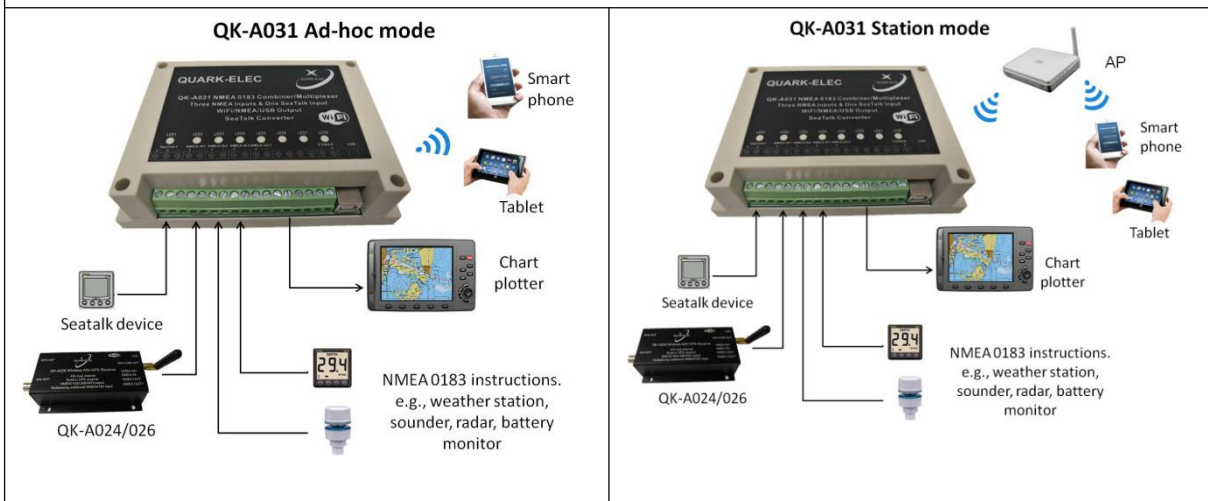
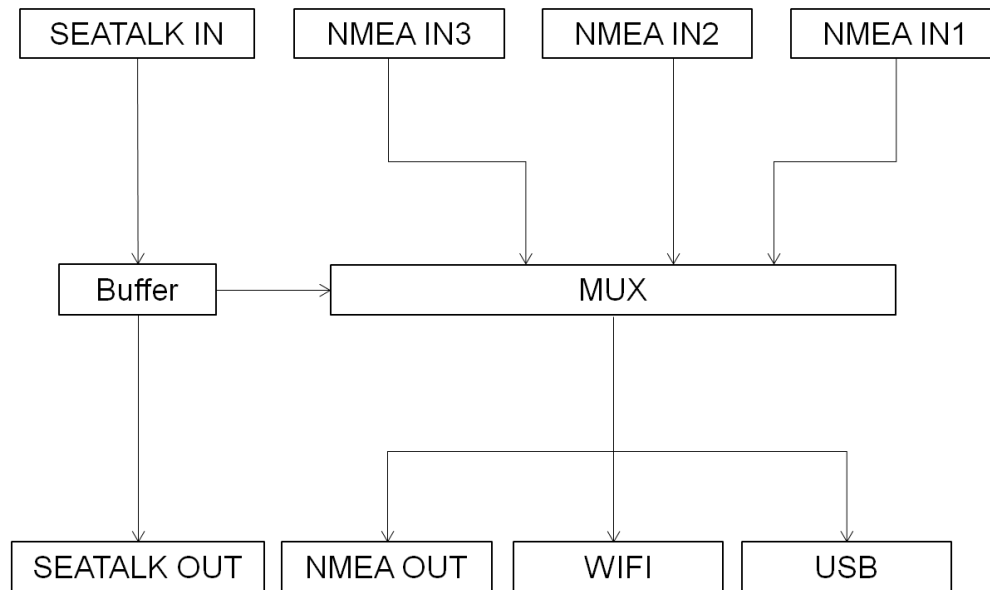


# QK-A031 NMEA 0183 Multiplexer with SeaTalk Converter

## Features

- Multiplex up to three NMEA 0183 input devices.
- Galvanically isolated NMEA and SeaTalk input ports.
- Configurable baud rates: (4.8, 9.6, 38.4k input and output).
- Differential NMEA output with galvanically isolated protection
- Simultaneous wireless and USB output.
- The internal WiFi access point connects up to 7 devices simultaneously.
- Ad Hoc and Station operating modes
- SeaTalk to NMEA 0183 protocol converter
- Wide power supply voltage: DC 9-35 Volts.





