



- » Product: SMT100
- » Interface: SDI-12

## » Application Note AN003

### SMT100 SDI-12 Quickstart Guide

english



[www.truebner.de](http://www.truebner.de)

### Introduction

The SMT100 is a sensor for measuring soil moisture and soil temperature. The SMT100 is available with a SDI-12 interface. This application note is a quickstart guide for using the sensor together with a PC for test purposes.

### Required hardware

- Personal computer with Microsoft Windows™
- Terminal program (e.g. HTerm)
- USB to SDI-12 converter by TRUEBNER
- SMT100 sensor with SDI-12 interface

### Setup

Connect the sensor SMT100 to the computer using an original TRUEBNER USB-to-SDI-12 converter. The converter translates the USB-protocol from the computer to the SDI-12 protocol of the sensor.

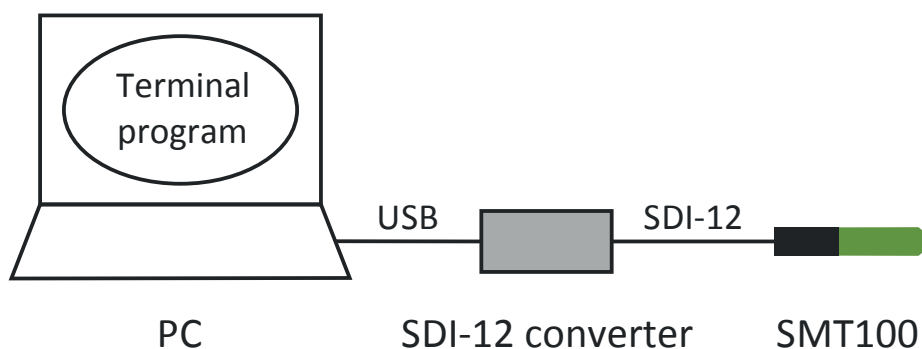


Figure 1: Hardware setup

### Driver installation

After plugging in the USB-to-SDI-12 converter the first time, Windows will automatically search for an appropriate USB driver and the driver is installed. It is recommended that the computer has access to the internet during installation of the driver, because Windows often automatically searches for driver updates.

Installation of the driver may take several minutes, please wait for the driver installation and do not abort or interrupt installation. After the driver is installed, it is recommended to restart the computer. Otherwise the driver may not work properly.

After restart of the computer and plugging in the USB-to-SDI-12 converter again, Windows automatically loads the installed driver and assigns a virtual COM port number to the device. This COM port number is listed in the Windows Device Manager as shown in the figure below. In this example the number is 7 (COM 7). Please note, that this number may vary from computer to computer!

