NK-80

NMEA 2000 Adaptor

USER MANUAL

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WARNING!	
The equipment said in this manual must only be used to which it was designed. Improper operation or installation may cause damage to the equipment. AMEC will not incur any liability as a result of equipment damage or data loss due to improper usage or installation of the equipment. It is strongly recommended reading this manual and the following safety instructions before proceeding to the installation or operation.	
WARNING!	WARNING!
 **ELECTRICAL SHOCK HAZARD.** Do not disassemble the equipment. Only qualified personnel should service the product.	**PLEASE KEEP AWAY FROM DIRECT WATER CONTACT.** Even though the equipment is waterproof, it is recommended to keep water away from reach. Water leaking into the equipment may cause electrical shock or fire.
TURN OFF THE POWER IMMEDIATELY IF WATER LEAKS IN OR OBJECT DROPS ONTO THE EQUIPMENT. Continue operating the equipment could cause electrical shock or fire. Contact your nearest distributor for service.	**AVOID OPERATING THE EQUIPMENT WITH WET HANDS.** Despite the fact that it is safe, but like any other electric appliances, operate with dry hands.

FOREWORD

AMEC thanks you for the purchase of your new NK-80 NMEA2000 adaptor. NK-80 is a clever little device that enables the communication between NMEA2000 and NMEA0183. With proper use, installation, and maintenance, the equipment will serve loyally and reliably at its optimum.

For sales, services, and technical supports, please contact your local AMEC representatives or Alltek Marine Electronics Corp at sales@alltekmarine.com or service@alltekmarine.com. You are always welcome to visit our website at www.alltekmarine.com for new product status and company update.

Thank you once again.

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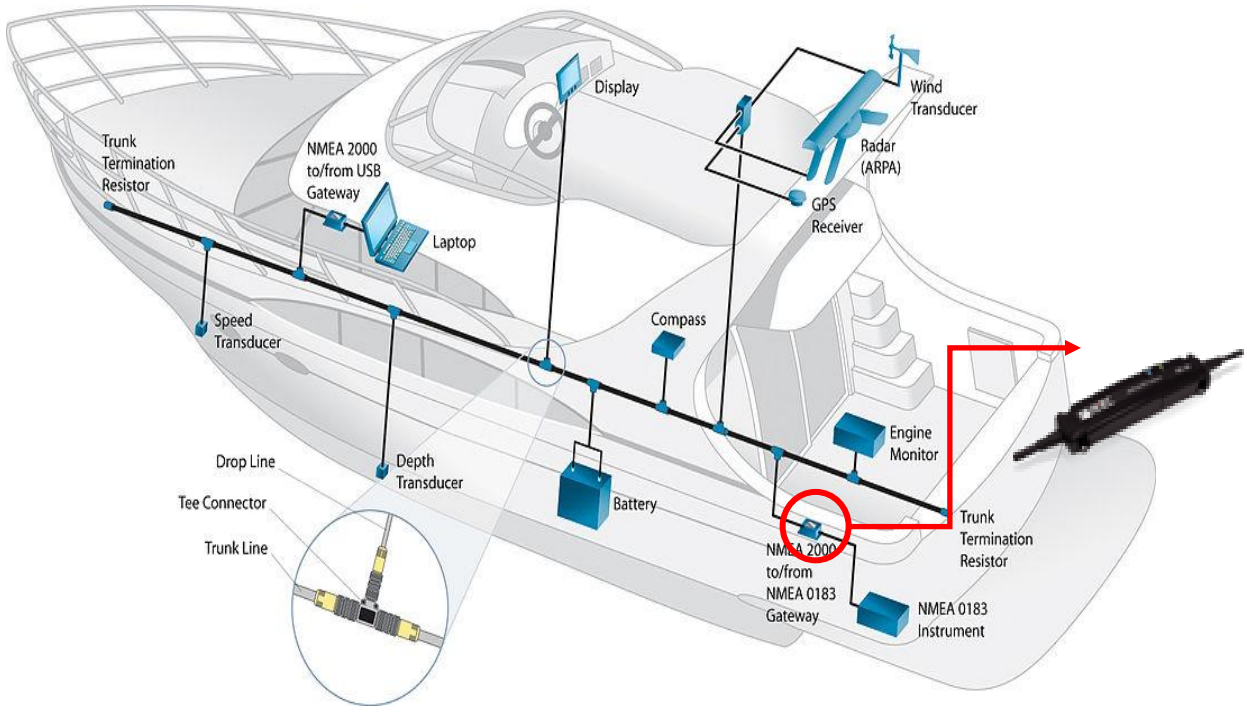
1 NK-80 INTRODUCTION

1.1 What is NMEA2000?

The NMEA2000 transmits data through Controller Area Network (Can Bus). It simplifies the connections and enables information sharing among different devices through a single trunk cable. Compared with NMEA0183 in “RS422” interface, NMEA2000 has better transmission reliability and shares data easier in a network.

1.2 NK-80 Overview

NK-80 NMEA2000 adaptor (as known as NK-80) is a gateway between NMEA0183 electronic devices and NMEA2000 device/network. NK-80 allows users to connect their existing NMEA 1083 devices to an NMEA2000 network.



The key features of NK-80 are shown as follows:

1) Extend NMEA0183 Devices into NMEA2000 Network

NK-80 is a gateway between NMEA0183 electronics devices and NMEA2000 device/network. NK-80 allows users to connect NMEA2000 network with their existing NMEA0183 devices.

