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»Product: SMT100
LV
»Interface: Low
voltage UART

» Application Note AN007

SMT100 LV (low voltage)
tutorial

english



Application Note AN007

Introduction

The SMT100 LV (low voltage) is a soil moisture sensor with a low voltage UART interface and the following wiring color code:

- Brown: +Vbat (power supply), 3.1 V to 15 V
- White: GND (ground)
- Green: UART RX (SMT100 receives on this wire), 3 V level
- Yellow: UART TX (SMT100 transmits on this wire), 3 V level

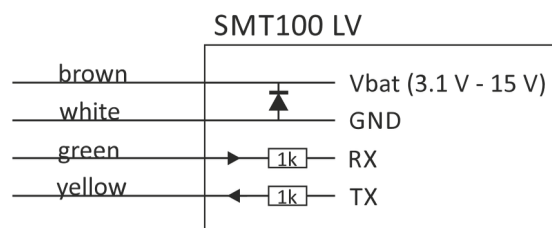


Fig. 1: SMT100 LV wiring and internal protection components

Attention: Please ensure correct polarity of the power supply. Reverse polarity will short circuit the power supply with a diode to protect the SMT100 from damage. Also do not apply more than 15 V to the power supply wire.

The UART levels are approximate levels. UART lines are protected by 1 kOhm series resistors to accommodate varying voltage levels, e.g. 2.7 V or 3.3 V UART levels are acceptable.

Power supply considerations

The SMT100 LV is especially meant for operation with appropriate Lithium batteries. There is a wide range of Lithium batteries with nominal voltage of 3.6 V and various size options (e.g. cell sizes AA, C, D). The actual voltage of these batteries depend on temperature, current and state of charge. Please see datasheet of the intended battery for details. The internal operating voltage of the SMT100 LV is 3 V and an ultra low drop voltage regulator is used. So with a minimal power supply voltage of 3.1 V there is headroom to accommodate battery voltage level variations.

UART interface

The UART interface is a standard communication interface and widely used with microcontrollers. It is also possible to connect the SMT100 LV to a personal computer using an appropriate UART to USB cable. Be sure to choose a cable with 3.3 V UART levels for RX and TX lines. The UART interface is typically used for point-to-point communication with a single sensor (master - slave configuration). The TX line of the master (microcontroller or PC) is connected to the RX line of the slave (sensor) and

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vice versa (see Fig. 2). Please note that sometimes definition of TX and RX is handled different by manufacturers of USB to UART cables and TX/RX lines may have to be swapped.

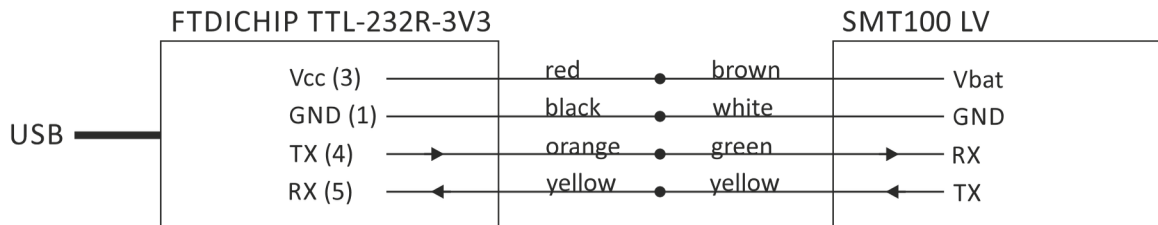


Fig. 2: Wiring scheme SMT100 LV and USB to UART cable TTL-232R-3V3 from FTDICHIP

It is also possible to create a UART bus with multiple SMT100 LV sensors by connecting all sensor RX lines and all sensor TX lines together (contact TRUEBNER for additional details and application specific advice).

Please also observe that UART is not meant for long cable lengths. For long cable lengths of more than 10 m the other interface variants of the SMT100 like RS-485 or SDI-12 are recommended.

