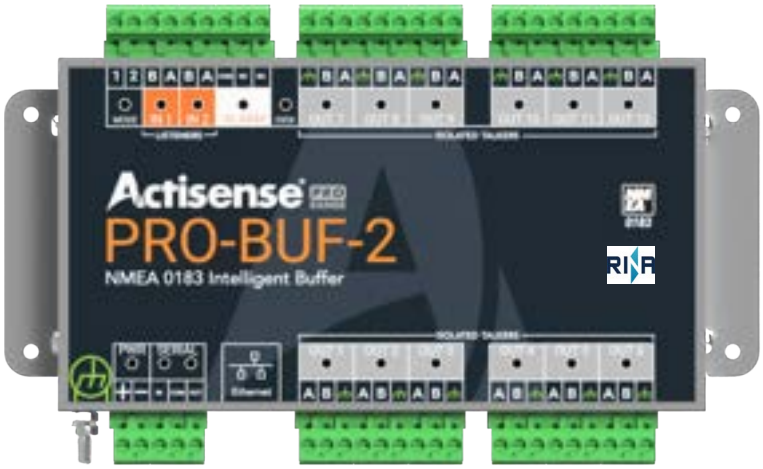
Actisense®
Connect **without limits**

Actisense PRO-Range products

Configuration Manual

- PRO-BUF-2 - NMEA 0183 Buffer
- PRO-MUX-2 - NMEA 0183 Multiplexer
- PRO-NDC-1E - NMEA 0183 Multiplexer



RINA

Issue 1.0

Important Notices

The device to which this manual relates complies with the Electromagnetic Compatibility requirements according to IEC 60945:2002-08, DNVGL-CG-0339:2019 & IACS UR E10 Rev7. The unit should always be used in conjunction with appropriately approved, shielded cable and connectors as per NMEA 0400 to ensure compliance. A declaration of conformity is available for download at www.actisense.com.

If the device to which this manual relates is to be installed within five metres of a compass, please refer to the 'Compass Safe Distance' section in the 'Technical Specifications' table.

Trademarks and Registered Trademarks

Actisense® and the Actisense logo are registered trademarks of Active Research Limited (Ltd). All other trademarks are the property of their respective owners.

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

Technical Accuracy

To the best of our knowledge the information contained in this document was 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 check 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 Registration

Please register your product via the online form at https://actisense.com/product-registration

Your product package includes a unit serial number. The serial number is six digits long and can be found below the barcode on the label. Your registration will assist Actisense Support to link your product to your details, simplifying any future assistance you may require.

Product Guarantee

All Actisense products are provided with a 5 year guarantee upon registration. To register your product, visit https://actisense.com/product-registration.

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 dispose of this product in accordance with the WEEE Directive. The product should be taken to a registered establishment for the disposal of electronic equipment.

Contents Page

Introduction

This manual contains instructions for configuring the PRO range of products from Actisense.

- **PRO-BUF-2 NMEA0183 Intelligent Buffer**
- **PRO-MUX-2 NMEA0183 Intelligent Multiplexer**
- **PRO-NDC-1 NMEA0183 Intelligent Multiplexer**

Please read through this manual carefully to realise the full potential of your new PRO product. This manual should be read in conjunction with the individual user/install manual available from the Actisense website at http://www.actisense.com

Built into the firmware of our PRO range products is a web-based configuration app. that allows the set-up to be tailored to your individual needs from any internet browser.

Since the products listed above have slightly different features, some of the screen shots contained within this manual will look slightly different to observed behaviour when the user configures their device, but the overall 'look and feel' will be the same as shown in the following pages. Specific features not available are marked accordingly.

Each of the PRO range products has it's own install manual where all the technical specifications of each device can be found. Please visit our website https://actisense.com for the individual install manuals.

PRO-Range products at a glance

Product	PRO-BUF-2	PRO-MUX-2	PRO-NDC-1E	
Inputs	2	8	2	
Outputs	12	6	5	
Serial Ports	1	1	1	
Ethernet	1	1	1	
Alarms	YES(With Relay)	YES(With Relay)	YES(No Relay)	

Accessing the PRO range of products via the network

The PRO range can be connected to your network in one of two ways.

1: Standard Ethernet Networks

- If the PRO product is connected to an ethernet network containing both DHCP and DNS servers, launch any of the popular web browsers.
- Replacing 'xxxxxx' with the serial number of your PRO product, type one of the following commands into the address bar depending on the product you have.
- **http://probuf-xxxxxx**
- **http://promux-xxxxxx**
- **http://prondc-xxxxxx**

2: Direct connection or basic ethernet networks

- If the PRO product is connected directly to a PC or the ethernet network does not have a DHCP server, the device will communicate using the auto-IP by default.
- The auto-IP process can take up to 60 seconds to complete.
- The PC's 'Local Area Connection' must also be set-up to use auto-IP in order to communicate on this network. Most PC's are set-up to do this by default. If needed, instructions on how to do this using Windows 10 are given in the user/install manual (other Windows operating systems will be similar). These can be found by visiting https://actisense.com

NOTE: PC administrator privileges are required to carry out these modifications.

- Once the PC and PRO product are using the same IP address range, launch any popular web browser.
- Replacing 'xxxxxx' below with the serial number of your PRO product, type in one of the following commands into the address bar depending on the product you have.
- **http://probuf-xxxxxx**
- **http://promux-xxxxxx**
- **http://prondc-xxxxxx**

The home-page for the PRO-MUX-2 will be as shown below.(Shown here for a PRO-MUX-2)
NOTE: You may need to refresh your browser window if the web-app does not display immediately.
NOTE: Clicking on any of the icons at this point will allow you to view the current settings of your PRO range device, but alterations are not possible until a user 'Login' is performed.
When prompted for login ID, please use :

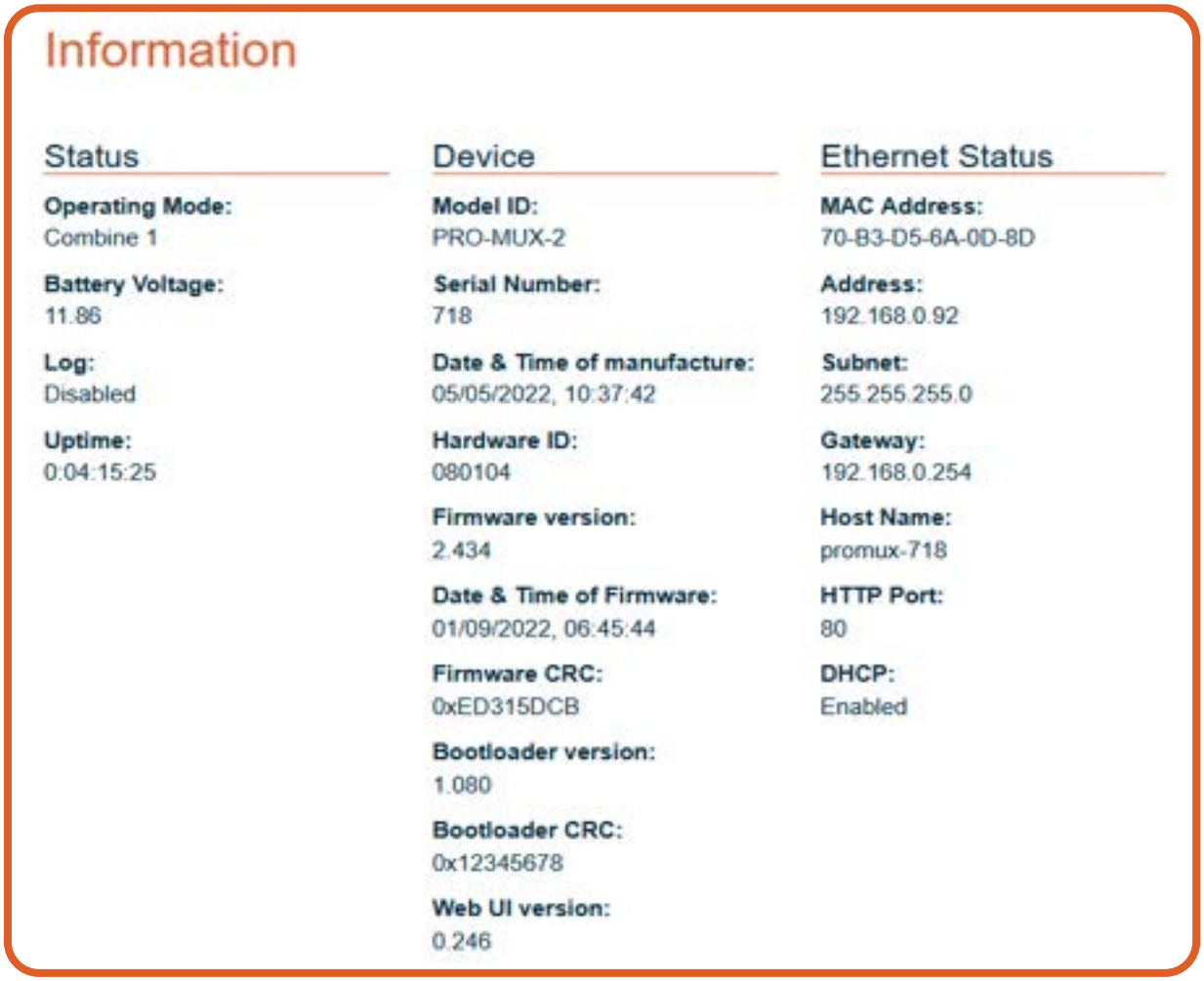
Username: admin Password: admin.

