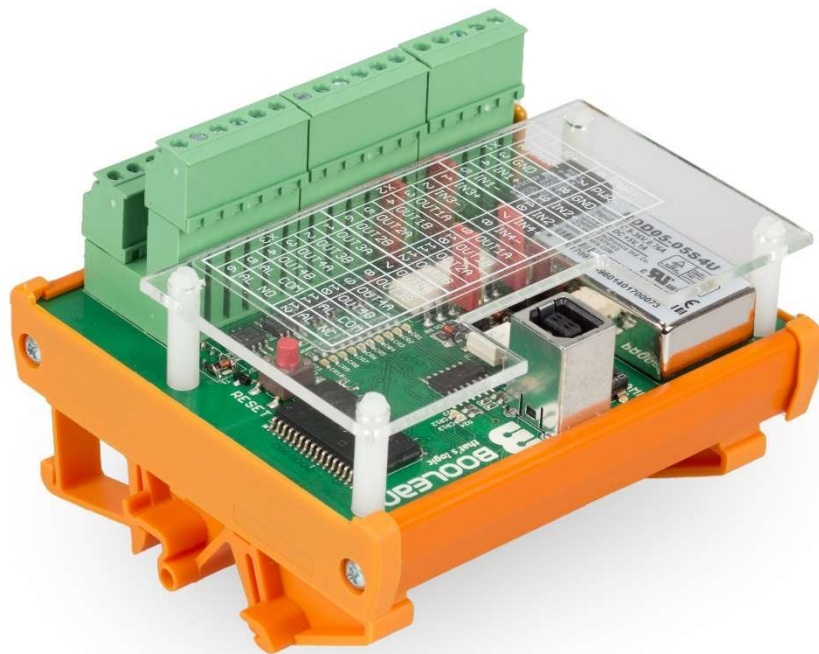


Multiplexer / Demultiplexer

Installation and user manual



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Abbreviation

- **EEPROM** - Electrically Erasable Programmable Read-Only Memory.
- **GPS** - Global Positioning System.
- **LED** - Light-emitting diode.
- **NDCU** - Navigation Data Computing Unit.
- **NMEA** - Electrical and data specification for communication between marine electronics instruments. It has been defined by, and is controlled by, the National Marine Electronics Association.

Safety information



Do not work inside the equipment unless totally familiar with electrical circuits.

Hazardous voltage which can cause electrical shock, burn or serious injury exists inside the equipment.



Turn off the power at the mains switchboard before beginning the installation.

Post a sign near the switch to indicate it should not be turned on while the equipment is being installed.

Fire, electrical shock or serious injury can result if the power is left on or is applied while the equipment is being installed.



Confirm that the power supply voltage is compatible with the voltage rating of the equipment.

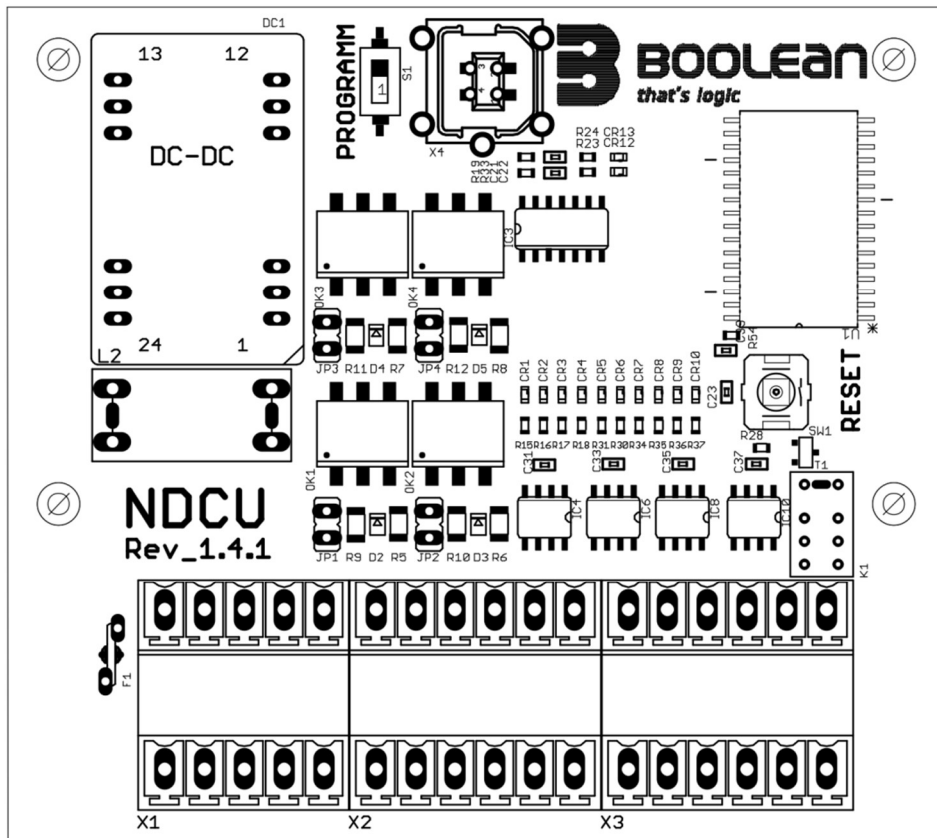
Connection to the wrong power supply can cause fire or equipment damage. The voltage rating appears on the last page of this manual.

