

# NM-251A-MUX NMEA-0183 Buffer With Two Channel Multiplexer

## User Guide V1.00



## Introduction

NM-251A-MUX is a two input channel multiplexer with five output channels NMEA-0183 data multiplier. It enables combining and multiplying of NM-0183 sources to all navigational instruments through five talker ports and PC connection through RS-232.

## Operation

NM-251A-MUX acquires the NM-0183 signals from the two optically isolated inputs, combines the data and outputs them to the five general output ports and the RS-232 output. The NM-251A-MUX has three distinct functional modes that can be selected from the user via dip-switches:

1. **Mux mode:** The combined output is routed to all five output ports and the RS-232 output. All outputs can be configured to transmit at 4.800/9.600/19.200 or 38.400 baud.
2. **Split/Mux mode:** The combined output is routed to the fifth output and the RS-232 interface while the first input is transmitted to outputs 1&2 and the second input to outputs 3&4. Combined output only can be configured to transmit at 4.800/9.600/19.200 or 38.400 baud.
3. **Fallback mode:** NM-251A-MUX acquires NMEA-0183 sentences from the most significant input and immediately sends them to the general purpose outputs and the RS-232 output. A watchdog timer routine supervises if the NMEA signals are correctly applied in the primary input and switches to the secondary input whenever there is no NMEA sentence for at least eight seconds. In this case the secondary input starts receiving data if there is an instrument attached. If not, the device automatically returns to the primary input after eight seconds. When the secondary input is already in receiving mode and an NMEA signal is applied to the primary port, the device immediately switches to the primary input. In the case that no signal is applied to any input, the device "circles" around sampling the two listener ports every eight seconds until an NMEA-0183 signal appears to any of the two listener ports.

The NM-251A-MUX has also the following features:

1. **Configurable output transmission speed:** The output speed for the combined data stream is user selectable via dip-switches and can be set to 4.800/9.600/19.200 or 38.400 baud.
2. **Input Autosense:** The NM-251A-MUX senses a correct NMEA signal application to any of the two inputs while in mux or split/mux mode. The LED Ina and Inb flash at 1/2 Hz while no NMEA signal is applied or the polarity is wrong. If at least one signal is correctly connected to one of the inputs it starts functioning normally.
3. **Data overflow indications:** The NM-251A-MUX has different overflow indication for each input. When an overflow occurs some of the input data are not transmitted. This is normal when connecting to instruments transmitting great amount of data, and can be resolved if the output transmission speed is increased.
4. **Watchdog:** The integrated watchdog reset feature will bring NM-251A-MUX back from any unresponsive state into normal operation.

## Input Ports (listeners)

The NM-251A-MUX has two input ports that can be connected to any instrument intended for marine use that can output NMEA-0183 signals. Each one of the two listener ports is optoisolated as specified in NMEA-0183 protocol, thus data(-) pole should never be connected to NM-251A-MUX ground. If the instrument's talker port is single ended, connect that terminal to the Ina(+) or Inb(+) input and tie the Ina(-) or Inb(-) to instrument's ground. If an RS-232 signal level is connected the ground pole (GND) should be connected to Ina(+) or Inb(+) and the data pole (TXD) to Ina(-) or Inb(-) respectively.

The two listener ports can acquire NMEA sentences carried in TTL, RS-232 and RS-485/422 signal levels.

## Output Ports (Talkers)

Each of the five general purpose talker ports transmit 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 each port is 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 provided that serial communication follows the 4.800, 9.600, 19.200 or 38.400/8/N/1 standard. This port is not optically isolated and should be used for testing purposes only to avoid current 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 supply.

The NM-251A-MUX 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.

