



www.actisense.com

Actisense intelligent
sensors and interfaces
‘The NMEA Specialists’



Active Research Limited was established in 1997 in Poole, Dorset, England.

For the first five years the company established a reputation within the marine electronics consultancy field, designing for many large manufacturers e.g. Airmar

To promote the ground-breaking designs of Active Research Limited, the **Actisense** brand name was registered in 2001.

With over 20 years of specialist experience in the design of interfacing software and hardware, Actisense has developed a wide range of products which are now sold in 24 countries.

Founder & MD, Phil Whitehurst



Meet the Team



Phil Whitehurst
Managing Director



Michele Whitehurst
Company Secretary



Andy Campbell
Chief Engineer



Maurice Ambridge
Electronic Design Engineer



Grant Bradley
Project Manager



Lesley Keets
Operations Manager



Doug Thomson
Engineering Support



Mark Glover
Software Engineer



Sarah Chandley
General Administrator



Dawn Carter
Bookkeeper



Vlad Gorre
Tech Support & Production Manager



Kris Raczka
Production Assistant



Brad Fisher
Production Assistant

NMEA 0183 Summary

NMEA 0183 specification

- For 25 years, NMEA 0183 has been the standard method for marine electronic devices to share information with each other.
- It defines the electrical signalling, data protocol & sentence formats for an ASCII based serial data bus.

NMEA 0183 data is transmitted from *Talkers*

- An NMEA 0183 data bus shall have only one Talker
- Talkers (NMEA 0183 ver.2 onwards) must meet the computer standard RS422
- Talkers (NMEA 0183 ver.1) were based on the RS232 computer standard
- Talkers are generally not Opto-isolated

NMEA 0183 data is received by *Listeners*

- An NMEA 0183 data bus can have multiple Listeners
- Listeners (NMEA 0183 ver.2 onwards) must be Opto-isolated and RS422 compliant
- Listeners (NMEA 0183 ver.1) generally were not Opto-isolated and were RS232 compliant

Overcoming Talker limitations

- To combine data from multiple talkers together, a multiplexer must be used
- To amplify a talker output so it can talk to many listeners, a buffer must be used

Differences between RS-422 and RS-232

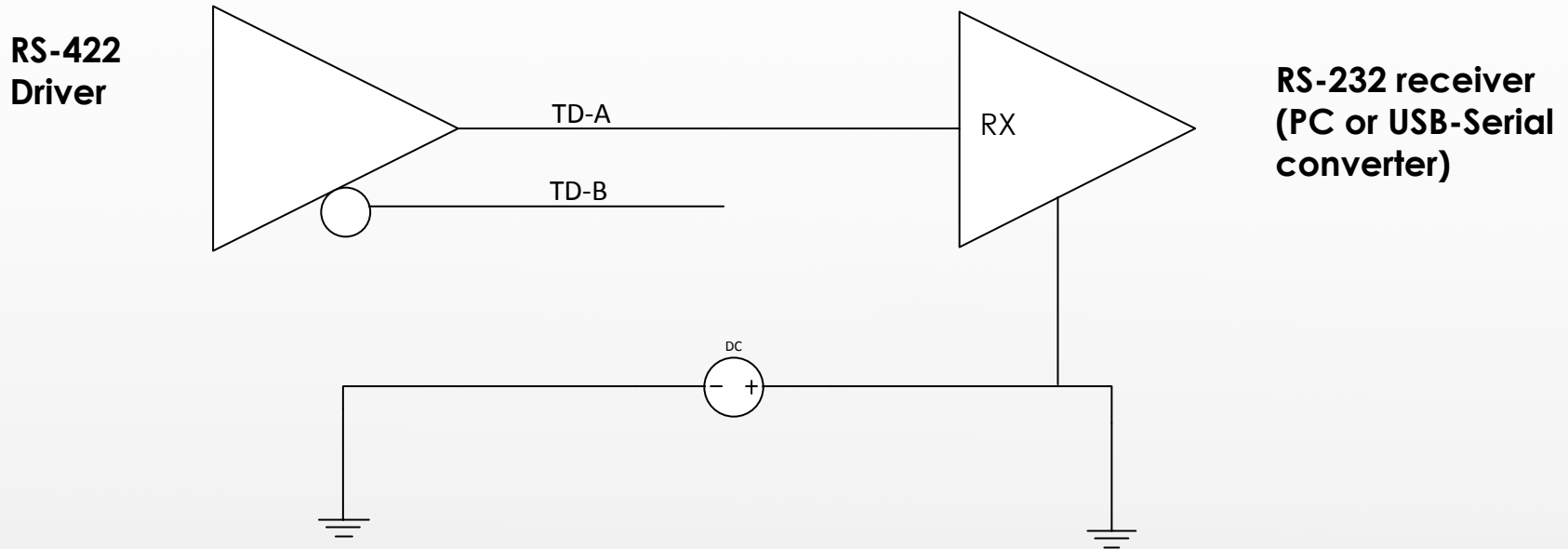
RS-422 features

- Connections are defined as “A” and “B”, e.g. TD-A and TD-B for Talkers, and RD-A and RD-B for Listeners
- Signal transitions are differential, so if TD-A is at +5V, TD-B will be at 0V, and vice-versa
- Driver outputs are always 0V or +5V
- Differential means no ground connection, so connecting TD-B to ground could result in driver damage
- Has balanced driver for improved noise immunity and drive length to 1000 feet or more
- Used on most NMEA 0183 equipped marine instruments

RS-232 features

- Single ended, a data source has a “Tx” connection, and ground
- The “Tx” voltage swings between a positive and a negative voltage
- Driver voltages for RS232 are allowed over a wide range, typically +/- 3-25V
- Limited in drive length (50 feet typical)
- Used on some (mostly legacy) NMEA 0183 equipped marine instruments
- Used on all PC computer systems, usually through a USB to serial adapter or PCI serial card

These differences require care when interfacing between the two standards!



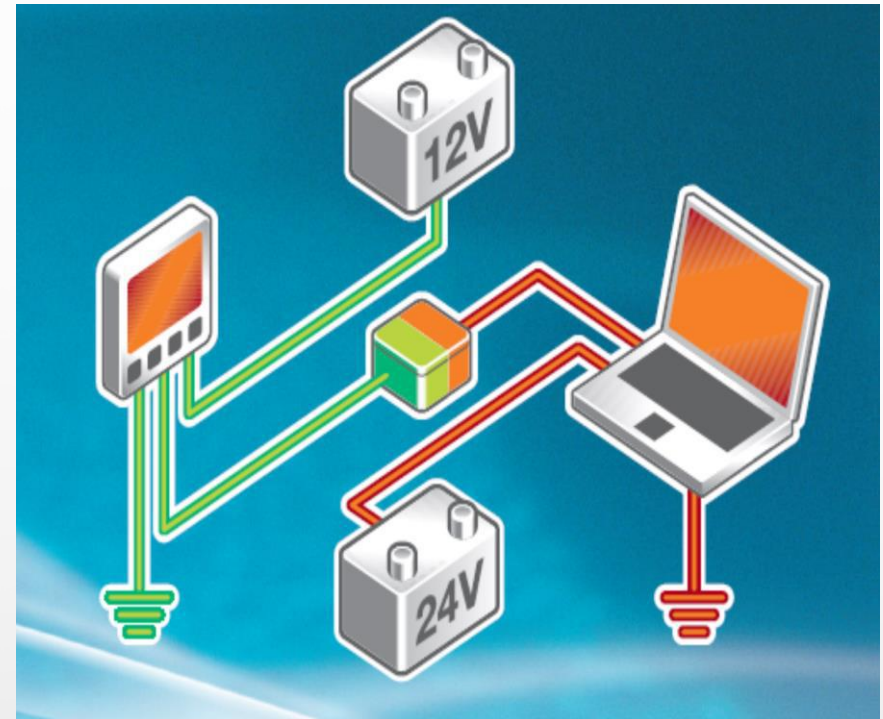
A basic method of connection works in some cases, but the DC offset and the ground potential difference both degrades performance and creates a real ground loop hazard

Even worse is tying TD-B to ground at the receiver end – the TD-B driver is short circuited!

