Actisense®
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NGW Configuration Manual for Actisense Toolkit

Issue 1.00

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Set up before using Actisense Toolkit

Before getting started, the NGW-1 needs to be powered and connected as per the NGW-1 User Manual.

- The NGW-1 needs to be connected to a working NMEA 2000 network (or bus) which fulfils the minimum network requirements (refer to NGW-1 User Manual for guidelines).
- The USB variant of the NGW-1 (product code: NGW-1-USB) requires the latest Actisense USB drivers to be installed. If there is a working internet connection in the PC when the NGW-1-USB is plugged in, and if the operating system settings allow automatic updates from Windows, the latest USB drivers will download automatically. If this fails, the same USB driver files are available as a pre-installer on the CD provided or from the NGW-1 Downloads page.
- Check that the NGW-1's COM port is not in use by another software application (e.g. NMEA Reader).

Actisense Toolkit is able to configure any NGW-1 running Firmware version 2.620 or higher/newer. For NGW-1 devices with older firmware, please update the firmware by following the instructions detailed in the NGW-1 User Manual.

Connecting to the NGW-1

ISO variants (NGW-1-ISO, NGW-1-STNG)

- Powered through the NMEA 2000 cable from the NMEA 2000 backbone.
- There are two connection methods available when configuring an NGW-1:
  - Connecting the ISO / NMEA 0183 cable to a PC using one of the three options detailed in the User Manual. This 'direct' method does require physical access to the NGW-1 or its ISO / NMEA 0183 cable.
  - Connecting an Actisense NGT-1 to the same operational NMEA 2000 network and a PC. This 'remote' method allows the NGW-1 to be reconfigured in-situ without the user needing to know where it is installed and without needing to temporarily rewire its ISO / NMEA 0183 cable.

USB variants (NGW-1-USB)

- Powered through the USB cable from a PC after successful installation of the Actisense USB drivers. If the PC has an active internet connection when the Actisense device is first plugged in, the latest USB drivers will be automatically downloaded and installed.
- Whilst the 'remote' method (using an Actisense NGT-1) can be used to configure, the simplest is to use the 'direct' USB connection method.

Useful Tip: To share an NGT-1 between Toolkit and another application, instead of closing the Actisense Toolkit (and needing to re-load device configurations), select 'Offline' in the COM port's drop down list so that the NGT-1 COM port is closed, allowing it to be used/opened by another program such as NMEA Reader.

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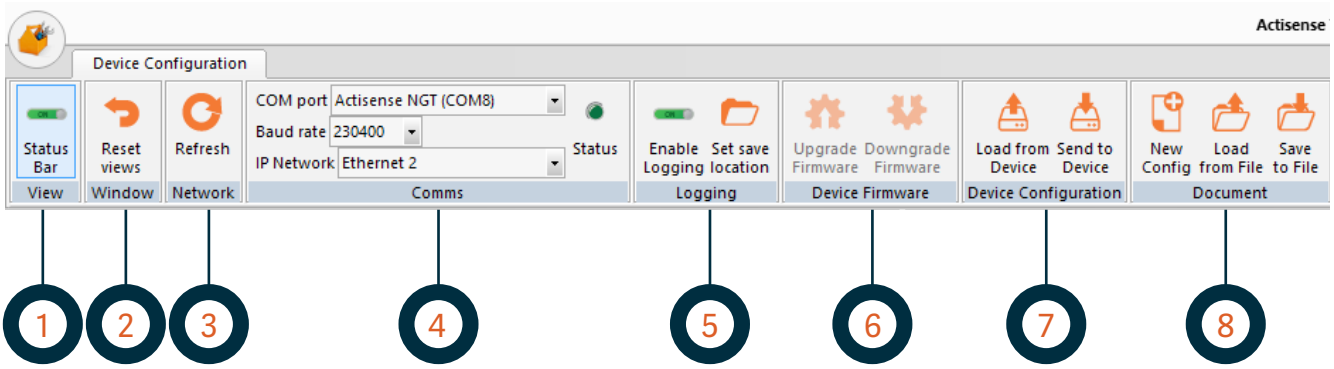
Ribbon Menu



1. View

Toggle the status bar on/off (at the bottom of the User Interface) that indicates the 'current state' details in a single place (such as 'PC Receive Load' and 'NMEA 2000 Bus Load' when an NGT-1 is in use).

2. Window

Resets the layout of all windows to the factory default. Use to show closed/hidden windows.

3. Network

Refreshes the 'Serial/CAN Device List' network view. New devices added to the network will be automatically detected and added to the corresponding device list. However, this manual refresh gives the option to repeat the Serial/CAN network detection process.

