

1 Introduction

Modbus is a serial communication standard and has become a de facto standard communication protocol of connecting industrial electronic devices. In Modbus RTU and Modbus ASCII RS485 is used as the physical layer. Its possible to use an Arduino as Slave (and with some restrictions also as Master) in Modbus applications, but a RS485 interface is needed. Our RS422 / RS485 Serial Shield is a fully galvanic isolated serial communication Shield designed for use with the Arduino UNO and other compatible boards like Arduino 101, STM Nucleo and the perfect choice for such kind of applications. The objective of this document is to show how to create together with an Arduino UNO a simple Modbus slave device. We will use a PC as Modbus master.

2 Bill of Material

Arduino UNO (or compatible board)

- RS422/RS485 Shield (available in our webstore)
- RS485-USB-Adapter for PC connection

Optional:

- push button
- Red LED
- 220 Ohm Resistor
- 10k Resistor
- Jumper wires
- Small Breadboard

Application Note: How to use Modbus

3 Software

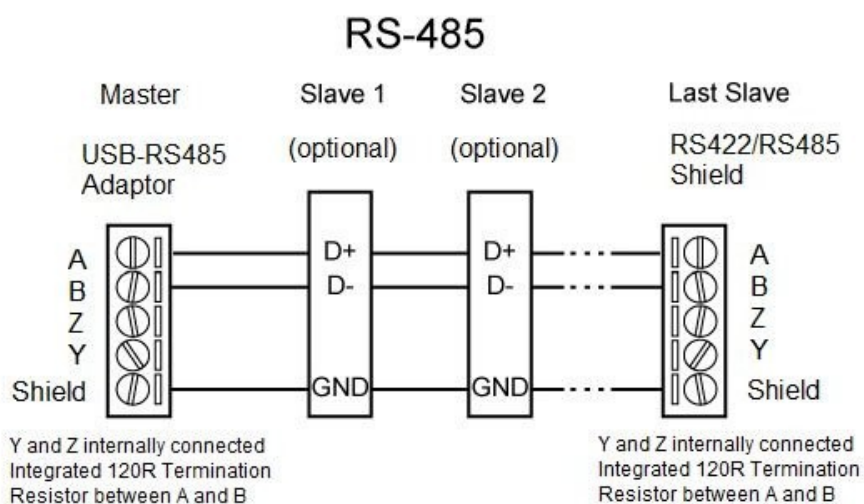
- Arduino IDE
- [Modbustester](#)

4 Wiring

The wiring is very simple. You have to connect only the A and B terminals of the Shield with the A and B line of the Modbus system. Y and Z terminals are not used for this kind of application.

For long distances it is recommend to use twisted pairs for A and B.

Sometimes devices of other manufacturers comes not with A and B marked terminals, but with T+ and T- or R+ and R- terminals. Our A terminal is the noninverting input or output (+) and the B terminal is the inverting input or output (-).