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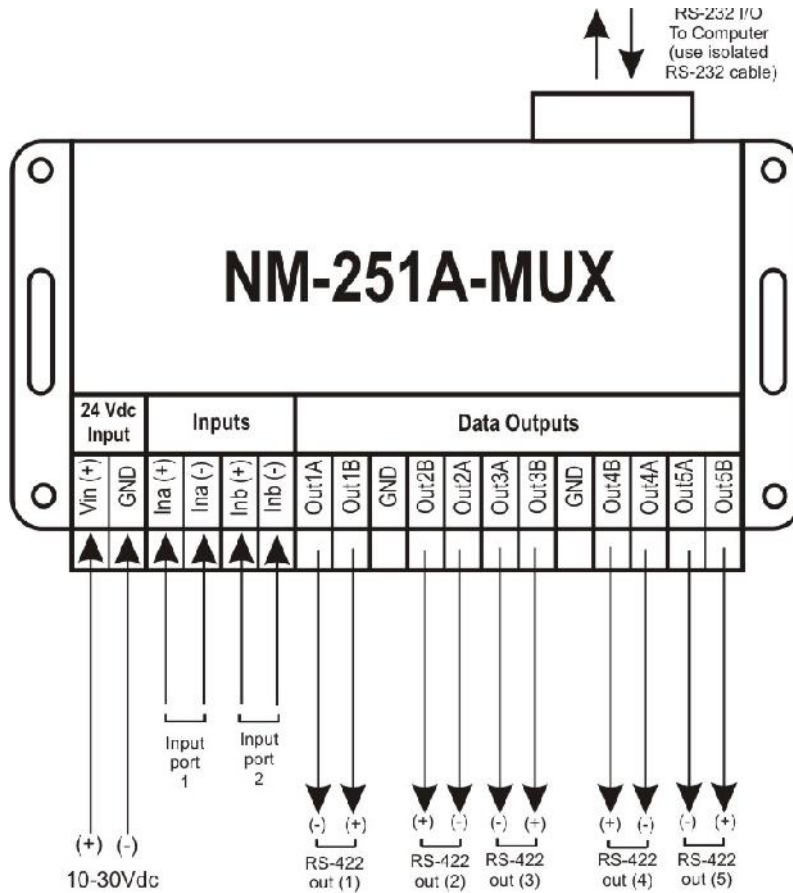