4. Comms

'COM Port' selects the COM port connected to the device to configure/update.
'Baud rate' selects the baud rate that matches the serial device being used with Toolkit.
'IP Network' selects the IP Network adapter that Toolkit will use to communicate with IP devices.

5. Logging

Enable / Disable data recording to EBL files (for both Serial/CAN & IP networks).
Select the desired save location for the EBL files.

6. Device Firmware

Upgrade / Downgrade the firmware inside an Actisense device. Ensure the device you wish to modify is selected in the 'Serial/CAN Device List' or 'IP Device List' window before using one of these options. Also available using the right-click device context-sensitive menu. Greyed out options are not available.

7. Device Configuration

'Load from Device' reads the current configuration from the selected device and displays it as a configuration document.
'Send to Device' writes the active configuration document to the selected device.

8. Document

'New Config' starts a new device configuration using a pre-set default as a starting point.
'Load from File' selects and opens a previously saved device configuration document for editing or sending to a device.
'Save to File' saves the active configuration document to file so it can be reopened later or shared.

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9. Gauges

'Custom Gauge Manager' is for use with Actisense EMU-1 devices only.

10. Help

This is the option that got you here. Access the product help documentation for EMU-1, PRO-BUF-1 and NGW-1 devices that Toolkit can configure and/or firmware update.

11. Style

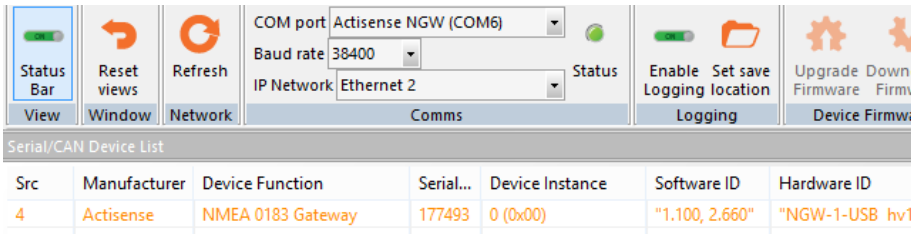
Change the graphical appearance of Toolkit to suit the user.

12. About

Access the Toolkit software version number. This is an important detail to share with Actisense Tech Support if you have an issue with Toolkit.

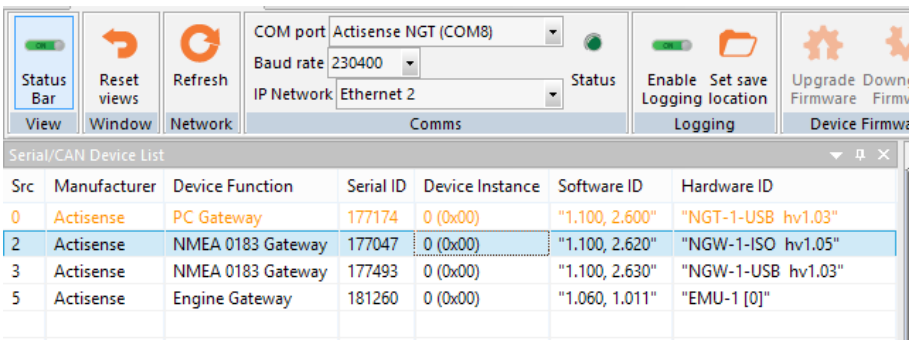
COM port set up

Choosing the Actisense NGW-1's COM port and baud rate (typically 4800 or 38400) will create a direct connection that will display the NGW-1's details in the 'Serial/CAN Device List'.



Alternatively, the Actisense NMEA 2000 PC interface (NGT-1) can make remote configuring NGW-1 devices much quicker and easier because they can remain in situ, removing the need to locate and rewire. Choosing the Actisense NGT-1's COM Port and baud rate (typically 115200 or 230400) will create a remote connection to the NGW-1 that will display the device details of all NMEA 2000 devices on the network.

Busy NMEA 2000 buses (with load above 45%) will require the NGT-1 to be configured to use the maximum NGT-1 baud rate of 230400 - **this baud rate change can be performed using NMEA Reader on the 'Hardware Config' tab**.