## Limited warranty

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-elec, nor their distributors or dealers accept responsibility or liability either to the product user or their estate for any accident, loss, injury or damage whatsoever arising out of the use of this product.

## Accuracy of this manual

The Quark-elec QK-A031 Multiplexer may be upgraded from time to time and future versions may therefore not correspond exactly with this manual. The manufacturer of this product

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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	05-10-2016	Initial release
1.1	12-12-2016	Support WiFi station mode

## Order Information

Part No	Description
QK-A031	QK-A031 NMEA 0813 Multiplexer with WiFi/USB output

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## 1 INTRODUCTION

QK-A031 NMEA 0183 multiplexer enables the connection of multiple NMEA 0183 devices and host devices such as PCs, laptops or tablets. QK-A031 multiplexer has three NMEA 0183 inputs (listener-ports), one SeaTalk1 input, one NMEA 0183 output (talker-port), a WiFi interface and a USB port to connect to a host devices. The multiplexer combines NMEA data that is received on the listener ports and sends this data to a talker port, the WiFi interface and the USB port simultaneously. The USB port is also used for configuration of specific WiFi and NMEA ports settings.

The built-in SeaTalk1 to NMEA converter translates SeaTalk data into NMEA sentences. This data is then combined with NMEA data received on the other inputs. This allows a SeaTalk instrument to communicate on the NMEA network. Only one SeaTalk input is provided since the SeaTalk bus is a single-cable system that connects all instruments together through one cable. The SeaTalk to NMEA converter in the QK-A031 works in one direction. NMEA sentences are unable to be converted into SeaTalk, the multiplexer just listens on the SeaTalk bus.

Data from multiple instruments is available wirelessly though a WiFi connection, giving complete freedom to navigate, monitor and control from anywhere on board. It acts as a wireless access point for iPad, iPhone, Android tablets and other WiFi enabled devices.

Every NMEA input on the QK-A031 is galvanically isolated (also called opto-isolation). A galvanically isolated input prevents unwanted currents flowing between the instruments and the multiplexer. These currents can damage equipment or interfere with radio signals and should therefore be avoided.

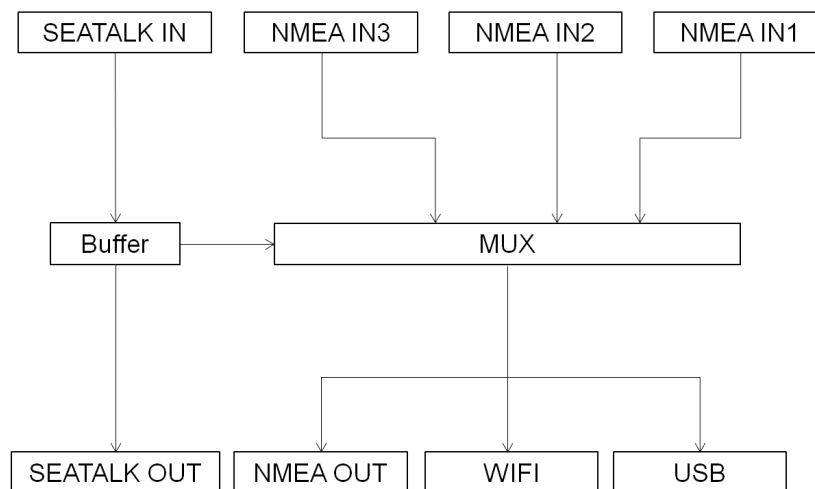


Figure 1 System diagram

## 2 CONNECTIONS

### 2.1 SeaTalk

The built-in SeaTalk1 to NMEA converter translates SeaTalk data into NMEA sentences. The SeaTalk port has 3-Pin terminals for connection to the SeaTalk bus. Make sure the connection is correct before powering up. A wrong connection could damage the QK-A031 and other devices on the SeaTalk Bus.

When a SeaTalk message is received, QK-A031 checks if the message is recognised and

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should be processed. When the message is recognized by the SeaTalk messages table, the message is extracted, stored and converted to an NMEA sentence. Any unknown datagram is ignored. These converted NMEA messages are then combined with NMEA data received on the other inputs. This function allows a SeaTalk instrument to communicate on an NMEA network. Only one SeaTalk input is needed since the SeaTalk bus is a single-cable system that connects all the instruments together through one cable. SeaTalk to NMEA converter in the QK-A031 works in one direction only. No NMEA sentences are converted into SeaTalk, the multiplexer just listens on the SeaTalk bus.

