

# NM-251D-HDT

## Heading Converter

### User Guide

V1.00



#### Introduction

The NM-251D-HDT is a member of the NM-251 Series family of interfaces and is programmed to function as a heading data signal format converter. It enables conversion of the NMEA-0183 input sentence containing the heading data in a different format (e.g. \$xxHDG, \$xxHDM, \$xxVHW etc.) to the following true heading format:

\$HEHDT,xxx.x,T\*[CS]

In addition it filters out all input NMEA-0183 strings except for the \$xxROT and transmits the \$HEHDT to all five RS-422 signal level outputs and the RS-232 port.

#### Operation

The NM-251D-HDT acquires the NMEA-0183 strings from the Ina port. Depending on the type and the format and the input signal the NM-251D-HDT will function as described below:

1. If the incoming string matches the configured via the dip-switches input format (see table 2 bellow), the NM-251D-HDT will extract the heading information contained and will retransmit it in a new heading true formatted string (\$HEHDT,xxx.x,T\*[CS]). In this manner the \$xxHDG, \$xxHDM, \$xxVHW and the \$xxRMC may be converted to the \$HEHDT.
2. If the incoming string is the \$xxHDT, it will override any configuration and transmit it unchanged.
3. If the incoming string is the \$xxROT, it will transmit it unchanged.
4. If the incoming string does not contain heading data (e.g. \$GPGGA, \$IIMTW etc.), it will ignore it and will instead transmit the latest processed value of the heading data in a heading true formatted string. In this way the refresh rate of the output ports is increased.

#### Input Ports (listeners)

The NM-251D-HDT uses only one of the two input ports. The input port Inb is not available in the NM-251D-HDT custom interface and should not be connected. The listener port Ina is optically isolated as specified in NMEA-0183 protocol, thus data(-) pole should never been connected to NM-251D-HDT ground. If the instrument's talker port is single ended, connect that terminal to the Ina(+) input and tie the Ina(-) to instrument's ground. If an RS-232 level signal is connected, the ground pole (GND) should be connected to Ina(+) and the data pole (TXD) to Ina(-) respectively. The listener port Ina can acquire NMEA sentences carried in TTL, RS-232 and RS-485/422 signal levels.

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## Output Ports (Talkers)

Each of the four general purpose talker ports can output NMEA sentences in both RS422 and TTL signal levels, depending on the connection topology chosen (see figure 1, 2 and 3), and can fan out one instrument. Current drawn from all port can be up to 40mA (maximum rating 60mA @ 24VDC power supply) simultaneously, efficient enough to drive any NMEA compatible instrument.

The RS-232 port can deliver NMEA sentences to any modern computer running the appropriate software on Windows 98 and above. The RS-232 port is not optically isolated and should be used for testing purposes only to avoid DC leakage. It can be used though to interface a computer system if proper isolation is achieved or if the computer is supplied from an isolated power source.

The Out5 port has two functionality modes that can be selected via jumper J6 located inside NM-251D-HDT (see figure 4). By shorting poles 1-2 on J6, the Out5 converts signals received from computer to RS-422 signal level. This functionality is independent from the rest of the NM-251D-HDT circuits. By shorting poles 1-3 on J6, Out5 is configured as a fifth output of the NM-251D-HDT. Further details on how to configure the functions of the NM-251D-HDT are shown on table 1.

The NM-251D-HDT can be connected as shown in figures 1,2 and 3 using all RS-422 outputs (figure 1), all TTL outputs (figure 2) or using either the RS-422 or TTL output of each port taking care not to connect the same port for both signal level outputting (figure 3).