Description

Multiplexer / Demultiplexer software based on NDCU (Navigation Data Computing Unit) hardware has been designed to combine up to 4 NMEA inputs and transmit all of them through one output. Transmitted and received signal is galvanically isolated from each other, power supply and all listeners. Multiplexer has configurable input and output baud rate separately for each input. Only baudrate of input 4 is combined with multiplexer output. Telegrams can be filtered, therefore it is possible to limit transmitted strings only to most important to avoid overloading of output line in slow baud rate mode. User can define manually which string will be forwarded. Unit can operate with signal baud rate from 2400 to 115200 bps and power supply range from 9 to 36 VDC.

The biggest advantage is Demultiplexer option what gives possibility to transfer all important strings in example from Navigation Bridge to Engine Room over only one pair of wires and split them back to 4 lines even with higher or lower baud rate!

Multiplexer and Demultiplexer are a part of the same software, so user decide which device has proper function. All relevant information can be achieved further in this manual.



Component layout.

Terminal description

DIP Switch S1. Programming only!

Jumpers JP1, JP2, JP3, JP4. Close jumper in case of weak input signal. Normally leave opened. JP1 corresponds to input 1 and JP2 corresponds to input 2 and so on up to input 4.

Connector X4 (USB) . Programming only!

LED Description.

LED number:	Colour / state:	Function:
CR1	Green / blinking	Input 1 data receiving
CR2	Green / blinking	Input 2 data receiving
CR3	Green / blinking	Input 3 data receiving
CR4	Green / blinking	Input 4 data receiving
CR5	Red / lit constantly	Power ON when lit
CR6	Red / lit constantly	System alarm when lit
CR7	Blue / blinking	Output 1 data transmission
CR8	Blue / blinking	Output 2 data transmission
CR9	Blue / blinking	Output 3 data transmission
CR10	Blue / blinking	Output 4 data transmission

X1 to X3. Power and signal connection for NDCU hardware rev_1.4.x. Refer to below tables:

PWR+	PWR-	GND	IN2+	IN2-	IN4+	IN4-	OUT1A	OUT1B	OUT2A	OUT2B	OUT3A	OUT3B	OUT4A	OUT4B	AL COM	AL NC
6	7	8	9	10	7	8	9	10	11	12	7	8	9	10	11	12
PWR+	PWR-	GND	IN1+	IN1-	IN3+	IN3-	OUT1A	OUT1B	OUT2A	OUT2B	OUT3A	OUT3B	OUT4A	OUT4B	AL COM	AL NO
1	2	3	4	5	1	2	3	4	5	6	1	2	3	4	5	6
X1				X2						X3						

NDCU 1.4.x Terminal description sticker



Note: Power terminals 1 and 6, 2 and 7, 3 and 8 are connected parallel!



Note: Upper and Lower NMEA output terminals are NOT connected parallel. In example NMEA out 1 from lower terminal has separate output driver as NMEA out 1 from upper terminal. They work as 2 channel NMEA buffer on each output.

Multiplexer connection.



Note: Baudrate of input 4 is combined with multiplexed output!

X1 Terminal description.

X1 Terminal number:	Description:	Function:
1	PWR+	Power input Positive (9-36VDC)
2	PWR-	Power input Negative
3	GND	Grounding point
4	IN1+	Input 1 data receiving
5	IN1-	Input 1 data receiving
6	PWR+	Power input Positive (9-36VDC)
7	PWR-	Power input Negative
8	GND	Grounding point
9	IN2+	Input 2 data receiving
10	IN2-	Input 2 data receiving

X2 Terminal description.

X2 Terminal number:	Description:	Function:
1	IN3+	Input 3 data receiving
2	IN3-	Input 3 data receiving
3	OUT1A	NMEA Data Output 1 – not used in Multiplexer mode
4	OUT1B	NMEA Data Output 1 – not used in Multiplexer mode
5	OUT2A	NMEA Data Output 2 – not used in Multiplexer mode
6	OUT2B	NMEA Data Output 2 – not used in Multiplexer mode
7	IN4+	Input 4 data receiving
8	IN4-	Input 4 data receiving
9	OUT1A	NMEA Data Output 1 – not used in Multiplexer mode
10	OUT1B	NMEA Data Output 1 – not used in Multiplexer mode
11	OUT2A	NMEA Data Output 2 – not used in Multiplexer mode
12	OUT2B	NMEA Data Output 2 – not used in Multiplexer mode

X3 Terminal description.