Communication protocol

There are 3 communication protocols available. The standard configuration is a dual stack with TBUS and ASCII. TBUS requires in-depth programming skills and is only recommended for experienced developers (protocol details on request). The ASCII protocol is very simple and covered in application note AN005. It is also possible to switch the SMT100 LV into Modbus mode using TRUEBNER Modbus tool software. Please note that this refers only to the data format of the communication and UART levels remain the same.

Fig. 3 shows an example for the ASCII communication. Before attempt to connect to the sensor verify the correct virtual COM port in the Windows device manager. Please also observe the correct COM port settings (also see application note AN005 with command details):

Baudrate:	9600
Parity:	None
Command termination	CR,LFFor CR+LF
Response termination	CR+LF

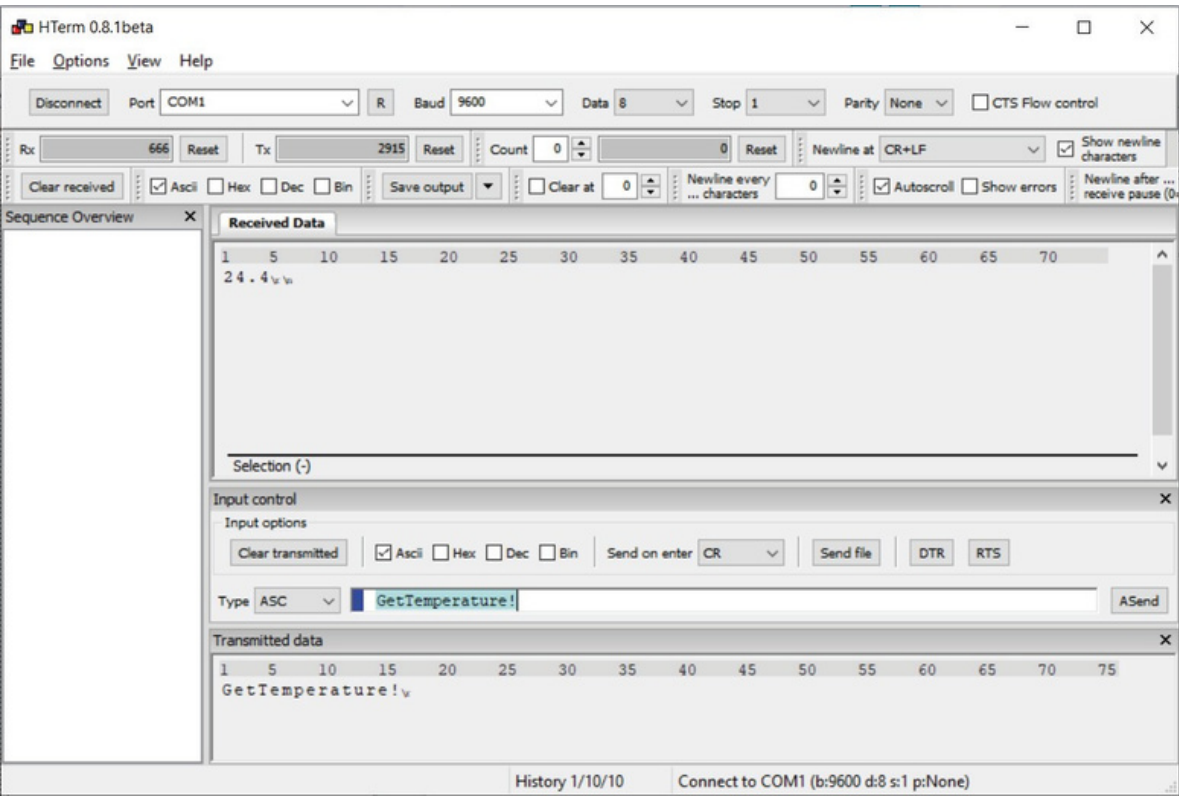


Fig. 3: ASCII communication protocol example