ISO-Drive

ISO-Drive is a ground-breaking RS422 output technology that is available across the Actisense NMEA 0183 interfacing range ...

- Isolated output can “float” from system ground up to 1500 volts
- No more ground loop trouble! The NMEA installation will not become damaged shortly after the engineer leaves the vessel
- No need for isolated power supplies
- Safely interface PC equipment to marine data buses
- Electrical spike & Over-voltage protection
- 100% compatible with RS-232 and RS-422



Since its introduction at METS 2006, many thousands of **ISO-Drive** equipped products have been sold and the level of support calls due to output connection problems has fallen... to zero!

How does ISO-Drive help?

ISO-Drive to RS-232 connection

- Connect TD-A to Rx, TD-B to GND at the receiver end
- The driver is “floating”, so from the receiver’s point of view, TD-A will “flip” from +5v to -5V, making it fully RS-232 compliant

ISO-Drive to RS-422 connection

- Compliant with the RS-422 specification, so wire TD-A to RD-A and TD-B to RD-B
- The advantage here is that you can connect to a non-isolated receiver, e.g. a PC RS-422 port, without any ground loop current risk

Features

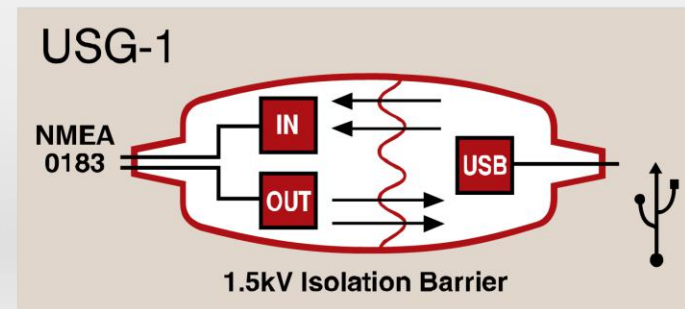
- 1.5 kV galvanic isolation
- Powerful drive capability meets all NMEA 0183 version specifications (1 through 4)
- Electrical spike & Over-voltage protection
- Low power consumption, much more efficient than power hungry battery power isolators

Safe & Simple way
to connect a PC

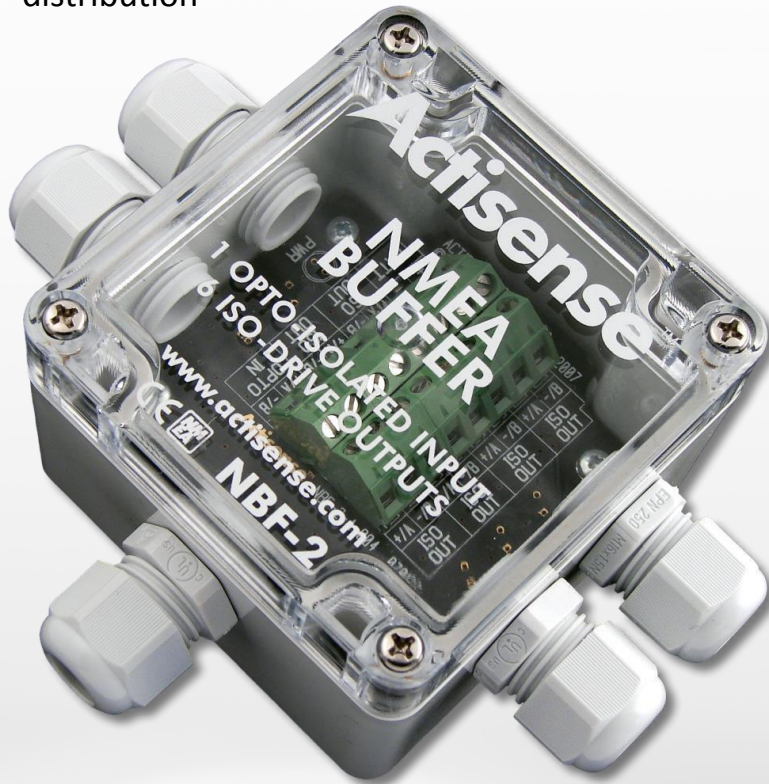


Connects your boat data network safely to your PC USB port with full isolation

- OPTO-isolated input with 2.5 kV isolation
- ISO-Drive output
- Output & input isolated from each other and USB
- USB drivers automatically installed on Windows 7
- USB Powered
- Appears as a regular Windows COM port
- Our VCP driver remembers its COM port number