The password can be altered later. The username 'admin' is static and cannot be altered.

Navigating the PRO range home-page (shown here for the PRO-MUX-2)

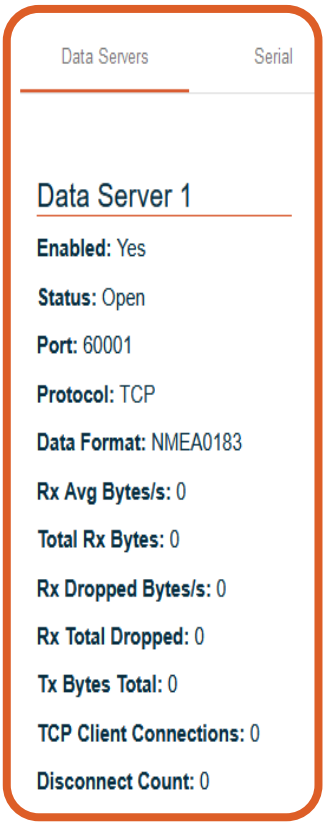
Information Icon

- 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.

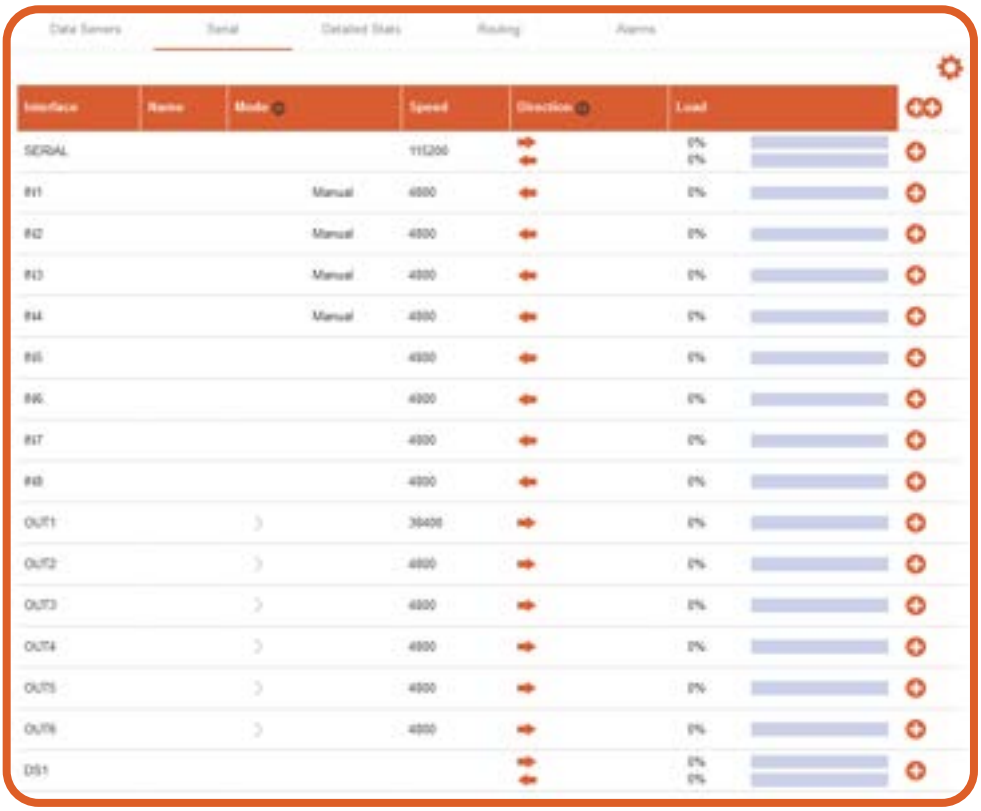


Status Icon

- This icon displays the current status of all the various user controlled settings:
- **Data Servers: Displays the following information relating to the data server if enabled.**



- **Serial: Displays the current status of all the serial ports, including their baud rate, alias name if applied, port direction and the current data load on each port.**



- **Detailed Stats:** Once the PRO device is operational, this page will show the number of individual sentences being received or transmitted over a 10 second period. The picture below shows a simple case of GPS sentences being sent and received. Once the device has more inputs and outputs enabled this will contain all the sentences being routed through the device.

- **Messages being received from talkers**

Data Servers | Serial | Detailed Stats | Routing | Alarms

Time Period: 10 secs — Receive / Transmit

	IN1-GPS	IN2	IN3
GPDTM	10		
GPGGA	10		
GPGLL	10		
GPGSA	10		
GPGSV	10		
GPRMC	9		
GPVTG	10		
GPZDA	0		

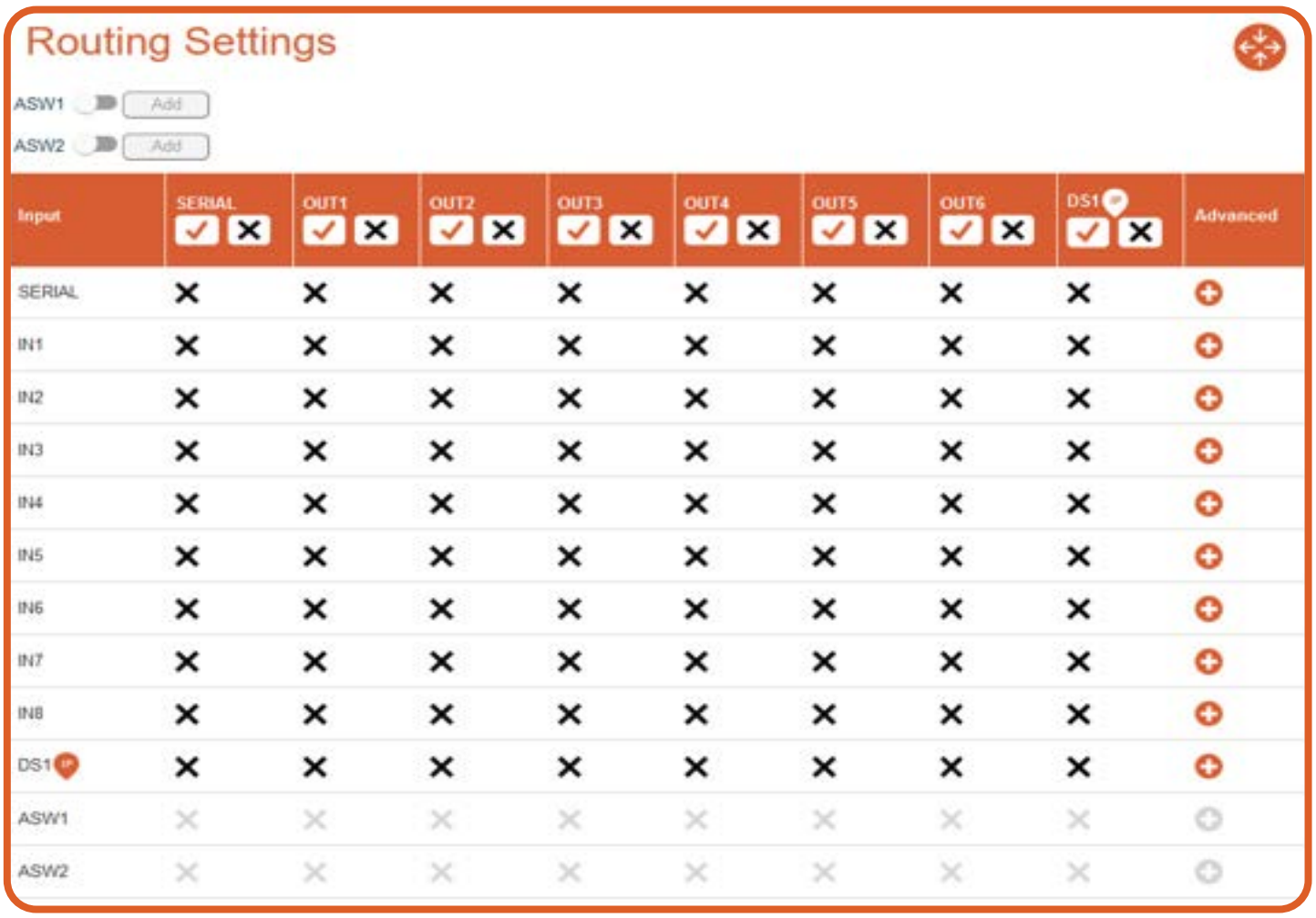
- **Messages being transmitted to listeners**