Supported SeaTalk Datagrams		
SeaTalk	NMEA	Description
00	DBT	Depth below transducer
10	MWV	Wind angle, (10 and 11 combined)
11	MWV	Wind speed, (10 and 11 combined)
20	VHW	Speed through water, includes heading when present
21	VLW	Trip mileage (21 and 22 combined)
22	VLW	Total mileage (21 and 22 combined)
23	MTW	Water temperature
25	VLW	Total and Trip mileage
26	VHW	Speed through water, includes heading when present
27	MTW	Water temperature
50	---	GPS latitude, value stored
51	---	GPS longitude, value stored
52	---	GPS speed over ground, value stored

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53	RMC	Course over ground. RMC sentence is generated from stored values from other GPS related datagrams.
54	---	GPS time, value stored
56	---	GPS date, value stored
58	---	GPS lat/long, values stored
89	HDG	Magnetic heading, including variation (99)
99	---	Magnetic variation, value stored

The table shows that not all datagrams result in an NMEA 0183 sentence. Some datagrams are only used to retrieve data, which is combined with data from other datagrams to be able to create one NMEA 0183 sentence.

## 2.2 NMEA input

QK-A031 has three NMEA inputs called IN1 to IN3. Each input should be connected to one output devices only. These inputs are galvanically isolated from QK-A031 multiplexer, as specified by the NMEA 0183 standard. QK-A031 performs serial combining of these three NMEA-0183 serial inputs into one NMEA-0183 serial output. Input baud rates are switch selectable through an application on a Windows system. The default baud rate of the NMEA 0183 inputs is 4800 bps (the NMEA standard) but it can be set to any value from 4800 to 38400 bps.

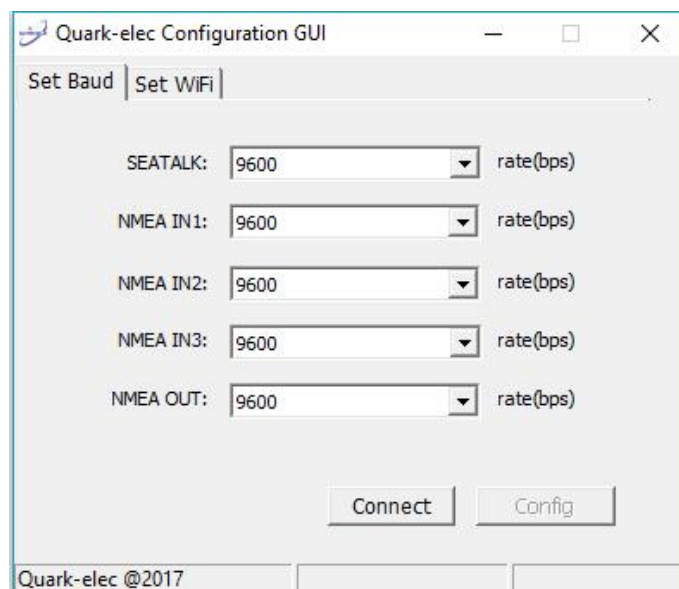


Figure 2 Baud rate settings

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Although the NMEA 0183 standard specifies the signal names, voltage levels and connection methods very clearly, in reality, this standard has been interpreted with quite a bit of variation between manufacturers. So to ensure QK-A031 is not damaged please double-check the specifications of the devices before connecting them.

The status LEDs on the panel show each input port activity and system status.

### 2.3 NMEA output

The NMEA 0183 output is capable of driving the combined data from the inputs. The default baud rate is 4800bps, however it can be set to from 4800 to 38400bps using the application software. Connect the + and - terminals of the NMEA output on the QK-A031 to the + and - terminals of the input on the instrument(e.g., chart plotter). These terminals may also be labeled as A/B, Data+/Data-, RX+/RX-, In+/In-.

### 2.4 WiFi interface(Ad-hoc mode)

15 seconds after QK-A031 has been powered up, the operator should be able to scan and find a WiFi network (SSID) similar to 'QK-A031xxxx' using WiFi enabled devices such as computers, mobile phones or tablets.



