

Locomarine

ADD-ON MODULE

**NMEA2000 TO ETHERNET
CONVERTER**

The easiest way to stay online.



Installation Manual

version 1.0

Read carefully.

For better understanding check video tutorials on our website.

Register your product for software update notifications.

Thank you.

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RoHS COMPLIANT

All devices in the Yacht Router series comply with the Restriction of Hazardous Materials (RoHS) Directive. This means that all components used to build Yacht Router and add-on modules are RoHS compliant. The RoHS Directive bans placing on the EU market new electrical and electronic equipment containing more than agreed levels of lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE) flame retardants.

INTRODUCING YACHT ROUTER SOLUTION

Yacht Router with add-on modules is a complete network infrastructure solution for yacht or boat of any size. Yacht Router devices with add-on modules will help you to easily install, setup and control Internet connection on your yacht. The most important part of Yacht Router solution is the software which controls complete system. It is designed by professionals specialized in yacht communication systems in collaboration with experienced yacht captains. The result is a system that is simple to operate, maintain and control. Underneath simple touch user interface, Yacht Router with add-on modules is a solution with an industry level of reliability, performance and unprecedented level of security.

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While we try to improve our equipment at all times, Locomarine Networks d.o.o. shall incur no liability based on contents, updates or modification of the contents, or the lack of contents in this manual.

Because of the nature of wireless communications, transmission and reception of data can never be guaranteed. Data may be delayed, corrupted (i.e. have errors) or be totally lost. Although significant delays or losses of data are rare when wireless devices such as the Yacht Router are used in a normal manner with a well-constructed network, the Yacht Router device and additional modules should not be used in situations where failure to transmit or receive data could result in damage of any kind to the user or any other party, including but not limited to personal injury, death, or loss of property. Locomarine Networks d.o.o. and its affiliates accept no responsibility for damage of any kind resulting from delays or errors in data transmitted or received using the Yacht Router device, or for failure of the Yacht Router device to transmit or receive such data.

The equipment said in this manual must only be used for what it was designed.

Improper operation or installation may cause damage to the equipment or personal injury. Locomarine Networks d.o.o. will not incur any liability of equipment damage or personal injury due to improper use or installation of the equipment. It is strongly recommended to read this manual and the following safety instructions before proceeding to installation or operation.

SAFETY INSTRUCTIONS

ELECTRICAL SHOCK HAZARD: Do not open enclosure of the equipment if you are not qualified to do it.

TURN OFF THE POWER IMMEDIATELY IF WATER LEAKS INTO THE EQUIPMENT OR AN OBJECT DROPS INTO THE EQUIPMENT:

Continue operating the equipment could cause electrical shock or fire. Contact your nearest distributor or dealer for service.

DO NOT DISASSEMBLE THE EQUIPMENT OR MODIFY THE EQUIPMENT: Improper disassemble or modification could cause electrical shock, fire, or personal injury.

AVOID OPERATING THE EQUIPMENT WITH WET HANDS: Electrical shocks could be resulted if operating with wet hands.

USE PROPER FUSE: Damage to the equipment or fire could be resulted if using improper fuse.

TURN OFF THE POWER IMMEDIATELY IF THE EQUIPMENT IS EMITTING SMOKE OR FIRE: Continue operating the equipment could cause electrical shock or fire. Contact your nearest distributor or dealer for service.

DO NOT PLACE ANY LIQUID-FILLED CONTAINER ON TOP OF THE EQUIPMENT.

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1.1. ABOUT NMEA2000 TO ETHERNET CONVERTER

Converter is Add-on module compatible with every Yacht Router model. Converter is compatible with any TCP based device (e.g. routers, switches, computers) from other manufacturers.

The NMEA 2000 Ethernet converter (hereinafter Converter or Device) connects navigation PCs and laptops to NMEA 2000 over Ethernet, Garmin Marine Network, Raymarine SeaTalk HS and RayNet, Furuno NavNet, or NMEA OneNet, and allows bridging of NMEA 2000 networks. The Converter is equipped with a standard Ethernet RJ45 connector, and you may need a proprietary adapter to connect it with your vessel's network; direct connection to PC with standard computer cable is also supported.

The Device provides NMEA 0183 and NMEA 2000 data streams using TCP and/or UDP protocols, and has a bi-directional converter between NMEA 0183 and NMEA 2000. This allows viewing of navigational data including AIS as well as managing NMEA equipment including autopilot from virtually all marine software, e.g. TimeZero, OpenCPN (NMEA 0183 only) and Expedition 10 (both NMEA 0183 and NMEA 2000 protocols are supported). The Converter has three data servers (TCP/UDP), which allows tailored settings for different applications.

The Converter has an internal web server, allowing it to be configured and updated from a web browser. The Web Gauges page of the built-in web site allows managing of digital switching equipment and real time viewing of vessel data using a web browser on PC, laptop, tablet or smartphone that can replace instrument displays. No internet connection or app installation is required.

The Device records vessel data to the internal memory, which can be downloaded as a GPS track, spreadsheet or in XML format from the internal web server. These data can also be automatically uploaded to the Yacht Device's free Cloud Service, to share your position and other data online, get your tracks or remotely monitor your vessel from home.

1.2. WHAT IS IN THE PACKAGE

When shipped, all devices are wrapped in plastic bags that protect them from humidity. Devices are then placed into a cardboard box.