X3 Terminal number:	Description:	Function:
1	OUT3A	NMEA Data Output 3 – not used in Multiplexer mode
2	OUT3B	NMEA Data Output 3 – not used in Multiplexer mode
3	OUT4A	NMEA Data Output 4 – Multiplexed output
4	OUT4B	NMEA Data Output 4 – Multiplexed output
5	AL COM	Alarm relay Common contact
6	AL NO	Alarm relay Normally Opened contact
7	OUT3A	NMEA Data Output 3 – not used in Multiplexer mode
8	OUT3B	NMEA Data Output 3 – not used in Multiplexer mode
9	OUT4A	NMEA Data Output 4 – Multiplexed output
10	OUT4B	NMEA Data Output 4 – Multiplexed output
11	AL COM	Alarm relay Common contact
12	AL NC	Alarm relay Normally Closed contact

Demultiplexer connection.



Note: Baudrate of input 4 is combined with output 4!

X1 Terminal description.

X1 Terminal number:	Description:	Function:
1	PWR+	Power input Positive (9-36VDC)
2	PWR-	Power input Negative
3	GND	Grounding point
4	IN1+	Input 1 data receiving – not used in Demultiplexer mode
5	IN1-	Input 1 data receiving – not used in Demultiplexer mode
6	PWR+	Power input Positive (9-36VDC)
7	PWR-	Power input Negative
8	GND	Grounding point
9	IN2+	Input 2 data receiving – not used in Demultiplexer mode
10	IN2-	Input 2 data receiving – not used in Demultiplexer mode

X2 Terminal description.

X2 Terminal number:	Description:	Function:
1	IN3+	Input 3 data receiving – not used in Demultiplexer mode
2	IN3-	Input 3 data receiving – not used in Demultiplexer mode
3	OUT1A	NMEA Data Output 1
4	OUT1B	NMEA Data Output 1
5	OUT2A	NMEA Data Output 2
6	OUT2B	NMEA Data Output 2
7	IN4+	Input 4 data receiving – Demultiplexer input
8	IN4-	Input 4 data receiving – Demultiplexer input
9	OUT1A	NMEA Data Output 1
10	OUT1B	NMEA Data Output 1
11	OUT2A	NMEA Data Output 2
12	OUT2B	NMEA Data Output 2

X3 Terminal description.

X3 Terminal number:	Description:	Function:
1	OUT3A	NMEAData Output 3
2	OUT3B	NMEA Data Output 3
3	OUT4A	NMEA Data Output 4
4	OUT4B	NMEA Data Output 4
5	AL COM	Alarm relay Common contact
6	AL NO	Alarm relay Normally Opened contact
7	OUT3A	NMEA Data Output 3
8	OUT3B	NMEA Data Output 3
9	OUT4A	NMEA Data Output 4
10	OUT4B	NMEA Data Output 4
11	AL COM	Alarm relay Common contact
12	AL NC	Alarm relay Normally Closed contact

System configuration

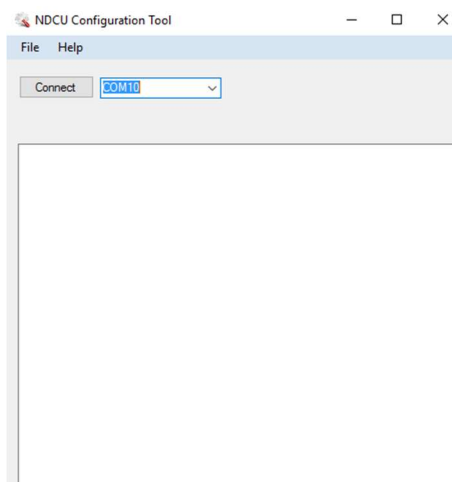
1. Connect USB A-B cable to NDCU USB Connector, install drivers, switch DIP Switch S1 to ON and proceed to next step, or connect any USB < > RS422 converter to Port 1 of NDCU according to connection scheme below:

USB < > RS422 converter	NDCU v1.2
Tx +	5. NMEA1 + input 1
Tx -	4. NMEA1 - input 1
Rx +	8 or 23. NMEA out 1 A
Rx -	9 or 24. NMEA out 1 B

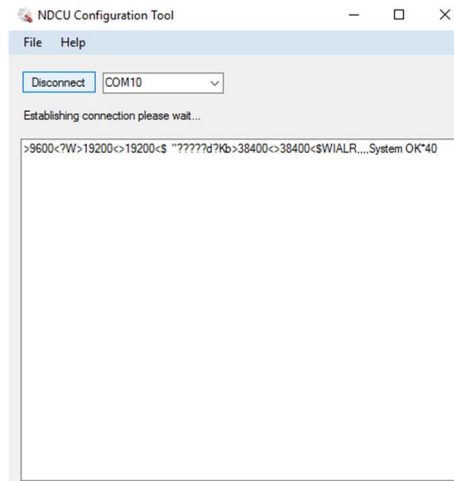


Note: Switch S1 to OFF once configuration has been completed!

