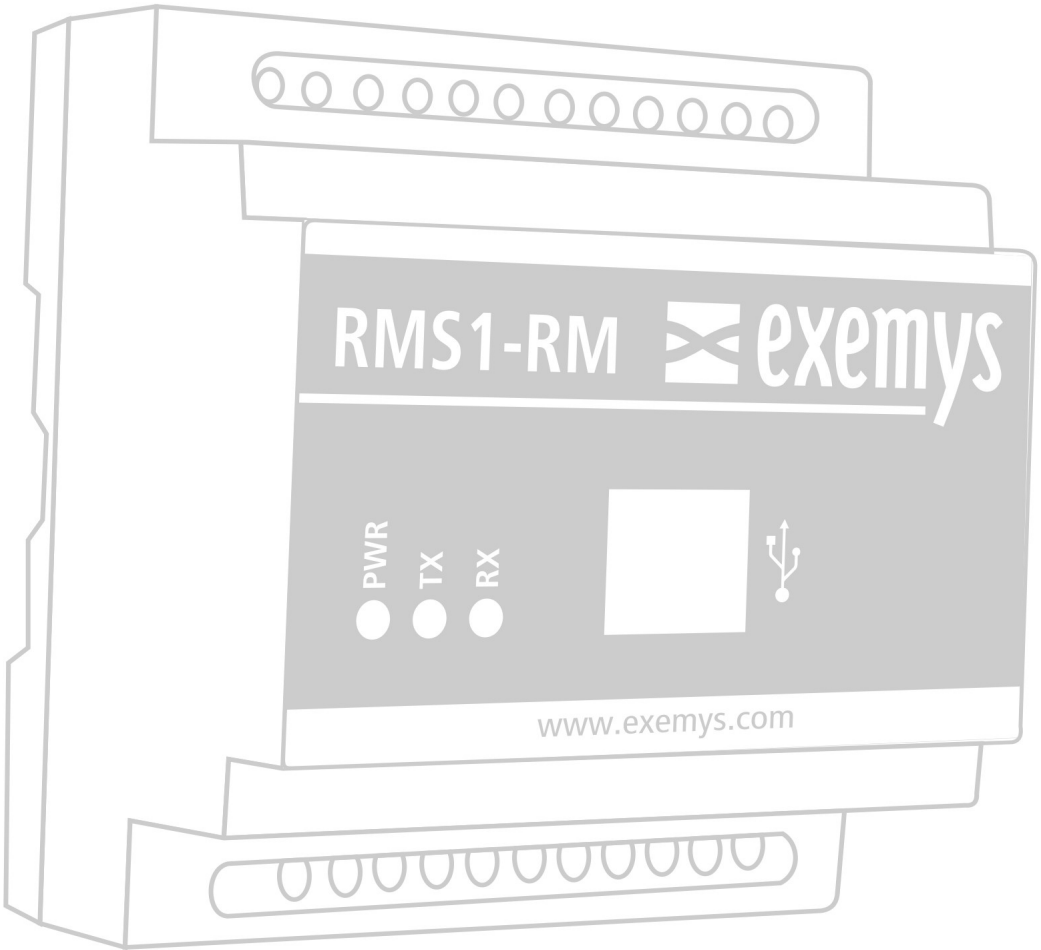
RMS1- RM

User's Manual



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exemys

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Rev. 2

1 General Description of the Product

The RMS1-RM is a device for the acquisition and control of digital and analog inputs and outputs, by means of the Modbus RTU/ASCII (Slave).

The serial communication is made by means of an RS232 or RS485 serial port.

By means of a device or Modbus Master Software, it is possible to obtain the status of inputs and modify the status of outputs individually or in groups.

Digital inputs can also be used as pulse counting inputs.

Connecting two RMS1-RM you can create I/O tunnels.

