

SMT-01 Description

Part 2. A practical guide

This describes how to connect sensor SMT-01 to Arduino UNO board and measure Soil moisture and Temperature using the kit.

Required components:

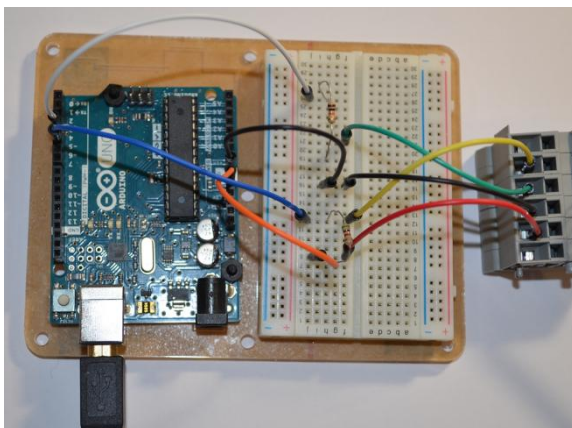
Hardware:

- Arduino UNO board
- SMT-01
- Resistors: 4.7k and 10k
- Wires

Software:

- Arduino IDE: <https://www.arduino.cc/en/software>
- OneWire Arduino libraries: <https://www.arduino-libraries.info/libraries/one-wire>
- Example sketch: <https://github.com/greensensors/SMT-Soil-Moisture-Sensor-for-Arduino/blob/main/SMT-Arduino-example.ino>

Make all necessary electrical connections according to the circuit:
https://github.com/greensensors/SMT-Soil-Moisture-Sensor-for-Arduino/blob/main/SMT_Arduino_Circuit.png



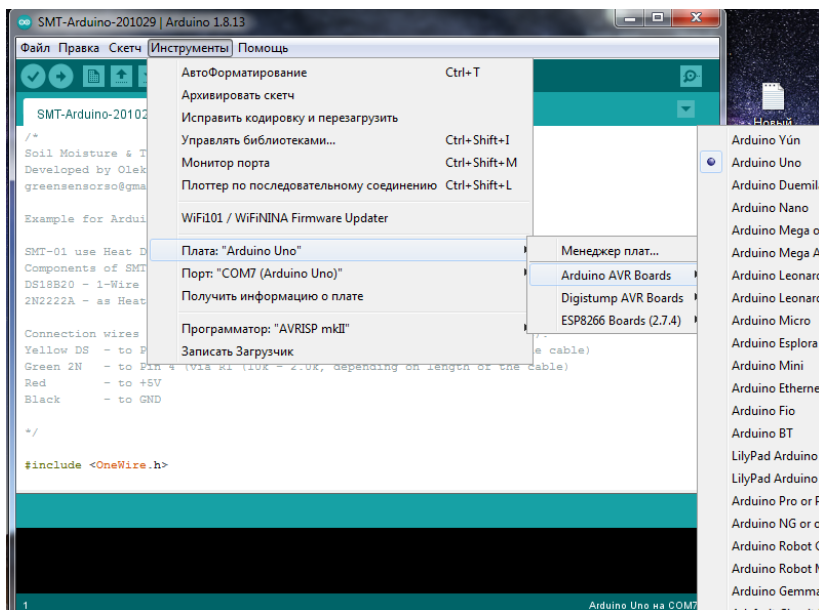
Place the SMT-01 sensor in a container with water.



Connect Arduino UNO board to PC. Open sketch «SMT-Arduino-example.ino» in Arduino IDE.