2) Conversion between NMEA2000 and NMEA0183

3) Support Latest NMEA2000 Sentences

NK-80 supports wide range of NMEA2000 sentences with latest NMEA association released documents.

4) User-friendly Configuration Utility

NK-80 also provides a configuration tool which allow user to modify NK-80 baud rate and manage/filter NMEA2000/NMEA0183 sentences easily.

5) NMEA2000 Certified, ensures product quality is reliable in most extreme conditions.

6) Fully galvanically isolated for electrical spike protection. Isolated power is provided through NMEA2000 network, NK-80 requires no additional battery source.

2 INSTALLATION

2.1 Items in the Package

The NK-80 standard package is listed in Table 1. It is also illustrated in Figure 1.

Table 1 Standard Equipment List

No.	Description	Qty
1	AMEC NK-80 NMEA2000 adaptor	1
2	Manual	1
3	Screw M4	4
4	CD	1

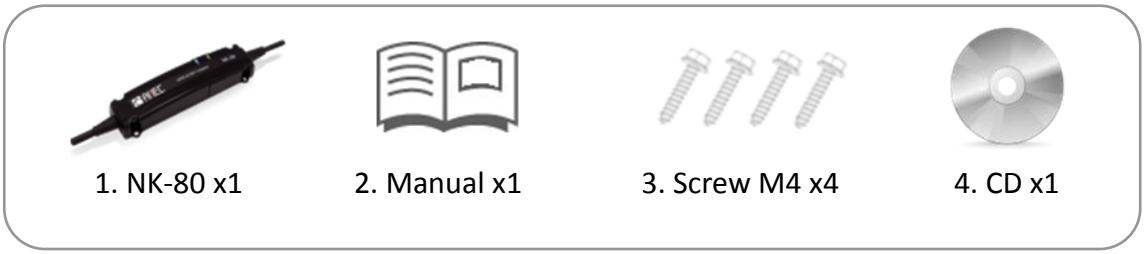
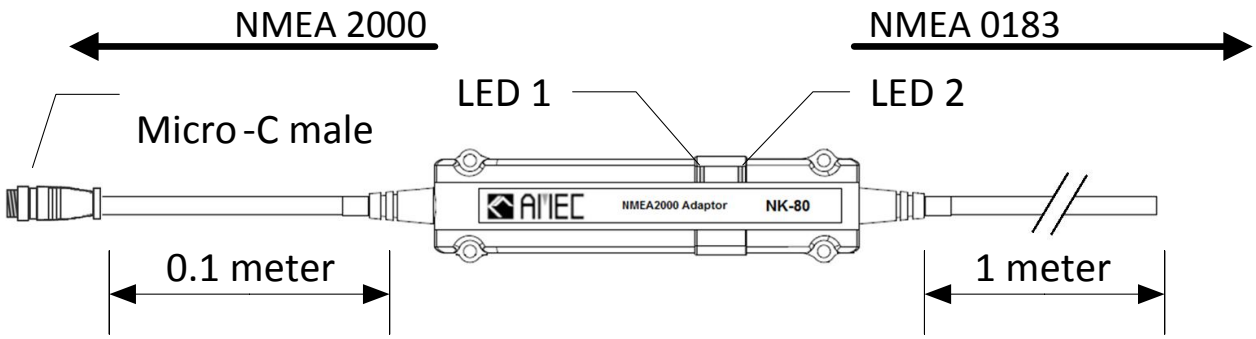


Figure 1 Standard Package

2.2 Connection

Diagram below shows the physical attributes of NK-80.



2.2.1 NMEA2000 Connections

The Micro-C male connector is an NMEA2000 standard connector. Connect this connector to any available Micro-C female connector in the NMEA2000 network.

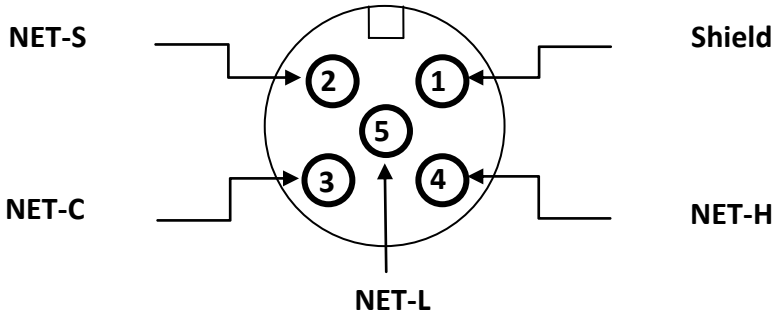


Figure 2 Pin Definitions of the Micro-C Male Connector

2.2.2 NMEA0183 Connections

The NMEA0183 cable provides flexible wiring to devices. Please follow the NMEA0183 cable description below when wiring to an NMEA0183 device.

Table 2 Wire Information for NMEA0183 Cable

Pin	Wire color	Name	Function
1	RED	TXP	Positive(＋); NMEA0183 Data output
2	GREEN	TXN	Negative (－); NMEA0183 Data output
3	BLACK	RXP	Positive(＋); NMEA0183 Data input
4	BLUE	RXN	Negative (－); NMEA0183 Data input
5	SHIELD	GND	Ground

- **Wiring NMEA0183 to NMEA0183/RS-422 Device**

Please follow the wiring diagram below to connect an NMEA0183/RS-422 device.