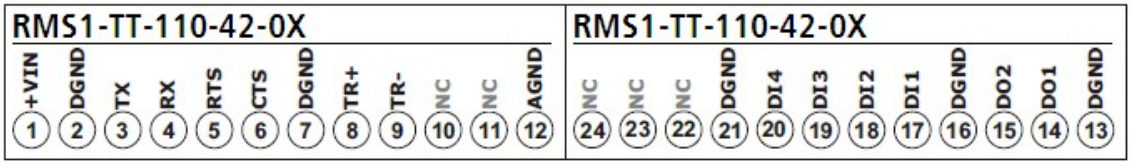
Devices with analog inputs and outputs can be configured to convert from 0-10V to 4-20mA and 4-20mA to 0-10V

Available models

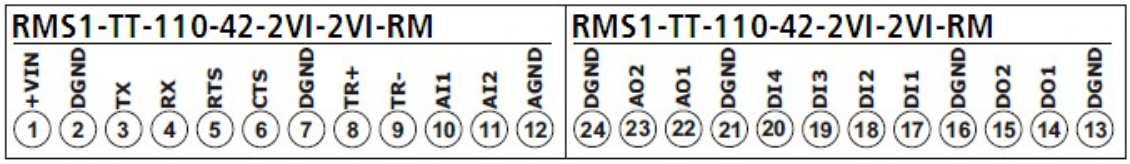
Model	COM ports	Digital Inputs (Counters)	Digital Outputs	Analog Inputs 0-10V / 4-20 mA	Analog Outputs 0-10V / 4-20 mA
RMS1-TT-110-42-0X-RM-MB	RS232 RS485	4	2	-	-
RMS1-TT-110-42-4VI-RM-MB	RS232 RS485	4	2	4	-
RMS1-TT-110-42-2VI-2VI-RM-MB	RS232 RS485	4	2	2	2

2 Pin out Assignments

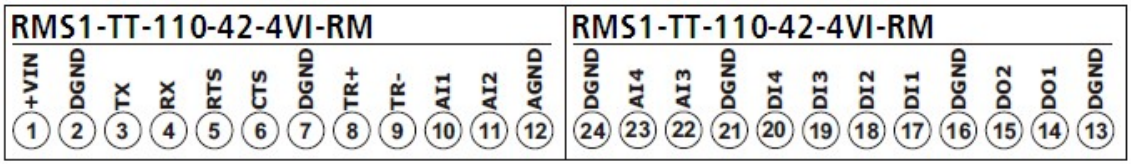
RMS1-TT-110-42-0X-RM-MB



RMS1-TT-110-42-2VI-2VI-RM-MB



RMS1-TT-110-42-4VI-RM-MB



3 Led Indicators

RMS1-RM device has 3 LED Indicators: Power, Rx and Tx. They can be read independently or in combinations.

Power	Rx	Tx	Description
ON together with Rx and Tx	ON together with Power and Tx	ON together with Rx and Power	RMS1-GR is booting
ON			RMS1-GR is ready to work
	Single blink		Valid Modbus message received
		Single blink	Modbus message sent
Slow and continuous blink	OFF	OFF	In configuration Mode. USB cable is connected.

4 Configuration

The RMS1-RM is configured thorough a commando console on its USB port.

The USB port can be connected to a computer using a USB type B cable and using the Exemys Console software.

You can use an Android mobile phone with and OTG adaptor to configure the RMS1-RM