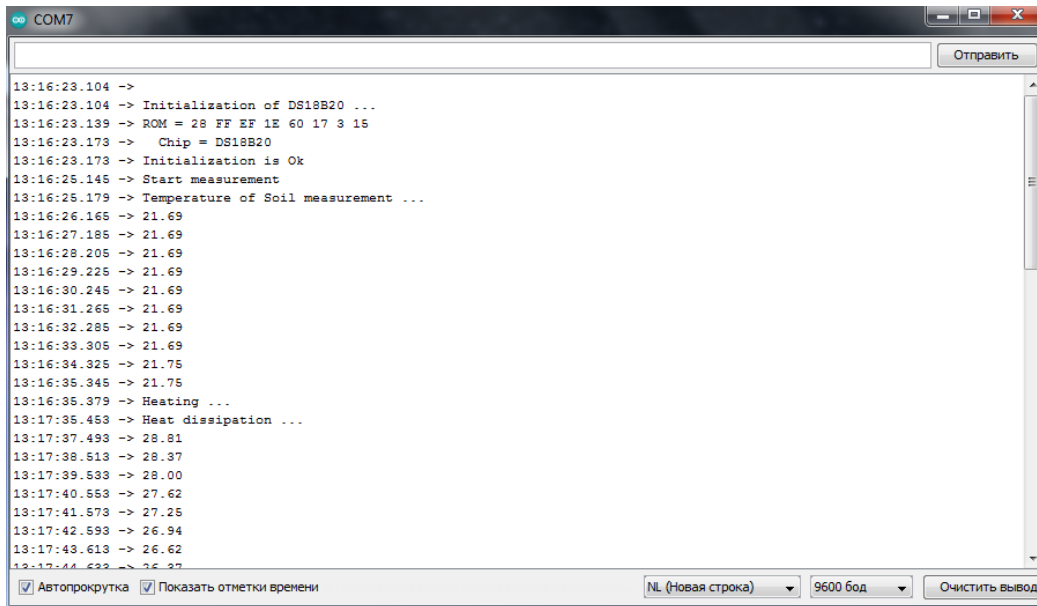
Configure the Port.



Load the sketch in to Arduino Uno board.

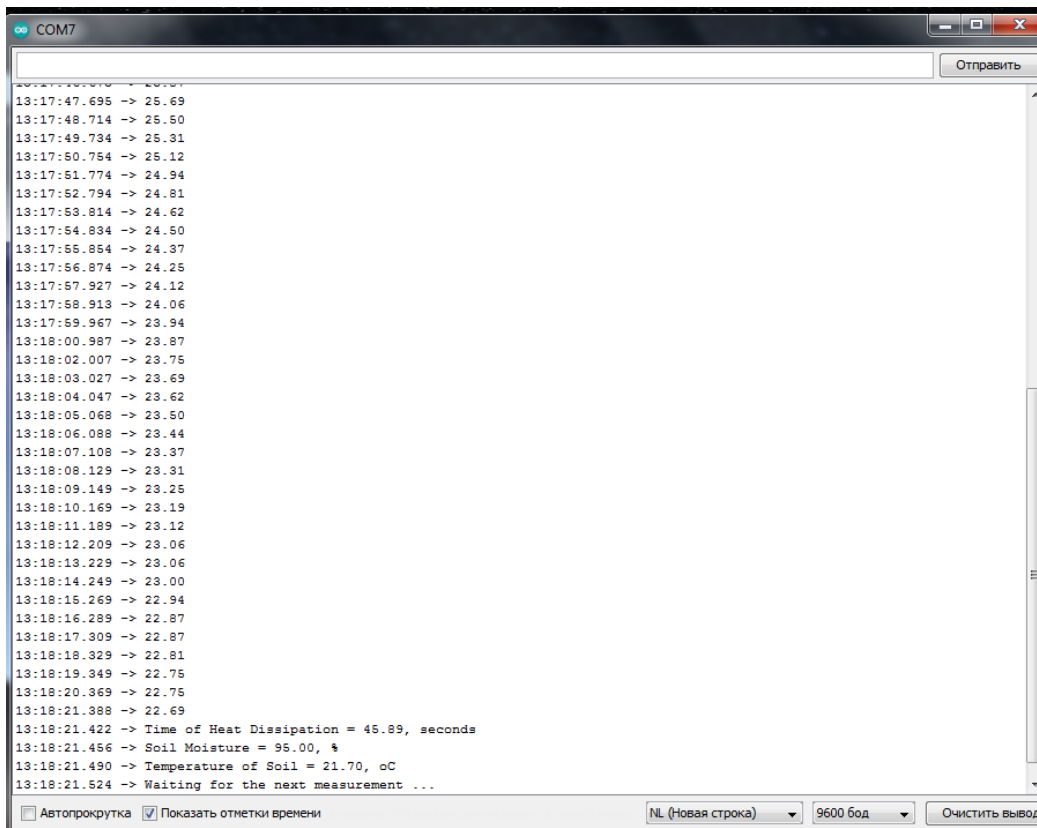
After loading the program will start. You can see all stages of the program execution.