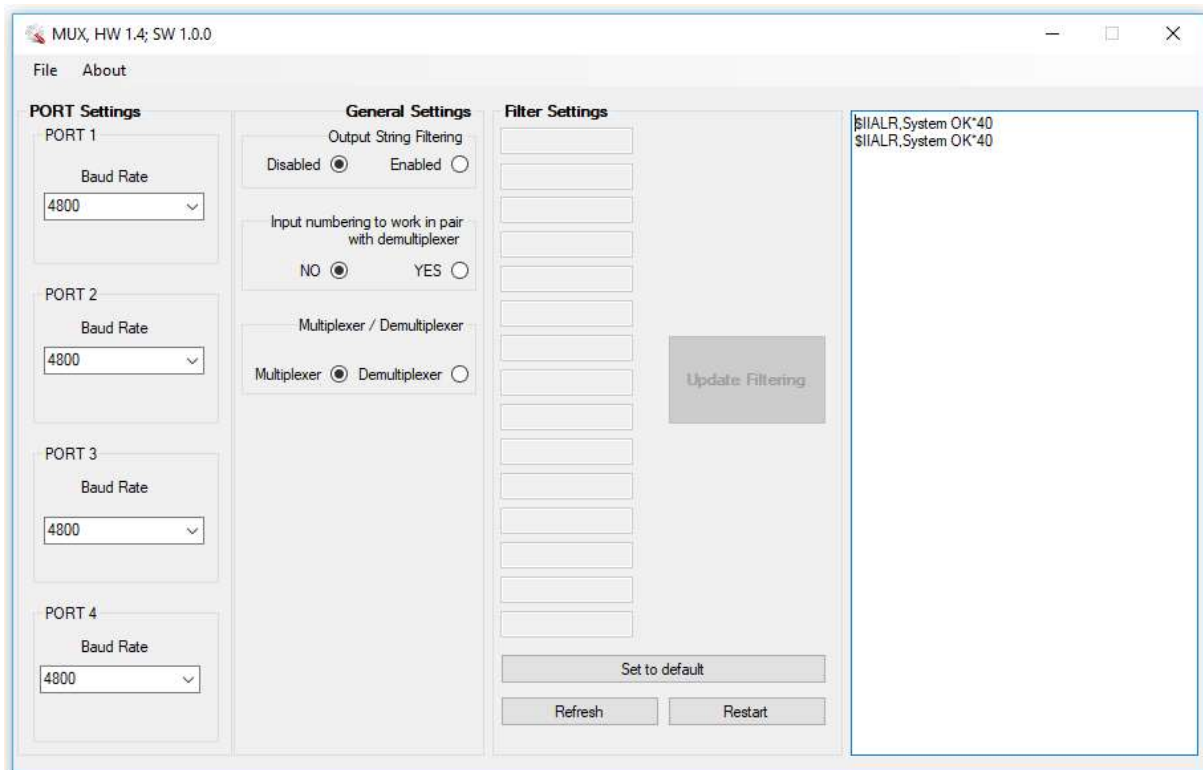
2. Launch NDCU Configuration Tool on service Laptop and select COM port corresponding to USB < > RS422 converter.



3. Press “Connect” Button and wait for connection with NDCU.



Application will find proper Baud rate to communicate with NDCU and configuration form starts automatically.

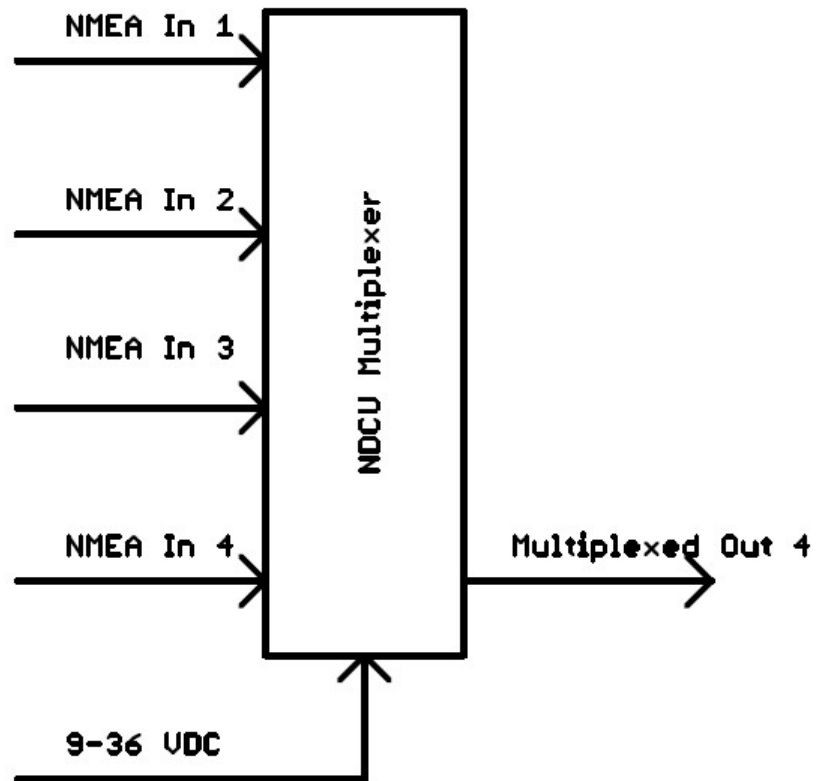


Any change on Configuration Application is immediately transferred to NDCU and stored in its internal EEPROM.