- 1 - NMEA2000 to Ethernet converter, NML-04, 1 pcs
- 2 - Manuals & control software (on USB stick), QIG-0



2.1. WARRANTY TERMS

1. The Device warranty is valid for two years from the date of purchase. If a Device was purchased in a retail store, the sales receipt may be requested when applying for a warranty claim.
2. The Device warranty is terminated in case of violation of the instructions in this Manual, case integrity breach, or repair or modification of the Device without the manufacturer's written permission.
3. If a warranty request is accepted, the defective Device must be sent to the manufacturer.
4. The warranty liabilities include repair and/or replacement of the goods and do not include the cost of equipment installation and configuration, or shipping of the defective Device to the manufacturer.
5. Responsibility of the manufacturer in case of any damage as a consequence of the Device's operation or installation is limited to the Device cost.
6. The manufacturer is not responsible for any errors and inaccuracies in guides and instructions of other companies.
7. The Device requires no maintenance. The Device's case is non-dismountable.
8. In the event of a failure, please refer to Appendix A before contacting technical support.
9. The manufacturer accepts applications under warranty and provides technical support only via e-mail or from authorized dealers.

3.1. DEVICE INSTALLATION AND CONNECTION

The Device requires no maintenance. When deciding where to install the Device, choose a dry mounting location. Do not place the Device where it can be flooded by water or exposed to rain or water spray. Please note that you may need to observe LED signals and/or press the Converter's hidden button during the configuration procedure. Interfaces of the Device can be connected in any order, a hot plug (when the Device is powered) of Ethernet cables is allowed. The Device is powered from the NMEA 2000 interface, and we recommend connecting it first.

3.2. CONNECTING TO ON NMEA 2000 NETWORK

The Device is directly connected to the NMEA 2000 network backbone without a drop cable. To connect the Device to a Simrad SimNet network (with yellow connectors) you can use an adaptor cable (SimNet Female – NMEA 2000 Micro Female, Navico part number 24006199).

Before connecting the Device, turn off the bus power supply. Refer to the manufacturer's documentation if you have any questions regarding the use of connectors:

- SeaTalk NG Reference Manual (81300-1) for Raymarine networks
- Technical Reference for Garmin NMEA 2000 Products (190-00891-00) for Garmin networks

After connecting the Device, close the lock on the connector to secure and waterproof it.

After turning on the NMEA 2000 network power supply, the status LED on the Ethernet connector will start flashing, indicating that the Converter is powered and functioning.

3.3. CONNECTING TO ETHERNET NETWORK

The Device supports direct connection to PC or can work over an Ethernet network (10, 100 or 1000 Mb/s), Garmin Marine Network, Raymarine SeaTalk HS and RayNet, Furuno NavNet, or NMEA OneNet.

To connect directly with a PC, a regular RJ45 Male-Male Cat 5e/6 cable is required. The cable is not supplied with the Device, but can be purchased in any computer store. The cable length can be up to 100 meters, and it must have at least 4 wires connected (usually all 8 wires are connected in the cable).

The same cable is used to connect with a standard Ethernet hub or router, or to a Garmin Marine Network. However, the vessel's Ethernet network (usually used to connect the chart plotter with radar or fishfinder) may have proprietary connectors. All known manufacturers supply adaptor cables with a standard RJ45 connector, for example:

- for Raymarine RayNet, use cables with part numbers A62360, A80151, A80159
- for Raymarine SeaTalk HS use cables with part numbers E55049, E55050, E55051

After connection to the Ethernet network (or to a PC), the network LED (yellow) of the Device will start flashing. This indicates network activity (including service packets), and flashes every few seconds even if Converter is not used by the PC software. A constant signal of the LED means that the cable is not connected, damaged or all network equipment is turned off. No signal of yellow LED means that NMEA 2000 network is turned off (the Device is powered from NMEA 2000) or indicates hardware problem (the Converter must be replaced).

4.1. CONNECTION TO THE CONVERTER

Usually, the Converter can be accessed using a web browser by following addresses: 10.81.0.92

The internal web site of the Ethernet Converter should be opened. Use login **admin** and password **admin** to enter the administrative web site. In case of a wrong password please contact our support at support@locomarine.com

It is possible that the connection will not be established due to network settings or you will open some other device in a web browser instead of the Ethernet Converter. Even in case of a successful connection, we strongly recommend you to read this entire Section to the end and change factory settings.

4.2. ETHERNET MODES OF THE CONVERTER

The Converter offers several network modes:

DHCP Client (dynamic IP address)

In this mode, the Converter automatically receives an IP address and other network settings from the network router. If your router has a web interface, you can enter the administrative web site and check the addresses of connected devices to get know the assigned IP address.

DHCP Server

In this mode, the Converter issues IP addresses to network devices which are configured to obtain IP address automatically. The address space is limited to four addresses (for four client devices), the first client's address will be next to the the address of the Converter; the other network devices must be configured for static IP addresses. The factory setting for Converter's address is 10.81.0.92.

Static IP Address

In this mode, other network devices may also have static IP addresses (stored in settings) or obtain addresses from the DHCP server on the network.