Data Servers | Serial | Detailed Stats | Routing | Alarms

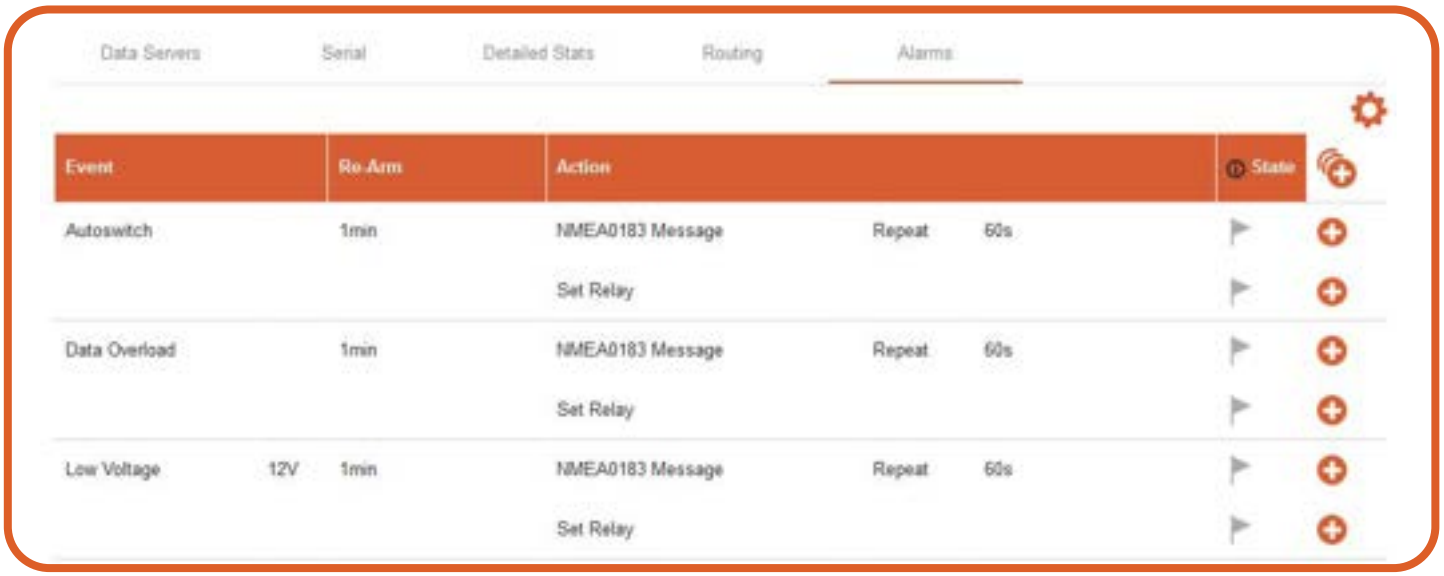
Time Period: 10 secs — Receive / Transmit

	SERIAL	OUT1-GPS
MXTXT	0	
GPGLL		10
GPRMC		10
GPVTG		10
GPZDA		0
GPGGA		10
GPGSA		10
GPGSV		10
GPDTM		10

- **Routing:** **Matrix showing data flow between inputs and outputs**

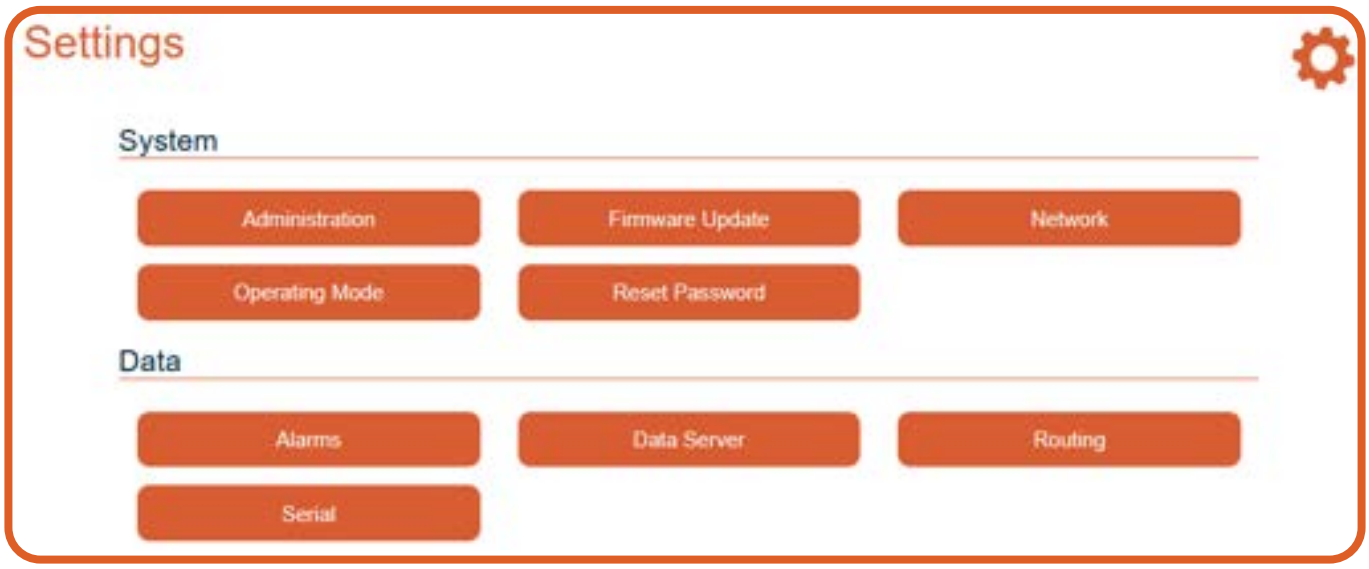


- **Alarms:** **Shows the status of any alarms which are currently set. See page 19 for further details regarding setting up alarms, and their requirements.**



Settings Icon

- Provides access to the device for configuration.
- Using any of these setting requires that the user 'Login' to the device (see page 5).
- The settings page provides the following functionality:



Administration:

Facility to change password only (Username is always 'admin')
Facility to re-start device.

Firmware Update:

Details current firmware version and provides the facility to update.

Network:

Allows the network to be configured correctly depending upon your particular set-up.

Operating mode:

Allows any pre-configured modes to be selected.

Reset Password:

Password can be reset to factory default

Alarms:

Allows the user to set up any required alarms.

Data Server:

Provides facility to turn server on/off as well as specifying data format output, direction and output protocol.

Routing:

Main configuration table to allow precise routing of data between inputs an outputs.
Access to 'autoswitch' operation and set-up.

Serial:

Allows full configuration for each port including baud rate setting, data direction, an 'alias' naming facility and also shows the current data load on each port.

Planning your NMEA0183 network

- Your PRO range device allows you to input data from NMEA0183 talkers' and direct these signals either individually, or in combination with other signals, to the various output ports which the device provides (See page 4 for details on individual number of ports available of the PRO range).
- In order for this to work correctly, the device must know at what baud rate the connected device is running. It is helpful to be able to name each device separately, so a facility to do this is provided.