The software for the PC and the USB driver can be downloaded from here

- http://www.exemys.com/rmsrmdriver
- http://www.exemys.com/console

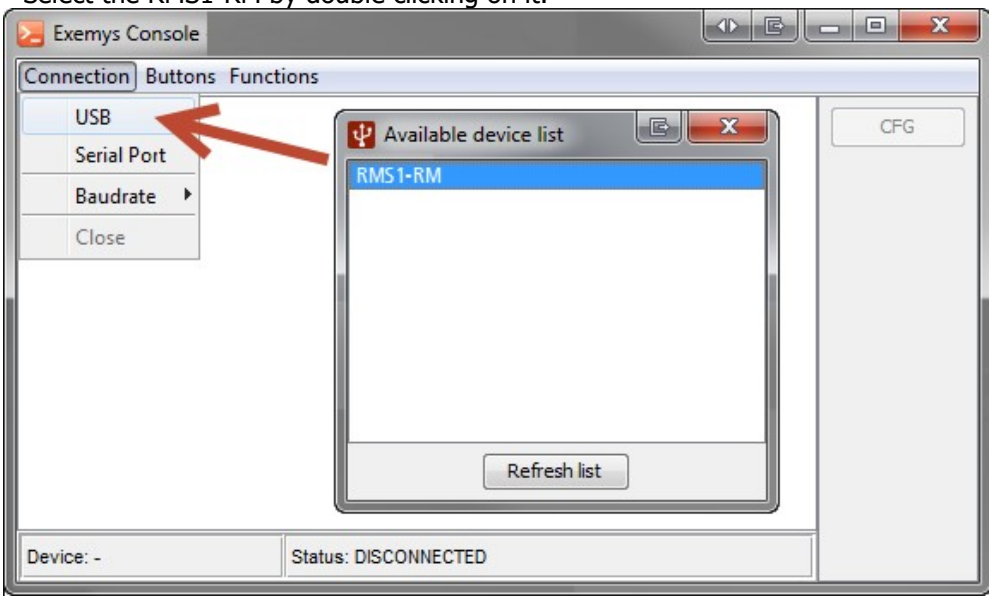
The software for Android devices can be downloaded from the Play Store (Exemys USB Console)

- http://www.exemys.com/usbconsoleandroid

4.1 Exemys Console on PC.

Once the software is installed, the USB cable connected and the USB driver installed, follow this steps.

1. Go to the Connection->USB menú. A list with all the Exemys devices connected the PC Will apear in a new window.
2. Select the RMS1-RM by double clicking on it.



Press the **CFG** button on the right; this menu will be displayed

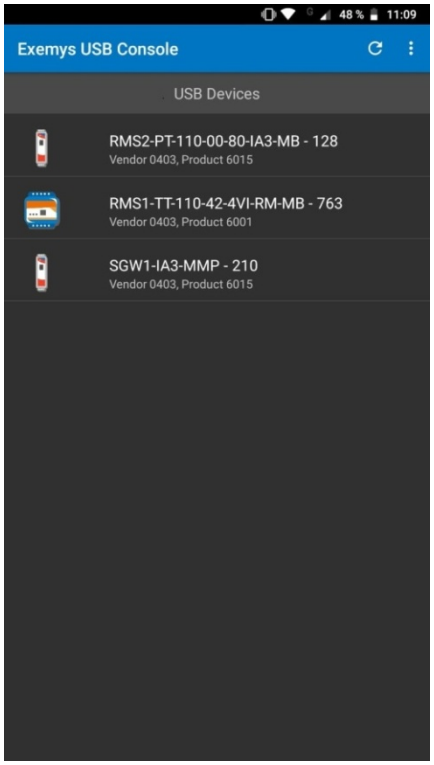
```
RMS1-RM Configuration (Firmware v2.0)
-------------------------------------
1) Modbus Mode
2) Serial Port
3) ID Number
4) Exceptions
5) Inputs Antidebounce
6) Counters divisor
7) Analog Input
8) Analog Output
9) Master Mode
A) RTS Control
B) Show Configuration
```

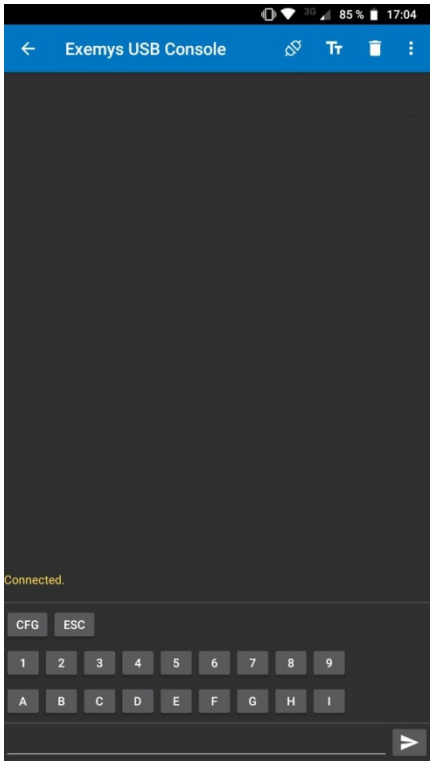
Browse the different options using the numeric keys

Some options might not be visible depending on the firmware version and device model.