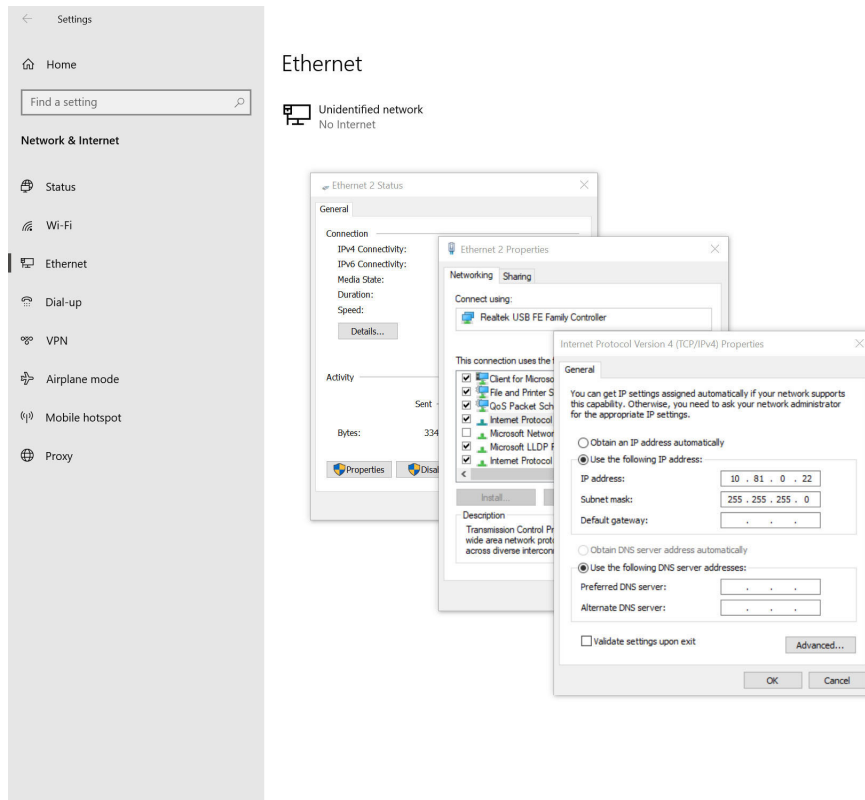
DHCP Magic

This is the factory setting of the Converter. In this mode, it initially tries to obtain the dynamic IP address (as in DHCP Client mode), and in case of failure switches to DHCP Server mode. The process usually takes a few seconds and the selected mode is indicated by status LED. The selected mode is not saved to settings, and after reboot the sequence repeats.

The DHCP Magic mode should work well in case of direct connection with PC (in rare cases, PCs are configured for a static IP address and an address conflict is possible). But if you have a network router with a DCHP server, it can assign random address to the Converter in DHCP Magic mode (if your router has a web interface, you can log on and check the list of connected devices).

4.3. EMERGENCY MODE OF THE CONVERTER

Turn off the NMEA 2000 power supply and use the supplied paperclip to press and hold the hidden button before powering on. Release the button when the status LED (green) lights up (it will be constantly lit while the button is pressed). Now the Converter is loaded in emergency mode and using the address 10.81.0.92.



Internet protocol settings in Microsoft Windows

Open network connection properties on the PC (Internet Protocol Version 4 (TCP/IPv4) on Microsoft Windows, see Figure 1) and set the IP address to 10.81.0.92 and subnet mask to 255.255.255.0, other settings can be ignored. To avoid possible network conflicts, it is recommended to connect the PC directly to the Converter with network cable.

If you still cannot open the Converter's web site from the PC, check the address of the Proxy Server in a web browser (it must be switched off) and/or try another web browser. See the next chapter for troubleshooting.

4.4. TROUBLESHOOTING OF ETHERNET CONNECTION

The following step-by-step guide will help you to troubleshoot the network connection:

1. Be sure that the network (yellow) LED of the Converter is flashing chaotically every few seconds. Otherwise, see the Section II.
2. Check the network mode of the Converter by signals of status (green) LED, see Section VI for details.
3. Reset Converter settings (or perform a hardware reset if you have installed the beta version of the firmware), the Converter will be switched to DHCP Magic mode.
4. Try to connect the PC directly to the Converter (without network hub or router) and try to access Converter's web server.
5. Switch the Converter to emergency mode and check settings of the PC and web browser.
6. Take a photo of your installation, internet settings of the PC, record a short video with the LEDs flashing and apply to technical support or ask a local computer specialist for help.

4.5. RECOMMENDED ETHERNET SETTINGS

We recommend switching your Converter from default DHCP Magic mode to DHCP Server in case of direct connection with laptop or if you only have a passive network hub that has no DHCP server. If you already have a DHCP server (network router with DHCP server), switch the Converter to Static IP Address. In both cases, the Converter's own IP address will be fixed. In case of an onboard PC (not a laptop, which can be taken away from the boat for a while), you may prefer to configure a static IP address (use addresses differing by at least 10 from Converter's address, for example to x.x.x.11 if the Converter has the address x.x.x.1).

If the IP address is different from the address on Device's label, put the sticker with the address on the Device or make a note in this manual.