Figure 1: Connection to RS-422 Outputs

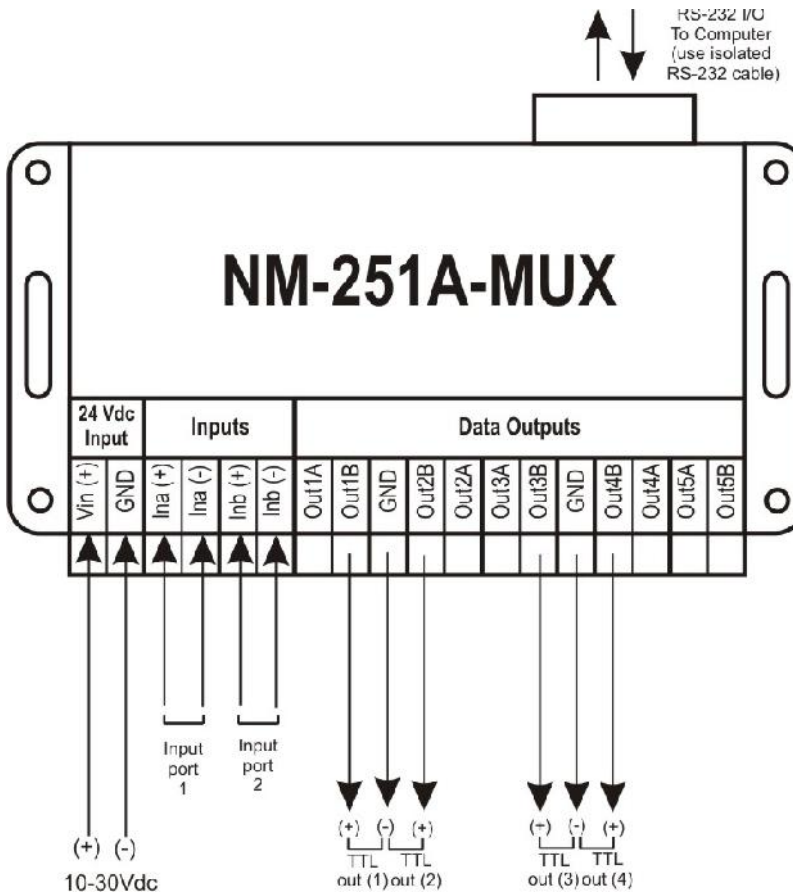


Figure 2: Connection to TTL outputs

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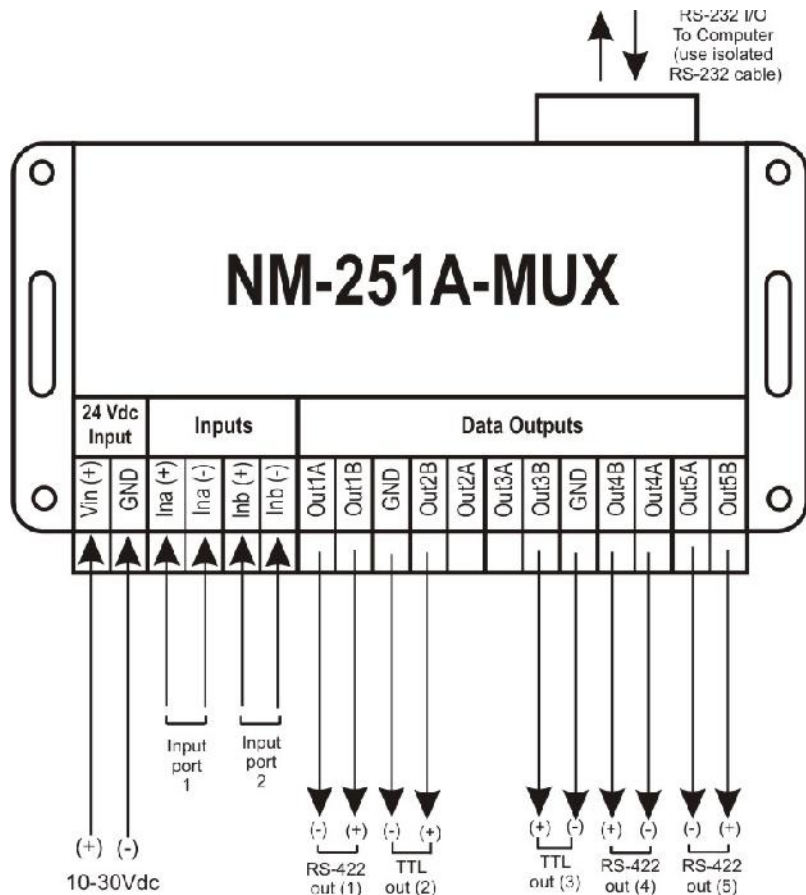


Figure 3: Combined use of TTL and RS-422 outputs

### Power Supply

The NM-251A-MUX 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

Ina LED	Flashing at 1/2 Hz: no input or incorrect polarity Flashing randomly: Data overflow at input port 1
Inb LED	Flashing at 1/2 Hz: no input or incorrect polarity Flashing randomly: Data overflow at input port 1
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 transmission to Out5 port and the RS-232 interface

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## Dip Switch Settings

**Note:** To achieve any of the following configurations a power cycle should be performed after setting the dip-switched on the NM-251A-MUX

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	
OFF	OFF	OFF	OFF	1-2	1-3	MUX MODE Combined data at 4.800/8/N/1				Combined data are transmitted to all outputs at 4.800/8/N/1
OFF	OFF	ON	OFF	1-2	1-3	MUX MODE Combined data at 9.600/8/N/1				Combined data are transmitted to all outputs at 9.600/8/N/1
OFF	OFF	OFF	ON	1-2	1-3	MUX MODE Combined data at 19.200/8/N/1				Combined data are transmitted to all outputs at 19.200/8/N/1
OFF	OFF	ON	ON	1-2	1-3	MUX MODE Combined data at 38.400/8/N/1				Combined data are transmitted to all outputs at 38.400/8/N/1
ON	OFF	OFF	OFF	1-2	1-3	SPLIT/MUX MODE				Out1/2 same as INA (4.800/8/N/1) Out3/4 same as INB (4.800/8/N/1) Out5 and RS-232 combined data at 4.800/8/N/1
						INA	INB	Combined data At 4.800/8/N/1		
ON	OFF	ON	OFF	1-2	1-3	SPLIT/MUX MODE				Out1/2 same as INA (4.800/8/N/1) Out3/4 same as INB (4.800/8/N/1) Out5 and RS-232 combined data at 9.600/8/N/1
						INA	INB	Combined data at 9.600/8/N/1		
ON	OFF	OFF	ON	1-2	1-3	SPLIT/MUX MODE				Out1/2 same as INA (4.800/8/N/1) Out3/4 same as INB (4.800/8/N/1) Out5 and RS-232 combined data at 19.200/8/N/1
						INA	INB	Combined data at 19.200/8/N/1		
ON	OFF	ON	ON	1-2	1-3	SPLIT/MUX MODE				Out1/2 same as INA (4.800/8/N/1) Out3/4 same as INB (4.800/8/N/1) Out5 and RS-232 combined data at 38.400/8/N/1
						INA	INB	Combined data at 38.400/8/N/1		
OFF	ON	OFF	OFF	1-2	1-3	FALLBACK MODE INA OR INB at 4.800/8/N/1				All outputs connected to INA or INB if no signal applied to INA. Reception and transmission at 4.800/8/N/1
OFF	ON	ON	OFF	1-2	1-3	FALLBACK MODE INA OR INB at 9.600/8/N/1				All outputs connected to INA or INB if no signal applied to INA. Reception and transmission at 9.600/8/N/1
OFF	ON	OFF	ON	1-2	1-3	FALLBACK MODE INA OR INB at 19.200/8/N/1				All outputs connected to INA or INB if no signal applied to INA. Reception and transmission at 19.200/8/N/1
OFF	ON	ON	ON	1-2	1-3	FALLBACK MODE INA OR INB 38.400/8/N/1				All outputs connected to INA or INB if no signal applied to INA. Reception and transmission at 38.400/8/N/1
X	X	ON	ON	X	X	NOT APPLICABLE				