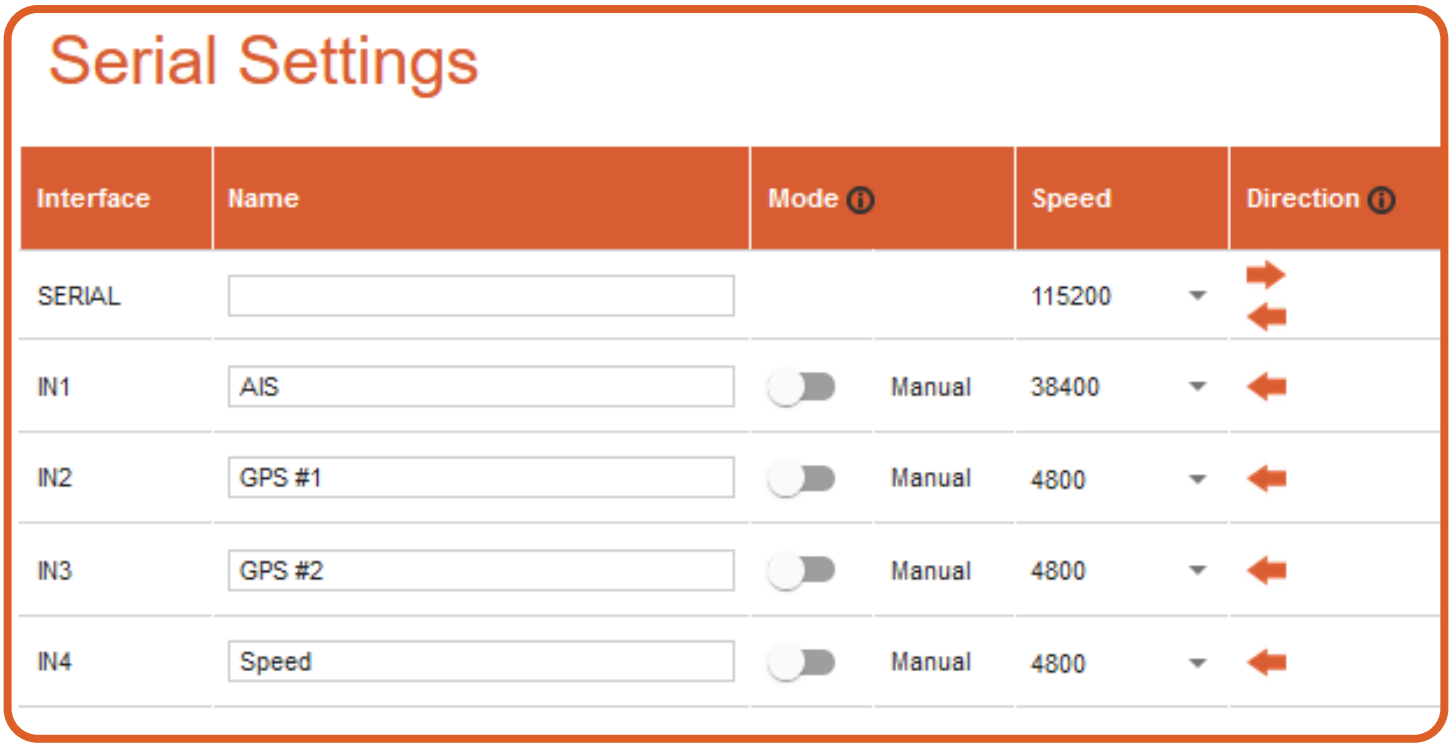
Configuring Input from 'Talkers'

- Please read this section in conjunction with the install/user manual if unsure of the required steps
- Adding a 'talker' device is a straight forward process.
- Connect your NMEA 0183 'talker' to one of the 'Listener' ports on the device.
- Pay attention to the wire-colours if your device follows the NMEA 0183 standard.
- Connect the **'talker'** pair of wires from your device to your PRO-MUX-2.
- Configure the device from within 'Serial Settings' of the configuration tool.
- Give the device a useful/meaningful name for future reference by filling in the blank 'Name' box next to its input.

As an example below, we have installed an AIS unit/two GPS units and a Speed sensor to the first four inputs of a PRO-MUX-2.
We have set the baud rate (speed) of the AIS unit to 38400, which is the usual rate for an AIS unit. The remaining three devices have all been set to 4800 baud.

NOTE: The first four inputs of the PRO-MUX-2 can be set to 'auto-baud' between 4800 & 38400 if required. Auto-baud allows the PRO-MUX-2 to follow the baud rate of the connected talker, without the need to specify it. This is helpful if you are unsure of the 'talker' baud rate, or it can change during its normal operation. Inputs 5-8 are pre-set to 4800 baud only. Again, the number of inputs and outputs visible will depend on the product being configured.

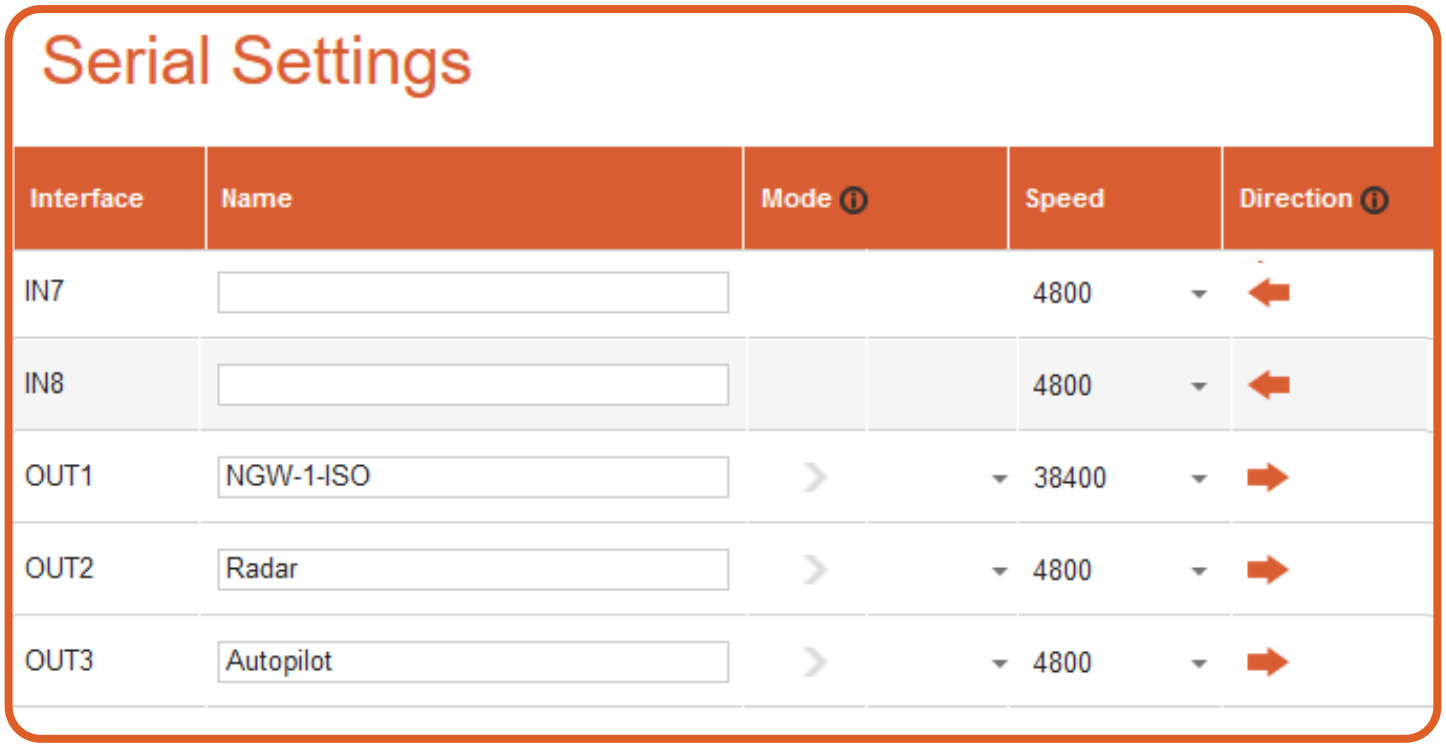
Manual / Autobaud



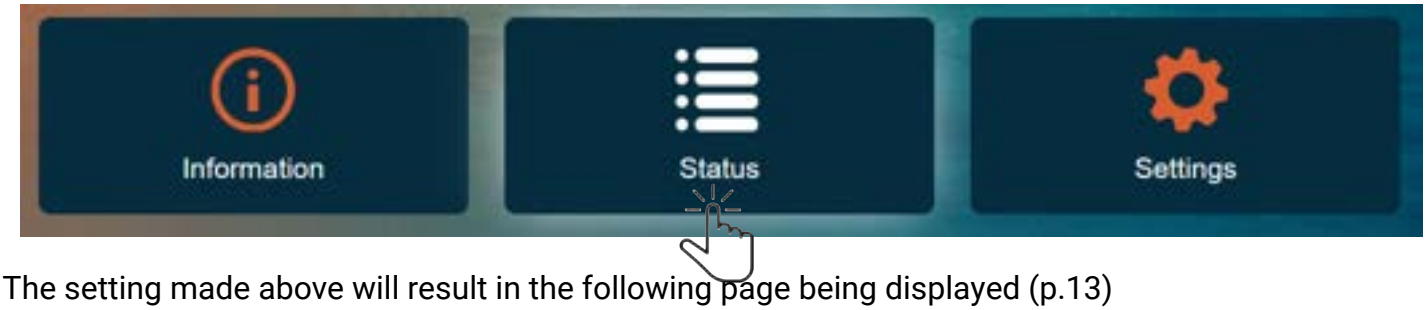
Configuring Output to 'Listeners'

- Configuring outputs from the device is performed in a similar way to configuring inputs.
- Connect the NMEA 0183 'listener' to one of the 'talker' ports on the device.
- Pay attention to the wire-colours if your device follows the NMEA 0183 standard.
- Connect the **'listener'** pair of wires from your device to your device.
- Configure the device from within the 'Serial Settings' of the configuration tool.
- Give the output stream a useful/meaningful name for future reference as shown previously.

