direction, water depth, AIS etc. These can be viewed in your chart software (See chapter below, ‘using openCPN-free software)

The IEEE 802.11b/g wireless standard has two basic modes of operation; Ad-hoc mode (peer to peer) and station mode (also called infrastructure mode).

The A012 supports both:-

- In **Ad-hoc mode WiFi:** mobile devices connect directly (peer to peer) to another device, without a router or access point. For example, your PC, tablet or smartphone can connect directly to the A012 to receiver marine data.
- In **Station mode WiFi:** 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 your router to handle the data and traffic from your device. This data can then be picked up through your router anywhere on your local area network. This is similar to plugging the device directly into the router by wire, but instead using wireless technology. In this way, the mobile devices receive both your marine data and other AP connections for example Internet.

The A012 is set to Ad-hoc mode as a default setting, but can be easily setup to station mode through the configuration tool (GUI).

6.1. WiFi Ad-hoc

ON YOUR DEVICE (phone, laptop etc.):
15 seconds after the A012 has powered up, you will be able to scan for a WiFi network with an (SSID) similar to ‘QK-A012xxxx’.
Connect the device to ‘**QK-A012xxxx**’ with the default password: ‘**88888888**’.

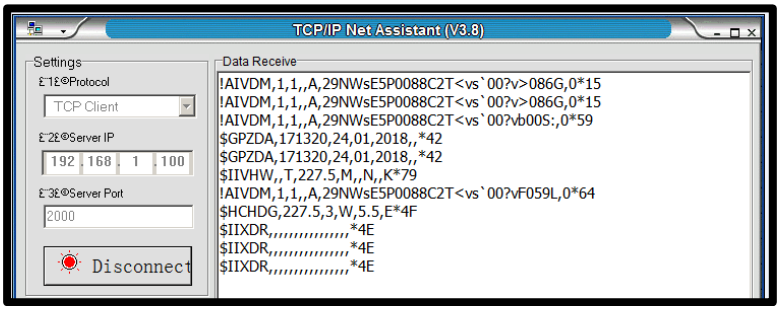
Device SSID	Similar to ‘QK-A012xxxx’
WiFi password	88888888

IN YOUR CHART SOFTWARE:
Set the protocol as ‘**TCP**’, IP address as ‘**192.168.1.100’** and the port number as ‘**2000**’ in the chart software.

Protocol	TCP
IP address	192.168.1.100
Data Port	2000

With the above settings, a wireless connection should be established and the user will be able to receive the data through the chart software.
Note: In Ad-hoc mode, the IP address should not be changed. SSID and password can be changed; the password should be between 8 to 12 characters.

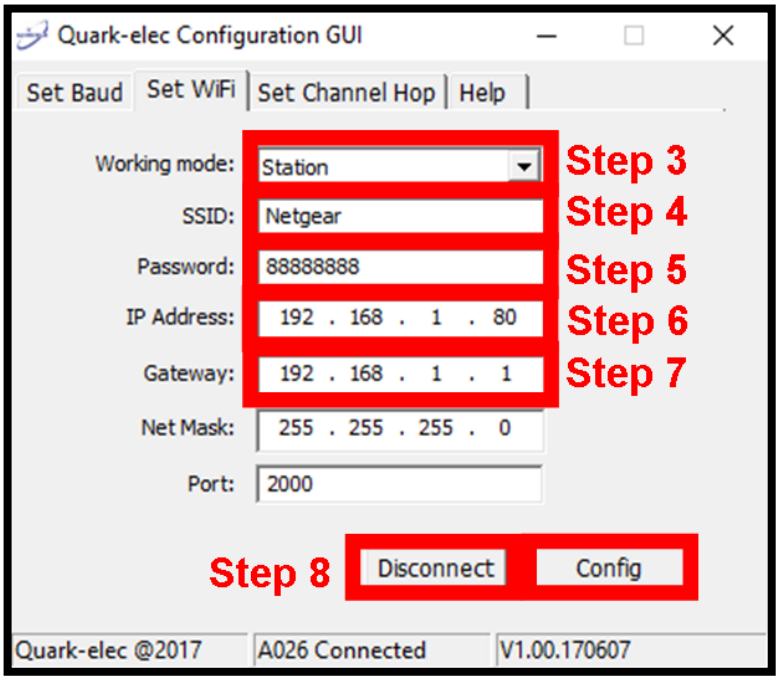
You can always check the wireless connection with TCP/IP port monitoring software as shown below:



6.2. WiFi Station mode

This allows your router to handle the data and traffic from your device. This data can then be picked up through your router anywhere on your local area network. Similar to plugging the device directly into the router by wire, but instead using wireless technology.
This allows your main mobile device to still receive internet and for you to be able to view the data.

