NMEA 2000 to Wi-Fi (W2K-2) Install/User Manual

Issue 1.2

Actisense®
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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-2-declaration-of-conformity/

Hereby, Active Research Ltd declares that the W2K-2 is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU.

Active Research Ltd tímto prohlašuje, že tento W2K-2 je ve shodě se základními požadavky a dalšími příslušnými ustanoveními směrnice 2014/53/EU.

Undertegnede, Active Research Ltd erklærer herved, at følgende udstyr W2K-2 overholder de væsentlige krav og øvrige relevante krav i direktiv 2014/53/EU.

Hiermit erklärt, Active Research Ltd dass sich das Gerät W2K-2 in Übereinstimmung mit den grundlegenden Anforderungen und den übrigen einschlägigen Bestimmungen der Richtlinie 2014/53/EU befindet.

Käesolevaga kinnitab, Active Research Ltd seadme W2K-2 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-2 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-2 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-2 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-2 è conforme ai requisiti essenziali ed alle altre disposizioni pertinenti stabilite dalla direttiva 2014/53/UE.

Ar šo Active Research Ltd deklarē, ka W2K-2 atbilst Direktīvas 2014/53/ES būtiskajām prasībām un citiem ar to saistītajiem noteikumiem.

Šiuo Active Research Ltd deklaruoja, kad šis W2K-2 atitinka esminius reikalavimus ir kitas 2014/53/ES Direktyvos nuostatas.

Hierbij verklaart , Active Research Ltd dat het toestel W2K-2 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-2 jikkonforma mal-ħtiġijiet essenzjali u ma provvedimenti oħrajn relevanti li hemm fid-Dirrettiva 2014/53/UE.

Alulírott, Active Research Ltd nyilatkozom, hogy a W2K-2 megfelel a vonatkozó alapvetõ követelményeknek és az 2014/53/EU irányelv egyéb elõírásainak.

Niniejszym Active Research Ltd oświadcza, że W2K-2 jest zgodny z zasadniczymi wymogami oraz pozostałymi stosownymi postanowieniami Dyrektywy 2014/53/UE.

Active Research Ltd declara que este W2K-2 está conforme com os requisitos essenciais e outras disposições da Directiva 2014/53/UE.

Active Research Ltd izjavlja, da je ta W2K-2 v skladu z bistvenimi zahtevami in ostalimi relevantnimi določili direktive 2014/53/EU.

Active Research Ltd týmto vyhlasuje, že W2K-2 spĺňa základné požiadavky a všetky príslušné ustanovenia Smernice 2014/53/EÚ.

Active Research Ltd vakuuttaa täten että W2K-2 tyyppinen laite on direktiivin 2014/53/EU oleellisten vaatimusten ja sitä koskevien direktiivin muiden ehtojen mukainen.

Härmed intygar Active Research Ltd att denna W2K-2 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-2 er í samræmi við grunnkröfur og aðrar kröfur, sem gerðar eru í tilskipun 2014/53/EU.

Active Research Ltd erklærer herved at utstyret W2K-2 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-2 este în conformitate cu cerinţele esenţiale şi celelalte prevederi aplicabile ale Directivei 2014/53/UE.

Contents

Important Notices

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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.

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 five year 'return to base' guarantee upon registration of the product. 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-2. 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-2 ensure the isolation switch is off. Wiring the W2K-2 while the connection is live may damage the W2K-2 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-2. Mounting on a contoured surface may cause damage to the case. Do not mount the W2K-2 while the device is powered, or the cable harness is connected. See also “Mounting the W2K-2” section.

Warning 4: Safe Distance

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

Firmware Updates

The W2K-2 unit has built-in firmware which is held in flash memory, allowing quick and easy upgrades using the firmware update option on the web interface. It is highly recommended that the W2K-2 firmware is kept up to date.

Details of the latest W2K-2 firmware version can be found 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 dispositive

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-2 Intro & Features

The W2K-2 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.

Also included with the W2K-2 is our Actisense-i diagnostics software, aimed at helping boaters check and diagnose potential issues on their NMEA2000 network. Development of Actisense-i is on-going and will have further features added in due course. See page 13 for further details.

The W2K-2 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 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-2 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
- 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
- Diagnostics and vessel monitoring via Actisense-i**

** Actisense-I is a new feature that is under continuous development currently. New features will be added in future releases

NMEA 2000 Network Basics

Minimum Requirements

A correctly powered and terminated NMEA 2000 network is required before installing the W2K-2. The minimum requirements for any NMEA 2000 network are:

Either

An **Actisense SBN-1/2** (an NMEA 2000 self-contained network)

Or

Power insertion point, or 'Power T' (**Actisense A2K-MPT-2**)
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-2 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-2

The W2K-2 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.

Refer to the 'Troubleshooting' section of this manual for a full description of the W2K-2 LED behaviour.

The W2K-2 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.

The W2K-2 measures the bus voltage and reports this via:
- The NMEA 2000 bus using PGN : 127508 : Battery Status (the instance can be configured).
- The Web Interface status page
- The Actisense-i gauge and graph

Set Up

The W2K-2 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-2.

Connecting to Wi-Fi

The initial connection to a W2K-2 must use the Access Point Method, and it will broadcast its SSID as “w2k-<serial number>”. This ensures that, by default, every W2K-2 has a unique Access Point.

The serial number of your device can be found on the front and rear of the case (e.g. If your serial number is 123456, then your the SSID for your W2K-2 will be W2K-223456).
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-2 (e.g. if more devices need to be connected to the W2K-2).

This Wi-Fi password can be changed at any time, but if it’s lost or forgotten, the W2K-2 password can be reset back to its default after gaining physical access to the unit. See ‘password recovery’ on page 23.

The W2K-2’s SSID will be visible using the network settings (i.e 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 (dependent on operating system).

Note: The connection manager will report “No Internet” which is correct as your device is now connected directly to the W2K-2 Access Point which does not provide internet access.

The W2K-2’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-2 can be used in either Access Point Method or Client Method (also referred to as Station or STA mode). Both modes can also be used simultaneously.

Access Point Method

This method can also be used where other Wi-Fi devices need to connect to / exchange data with the W2K-2 in the absence of an existing Wi-Fi network. The W2K-2 will, by default, use ‘channel 1’ in this mode.

Client Method

This is where the W2K-2 will become a “client” on an existing Wi-Fi enabled network, enabling the W2K-2 to connect and/or exchange data with other devices connected to that existing network. The W2K-2 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-2.

Set Up (cont'd)

The W2K-2 default channel for access point mode is channel 1, however when the W2K-2 is used in client mode, the Wi-Fi channel of the client (e.g. Wi-Fi router) will be adopted by the W2K-2 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-2 remembers client status, so even on a power cycle it will automatically re-join the client on the clients Wi-Fi channel.

Make sure you have connected the W2K-2 Access Point via Wi-Fi with your PC or device. You can now access the W2K-2 configuration page from any web browser. Enter the IP address :

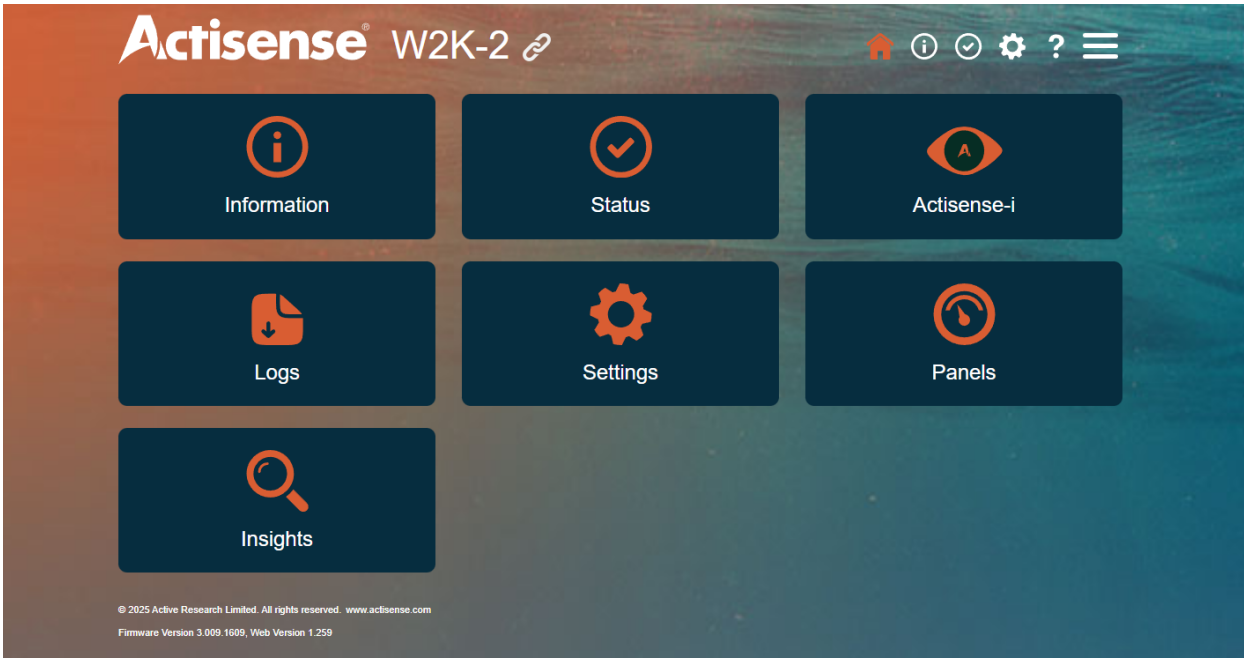
http://192.168.4.1

into the address bar and you will be presented with the W2K-2 home page shown on the next page.
Note: Pages which allow configuration changes are password protected and will prompt the user to "Login".