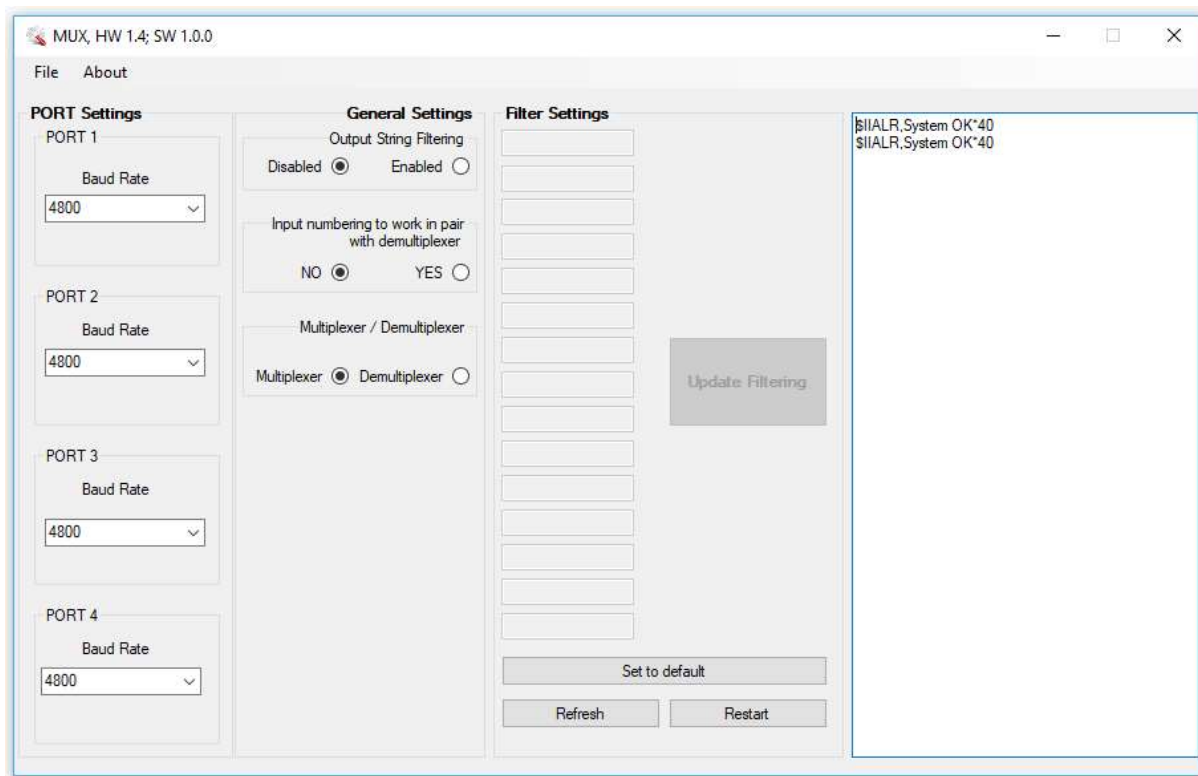


Note: System reads Baud rate configuration ONLY during startup, therefore any change in Baud rate configuration must be followed by main power recycle or pressing “Restart” button! Baudrate 230400 bps is used as output only. System will not read any data at this speed.

Multiplexer configuration



By default following multiplexer application window will appear:



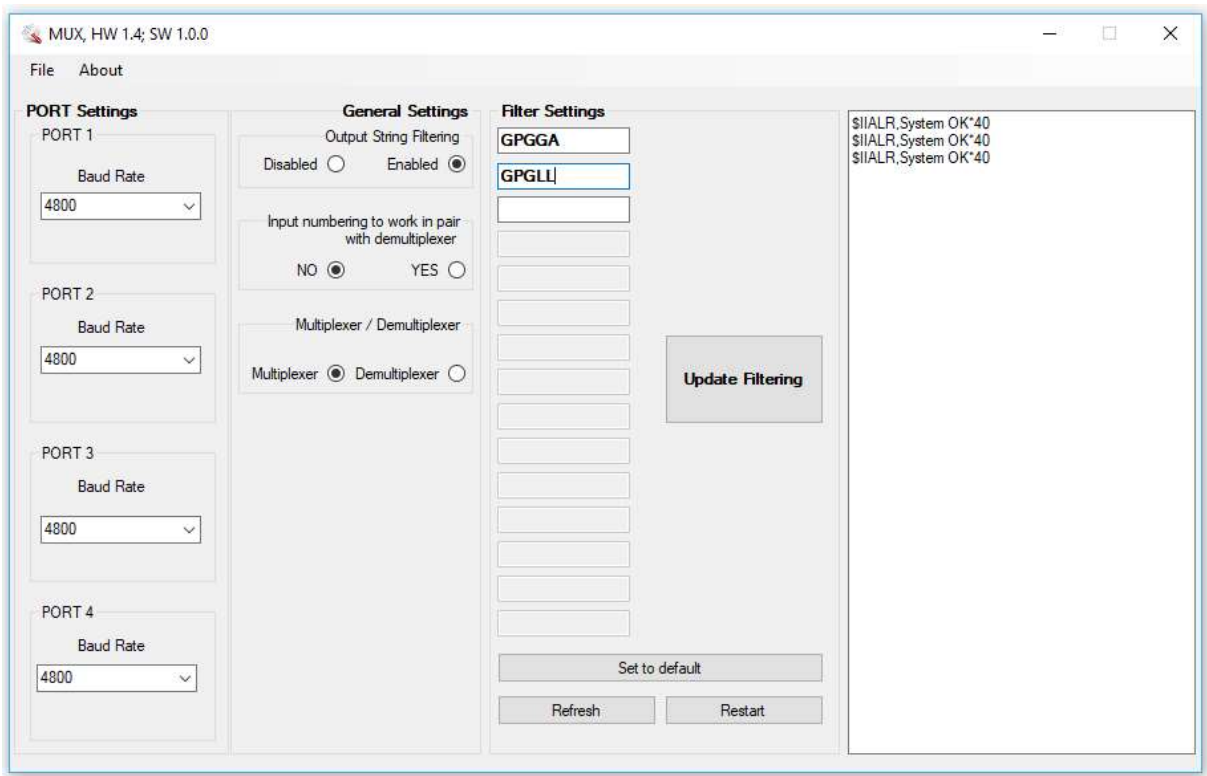
User may define several options such like baudrate, filtering, input numbering and Multiplexer / Demultiplexer option.



Note: Port 4 is an output, therefore it is recommended to set its baudrate at least to sum of all ports from 1 to 3 or higher to avoid port overloading with big number of transferred telegrams.

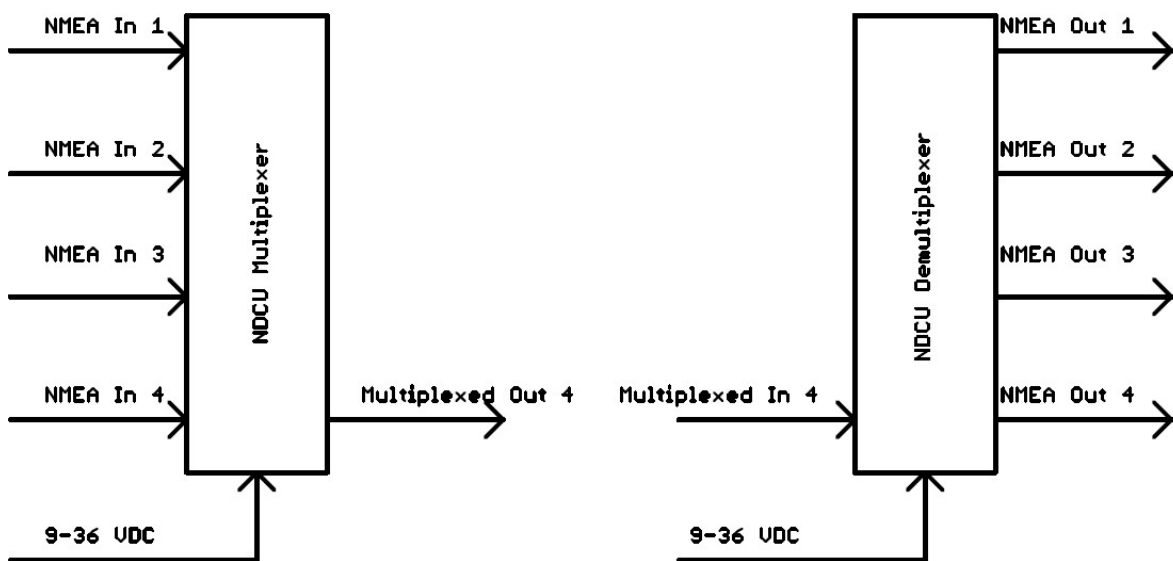
Output String Filtering

Enable Output String Filtering option and Filter Settings will be active. Fill the fields with desired strings examples. **Only CAPITAL letters are accepted!**

