

# NMEA 2000 to Wi-Fi (W2K-1) Install/User Manual

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Issue 2.10



## European Union

The full text of the EU declaration of conformity is available at the following internet address:  
[https://www.actisense.com/acti\\_download/w2k-1-declaration-of-conformity/](https://www.actisense.com/acti_download/w2k-1-declaration-of-conformity/)

Hereby, Active Research Ltd declares that the W2K-1 is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU.

Active Research Ltd tímto prohlašuje, že tento W2K-1 je ve shodě se základními požadavky a dalšími příslušnými ustanoveními směrnice 2014/53/EU.

Undertegnede, Active Research Ltd erklærer herved, at følgende udstyr W2K-1 overholder de væsentlige krav og øvrige relevante krav i direktiv 2014/53/EU.

Hiermit erkläre, Active Research Ltd dass sich das Gerät W2K-1 in Übereinstimmung mit den grundlegenden Anforderungen und den übrigen einschlägigen Bestimmungen der Richtlinie 2014/53/EU befindet.

Käesolevaga kinnitab, Active Research Ltd seadme W2K-1 vastavust direktiivi 2014/53/EL põhinõuetele ja nimetatud direktiivist tulenevatele teistele asjakohastele sätetele.

Por medio de la presente Active Research Ltd declara que el W2K-1 cumple con los requisitos esenciales y cualesquiera otras disposiciones aplicables o exigibles de la Directiva 2014/53/UE.

ΜΕ ΤΗΝ ΠΑΡΟΥΣΑ, Active Research Ltd ΔΗΛΩΝΕΙ ΟΤΙ W2K-1 ΣΥΜΜΟΡΦΩΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΚΑΙ ΤΙΣ ΛΟΙΠΕΣ ΣΧΕΤΙΚΕΣ ΔΙΑΤΑΞΕΙΣ ΤΗΣ ΟΔΗΓΙΑΣ 2014/53/ΕΕ.

Par la présente, Active Research Ltd déclare que l'appareil W2K-1 est conforme aux exigences essentielles et aux autres dispositions pertinentes de la directive 2014/53/UE.

Con la presente, Active Research Ltd dichiara che questo W2K-1 è conforme ai requisiti essenziali ed alle altre disposizioni pertinenti stabilite dalla direttiva 2014/53/UE.

Ar šo Active Research Ltd deklarē, ka W2K-1 atbilst Direktīvas 2014/53/ES būtiskajām prasībām un citiem ar to saistītajiem noteikumiem.

Šiuo Active Research Ltd deklaruoja, kad šis W2K-1 atitinka esminius reikalavimus ir kitas 2014/53/ES Direktyvos nuostatas.

Hierbij verklaart, Active Research Ltd dat het toestel W2K-1 in overeenstemming is met de essentiële eisen en de andere relevante bepalingen van richtlijn 2014/53/EU.

Hawnhekk, Active Research Ltd, jiddikjara li dan W2K-1 jikkonforma mal-ħtiġijiet essenzjali u ma provvedimenti oħrajn rilevanti li hemm fid-Dirrettiva 2014/53/UE.

Alulírott, Active Research Ltd nyilatkozom, hogy a W2K-1 megfelel a vonatkozó alapvető követelményeknek és az 2014/53/EU irányelv egyéb előírásainak.

Niniejszym Active Research Ltd oświadcza, że W2K-1 jest zgodny z zasadniczymi wymogami oraz pozostałymi stosownymi postanowieniami Dyrektywy 2014/53/UE.

Active Research Ltd declara que este W2K-1 está conforme com os requisitos essenciais e outras disposições da Directiva 2014/53/UE.

Active Research Ltd izjavlja, da je ta W2K-1 v skladu z bistvenimi zahtevami in ostalimi relevantnimi določili direktive 2014/53/EU.

Active Research Ltd tímto vyhlasuje, že W2K-1 spĺňa základné požiadavky a všetky príslušné ustanovenia Smernice 2014/53/EÚ.

Active Research Ltd vakuuttaa täten että W2K-1 tyyppinen laite on direktiivin 2014/53/EU oleellisten vaatimusten ja sitä koskevien direktiivin muiden ehtojen mukainen.

Härmed intygat Active Research Ltd att denna W2K-1 står i överensstämmelse med de väsentliga egenskapskrav och övriga relevanta bestämmelser som framgår av direktiv 2014/53/EU.

Hér með lýsir Active Research Ltd yfir því að W2K-1 er í samræmi við grunnkröfur og aðrar kröfur, sem gerðar eru í tilskipun 2014/53/EU.

Active Research Ltd erklærer herved at utstyret W2K-1 er i samsvar med de grunnleggende krav og øvrige relevante krav i direktiv 2014/53/EU.

Noi, Active Research Ltd, declarăm pe propria noastră răspundere că produsul W2K-1 este în conformitate cu cerințele esențiale și celelalte prevederi aplicabile ale Directivei 2014/53/UE.

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## Important Notices

### **Trademarks and Registered Trademarks**

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The NMEA® name and NMEA logo are copyright held by the NMEA. All uses in this manual are by permission and no claim on the right to the NMEA name or logo are made in this manual.

### **Fair Use Statement**

The contents of this manual may not be transferred or copied without the express written permission of Active Research Ltd.

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### **Technical Accuracy**

To the best of our knowledge the information contained in this document is correct at the time it was produced. Active Research Ltd cannot accept liability for any inaccuracies or omissions.

The products described in this manual and the specifications thereof may be changed without prior notice. Active Research Ltd cannot accept any liability for differences between the product and this document. To check for updated information and specifications please go to [www.actisense.com](http://www.actisense.com).

Active Research Ltd will not be liable for infringement of copyright, industrial property rights, or other rights of a third party caused by the use of information or drawings described in this manual.

### **Product Guarantee**

This product comes with a three year 'return to base' guarantee. If you suspect that the unit is faulty please refer to the Troubleshooting Section of the User Manual before contacting support.

It is a requirement of the guarantee that all installations of electronic equipment follow the NMEA 0400 specification. Any connection to a battery or power supply must meet the mandatory essential safety requirements that may be imposed by local regulatory agencies.

Actisense products are intended for use in a marine environment, primarily for below deck use. If a product is to be used in a more severe environment, such use may be considered misuse under the Active Research Ltd guarantee.

### **Product Disposal**

Please consider the environment when disposing of this product. It should be disposed of according to the European WEEE Directive, or according to the applicable local regulations for the disposal of electrical equipment

The product packaging is recyclable.

**All features and specifications may change without notice.**

## Installation Warnings

All warnings and notices must be followed to ensure the correct operation of the W2K-1. Incorrect installation may invalidate the guarantee.

It is highly recommended that all of the installation instructions are read before commencing the installation. There are important warnings and notes throughout the manual that should be considered before the installation is attempted.

### Warning 1: Installation and Operation

This product must be installed and operated in accordance with the instructions provided. Failure to do so could result in personal injury, damage to your boat and/or poor product performance.

### Warning 2: Installation Code of Practice

When wiring the power supply to the W2K-1 ensure the isolation switch is off. Wiring the W2K-1 while the connection is live may damage the W2K-1 and is in breach of the guarantee. Any connection to a battery or power supply must meet the mandatory essential safety requirements that may be imposed by local regulatory agencies, this should include suitable fusing.

All wiring should be in accordance with the requirements of the NMEA 0400 installation specification.

### Warning 3: Mounting Requirements

Select a flat location to mount the W2K-1. Mounting on a contoured surface may cause damage to the case. Do not mount the W2K-1 while the device is powered, or the cable harness is connected. See also "Mounting the W2K-1" section.

### Warning 4: Safe Distance

This device should be installed and operated keeping a distance of at least 20cm between it and a persons body.

## Software Updates

The W2K-1 unit has built-in firmware which is held in flash memory, allowing quick and easy upgrades using the the firmware update option on the web interface. It is highly recommended that the W2K-1 firmware is kept up to date.

The firmware version installed in the W2K-1 can be viewed on the web based info page, in the 'Main Application' section. Details of the latest W2K-1 firmware version released can be viewed on the Actisense website.

## Regulatory & Safety Notices

### **USA: Federal Communications Commission (FCC) Statement**

This device complies with FCC part 15 FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

### **FCC Warning**

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

**NOTE:** This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device meets the FCC and IC requirements for RF exposure in public or uncontrolled environments.