As an example below, we have installed an NGW-1-ISO, a Radar and an Autopilot to the first three outputs of a PRO-MUX-2.
We have set the baud rate (speed) of the NGW-1-ISO unit to 38400 baud. The remaining devices have been set to 4800.
Consult the manuals and datasheets for your individual devices to find the correct settings.



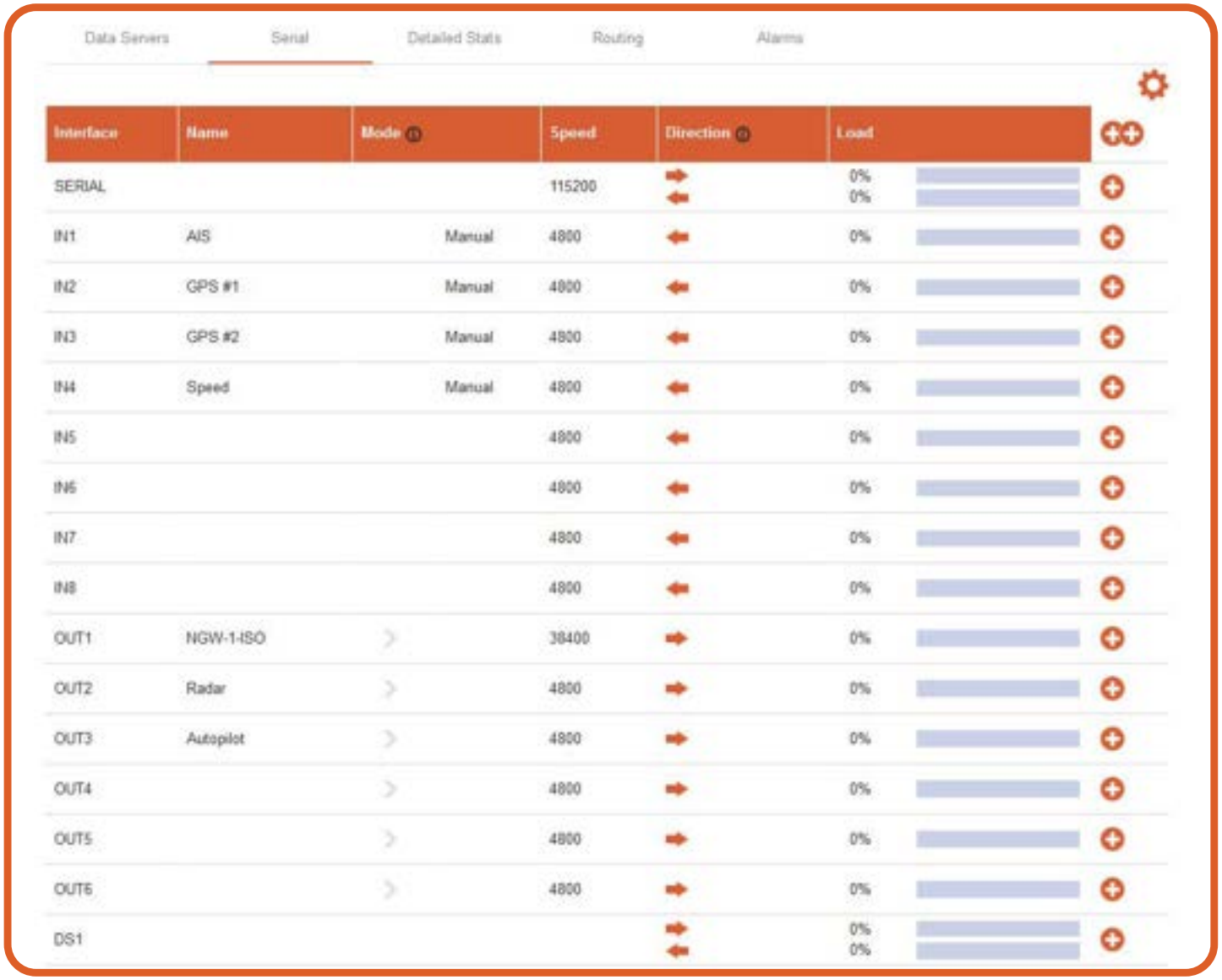
To confirm any changes made to the INPUTS and OUTPUTS on the device, click on the Serial tab of the 'Status' page.



The setting made above will result in the following page being displayed (p.13)

Serial 'Status' confirmation

- Below is the current state of INPUTS and OUTPUTS based on the previous examples.
- With real devices connected and 'talking' to the network, there would be an indication of 'Load' displayed as well.



Load Indicator

- Once the device is operational and combining data, each port in use will give an indictation of its current 'load' and sentences being passed as shown below.

Routing of INPUTS to OUTPUTS

- Once the required 'talkers and 'listeners' are connected to the device, you need to decide how you wish the various input signals to be routed and/or combined to the required outputs.
- When implementing this routing plan, there are baud rate issues that need to be considered.

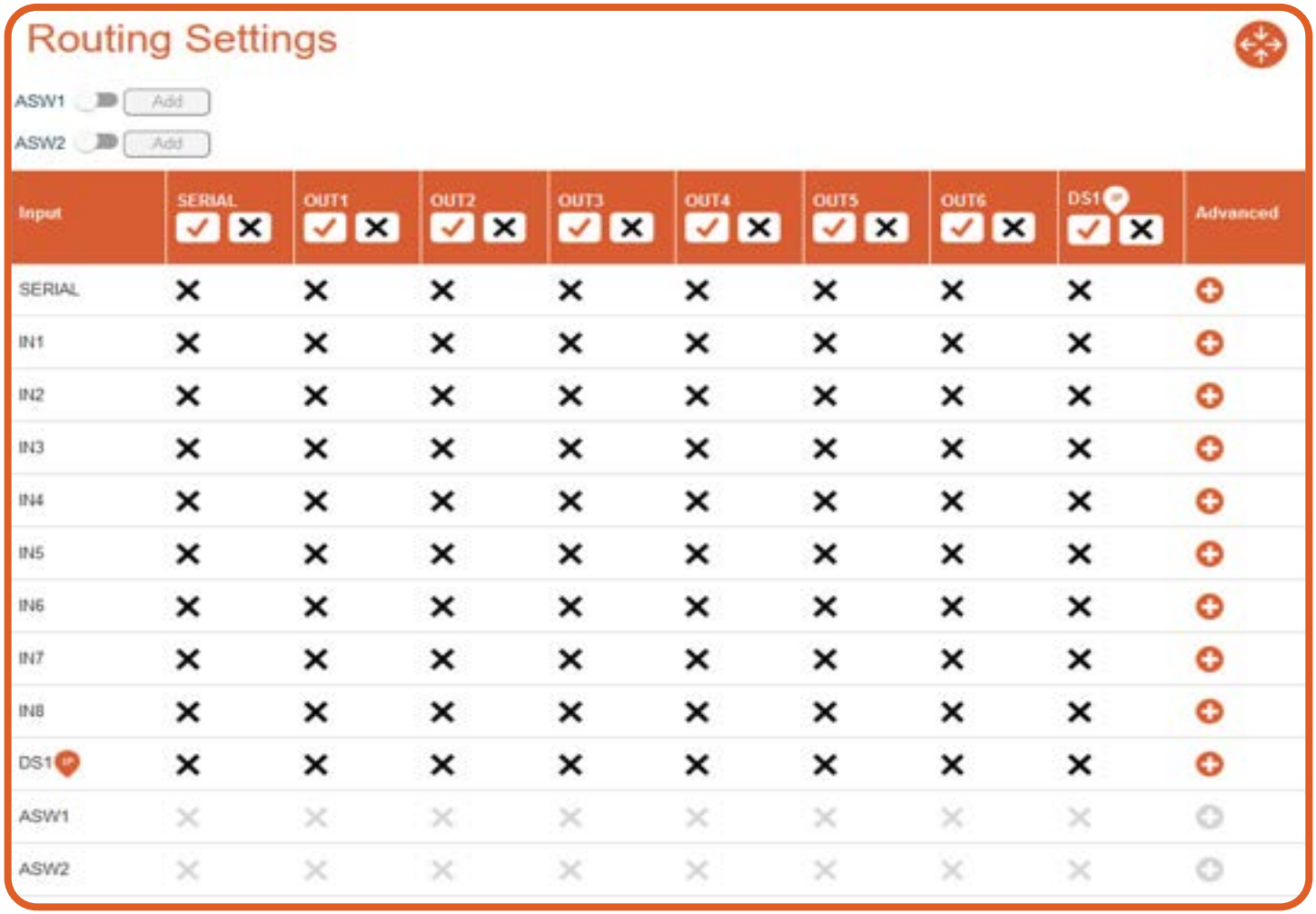
- An input signal being received at 4800 baud will not be output 4x faster if the **output** baud rate is set to 38400 baud. The device cannot replicate the messages it receives. The input signal of 4800 baud **can** be output at 38400 baud, but not repeated any faster than the original 4800 input baud rate frequency.