5.1. CONFIGURATION OF APPLICATION PROTOCOLS

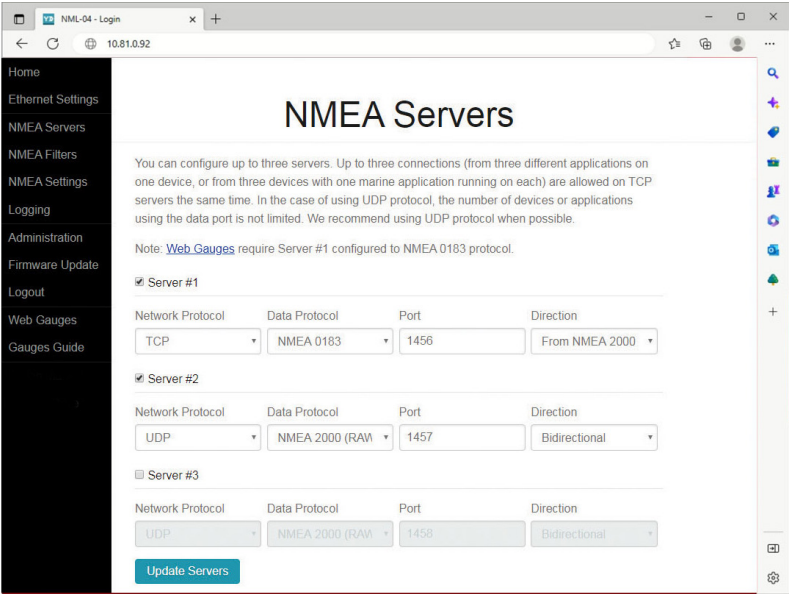
Most marine applications support both TCP and UDP network protocols. TCP is a connection-oriented protocol. This means that the receiver must confirm reception of data before it gets the next packet of data, otherwise the sender repeats the transmission after a timeout. So, the second TCP connection doubles the network traffic and CPU load, despite the fact that both clients receive the same data.

UDP is a connectionless protocol; any number of clients can listen to data broadcasted from a specified port without any additional load on the server and without increasing the actual network traffic. We recommend using UDP protocol where possible, because the resources of the Device's CPU are limited.

The Converter supports NMEA 2000 (RAW) and NMEA 0183 data protocols. The Converter contains a bi-directional converter between NMEA 0183 and NMEA 2000 and has a flexible system of message filters. The NMEA 2000 (RAW) protocol is supported in Expedition 10 and CAN Log Viewer. The RAW protocol is very simple, open and supported by our other Converters and routers. On the NMEA Server page you can set up to three server ports. If TCP network protocol is selected, up to three connections (from three different applications on one device, or from three devices with one marine application running on each) are allowed at the same time. So three servers allow nine connections in total. In the case of using UDP protocol, the number of devices or applications used on the data port is not limited. We recommend using UDP protocol when possible.

Servers can be configured as bi-direction, read-only (From NMEA 2000) or write-only (To NMEA 2000). We recommend configuring data ports as read-only if possible, to prevent network flooding from incorrectly configured applications.

Server #1 serves Web Gauges in addition to connected clients; Web Gauges will not work when this server is configured to NMEA 2000 protocol or turned off.



Converter server settings

Server #3 also supports the Debug and Memory data protocols. The Debug protocol is designed to diagnose hardware or software issues. The Memory protocol allows export of the vessel's data from an internal memory to GPX (tracks), CSV (spreadsheets) or XML formats.

With the factory settings, Converter has Server #1 enabled and pre-configured use of TCP port 1456 and the NMEA 0183 data protocol. To connect your application to the Converter with factory settings:

- set the IP address 10.81.0.92 in the application settings
- specify the TCP protocol and port 1456 in the application settings.

To use the Converter with a Navionics Boating App, no settings are required in the app, but some changes are required in the Converter configuration:

- configure one of the Converter servers to use UDP port 2000 and NMEA 0183 data protocol
- be sure that Converter web server is accessible from your mobile device
- be sure that your router forwards UDP packets between Ethernet and WIFI networks

5.2. NMEA SETTINGS AND AUTOPILOT CONTROL

On the NMEA Settings page you can configure control of NMEA 2000 (SeaTalk NG) autopilots, and tune conversion between NMEA 0183 and NMEA 2000 protocols.

True wind calculation

The wind sensor always measures apparent wind; true wind angle is calculated using SOG or STW data and true wind direction requires COG or heading. A chart plotter can join all these data and send calculated values to NMEA 2000, but usually TWD, TWA and TWS are not available.

Historically, STW/HDG are used to calculate true wind. However, this is not correct in places with strong current, and the true value of true wind can be obtained using the SOG/HDG pair. Therefore, our Converters offers four options: SOG/HDG (if you love truth), SOG/COG (if you have GPS only), STW/HDG (if tradition is most important), or you can disable calculations. In the last case the Converter reports true wind data only if they are calculated by another device available on NMEA 2000 network. The default setting Any means that the Converter will detect what data are available on the network and will calculate true wind data using the best possible option.

Talker ID

You can configure the talker ID (two next characters after \$ or ! sign) for NMEA 0183 output sentences. The default setting for the talker ID is YD and Converter sentences looks like:

```
$YDWPL,5441.1350,N,02014.8640,E,005*7A
```

```
$YDRTE,1,1,c,My Funyy Route,001,002,003,004,005*10
```

Autopilot control

Modern autopilots have the following modes:

- Standby: In this mode, autopilot is not engaged to the vessel control.
- Auto: The autopilot has a fixed course to steer.
- Wind: The autopilot steers the boat at a specified angle to the wind.
- Waypoint: The autopilot steers the boat to the specified waypoint.
- Route or Track: The autopilot steer the boat by a specified route.