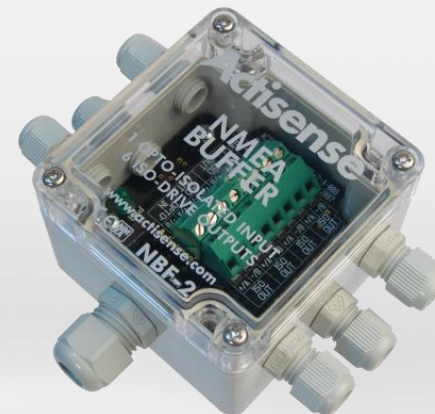


Easy isolation and distribution

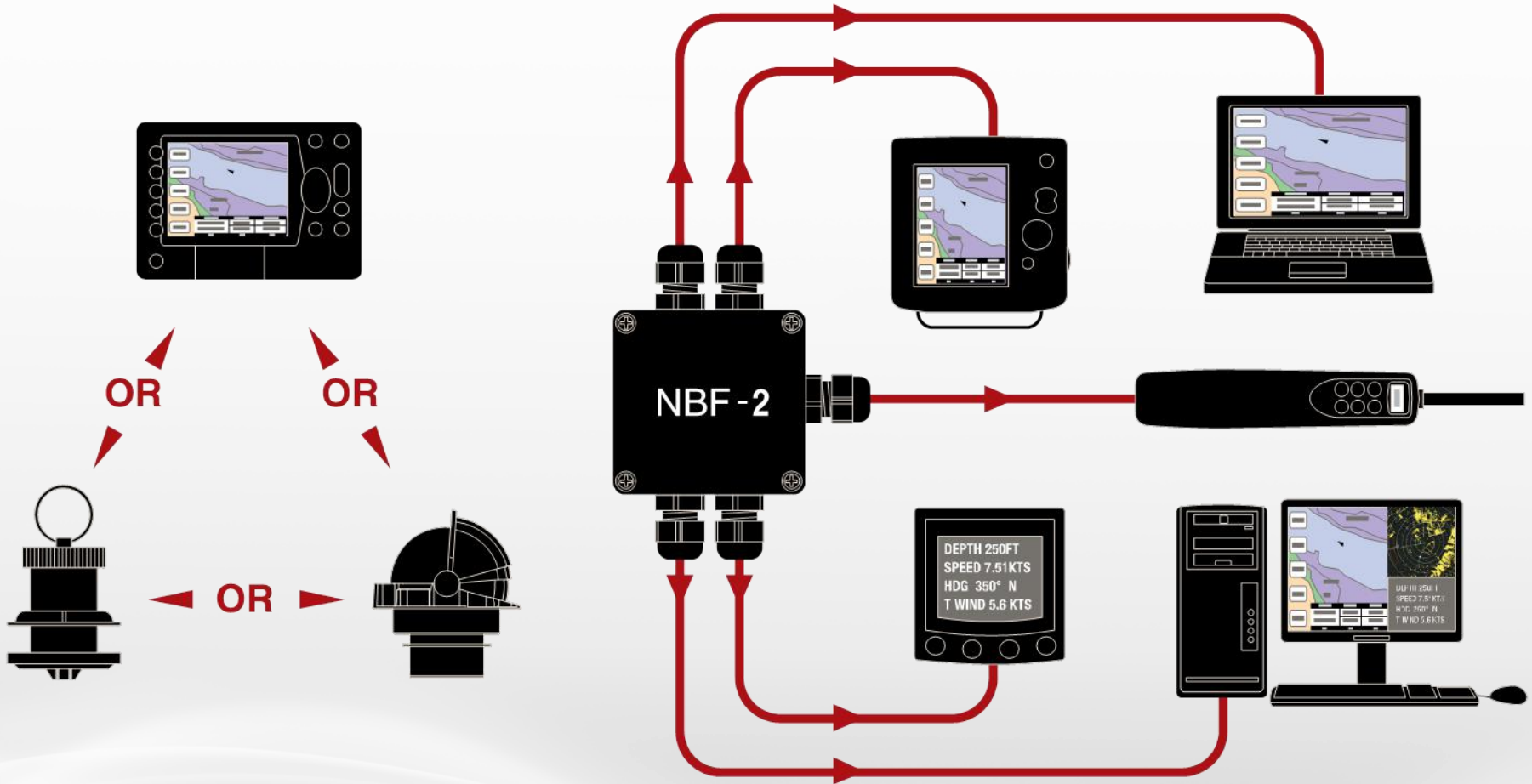


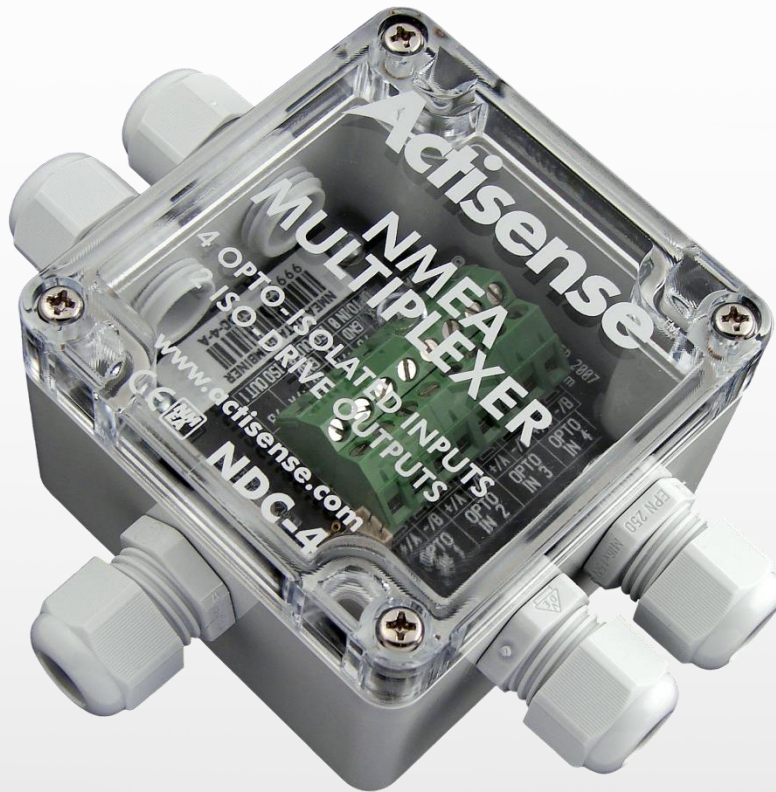
Isolates an NMEA 0183 talker from up to six listeners

- 6 x ISO-Drive outputs: all separately isolated from each other and ground
- Opto-isolated input
- Amplifies weak NMEA sources
- Compatible with all NMEA versions
- Very low power consumption