- An input signal being received at 38400 baud will result in a loss of data if it is tied to an output baud rate rate lower than the input. If the rate of messages being received is faster than the output port can transmit them, this will lead to signal loss, and sentences being dropped. This is quite a common scenario and is not necessarily an issue if its implications are understood.

The Routing Matrix

Shown below is an indication of the routing matrix which will be observed on the device.

- This screen shot shows the settings for a PRO-MUX-2 for example only.
- The inputs for the PRO-MUX-2 are located on the LHS of the matrix table.
- The outputs from the PRO-MUX-2 are shown on the horizontal orange bar.
- DS1(IP) input/output relates to the Ethernet port.
- ASW1 & ASW-2 provide access to the auto-switching functionality. These are inactive when auto-switching is not being used.

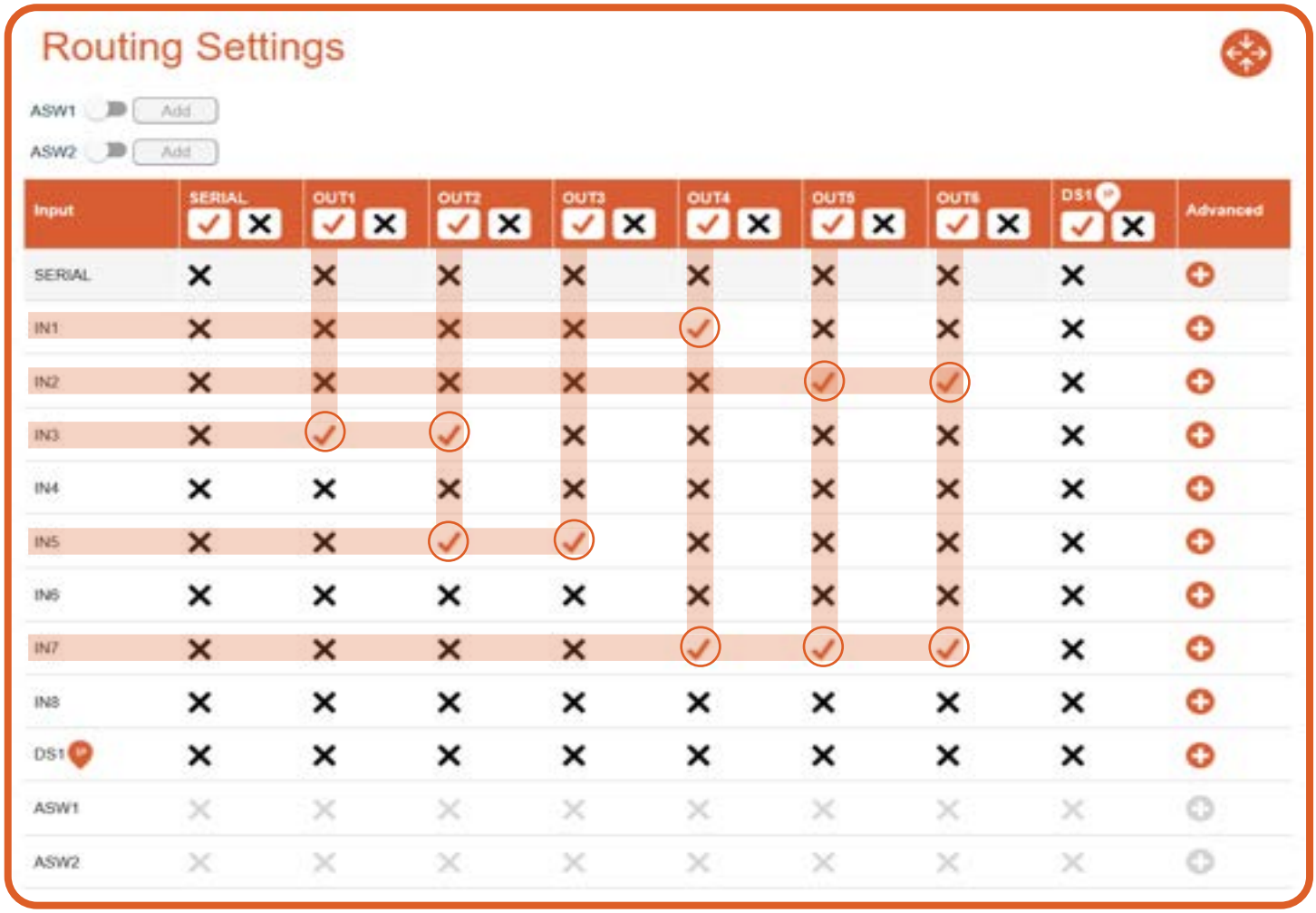


Basic Routing

- The basic routing of signals is a straight forward process of connecting inputs and outputs in the matrix table.
- Inputs and outputs are connected by setting or clearing the point where they cross in the table.
- As an example setting (shown below) the following routing connections have been made.
- OUT-6 - Taking a feed from IN-2 and IN-7
- OUT-5 - Taking a feed from IN-2 and IN-7
- OUT-4 - Taking a feed from IN-1 and IN-7
- OUT-3 - Taking a feed from IN-5 only
- OUT-2 - Taking a feed from IN-3 and IN-5
- OUT-1 - taking a feed from IN-3 only

From your browser window, simply click the **X** at the point where the required routing is required. This will change it to a tick as shown, indicating that data will be passed between this Input and Output.

Note: Pressing the “tick” or X on the orange bar will quickly toggle all connections ON or OFF.

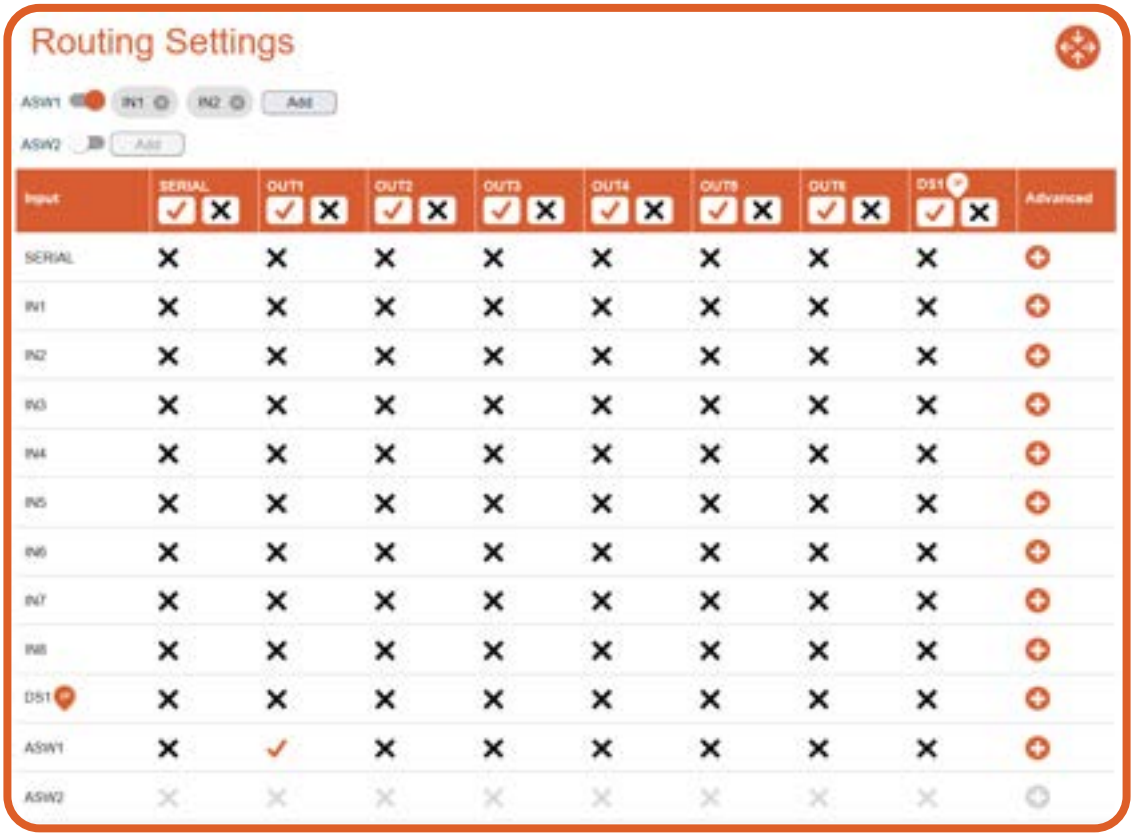


Auto-switching

- For marine systems that have multiple NMEA devices of an identical type (e.g. two GPS's or two depth sounders), automatic selection of the highest priority device with valid data is very important. However, the NMEA 0183 standard has no method of automatically switching between different devices, so this requirement is usually fulfilled with a manual changeover switch.
- The PRO-MUX-2 has the provision for auto-switching on two devices, where the incoming signal can be prioritised in case of signal loss on one of the channels.
- In practise, this means that should the signal on your GPS(1) be interrupted due to a malfunction of the GPS unit, the auto-switching facility will detect this and the signal from GPS(2) will automatically replace it, giving you a seamless continuation of your data.
- The PRO-MUX-2 allows for auto-switching of two devices (eg. GPS's(x2) & Depth sounders(x2)).
- Any NMEA 0183 device can be auto-switched if required.