See page 15 for username and password details.

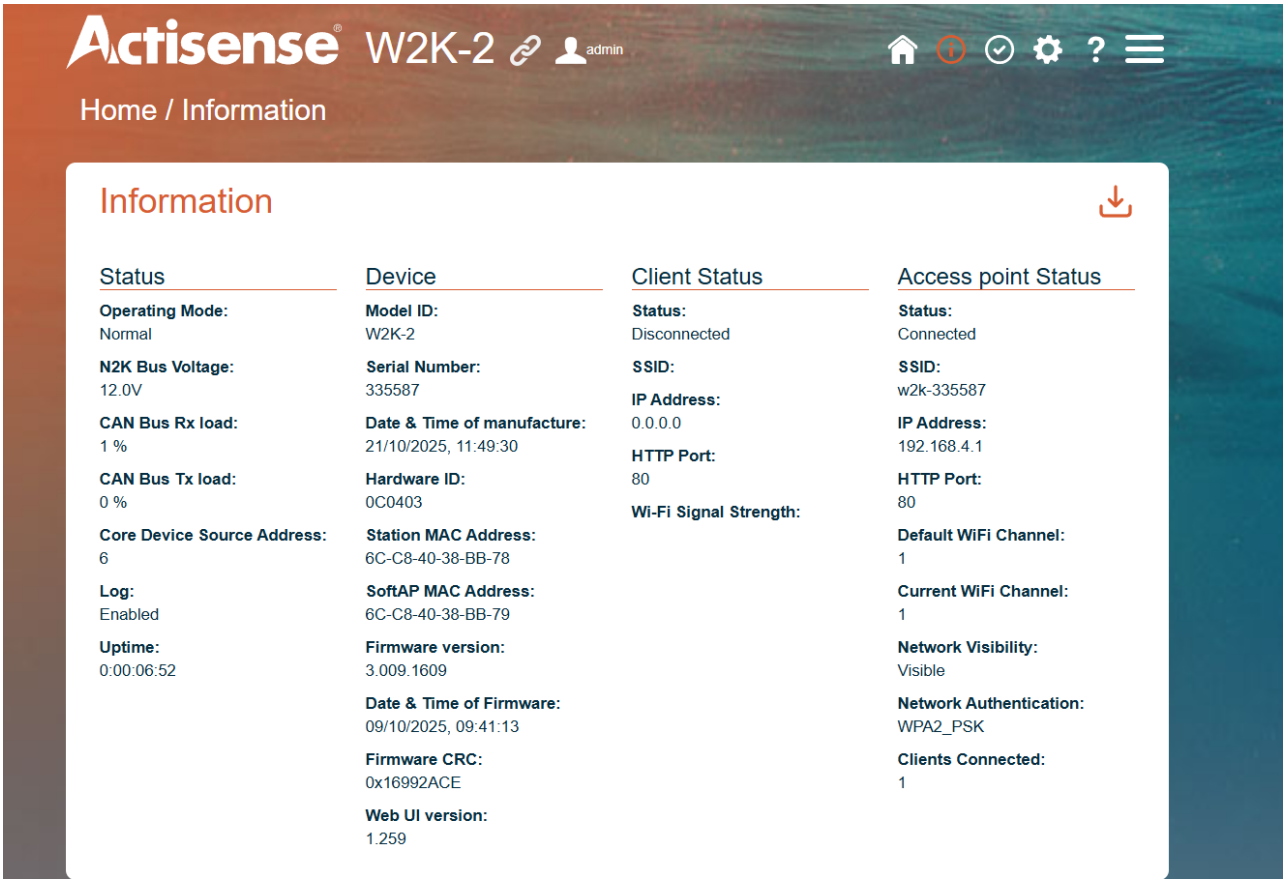
Note: The web browser will automatically test its connection to the W2K-2 and display a warning if the connection is lost.

Navigating the W2K-2 home-page



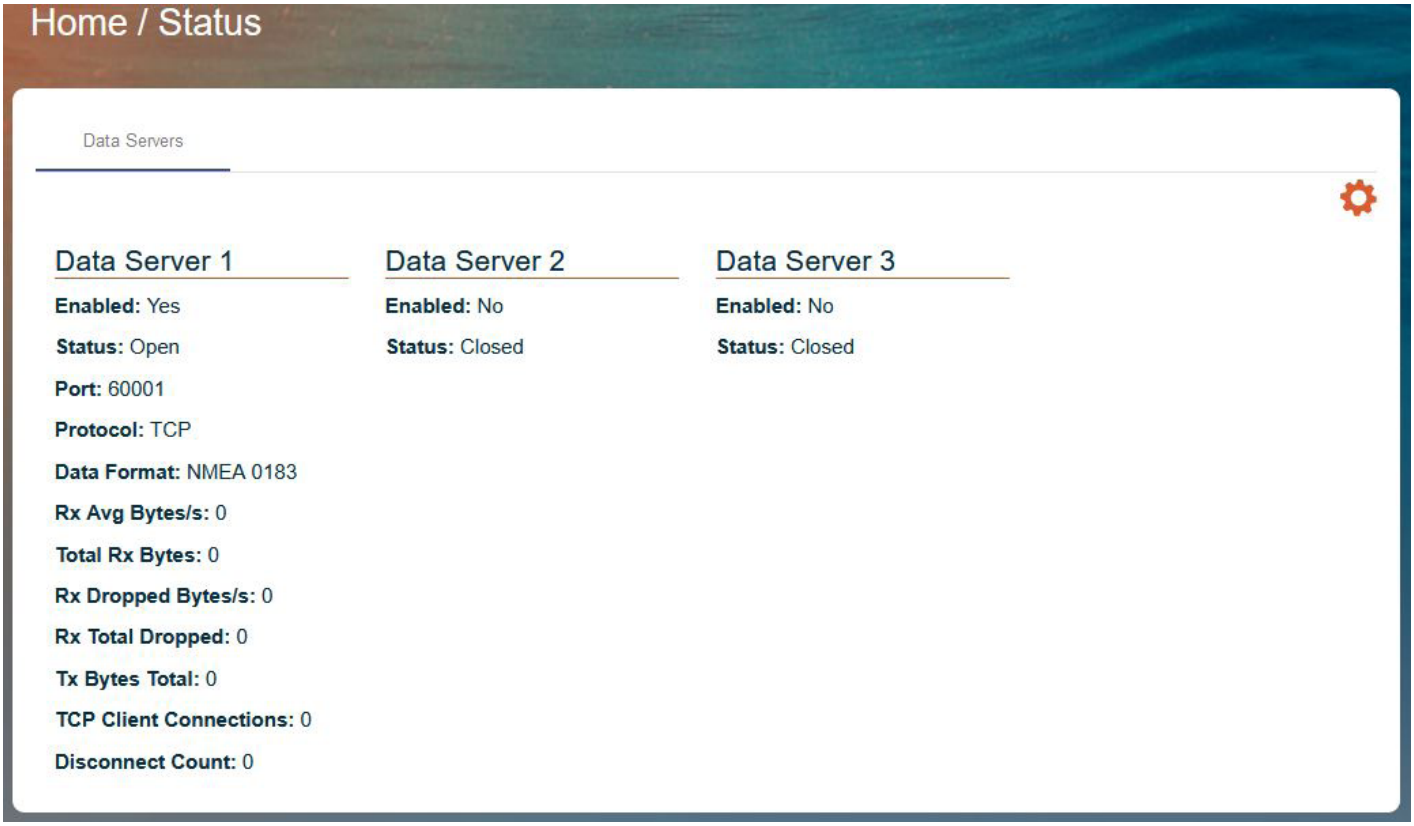
Information Icon

- This icon will display all the relevant technical information relating to the device itself.
- This information is important if you need to troubleshoot your device or require technical assistance at a future date.



Status

Data Servers: **Displays the following information relating to the data servers if enabled.**



Note:

TCP Client Connections - This is the number of clients ie. different applications which are connected to that data server at any one time.

Disconnect Count - This is the number of times that a client has disconnected (eg. closed the application) since the W2K-2 was last powere cycled of the data server was enabled.

Actisense-i

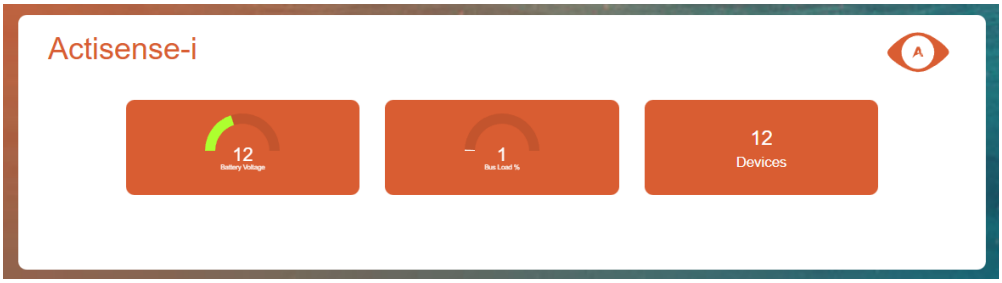
Actisense-i

Actisense-i brings valuable diagnostic capabilities to your W2K-2, monitoring various aspects of your NMEA 2000 network through a neat graphical interface. Actisense will be adding new functionality regularly through firmware updates.