The difference in the last two modes is that autopilot not only maintains the right direction to the waypoint, but also tries to follow the line from the previous to the next waypoint. Note that Converter server port must be configured to work in both directions (Bidirectional in factory settings) to allow control of autopilot from the application. When NMEA 2000 autopilot is controlled from an NMEA 0183 application, it must receive:

- position of the destination waypoint (from RMB sentence)
- course from the position to the destination waypoint (APB and/or RMB)
- cross track error, means the distance and direction from the current position to the route (APB and/or RMB and/or XTE)

Depending on the implementation, the NMEA 2000 autopilot can also use the following data (and not only):

- vessel heading (HDG sentence), but in most systems the heading sensor is connected directly to the autopilot
- rate of turn (ROT sentence)
- position, course and speed over ground (RMC sentence)

To control the autopilot, Converter should receive APB and RMB sentences from the application. Converter also needs to have magnetic variation data, which can be obtained from HDG or RMC sentences or from the NMEA 2000 messages (must be turned on in the Converter settings).

If your NMEA 2000 network has GPS data, it can use data already available on NMEA 2000 and sending of the ROT, HDG and RMC sentences from the application may not be required. It is better to send minimal data from a PC to the NMEA 2000 network if possible.

Depending on the autopilot sensitivity settings, autopilot can control your vessel smoothly or aggressively. The application only provides the situation (where is the waypoint and how far we are from the route), but the course to steer and the rudder angle are defined by the autopilot logic.

Switching of waypoints is the work of the application. If the arrival radius is set to 1 NM, application can switch to the next waypoint when the current point is still a mile away. If your route is circular or approximately so, the application can unexpectedly switch from the first point to the last. You should be familiar with your application settings and test how the system works on the open water.

The autopilot can warn you or ask for your confirmation when the application changing the waypoint. It depends on autopilot settings. When the application terminates the navigation, it usually stops sending APB and RMB sentences. Autopilot usually switches to Auto mode and signals about that. Raymarine autopilots use proprietary messages to control. The Converter was tested with the two systems, but we also expect that it will work well with all other Raymarine SeaTalk NG autopilots:

- Raymarine C90W chartplotter, Raymarine SPX SmartPilot SPX30 and Raymarine ST70 Pilot Head
- Raymarine c125 chartplotter (LightHouse 17), Raymarine EV-1 Course Computer and Raymarine ACU200 Actuator Unit

To control Raymarine autopilot:

- Converter server port must be configured to use the NMEA 0183 data protocol and works in both directions (Bidirectional in factory settings)
- its support must be turned on in the settings (first setting at the NMEA Settings page), because it is turned off by default
- autopilot must be initially set to the Auto mode to be controlled from the application
- the application must provide APB, RMB and RMC sentences
- the application should provide an HDG or RMC sentences or using of NMEA 2000 variation must be on in the settings (3rd setting at the NMEA Settings page)

When the route or waypoint is activating in the application, autopilot switches to the Track mode from Auto. If automatic confirmations are off (default settings, 2nd setting at the NMEA Settings page), the chart plotter and pilot head will ask for the confirmation when waypoint is changing. When the application terminates the navigation, autopilot returns to the Auto mode.

It is impossible to switch from Track mode to Auto when the application controls the autopilot, because it will return it to the Track mode after a 5-second delay. To take control in an emergency, switch the autopilot to Standby mode.

XDR Settings

The XDR sentence is used to transfer data from sensors, tanks, engines, etc. This sentence contains the sensor's text identifier (name), which was not defined by NMEA Standard until end of 2018. This led to the invention of names by every company on the market. For example, B&G uses AIRTEMP to send air temperature data, OpenCPN software uses TempAir, Maretron uses ENV_OUTSIDE_T, and the NMEA 0183 Standard 4.11 defines Air.

With these settings you can define names used in XDR to provide compatibility with software or hardware. The length of the name is limited to 16 characters. An empty name means that data will not be sent in XDR sentence.

NMEA 0183 and NMEA 2000 Message Filters

On the NMEA Filters page, you can block NMEA 2000 devices or selected types of messages to or from applications or Web Gauges (for example, to exclude the possibility to control the autopilot). These settings are usually not required, and you can skip this chapter.

The Device has 14 filter lists which allow limiting the set of messages passed from the NMEA 2000 network to a PC or mobile application (transmit filters) and messages passed from the application to the NMEA 2000 network (receive filters).

Each NMEA server has four filter lists: two for incoming and outgoing NMEA 0183 messages, two for incoming and outgoing NMEA 2000 messages (used for RAW protocol). Which filter is used depends on the server data protocol settings defined on the NMEA Servers page. There are 12 filter lists in total.

The Device also has two Global filter lists, which define what NMEA 2000 messages can be passed from the network to internal NMEA servers and what NMEA 2000 messages can be sent by internal NMEA servers to the NMEA 2000 network. Each filter list has a switchable type: WHITE or BLACK. A message is passed thru the WHITE filter if it contains a record matched with a message. And the reverse for BLACK. In the factory settings, all filter lists are empty and are of BLACK type, so all messages are passed through the filters.

Syntax of NMEA 0183 filters

NMEA 0183 filters contain 3-char NMEA 0183 sentence formatters separated by a space character. According to the standard, an NMEA 0183 sentence starts with a \$ or ! symbol, followed by a two-character talker ID and a 3-char sentence formatter. These elements are followed by data fields (after the comma).