NBF-2-GX





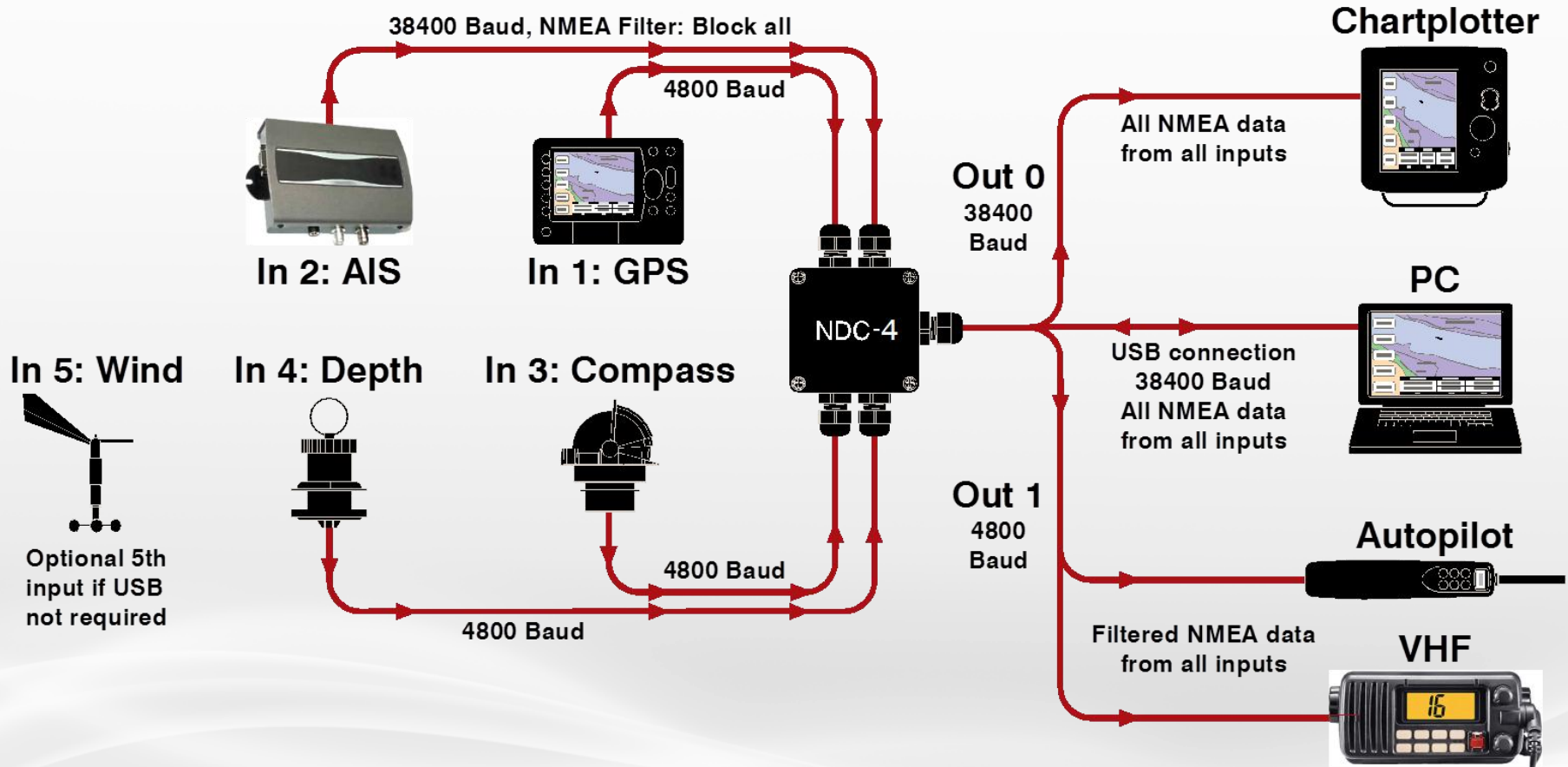
AIS compliant inputs

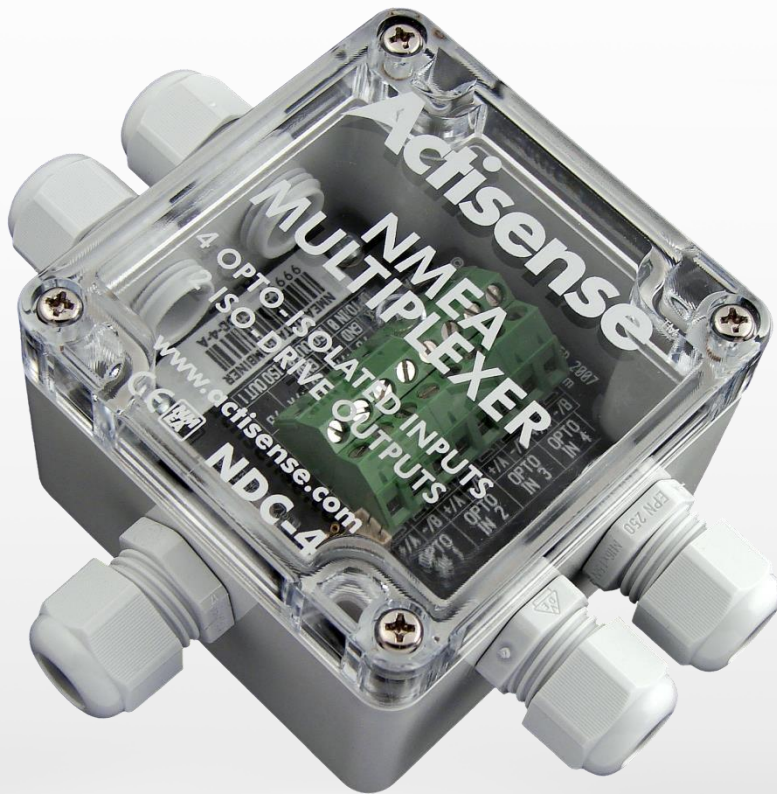
Combines multiple NMEA 0183 data streams together

- The world's only multiplexer with ISO-Drive
- 5 Opto-isolated NMEA 0183 inputs
- 4 inputs are NMEA HS (AIS compliant)
- 2 separate ISO-Drive outputs
- Can change baud rate of data stream
- Free configuration software (Control Centre)
- Port filtering built in to remove unwanted data
- Configurable port baud rates (4800 - 57600)
- Firmware upgradeable
- USB connection on NDC-4-USB variant

NDC-4 Typical installation

Inputs: AIS, GPS, Compass and Depth (optional Wind)
Outputs: Chartplotter, PC, Autopilot and VHF





Two pre-configured options to make life easier for the installer:

NDC-4-AIS

- NDC-4 preconfigured for AIS operation
- NMEA Input 2 set to 38400 Baud and its Filter list set to block all NMEA data from going out ISO-Drive Output 1
- Prevents the high volume AIS data from going out of the slow speed 4800 port

NDC-4-ASW

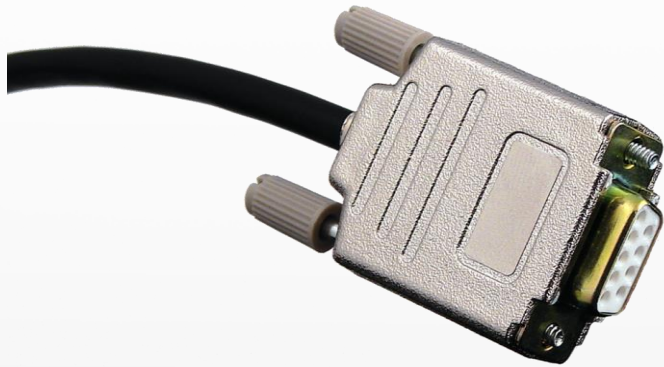
- NDC-4 preconfigured as an Autoswitch
- Automatically switches NMEA data from the highest priority 'talker' with valid data to the two ISO-Drive outputs
- Output 0 set to 38400 baud, Output 1 to 4800 baud
- Any NDC-4 can be easily configured by the installer and/or customer (using a PC) for AIS or Autoswitch operation in the field.



Re-use existing transducers

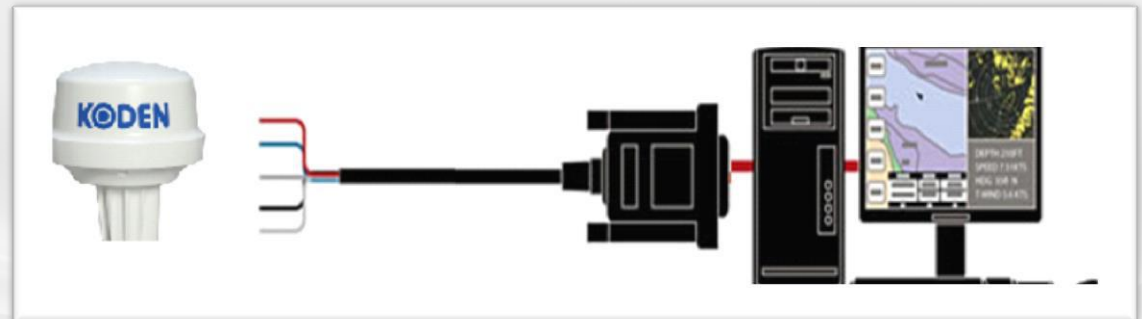
Breathe smart digital life into depth transducers with this NMEA 0183 depth, speed & temperature digital signal processor...