Stay updated via our blog and social media channels for more information.

Currently, the Actisense-i functionality monitors:

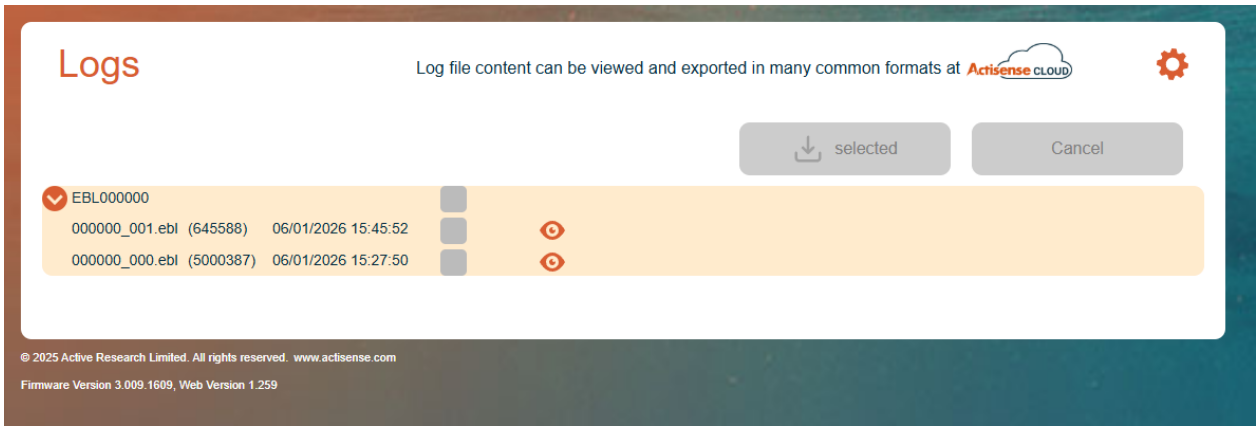
- NMEA2000 Bus Voltage
- NMEA2000 Bus Loading
- The number of devices currently connected to your NMEA2000 network. This allows a user to produce a network report which can be exported to a CSV or PDF format. This can be used as a manifest of all devices connected to the NMEA2000 network.



Clicking on an icon within the window above will give you access to further information regarding each feature.

Download Logs

Provides access to any log files which have been created allowing them to be downloaded for diagnostic purposes or reviewing race data etc.



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.

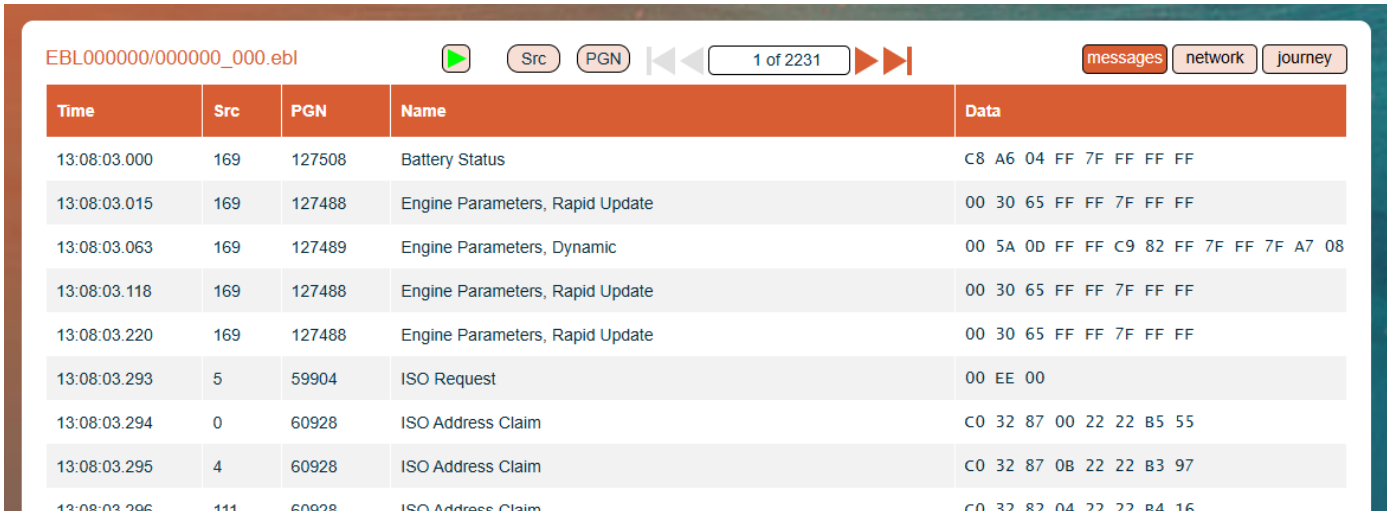
If the W2K-2 is restarted or power cycled, it will create a new log file and the previous log file size will be dependant on when restart occurred.

The SD Card slot within the W2K-2 supports up to 128GB SD Cards.
See page 23 for details on removing and replacing the SD card.

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.

Expand the EBL folder of interest and click the top check box to select all the logs files within the folder.You can now download all of the files from the highlighted “Download selected files” bar at the top of the page.
Each file is approximately 5MB in size and multiple files or an entire directory can be selected.

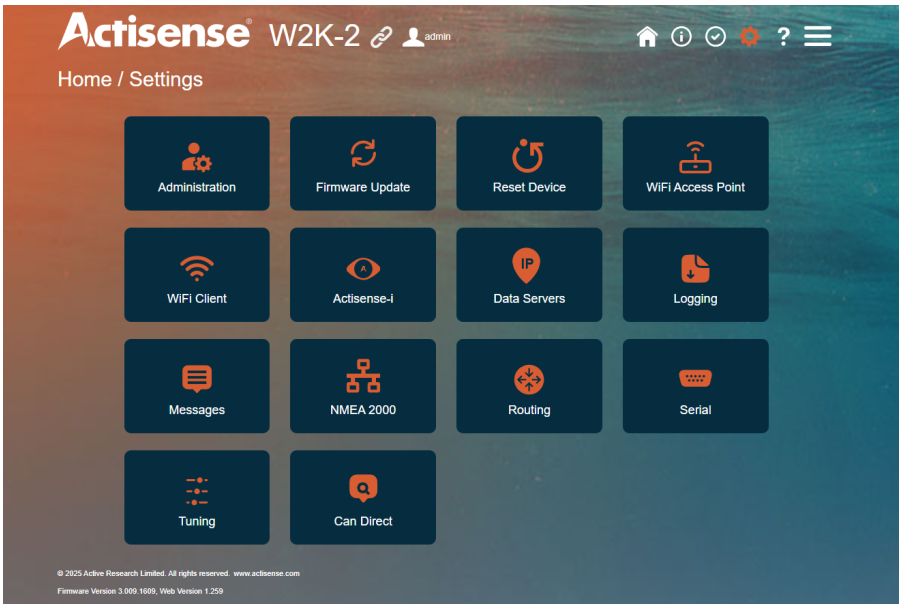
Live view of the logs is also possible, removing the need to download them for investigation.



Time	Src	PGN	Name	Data
13:08:03.000	169	127508	Battery Status	C8 A6 04 FF 7F FF FF FF
13:08:03.015	169	127488	Engine Parameters, Rapid Update	00 30 65 FF FF 7F FF FF
13:08:03.063	169	127489	Engine Parameters, Dynamic	00 5A 0D FF FF C9 82 FF 7F FF 7F A7 08
13:08:03.118	169	127488	Engine Parameters, Rapid Update	00 30 65 FF FF 7F FF FF
13:08:03.220	169	127488	Engine Parameters, Rapid Update	00 30 65 FF FF 7F FF FF
13:08:03.293	5	59904	ISO Request	00 EE 00
13:08:03.294	0	60928	ISO Address Claim	C0 32 87 00 22 22 B5 55
13:08:03.295	4	60928	ISO Address Claim	C0 32 87 0B 22 22 B3 97

Settings

Provides access to all the W2K-2 functionality, allowing the device to be configured to suit your needs. Please note that you will need to login to your device to allow any changes to be made.



Configuring the W2K-2

Configuration of the W2K-2 is performed via the “Settings” tab of the menu. You will require to login to the W2K-2 to change and save any required settings.