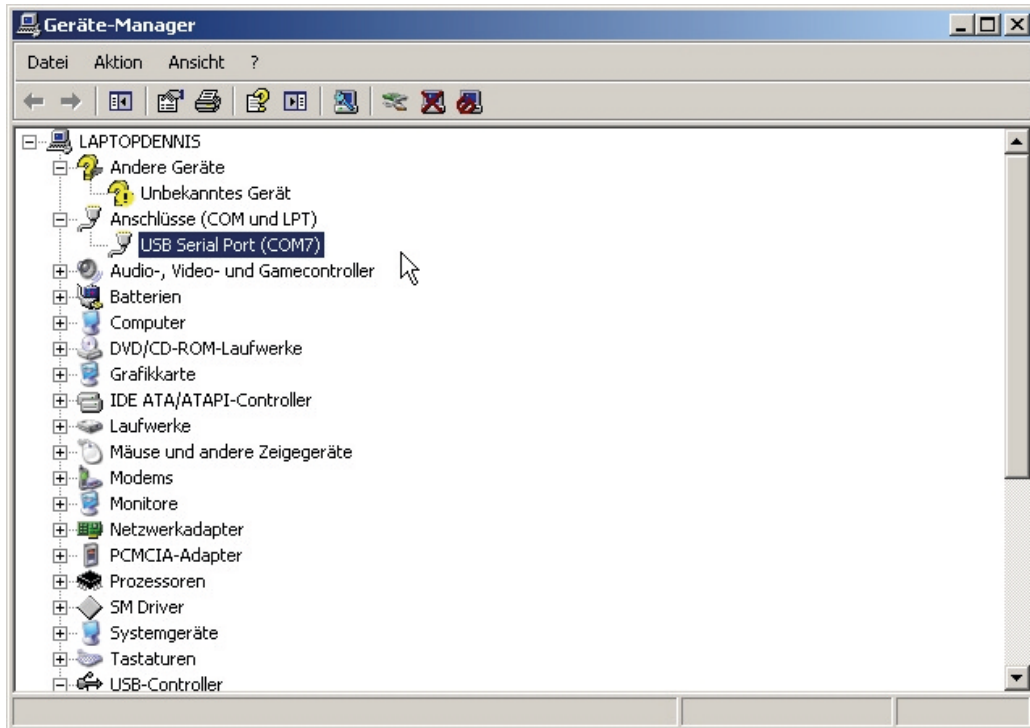


Figure 2: Windows Device Manager COM port identification

### Terminal program settings

There are many free terminal programs available for computers. In general any terminal program can be used for communication with the sensor. However, in this example we use the program called "HTerm". It is available on the internet for free and requires no installation. Simply download and start the .exe file.

After launching the terminal program "HTerm" a few settings have to be made:

Port:	Com port number assigned by the computer
Baud:	1200
Newline at:	CR+LF
Send on enter:	CR

After entering all settings please press the button "Connect" located at the upper left corner of the program. The program will now establish a serial connection to the USB-to-SDI-12 converter.

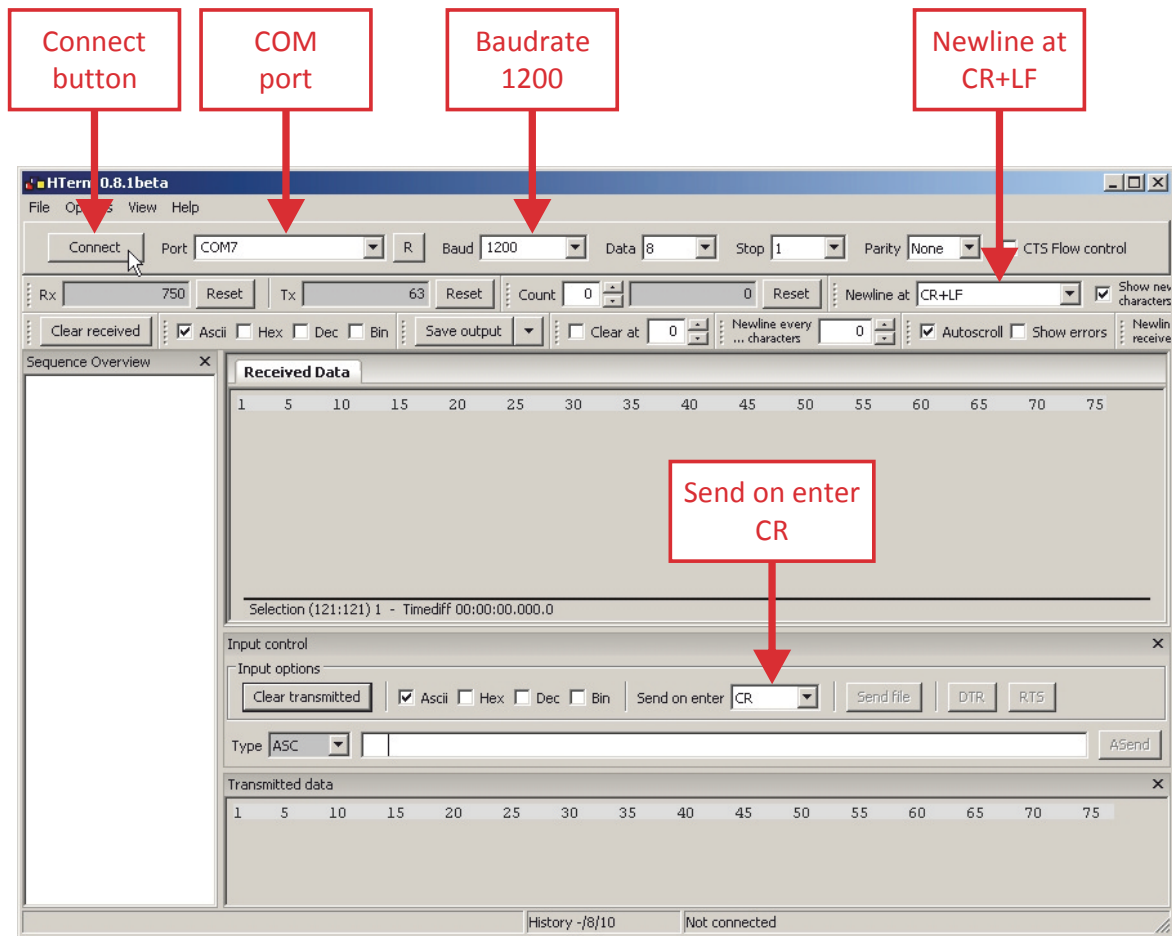


Figure 3: Terminal program settings

Each communication with the sensor SMT100 is initiated by sending a command from the computer to the sensor via the USB-to-SDI-12 converter. For sending a command it is required to enter the command in the white command line and pressing **"Enter" on the keyboard**. (Please do not click on the button "ASend" with the mouse cursor, this does not send the command! It is mandatory to press the "Enter-Key" on the keyboard!)