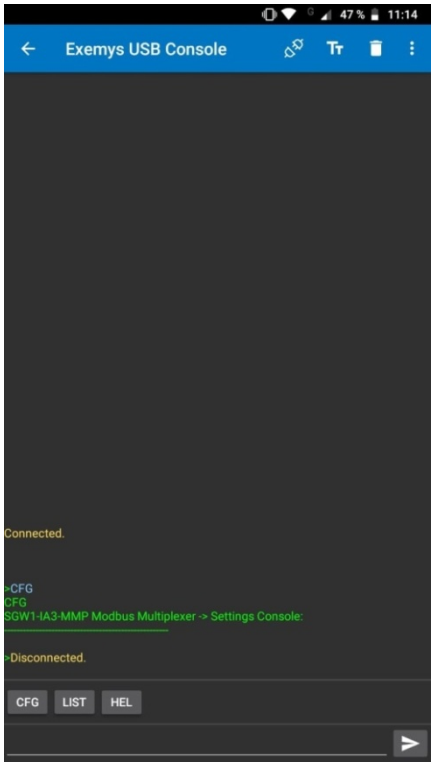
4.2 USB Android Console

Open the Exemys USB Console on your Android device and choose the RMS1-RM from the list. Once the RMS1-RM is selected the system will ask your for permission to access the device.





Use the buttons to browse the different options.



Menu 1 – Modbus Mode

Choose between Modbus RTU or ASCII

```
Modbus Mode
-----------
1) RTU
2) ASCII
Press ESC to return to previous menu
```

Menu 2 – Serial Port

Configure the baud rate of the serial port.
(1200, 2400, 4800, 9600, 19200, 38400, 57600 or 115200 bps)

```
Serial
------
1) Baud Rate
2) Data Bits
3) Parity
Press ESC to return to previous menu
```

Menu 3 – ID Number

Choose the Modbus ID number.

```
ID Number

Enter ID number (1 - 254) [current = 100]:
```

Menu 4 – Exceptions

Choose whether the RMS1-RM will answer or not with Modbus exceptions.

```
Exception
---------
1) Enabled
2) Disabled
```

Menú 5 – Anti-debounce

Configure the anti-debounce time on the digital inputs

```
Inputs Anti-debounce
--------------------
1) Input 1
2) Input 2
3) Input 3
4) Input 4
Press ESC to return to previous menu
```

Menu 6 – Counters divisors

Configure the count divisor value applied to the pulse counters on each input.

```
Counters divisor
----------------
1) Input 1
2) Input 2
3) Input 3
4) Input 4
Press ESC to return to previous menu
```

Menu 7 – Analog Input type

Choose between current o voltage measurement on each analog input.

```
Analog Inputs
-------------
1) Input 1
2) Input 2
Press ESC to return to previous menu
```

Menu 8 – Analog Output type

Choose between current o voltage output.

```
Analog Outputs
--------------
1) Output 1
2) Output 2
Press ESC to return to previous menu
```

Menu 9 – Master Mode

Enable and configure the Master Mode to create I/O tunnels.

```
Modbus Master
--------------
1) Enabled
2) Disabled
3) Timeout
4) Time between queries
Press ESC to return to previous menu
```

Menú A – Control RTS

Configure and enable RTS control on the RS232 port.

```
RTS control
-------------
1) Logic
2) ON Delay
3) OFF Delay
Press ESC to return to previous menu
```