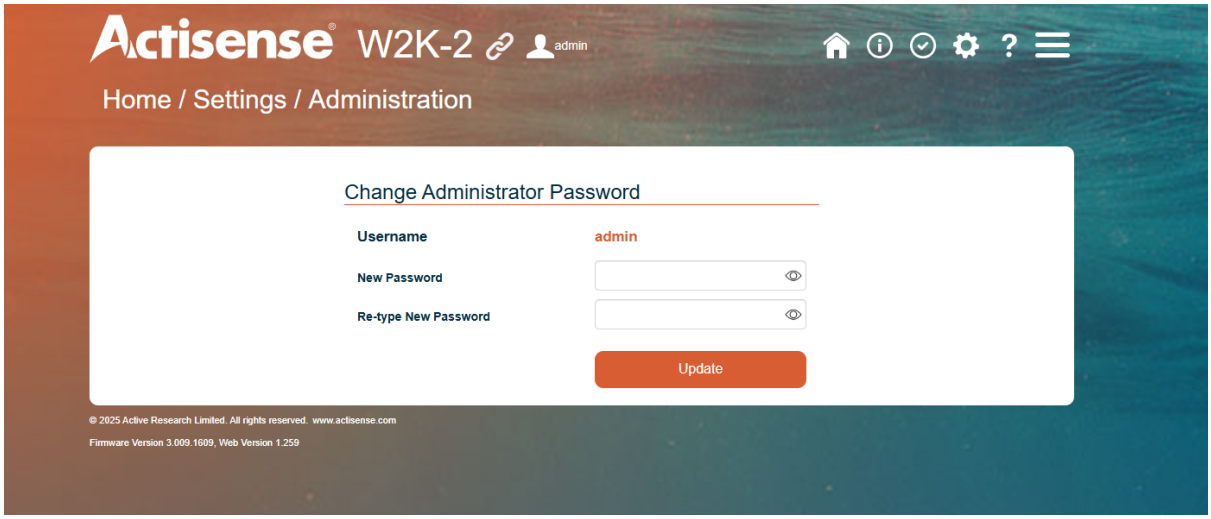
Administration

This tab gives you access to the following three functions:

- Change the password to access the device (Note: the username “admin” cannot be changed)
- Restart the device.

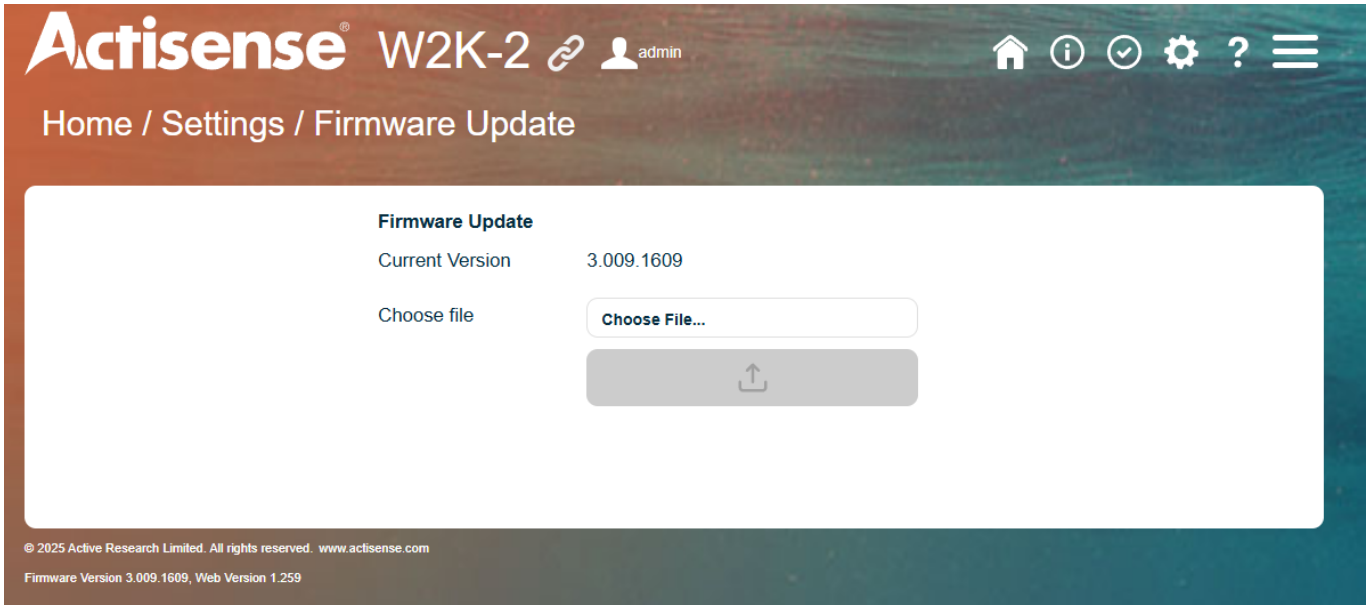
The Admin (Login) password can be changed here to a new one that’s between 2 and 30 characters long. If the password is mislaid or forgotten, it can be reset back to the default after gaining physical access to the unit by opening the blank end-cap and ejecting the SD card. See Password Recovery on page 23.

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



Firmware Update

This tab allows you to specify an update file to load onto your W2K-2. This file will be downloadable from the Actisense.com website as and when updates are made available.



Note: Do NOT extract files prior to upload. Firmware updates in the correct '.zip' file format for the W2K-2 are available from the downloads section at www.actisense.com. The version of firmware currently installed in the W2K-2 can be found in the "Information" menu on the W2K-2 home page.

Installation procedure

- Download the required .'zip' file from the downloads page, and save it on your PC/tablet.
- Click the "Choose File" icon and browse to the 'zip' file previously downloaded.
- Press "Upload" to install the new file.
- W2K-2 will automatically install the new file for you. Your W2K-2 will pause operation during this process, and should re-connect automatically once the upload has been successful.

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.

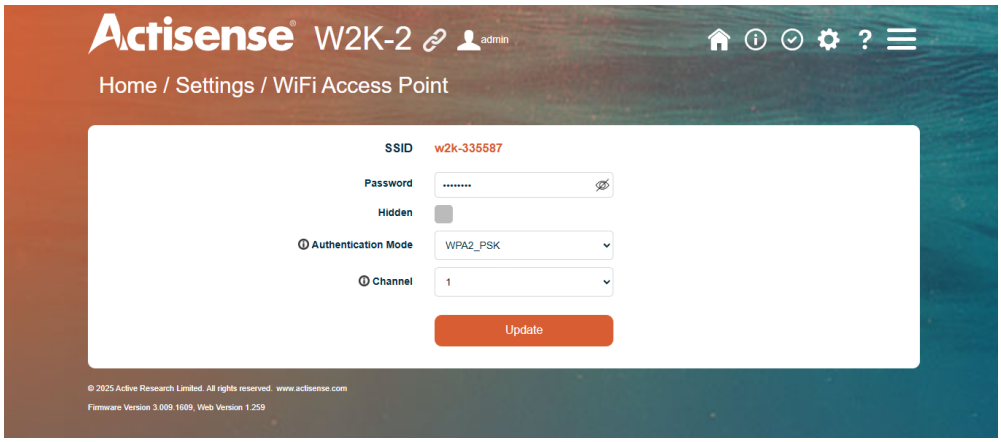
Remember, you may need to re-connect to the Wi-Fi after the firmware upgrade if the "automatically re-connect" option has not been selected.

Wi-Fi Access Point Settings

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 reset to the default after gaining physical access to the unit and removing the SD card. See Password Recovery on page 23.

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-2. The SSID of the W2K-2 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 PCs 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-2 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-2 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

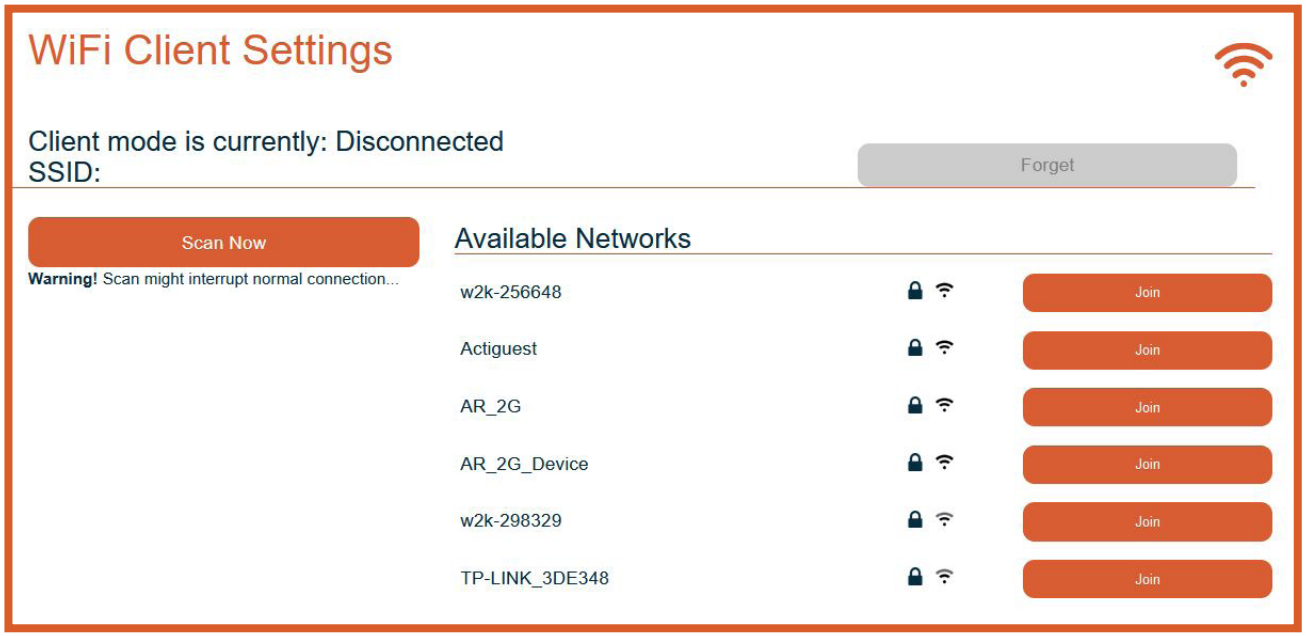
Scan for Client networks and then either join or disconnect from these networks.