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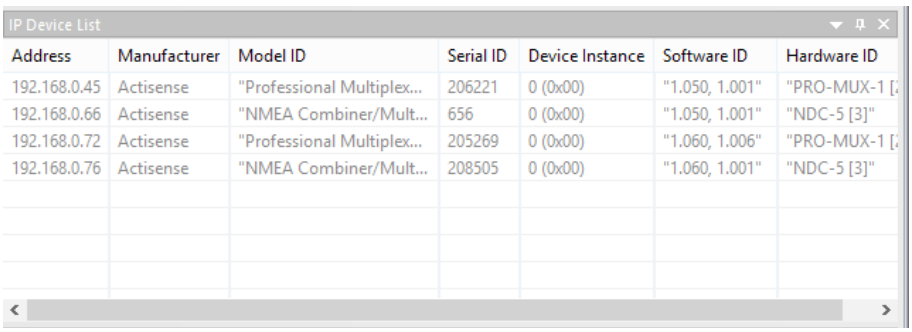
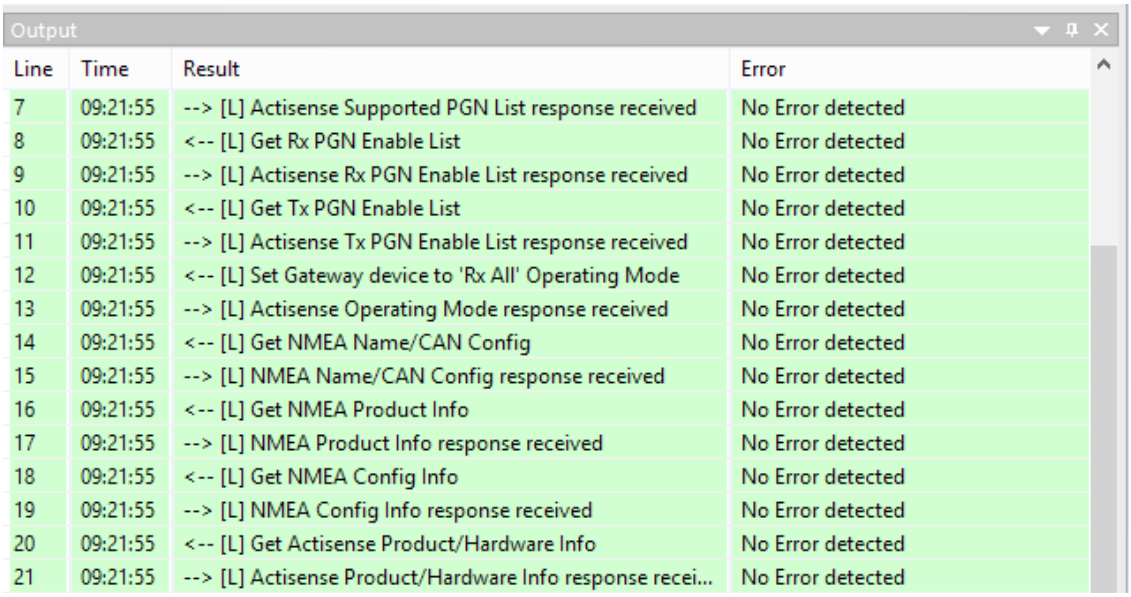
As the NGW-1 is not an IP device, it's details will appear in the 'Serial/CAN Device List" and not in the 'IP Device List'.



Address	Manufacturer	Model ID	Serial ID	Device Instance	Software ID	Hardware ID
192.168.0.45	Actisense	"Professional Multiplex...	206221	0 (0x00)	"1.050, 1.001"	"PRO-MUX-1 [
192.168.0.66	Actisense	"NMEA Combiner/Mult...	656	0 (0x00)	"1.050, 1.001"	"NDC-5 [3]"
192.168.0.72	Actisense	"Professional Multiplex...	205269	0 (0x00)	"1.060, 1.006"	"PRO-MUX-1 [
192.168.0.76	Actisense	"NMEA Combiner/Mult...	208505	0 (0x00)	"1.060, 1.001"	"NDC-5 [3]"

Output Log window

The 'Output' log shows the result of every communication event between Toolkit and the Actisense devices it communicates with. This can occur when opening a COM port, upgrading or downgrading device firmware or when configuring a device.



Line	Time	Result	Error
7	09:21:55	--> [L] Actisense Supported PGN List response received	No Error detected
8	09:21:55	<-- [L] Get Rx PGN Enable List	No Error detected
9	09:21:55	--> [L] Actisense Rx PGN Enable List response received	No Error detected
10	09:21:55	<-- [L] Get Tx PGN Enable List	No Error detected
11	09:21:55	--> [L] Actisense Tx PGN Enable List response received	No Error detected
12	09:21:55	<-- [L] Set Gateway device to 'Rx All' Operating Mode	No Error detected
13	09:21:55	--> [L] Actisense Operating Mode response received	No Error detected
14	09:21:55	<-- [L] Get NMEA Name/CAN Config	No Error detected
15	09:21:55	--> [L] NMEA Name/CAN Config response received	No Error detected
16	09:21:55	<-- [L] Get NMEA Product Info	No Error detected
17	09:21:55	--> [L] NMEA Product Info response received	No Error detected
18	09:21:55	<-- [L] Get NMEA Config Info	No Error detected
19	09:21:55	--> [L] NMEA Config Info response received	No Error detected
20	09:21:55	<-- [L] Get Actisense Product/Hardware Info	No Error detected
21	09:21:55	--> [L] Actisense Product/Hardware Info response recei...	No Error detected

Right-clicking in the 'Output' log window provides three useful menu options:

- 'Export log to File' option allows the log details to be saved to file to allow sharing with Actisense Tech Support.
- 'Email log to Tech Support' option allows easier sharing of log details with Actisense Tech Support when the default email client is configured and available. It opens an email with the exported log file attached.
- 'Clear log' option to clear the current event log.