- Interfaces analogue transducers to NMEA 0183
- 100 watts RMS depth power
- Speed log (paddle-wheel) transducer & temperature thermistor interfaces
- Bi-directional RS422 (RS232 compatible) port
- 150 kHz, 170 kHz, 200 kHz
- PC calibration tool to set depth offset, speed calibration curve and temperature offset



Bi-directional NMEA 0183 to RS232 interface offers Opto-isolated protection for marine electronic equipment

- Comprehensive isolation of PC hardware
- Port powered - no external power supply required
- Shielded cable and metallised shielded case
- Opto-isolation on NMEA input
- Protection on NMEA output





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NGW-1: NMEA 0183 to NMEA 2000 Gateway

www.actisense.com



Converts between NMEA 0183 and NMEA 2000

- Bi-directional conversions
- Configuration allows setup from anywhere on the NMEA 2000 network (using an NGT-1 and NMEA Reader software)
- Four configurations available:

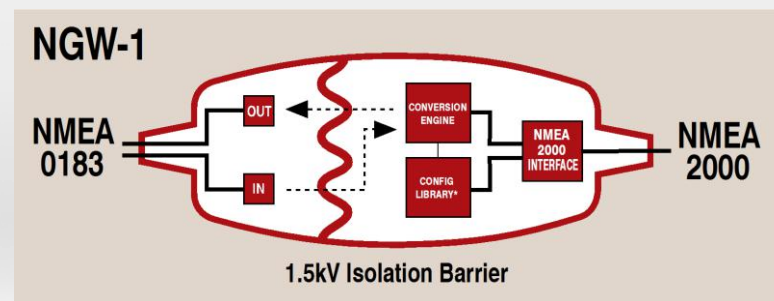
NGW-1-ISO

NGW-1-ISO-AIS

NGW-1-STNG

NGW-1-USB

- ISO-Drive output & OPTO isolated input
- NMEA 2000 powered





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NGW-1-STNG: NMEA 0183 to Seataalk STNG®

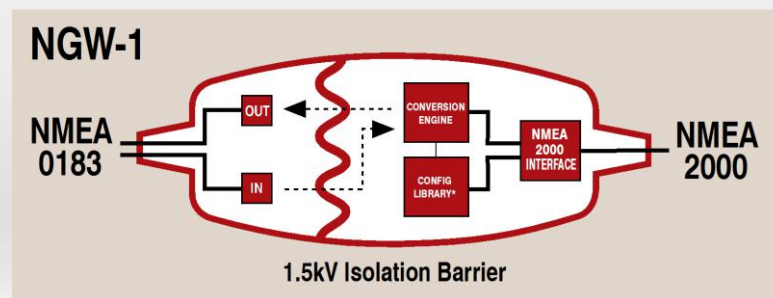
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Converts between Seataalk NG® and NMEA 0183

- Seataalk NG uses NMEA 2000 messaging, so works with a standard NGW-1-ISO.
- To assist easy installation, this version of the NGW-1 has been specially configured to integrate seamlessly with the Raymarine Seataalk system.
- Supplied with the STNG to NMEA 2000 adapter cable to allow the NGW to connect to the Seataalk system
- The NGW-1-STNG powers itself from the Seataalk bus



Allows a Seataalk NG® equipped boat to connect to NMEA 0183 products





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NGT-1: NMEA 2000 PC Interface

www.actisense.com



Connect your PC to an NMEA 2000 network

- Transfers NMEA 2000 messages to and from the NMEA 2000 bus
- Works with many brands of PC navigation software incl Fugawi Marine 5 and Avia Motor & Avia Sail
- Works with the free NMEA Reader and EBL Reader
- Makes NMEA 2000 diagnostics easy
- Available in ISO and USB versions
- Firewall enforces the NMEA 2000 rules
- An NMEA 2000 CAN-Bus dongle for Windows, MAC or Linux that runs the NMEA 2000 stack
- DLL and source code software stacks available

NMEA Reader – enhancing the NGT

The screenshot shows the NMEA Reader application window. The main window displays a list of messages with columns for Line, PGN, SRC, DST, Name, Time, Interval, and Data. The messages include ISO Address Claims, Product Information, Configuration Information, and various sensor data like Wind Data, Magnetic Variation, Attitude, Rate of Turn, Position, COG & SOG, GNSS DOPs, Environmental Parameters, Vessel Heading, GNSS Sats in View, Meteorological Station Data, System Time, Time & Date, GNSS Position Data, ISO Address Claim, Datum, and Manu. Proprietary fast-packet.

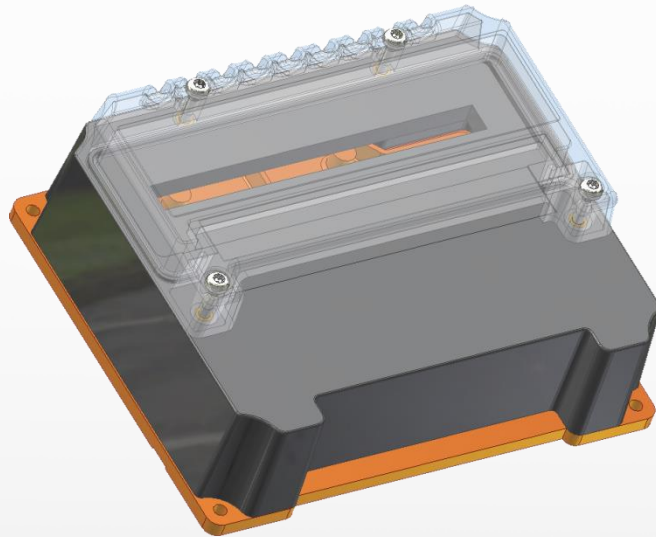
Line	PGN	SRC	DST	Name	Time	Interval	Data
1	60928	0	255	ISO Address Claim	09:53:08:173		0B 85 E1 10 00 82 32 C0
2	126996	0	255	Product Information	09:53:09:707		14 05 36 6F 55 32 30 30 ...
3	126998	0	255	Configuration Information	09:53:09:925		0D 01 74 65 73 74 20 73 ...
4	60928	1	255	ISO Address Claim	09:53:08:173		01 01 20 22 00 82 32 C0
5	126996	1	255	Product Information	09:53:10:578		14 05 69 2C 4E 4D 45 41 ...
6	126998	1	255	Configuration Information	09:53:10:798		02 01 02 01 45 01 41 63 ...
7	60928	3	255	ISO Address Claim	09:53:08:174		04 01 20 22 00 82 32 C0
8	126996	3	255	Product Information	09:53:11:563		14 05 69 2C 4E 4D 45 41 ...
9	126998	3	255	Configuration Information	09:53:11:782		02 01 02 01 45 01 41 63 ...
10	60928	4	255	ISO Address Claim	09:53:08:175		05 01 20 22 00 82 32 C0
11	126996	4	255	Product Information	09:53:12:441		14 05 69 2C 4E 4D 45 41 ...
12	126998	4	255	Configuration Information	09:53:12:660		20 01 54 6F 6D 65 6B 27 ...
13	60928	5	255	ISO Address Claim	09:53:08:175		06 01 20 22 00 82 32 C0
14	126996	5	255	Product Information	09:53:13:315		14 05 27 6E 4E 4D 45 41 ...
15	126998	5	255	Configuration Information	09:53:13:535		20 01 54 6F 6D 65 6B 75 ...
16	60928	6	255	ISO Address Claim	09:53:08:176		B0 AA 21 22 02 82 32 C0
17	126996	6	255	Product Information	09:53:14:194		14 05 27 6E 4E 4D 45 41 ...
18	126998	6	255	Configuration Information	09:53:14:406		07 01 64 6F 6D 65 6B 0B ...
19	60928	7	255	ISO Address Claim	09:53:08:176		03 01 20 22 03 82 32 C0
20	126996	7	255	Product Information	09:53:15:068		14 05 27 6E 4E 4D 45 41 ...
21	126998	7	255	Configuration Information	09:53:15:284		15 01 49 73 20 74 68 69 ...
22	130306	84	255	Wind Data	09:54:04:414	0.25	2B FF FF FF FF FF FF FF
23	127258	84	255	Magnetic Variation	09:54:04:414	1.00	F6 F5 D5 3A 6F FE FF FF
24	127257	84	255	Attitude	09:54:04:415	1.00	E5 FF 7F CD E4 C1 FA FF
25	127251	84	255	Rate of Turn	09:54:04:416	0.10	B5 9F D3 00 00 FF FF FF
26	129025	84	255	Position, Rapid Update	09:54:04:416	1.00	FF FF FF 7F FF FF FF 7F
27	129026	84	255	COG & SOG, Rapid Update	09:54:04:419	1.00	FF FF FF FF FF FF FF FF
28	129539	84	255	GNSS DOPs	09:54:04:422	1.00	FF FB FF 7F FF 7F FF 7F
29	130311	84	255	Environmental Parameters	09:54:04:423	0.50	CD C1 D9 76 FF 7F F2 03
30	127250	84	255	Vessel Heading	09:54:04:424	0.10	EE F5 B8 00 00 6F FE FD
31	129540	84	255	GNSS Sats in View	09:54:03:425	1.00	9F FF 09 04 2E 08 CC C9 ...
32	130323	84	255	Meteorological Station Data	09:54:03:478	1.00	F0 D5 3A C0 86 19 13 FF ...
33	126992	84	255	System Time	09:54:03:535	1.00	9F F0 D5 3A C0 86 19 13
34	129033	84	255	Time & Date	09:54:03:535	1.00	D5 3A C0 86 19 13 FF 7F
35	129029	84	255	GNSS Position Data	09:54:03:874	1.00	FF D5 3A D0 AD 19 13 FF...
36	60928	84	255	ISO Address Claim	09:53:08:177		7C 00 E0 10 01 B4 A0 C0
37	129044	84	255	Datum	09:54:00:420	10.00	57 38 34 FF 00 00 00 00 ...
38	130945	84	255	Manu. Proprietary fast-packet ...	09:54:00:495	10.00	87 98 01 01 00 01
39	126996	84	255	Product Information	09:53:15:951		BA 04 7B 22 50 42 32 30 ...
40	126998	84	255	Configuration Information	09:53:16:267		04 01 39 38 1E 01 74 6F ...