Note: The connection will be interrupted during a scan.

This page shows the current connection status and Client SSID (if connected) in the top status bar. When a Client network is joined, the Wi-Fi channel of the Client will be adopted for all modes. The W2K-2 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-2 via the Client network.

The W2K-2 Access Point will still be active and you can find out the IP address allocated to the W2K-2 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.

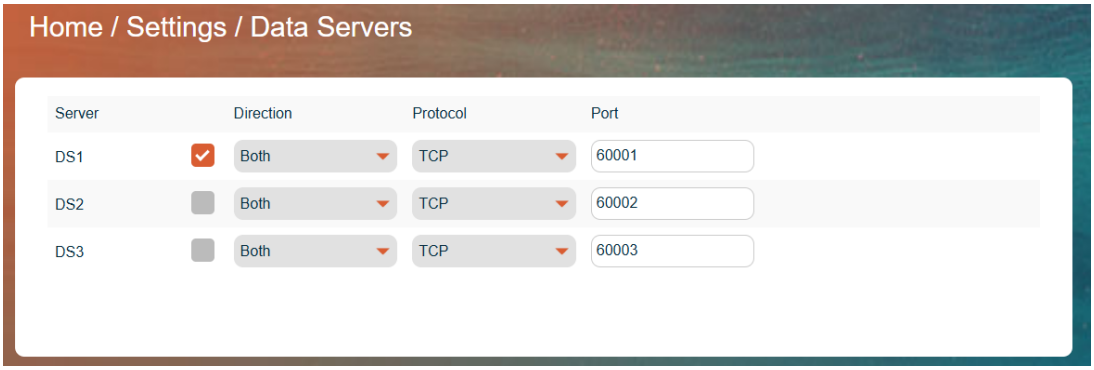
Note: The W2K-2 remembers the Client's connection details and will use those to automatically join the Client after a power cycle, or when the connection is dropped for some reason. Click the "Forget" button to remove a client's connection details from the W2K-2's memory.



Data Server Settings

The W2K-2 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 “Direction”, “Protocol” and “Port”. There is also an independent “Check box” which can enable or disable a data server. This will not cause the W2K-2 to forget the other settings – it is an on/off switch which will start or stop that server.

Note: The Format of the data is set on the Serial settings page.



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-2 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.

Port

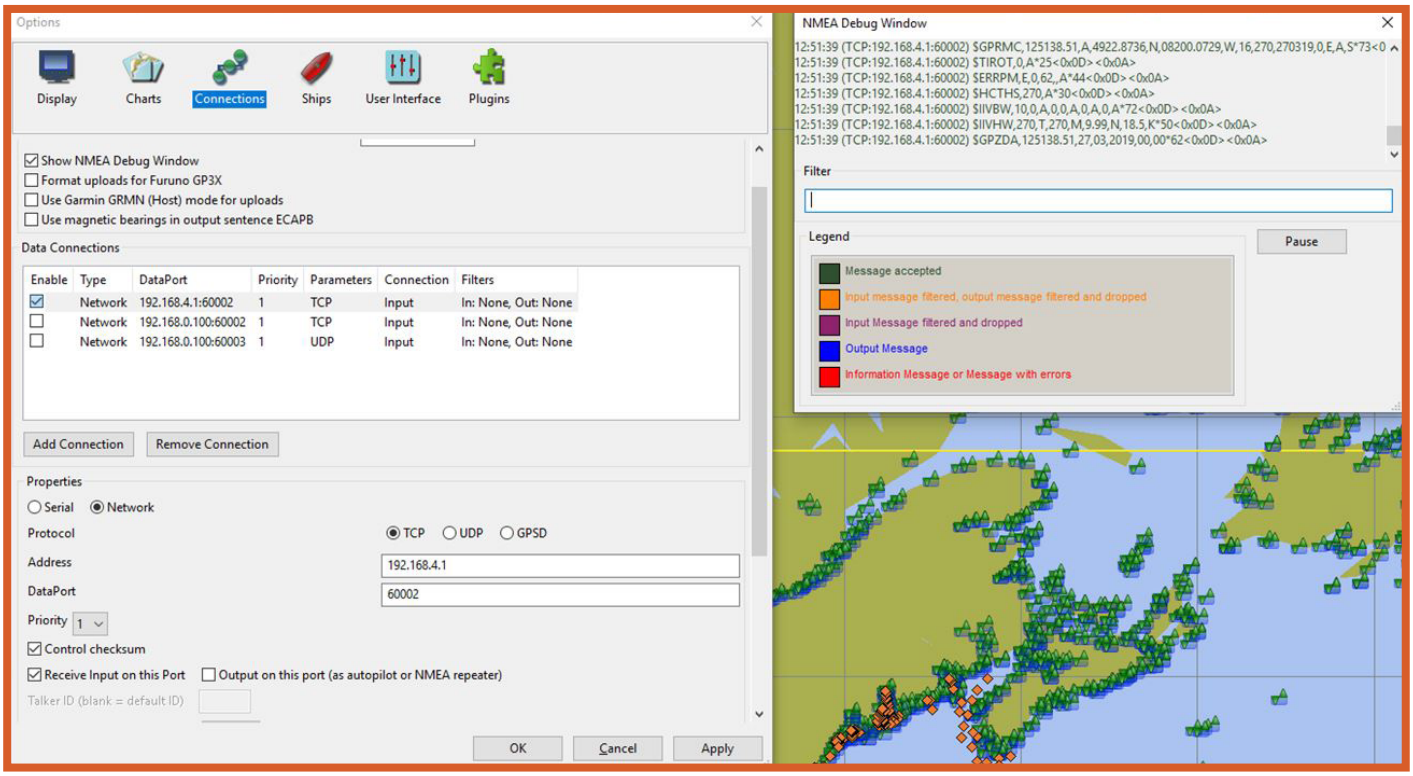
By default, the W2K-2 uses Ports 60001 - 60003, but can be set to any value corresponding to that of the application software. IP Ports can be set in the range 1-65535, although ports 1-1024 should be avoided, as they are used by special internet services. Setting a data server to use those ports could 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-2 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-2, the IP Address of the W2K-2 (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.

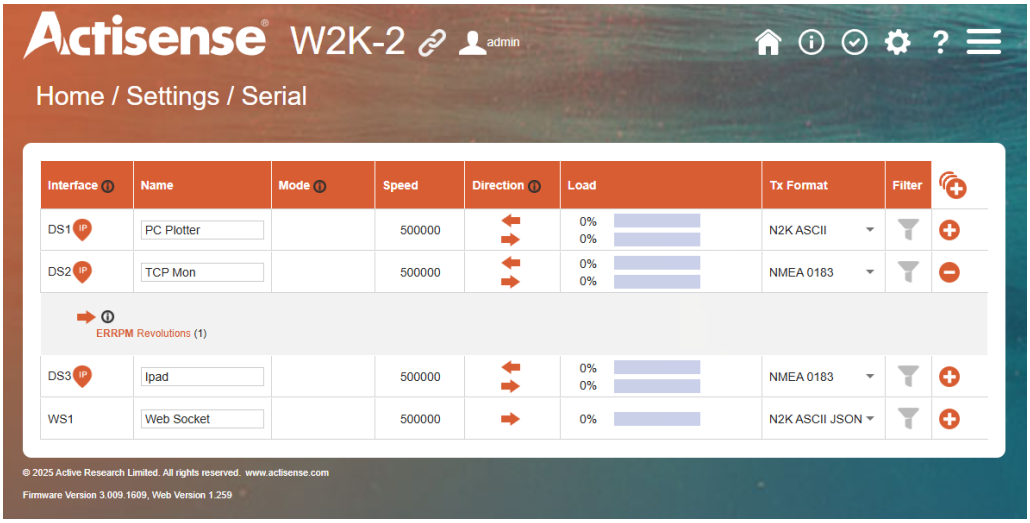
The W2K-2 has been tested with many popular PC and Device applications and configuring the connection and data format is similar across the different software applications.
Below shows an example of connecting to the popular OpenCPN application.

OpenCPN Setup Example



Serial Settings

The Serial settings page allows the user to configure the different Wi-Fi Data Servers.



You can add a friendly name for the interface, configure the format and add filters
It also provides a useful indication of the current loading of the interfaces. Clicking on the "+" will provide details of the sentences / PGN's which are being sent / received along with the number of times detected during the previous 10 seconds in brackets.

Name

A friendly name of up to 10 characters can be added to help identify the interface.

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 changeable within the **'Serial'** page 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-2 Conversion List.

RAW ASCII

This allows the W2K-2 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 ASCII Raw has the advantage of being human readable.

RAW Actisense

Like ASCII raw, this format allows the W2K-2 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.