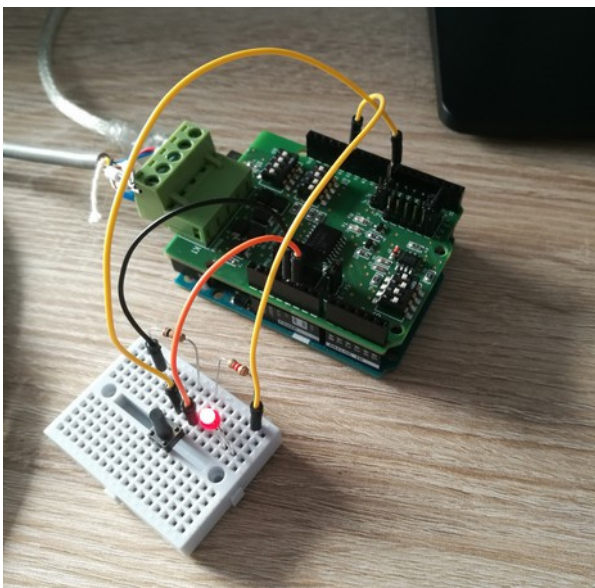
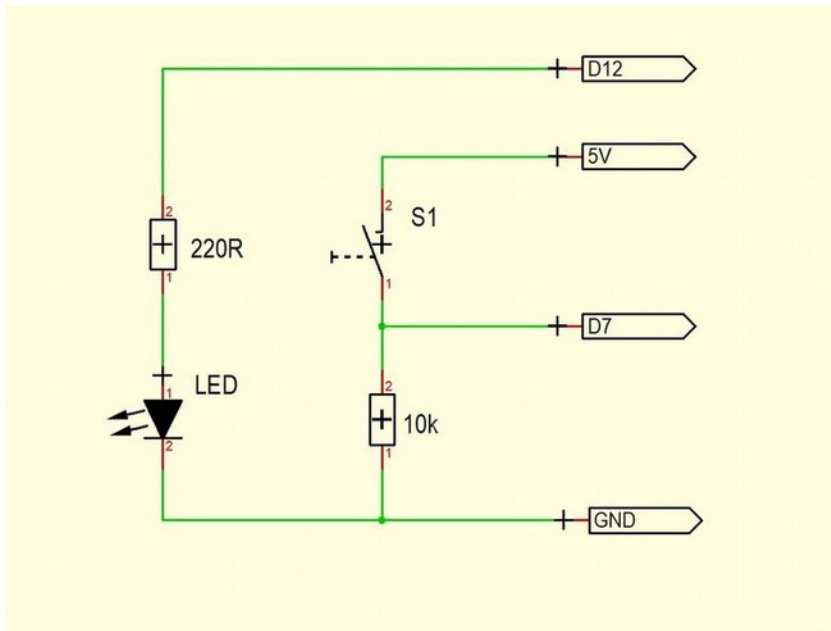


RS422/RS485 Shield

Application Note: How to use Modbus

5 Wiring of example application (optional)

If you want to use our example code it's recommend to add a LED and a button to the Arduino to see some effects of the MODBUS communication. It's optional and not necessary needed.



6 DIP Switch Settings

The transmitting/receiving direction can be switched automatically:

SW1	
1	OFF
2	ON
3	ON
4	OFF

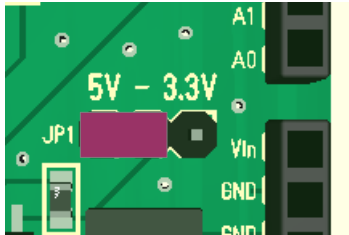
SW2	
1	OFF
2	OFF
3	ON
4	ON

Depending of the position of the RS422/RS485 Shield in the Modbus line you have to switch the terminating resistor ON or OFF. Please switch the resistor to ON position only if the Shield is on one the ends of the bus line. In all other cases switch the terminating resistor OFF:

SW3	
1	ON/OFF
2	OFF
3	OFF
4	OFF

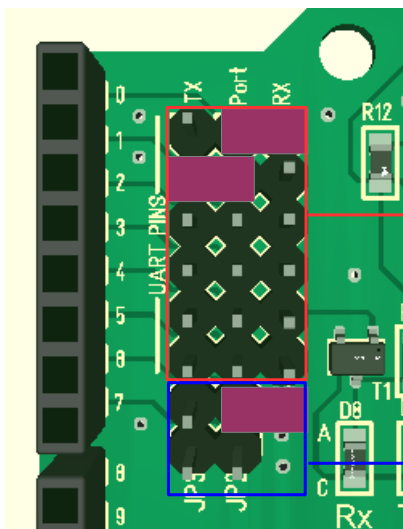
7 Jumper Settings

Jumper J1 – voltage settings:



The Arduino UNO works with 5V internally. You have to set this Jumper to the 5V position (for 3.3V boards for example Arduino 101 to the 3.3V position).