Table 1: NM-251A-MUX Configuration

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## Printed Circuit Board composite layout

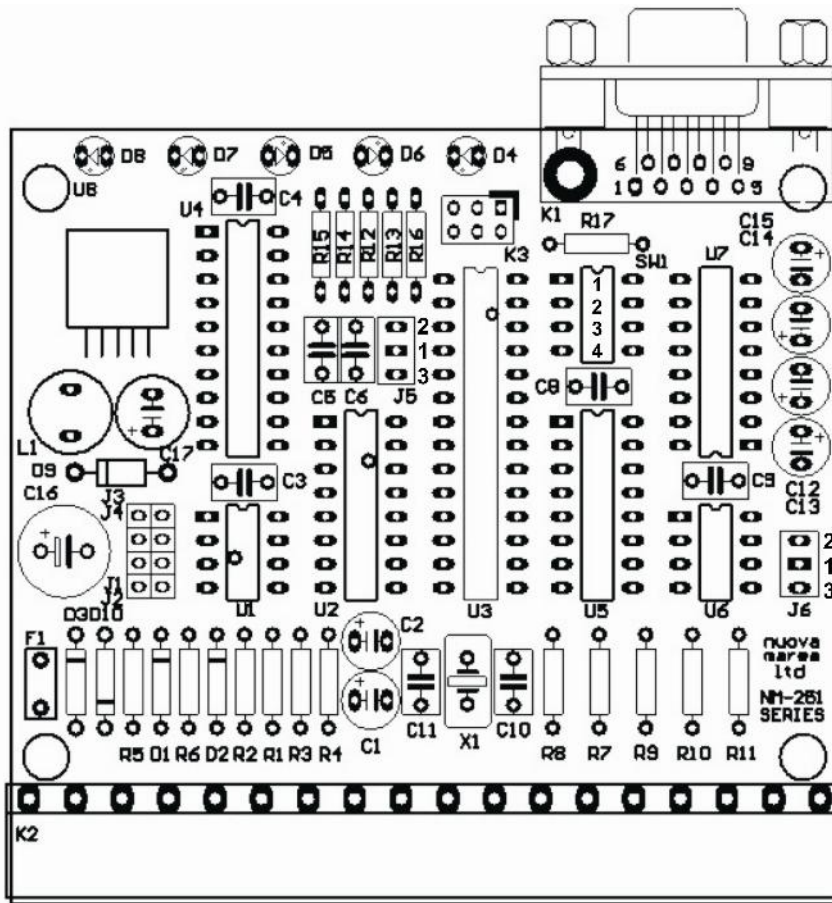


Figure 4: Composite layout of NM-251A-MUX printed circuit board

## Specifications

Supply Voltage	9 to 35 Vdc
Power Supply Protection	PTC Resetable 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	50mA in idle state/ 150mA in full output mode
Inputs	2 x NMEA-0183, optically isolated Common Mode Rejection: 10kV/usec, Isolation: 480 Vrms
Input Resistance	1,5 KOhm
Outputs	5 x buffered RS-422/TTL (general purpose) 1 x RS-232
Output protection	Buffered for all RS-422 outputs
Speed for NMEA inputs	4.800/8/N/1 in mux and split/mux mode 4.800, 9.600, 19.200 or 38.400/8/N/1 when configured in fallback mode
Speed for NMEA outputs	4.800, 9.600, 19.200 or 38.400/8/N/1 user selectable
Indicators	Ina LED: Data overflow at input port 1 or no signal or incorrect polarity Inb LED: Data overflow at input port 2 or no signal or incorrect polarity Out 1/2 LED : Data transmission from output ports 1 and 2 Out 3/4 LED Data transmission from output ports 3 and 4 Out 5 LED: Data transmission from output ports 5 and RS-232 interface
Dimensions	Width = 110mm/134,80 mm Depth = 82 mm Height = 43 mm
Housing	Styrene

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Port ID	Wire ID / Color	Cable ID	Signal Description
Vin(+)			
GND			
Ina(+)			
Ina(-)			
Inb(+)			
Inb(-)			
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:

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

MODEL: NM-251 Series

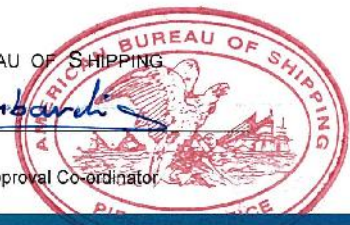
ABS RULE: 2008 Steel Vessel Rules 1-1-4/7.7, 4-8-3/1.7, 4-8-3/1.9 and 4-8-3/Table 2

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