Initialization of temperature 1-wire sensor DS18B20, Temperature of Soil measurement, Heating.



```
COM7
13:16:23.104 ->
13:16:23.104 -> Initialization of DS18B20 ...
13:16:23.139 -> ROM = 28 FF EF 1E 60 17 3 15
13:16:23.173 -> Chip = DS18B20
13:16:23.173 -> Initialization is Ok
13:16:25.145 -> Start measurement
13:16:25.179 -> Temperature of Soil measurement ...
13:16:26.165 -> 21.69
13:16:27.185 -> 21.69
13:16:28.205 -> 21.69
13:16:29.225 -> 21.69
13:16:30.245 -> 21.69
13:16:31.265 -> 21.69
13:16:32.285 -> 21.69
13:16:33.305 -> 21.69
13:16:34.325 -> 21.75
13:16:35.345 -> 21.75
13:16:35.379 -> Heating ...
13:17:35.453 -> Heat dissipation ...
13:17:37.493 -> 28.81
13:17:38.513 -> 28.37
13:17:39.533 -> 28.00
13:17:40.553 -> 27.62
13:17:41.573 -> 27.25
13:17:42.593 -> 26.94
13:17:43.613 -> 26.62
13:17:44.633 -> 26.37
 Автопрокрутка  Показать отметки времени
NL (Новая строка) 9600 бод ОЧИСТИТЬ ВЫВОД
```

Heating dissipation and Soil Moisture Calculation.



```
COM7
13:17:44.633 -> 26.37
13:17:47.695 -> 25.69
13:17:48.714 -> 25.50
13:17:49.734 -> 25.31
13:17:50.754 -> 25.12
13:17:51.774 -> 24.94
13:17:52.794 -> 24.81
13:17:53.814 -> 24.62
13:17:54.834 -> 24.50
13:17:55.854 -> 24.37
13:17:56.874 -> 24.25
13:17:57.927 -> 24.12
13:17:58.913 -> 24.06
13:17:59.967 -> 23.94
13:18:00.987 -> 23.87
13:18:02.007 -> 23.75
13:18:03.027 -> 23.69
13:18:04.047 -> 23.62
13:18:05.068 -> 23.50
13:18:06.088 -> 23.44
13:18:07.108 -> 23.37
13:18:08.129 -> 23.31
13:18:09.149 -> 23.25
13:18:10.169 -> 23.19
13:18:11.189 -> 23.12
13:18:12.209 -> 23.06
13:18:13.229 -> 23.06
13:18:14.249 -> 23.00
13:18:15.269 -> 22.94
13:18:16.289 -> 22.87
13:18:17.309 -> 22.87
13:18:18.329 -> 22.81
13:18:19.349 -> 22.75
13:18:20.369 -> 22.75
13:18:21.388 -> 22.69
13:18:21.422 -> Time of Heat Dissipation = 45.89, seconds
13:18:21.456 -> Soil Moisture = 95.00, %
13:18:21.490 -> Temperature of Soil = 21.70, oC
13:18:21.524 -> Waiting for the next measurement ...
 Автопрокрутка  Показать отметки времени
NL (Новая строка) 9600 бод ОЧИСТИТЬ ВЫВОД
```

You may notice that Time of Heat Dissipation = 45.89 in Water content.