Jumper J2-J4 – pin settings:



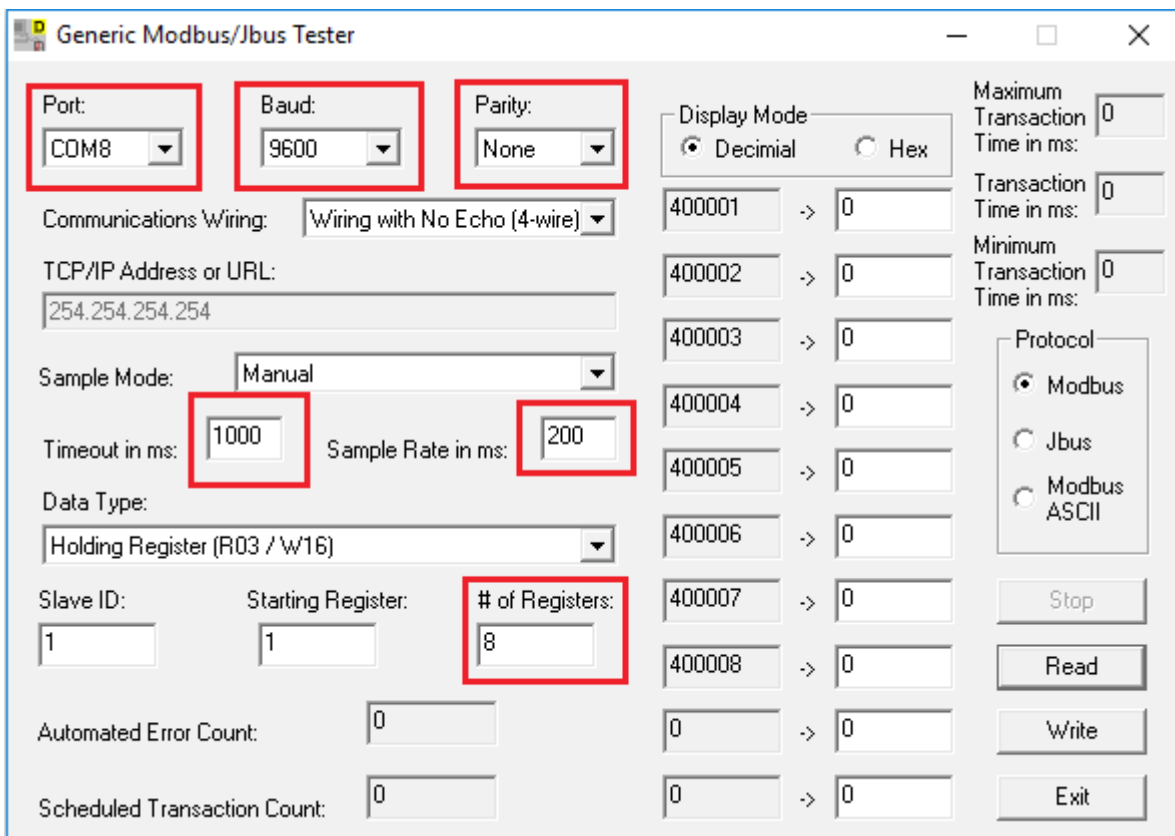
Set the jumpers for the communication ports in the upper left corner as in the picture above. The internal UART on port 0 and 1 will be connected in this case to the RS485 interface of the shield.

Last but not least we have to set Jumper for the RX/TX control port. We don't use this Jumper, because the automatic RX/TX switching is configured.

Application Note: How to use Modbus

6 Installation of Modbustester

We will use in this example the PC as MODBUS master. You've to download [Modbustester](#). Please unpack the zip archive to a new directory on your haddisk. Open the software and change the marked fields as in the picture above. You have to connect the USB-RS485-adaptor bevore- Please choose the right COM-port for this adaptor in Modbustester.



7 Firmware for Arduino

You will find 3 sample programs for Arduino UNO, Genuino 101 and STM Nucleo. Please load them into the Arduino IDE for compiling and programming.

These programs are very simple and give you an idea about the basic function of the MODBUS communication. If you want, you can add further functions.

8 Test your work

Now its time to test your work!

You can press the Read button in Modbustester. This command will read 8 bytes of the memory of our new slave device. In address 400008 you can find the status of the button. The address 400001 - 400006 contains values of the ADC ports.

With the write button you can manipulate registers in the slave. You can enter in address 400007 a 0 or 1 to switch the LED ON or OFF.

Good luck!