The right-hand pane shows details for NMEA 2000 PGN: 130323 (0x1FD13). The details include: Name: Meteorological Station Data, Source = 84, Destination = 255, Priority = 6, Length = 30, Number of Fields = 15, Field 1: Mode = 0 (Autonomous mode), Field 2: Reserved field, Field 3: Measurement date = 28/03/2011, Field 4: Measurement time = 08:54:04, Field 5: Station location, latitude = Not Available, Field 6: Station location, longitude = Not Available, Field 7: Wind Speed = 2.00 Metres Per Second (3.88 Knots), Field 8: Wind Direction = 3.2916 Radians (188.595 Degrees), Field 9: Wind Reference = 2 (Apparent Wind (relative to the vessel centerline)), Field 10: Reserved field, Field 11: Wind Gusts = Not Available, Field 12: Atmospheric Pressure = 101000 Pascals, Field 13: Air Temperature = 304.25 Kelvin (31.10 Degrees), Field 14: Station ID String = "", Field 15: Station Name String = "".

Benefits:

- Data view shows all NMEA 2000 messages
- Breaks down message to show the detail of each value
- Network view shows the details of connected devices
- Hardware view allows configuration of NGT & NGW devices
- Allows the user to become an NMEA “master”
- Logs messages to a time-stamped file
- Also works with NMEA 0183 messages on any serial connection

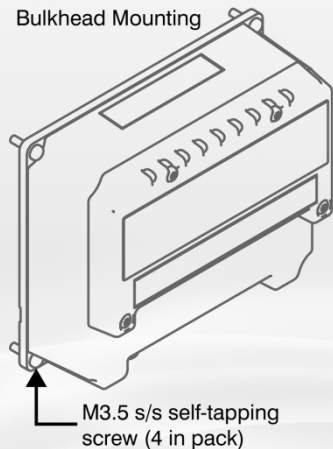
Use an NGT-1 to view NMEA 2000 or a USG-1 to view NMEA 0183



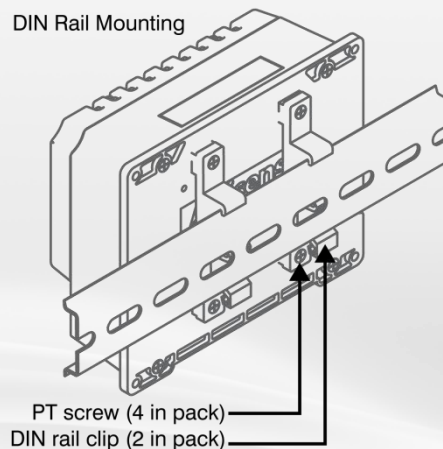
Flexible multi-purpose product case

- Internal PCB assembly is waterproof to IP66
- Removable external connection cover provides excellent water resistance and wire strain-relief
- Pluggable screw-terminal connectors for fast and easy installation and re-installation
- DIN Rail mountable (either horizontally or vertically) using an optional kit
- Translucent case allows use of LED indicators
- Up to 3 waterproof connectors can be optionally mounted on the case front edge

Bulkhead Mounting



DIN Rail Mounting



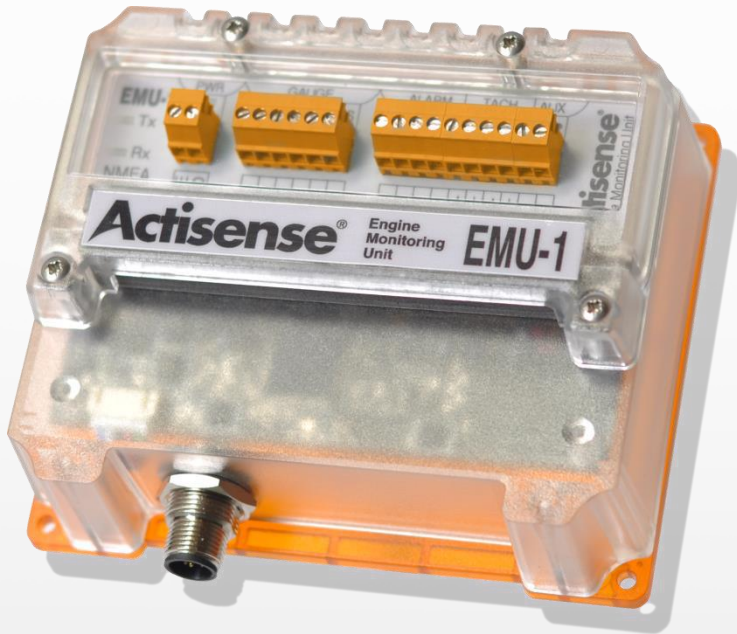


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EMU-1: Engine Monitoring Unit