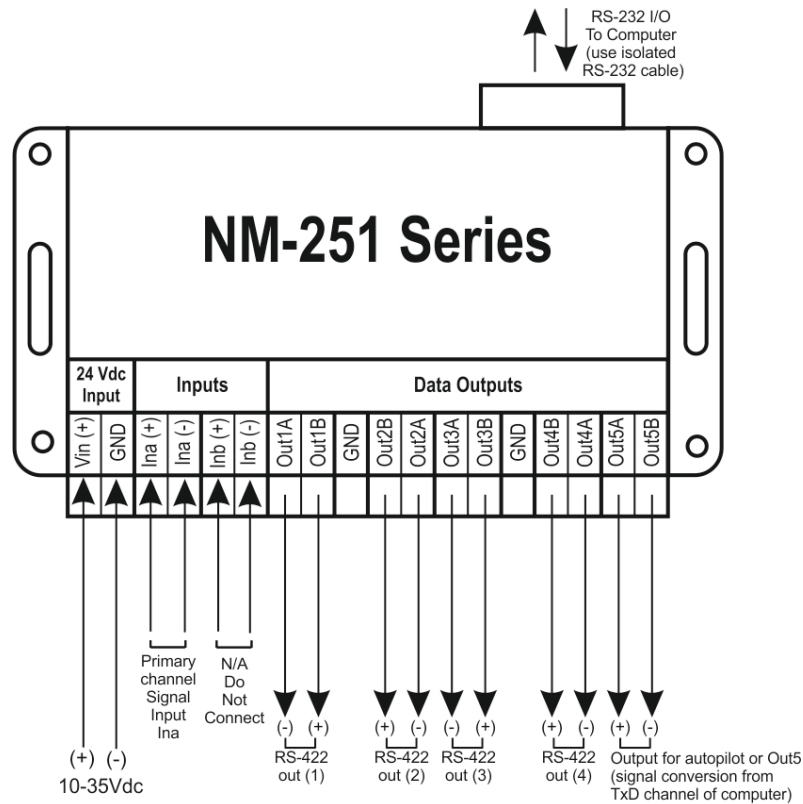


Figure 1: Connection to RS-422 Outputs

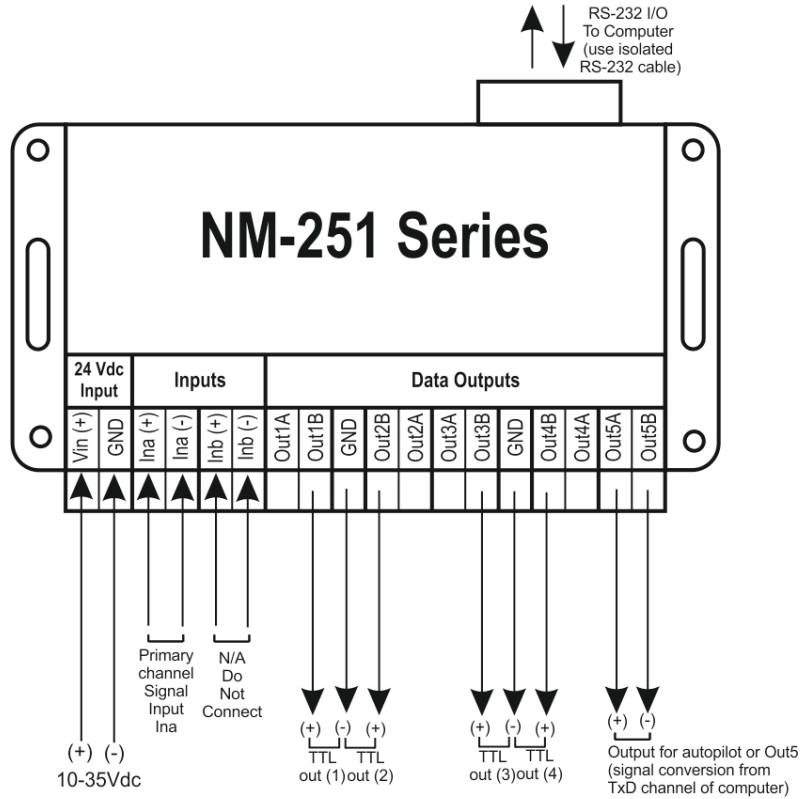


Figure 2: Connection to TTL outputs

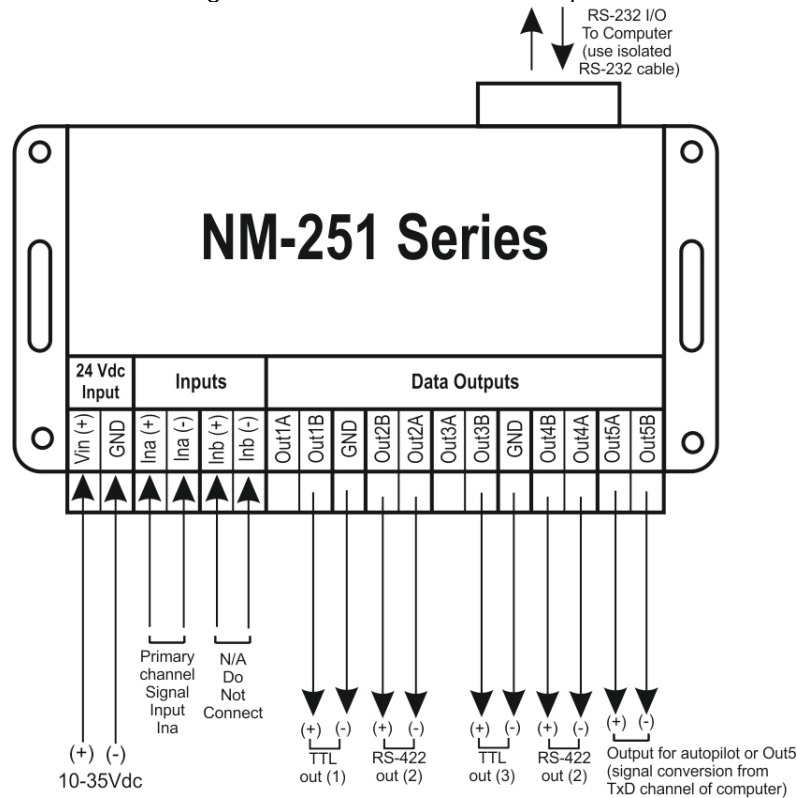


Figure 3: Combined use of TTL and RS-422 outputs

## Power Supply

The NM-251D-HDT can be powered within the range of 10-35 VDC. The nominal voltage of 24 VDC is advised for powering the device in normal operation.

Power input port has a protection for incorrect polarity connection of the supplying voltage.

## LED Indicator sequence

Inb LED	ON: Indicates normal state. CPU is executing the custom firmware
Ina LED	
Out 3/4 LED	Flashing indicates data transmission to output port 3 and 4
Out 1/2 LED	Flashing indicates data transmission to output port 1 and 2
Out5 LED	Flashing indicates reception from RS-232 port and transmission to Out5 port if J6@1-2 or flashing indicates data transmission to Out5 port if J6@1-3 (configured as general purpose)

## Jumper Settings

Configuration		Functionality Description
J5	J6	
1-2	X	Input Signal at Ina is processed from the CPU. Baud rate and functionality at the output ports are defined from the software executed in the CPU (factory default)
1-3	X	Input Signal at Ina is not processed from the CPU. Signal output baud rate is the same as input (maximum 38.400 baud)