Menu B – Show Configuration

Display current the configuration

```
Current Configuration
---------------------
Model:  RMS1-TT-110-42-2VI-2VI-RM-MB
Modbus: RTU
Serial:
        Baud Rate: 9600
        Data bits: 8 Bits
        Parity: No parity
Slave: 100
Exceptions: Disabled
Divisors:
                Input 1: 1
                Input 2: 1
                Input 3: 1
                Input 4: 1
Anti-debounce:
                Input 1: 10
                Input 2: 10
                Input 3: 10
                Input 4: 10
Analog Inputs:
                Input 1: Voltage
                Input 2: Voltage
Analog Outputs:
                Output 1: Voltage
                Output 2: Voltage
RTS Control:
           Logic: Normal
           RTS ON Delay: 1000 [ms]
           RTS OFF Delay: 500 [ms]
```

5 Modbus Map

Register Type	Address	Description
Coil Status	00001	Digital Output DO1
	00002	Digital Output DO2
	00003 a 00016	Reserved
Input Status	10001	Digital Input DI1
	10002	Digital Input DI2
	10003	Digital Input DI3
	10004	Digital Input DI4
	10005 a 10016	Reserved
Input Register	30001	Analog Input AI1 (1)
	30002	Analog Input AI2 (1)
	30003	Analog Input AI3 or AO1 Feedback (1)(4)
	30004	Analog Input AI4 or AO2 Feedback(1)(4)
	30005	Digital DI1 counter (low part) (3)
	30006	Digital DI1 counter (high part) (3)
	30007	Digital DI2 counter (low part) (3)
	30008	Digital DI2 counter (high part) (3)
	30009	Digital DI3 counter (low part) (3)
	30010	Digital DI3 counter (high part) (3)
	30011	Digital DI4 counter (low part) (3)
	30012	Digital DI4 counter (high part) (3)
	30013	Digital Inputs (All on a single register)
	30014	Digital Outputs (All on a single register)
	30015	Analog Output AO1 (2)
	30016	Analog Output AO2 (2)
Holding Register	40001	Analog Input AI1 (1)
	40002	Analog Input AI2 (1)
	40003	Analog Input AI3 or AO1 Feedback (1)(4)
	40004	Analog Input AI4 or AO2 Feedback(1)(4)
	40005	Digital DI1 counter (low part) (3)
	40006	Digital DI1 counter (high part) (3)
	40007	Digital DI2 counter (low part) (3)
	40008	Digital DI2 counter (high part) (3)
	40009	Digital DI3 counter (low part) (3)
	40010	Digital DI3 counter (high part) (3)
	40011	Digital DI4 counter (low part) (3)
	40012	Digital DI4 counter (high part) (3)
	40013	Digital Inputs (All on a single register)
	40014	Digital Outputs (All on a single register)
	40015	Analog Output AO1 (2)
	40016	Analog Output AO2 (2)

(1) On 0-10V inputs the reading will be 0 to 1000 for 0 to 10V
On 4-20mA inputs the reading will be 0 to 2000 for 0 to 20mA
If the module doesn't have analog inputs the values read will be 0.

(2) On 0-10V outputs the reading will be 0 to 1000 for 0 to 10V
On 4-20mA outputs the reading will be 0 to 2000 for 0 to 20mA
If the module doesn't have analog outputs write operation won't have any effect.

(3) Count values will be stored on a non-volatile memory
To set the count value both registers must be written at the same time
The counter will roll over when it reaches 1.000.000.000

(4) If the device has analog outputs feedback value can be read here

Feedback

For 0-10V outputs, it's the current on the load.
For 4-20mA outputs, it's the resistance value of the load.

Output type	Minimum	Maximum	Unit	Description
0-10V	5	2000 (*)	mA x 100	Current on the load
4-20mA	0	500 (*)	Ω	Resistance value of the load

(*) These values can only be reached if the correct power source voltage is applied to the RMS1-RM

If the load is beyond valid values the reading will be 65535.
To low on 0-10V outputs or to high in 4-20mA inputs.
Please check the technical specifications in case you are sure about the limits

6 Modbus Master (Inputs/Outputs tunnel)

The Modbus master mode allows you to create an I/O tunnel using two RMS1-RM devices. The module's digital inputs will be replicated on the other's outputs and vice versa. It the modules have analog I/O and the analog inputs will be replicated on the remote analog outputs.