The sentence is finished by a check sum after the * (asterisk) symbol. Converter with factory settings using YD talker ID, it can be changed on the NMEA Settings page. The Device uses 3-character sentence formatters only for filtering. The following sentences matches to GLL and VDM records (sentence formatters):

```
$GPGLL,4146.5894,N,07029.6952,W,173412.02,A*15
```

```
!AIVDM,1,1,,B,ENK`smq71h@@@@@@@@@@@@@@@=MeR6<7rpP00003vf400,4*5F
```

Example of correct NMEA 0183 filter text:

```
GLL VDM DPT
```

Syntax of NMEA 2000 (RAW protocol) filters

You should be familiar with the NMEA 2000 Standard (can be purchased from National Marine Electronics Association, www.nmea.org) to operate with NMEA 2000 filters.

These filters actually contain pairs of 29-bit message identifiers and a mask. The identifier is compared by processing the NMEA 2000 message identifier and the second value (mask) defines the comparison concerning which bits are significant. The identifier contains a PGN (Parameter Group Number, described in NMEA 2000 Standard) and a source device address. You can use decimal and hexadecimal numbers (which start with a 0x prefix).

To simplify defining filters, it is also allowed to set filters using PGN only. The filter string contains records separated by comma. Records contain an identifier and mask separated by space, or a PGN number.

Example of correct filter:

```
0x1FD0700 0x1FFFFFF, 130310, 1 255, 130311
```

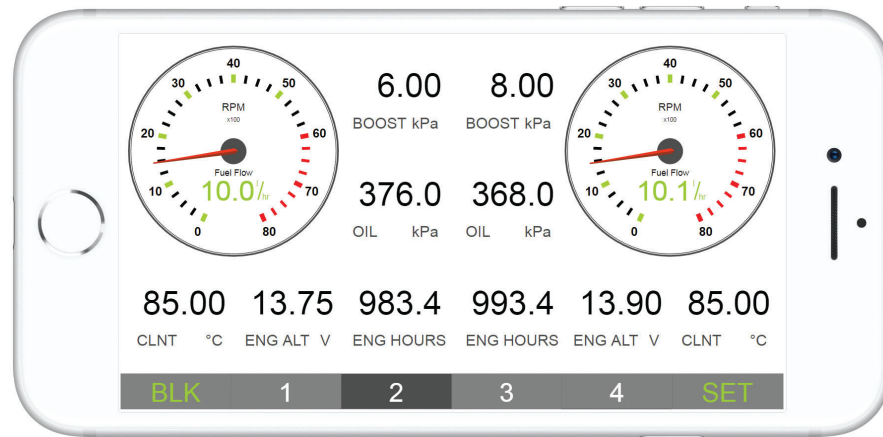
This filter matches with messages with PGN 130311 (0x1FD07) sent by the device with address 0, PGN 130310 (sent by any device), messages sent by a device with address 1 (1 255 is another form of the record 0x0000001 0x00000FF), and PGN 130311 (sent by any device).

Configure filters

To configure a filter, open the NMEA Filters page on the administration web site and select it with Server, Data Protocol and Filter combo boxes. Switch the filter type to required, enter a filter string and click Update (to discard changes just switch to another filter or refresh page in browser). On update, the Device parses the string and returns the effective settings back. Incorrect strings are ignored by the Device. Changes take effect immediately, and if you have diagnostics data opened in another browser window, you can monitor the effect of changes in real time.

6.1. WEB GAUGES OF ADMINISTRATIVE WEB SITE

The Web Gauges page (WG) allow real time viewing of vessel data using a web browser on PC, laptop, tablet or smartphone and can replace instrument displays. You can open the WG using the link on the logon page of the Converter's administrative web site (no authorization is required) or, if you are logged in, using the Web Gauges menu item. No internet connection or app installation is required.



Built-in web gauges

WG offers four customizable data pages. On mobile devices you can slide pages, or you can use the numeric buttons on the menu (at the bottom of the screen) to choose the active page. Data pages are pre-configured. The first page contains circular gauges for course/speed and AWA/AWS (apparent wind angle and speed), and text data bars with STW, heading, TWS and TWA data. The second page is configured to view twin engines' data and contains circular tachometers and text data bars with engine temperature and fuel rate data. The third page contains data bars with position, time, log, sea and air temperature, barometric pressure and depth surface graph with current depth value. The fourth page is not configured and contains no gauges or data bars. You can change any page's layout and its sets of data bars.

On an iPhone, iPad and Android devices, the address bar and/or menu bar of a web browser can reduce the visible area and overlap WG menu in horizontal or vertical screen orientation. In this case, add WG to the Home Screen (see browser menu) and open it using the WG icon on the Home Screen. The page will then open in full screen mode without browser menus or address bars.

7.1. NMEA 2000 MESSAGES SUPPORTED BY CONVERTER

The Converter can pass any message from NMEA 2000 to a PC application and in the opposite direction. No in the table below means that the Device will not process these messages during service communication with other devices on the network. Note that service communications are not affected by the filter settings of the Device

Message	Receive	Transmit
ISO Acknowledgment, PGN 59392 (0xE800)	Yes	Yes
ISO Address Claim, PGN 60928 (0xEE00)	Yes	Yes
ISO Request, PGN 59904 (0xEA00)	Yes	No
GNSS Position Data, PGN 129029 (0x1F805)	Yes	No
Local Time Offset, PGN 129033 (0x1F809)	Yes	No
PGN List Group Function, PGN 126464 (0x1EE00)	No	Yes
Product Information, PGN 126996 (0x1F014)	Yes	Yes
System Time, PGN 126992 (0x1F010)	Yes	No