X	1-2	Output port Out5 converts signals received from a computer at the RS-232 (pin3 of the DSUB9 connector) to RS-422 signal level
X	1-3	Output port Out5 is functioning as a general purpose output (same as Out1-4)

Table 1: NM-251D-HDT Jumper configuration

## Dip Switch Settings

Configuration						Input – Output routing				Functionality Description
SW-1	SW-2	SW-3	SW-4	J5	J6	Out 1/2	Out 3/4	RS 232	Out 5	
ON	X	X	X	1-2	1-3	\$HEHDT,xxx.x,T*[CS]				Converts input signal \$xxHDG to \$HEHDT
X	ON	X	X	1-2	1-3					Converts input signal \$xxHDM to \$HEHDT
X	X	ON	X	1-2	1-3					Converts input signal \$xxVHW to \$HEHDT
X	X	X	ON	1-2	1-3					Converts input signal \$xxRMC to \$HEHDT

### Notes:

- Switching two or more dip switches to the ON position would result multiple conversions, if the configured input signal is contained in the input string.
- Checksum is generated and added to the output string at all times
- If the \$HEHDT is contained in the input string, it overrides any setting and is transmitted unchanged.
- If the expected input sentence is not contained in the input string, then \$HEHDT,,T[CS] is transmitted.
- Two decimal modern gyro input signals are supported (firmware ver.1.20)