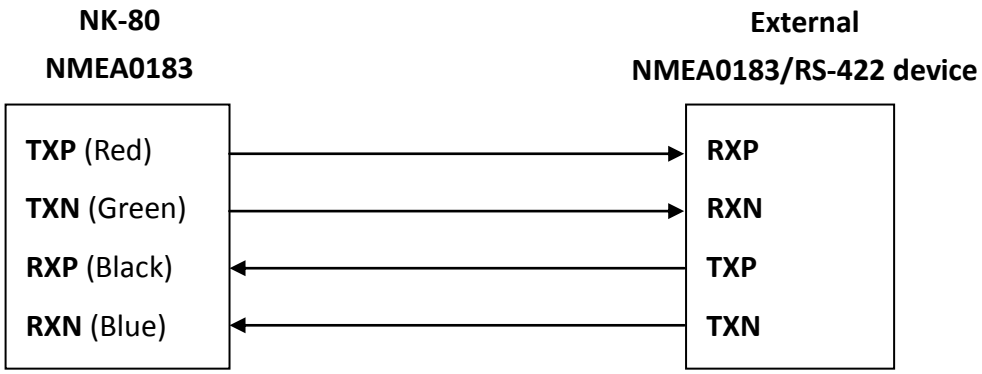


Figure 3 NMEA0183 to RS-422 Connection

NOTE: Please ensure the connecting device is fully NMEA0183 compliant.

- **Wiring NMEA0183 to RS-232/PC**

  Please follow the wiring diagram below to connect to RS-232/PC

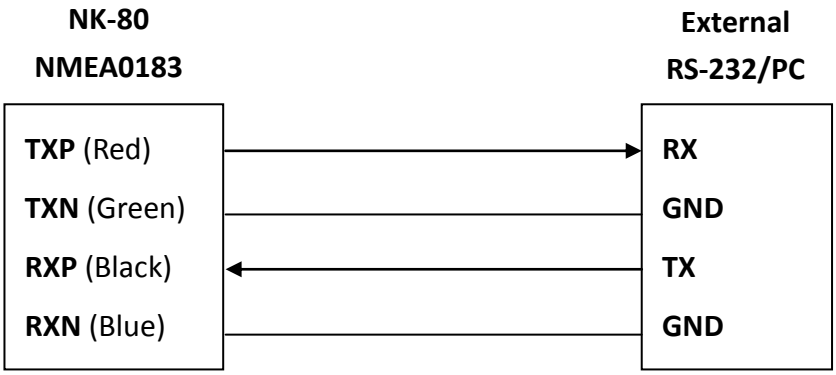


Figure 4 NMEA0183 to RS-232 Connection

NOTE: Please ensure the wire definitions of RS-232/PC are correct during wiring.

2.3 LED Indication

NK-80 has two LED indicators: LED 1 and LED 2.

- LED 1 flashes blue light when processing/receiving NMEA2000 messages.
- LED 2 flashes green light when processing/receiving NMEA0183 messages.

Figure 5 LED Indication of NK-80

The details on indicators statuses are shown in the following table.

Table 3 Description of Indicator Statuses

Indication	Status	Description
LED 1 ●(Blue)	Flash	Receiving NMEA2000 messages
LED 2 ●(Green)	Flash	Receiving NMEA0183 messages
LED 1 ●(Blue) LED 2 ●(Green)	Flash simultaneously in a 5 seconds interval	Normal Operation
LED 1 ●(Blue) LED 2 ●(Green)	Steady	During Firmware Upgrading
LED 1 ●(Blue) LED 2 ●(Green)	Flash takes more than 5 seconds	System/Power Failure*

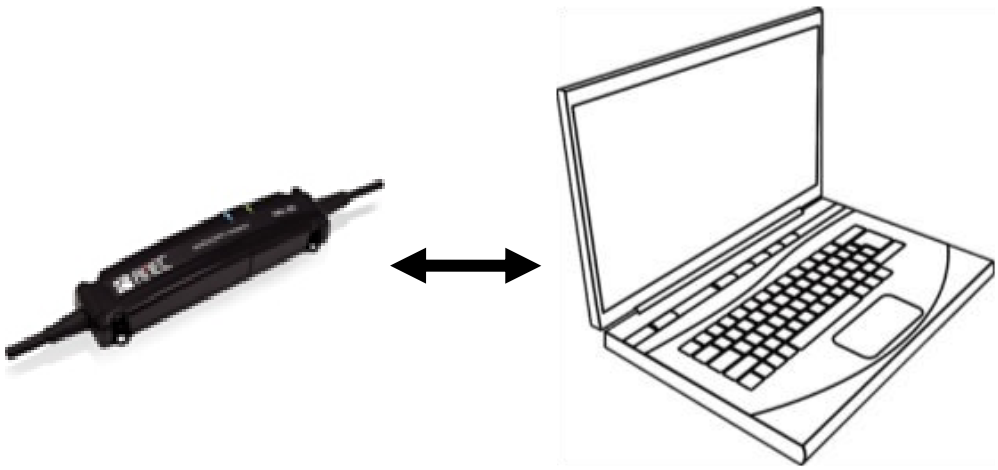
***NOTE:** If it takes more than 5 seconds to see LED activities, please verify your NMEA2000 network power output voltage.

3 Configuring NK-80

With the help of AMEC NK-80 Configuration Utility, NK-80 can be configured with other NMEA0183 baud rates, flow rates and NMEA 2000 device instance. The software delivers also comprehensive product information about your NMEA adaptor which is helpful for error diagnosis. For advanced applications, users can also filter NMEA0183 / NMEA2000 output messages and display the incoming NMEA 2000 sentences.