7.2. CONVERSIONS FROM NMEA2000 TO NMEA0183

NMEA2000	NMEA0183	Comment
65311 Magnetic Variation, (Raymarine Proprietary)	-	Magnetic variation is used in RMC, HDT, HDG, VDR, VHW, VTG. Priority of variation PGNs: 127250, 127258, 65311.
126992 System Time	ZDA, GLL	See also PGN 129033
127233 Man Overboard, Notification (MOB)	MOB	
127237 Heading/Track Control	APB, HSC	Use PGN 129284, 129283 if possible
127245 Rudder	RSA	Two rudders supported
127250 Vessel Heading	HDG, HDM, HDT	Magnetic variation is used in RMC, HDT, HDG, VDR, VHW, VTG. Priority of variation PGNs: 127250, 127258, 65311.
127251 Rate of Turn	ROT	
127258 Magnetic Variation	-	Magnetic variation is used in RMC, HDT, HDG, VDR, VHW, VTG. Priority of variation PGNs: 127250, 127258, 65311.

127488 Engine Parameters, Rapid Update	RPM, XDR, DIN, PGN	DIN and PGN are wrap NMEA 2000 messages according SeaSmart (v1.6.0) and MiniPlex (v2.0) specifications. Engine revolutions, boost pressure, coolant temperature, hours, fuel rate, alternator voltage are also transmitted in XDR sentence.
127489 Engine Parameters, Dynamic	XDR, DIN	
127493 Transmission Parameters, Dynamic	DIN, PGN	
127501 Binary Status Report	DIN	
127505 Fluid Level	DIN, PGN	
127508 Battery Status	DIN, PGN	
128267 Water Depth	DBT, DBS, DPT	
128275 Distance Log	VLW	
129025 Position, Rapid Update	GLL	Also use PGN 126992 or 129029
129026 COG & SOG, Rapid Update	VTG	Also used in RMC
129029 GNSS Position Data	GGA, GLL, RMC, ZDA	See also PGN 129033
129033 Local Time Offset	-	Time offset is used in ZDA
129044 Datum	DTM	
129283 Cross Track Error	XTE	
129284 Navigation Data	RMB, HSC	Use 129283, 129029 if possible
129285 Navigation - Route/WP information	-	Waypoint names from this message are used in RMB and APB sentences
129291 Set & Drift, Rapid Update	VDR	
129539 GNSS DOPs	GSA	PGN 129540 is also required
129540 GNSS Sats in View	GSV, GRS	PGN 129539, 129029 required
130066 Route and WP Service – Route/WP – List Attributes	RTE	Use waypoints from 130067
130067 Route and WP Service – Route – WP Name & Position	WPL	
130074 Route and WP Service – WP List – WP Name & Position	WPL	
130306 Wind Data	MWD, MWV, VWR, VWT	Device with factory settings perform conversion from true to apparent wind and vice versa. MWV sentence is sending twice (one for relative wind and one for true). Also used in MDA.
130310 Environmental Parameters	XDR, MTW, MDA	Air, dew point, inside (saloon), water and exhaust gas temperature, inside and outside humidity, barometric pressure are supported. MDA is sent only when air, dew point or water temperature, or barometric pressure or outside humidity are available. Also contains wind speed and direction.

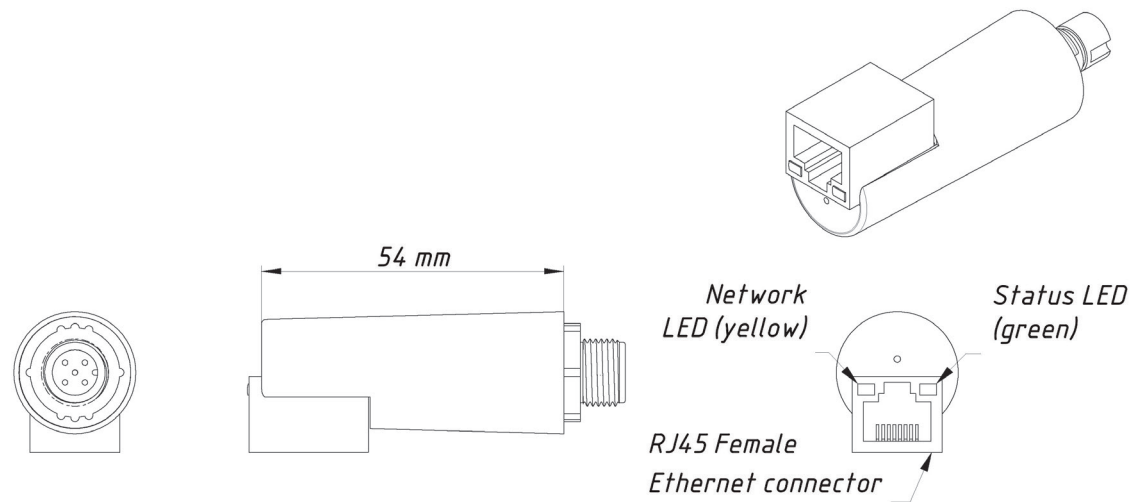
130311 Environmental Parameters	XDR, MTW, MDA	Device with factory settings perform conversion from true to apparent wind and vice versa. MWV sentence is sending twice (one for relative wind and one for true). Also used in MDA. Only messages with data instance 0 are converted. Air, dew point, inside (saloon), water and exhaust gas temperature, inside and outside humidity, barometric pressure are supported. MDA is sent only when air, dew point or water temperature, or barometric pressure or outside humidity are available. Also contains wind speed and direction.
130312 Temperature	XDR, MTW, MDA	
130313 Humidity	XDR, MDA	
130314 Actual Pressure	XDR, MDA	
130316 Temperature, Extended Range	XDR, MTW, MDA	
130578 Vessel Speed Components	VBW	
129038 AIS Class A Position Report	VDM, VDO	AIS VHF messages 1, 2 and 3
129039 AIS Class B Position Report	VDM, VDO	AIS VHF message 18
129040 AIS Class B Extended Position Report	VDM, VDO	AIS VHF message 19
129041 AIS Aids to Navigation (AtoN) Report	VDM, VDO	AIS VHF message 21
129793 AIS UTC and Date Report	VDM, VDO	AIS VHF messages 4 and 11
129794 AIS Class A Static and Voyage Related Data	VDM, VDO	AIS VHF message 5
129798 AIS SAR Aircraft Position Report	VDM, VDO	AIS VHF message 9
129802 AIS Safety Related Broadcast Message	VDO, VDM	AIS VHF message 14
129809 AIS Class B CS Static Data Report, Part A	VDM, VDO	AIS VHF message 24
129810 AIS Class B CS Static Data Report, Part B	VDM, VDO	AIS VHF message 24