To begin using station mode the Quark-elec instrument should be attached to a computer running windows (for Mac user's windows boot camp) via USB.



1. Connect A012 to computer via Micro USB B connection.
2. Run the Configuration tool and check connection to A012 at the bottom of configuration tool.
3. Change working mode to '**Station mode'**
4. Enter your router's **SSID.**
5. Enter the **password** for your network.
6. Enter the **IP address** you want to assign to the A012. Start with 192.168. The third group of digits depends on your router's configuration (Commonly 1 or 0). The fourth group must be a unique number between 0 and 255. This number must not be used by any other equipment connected to your router.
7. Enter your **router's IP address** in the **Gateway** section. This can usually be found under the router. Leave the other settings as they are.
8. Click '**Config'** in the bottom right hand corner and wait 60 seconds. After 60 seconds Click '**Disconnect'**.
9. Repower your A012. The A012 will now attempt to connect to your router.
10. In your chart software set the protocol as '**TCP**'
    Insert the **IP address** you assigned the A012
    Enter the Port number as '**2000**' in the chart software.

Protocol	TCP
IP address	(check your router)
Data Port	2000

You should now be connected and see A GPS targets on your chart software.
If not then check your router's **IP address list** and check the **IP address** that your router has given your A012.
Occasionally, a router assign a different **IP address** to a device than the one you chose to assign it during Configuration. If this is the case, copy the **IP address** from the router into your chart software.
If the **IP address** in your router's **IP address list** is the same as the one you input into your chart software then everything will work in station mode. If you are unable to see any data repeat the steps, and check all the data has been input correctly.

If you are not able to view your data in Station mode, the likely cause is either the data has been input incorrectly, or the IP address is different in your chart software to that of your router.

7. Connecting via USB port

A012 is supplied with a USB connector. This connector provides power supply for GPS data output as standard This USB connector can be linked directly to a USB port on the PC. It can also be connected to other mobile devices via an USB OTG(On the Go) connection using the supplied cable.

Windows: To enable the USB data connection of A012 to other devices, related hardware drivers may be needed dependent on your system requirements.
Windows 7,8,10 the driver can be found on the CD in the packing box or be downloaded from https://www.quark-elec.com
The A012 registers itself to the computer as a virtual serial com port.
The drivers usually install automatically to your device if it is running an original Windows 10 version.
A new COM port will automatically show up in the device manager after plug in.

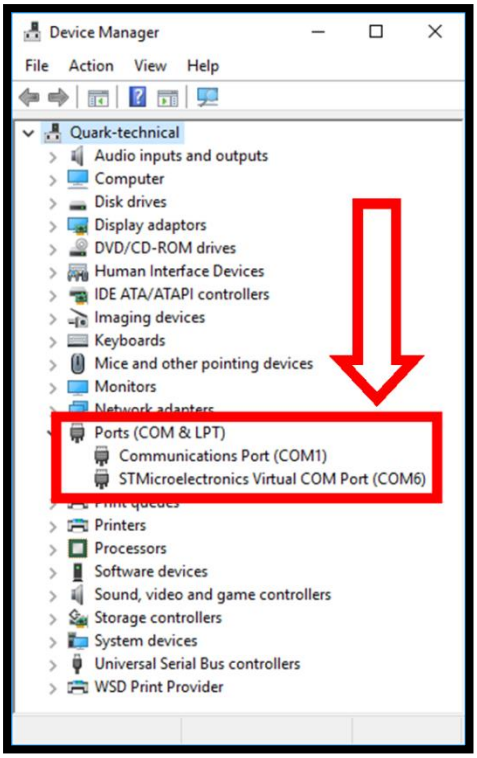
Mac: For Mac OS X, the A012 will be recognized and shown as a USB modem. The ID can be checked with the following steps:

1. Plug the A012 into a USB port and launch Terminal.app.
2. Type: less /dev/*sub*
3. The Mac system will return a list of USB devices. A012 will display 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 plugged into the computer, A012 will show up as a USB CDC device on /dev/ttyACM0.