### **Canada: Industry Canada (IC) Statement**

IC Notice to Users English/French in accordance with RSS GEN Issue 3:

This device complies with Industry Canada license exempt RSS standard(s).

Operation is subject to the following two conditions:

1. this device may not cause interference, and
2. this device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil est conforme avec Industrie Canada RSS standard exempts de licence (s). Son utilisation est soumise à Les deux conditions suivantes:

1. cet appareil ne peut pas provoquer d'interférences et
2. cet appareil doit accepter Toute interférence, y compris les interférences qui peuvent causer un mauvais fonctionnement du dispositif

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada

## W2K-1 Intro & Features

The W2K-1 is a compact and low-power NMEA 2000 to Wi-Fi Gateway with data logging. It transfers data from an NMEA 2000 backbone to any compatible device (e.g. laptop, tablet or smartphone) connected to it via Wi-Fi.

It has built-in conversion of NMEA 2000 messages into NMEA 0183 sentences thus allowing a wide variety of vessel data (e.g. position, speed, course, wind speed, depth, engine data, AIS messages etc.) to be shared with NMEA 0183 compatible software applications running on connected devices.

All the data received (or a selected subset) can be logged to its internal micro SD card for later downloading to use for analysing the voyage. This is very useful for analysing race data, generating logbooks, diagnosing problems or even sharing your voyage details. Approximately 16 days\* of data can be stored on the pre-installed industrial grade micro SD card, which can be upgraded should the user require more storage.

The W2K-1 has the legendary Actisense “Reliability Built In” along with useful diagnostic LEDs, internal antenna, enhanced password security, full certification and all packaged in an extremely rugged IP67 case.

- NMEA 2000 to Wi-Fi Gateway and data logging in one device
- Converts NMEA 2000 to / from NMEA 0183 (streamed over Wi-Fi)
- Supports both TCP and UDP and streams data using up to three separate data servers
- Compatible with a huge range of navigation software and Apps
- 8GB high reliability industrial micro SD card is pre-installed
- Approximately 16 days data logging\*
- Remote firmware upgradability
- Diagnostic LEDs for NMEA 2000 bus activity and Wi-Fi status
- IP67 rated ruggedized case
- Works as an access point and connects to existing Wi-Fi networks in client mode
- Low power – 70mA at 12 VDC (2 LEN) from NMEA 2000 bus
- 2.4GHz radio with integrated internal antenna (up to 150Mbps)
- Automatically measures and reports the NMEA 2000 bus voltage
- Embedded user manual – accessible via browser
- Unique default SSID and password for enhanced security

\* between 4 days and 100 days dependent on number of devices on the network and filtering options selected



## NMEA 2000 Network Basics

### Minimum Requirements

A correctly powered and terminated NMEA 2000 network is required before installing the W2K-1. The minimum requirements for any NMEA 2000 network are:

#### Either

An **Actisense SBN-1** (a NMEA 2000 self-contained network)

#### Or

Power insertion point, or 'Power T' (**Actisense A2K-MPT-1**)

2x T-Pieces (**Actisense A2K-T-MFF**)

2x Termination resistors. **One** at either end of the NMEA 2000 Network (**Actisense A2K-TER**)

#### And

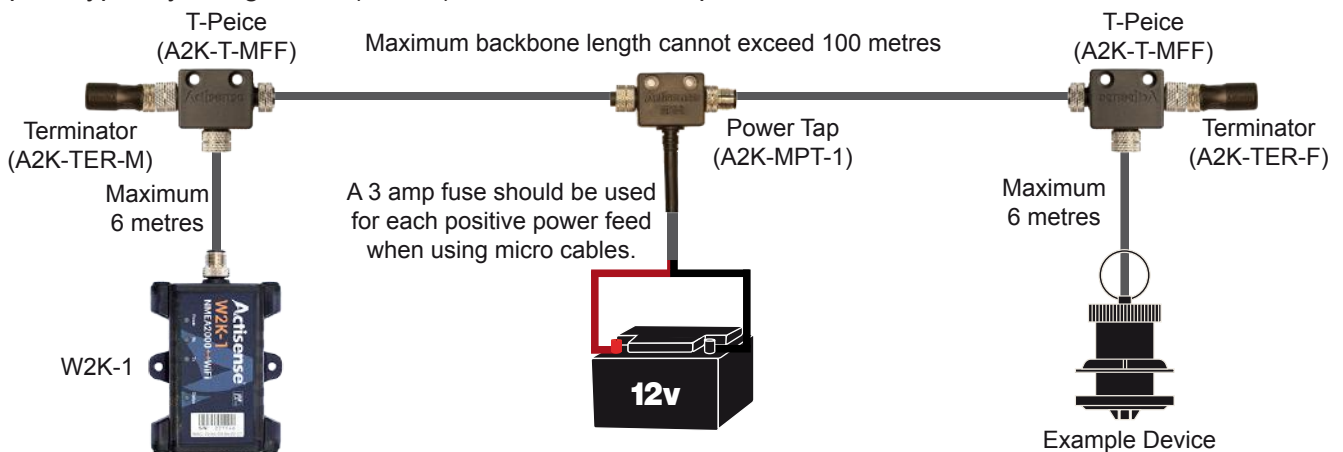
2x NMEA 2000 Devices (The W2K-1 is one of these devices)

NMEA 2000 Network Cable Limitations

Cable Type	Max Length	Max Amp	Power Pair	Data Pair
Drop Cable	6m			
Sum of all drop cables	78m			
Micro backbone (terminator to terminator)	100m	3 Amps	22 AWG	24 AWG
Mid backbone (terminator to terminator)	250m	4 Amps	18 AWG	20 AWG
Mini backbone (terminator to terminator)	250m	8 Amps	15 AWG	18 AWG

### Powering the W2K-1

The W2K-1 receives its power from the NMEA 2000 backbone and is compatible with 12VDC and 24VDC supplies typically using 70mA (2 LEN) at 12 VDC. Once powered, the LEDs inside the case will illuminate.



All wiring should be in accordance with the regional code of practice for installations.

Refer to the 'Troubleshooting' section of this manual for a full description of the W2K-1 LED behaviour.



The W2K-1 has been designed to connect directly to an Actisense “T” piece (A2K-T-MFF) without the need for a drop cable, however a drop cable (A2K-TDC) can be used to improve the installation.

The maximum length for any instrument drop from the NMEA 2000 backbone is 6 metres. The NMEA 2000 network should always be fused according to the maximum capacity of the cable used. See ‘NMEA 2000 Network Cable Limitations’ above.

To avoid unnecessary voltage drops on your backbone, always try and install the W2K-1 close to the power insertion point.

The W2K-1 measures the bus voltage at its micro connector and reports this via:

- The NMEA 2000 bus using PGN : 127508 : Battery Status.
- The Web Interface status page

## Set Up

The W2K-1 has a built in, web based configuration tool compatible with the latest versions of all popular web browsers. To access it, a Wi-Fi connection is required between a compatible device and the W2K-1.

## Connecting to Wi-Fi

When first powered up, the W2K-1 will act as an **Access Point**, and it will broadcast it's SSID as “w2k <serial number>”. This ensures that, by default, every W2K-1 has a unique Access Point.

The serial number of your device can be found printed on labels, both on the front and rear of the case. (e.g. If your serial number is **123456**, then your the SSID for your W2K-1 will be **w2k-123456**)

The default **Wi-Fi password** is printed on the rear of the device.

**Note** : the password is 8 characters consisting of 1...9, A...Z (excluding I & O), a...z (excluding l)

A spare password sticker is also provided which can be kept in a safe & convenient location to avoid having to physically access the W2K-1.(e.g. if more devices need to be connected to the W2K-1)

This Wi-Fi password can be changed at any time, but if it's lost or forgotten, the W2K-1 password can be reset back to its default after gaining physical access to the unit, see **Password Recovery**.

The W2K-1's SSID will be visible using the network settings (show available networks) of your PC, or usually under settings / connections / Wi-Fi on your mobile device. Selecting it will prompt a connection and request the user to enter the Wi-Fi password listed on the rear of the device. Once the password is entered, the Wi-Fi enabled PC or device should connect within a few seconds (dependant on operating system).

**Note:** The connection manager will report “No Internet” which is correct as your device is now connected directly to the W2K-1 **Access Point** which does not provide internet access.