### SDI-12 commands

For setting the SDI-12 Address the following command is required:

**?An!**

- ? : broadcast-address (each SDI-12 sensor accepts commands to address "?")
- A : command used for programming a new address into a sensor
- n : new address
- ! : terminates the SDI-12 command

## Example: Changing the SDI-12 Address of an SMT100 sensor

For programming address 4 to the SMT100 sensor, the command ?A4! must be sent to the sensor.

The figure below shows a screenshot of a full communication cycle. After sending the command ?A4! to the sensor, the sensor changes its address to 4 and acknowledges the message by sending "4" as response. The response is displayed on the computer screen.

**Important: The SDI-12 protocol only allows single character addresses, e.g. the characters 0...9 ! Addresses having more than one character (e.g. "37" ) are not allowed!**

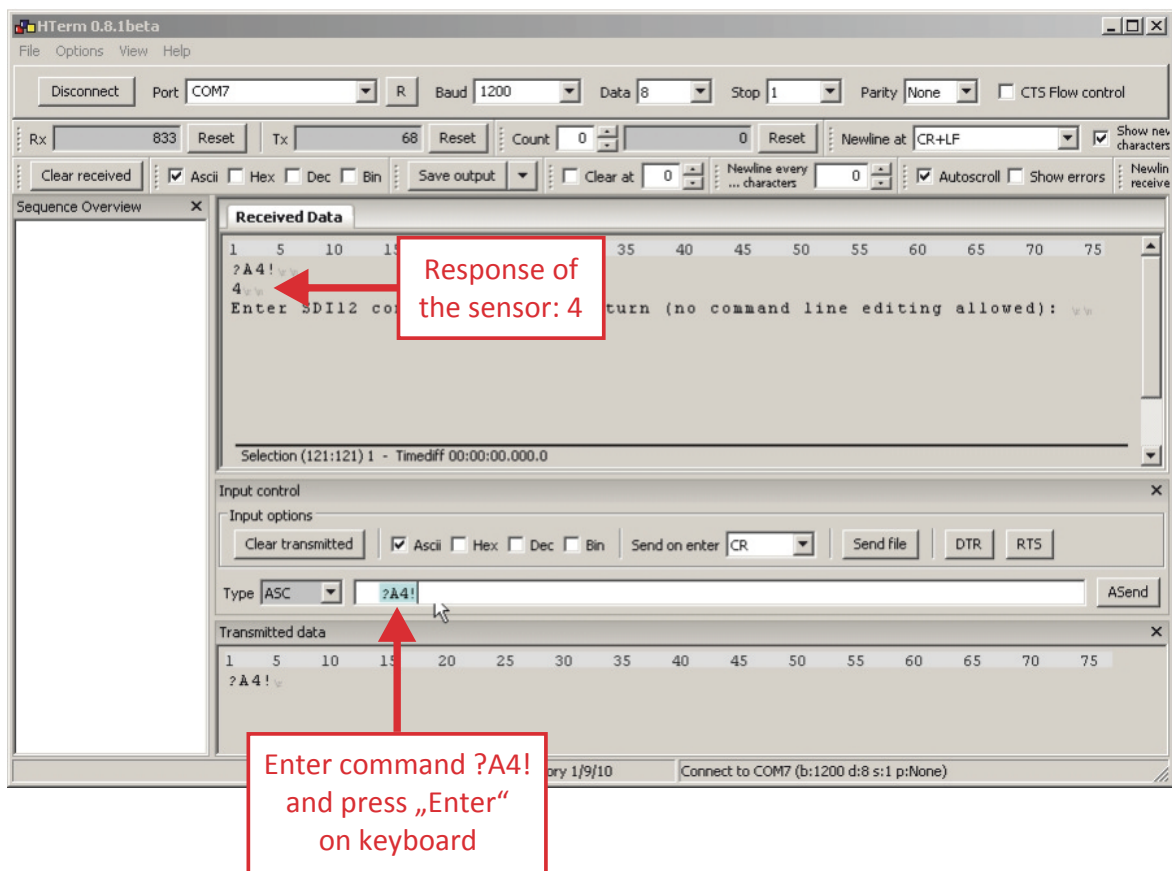


Figure 4: SDI-12 address change example

### Reading Measurement values from the SMT100 sensor

Reading measurement values from the SMT100 requires two communication cycles:

First the command ?M! has to be sent. This command forces the sensor to measure all parameters (e.g. moisture and temperature). The values are not sent to the computer.