7.1. Checking the USB connection (Windows)

After the driver is installed, run the Device Manager and check the **COM number** (this is the number associated with the USB port you are using. The port number is the number that Windows assigns as an input device. These can be generated randomly by your computer). Your chart software may require your COM number in order to access the data.



The port number for the A012 can be found in Windows ‘Control Panel->System->Device Manager’ under ‘Ports (COM & LPT)’. Find the A012 in the list for the USB variant. To change this number, double click the A012 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 checked with a terminal monitor application, like Putty or HyperTerminal. To do this, enter the following into the COM port settings: **Bits per second: 38400bps**, **Data bits: 8**, **Parity: None**, and **Stop bits: 1** as shown below using HyperTerminal on Windows as an example

8. Status LED’S

The A012 features two LEDs which indicate power and GPS status. The two LED’s turn on and then off after initialization. When operating, these LED’s flash as below:

Power LED: left LED flashes at 3 second intervals.

GPS LED: right LED Flashes every second while receiving a valid message

9. Chart software

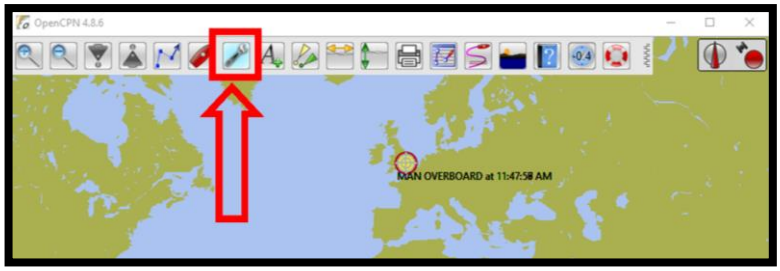
There is a wide range of chart software is available such as Imray, PolarView and OpenCPN.

- https://opencpn.org/ OpenCPN (Open Chart Plotter Navigator) is a free software project to create 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.
- http://www.polarnavy.com/main/download
- https://www.imray.com/imray-navigator-app/

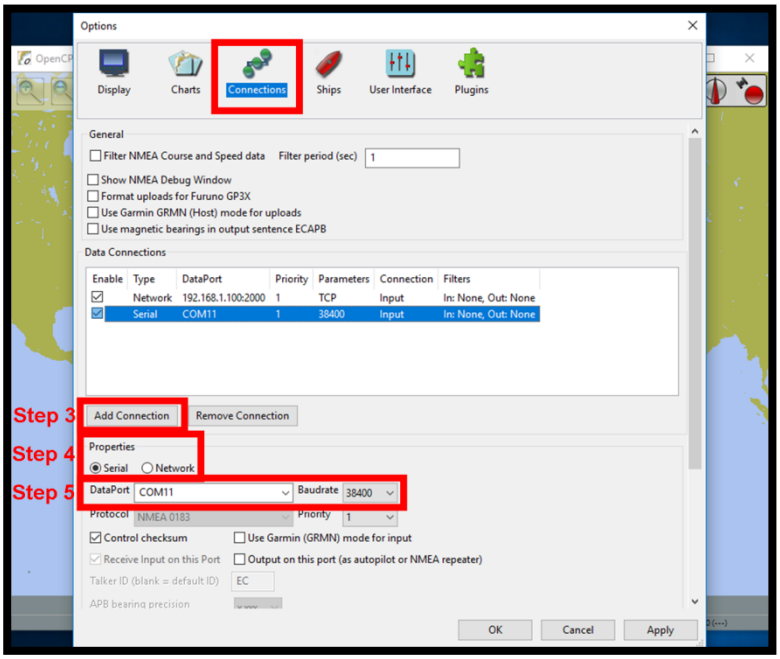
We will use OpenCPN for our example, other software will require similar setup.