The W2K-1's built-in configuration can always be accessed by typing in the **IP address:192.168.4.1** into the address bar of your Wi-Fi enabled PC or devices web browser.

## Wi-Fi Modes

The W2K-1 can be used in either **Access Point mode** or **Client Mode** (also referred to as Station or STA mode) Both modes can also be used simultaneously under certain circumstances.

### Access Point Mode

This is the default mode for the W2K-1 used for initial configuration. This mode can also be used where other Wi-Fi devices need to connect to / exchange data with the W2K-1 in the absence of an existing Wi-Fi network. The W2K-1 will, by default, use channel 1 in this mode.

### Client Mode

This is where the W2K-1 will become a “client” on an existing Wi-Fi enabled network, enabling the W2K-1 to connect to / exchange data with other devices connected to that existing network. The W2K-1 will switch to the Wi-Fi channel of the client network in this mode. See **Wi-Fi Client settings**.

**Note:** Log files will download faster if only a single access point is connected to the W2K-1.

The W2K-1 default channel for access point mode is channel 1, however when the W2K-1 is used in client mode, the Wi-Fi channel of the client (e.g. Wi-Fi router) will be adopted by the W2K-1 for all modes. The device which is browsing will need to re-connect to the access point or connect via the client using the client IP address. The W2K-1 remembers client status, so even on a power cycle it will then automatically join the client on its channel.

## Configuring the W2K-1

Make sure you have connected the W2K-1 **Access Point** via Wi-Fi with your PC or device. You can now access the W2K-1 configuration page from any web browser. Enter the **IP address : 192.168.4.1** into the address bar and you will be presented with the W2K-1 home page.

Note: Pages which allow configuration changes are password protected and will prompt the user to “Login”.



## Information Page

Use this page to access important product information such as device status, serial number, MAC address and firmware version. Client and access point status are also available from this page.

Home / Status

### Information

Client mode is currently: **Disconnected**

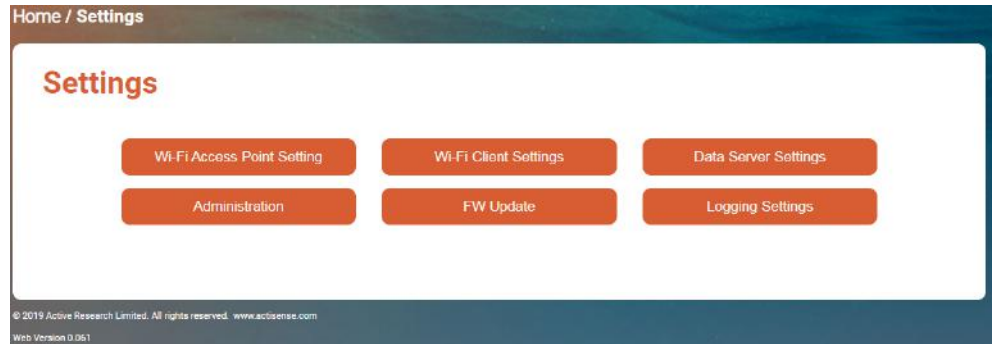
Status	Device	Client Status	Access point Status
<b>Battery voltage at N2K connector:</b> 13.0 volt	<b>Model ID:</b> W2K-1	<b>Client Network SSID:</b> w2k-229290	<b>AP Network SSID:</b> w2k-229290
<b>CAN Bus Rx load:</b> 6 %	<b>Serial Number:</b> 229290	<b>Client Network Status:</b> Disconnected	<b>AP Network Status:</b> Connected
<b>CAN Bus Tx load:</b> 7 %	<b>Date &amp; Time of manufacture:</b> 03/12/2019, 10:38:37	<b>Client Network IP Address:</b> 0.0.0.0	<b>AP Network IP Address:</b> 192.168.4.1
<b>Source Address:</b> 0	<b>Hardware ID:</b> 7	<b>Client Network HTTP Port:</b> 80	<b>AP Network HTTP Port:</b> 80
<b>Log:</b> Enabled	<b>MAC Address:</b> 30-AE-A4-DC-F9-31	<b>Client Network Wi-Fi Signal Strength:</b> 0 dBm	<b>Wi-Fi Channel:</b> 1
	<b>Firmware version:</b> 1.039		<b>AP Network Visibility:</b> Visible
	<b>Date &amp; Time of Firmware:</b> 10/12/2019, 11:17:12		<b>AP Network Authentication:</b> WPA2_PSK
	<b>Firmware CRC:</b> 0x9246861E		
	<b>Web UI version:</b> 0.061		

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Web Version: 0.061

## Settings Menu Page

This page provides access to:

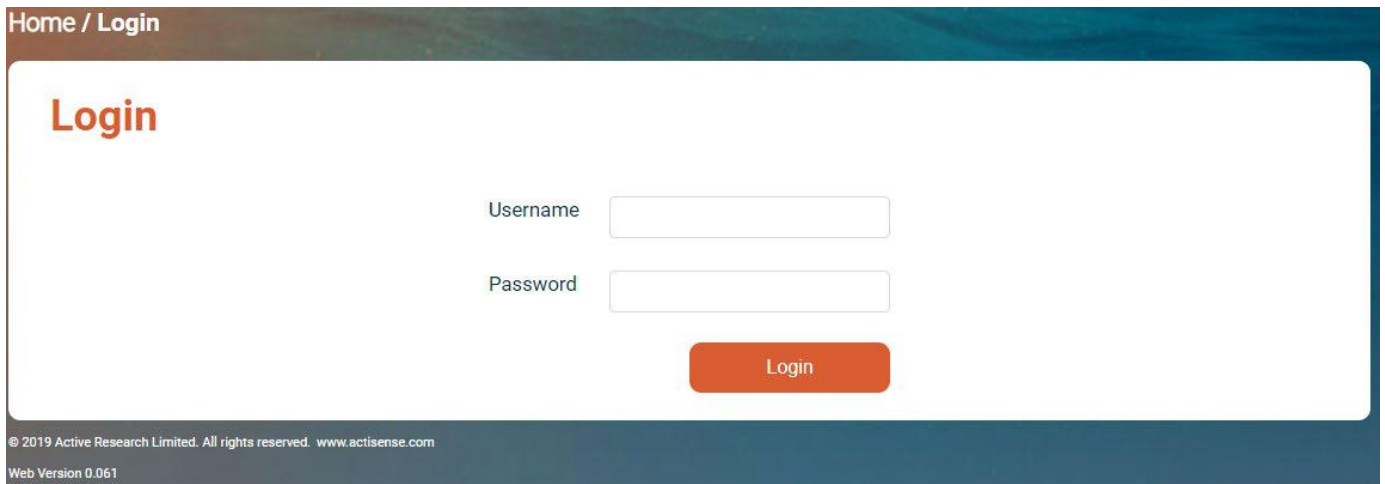
- Wi-Fi Access Point Setting
- Wi-Fi Client Settings
- Data Server Settings
- Administration
- Firmware Update
- Log files and Settings



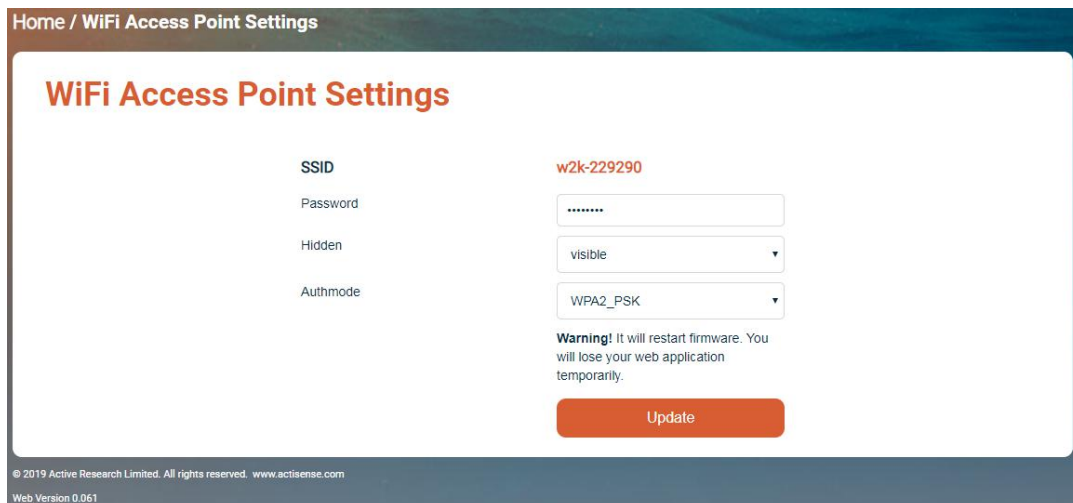
## Login Page

The default login details for the W2K-1 configuration tool are:

Username : **admin** Password : **admin**



## Wi-Fi Access Point Setting



The Wi-Fi Password can be changed here. It needs to be a minimum of 8 characters, and a max of 50.