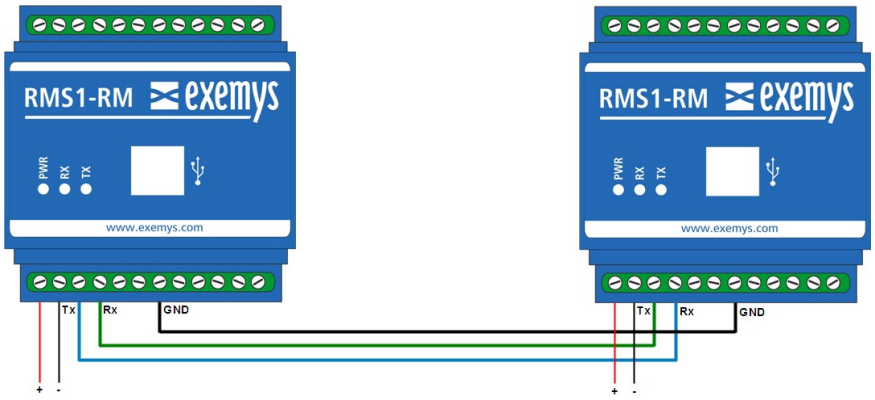
These are the requisites to make this configuration work.

- 2 RMS1-RM, on set as Master and the other as slave (master disabled)
- Same serial port configuration (baud rate, parity, Modbus type)
- Same Modbus ID

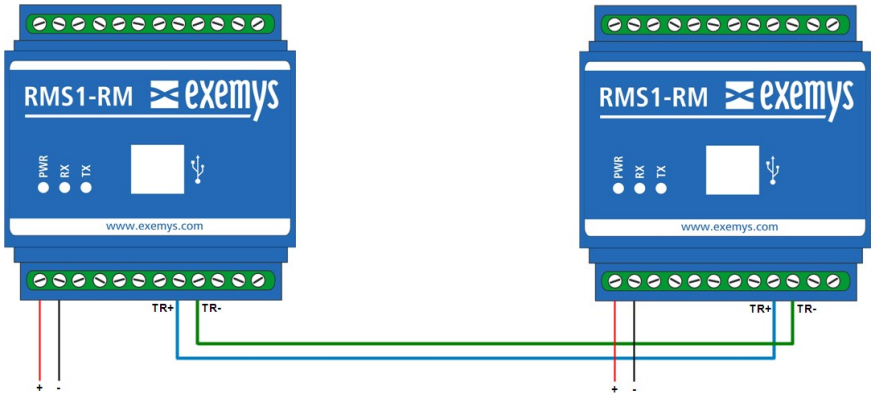
If you are implementing an analog tunnel inputs and outputs must be of the same type (voltage or current).

On the master module you can also set the message time out and time between polls. Typically you won't have to modify these values if the modules are connected using a wired direct RS232 or RS485 connection.

Using RS232



Using RS485



7 0-10V to 4-20mA / 4-20 mA to 0-10V converter feature

The version with analog outputs (RMS1-TT-110-42-2VI-2VI-RM-MB) can be configured to convert 0-10V inputs to 4-20mA outputs and 4-20mA inputs to 0-10V outputs.