Figure 3 Operating in Ad-hoc mode

Connect the device/s to 'QK-A031xxxx' with '88888888' as the default password. Set the protocol as 'TCP', IP address as '192.168.1.100' and the port number as '2000' in the chart software.

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Item	Setting
SSID	Similar to 'QK-A031xxxx'
Protocol	TCP
IP address	192.168.1.100
Port	2000

With the above settings, wireless connection should be set and the operator will be able to receive the output messages through the chart software. the operator can always check the wireless connection with TCP/IP port monitoring software as shown below:

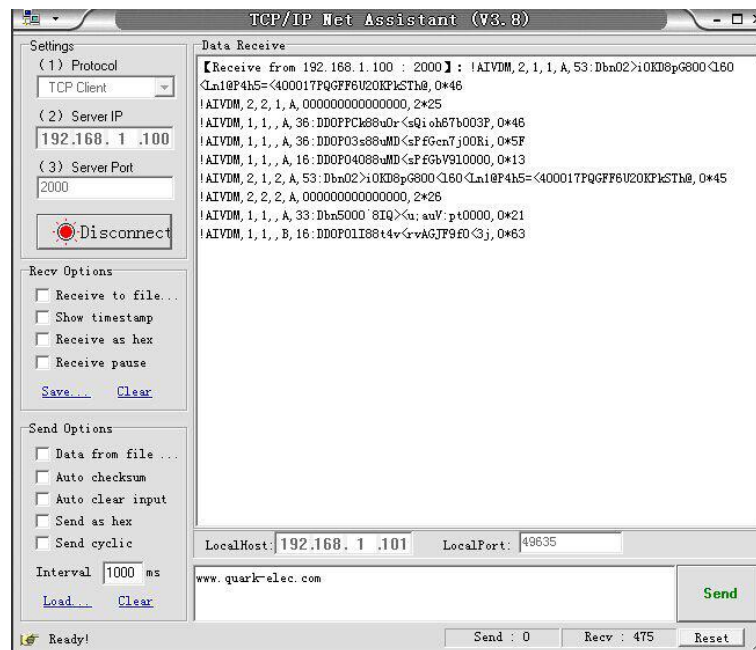


Figure 4 TCP/IP setting check

Operator can always change the SSID and password through the QK-A031 configuration panel, increasing security and memorability.



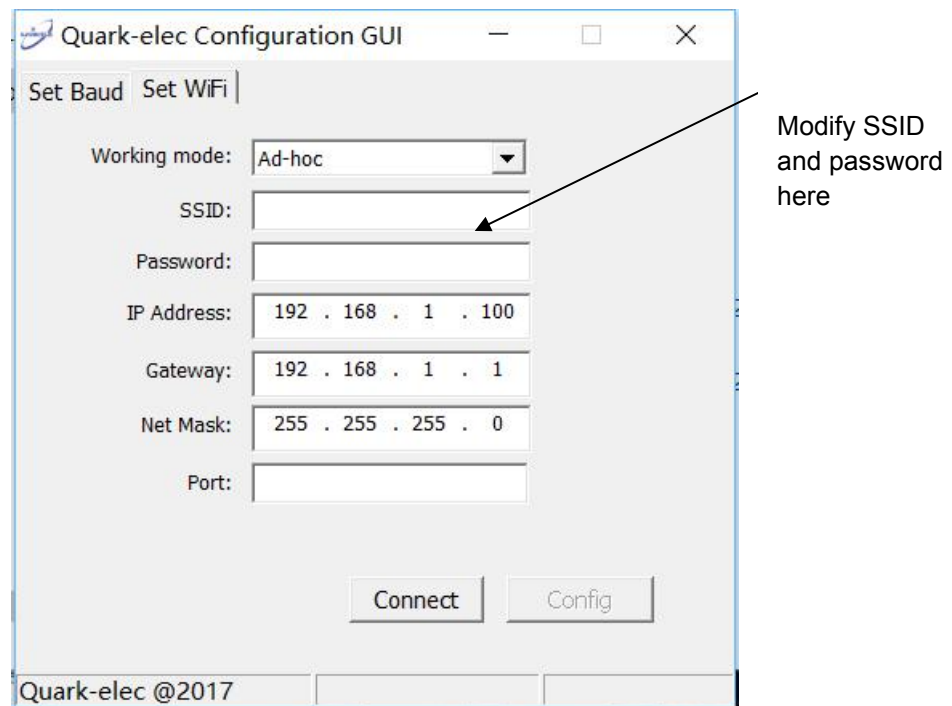


Figure 5 Ad-hoc mode settings

## 2.5 WiFi in Station mode

More and more vessels have a wireless onboard network for access to the internet. In most cases the network is created by using a 3G/4G wireless router with cellular modem. iOS devices, tablets, mobile phones can all access the internet to obtain weather forecasts, send/receive email and access many other internet services via onboard WiFi.