3.1 Connect NK-80 to your PC

Step 1: Connect NK-80 adaptor to PC through RS-232/USB and ensure power is available from the NMEA2000 network.



***NOTE:** PC connection is required for advanced configuration.

Step 2: Run AMEC NK-80 Configuration utility. In the window "Serial Port and Baud Rate Setting", there are 2 options to connect the software with your NMEA adaptor:

- **Auto**: The system will scan all connected ports and their available baud rates and establish connection automatically.
- **Manual**: Configure baud rate and port manually. The default baud rate is 4800. Manually enter port value and NMEA0183 baud rate. If the baud rate is unknown, choose **Auto**. Then, click **Connect** to connect NK-80.

  Click on "Connect", to connect AMEC NMEA Configuration utility with NK-80.

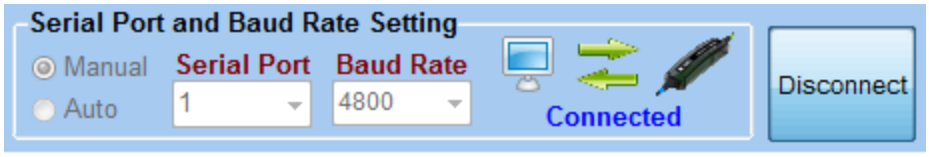


Figure 6 AMEC NMEA Configuration Utility

3.2 Product Properties

3.2.1 NMEA 1083 baud rate setting

The tab **PROPERTIES** delivers complete information about the adaptor, which should enable a better communication when technical support is needed:

NMEA 0183 baud rate: default baud rate is 4800 and can be changed with the pull-down menu below with 4800, 9600, 38400 as options. After new baud rate is set, press "**Apply**" to confirm the choice and the device will be disconnected automatically. To reestablish the connection, choose the new baud rate and repeat the steps described in 3.1.

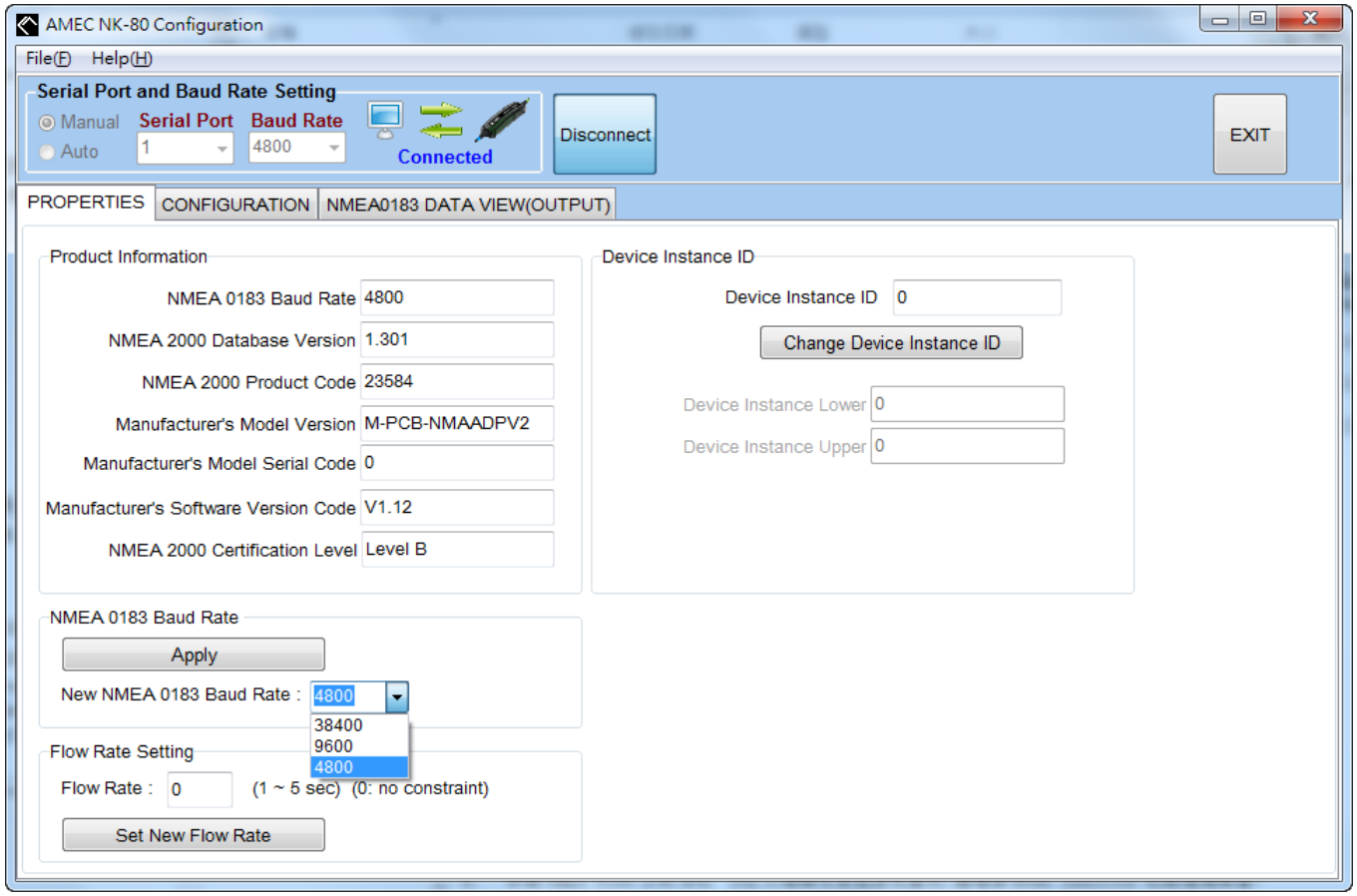


Figure 7 Properties Tab

3.2.2 Flow Rate Setting

The flow rate setting enables the users to configure how frequently received messages will be transmitted. When flow rate is set to 0, received messages will be transmitted immediately. When it´s set to 1 second, then received messages will be collected and transmitted every 1 second and so on and so forth. Lowest frequency available is 5 second.