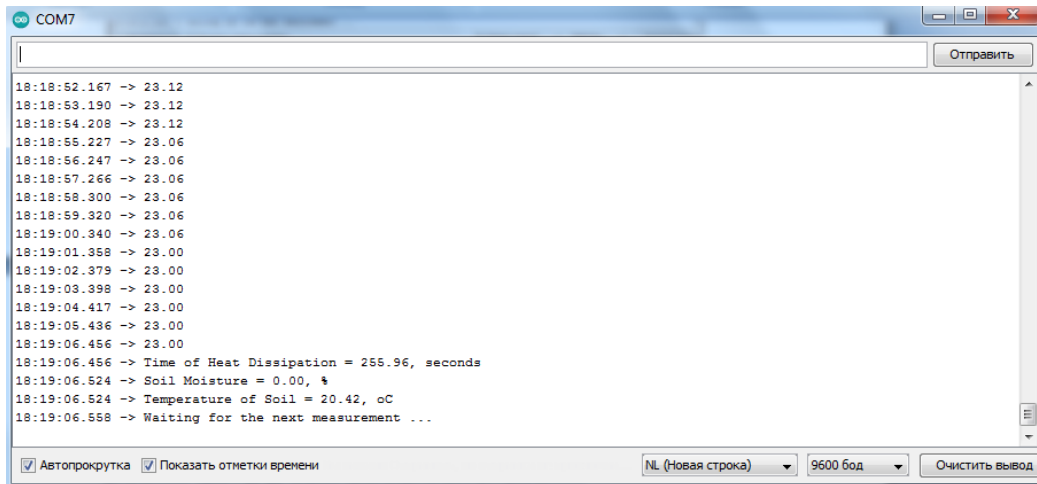
Replace on line 102 of the program

```
float Sensor_Wet = 35.0; // Time of Heat Dissipation for Wet Sensor
```

to

```
float Sensor_Wet = 45.89; // Time of Heat Dissipation for Wet Sensor
```

Then pull the sensor out of the Water and check the sensor data in Air.



The screenshot shows a serial terminal window titled 'COM7'. The output displays a series of temperature readings (23.12, 23.06, 23.00) followed by a 'Time of Heat Dissipation = 255.96, seconds' message. Subsequent lines show 'Soil Moisture = 0.00, %' and 'Temperature of Soil = 20.42, cC'. The terminal interface includes a 'Send' button, a scroll bar, and a status bar with options for 'Autoscroll', 'Show time markers', 'NL (New line)', '9600 baud', and 'Clear output'.

Time of Heat Dissipation = 255.96 on Air.

Replace on line 101 of the program

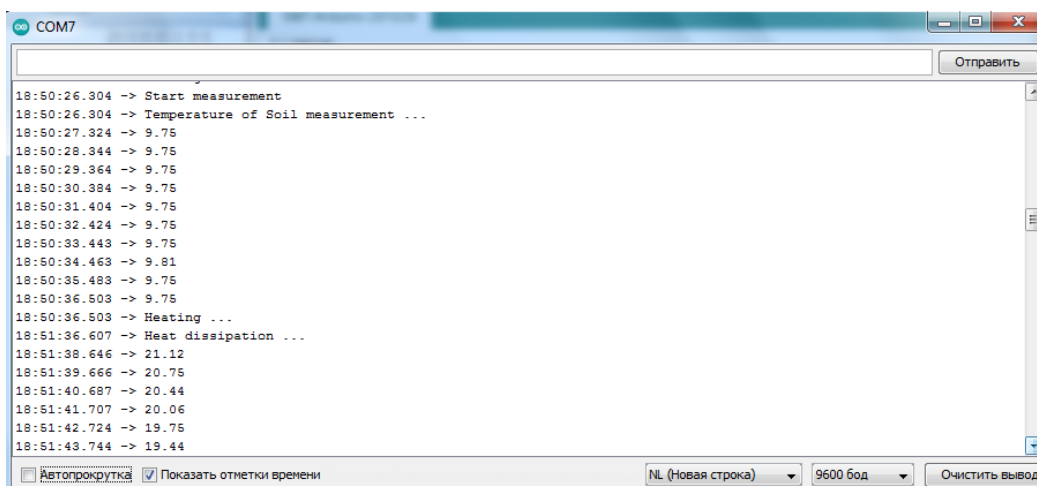
```
float Sensor_Dry = 250.0; //Time of Heat Dissipation for Dry Sensor
```

to

```
float Sensor_Dry = 255.96; //Time of Heat Dissipation for Dry Sensor
```

Save changes and reload the program. After calibration, we can check the sensor data in the soil.