**Note:** If the password is forgotten, it can be re-set back to the default after gaining physical access to the unit, to remove and restore the micro SD card. See Password Recovery.

The Access Point can be set to "Hidden" in which case the SSID will not be broadcasted. If it is set to "Hidden", you will need to use the "join hidden network" function on your PC or device in order to connect to the W2K-1. The SSID of the W2K-1 will then need to be manually typed in when prompted.

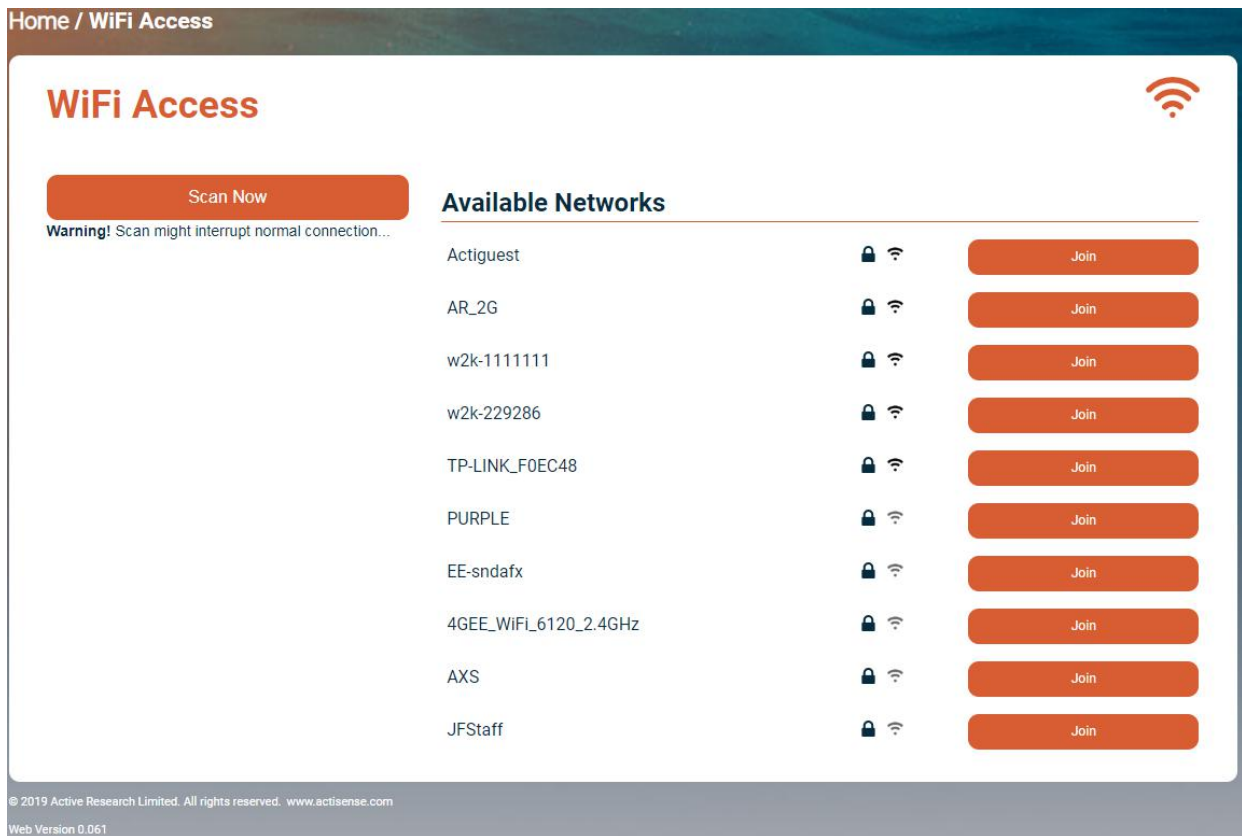
The authentication mode can be set by “Authmode”. By default this is “WPA2-PSK”, which is supported by most modern PC’s and devices.

**Warning:** It is NOT recommended to set this to “Open” as this will allow any Wi-Fi enabled PC or mobile device to access the W2K-1 without entering a password.

The Access Point uses Wi-Fi channel 1 by default, however when a client is joined, the Wi-Fi channel of the client will be adopted for all modes. If a user is connected to the W2K-1 Access Point and then joins a Client network, the link to the Access Point will be dropped if the Client network is set to a different Wi-Fi channel. In this case, simply reconnect to the Wi-Fi Access Point if needed, and your PC or device will adopt the correct Wi-Fi channel.

The maximum number of simultaneous connections to the Access Point is 4.

## Wi-Fi Client Settings



Scan for **Client** networks and then either join or disconnect from these networks.

**Note:** The connection will be interrupted during a scan.

When a Client network is joined, the Wi-Fi channel of the **Client** will be adopted for all modes. The W2K-1 will be issued with an IP address by the **Client** network, and this IP address should then be used to connect to and access the W2K-1 via the **Client** network.

The W2K-1 **Access Point** will still be active and you can find out the IP address allocated to the W2K-1 by connecting to the Access Point and entering the default IP address 192.168.4.1 in a web-browser and checking the Information Page.

**Note:** The W2K-1 will remember the **Client** connection status and will automatically join the **Client** after a power cycle.

## Data Server Settings

Server	Format	Direction	Protocol	Port
Server 1 <input checked="" type="checkbox"/>	ASCII N2K	Transmit Only	TCP	60001
Server 2 <input checked="" type="checkbox"/>	ASCII RAW	Transmit Only	TCP	60002
Server 3 <input checked="" type="checkbox"/>	NMEA0183	Transmit Only	UDP	60003

**Warning!** Update will refresh the data servers and restart firmware. You will lose connection to this web application temporarily.

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The W2K-1 has three separate data servers – “Server 1”, “Server 2” and “Server 3” which can work concurrently and can be enabled independently. The Data Server Settings need to be configured to correspond to that of the connected application software. To configure a data server for your application, you can setup the “Protocol”, “Format”, “Direction” and “Port”. There is also an independent “Check box” which can enable or disable a data server. This will not cause the W2K-1 to forget the other settings – it is an on/off switch which will start or stop that server.

### Protocol

This is the “IP” protocol. Both TCP and UDP are supported, and this should be set according to the connected applications’ capabilities. TCP is recommended as it has built-in error correction.

**Note:** The W2K-1 currently only supports UDP transmit, (Not UDP receive). If a client network has been joined, then UDP will be available via both client network and Access point because UDP connections only require a Port Number.

### Direction

This sets whether this data server will transmit, receive, or both receive and transmit data.

### Format

Several data formats are provided. If the format required for your application is not currently available, please contact Actisense support to check availability – we might already have it on our development road map or be able to add it specifically for a customer application. The current formats are:

#### NMEA 0183

As most applications support the NMEA 0183 format, this provides universal compatibility, however please note that this involves conversion from NMEA 2000 PGNs to NMEA 0183 sentences and not every NMEA 2000 PGN field has a corresponding NMEA 0183 sentence field. Conversions for all popular sentences and PGNs are provided, please refer to the current W2K-1 Conversion List.

#### ASCII RAW

This allows the W2K-1 to send and receive raw CAN packets to and from the NMEA 2000 bus. Caution should be exercised when sending unformatted CAN data to the NMEA 2000 bus. It is supported by some other manufacturers as a means for receiving and sending CAN information in its simplest “Raw” form.

#### Actisense RAW

Like ASCII raw, this format allows the W2K-1 to send and receive raw CAN packets to and from the NMEA 2000 bus. Similar caution should be exercised as for ASCII Raw when sending unformatted CAN data to the NMEA 2000 bus. This format is not currently widely supported and will be used by Actisense data logging and simulation technology in due course. For user applications, this format is more bandwidth efficient than ASCII formats and will be fully documented for use by third party software.