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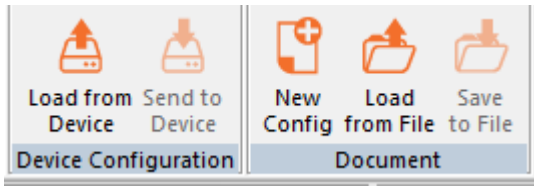
How to configure the NGW-1

Refer to section "Connecting to the NGW-1" for details of how to remotely or directly connect an NGW-1 to Actisense Toolkit for the purpose of configuring it and the "COM port set up" section to open the COM port.

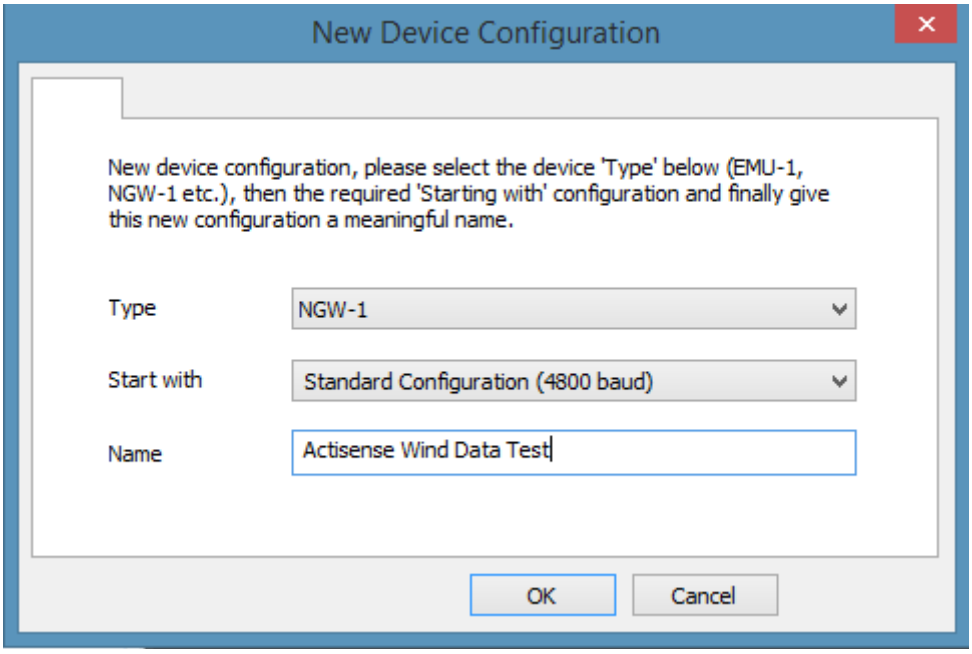
There are three options for opening a device configuration document:

- 'Load from Device' Ribbon menu option (or by right-clicking the device in 'Serial/CAN Device List')
- 'New Config' Ribbon menu option.
- 'Load from File' option.



New NGW-1 Configuration

When using the 'New Config' option, or the 'Load from Device' option and the NGW-1 has not had a configuration previously sent to it, the new configuration wizard requires the user to choose the 'Starting with' configuration option that provides the closest match to your requirements and give the configuration a relevant and meaningful name.



Good configuration names help identify its use, for example "NGW for WIND 4800" or "NGW for AIS 38400" and could also include the make and model details of the NMEA 0183 Talker/Listener device.