3.2.3 Device Instance ID

The adaptor comes with the device instance value set to 0 as default. If the adaptor is connected to multiple of same devices on a NMEA 2000 network, you may find it necessary to set the device instances of other devices of this type so that they are different.

The further options enable you to change the upper device instance or lower device instance fields of the adaptor, provided that it supports modification of these fields over the network.

3.3 Filter NMEA0183 / NMEA2000 Output Messages

Step 1: At the **CONFIGURATION** tab, expand the message list on the left and click on a desired message to configure.

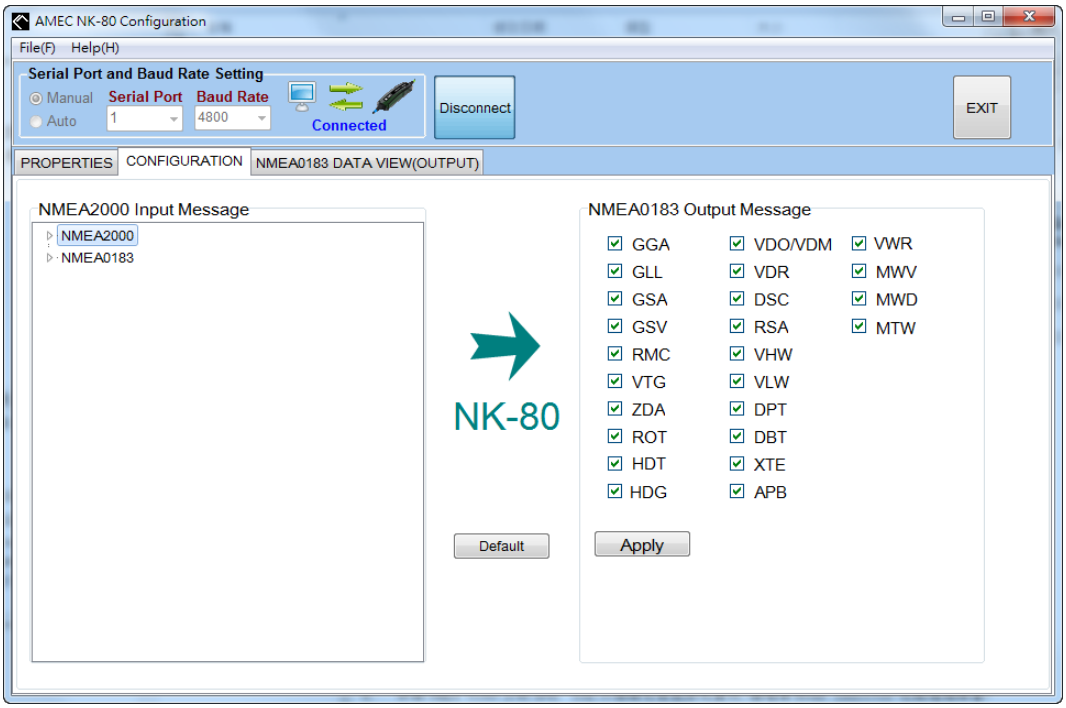


Figure 8 NMEA Message Filtering

HINT: Double click to expand the message groups will show their message names.

Step 2: Once clicked on the desired message, the message properties will reveal on the right panel. On the panel choose the needed attributes and click on **Apply**.

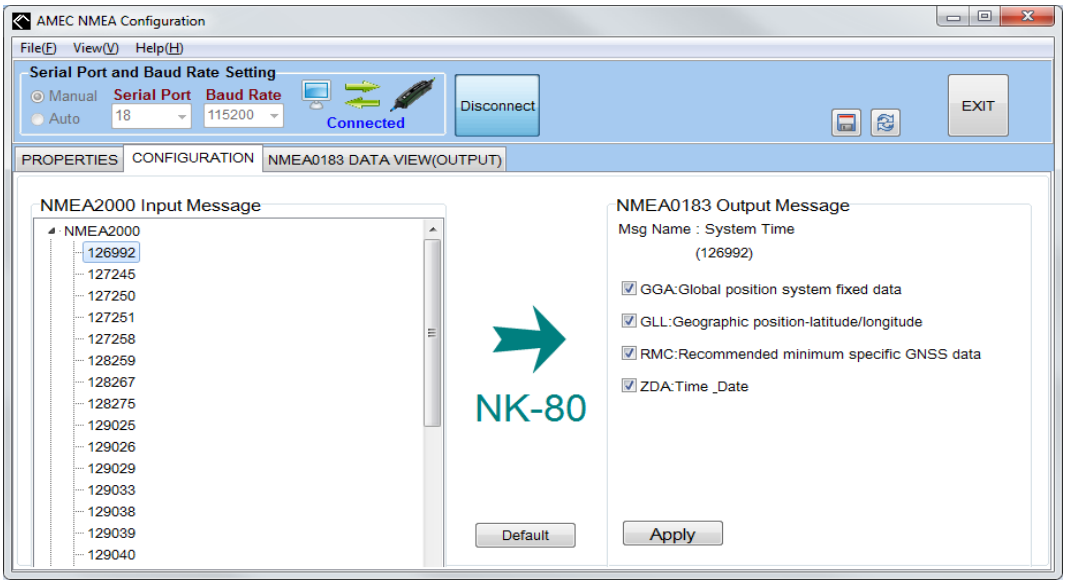


Figure 9 NMEA Message Filtering

Note: All message settings are enabled in factory default. The **Default** button restores all message settings back to factory default.