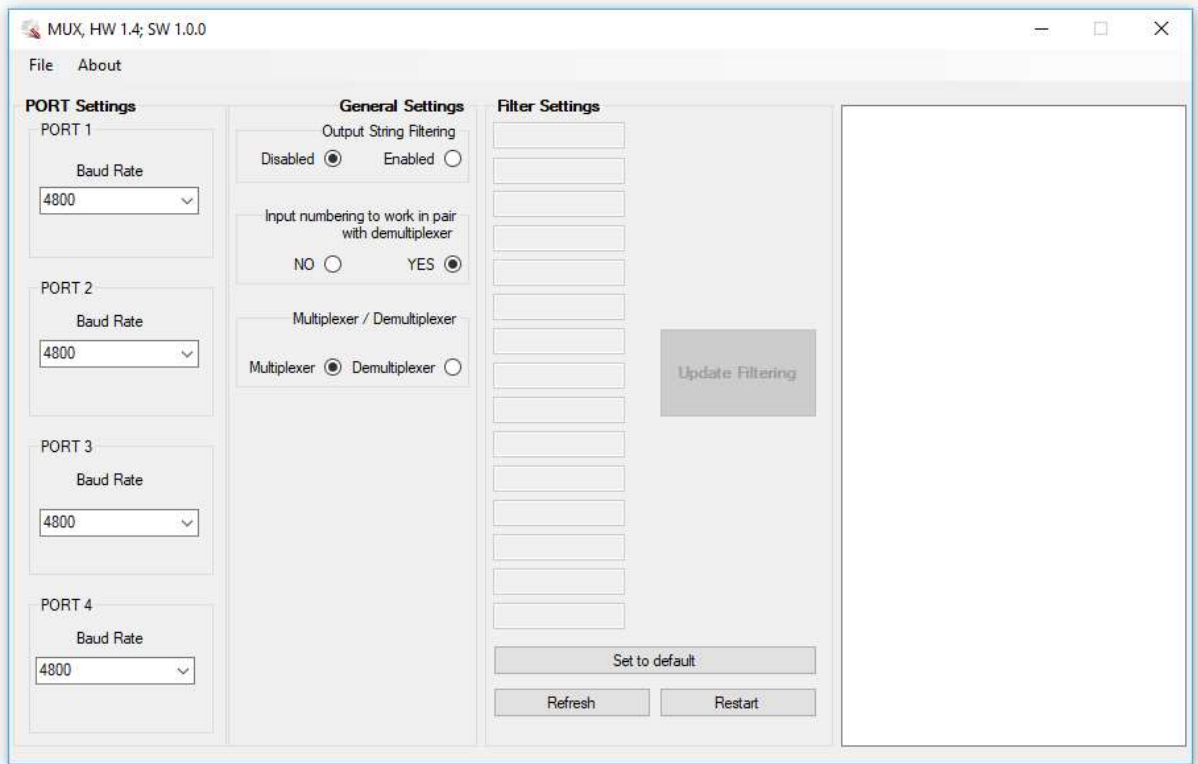


Once all necessary string are entered to the fields **press Update Filtering button**. All fields will be transferred to the device and stored in the EEPROM memory.

Input numbering (pair with Demultiplexer)

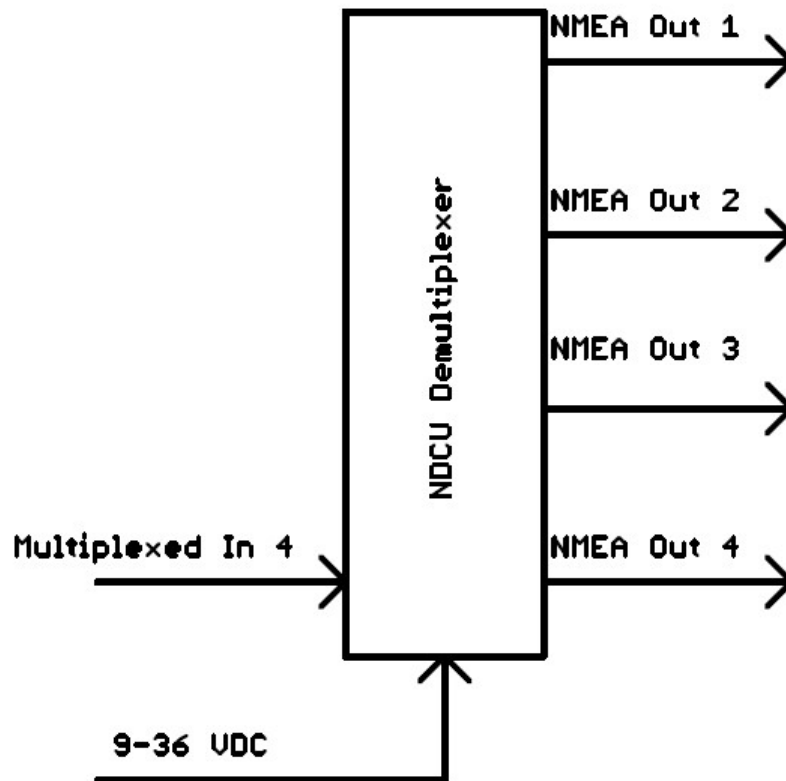


The biggest advantage is Demultiplexer option what gives possibility to transfer all important strings in example from Navigation Bridge to Engine Room over only one pair of wires and split them back to 4 lines even with higher or lower baud rate! Therefore multiplexer input numbering is necessary. Demultiplexer connected at the end of line will recognize which string has to be transferred to proper output. It is recommended that Baudrates of demultiplexer ports has to be equal or higher as on Multiplexer. To enable Input Numbering simple click “Yes” button on Input numbering field as on example below. This setting is transferred automatically to the device and stored in internal EEPROM.