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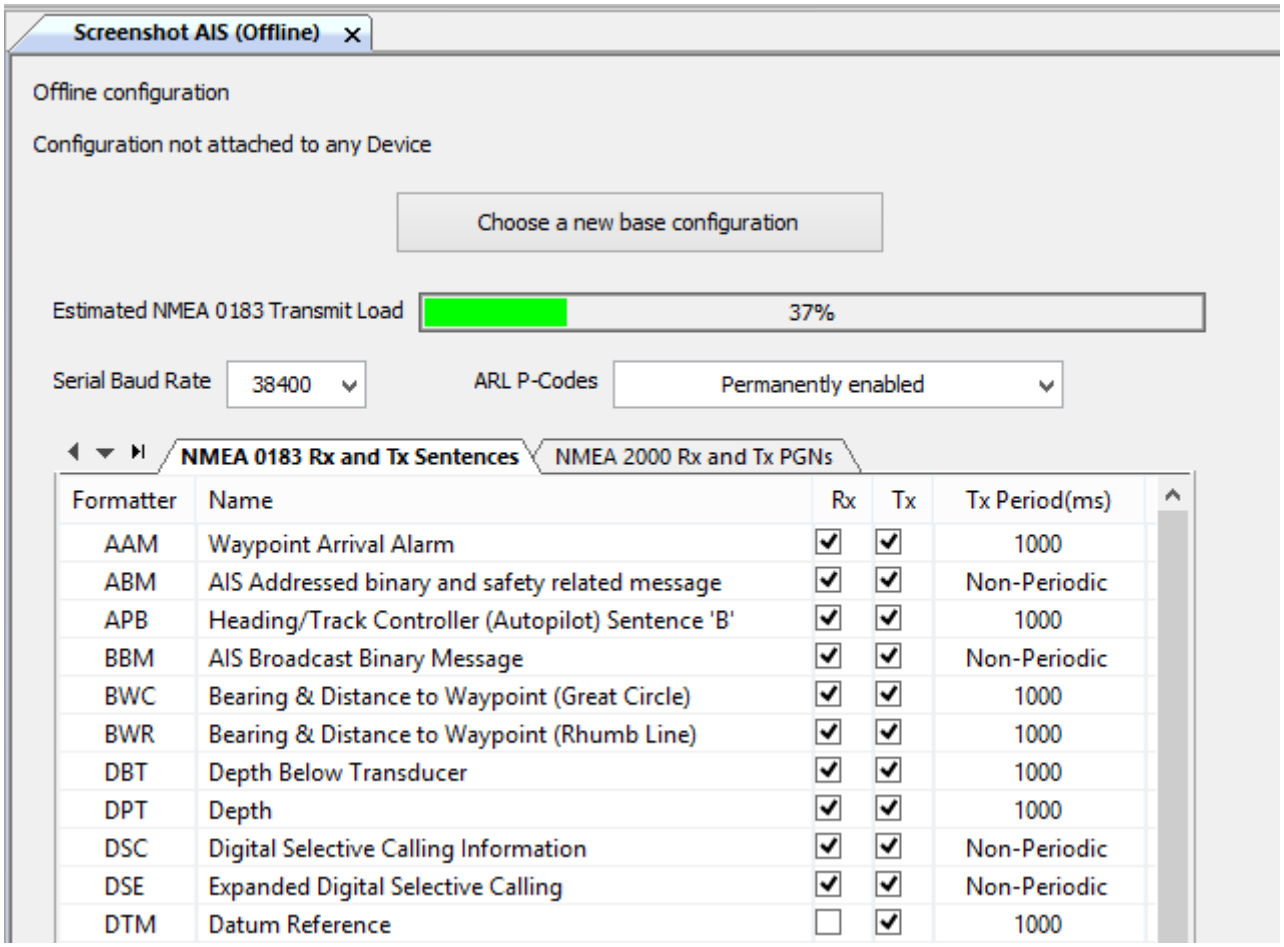
NGW-1 Configuration window

The configuration document is fully editable: starting/base configuration, baud rate, ARL P-Codes, NMEA 0183 Rx (Receive) and Tx (Transmit) Sentences and NMEA 2000 Rx & Tx PGNs.



Formatter	Name	Rx	Tx	Tx Period(ms)
AAM	Waypoint Arrival Alarm	☑	☑	1000
ABM	AIS Addressed binary and safety related message	☑	☑	Non-Periodic
APB	Heading/Track Controller (Autopilot) Sentence 'B'	☑	☑	1000
BBM	AIS Broadcast Binary Message	☑	☑	Non-Periodic
BWC	Bearing & Distance to Waypoint (Great Circle)	☑	☑	1000
BWR	Bearing & Distance to Waypoint (Rhumb Line)	☑	☑	1000
DBT	Depth Below Transducer	☑	☑	1000
DPT	Depth	☑	☑	1000
DSC	Digital Selective Calling Information	☑	☑	Non-Periodic
DSE	Expanded Digital Selective Calling	☑	☑	Non-Periodic
DTM	Datum Reference	☐	☑	1000