3.4 Save NMEA0183 Output Message Log

Click on the **NMEA0183 DATA VIEW (OUTPUT)** tab to view message log history.

To record a log session, click on the disk button to start recording. The system will prompt you first to save the log. It continues logging till the icon is click again.

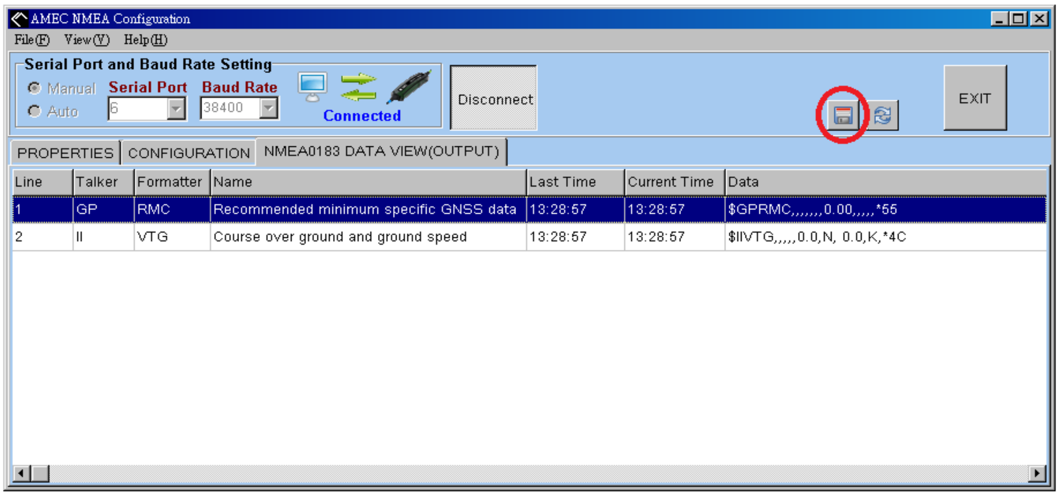
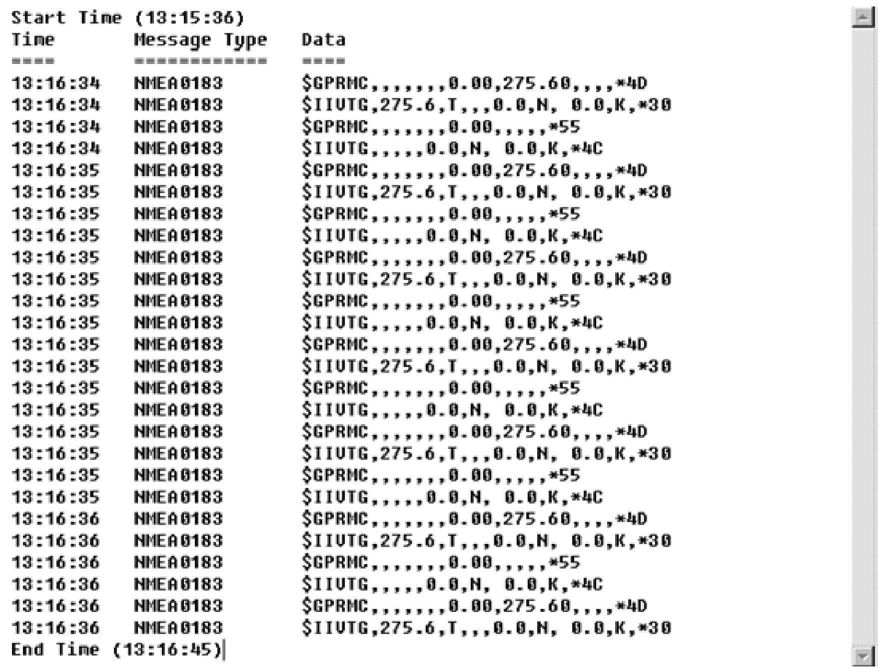


Figure 10 NMEA0183 Data Log

NOTE: NK-80 configuration utility can only log NMEA0183 output sentences processed from NMEA2000 messages.