www.actisense.com



Share analogue engine information on the NMEA 2000 bus

- Converts 'engine' analogue signals in to NMEA 2000 PGN messages
- 6 Gauge/Sender inputs, 4 Alarm inputs, 2 Tach inputs and 2 flexible auxiliary inputs (for future expansion)
- Configurable to suit the engine it is working with
- Uses the Actisense custom Titan case with an optional DIN rail mounting kit
- Config Tool allows setting of Gauge/Sender type, engine speed / Tach ratio, Alarm trigger voltage and the PGN field association
- Currently, 1 Engine per EMU: a configurable engine instance allows multiple engines to be set up
- Supports the Transmission (Gearbox) Parameters PGN, Battery Status PGN and Alternator Potential PGN
- Future support for Fluid Level PGN

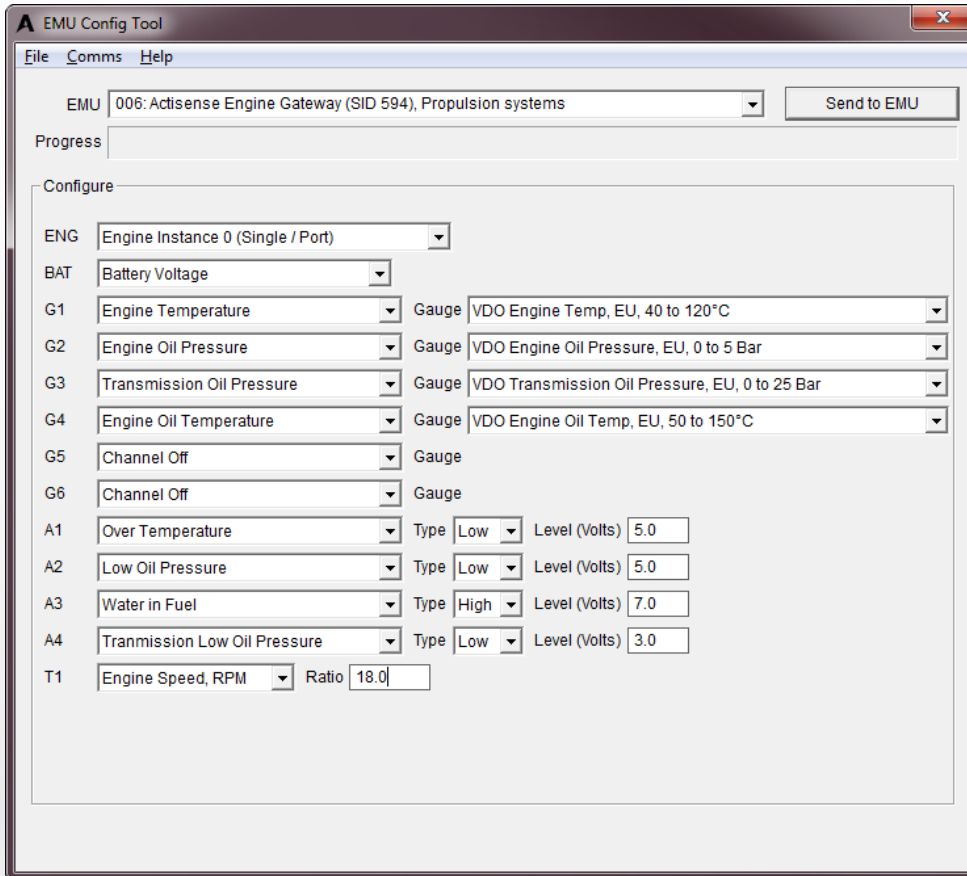


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EMU-1: Configuration Tool

www.actisense.com



Configure what analogue signals are connected to the EMU-1

- Automatically connects to an NGT-1
- Sets up the required Gauge/Sender type for each of the 6 Gauge/Sender inputs
- Sets up the required Alarm signal and its trigger level for each of the 4 Alarm inputs
- Sets up the engine speed (RPM) ratio of the Tach input
- Option of sharing the measured 'Power' voltage as the 'Battery Voltage' or 'Alternator Potential'
- Quick one-button operation to send configuration to EMU-1

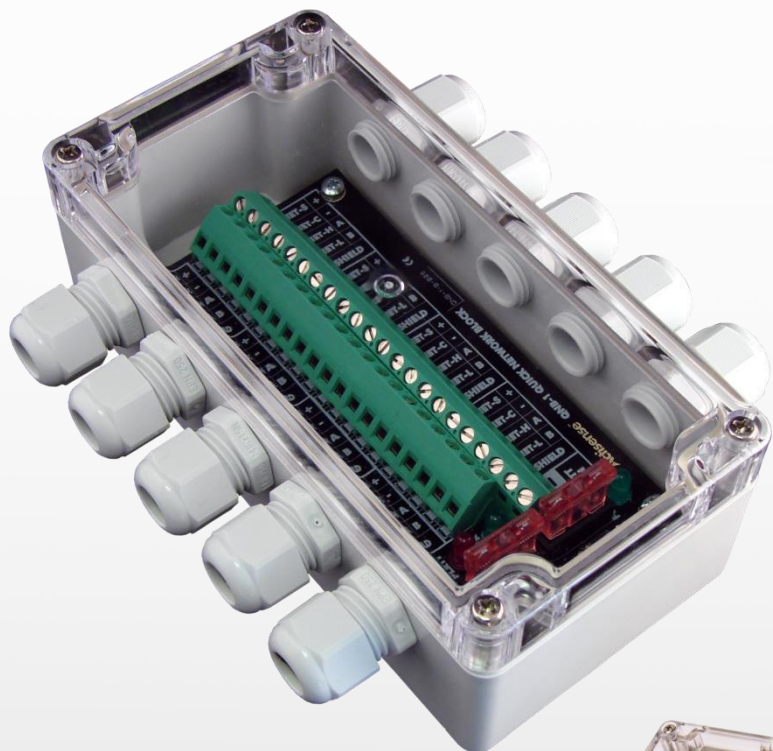


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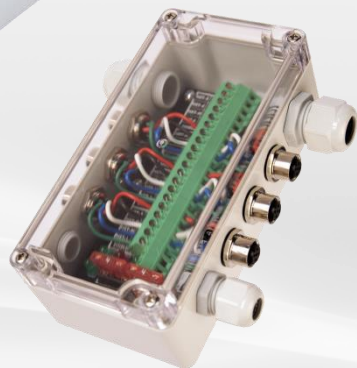
QNB-1: Quick Network Block

www.actisense.com



Allows the easy creation of an NMEA 2000 network backbone

- Eight x 5-way connection points provided
- Up to six NMEA 2000 network drops and two NMEA 2000 backbone connections
- Double fused battery entry point allows the entire NMEA 2000 network to be powered from a central point
- 8 Amp maximum battery current for each half
- Diagnostic power and data LEDs
- Makes 'backbone' routing of cables easy – no connectors required
- QNB-1-PMW has pre-fitted M12 Panel Mount Connectors
- Connect standard NMEA 2000 products to the 'backbone'



QNB-1-PMW



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QPD-1 NMEA 2000 Quick Power Drop

www.actisense.com



QPD-1-PMW



QPD-1-GLA

Power up the NMEA 2000 network

- Available in two versions:
- QPD-1-PMW - equipped with female and male M12 micro connectors for simple plug and play integration with a standard NMEA 2000 backbone.
- QPD-1-GLA - equipped with waterproof glands and screw terminal connection points to work with a “bulk-cable” style backbone.
- Both versions are equipped with a double fused screw terminal connection to power the NMEA 2000 bus from a battery or other power source.
- NMEA 2000 diagnostic LEDs show power status on each side of the bus.
- Reverse protection is provided with high power “Schottky” diodes.