## **ASCII N2K**

This is a new Actisense proprietary encoding technique for transferring complete NMEA 2000 PGNs. Currently this format can only be transmitted from the W2K-1. If viewed on “IP port monitor” software such as <https://www.aggsoft.com/serial-port-monitor.htm>, the N2K “PGNs” are easy to read as a scrolling text display. The advantage of this format is that all PGN data is “assembled” from the raw CAN packets into an easier to use format for user applications. This format will be fully published on the Actisense website.

## **Actisense N2K**

For transferring complete NMEA 2000 PGNs. Currently this format can only be transmitted from the W2K-1. This is a pure binary format used by the future versions of Actisense Toolkit software to allow data logging and analysis of N2K data. It is more bandwidth efficient than ASCII N2K format. This format will be fully published on the Actisense website.

## **Actisense NGT**

This format has been in use by the Actisense NGT-1 since 2007. Currently this format can only be transmitted from the W2K-1. This is also a pure binary format encoded in the same binary format as the Actisense NGT. For software applications that have been previously designed to be compatible with the NGT-1, this format will work directly with that software. There are third-party applications which can use this NMEA 2000 binary format now.

## **Port Number**

By default, the W2K-1 uses Ports 60001 - 60003, but can be set to any value corresponding to that of the application software. IP Ports can be set in the range 1-65535, although ports 1-1024 should be avoided, as they are used by special internet services. Setting a data server to use those ports could result in network problems.

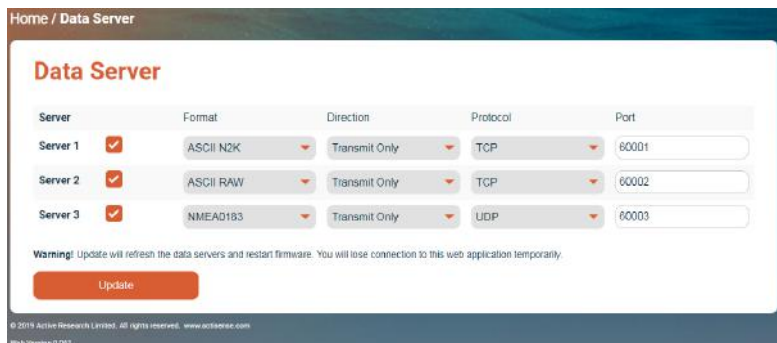
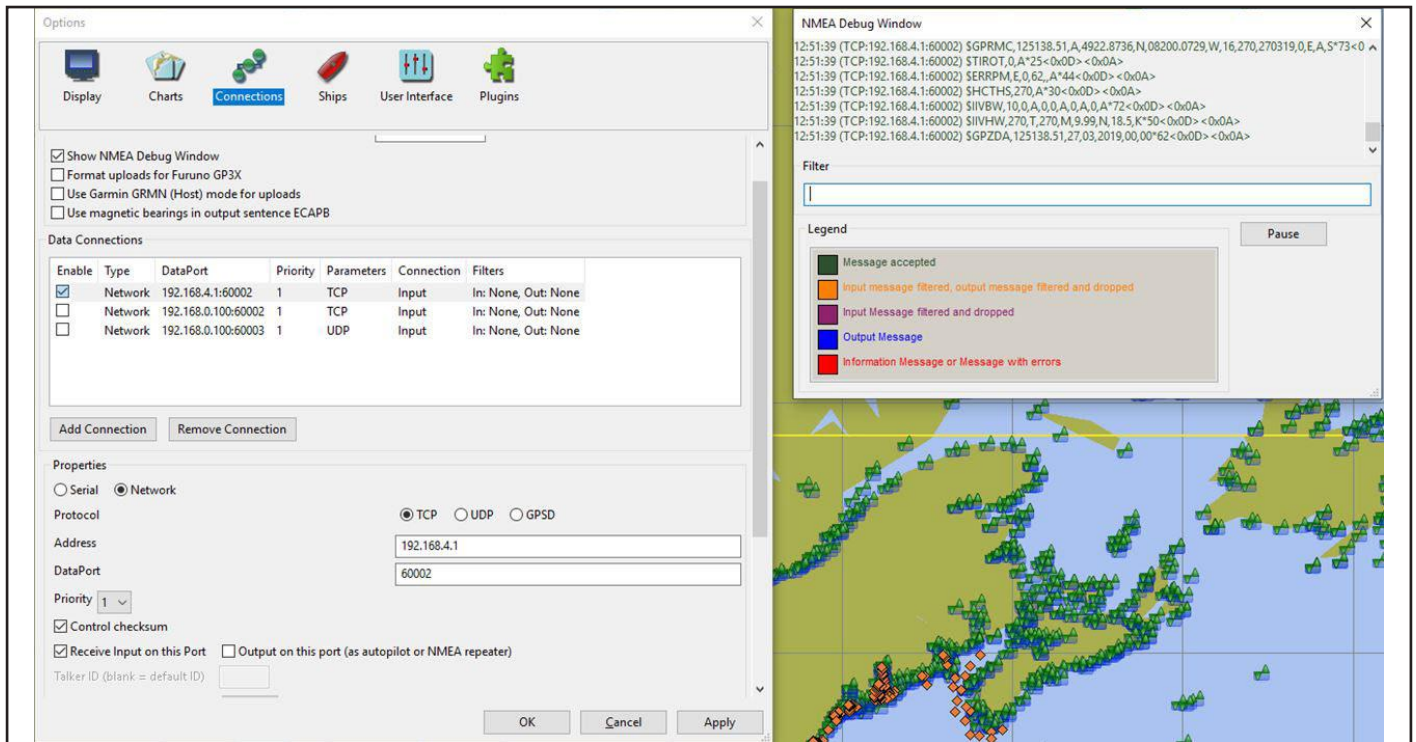
**Note:** Some applications use the default setting for NMEA 0183 over Wi-Fi as port 10110, so in this case the W2K-1 data server settings should be set to 10110. Other vendors such as Navionics use port 2000 for the default NMEA Wi-Fi gateway.

To get an application to work with the W2K-1, the IP Address of the W2K-1 (see Wi-Fi Access Point and Client Settings) and the port settings need to correspond. For UDP, often only the port number is used, and it is possible to merge data across multiple applications by sending to the same UDP port. Thus, care should be exercised, as not all data formats are compatible.

For an IP networking expert, an excellent free diagnostics software such as “Wireshark” available on the internet, which can help diagnose networking issues. Be warned however that it is a very technical piece of software and requires good basic knowledge to get to grips with. Fortunately, most marine applications only need you to set up the correct format, protocol and port, and the rest is handled by the software.

The W2K-1 has been tested with many popular PC and Device applications and configuring the connection and data format is similar across the different software applications.

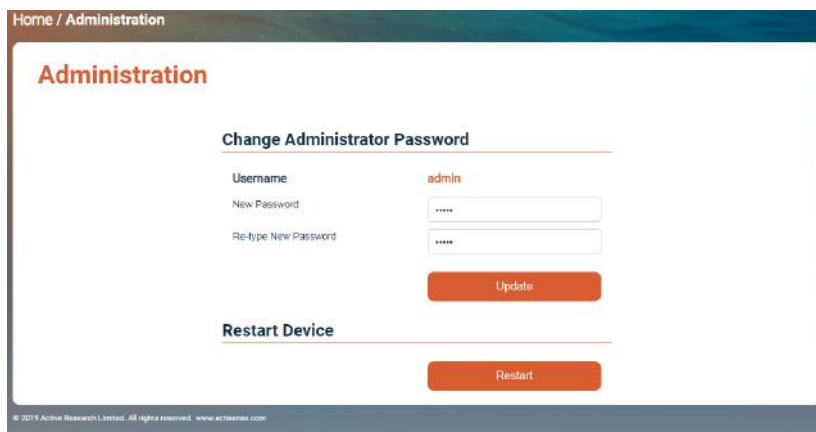
Below shows an example of connecting to the popular OpenCPN application.



## Administration

The Admin (Login) password can be changed here to a new one that's between 2 and 30 characters long. If the password is mislaid or forgotten, it can be reset back to the default after gaining physical access to the unit by opening the blank end-cap and ejecting the SD card, see **Password Recovery**.