7.3. CONVERSIONS FROM NMEA0183 TO NMEA2000

NMEA0183	NMEA2000	Comment
APB	129283 Cross Track Error	Also used in PGN 129284
DIN	59904 ISO Request 127488 Engine Parameters, Rapid Update 127489 Engine Parameters, Dynamic 127493 Transmission Parameters, Dynamic 127502 Switch Bank Control 127505 Fluid Level 127508 Battery Status	According SeaSmart.Net protocol specification v1.6.0
DPT	128267 Water Depth	
DTM	129044 Datum	
GGA	129029 GNSS Position Data	ZDA or RMC are required
GLL	129025 Position, Rapid Update	The Device provides 50 milliseconds intervals between outgoing NMEA 2000 messages that are generated by more than one NMEA 0183 sentence. For example, a message with PGN 129025 is generated only once if RMC and GLL are received within a 50 millisecond interval, and twice if the time between GLL and RMC is more than 50 milliseconds.
GSA	129539 GNSS DOPs	
GSV	129540 GNSS Sats in View	Use data from GRS and GSA
HDG	127250 Vessel Heading	
HDM, HDT	127250 Vessel Heading	Use variation and deviation from HDG
MDA	130311 Environmental Parameters 130314 Actual Pressure 130306 Wind Data	Relative air humidity, air and water temperature, atmospheric pressure, wind data
MOB	127233 Man Overboard Notification (MOB)	
MTW	130311 Environmental Parameters	
MWD	130306 Wind Data	
MWV	130306 Wind Data	Theoretical wind sent as calculated using Heading/Speed through Water
RMB	129283 Cross Track Error 129284 Navigation Data 129285 Navigation – Route/ WP information	Use data from APB; PGN 129284 sent twice with true and magnetic bearings

RMC	126992 System Time 127258 Magnetic Variation 129025 Position, Rapid Update 129026 COG & SOG, Rapid Update	The Device provides 50 milliseconds intervals between outgoing NMEA 2000 messages that are generated by more than one NMEA 0183 sentence. For example, a message with PGN 129025 is generated only once if RMC and GLL are received within a 50 millisecond interval, and twice if the time between GLL and RMC is more than 50 milliseconds.
RSA	127245 Rudder	
RTE	130066 Route and WP Service – Route/WP-List Attributes 130067 Route and WP Service – Route – WP Name & Position	Use data from WPL
ROT	127251 Rate of Turn	
VBW	130578 Vessel Speed Components	
VDR	129291 Set & Drift, Rapid Update	
VHW	128259 Speed, Water referenced	
VLW	128275 Distance Log	
VTG	129026 COG & SOG, Rapid Update	
VWR, VWT	130306 Wind Data	Only waypoints not included to the route (the RTE should be received during 3 seconds after WPL).
WPL	130074 Route and WP Service – WP List – WP Name & Position	
XTE	129283 Cross Track Error	
ZDA	126992 System Time 129033 Local Time Offset	
VDO, VDM	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 129793 AIS UTC and Date Report 129794 AIS Class A Static and Voyage Related Data 129798 AIS SAR Aircraft Position Report 129802 AIS Safety Related Broadcast Message 129809 AIS Class B CS Static Data Report, Part A 129810 AIS Class B CS Static Data Report, Part B	AIS VHF messages 1, 2 and 3 AIS VHF message 18 AIS VHF message 19 AIS VHF message 21 AIS VHF messages 4 and 11 AIS VHF message 5 AIS VHF message 9 AIS VHF Message 14 AIS VHF message 24 AIS VHF message 24

8.1. DIMENSION DRAWING



8.2. SPECIFICATIONS

Supply voltage (from NMEA 2000 network): 7-17 V

Current consumption (average): 48 mA

Load Equivalency Number: 1 LEN

Ethernet physical layer: 10/100 Base-T/TX

Ethernet interface maximum speed: 100 Mb/s

Ethernet galvanic isolation from NMEA 2000: 1500 V_{RMS}

Internet protocol version: IPv4

TCP connections from applications (max.): 9

UDP clients (applications or devices): unlimited

Weight: 18 g

Operating temperature range: -25 °C - 55 °C