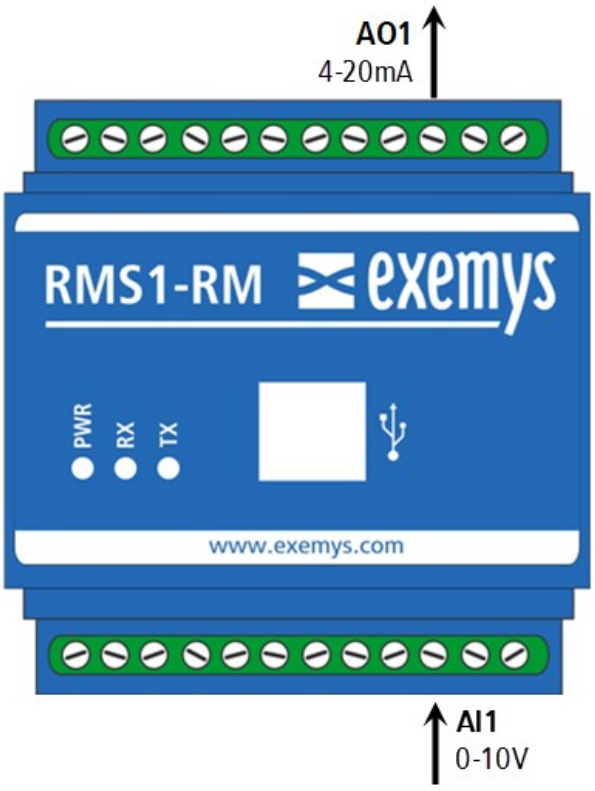
Analog output #1 will follow analog input #1 and analog output #2 will follow analog input #2

Since firmware **2.1** two outputs can follow the value of a single input.

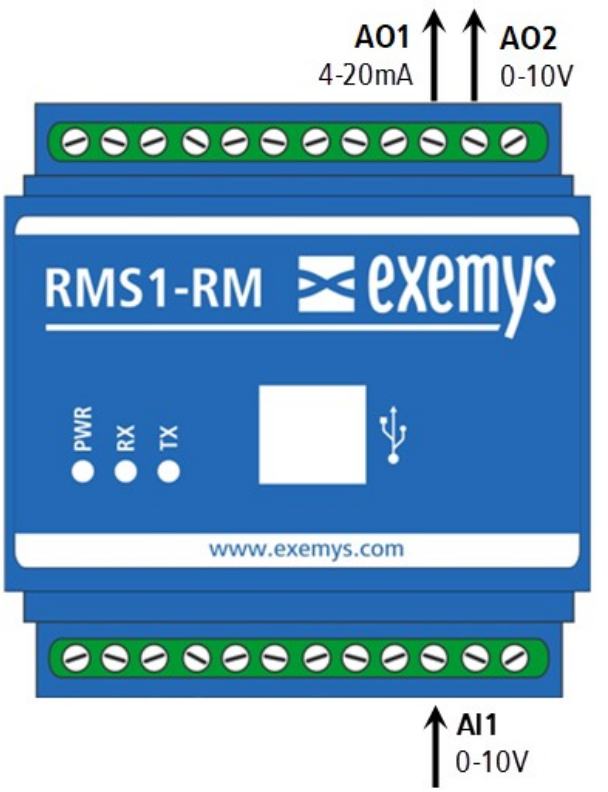
```
Analog Output -> Output 1
------------------------------
1) Voltage
2) Current

T) Activate Tunnel with analog input 1
D) Activate Tunnel Double with analog input 1 and 2
```

If the tunnel is enables this will be shown when displaying the device configuration

```
Analog Outputs:
      Output 1: Voltage   (Tunnel activated)
      Output 2: Voltage
```




```
Analog Outputs:
      Output 1: Voltage   (Tunnel Double activated)
      Output 2: Voltage   (Tunnel Double activated)
```

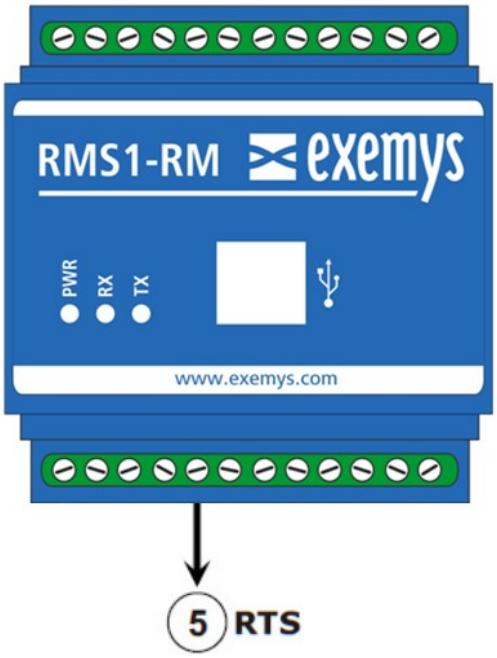


8 RTS terminal control

RTS terminal can be configured to control a serial radio modem. RTS can set the ratio to transmit mode.