Shown below is the content of a log file.



```
Start Time (13:15:36)
Time        Message Type   Data
====        ============   ====
13:16:34    NMEA0183       $GPRMC,,,,,,,0.00,275.60,,,,*4D
13:16:34    NMEA0183       $IIVTG,275.6,T,,,0.0,N, 0.0,K,*30
13:16:34    NMEA0183       $GPRMC,,,,,,,0.00,,,,,*55
13:16:34    NMEA0183       $IIVTG,,,,,0.0,N, 0.0,K,*4C
13:16:35    NMEA0183       $GPRMC,,,,,,,0.00,275.60,,,,*4D
13:16:35    NMEA0183       $IIVTG,275.6,T,,,0.0,N, 0.0,K,*30
13:16:35    NMEA0183       $GPRMC,,,,,,,0.00,,,,,*55
13:16:35    NMEA0183       $IIVTG,,,,,0.0,N, 0.0,K,*4C
13:16:35    NMEA0183       $GPRMC,,,,,,,0.00,275.60,,,,*4D
13:16:35    NMEA0183       $IIVTG,275.6,T,,,0.0,N, 0.0,K,*30
13:16:35    NMEA0183       $GPRMC,,,,,,,0.00,,,,,*55
13:16:35    NMEA0183       $IIVTG,,,,,0.0,N, 0.0,K,*4C
13:16:35    NMEA0183       $GPRMC,,,,,,,0.00,275.60,,,,*4D
13:16:35    NMEA0183       $IIVTG,275.6,T,,,0.0,N, 0.0,K,*30
13:16:35    NMEA0183       $GPRMC,,,,,,,0.00,,,,,*55
13:16:35    NMEA0183       $IIVTG,,,,,0.0,N, 0.0,K,*4C
13:16:35    NMEA0183       $GPRMC,,,,,,,0.00,275.60,,,,*4D
13:16:35    NMEA0183       $IIVTG,275.6,T,,,0.0,N, 0.0,K,*30
13:16:35    NMEA0183       $GPRMC,,,,,,,0.00,,,,,*55
13:16:35    NMEA0183       $IIVTG,,,,,0.0,N, 0.0,K,*4C
13:16:36    NMEA0183       $GPRMC,,,,,,,0.00,275.60,,,,*4D
13:16:36    NMEA0183       $IIVTG,275.6,T,,,0.0,N, 0.0,K,*30
13:16:36    NMEA0183       $GPRMC,,,,,,,0.00,,,,,*55
13:16:36    NMEA0183       $IIVTG,,,,,0.0,N, 0.0,K,*4C
13:16:36    NMEA0183       $GPRMC,,,,,,,0.00,275.60,,,,*4D
13:16:36    NMEA0183       $IIVTG,275.6,T,,,0.0,N, 0.0,K,*30
End Time (13:16:45)
```

Figure 11 A Sample Log File

4 SPECIFICATIONS

4.1 Product Specifications

APPLICABLE STANDARDS			
NMEA2000 standard version1.2 (2004)			
CERTIFICATIONS			
NMEA2000 ®			
NMEA2000 CAN Bus line Transmitter			
Parameter	**Conditions**	**Min.**	**Max.**
Recessive bus voltage	VTXD = VDD; no load	2.0V	3.0V
Dominant bus voltage NET-H	VTXD = 0.8V	2.75V	4.5V
Dominant bus voltage NET-L	VTXD = 0.8V	0.5V	2.25V
Recessive differential output voltage	VTXD = 2V; no load	-500mV	50mV
Dominant differential output voltage	40Ω < RL < 60Ω	1.5V	3.0V
NMEA2000 CAN Bus line Receiver			
NET-H, NET-L common-mode input resistance	typical 100 KΩ		
Differential input resistance	typical 100 KΩ		
NMEA0183 Baud Rate Settings			
Configurable baud rate	4800, 9600, 38400 bps (default is 38400 bps)		
Environmental			
Operation temperature	-20°C~+55°C		
Storage temperature	-25°C~+70°C		
Water proof	IP54		
Humidity	0~80% RH		
PHYSICAL			
Length	132 mm		
Width	30 mm		
Height	22.8 mm		
Cable Lengths	NMEA2000 cable: 0.1m NMEA0183 cable: 1 m		
Weight	< 150 g		
ELECTRICAL			
NMEA2000 LEN (Load Equivalency Number)	1 (under 50 mA)		
POWER SUPPLY			
Supply Voltage from CAN Bu	12VDC / 24VDC (Typical)		