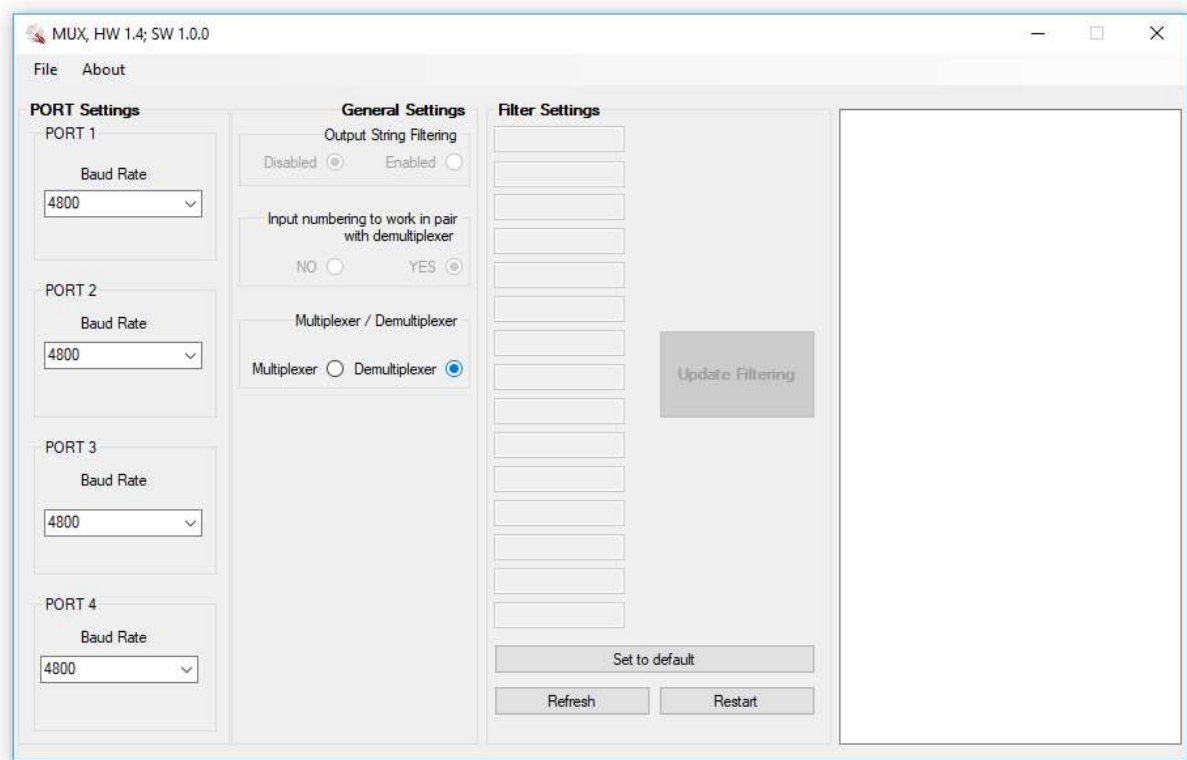



Output String Filtering option works also with Input Numbering enabled.


Demultiplexer configuration



Simply click on Demultiplexer option and NDCU will work as a demultiplexer now. This setting is automatically transferred to the device and stored in its internal EEPROM memory. Set all Baudrates to the same value as in Multiplexer combined with Demultiplexer. Baudrate may vary, but make sure that string will not overload output port. In example, If inut 1 of Multiplexer has 38400 bps, but some string is transferred only once per second, you can set 4800 bps on demultiplexer and enable string filtering in multiplexer to forward only desired telegrams.



 **Note:** Port 4 is an input, therefore it is recommended to set its baudrate to the same value as connected multiplexer. Baudrate 230400 bps will **NOT** be read by input! From technical reason maximum input baudrate is 115200 bps.

 **Note:** System reads Baud rate configuration **ONLY** during startup, therefore any change in Baud rate configuration must be followed by main power recycle or pressing “Restart” button!

Technical data

- Power Supply: 24VDC (9 to 36VDC)
- Power consumption: maximum 7,5 W at 24VDC
- Number of inputs: 4, baudrate configured separately
- Number of outputs: 4 the same baudrate as input
- Input/output signal baudrate: 2400 – 115200 bps (230400 bps as output only) compatible with IEC 61162-1, IEC 61162-2
- Connection: cables diameter up to 1,5mm²
- Dimensions: L 102mm x W 87mm x H 60mm
- Mounting: DIN Rail.
- Data retention: 20 years at 85 °C / 100 years at 25 °C
- Galvanic isolation: Power supply 1,5kVDC, signal input/output up to 5kV_{RMS}

Warranty and after sales support

For warranty terms and conditions please refer to our website: <http://www.boolean.pl/>

Or contact via e-mail: info@boolean.pl



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