Format (cont'd)

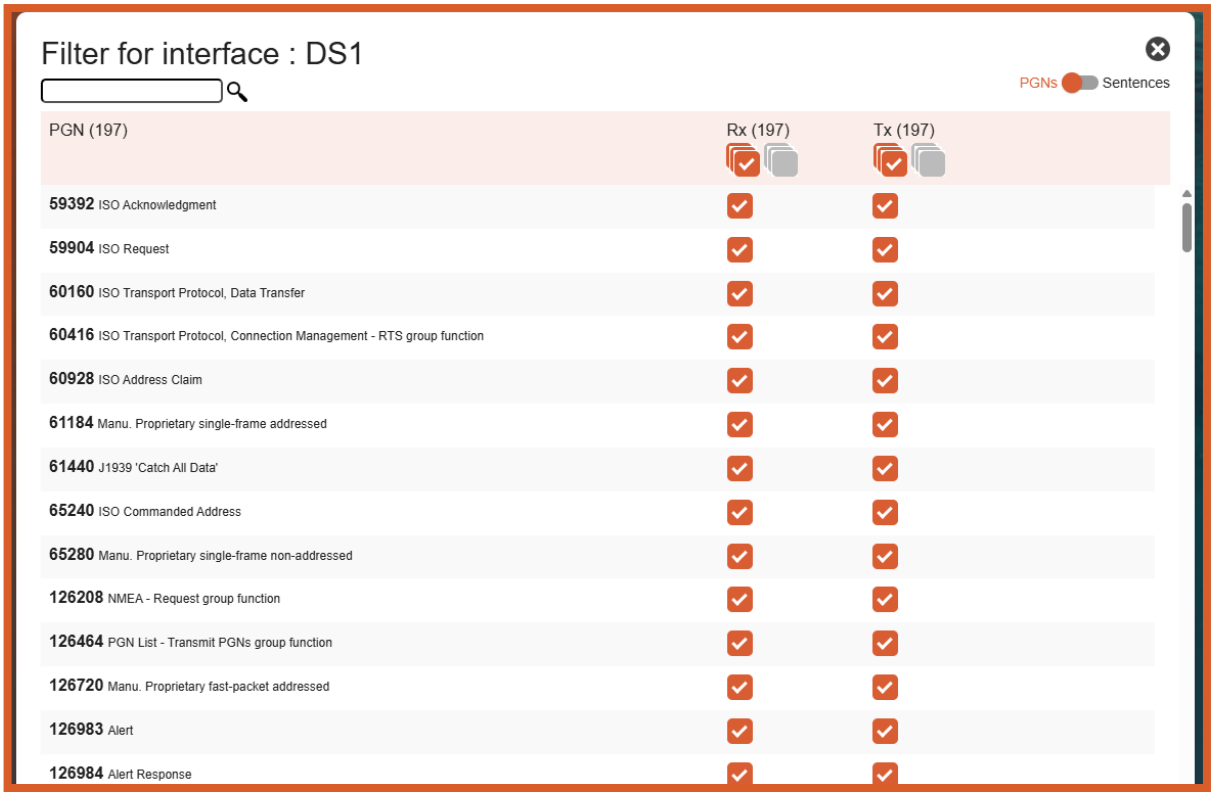
N2K ASCII
This is a new Actisense proprietary encoding technique for transferring complete NMEA 2000 PGNs. This format can be sent and received by the W2K-2. If viewed on "IP port monitor" software such as https://www.aggsoft.com/serial-port-monitor.htm, the N2K "PGNs" are easy to read as a scrolling 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.

N2K Actisense
For transferring complete NMEA 2000 PGNs. This format can be transmitted and received by the W2K-2. 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.

NGT Actisense
This format has been in use by the Actisense NGT-1 since 2007. Currently this format can only be transmitted from the W2K-2. 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.

Filtering
The filter option allows for fine tuning of the data which is sent and received on each interface. This is useful for limiting bandwidth. Clicking the Filter Icon will open a list containing check boxes which can be selected for both Sentences and PGN's. (Selectable with toggle switch in top right corner)

With the filter icon active, pressing the icon will present the user with a full list of PGN values which can selectively be included / excluded depending upon requirements. Please note that CAN Tx rates are currently not adjustable and set to default values.

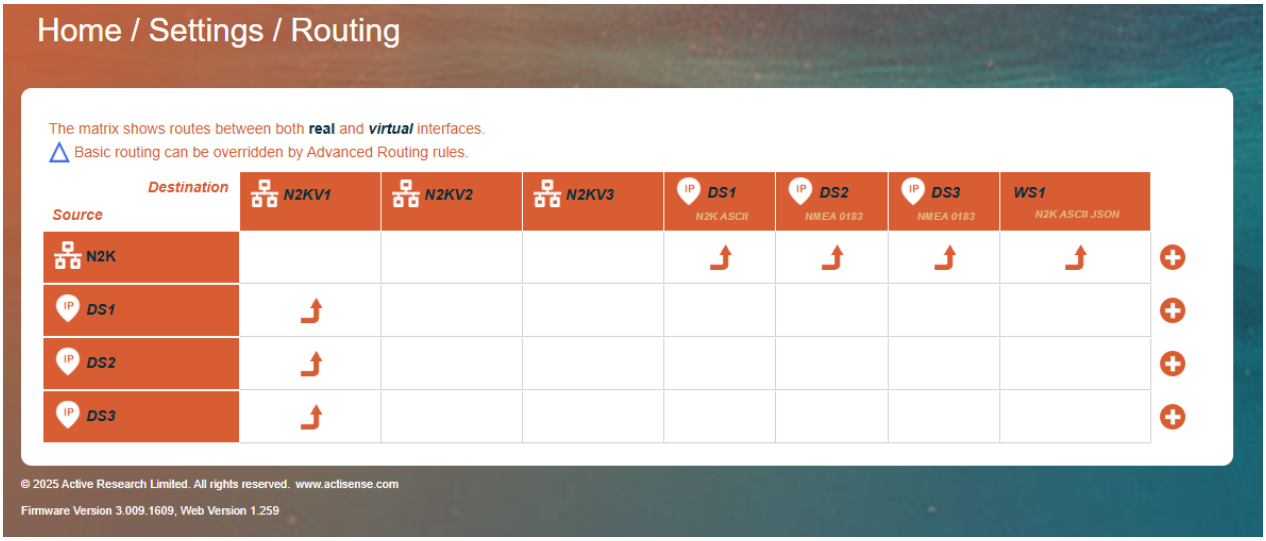


NMEA 2000 Settings

This functionality allows the instance of various parameters to be changed so that similar products on the bus can be identified seperately. Select the PGN which is required to have more than one instance and alter its value. Press “Update” to commit this change to the W2K-2

Routing Settings

This page allows routing to be configured.
The device can be set up quickly by using “Basic” routing which will route all data from a Source to a Destination on a selected route. In the matrix simply select which source should be routed to which destination. An arrow symbol will show a route (i.e. all data will be passed) whereas a blank indicates there is no route. (i.e. all data will be blocked)

