

1 Introduction

The RS422/RS485 HAT for the Raspberry Pi can be used for Modbus systems. In Modbus RTU and Modbus ASCII RS485 is used as the physical layer.

Our RS422 / RS485 Serial HAT is a fully galvanic isolated serial communication HAT designed for use with the Raspberry Pi and the perfect choice for such kind of applications. The objective of this document is to show how to configure the HAT and the Raspberry Pi to be used for Modbus serial communication.

2 Bill of Material

- Raspberry Pi B+, B2 or B3
- [RS422/RS485 serial HAT](#) (available in our webstore)

3 Wiring

The wiring is very simple. You have to connect only the A and B terminals of the HAT 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.

5 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 HAT in the Modbus line you have to switch the terminating resistor ON or OFF. Please switch the resistor to ON position only if the HAT is on one the end of the bus line. In all other cases switch the terminating resistor OFF:

SW3	
1	ON/OFF
2	OFF
3	ON
4	ON

6 Free up Serial Line and Enable UART

6.1 Raspberry Pi 1 and 2 (old Raspbian Wheezy or Jessie)

On the Raspberry Pi 1 and 2 with an old Raspbian Wheezy or Jessie `ttyAMA0` might be used by the serial console.

To free it up do the following. Remove any references to `ttyAMA0` from *`/etc/inittab`* and *`/boot/cmdline.txt`*.

Our `/boot/cmdline.txt` looks like this:

```
dwc_otg.lpm_enable=0 console=tty1 root=/dev/mmcblk0p2 rootfstype=ext4 elevator=deadline rootwait
```

Please follow this link for more information:

http://elinux.org/RPi_Serial_Connection#Preventing_Linux_using_the_serial_port

If you want to run the latest version of Raspbian Stretch on your old Raspberry Pi 1 or 2 please follow the tutorial for Raspberry Pi 3 on the next page.

6.2 Raspberry Pi 3A, 3B and 3B+ (Raspbian Stretch)

The easiest way is to use the raspi-config tool to switch the UART to the GPIO14/15 pins.

- take a fresh Raspbian image
- `sudo raspi-config`
- goto '5 Interfacing Options'
- goto 'P6 Serial'
- 'Would you like a login shell to be accessible over serial?' --> NO
- 'Would you like the serial port hardware to be enabled?' --> YES
- Finish raspi-config
- reboot the Raspberry Pi

Now you can access the UART via `/dev/serial0`

6.3 UART test

You can easily test the function of the internal UART with Minicom or any other terminal program without a Modbus system.

If the UART `/dev/serial0` is free and connected to the GPIO14/15 pins of the 2x20 header of the Raspberry Pi then the TX Led of the HAT will blink when you send data from the terminal.

7 Software for Modbus

You will find an easy-to-use and tested Modbus RTU and Modbus ASCII implementation for Python on:

[MinimalModbus](#)