Although switching between the QK-A031 WiFi network and the onboard wireless network is simple and quick, it can be advantageous to integrate the two networks and allowing operators to receive the QK-A031 multiplexer output through the onboard WiFi network. This way, operators can access the internet while receiving the NMEA 0183 messages without having to switch between the 2 access points. To work in this way, operators should set up QK-A031 in Station mode through QK-A031 configuration panel.

After the proper SSID and password setup, QK-A031 should be reset to activate the settings. IP address, Gateway, Net Mask and Port can be left blank if no fixed IP address is needed.

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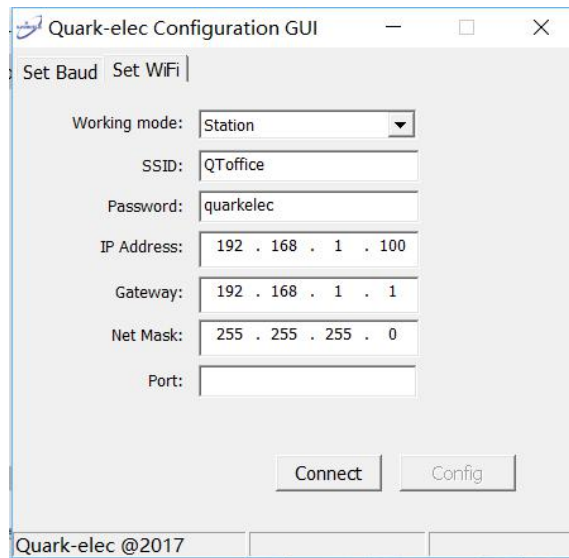


Figure 6 Station mode settings

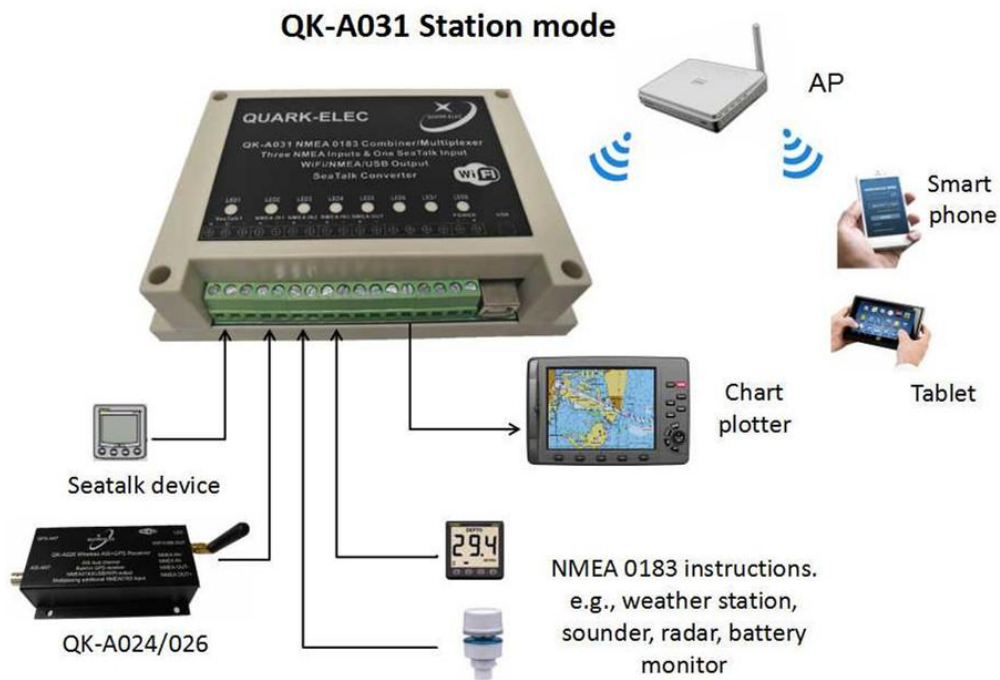


Figure 7 Operating in station mode

## 2.6 USB port

QK-A031 is supplied with a USB connector. This connector provides the NMEA 0813 data output and the configuration input. This USB connector can be linked directly to a USB port on the PC or other mobile devices via the supplied cable.