Auto-switch routing

- The auto-switch is configured in software to act as in INPUT even though it does not have a physical direct input of its own. It is often described as a "virtual input."
- To configure the ASW mode, you need to decide which inputs you wish to be auto-switched. It is very common to auto-switch a GPS signal, so the following description will assume that a GPS unit is attached to IN-1 and IN-2 as an example.
- From within the routing matrix, enable ASW1 with the slider at the top of the window. This will change the ASW1 output row at the bottom of the screen to be active.
- Press "Add" and select which of the physical inputs you would like to be the primary GPS source.
- Repeat the above step, and add which GPS input will be the secondary source, auto-switching should the primary GPS fail.
- On the active ASW-1 row at the bottom, select which output you require the auto-switched signal to be fed to (in this example OUT-1 is used). The ASW-1 will now feed IN-1 to OUT-1, and in the event of IN-1 failing, will autoswitch to feeding IN-2 to OUT-1.
- NOTE: In the main matrix, DO NOT also feed IN-1 & IN-2 to OUT-1. This will by-pass the auto-switch functionality. Leave these as X. IN-1 & IN-2 can however still be used to feed other outputs.

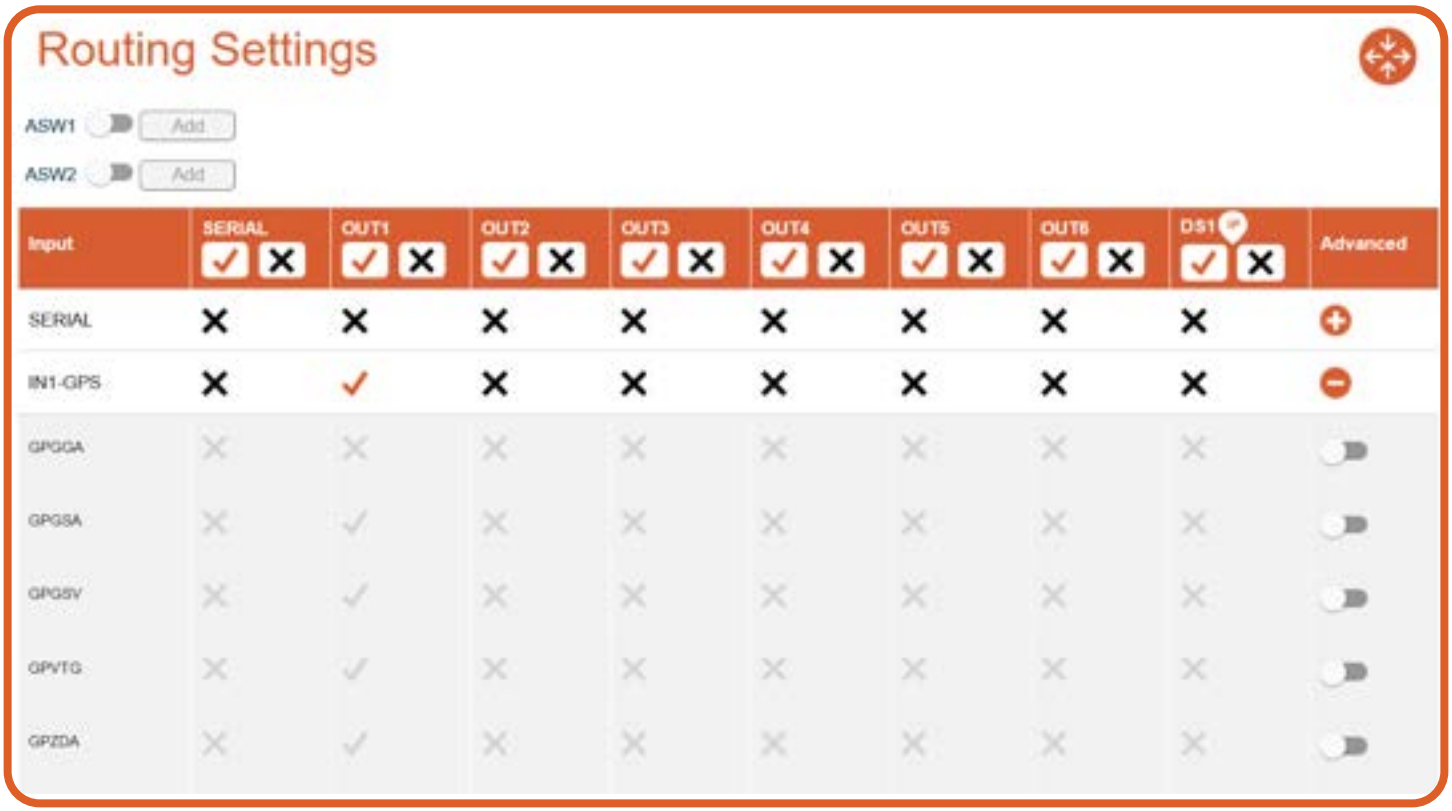


Advanced Routing

- Advanced routing is a feature which allows the user to select which messages within an 0183 data stream are allowed to pass to the output and which sentences are not transmitted.
- It is an ideal feature if you only require certain sentences transmitted to increase the message bandwidth.
- As an example of how this feature works, we have set up a feed from IN-1 to OUT-1 with a data stream containing 5 different 0183 sentences.
- These sentences contain GPGGA, GPGSA, GPGSV, PGVTG & GPZDA.
- On feeding this data into IN-1 and out from OUT-1 the following message stream would be available.

```
$GPVTG,,T,,M,0.05,N,0.09,K,A*2F
$GPGSA,A,3,11,14,19,20,23,28,31,32,,,,,1.6,1.0,1.2*30
$GPGSV,3,1,09,11,87,300,48,14,22,042,43,17,21,316,00,19,26,163,46*7D
$GPGSV,3,1,09,11,87,300,48,14,22,042,43,17,21,316,00,19,26,163,46*7D
$GPGSV,3,1,09,11,87,300,48,14,22,042,43,17,21,316,00,19,26,163,46*7D
$GPGSV,3,1,09,11,87,300,48,14,22,042,43,17,21,316,00,19,26,163,46*7D
$GPGSV,3,2,09,20,55,254,48,23,16,188,44,28,15,270,27,31,07,095,40*78
$GPGSV,3,2,09,20,55,254,48,23,16,188,44,28,15,270,27,31,07,095,40*78
$GPGSV,3,3,09,32,84,338,50,,,,,,,,,,,,*40
$GPGSV,3,3,09,32,84,338,50,,,,,,,,,,,,*40
$GPZDA,080453.00,08,04,2010,-2,00*7C
$GPGGA,080453.31,4329.771,N,00521.115,E,1,08,1.0,115.29,M,49.16,M,,*67
$GPVTG,,T,,M,0.04,N,0.08,K,A*2F
$GPGSA,A,3,11,14,19,20,23,28,31,32,,,,,1.6,1.0,1.2*30
$GPGSV,3,1,09,11,87,300,48,14,22,042,43,17,21,316,00,19,26,163,46*7D
$GPGSV,3,1,09,11,87,300,48,14,22,042,43,17,21,316,00,19,26,163,46*7D
$GPGSV,3,1,09,11,87,300,48,14,22,042,43,17,21,316,00,19,26,163,46*7D
```