Two timers can be configured. The first one to wait to send the data after turning RTS ON. The second timer will hold RTS ON for a timer after the data is sent.

The RTS value can be inverted in case its necessary.



9 Digital output control based on analog input

On models with analog inputs (RMS1-TT-110-42-2VI-2VI-RM-MB y RMS1-TT-110-42-4VI-RM-MB) you can enable a feature to control a digital ouputs based on the readings.

Digital output #1 will be controlled by analog input #1, digital output #2 will be controlled by analog input #2.

```
Analog Input -> Input 1
---------------------------
1) Voltage
2) Current

P) Digital Output 1 Control
Press ESC to return to previous menu


Digital Output 1 control with Analog Input 1
----------------------------------------
1) Enabled
2) Disabled
3) Low value
4) High value
Press ESC to return to previous menu
```

1) Enable digital ouput X control

2) Disable digital ouput X control

3) Set the off low setpoint on the analog X input (bellow this value the output will go off)

4) Set the off high setpoint on the analog X input (above this value the output will go off)

NOTE:if the low/high setpoint are inverted (low value higher than high value), the digital output control will be inverted too (off inside the range and on outside the range)

```
Analog Inputs:
                Input 1: Voltage
                        DO1 Control: Disabled
                Input 2: Voltage
                        DO2 Control: Enabled
                        Low value: 1000
                        High value: 500
                Input 3: Voltage
                Input 4: Voltage
```

10 Default configuration

Parameter	Value
Modbus Type	RTU
Baud Rate	9600 bps
Data bits	8 bits
Modbus slave ID	100
Exceptions	Disabled
Modus master	Disabled
Time out (M. Master)	1000 ms
Time between polls (M. Master)	0 ms
Analog inputs type	0-10V
Analog outputs type	0-10V
Counts divisor	1

11 Technical Specifications

Power source

Parameter	Minimum	Maximum	Unit
Power source voltage	10 (1)	30	Vdc

(1) On module with analog outputs configured at 0-10V, minimum power source voltage must be 13V to reach 10 Volts on the output.

Power consumption

Model	Power voltage	Consumption (maximum)	Unit
RMS1-TT-110-42-0X-RM-MB	24V 12V	25 20	mA mA
RMS1-TT-110-42-4VI-RM-MB	24V 12V	30 25	mA mA
RMS1-TT-110-42-2VI-2VI-RM-MB	24V 12V	35 (1) 50 (1)	mA mA

(1) The current necessary to excite analog outputs must be added. It will vary depending on the output load.

Digital Inputs

Parameter	Minimum	Maximum	Unit
ON voltage	3.5	25	V
OFF voltage	0	0.5	V
Input impedance	2	-	KΩ
Count frequency	-	1	KHz

Digital Outputs

NPN Sourcing (Open Collector)

Parameter	Maximum	Unit
Voltage applied	45	V
Current	50	mA

Analog Inputs

0-10 V Input

Parameter	Value	Unit
Input voltage	10	V
Resolution	0.01	V
Input impedance	10.7	KΩ

0-20 mA Input

Parameter	Value	Unit
Resolution	0.01	mA
Shunt value	68	Ω

Analog Outputs

0-10V Output

Parameter	Value	Unit
Resolution	0.01	V
Minimum load	500	Ω
Maximum output current	20	mA

0-20mA Output

Parameter	Value	Unit
Resolution	0.01	mA
Maximum resistor load	500 (*)	Ω

(*) Maximum load will vary depending on the power source voltage

Power source voltage (V)	Maximum load	Unit
13	650	Ω
15	750	Ω
24	1,2	KΩ
30	1,5	KΩ