**Warning:** Actisense strongly recommends changing the default password to reduce the chance of unauthorised access to the N2K network and the vessels systems.

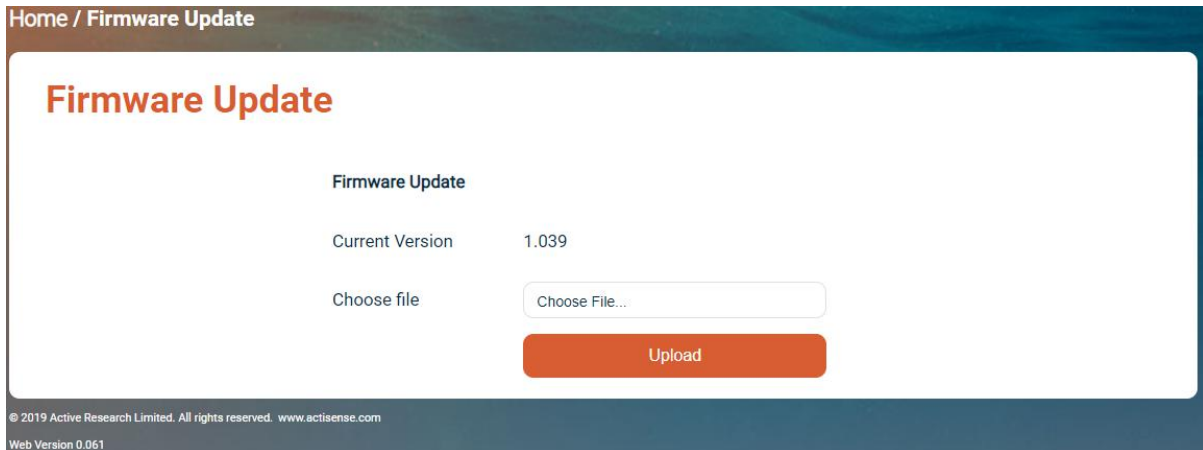


The W2K-1 device can be conveniently restarted by clicking the 'Restart' button.



## Firmware Update

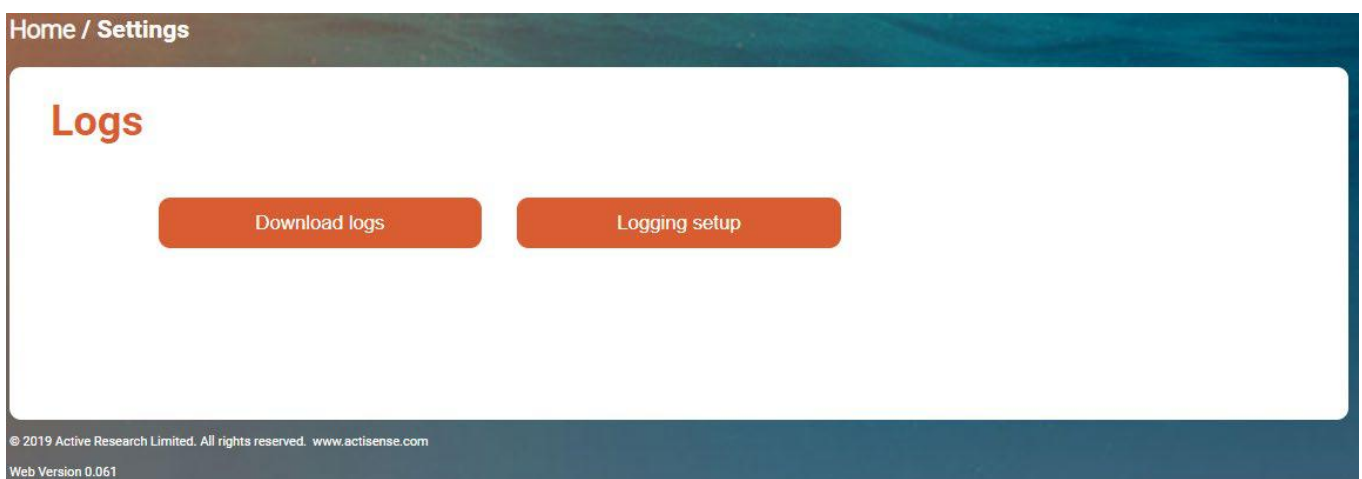
Upload and install new firmware from a “.zip” file. **Note: Do NOT extract files prior to upload.** Firmware updates in the correct ‘.zip’ file format for the W2K-1 are available from the downloads section at [www.actisense.com](http://www.actisense.com). The version of firmware currently installed in the W2K-1 can be found in the “Information” menu on the W2K-1 home page.



**Note:** Do not disconnect the unit from the NMEA 2000 bus or remove power until the firmware update process has completed **and** the unit has re-booted such that the PWR LED is pulsing. See LED Behaviour. Remember, you need to re-connect to the Wi-Fi after the firmware upgrade.

## Logging Settings

The W2K-1 ships with an internal 8GB industrial rated micro SD card specified with a C10 continuous writing speed. Enable logging of data to that SD card via the ‘Logging setup’ button. The length of time before the SD card becomes full depends on the amount of data on the NMEA 2000 network. When the SD card is full, it will begin to write over existing log files, starting with the oldest.

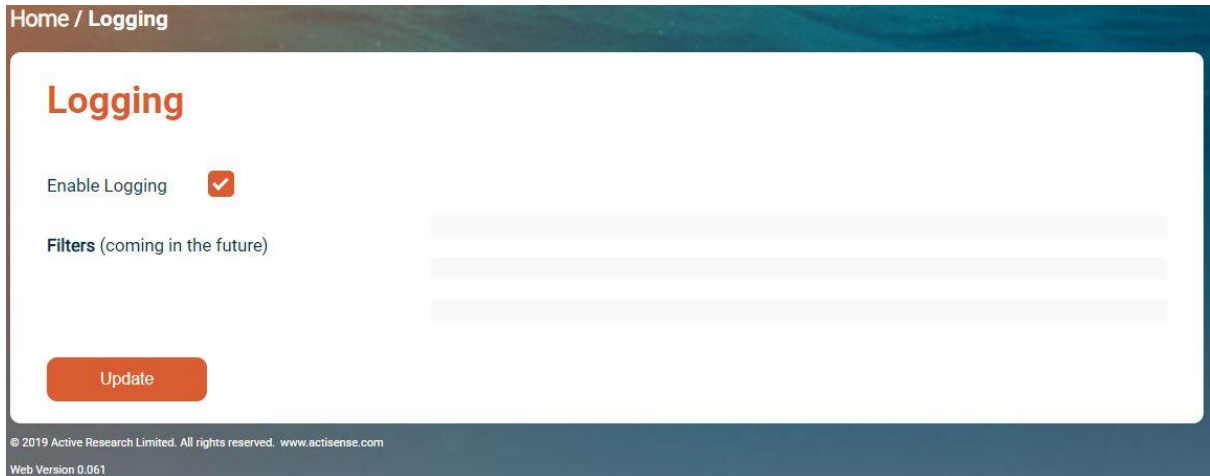


The amount of data which can be logged on the 8GB micro SD is dependant on exactly how “busy” the bus is. On a “busy” bus, (approximately 50% loading), the user can expect at least 6 days of continuous data logging. On a “lightly loaded” bus, (approximately 5% loading), the user can expect in excess of 30 days continuous data logging.