9.1. OpenCPN example USB setup

1. When you first open the software you will be greeted with a page similar to the one below. This is the main view of openCPN software. You now need to add data to openCPN via your Quark-elec instruments. Click on the 'Options' tab at the top. The settings tab looks like a spanner as seen below in the highlighted image.



2. In the options at the top of the menu 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 the **COM** number assigned to A012 (See connecting via USB to find com port in device manager). Adjust the Baud rate accordingly (38400 covers AIS)
6. Click **'Apply'** and then **'OK'**

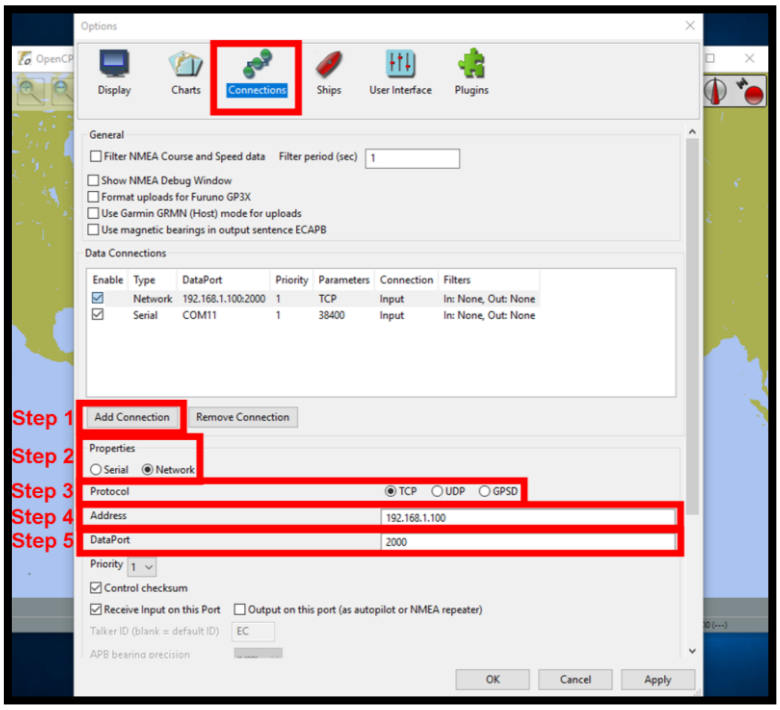


9.2. OpenCPN example Network setup

Using the same options tab as above we can set up a wireless network connection via Ad-hoc. Go to the 'Connections' tab at the top of the options menu and click.

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

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



9.3. Maps

OpenCPN's interface comes with a basic map view. You can easily download more detailed maps.

There is a wide range of free and licensed charts available in different formats via the OpenCPN website at https://opencpn.org/OpenCPN/info/chartsource.html.

A worldwide directory of free nautical charts can also be found on openseachart.org. The collection and the updates are community driven.

10. Specification

Item	Specification
Operating temperature	-25°C to +80°C
Storage temperature	-25°C to +85°C
DC supply	5.0V(+/-0.2V)
Average supply current (typical quiescent)	50mA
Maximum supply current (cold start)	80mA
GPS receiver sensitivity	-162dBm
WiFi mode	Ad Hoc and Station modes on 802.11 b/g/n
Security	WPA/WPA2
Network Protocols	TCP

11. 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 option, 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	20-06-2014	Initial release
2.0	15-10-2018	New 2018 format

12. Glossary

- **Ad-hoc WiFi:** devices communicate directly with each other without a router.
- **Station mode WiFi:** devices communicate by going through an Access Point (AP) or router.
- **IP:** internet protocol (ipv4, ipv6)
- **IP Address:** is a numerical label assigned to each device connected to a computer network.
- **Router:** A router is a networking device that forwards data packets between computer networks. Routers perform the traffic directing functions on the Internet.
- **USB:** cable for communication and power supply between devices.
- **NMEA 0183:** is a combined electrical and data specification for communication between marine electronics

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