- The 'Choose a new base configuration' option allows for a different factory pre-set configuration to be selected as a base configuration that can then be tweaked.
- The 'Baud Rate' needs to match the NMEA 0183 Talker/Listener that the NGW-1 is connected to. Lowering the baud rate will reduce the volume of NMEA 0183 data that can be sent and will require either some NMEA 0183 Tx sentences to be disabled or their Tx Periods to be increased.
- As 'ARL P-Codes' are helpful to Toolkit, NMEA Reader and debugging, they are typically kept enabled for configurations with a 38400 baud rate and disabled when the configuration requires a 4800 baud rate (due to the lower available bandwidth).
- The starting/base 'AIS Configuration' enables almost all of the conversions an NGW-1 is capable of performing, and the 38400 baud rate can handle. The 'Standard Configuration' contains a subset of the possible conversions due to the much smaller 4800 baud bandwidth used by standard NMEA 0183 devices. NMEA 0183 sentences and NMEA 2000 messages can be enabled or disabled as required using the 'Rx' (Receive) and 'Tx' (Transmit) column tick-boxes. When enabling a sentence/message for transmission, the corresponding sentence/message must be enabled for receive in order to supply the NGW-1 with the required data.

  For example, enabling DPT for 'Tx' will switch on transmission of the NMEA 0183 'Depth' sentences, however in order for the NGW-1 to receive a depth value from the NMEA 2000 network, the corresponding NMEA 2000 Depth PGN 128267 needs to be enabled for 'Rx'. To understand the corresponding NMEA 2000 messages and NMEA 0183 sentences, please refer to the NGW-1 Conversion List.

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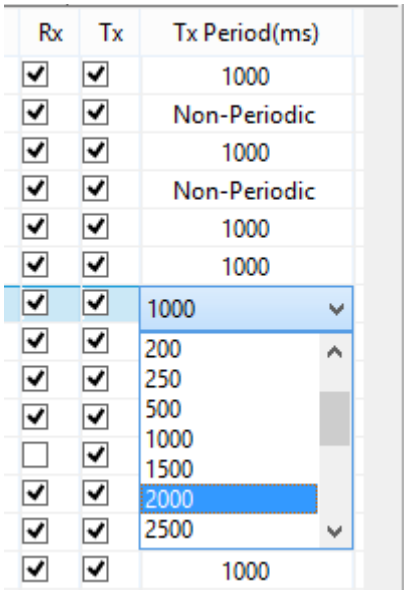
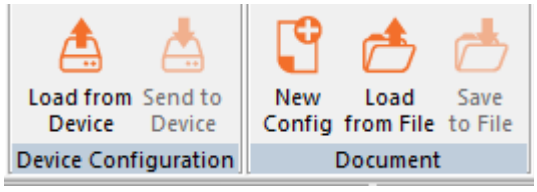
- The 'Tx Period' of all periodic NMEA 0183 sentences and NMEA 2000 messages can be made faster or slower to suit the specific requirements of the installation. However, the resulting change to the 'Estimated NMEA 0183 Transmit Load' should always be considered: whilst reducing the transmit period should result in the NGW-1 sending that sentence more frequently, that will only be possible if there is sufficient bandwidth available on the NGW-1's NMEA 0183 Talker output.

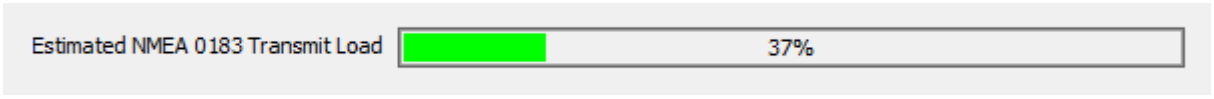


As 'Non-periodic' sentences and messages do not have a defined 'Tx Period' they cannot have their transmit periods configured – instead they will be converted by the NGW-1 as and when they arrive. An important note is that the resulting bandwidth of non-periodic sentences cannot be included in the 'Estimated NMEA 0183 Transmit Load' value.

- Once editing of the configuration is complete, it can be sent to the NGW-1 using the 'Send to Device' Ribbon menu option or by right-clicking the device in 'Serial/CAN Device List'.



- As NMEA 0183 bandwidth is a limited resource, Toolkit visualises the estimated volume of NMEA 0183 data the configuration could allow the NGW-1 to generate if all enabled NMEA 2000 PGNs were received within 2 seconds of each other. As this 'Estimated NMEA 0183 Transmit Load' bar is the estimated worst-case load on the NGW-1's NMEA 0183 Talker output, it should be used as a guide and not a strict rule.



Whilst any estimated load above 100% could result in the NGW-1's NMEA 0183 Talker output becoming overloaded (and the true transmit periods of some sentences become longer than what was defined in the configuration), in reality, values above 100% can result in the expected transmit periods because not all conversions will be active at the same time due to input data availability.