To enable the USB data connection of QK-A031 to other devices, related hardware drivers may be needed, dependent on system requirements.

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For Windows 8, 7, Vista and XP, the driver can be found on the CD in the packing box or can be downloaded from the Quark-elec website at:

<http://www.quark-elec.com/drivers>

QK-A031 registers itself to the computer as a virtual serial port.

No drivers are required on Windows 10. A new COM port will automatically show up in the device manager after plug in.

For Mac OS X, QK-A031 will be recognized and shown as a USB modem. The ID can be checked with the following steps:

--- After plugging QK-A031 into a USB port, launch Terminal.app.

--- Type `ls /dev/*usb*`

--- Mac system will return a list of USB devices. QK-A031 will display as -  
“/dev/tty.usbmodemXYZ” where XYZ is a number. Nothing further needs to be done if it is listed.

No driver is required for Linux. When plugged into the computer, QK-A031 will show up as a USB CDC device on /dev/ttyACM0.

The USB connection status can always be checked with a terminal monitor application like Putty or HyperTerminal. Ensure that the COM port is set at 38400bps, 8, N and 1 as shown below using HyperTerminal on Windows as an example to illustrate this process. Connect QK-A031 to the computer, follow the instructions to install the driver if required. After the driver is installed, run the Hardware Manager and check the COM interface number.

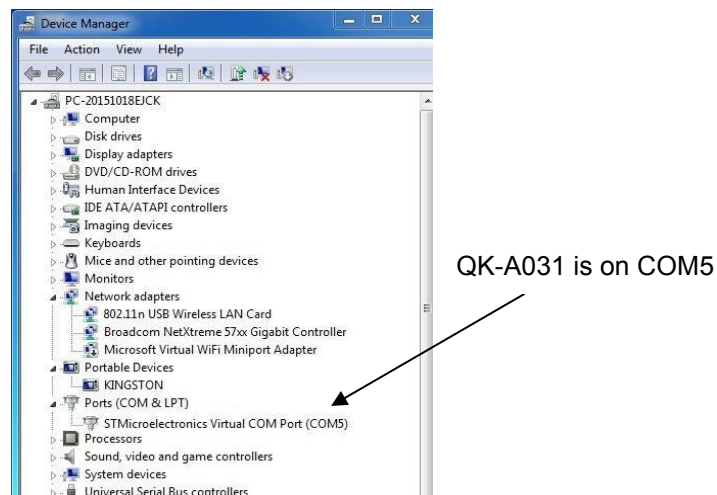


Figure 8 Check COM port

Run HyperTerminal, ensure that the COM port is set at 38400bps, 8, N and 1.

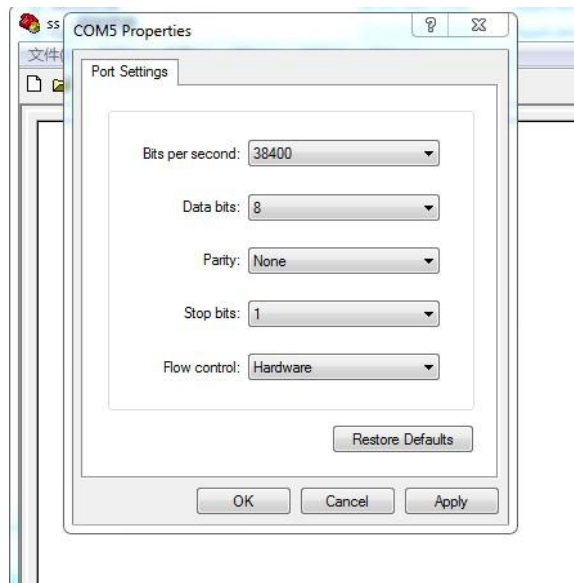


Figure 9 Setting on HyperTerminal

If all the above is set up correctly, similar NMEA 0183 messages to the examples below should be shown.

