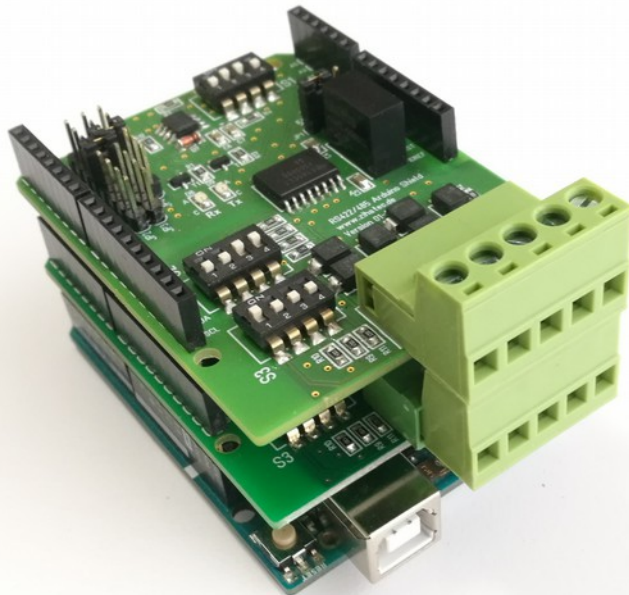


RS422/RS485 Shield

Application Note: Multiple RS485 busses

1 Introduction

This application note will show you how to connect up to 3 independent RS485 busses to one Arduino. This can be useful if you want to create a gateway between these busses or if you want to control devices in these busses (without to connecting the busses itself). Another application is the connection of a RS422 device (for example motor control) and a RS485 device (for example a sensor) to the same Arduino.



RS422/RS485 Shield

Application Note: Multiple RS485 busses

2 Bill of Material

- Arduino UNO
(or any other single board computer with Arduino Shield sockets)
- 1-3 RS422/RS485 Shield for Arduino (available in our webstore)

3 Software

- Arduino IDE

4 DIP Switch Settings for every Shield

The transmitting/receiving direction can be switched automatically:

SW1	
1	OFF
2	ON
3	ON
4	OFF

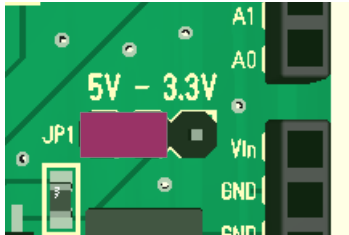
SW2	
1	OFF
2	OFF
3	ON
4	ON

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

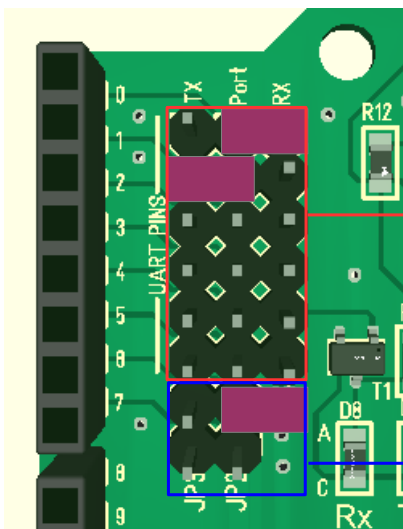
5 Jumper Settings for 1st Shield

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:

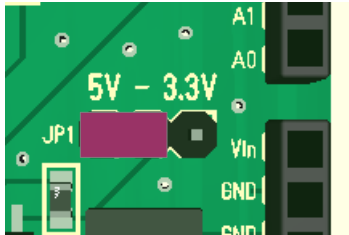


Set the jumpers for the communication ports in the upper left corner as in the picture left. The internal UART on **port 0 and 1 will be connected** in this case to the RS485 interface of the shield of the **first BUS**.

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.

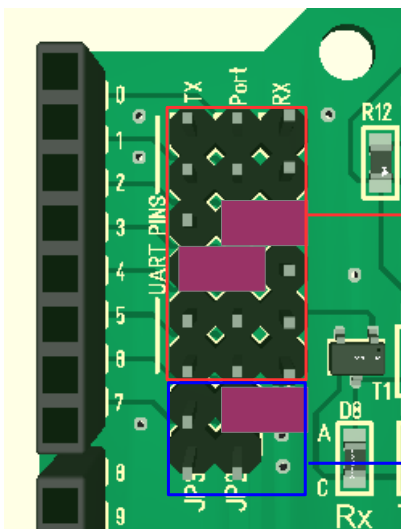
6 Jumper Settings for 2nd Shield

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:

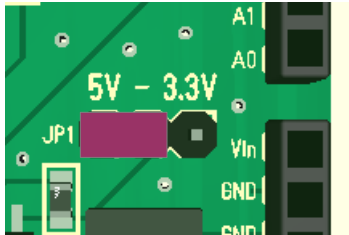


Set the jumpers for the communication ports in the upper left corner as in the picture left. The internal UART on **port 2 and 3** will be connected in this case to the RS485 interface of the shield of the **second BUS**.

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.

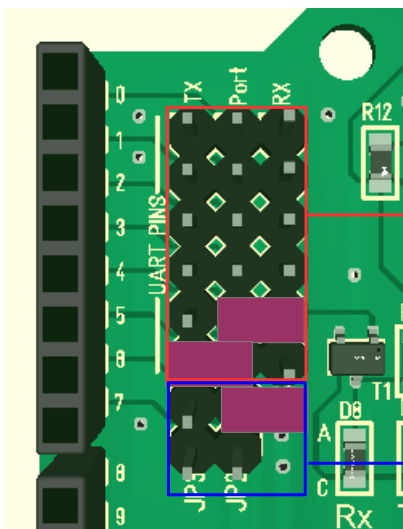
7 Jumper Settings for 3rd Shield

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 left. The internal UART on **port 4 and 5** will be connected in this case to the RS485 interface of the shield of the **third BUS**.

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.

8 Software Integration

The shield for bus 1 will use the hardware UART on PIN 0 and 1 of the Arduino. The both other shields will use software UARTs:

```
#include <SoftwareSerial.h>
SoftwareSerial RS485_BUS2(2,3);
SoftwareSerial RS485_BUS3(4,5);

void setup()
{
  ....
  // init serial port for bus 1
  Serial.begin(9600);

  // init serial port for bus 2
  RS485_BUS2.begin(9600);

  // init serial port for bus 3
  RS485_BUS3.begin(9600);
  ....
}
```

The transmission data of these software UARTs is limited by the calculation power of the Arduino. Of course if you will use an ARM based Arduino or STM32 board this will not be really a problem, but for the UNO it is recommend to use only two shields at the same time and for the second shield not more as 9600 Baud as data rate.