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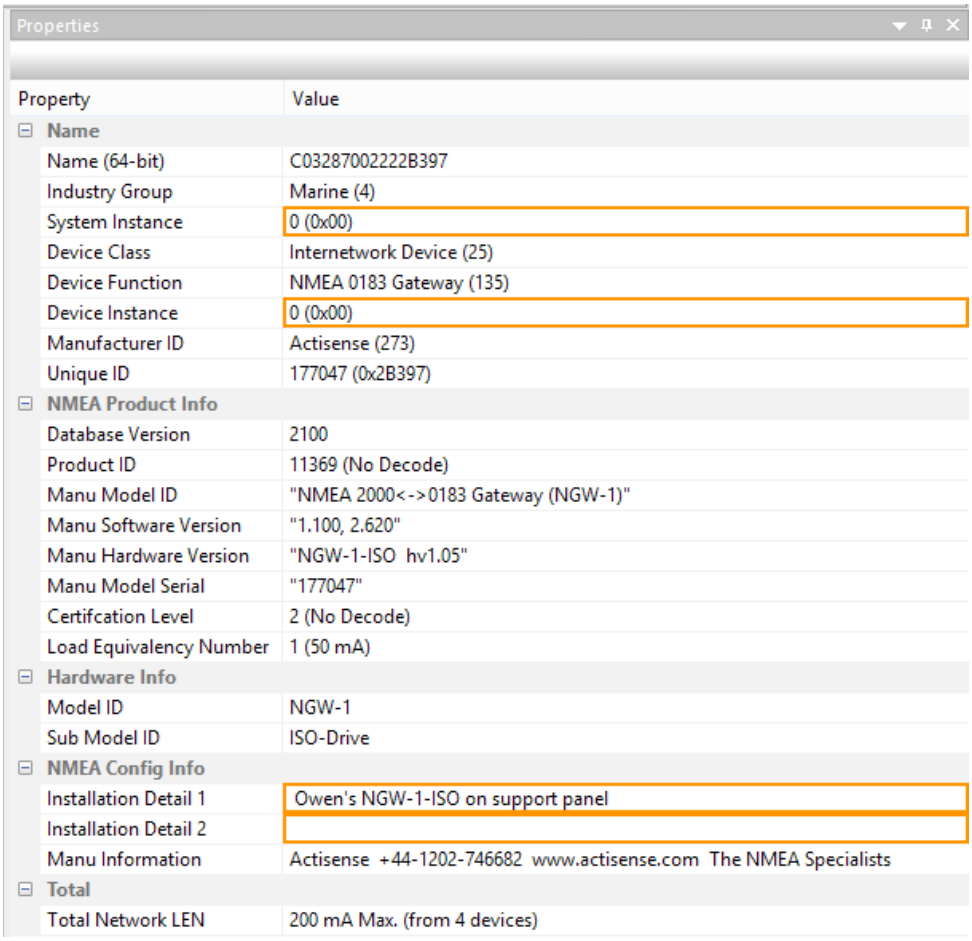
Properties window

The 'Properties' window details all information available on the selected device in the 'Serial/CAN Device List' or 'IP Device List' windows. NMEA 0183 devices will populate any information fields not relevant to them as 'Not Available'.



An orange border to an information field indicates that on some devices the user can configure the value stored inside the selected device: 'System Instance', 'Device Instance', 'Installation Details 1' and 'Installation Details 2'.

The 'System Instance' defaults to 0 and can be set to an integer between 0 and 15. Every device on an NMEA 2000 network is required to have the same 'System Instance' value. On vessels with redundant NMEA 2000 networks, one network will use 'System Instance' 0 and the other 'System Instance' 1.

The 'Device Instance' defaults to 0 and can be set to any integer between 0 and 255. It can be used to differentiate between multiple instances of the same type of device on an NMEA 2000 network (e.g. multiple GPS or depth devices).

Whilst this requirement was important in the past (due partly to display device limitations), it should be noted that the majority of NMEA 2000 devices manufactured since 2015 no longer require their 'Device Instance' value to be changed to a unique value. Instead, the entire 64-bit NMEA Name is used to uniquely identify each instance of a device, not just the 'Device Instance' part of the NMEA Name. However, it can still help human users grasp the different instances.

'Installation Detail 1' and 'Installation Detail 2' are two 70-character fields that can be configured with useful install, location and power details to help future users find the physical device and understand how it's powered. For example "Behind starboard panel 5, powered from breaker 12". This feature is not supported by all NMEA 2000 devices.