The sensor will respond with a status message such as e.g. "10025" which means: the sensor has address 1, the measurements will take up to 002 seconds and 5 parameters will be returned when retrieving the measurement results.

Then the second command ?D0! has to be sent to the sensor. The sensor will then return the measured data to the computer as a long string. The values are separated by "+" characters according to the SDI-12 protocol specification.

Example response:

1+21137+1.00+0.00+24.62+4.75

*Value 1: Address of the sensor (e.g. 1)*

*Value 2: Uncalibrated raw measurement data (e.g. 21137)*

*Value 3: Calibrated permittivity (e.g. 1.00)*

*Value 4: Calibrated volumetric water content in percent (e.g. 0.00)*

*Value 5: Temperature in degrees Celsius (e.g. 24.62)*

*Value 6: Supply voltage of the SMT100 in volts (e.g. 4.75)*

***Important: Please make sure, that the supply voltage of the sensor is NOT switched off between sending the two commands! This has to be taken into account for configuration of many available data loggers! If the power is switched off, the measurement data is lost!***

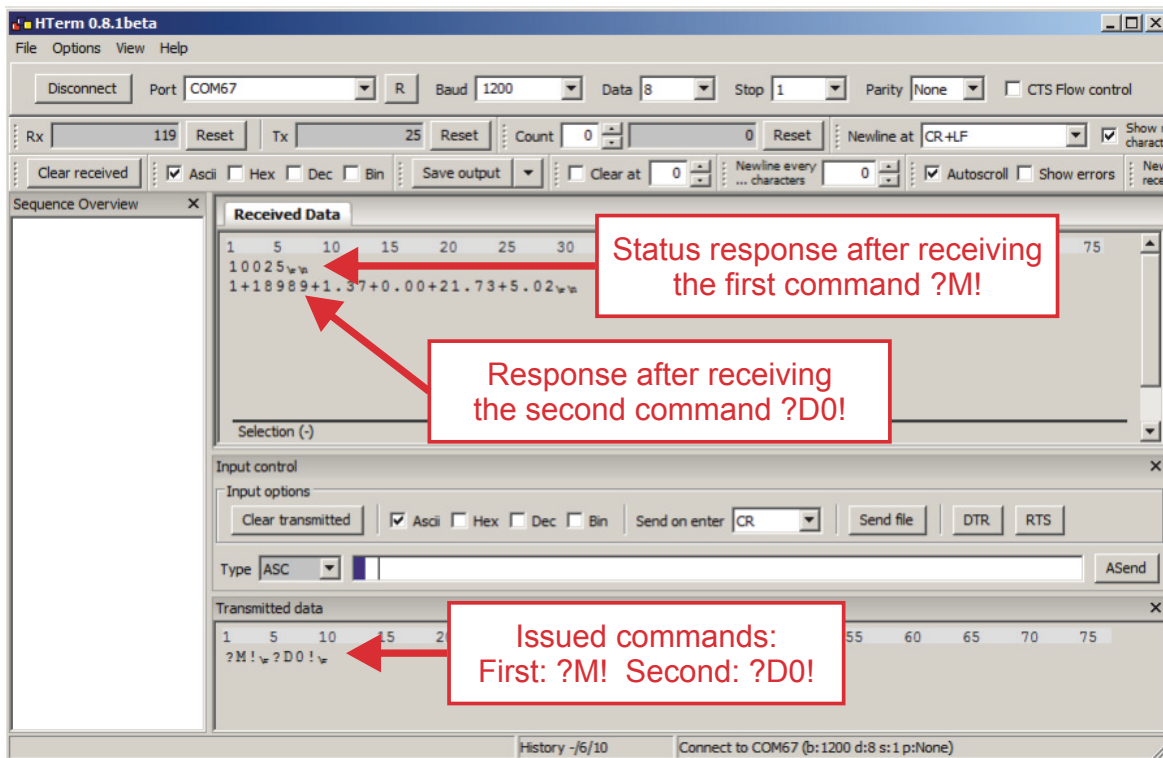


Figure 5: Measurement example