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NMEA 2000 Connectors

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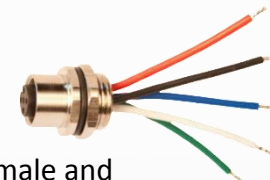


A2K-T-MFF

Micro T-Piece - The mounting body thicker than standard for use with large field-fit connectors

A2K-PMW-M & A2K-PMW-F

Micro Panel Mounts - Prewired, robust male and female connectors for bulkhead routing



A2K-TER-F & A2K-TER-M

Micro Terminators - High quality male and female terminating resistors



A2K-TDC - xxx

Cable assemblies - Male to female drop cables available in 10*, 6, 5, 2, 1, 0.5, 0.25 metre lengths (10m length for backbone only)



A2K-KIT-1

Micro starter kit - everything needed to make an initial NMEA 2000 network



A2K-BULK-100M

Bulk cable - 100 metre reel for large installations. Ideal for use with the QNB-1

A2K - MPT-1

Micro power Tee - NMEA 2000 power tap



OPTO-4: PC Opto-isolator cable

- Replacing the PC-OPTO-3 (May/June 2013) with the same purchase price
- Additional benefits of the OPTO-4:
- New over-moulded case design for improved water resistance
- Reduced footprint for easier installation in tight spaces



NBF-3: NMEA Buffer

- Release date est. July 2013
- Pluggable connectors for quick, easy installation
- Diagnostic LED on the input confirms correct connection
- Actisense designed case with DIN rail option



Upcoming Products – NMEA 2000

These products are in the very early stages of development:

NOG-1: NMEA OneNet Gateway (est. release 2014)

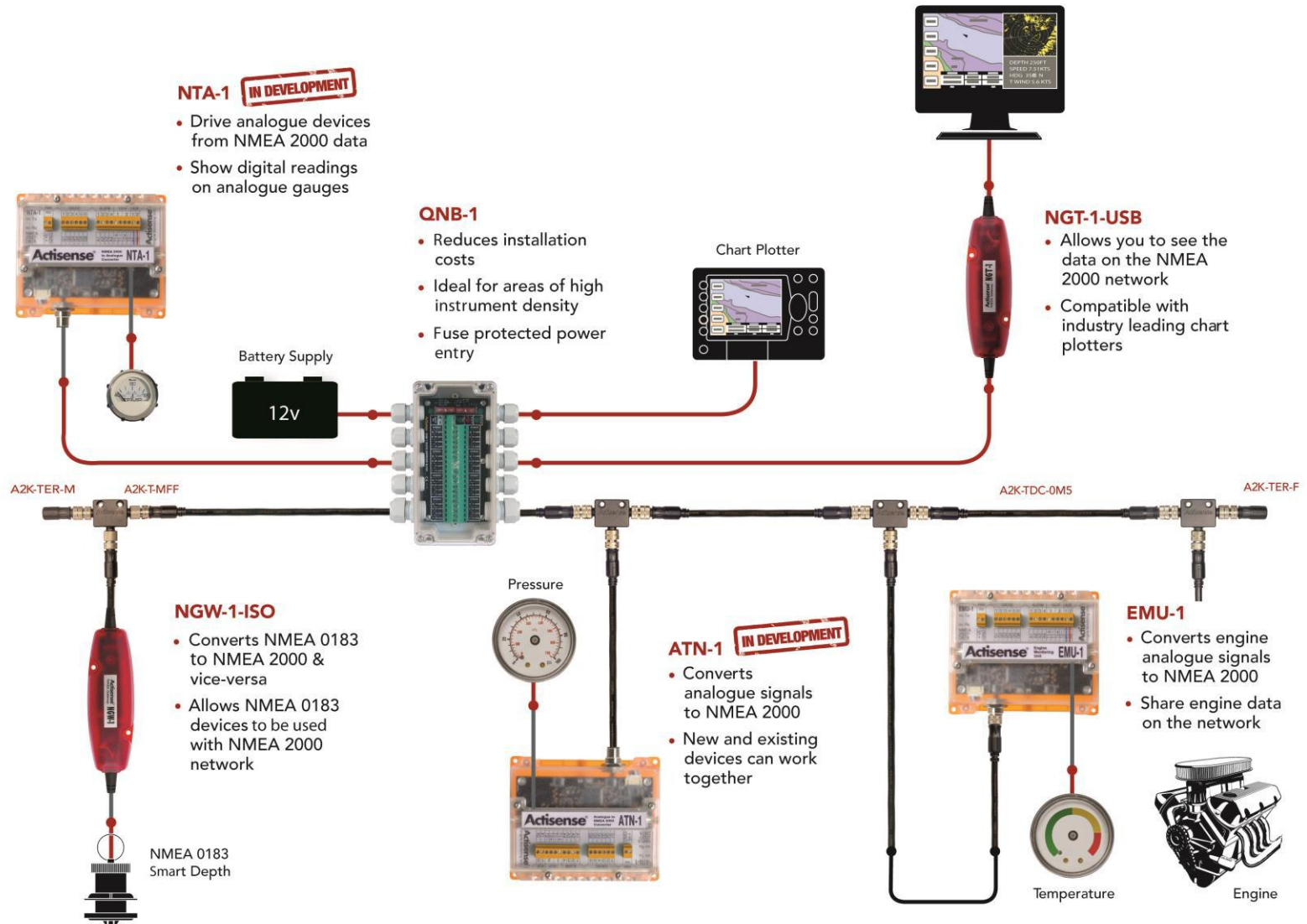
- Share data between NMEA 2000 and OneNet networks
- Makes NMEA 2000 and OneNet devices visible on both networks

ATN-1: Analogue to NMEA 2000 converter (est. release 2014)

- Converts analogue signals (voltage, current, frequency) into digital and then output that value in a user defined NMEA 2000 message (PGN)
- Each input will be isolated from each other and the NMEA 2000 network
- Full input configuration available to the installer
- Connects directly to existing analogue gauges to share the reading on the NMEA 2000 network

NTA-1: NMEA 2000 to Analogue converter (est. release 2015)

- Can convert a user defined NMEA 2000 message (PGN) in to an analogue signal (voltage, current, frequency)
- Allows old gauges to show NMEA 2000 data values
- Enables NMEA 2000 engines to work with old gauges



Service from Actisense

Purchase peace of mind...

- E-mail & telephone technical advice and support
- 3 year 'return to base' guarantee on all Actisense products
- Free software upgrades on website
- User manuals and datasheets on website

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