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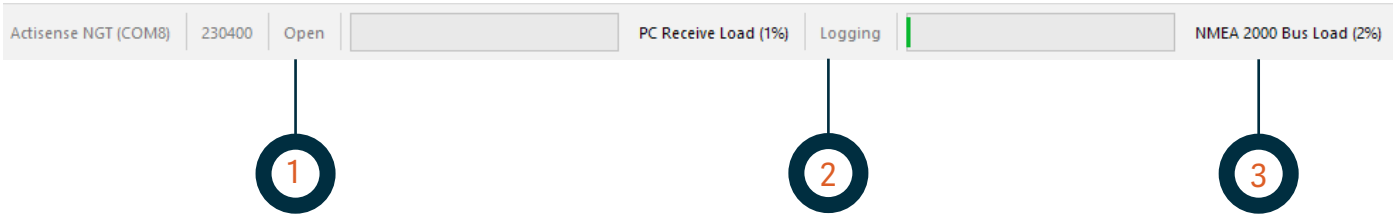
Status Bar

The Status Bar shows all of the current Toolkit 'state' details in a single place.



1. COM Port status

Indicates the name, baud rate, open status and data load (in percent) of the current Toolkit COM port.

2. Logging status

Indicates if log files (for both Serial/CAN and IP networks) are being saved to the defined log location. The default save location for log files is the user's documents folder and this can be changed using the 'Set save location' ribbon menu option.

3. NMEA 2000 Bus Load

When an NGT-1 is interfacing Toolkit to an NMEA 2000 network, this bus load bar indicates the data load (in percent) of the NMEA 2000 network. This load bar will not be active if an NGT-1 is not in use.

Viewing NMEA 2000 / NMEA 0183 data

Actisense NMEA Reader can show all the NMEA 2000 PGN messages on an NMEA 2000 network using an Actisense NGT-1, and all NMEA 0183 sentences when safely connected to an NMEA 0183 Talker device (such as the Actisense NGW-1, NDC-5) or an NMEA 0183 interface (such as the Actisense USG-2, OPTO-4 or USBKIT).

If the same COM port needs to be used with NMEA Reader as well as another application (such as Toolkit), the **COM port** in Toolkit will need to be closed (i.e. set to '**Offline**') before it can be opened in NMEA Reader.

Selecting an NGW-1's COM Port in NMEA Reader will show the NMEA 0183 sentences being output from the NGW-1.

Line	Talker	For...	Name	Time	Interval	Data
1	GP	GGA	Global Positioning System Fix ...	11:09:49:016	1.00	$GPGGA,110947.45,5125.95
2	GP	GLL	Geographic Position Latitude/...	11:09:49:047	1.00	$GPGLL,5125.9534,N,00334
3	GP	GNS	GNSS Fix Data	11:09:49:047	1.00	$GPGNS,110947.45,5125.95
4	HC	HDG	Heading, Deviation & Variation	11:09:49:063	1.00	$HCHDG,119.7,,,,*4C
5	WI	MWV	Wind Speed and Angle (Relati...	11:09:49:063	1.00	$WIMWV,223,R,0,N,A*20
6	HC	HDT	Heading, True	11:09:49:094	1.00	$HCHDT,209,T*3C
7	GP	RMC	Recommended Minimum Spec...	11:09:49:094	1.00	$GPRMC,110947.45,A,5125.9
8	ER	RPM	Revolutions	11:09:49:094	0.50	$ERRPM,E,1,0,,A*71

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Selecting an NGT-1's COM Port in NMEA Reader will show the NMEA 2000 PGN messages transferred by the NGT-1 from the NMEA 2000 Network.

6	127250	2	255	Vessel Heading	11:10:57:043	0.05	45 9C 51 FF 7I
7	130306	2	255	Wind Data	11:10:56:955	0.10	44 00 00 09 98
8	129025	2	255	Position, Rapid Update	11:10:56:956	0.10	65 0F A7 1E C
9	129539	2	255	GNSS DOPs	11:10:56:080	1.00	32 FF 46 00 FI
10	130578	2	255	Vessel Speed Components	11:10:56:938	0.25	44 38 1D 18 11
11	60928	2	255	ISO Address Claim	11:10:46:702		97 B3 22 22 00
12	129029	2	255	GNSS Position Data	11:10:56:908	1.00	42 FF FF BC 7
13	126992	2	255	System Time	11:10:56:933	1.00	42 F0 FF FF B
14	130577	2	255	Direction Data	11:10:56:935	0.48	CF 43 FF FF F

Just like Toolkit, NMEA Reader has logging functionality that (when enabled) will save data recordings in EBL format to the chosen folder. The save path can be changed and defined to a different location by changing the save location through NMEA Reader's menu option.

Any EBL format recordings (from NMEA Reader or Toolkit) can be opened using Actisense EBL Reader. With NMEA Reader offering a real-time view of NMEA sentences/messages and EBL Reader offering a history view of NMEA sentences/messages, the user can use them both to perform a very detailed analysis of the data on a wide variety of devices and networks.

EBL recordings have proven over the years to be very helpful to Actisense Tech Support when diagnosing issues with customer's installations - please provide EBL recordings, where possible, when contacting Actisense Tech Support.

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