Table 2: NM-251D-HDT Configuration

## Printed Circuit Board composite layout

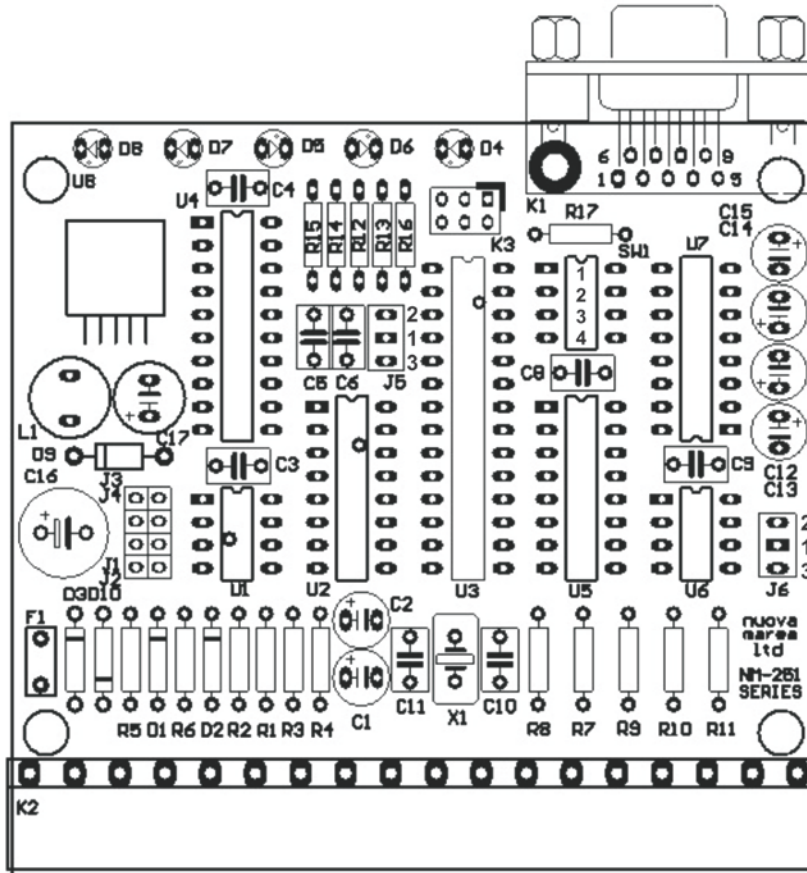


Figure 4: Composite layout of NM-251D-HDT printed circuit board

### Specifications

Supply Voltage	9 to 35 VDC
Power Supply Protection	PTC Resettable Fuse Vmax: 60V, Imax: 40A, Ihold: 0,25A (23°C), Itrip:0,5A (23°C), Max time to trip (23°C): 2,2sec for 1,25A
Current Consumption	20mA in idle state @ 24VDC / 60mA in full output mode @ 24VDC
Inputs	1 x NMEA-0183, optically isolated Common Mode Rejection: 10kV/usec, Isolation: 480 Vrms
Input Resistance	1,5 KOhm
Outputs	4 x buffered RS-422/TTL (general purpose) 1 x RS-232 1 x RS-422 signal conversion from RS-232 RXD channel or as fifth output
Output protection	Buffered for all RS-422 outputs
Indicators	Input (Ina) & Input (Inb) – Always ON indicates custom firmware Data transmission from output ports 1 and 2 (Out 1/2 LED) Data transmission from output ports 3 and 4 (Out 3/4 LED) Data reception from RS-232 interface or output 5 port (Out 5 LED)
Dimensions	Width = 110mm/134,80 mm Depth = 82 mm Height = 43 mm

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Port ID	Wire ID / Color	Cable ID	Signal Description
Vin(+)			
GND			
Ina(+)			
Ina(-)			
Inb(+)	N/A	N/A	N/A
Inb(-)	N/A		
Out1A			
Out1B			
GND			
Out2B			
Out2A			
Out3A			
Out3B			
GND			
Out4B			
Out4A			
Out5A			
Out5B			

**SETTINGS**

**J5\***

2	1	3

**J6\***

2	1	3

**Dip Switches\*\***

ID	OFF	ON
1		
2		
3		
4		

\* Mark the positions that are occupied by the jumper

\*\* Mark the position for every switch

**NOTES:**





CERTIFICATE NUMBER

08-PR299432-1-PDA

DATE

01 March 2013

ABS TECHNICAL OFFICE

Piraeus Engineering Department

## CERTIFICATE OF DESIGN ASSESSMENT

This is to Certify that a representative of this Bureau did, at the request of  
**NUOVA MAREA LTD - PIRAEUS**

assess design plans and data for the below listed product. This assessment is a representation by the Bureau as to the degree of compliance the design exhibits with applicable sections of the Rules. This assessment does not waive unit certification or classification procedures required by ABS Rules for products to be installed in ABS classed vessels or facilities. This certificate, by itself, does not reflect that the product is Type Approved. The scope and limitations of this assessment are detailed on the pages attached to this certificate.

**PRODUCT: Programmable Controller, I/O Units, Operator & Communication Interfaces**

**MODEL: NM-251 Series**

This Product Design Assessment (PDA) Certificate 08-PR299432-1-PDA, dated 01/Mar/2013 remains valid until 19/Mar/2018 or until the Rules or specifications used in the assessment are revised (whichever occurs first).

This PDA is intended for a product to be installed on an ABS classed vessel, MODU or facility which is in existence or under contract for construction on the date of the ABS Rules or specifications used to evaluate the Product.

Use of the Product on an ABS classed vessel, MODU or facility which is contracted after the validity date of the ABS Rules and specifications used to evaluate the Product, will require re-evaluation of the PDA.

Use of the Product for non ABS classed vessels, MODUs or facilities is to be to an agreement between the manufacturer and intended client.

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