4.2 Dimension

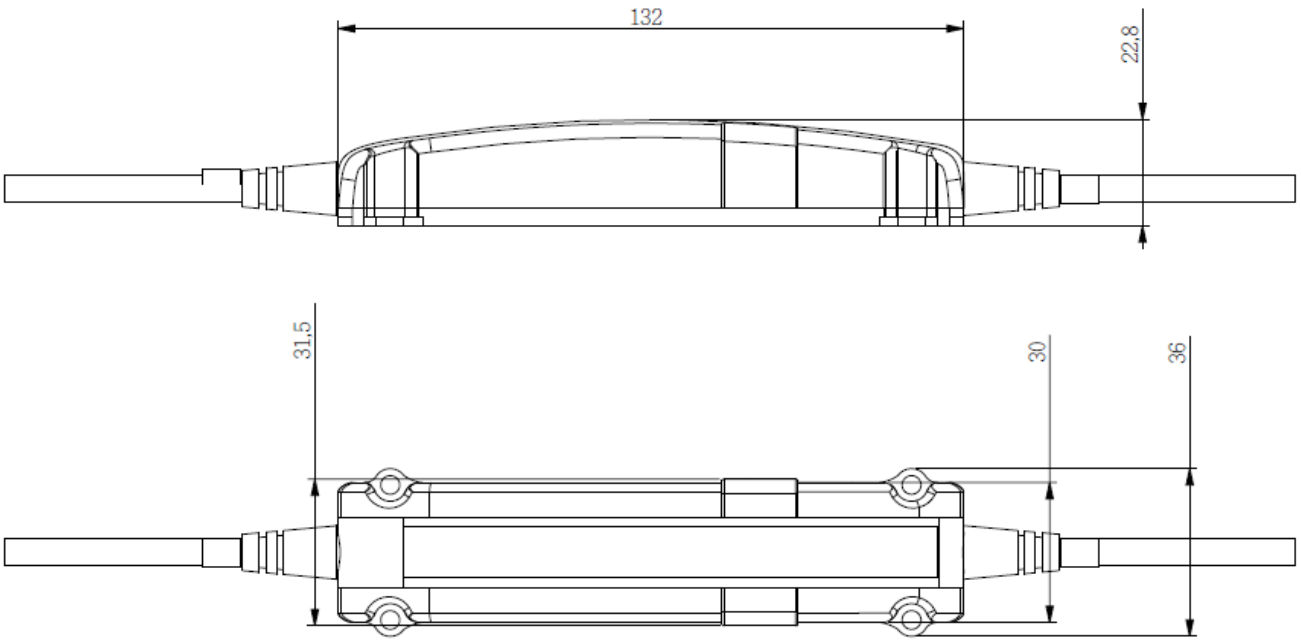


Figure 12 NK-80 Main Body Dimension (mm)

4.3 PGN Information

Table 4 PGN Information

Transmit	
PGN	**Description**
59392	ISO Acknowledgment
59904	ISO Request
60928	ISO Address Claim
126464	PGN List - Transmit PGN's group function
126992	System Time
126996	Product Information
127245	Rudder
127250	Vessel Heading

Receive	
PGN	**Description**
59392	ISO Acknowledgment
59904	ISO Request
60928	ISO Address Claim
126992	System Time
127245	Rudder
127250	Vessel Heading

127251	Rate of Turn
127258	Magnetic Variation
128259	Speed, Water referenced
128267	Water Depth
129025	Position, Rapid Update
129026	COG & SOG, Rapid Update
129029	GNSS Position Data
129033	Time & Date
129038	AIS Class A Position Report
129039	AIS Class B Position Report
129040	AIS Class B Extended Position Report
129041	AIS Aids to Navigation (AtoN) Report
129283	Cross Track Error
129284	Navigation
129291	Set & Drift, Rapid Update
129539	GNSS DOPs
129540	GNSS Sats in View
129792	AIS DGNSS Broadcast Binary Message
129793	AIS UTC and Date Report
129794	AIS Class A Static and Voyage Related Data
129795	AIS Addressed Binary Message
129796	AIS Acknowledge
129797	AIS Binary Broadcast Message

127251	Rate of Turn
127258	Magnetic Variation
128259	Speed, Water referenced
128267	Water Depth
129025	Position, Rapid Update
129026	COG & SOG, Rapid Update
129029	GNSS Position Data
129033	Time & Date
129038	AIS Class A Position Report
129039	AIS Class B Position Report
129040	AIS Class B Extended Position Report
129041	AIS Aids to Navigation (AtoN) Report
129283	Cross Track Error
129284	Navigation
129291	Set & Drift, Rapid Update
129539	GNSS DOPs
129540	GNSS Sats in View
129792	AIS DGNSS Broadcast Binary Message
129793	AIS UTC and Date Report
129794	AIS Class A Static and Voyage Related Data
129795	AIS Addressed Binary Message
129796	AIS Acknowledge
129797	AIS Binary Broadcast Message

129800	AIS UTC/Date Inquiry
129801	AIS Addressed Safety Related Message
129802	AIS Safety Related Broadcast Message
129803	AIS Interrogation
129804	AIS Assignment Mode Command
129805	AIS Data Link Management Message
129806	AIS Class A Position Report
129807	AIS Group Assignment
129808	DSC Call Information
129809	AIS Class B “CS” Static Data Report, Part A
129810	AIS Class B “CS” Static Data Report, Part B
130306	Wind Data
130311	Environmental Parameters
130312	Temperature

129800	AIS UTC/Date Inquiry
129801	AIS Addressed Safety Related Message
129802	AIS Safety Related Broadcast Message
129803	AIS Interrogation
129804	AIS Assignment Mode Command
129805	AIS Data Link Management Message
129806	AIS Class A Position Report
129807	AIS Group Assignment
129808	DSC Call Information
129809	AIS Class B “CS” Static Data Report, Part A
129810	AIS Class B “CS” Static Data Report, Part B
130306	Wind Data
130311	Environmental Parameters
130312	Temperature

4.4 NMEA0183 Information

Table 5 NMEA0183 Information

Formatter mnemonic code	Name
RMC	Recommended minimum specific GNSS data
GSA	GNSS DOP and active satellites
GGA	Global positioning system (GPS) fix data
GSV	GNSS satellites in view
GLL	Geographic position – latitude/longitude
VTG	Course over ground and ground speed
ZDA	Time and date
VDM	AIS VHF data-link message
VDO	AIS VHF data-link own-vessel report
DSC	Digital selective calling information
RSA	Rudder sensor angle
VHW	Water speed and heading
VLW	Dual ground/water distance
DPT	Depth
DBT	Depth below transducer
XTE	Cross-track error, measured
APB	Heading/track controller (autopilot) sentence B
ROT	Rate of turn
VWR	Relative Wind Speed and Angle
MWV	Wind speed and angle
MWD	Wind direction and speed
MTW	Water temperature
VDR	Set and drift
BWC	Bearing and distance to waypoint – great circle
BWR	Bearing and distance to waypoint – rhumb line

5 FCC INTERFERENCE STATEMENT

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of 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 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 complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1) This device may not cause harmful interference, and

2) This device must accept any interference received, including interference that may cause undesired operation.

6 DECLARATION OF CONFORMITY

Hereby, Alltek Marine Electronics Corp. (AMEC) declares that this NK-80 is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

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