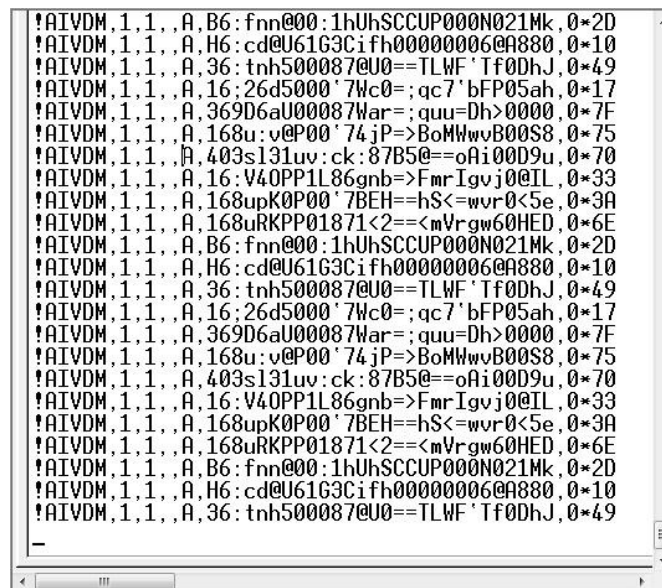


Figure 10 Display on HyperTerminal

### 3 CONFIGURATION

The QK-A031 multiplexer can be configured with a configuration program in Windows system. This program can be found on the accompanying CD or downloaded from:

## Quark-Elec Application Note

<http://www.quark-elec.com/download>

Before being able to configure QK-A031 multiplexer, a USB connection must be set up. To check the status of the connection, just run the program and click 'Connect' button. If 'Config' changes to black then the connection has setup and is ready for configuration.

With the configuration program, operator can modify the SSID and password for WiFi connection. The input/output data rate can also be selected through drop-down list on the page.

All configuration settings are stored in the internal flash memory and are retained without power supply.

## 4 MOUNTING

The QK-A031 is aimed at the small-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.

QK-W031 uses an IP56 Insulation Class 2 plastic enclosure with 115 x 90 x 40 mm external dimensions.

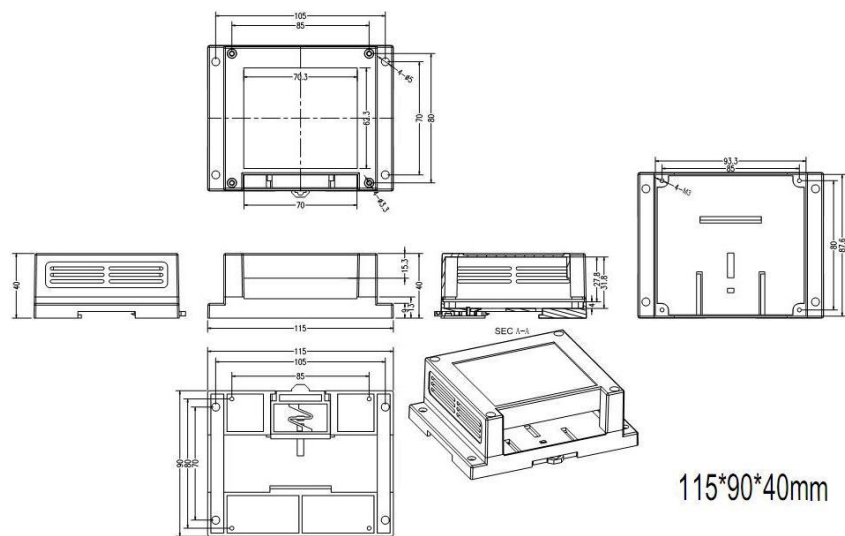


Figure 11 Enclosure drawing



Figure 12 Front panel

## 5 SPECIFICATION

Item	Specification
DC supply	9-35V(+/-0.2V)
Average supply current (typical quiescent)	80mA
NMEA data format	ITU/ NMEA 0183 format
NMEA input data rate	4.8k to 38.4kbps, RS-422 galvanically isolated
NMEA output data rate	4.8k to 38.4kbps, RS-422 galvanically isolated
Seataalk1 data rate	Default 4.8kbps, can be set up to 38.4kbps.

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WiFi mode	Station mode on 802.11 b/g/n
Security	WPA/WPA2
Operating temperature	-25°C to +80°C
Storage temperature	-25°C to +85°C

For more technical information and other enquiries, please go to the Quark-elec forum at:

<http://quark-elec.com/forum/>

For sales and purchasing information, please email us: [info@quark-elec.com](mailto:info@quark-elec.com)



Quark Electronics (UK)

Suite 4, Intech House

34-35 Wilbury Way

Hitchin

Herts., UK

SG4 0TW