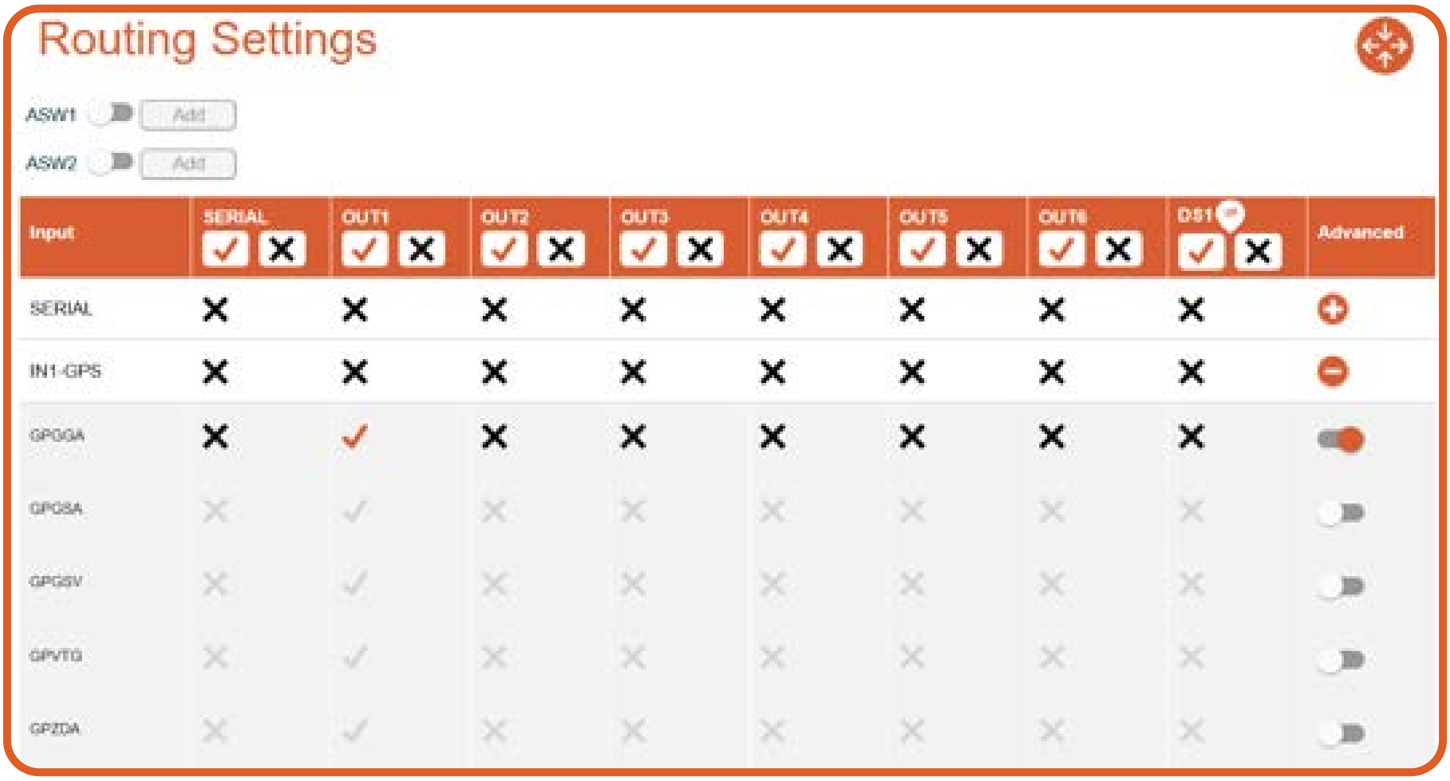
- On viewing the Routing Settings page, shown below, clicking on the '+' sign at the RHS in the '"Advanced" column will display all of the message headers that this stream contains.



Advanced Routing (cont'd)

- If you wish, for example, to only allow sentence GPGGA to pass through to OUT-1, you need to perform the following three steps:

1: Enable the required message with the slider on the RHS (in this case GPGGA).
2: **Disable the IN-1 to OUT-1 FULL data stream.This stops the entire stream being transmitted.**
3: Enable the required message stream from within the header window (Tick beside GPGGA only).



- The setting shown above will automatically transmit GPGGA, and reject all other sentences from this data stream (as shown below). There is a small delay as buffers are emptied.
- You are free to select other sentences for transmission, or by selecting all but one sentence, you can reject an individual sentence if required.
- As shown below, only the GPGGA sentence is now being transmitted.

```
$GPGSV,3,3,09,32,84,338,50,,,,,,,,,,,,*40
$GPGSV,3,3,09,32,84,338,50,,,,,,,,,,,,*40
$GPGGA,080454.31,4329.771,N,00521.114,E,1,08,1.0,115.02,M,49.16,M,,*68
$GPGGA,080454.31,4329.771,N,00521.114,E,1,08,1.0,115.02,M,49.16,M,,*68
$GPGGA,080454.31,4329.771,N,00521.114,E,1,08,1.0,115.02,M,49.16,M,,*68
$GPGGA,080454.31,4329.771,N,00521.114,E,1,08,1.0,115.02,M,49.16,M,,*68
$GPGGA,080454.31,4329.771,N,00521.114,E,1,08,1.0,115.02,M,49.16,M,,*68
$GPGGA,080454.31,4329.771,N,00521.114,E,1,08,1.0,115.02,M,49.16,M,,*68
$GPGGA,080455.31,4329.771,N,00521.115,E,1,08,1.0,115.19,M,49.16,M,,*62
$GPGGA,080455.31,4329.771,N,00521.115,E,1,08,1.0,115.19,M,49.16,M,,*62
$GPGGA,080455.31,4329.771,N,00521.115,E,1,08,1.0,115.19,M,49.16,M,,*62
$GPGGA,080455.31,4329.771,N,00521.115,E,1,08,1.0,115.19,M,49.16,M,,*62
$GPGGA,080455.31,4329.771,N,00521.115,E,1,08,1.0,115.19,M,49.16,M,,*62
$GPGGA,080456.31,4329.771,N,00521.115,E,1,08,1.0,115.15,M,49.16,M,,*6D
$GPGGA,080456.31,4329.771,N,00521.115,E,1,08,1.0,115.15,M,49.16,M,,*6D
$GPGGA,080456.31,4329.771,N,00521.115,E,1,08,1.0,115.15,M,49.16,M,,*6D
$GPGGA,080456.31,4329.771,N,00521.115,E,1,08,1.0,115.15,M,49.16,M,,*6D
```

Alarm Connections (See the user/install manual for further information)

The PRO-range products feature alarm functionality which, depending on the condition being monitored, can output NMEA 0183 messages to display equipment / MFD's etc.
Currently, the PRO-range caters for three alarm conditions:

- Autoswitch: Gives warning that an autoswitch occurance has occured.
- Data Overload: Alerts the user that data overload has occured on a port
- Low voltage: Reports the status of the battery voltage.

Alarm Relay

PRO-range products also feature an alarm relay (Excludes PRO-NDC-1E) to allow electrical connections to be made to the device to trigger visual and/or audible signals. This will alert the user that an alarm condition has been met. The installed relay has the usual COM(Common), NC(Normally closed) & NO(Normally open) configuration.

PLEASE NOTE: As written on the label of the device, the NC & NO legend refers to the de-energized state of the relay. i.e. The "powered off"/ "power lost" state. When the device first receives power, you will hear a click as the relay energizes so that a "power lost" state can be detected by any alarm monitoring circuit. This implies that if you are connecting to a system which is monitoring a closed loop, then the COM and NO connections should be used so that the "power lost" state can be detected. Power loss is not an alarm event which can be sent as an 0183 sentence.

Setting the Alarm

The alarm has its own configuration menu accessed via the "Settings" page.
Below we explain the process for setting up the "low voltage" alarm.
There are three conditions that can be set with the "flag" icon.

- Output solely NMEA 1083 sentences
- Activate the relay separately.
- Activate both alarms together.

- **Event**: Select the event you wish to monitor for. Here, we are setting the battery "low-voltage" alarm. Should it drop below 11v, the alarm will be triggered.
- **Re-Arm:** The length of time you wish to elapse before the alarm is re-armed.
- **Action:** This allows you to set the frequency of outputted messages. Uncheck "repeat" to allow a single message only.
- To Activate the alarm simply click the "flag" icon in whichever position you require and this will change it's colour from grey to green to indicate that the alarm is "enabled & inactive". Should the alarm be activated, the flag will change colour to red to indicate an "enabled & active" status.
- The "+" icon on the RHS gives access to an running alarm count.
- To select which port you wish this alarm signal to be fed to, simply select the required output port in the small routing matrix at the bottom of the alarms window.

Troubleshooting Guide

First level PRO range diagnostics/fault finding can be performed by observing the LED behaviour. Please consult the user/install manual for your own device for details regarding LED behaviour.

In addition to the above, please always check the following points.

- Connectors are fully inserted
- All pins of the connector are in the correct location (not overlapping into another port position)
- Wires are terminated firmly and correctly (check polarity)

Actisense®
Connect **without limits**

Active Research Ltd
21 Harwell Road
Poole, Dorset
UK BH17 0GE

Telephone: +44 (0)1202 746682
Email: sales@actisense.com
Web: www.actisense.com