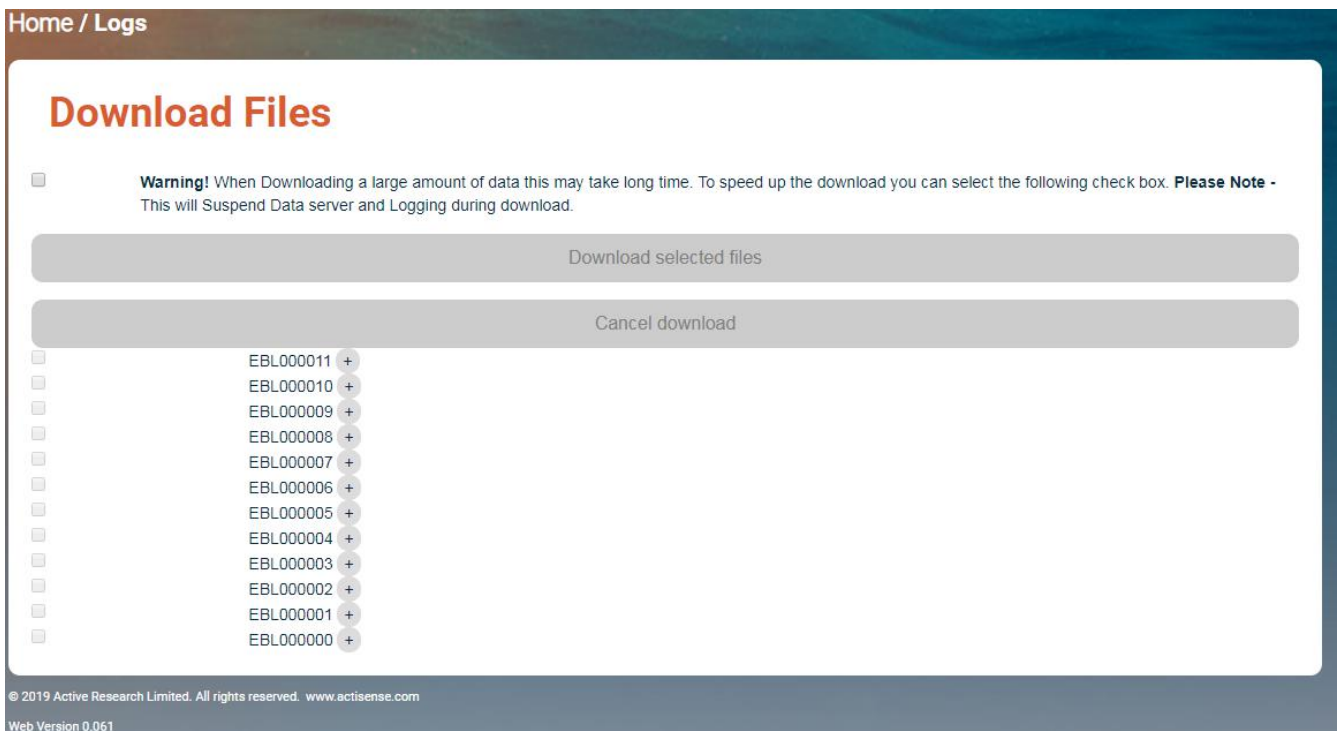
If the W2K-1 is restarted or power cycled, it will create a new log file and the previous log file size will be dependant on when restart occurred.

**Note:** A GPS source on the NMEA 2000 bus needs to be used in order to provide UTC time stamps for the log files. If no GPS is available, default date and time will be used.

Log files can be downloaded using the 'Download logs' button. Each file is approximately 5MB in size and multiple files or an entire directory can be selected.



**Note:** Log files will download faster if the check-box is selected to suspend data servers and logging during download. This may effect applications on connected devices.



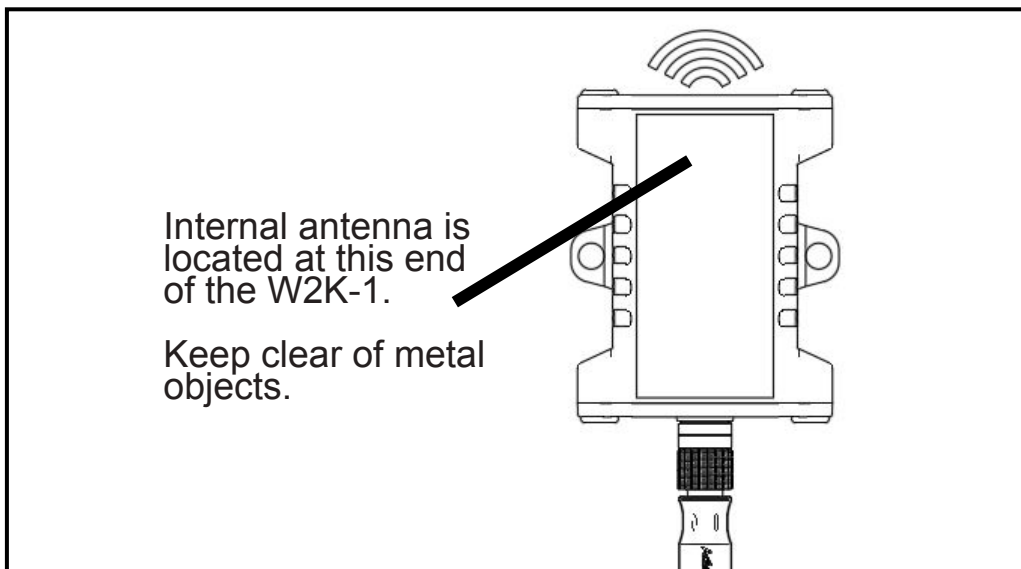
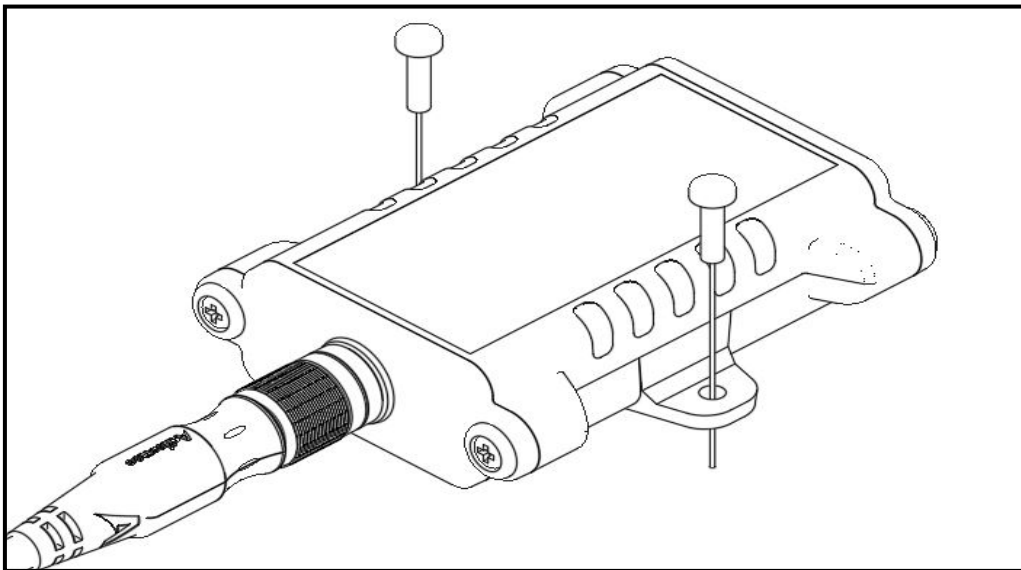
## Mounting the W2K-1

The W2K-1 has an internal antenna which is located on the end opposite to the NMEA 2000 connector and should not be mounted on a metal surface. To ensure best range it should be mounted vertically and located centrally on the boat as high as possible, avoiding other metallic objects. See picture below right.

**Warning:** The W2K-1 should not be mounted within 5m of a compass or operated within 20cm of a human body. To avoid potential injury it should be mounted at a height of less than 2m from floor level.

## **Bulkhead Mounting**

The W2K-1 can be secured to a bulkhead using the two screw holes on the side of the W2K-1 shown in the picture below left.



## Trouble Shooting Guide

First level W2K-1 diagnostics / fault finding can be performed by observing the LED behaviour.

The normal behaviour of the W2K-1 LEDs is described in the table below. If the LEDs are not behaving as expected, this will indicate a fault in either the device connected to the W2K-1, the NMEA 2000 network, or the W2K-1 itself.

Some common checks to perform on the W2K-1 if the correct LED behaviour is not displayed:

- Connectors are properly inserted and secure.
- If NMEA 2000 field fit connectors are used, all pins have been wired correctly and wires are terminated firmly.
- The NMEA 2000 network is properly terminated at each end, with a 120ohm resistor. The network should not have more than two terminators. Make sure that any devices attached to the network do not contain any internal termination resistors.
- If using a client network then UDP will only be available via the client network.