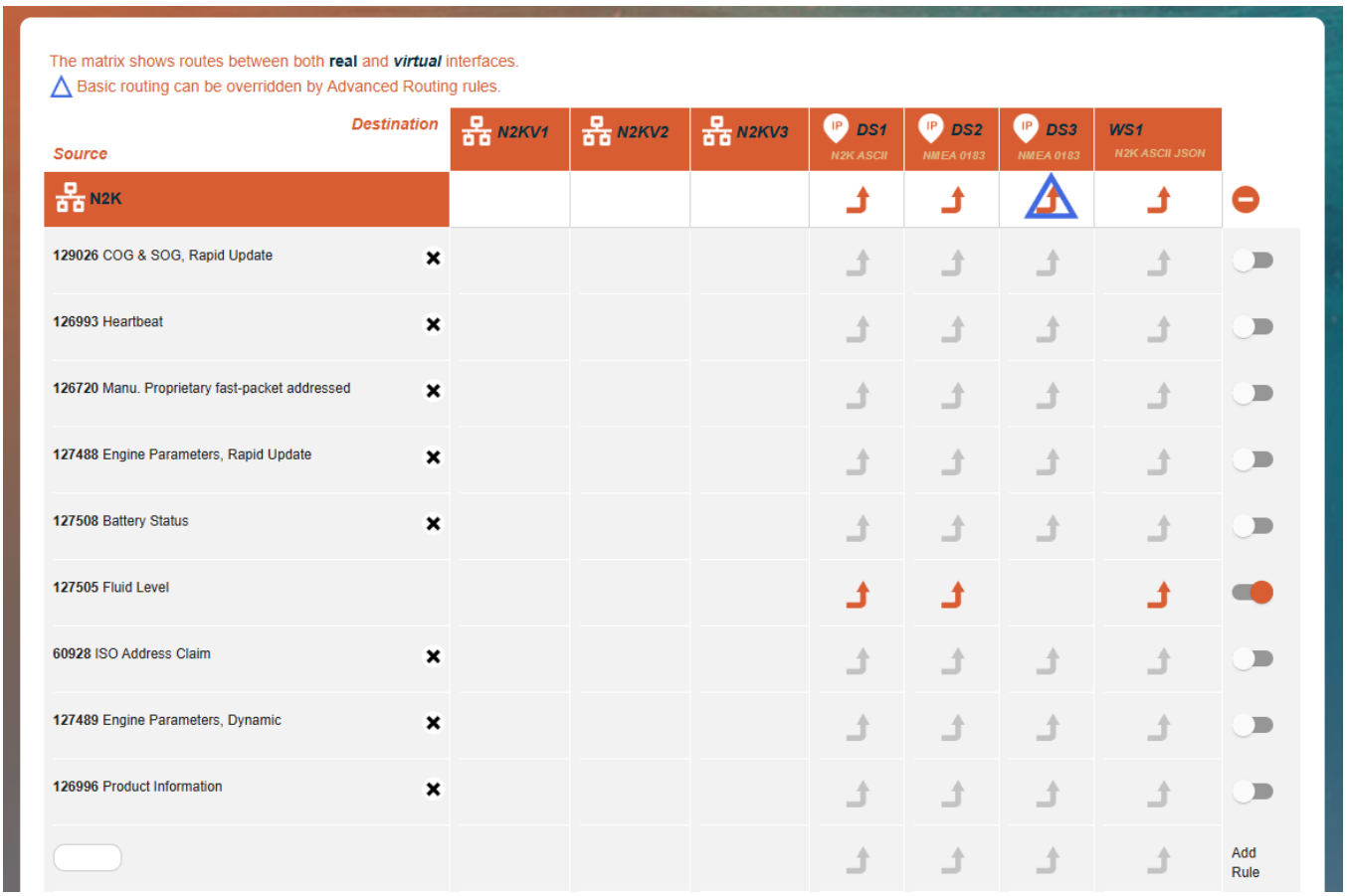


Advanced Routing

The W2K-2 allows for “Advanced” routing by clicking the “+” on the right hand side of the source row.

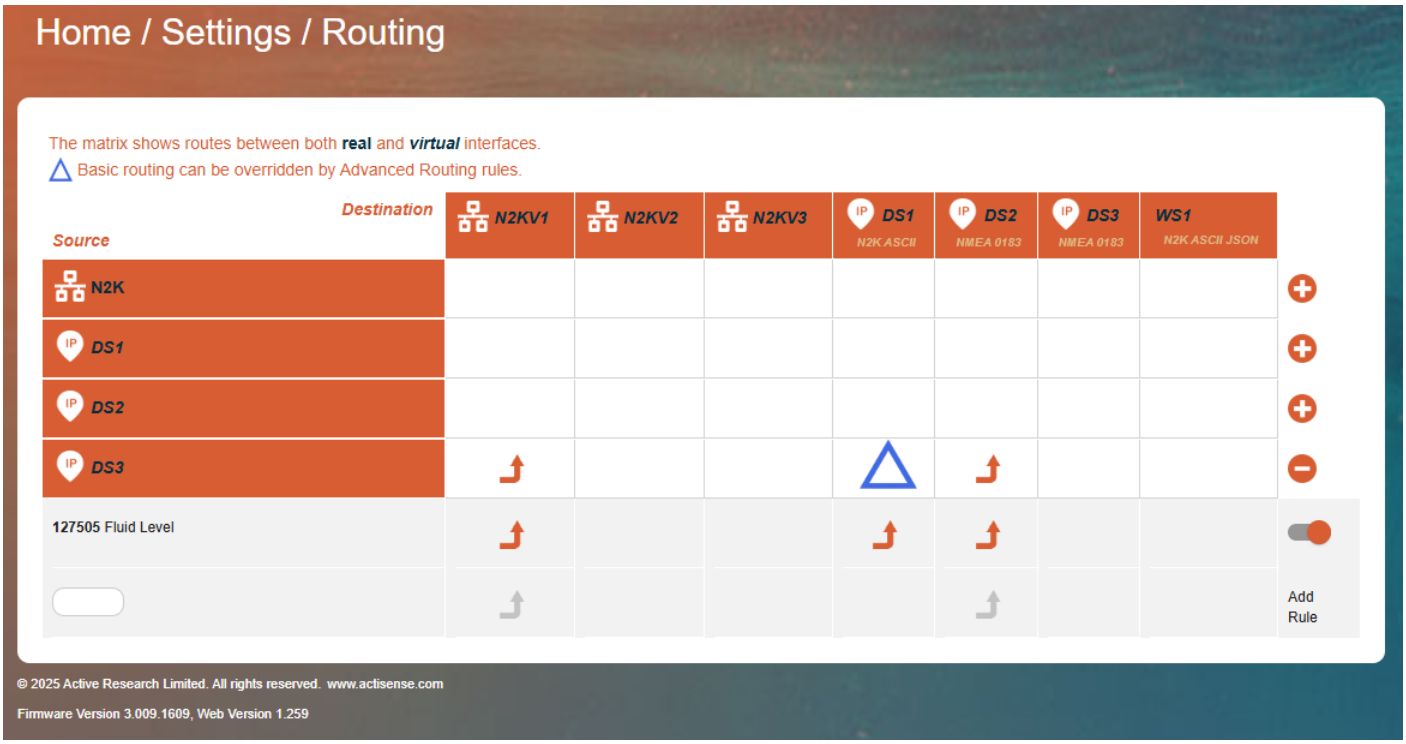
This allows for fine tuning of which data is passed or blocked.
This is done by creating a routing rule which can be input manually or else use the suggested rules which are presented. These rules are automatically populated from the data which the W2K-2 is currently seeing on that particular interface. For a rule to be activated it needs to be enabled with the toggle switch on the right hand side.
When an advanced rule is enabled you essentially modify the functionality of the “Basic” rule above. A blue triangle appears to indicate that an advanced rule is being applied. The details of that rule can be seen next to each enabled rule.

In the example below the rule for “127505 Fluid Level” (an auto populated sentence which the W2k-2 detected being received on the Serial interface) has been enabled. The Route for HCHDT to DS3 was modified. (Clicking the route removed it and it now shows Blank indicating no route)
A Blue Triangle appears on the Route above indicating that an “Advanced” Route is applied.
This modified route w.r.t. the N2K interface is as follows:
All data from the N2K Interface will be routed to the DS1 and DS2 and the Web Socket.
All data except for **“127505”** from the N2K interface will be routed to DS3.



Advanced Routing (cont'd)

In the example below a rule for "127505" was manually entered and then enabled. It was modified by clicking on a route from DS3 to DS1. Note: There was no existing route covering this, i.e. it was blank. A Blue Triangle appears on the Route above indicating that an "Advanced" Route is applied.
This modified route w.r.t. the DS3 interface is as follows:
All data from DS3 is routed to DS2.
Only "127505 Fluid Level" from DS3 is routed to DS1.
This is shown below:



Password Recovery (W2K-1)

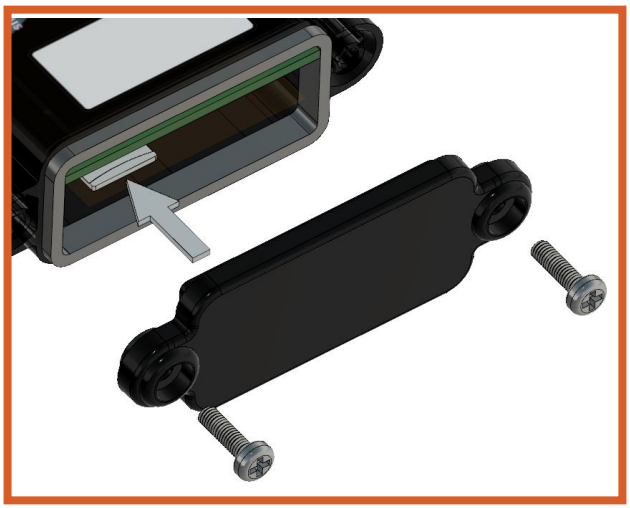
It is not possible to reset the configuration username and password using the NMEA 2000 connection, as this would require an insecure transmission of the Wi-Fi password.

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.

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.

Password Recovery (W2K-2)

It is not possible to reset the Wi-Fi and / or admin username and password using the NMEA 2000 connection as this would require an insecure transmission of the Wi-Fi password, therefore for additional security, the method used tot reset the password to its defaults requires physical access to the unit and is provided via a reset button mounted on the PCB. Please follow the procedure below to re-set your device.

Warning: Before doing this ensure the device is disconnected from the NMEA 2000 network and power! It is important to observe ESD precautions when handling the PCB to avoid static damage!

On the Flat end cap side of the W2K-2 housing carefully remove the two screws using a PZ1 (pozi) screwdriver. Then carefully remove the end-cap and locate the small push button on the PCB edge.

Carefully power the device up ensuring that there is no chance of anything touching the PCB which could cause shorts and damage the device. Depress the pushbutton for 5 seconds, then release it. The device should restart after a further 5 seconds with the passwords reset to default.

The Wi-Fi password will be reset to the default password which is printed on the label on the underside of the unit.

The Admin username and password will also be reset back to their factory defaults which is printed on the label on the underside of the unit.

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 support centre where 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-2 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 possible charge. Any cables originally supplied with the product are to be included in the returned box.