Place the sensor in dry ground. We get the following result (soil from the garden, so the temperature is low):



The screenshot shows a serial terminal window titled 'COM7'. The output starts with 'Start measurement' and 'Temperature of Soil measurement ...'. It then displays a series of temperature readings (9.75, 9.81, 19.44) and a 'Heat dissipation ...' message. The terminal interface includes a 'Send' button, a scroll bar, and a status bar with options for 'Autoscroll', 'Show time markers', 'NL (New line)', '9600 baud', and 'Clear output'.

```
COM7
18:55:38.629 -> 10.94
18:55:39.649 -> 10.94
18:55:40.669 -> 10.94
18:55:41.689 -> 10.94
18:55:42.709 -> 10.94
18:55:43.729 -> 10.94
18:55:44.747 -> 10.94
18:55:45.764 -> 10.94
18:55:46.782 -> 10.88
18:55:47.836 -> 10.88
18:55:48.856 -> 10.88
18:55:49.876 -> 10.88
18:55:50.896 -> 10.88
18:55:51.915 -> 10.88
18:55:52.935 -> 10.88
18:55:52.935 -> Time of Heat Dissipation = 255.96, seconds
18:55:52.968 -> Soil Moisture = 0.00, %
18:55:53.002 -> Temperature of Soil = 9.76, oC
18:55:53.036 -> Waiting for the next measurement ...

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NL (Новая строка) 9600 бод Очистить вывод
```

Now we will pour the soil abundantly



and check the data (the water from the tap at home is warm, so the soil temperature has changed after watering):

```
COM7
18:55:53.002 -> Temperature of Soil = 5.76, oC
18:55:53.036 -> Waiting for the next measurement ...
19:02:53.568 -> Start measurement
19:02:53.602 -> Temperature of Soil measurement ...
19:02:54.588 -> 27.44
19:02:55.608 -> 27.44
19:02:56.628 -> 27.44
19:02:57.682 -> 27.44
19:02:58.703 -> 27.44
19:02:59.723 -> 27.44
19:03:00.743 -> 27.44
19:03:01.763 -> 27.44
19:03:02.764 -> 27.44
19:03:03.783 -> 27.44
19:03:03.783 -> Heating ...
19:04:03.891 -> Heat dissipation ...
19:04:05.931 -> 35.13
19:04:06.950 -> 34.69
19:04:07.970 -> 34.25
19:04:08.989 -> 33.88
19:04:10.009 -> 33.56
```

Автопрокрутка Показывать отметки времени NL (Новая строка) 9600 бод Очистить вывод

```
COM7
19:04:38.604 -> 29.31
19:04:39.624 -> 29.25
19:04:40.644 -> 29.19
19:04:41.664 -> 29.12
19:04:42.684 -> 29.06
19:04:43.704 -> 29.00
19:04:44.724 -> 28.94
19:04:45.744 -> 28.87
19:04:46.764 -> 28.81
19:04:47.785 -> 28.81
19:04:48.805 -> 28.75
19:04:49.825 -> 28.69
19:04:50.845 -> 28.62
19:04:51.865 -> 28.62
19:04:52.885 -> 28.56
19:04:53.905 -> 28.50
19:04:54.959 -> 28.44
19:04:54.959 -> Time of Heat Dissipation = 50.99, seconds
19:04:54.993 -> Soil Moisture = 93.00, %
19:04:55.027 -> Temperature of Soil = 27.44, oC
19:04:55.061 -> Waiting for the next measurement ...
```

Автопрокрутка Показывать отметки времени NL (Новая строка) 9600 бод Очистить вывод

We have Soil Moisture = 93%.

Thank you very much.