LED	Colour	Normal State	Description	User action (during abnormal state)
PWR	Blue	Pulsing	Indicates presence of power	Check power on NMEA2000 Bus / Check Fuses / Battery Voltage
		Flashing Fast	Indicates Firmware Update (Approx 4 times per second)	Do not remove power while the Firmware update is in progress
Status	Yellow	Pulsing	Indicates Wi-Fi access point is active	Confirm SSID on connecting device is correct / Confirm Client network is active / Check password is correct
		Flashing	Indicates active Wi-Fi connection in either Access Point mode or Client Mode (approx once per second)	
RX	Green	Flashing	Indicates data is being received on the NMEA2000 bus	Confirm there is another device transmitting on the NMEA2000 bus
TX	Amber	Flashing	Indicates data is being transmitted on the NMEA2000 bus	Confirm there are at least two NMEA2000 devices present on the bus

**Note:** Pulsing refers to the continuous “fading” mode of the LED

**Note:** If the W2K-1 does not re-direct to the home page and an error message is displayed, the likely cause is that the connection to the access point has been dropped during a re-start. This is dependant on the device connecting to the W2K-1's connection settings, and is also dependant on the operating system.

The device should be set to automatically connect to prevent this situation, thus avoiding having to manually re-connect.

## Technical Support and the Returns Procedure

The first point of contact for all technical enquiries should be the vendor / supplier where the device was originally purchased. All warnings in this manual must be adhered to and installation instructions followed prior to any support requests. If the troubleshooting guide or the supplier are not able to help resolve the problem and an error persists, please visit the Actisense help centre here you will find useful articles to aid further troubleshooting and a contact form for raising a support ticket.

If the Actisense support engineer concludes that the W2K-1 unit should be returned to Actisense, a 'Return Merchandise Authorisation' (RMA) number will be issued.

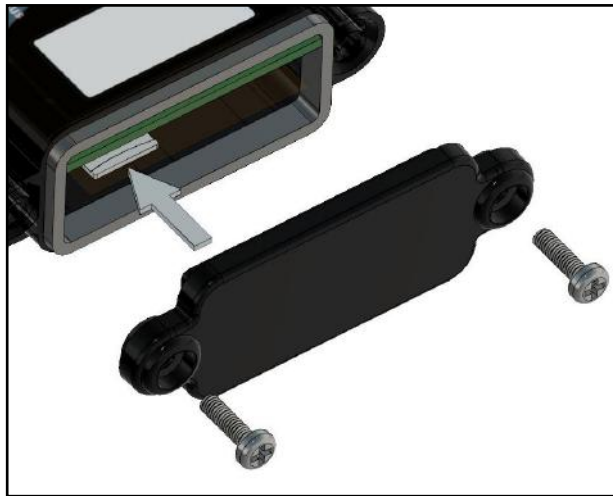
The RMA number must be clearly visible on both the external packaging and any documentation returned with the product. Any returns sent without an RMA Number will incur a delay in being processed and a possible charge. Any cables originally supplied with the product are to be included in the returned box.

## Password Recovery

It is not possible to reset the configuration username and password using the NMEA 2000 connection, as this would require an insecure transmission of the Wi-Fi password.

For additional security, the method used to reset the password to its default requires physical access to the unit. There is no reset button provided. The SD card switch is used as a method to invoke the password reset process:

1. Switch off the unit by disconnecting the NMEA 2000 cable and open the blank end cap, as shown in the picture below.
2. As the SD card holder is a “push-push” type, push the SD card in gently and the card will then release/eject. There is no need to completely remove the SD card from the holder.



Micro SD card ejection

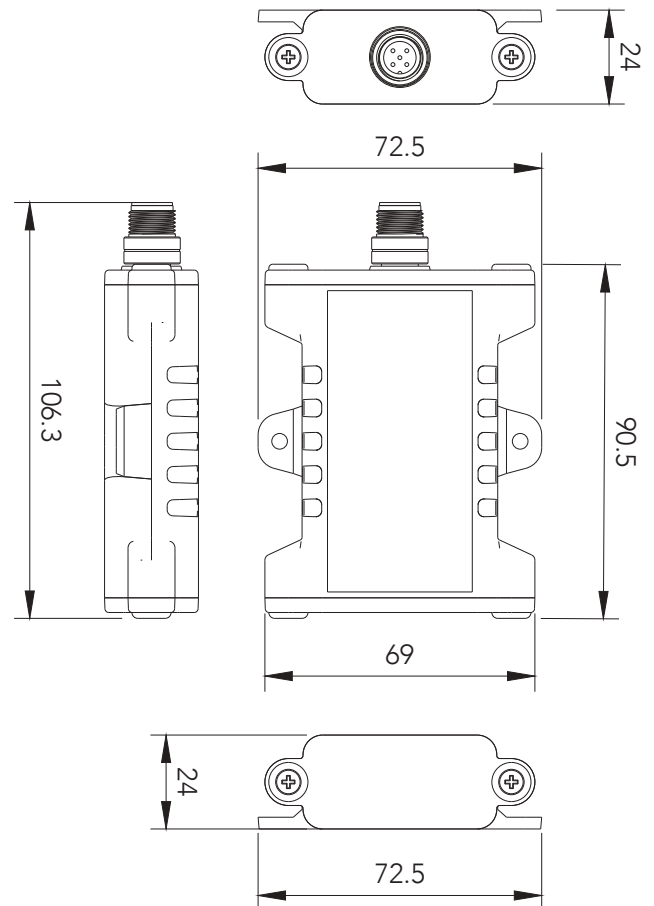
3. Switch on the unit (by reconnecting the NMEA 2000 cable). It will detect that there is no SD card present and use the default Wi-Fi password to create its Access Point.
4. Use the default Wi-Fi password in the device(PC, Mobile phone, Tablet) to connect to the unit.
5. Refresh the web browser to see the simple “fall-back” web page.
6. On the “fall-back” web page, click the “Reset Wi-Fi settings and passwords to factory default” button.
7. The Wi-Fi password will be reset back to the unique default password shown on the unit’s underside label and on the spare password sticker supplied in the delivery box.
8. The Web Config Username and Password will also be reset back to their factory defaults (refer to ‘**Login Page**’ section above for details).
9. Switch off the unit again, push the SD card in until it clicks and close the blank end cap, making sure the rubber end cap seal is still fitted correctly.
10. Switch the unit back on and change the Wi-Fi password, Web Config username or Web Config password as required.

## Technical Specifications

Power Supply	
Supply Voltage (NMEA 2000)	9 to 30V DC
Supply Current (NMEA 2000 Port)	70mA (avg.) @ 12V DC 100mA (avg.) @ 9V DC
Load Equivalent Number (LEN)	2
Supply protection	Continuous reverse polarity protection and transient overvoltage protection to 40V
Wi-Fi Radio	
Compatibility	IEEE 802.11 b/g/n
Speed	802.11n up to 150Mbps
Frequency Band	Wi-Fi: 2412 -2472MHz
Max Output power	Wi-Fi: 17.56dBm (802.11b) 19.06dBm (802.11g) 18.69dBm (802.11n)
Antenna	Integrated internal antenna, 3.74dBi
Range (Open space)	approx. 30 meters
Security	WPA / WPA2 / WEP
Configuration	
IP support	Supports TCP & UDP broadcast
Data servers	Three separate data servers
Data protocols	NMEA 0183 & Five proprietary
Security	SSID and Password configurable (Unique defaults per device)
Diagnostics	
Power LED	Blue
NMEA 2000 Tx LED	Orange
NMEA 2000 Rx LED	Green
Status LED	Yellow
micro SD card	8GB Industrial Grade, FAT32
Mechanical	
Housing Material (body)	Polycarbonate
Housing Material (endcaps)	PBT
NMEA 2000 Connector	M12 Male (A polarised) connector moulded into case
NMEA 2000 Connector Material	Nickel plated brass
Weight	80g
Dimensions	106mm (L) x 73mm (W) x 24mm (H)
Environmental	
Environmental Protection	IP67
Operating Temperature	-20°C to +55°C
Storage Temperature	-40°C to +85°C
Recommended Humidity	0 - 93% RH

Approvals and Certifications	
NMEA 2000 Certification pending	
RoHS and REACH compliant	
RF Module certification	FCC / CE-RED / IC / TELEC / KCC / SRRC / NCC
EMC	EN 301489-1 V2.2.0:2017 EN301489-17 V3.2.0:2017 FCC part 15b, ICES-003 ANSI C63.4:2014, Class B
Radio	EN 300 328 V2.1.1:2016
Safety	EN 62368:2014
Guarantee	3 years (2 years on SD card)

## Product Dimensions (mm)



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