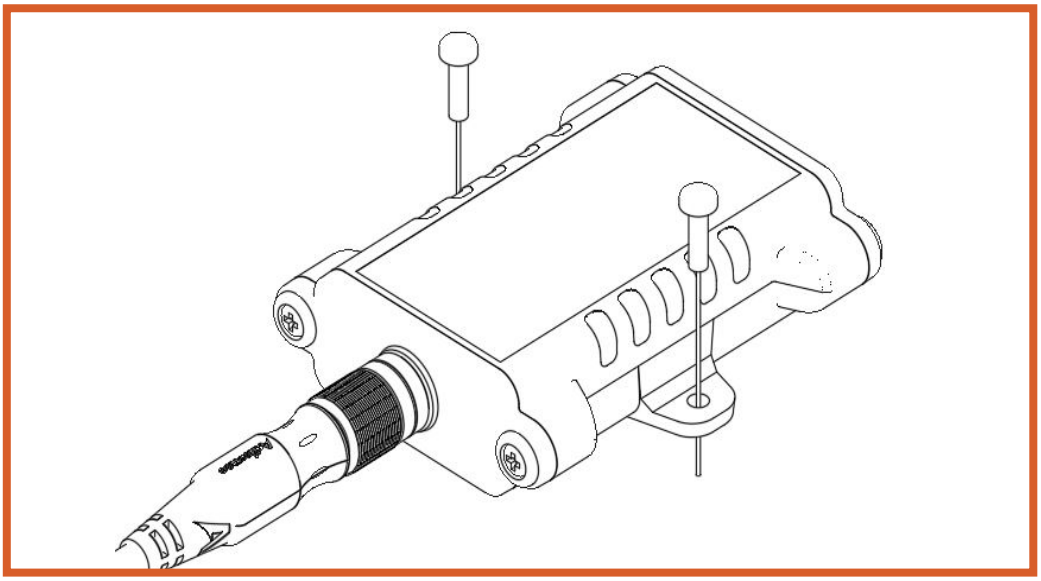
Mounting the W2K-2

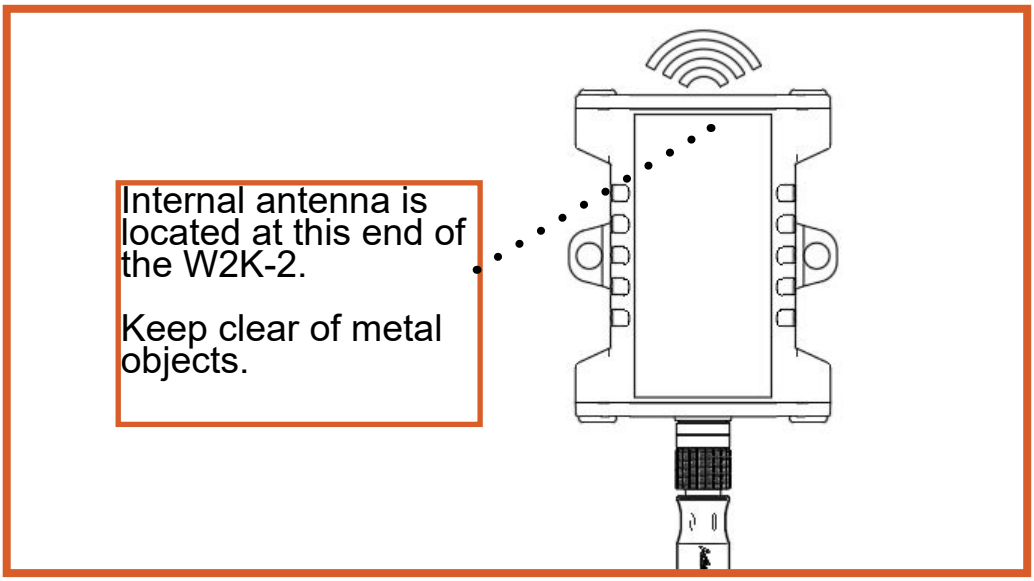
The W2K-2 has an internal antenna which is located on the end opposite to the NMEA 2000 connector and should not be mounted on a metal surface. To ensure best range it should be mounted vertically and located centrally on the boat as high as possible, avoiding other metallic objects. See picture below.

Warning: The W2K-2 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-2 can be secured to a bulkhead using the two screw holes on the side of the W2K-2 shown in the picture below.





Troubleshooting Guide

First level W2K-2 diagnostics / fault finding can be performed by observing the LED behaviour. The normal behaviour of the W2K-2 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-2, the NMEA 2000 network, or the W2K-2 itself.

Some common checks to perform on the W2K-2 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

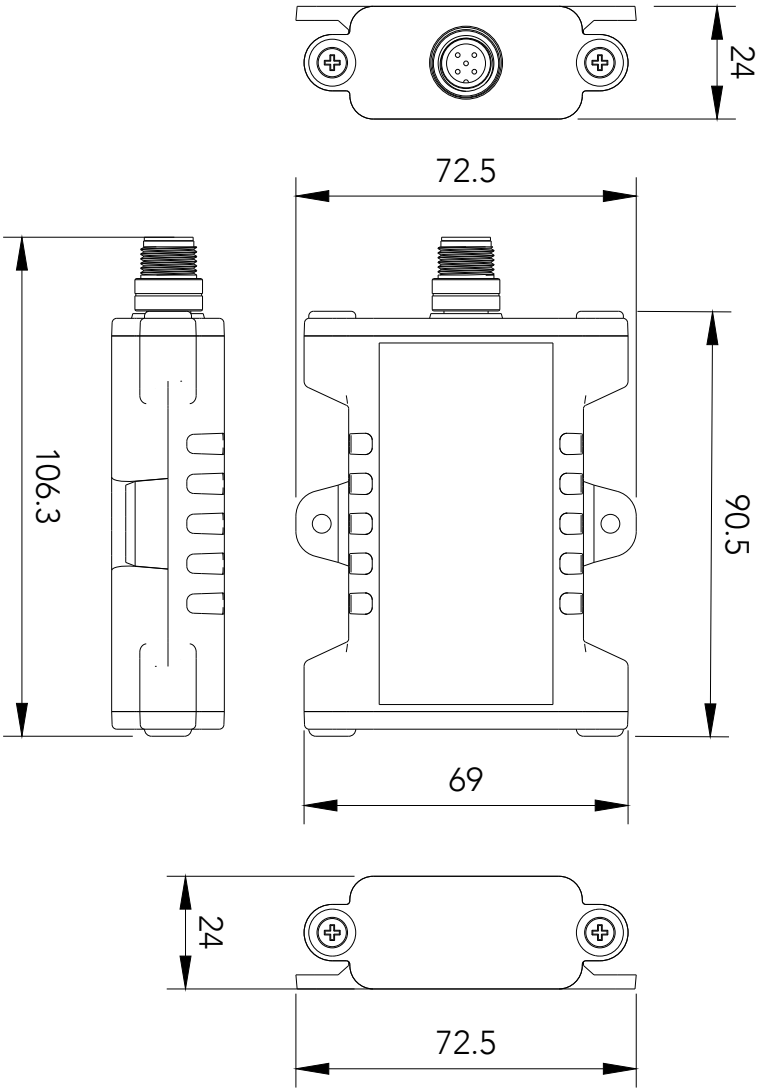
Note: If the W2K-2 does not re-direct to the home page and an error message is displayed, the likely cause is that the connection to the access point has been dropped during a re-start. This is dependent on the device connecting to the W2K-2’s connection settings, and is also dependent on the operating system.

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

Technical Specifications

Power Supply	
Supply Voltage (NMEA 2000 Port)	9 to 30V DC
Supply Current (NMEA 2000 Port)	70-80mA @ 9V DC, Max 220mA
Load Equivalent Number (LEN)	2
NMEA 2000 Port	
Speed / Baud Rate	250kbps
Connectivity	M12 Male (A coded)
Wi-Fi Radio	
Compatibility	IEEE 802.11 b/g/n
Speed	802.11n up to 150Mbps
Frequency Band	Wi-Fi: 2412 -2484MHz
Max Output power	Wi-Fi: 19.14dBm (802.11b) 19.22dBm (802.11g) 19.12dBm (802.11n)
Antenna	Integrated internal antenna, 3.4dBi
Range (Open space)	approx. 30 meters
Security	WPA_PSK, WPA2_PSK, WPA_WPA2_PSK
Configuration	
IP support	Supports TCP & UDP broadcast
Data protocols	NMEA 0183 & Five proprietary
Security	Unique SSID and unique default Password per device. (Password is user configurable)
Mechanical	
Housing Material Body	Flame retardant Polycarbonate
Housing Material End Caps	Flame retardant PBT
Weight	112g
Dimensions	126mm x 73mm x 24mm
Approvals and Certifications	
NMEA 2000	NMEA 2000 Certified
NMEA 0183	IEC 61162-1 & 61162-2 compliant
RoHS and REACH	Compliant
Module Certification	KCC / BQB / IC / Wi-Fi / NCC / MIC / FCC DSS / FCC DTS / SRRC / CE
EMC	EN 60945:2002 Edition 4 (section 9.3) EN 301 489-1 V2.2.3 EN 301 489-17 V3.2.4 EN 300 328 V2.2.2 Radiated Spurious Emissions FCC Part 15b ICES-003 Iss 7
Environmental Protection	IP67
Operating Temperature	-25°C to +70°C
Storage Temperature	-30°C to +70°C
Recommended Humidity	0 to 93% RH @ 40°C

Product Dimensions (mm)



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