

Manual

Soil Sensor 140

with serial output



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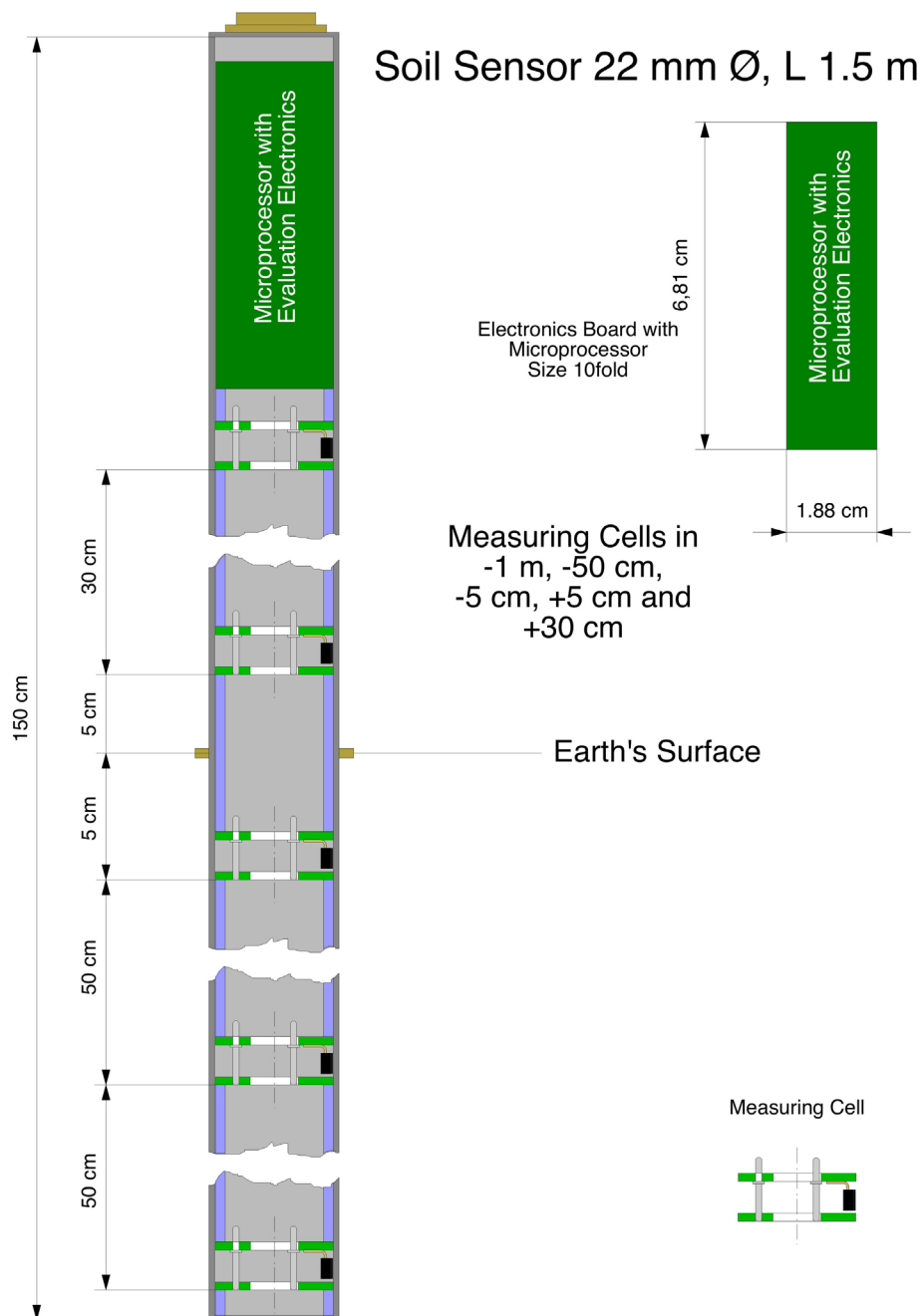
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Scheme of the Soil Sensor 140

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1 For compliance

1.1 Usage

The Reinhardt Soil Sensor 140 has been designed for stationary operation to measure the soil temperature at depths of 5 cm, 50cm and 100cm. 2 additional temperature sensors measure at 5cm and 30cm above the ground.

The measured values are transmitted via a serial RS-232 port with 9600 baud each 5 seconds.

The recommended usage is as additional sensor at the GPS input of a Reinhardt weather station or sensor.

Any use other than described above may cause damage of the product or lead to other dangers.

Carefully read the complete operating manual. It contains important information about the installation and operation.

1.2 Safety Regulations



The instruments are manufactured according to modern technical standards and can be operated without danger when used as directed.

Damage caused by non-observance of this operating manual can lead to forfeiture of warranty. We shall not assume any liability for subsequent damage.



We shall not assume any liability for damage of items or persons caused by improper handling or non-observance of the safety instructions! In such cases any guarantee claims shall become null and void.



Dear customer, the following safety and hazard notices not only serve the protection of your health but also the protection of the appliance. Please read the following points carefully.



The supply voltage is provided by the weather station to which the Soil Sensor 140 is connected to. In the Soil Sensors plug a voltage regulator is implemented which generates the 5VDC supply voltage needed by the Soil Sensor 140. This is performed to avoid temperature errors due to self heating of the voltage regulator.



Do not leave the packaging material lying around. These parts are dangerous toys in the hands of children.



Handle the product with care. Blows or impact, or dropping it even from a small height will damage it.

1.3 Mounting

For mounting the Soil Sensor 140 you first need to drill a hole 1m deep into the ground. To perform this you need an earth auger with at least 35mm diameter.

Then you insert the Soil Sensor 140 into the hole and align the label on the Soil Sensor to the ground surface. At last you water the ground until the Soil Sensor 140 is completely covered by soil.

Then you connect the cable to the GPS input of a Reinhardt weather station or sensor.

The Soil Sensor 140 is now ready for usage and sends a datastring each 5 seconds.

2 Commissioning

2.1 Hardware installation

Mount the Soil Sensor 140 as described above.

After mounting the Soil Sensor 140 the Reinhardt weather station or sensor must be prepared for operation with the Soil Sensor 140 at its GPS input.

2.2 Preparing the weather station / sensor

Send the following command to the weather station using a terminal software:

```
! ?0
```

The weather station will reply something like this:

```
<! ?0>{13}{10}
{13}{10}
*+ MWS/EZ V2.43 +*{13}{10}
DA: 00255{13}{10}
DI: 00001{13}{10}
DV: 00001{13}{10}
ME: 01024{13}{10}
MU: 00007{13}{10}
MI: 00005{13}{10}
OD: 00004{13}{10}
A#: 00084{13}{10}
ER: 00100{13}{10}
FL: 00192{13}{10}
PM: 00000{13}{10}
PS: 00000{13}{10}
SC: 00005{13}{10}
TZ: 00001{13}{10}
AT: 00000{13}{10}
HZ: 00000{13}{10}
TA: 00000{13}{10}
KM: 00001{13}{10}
IF: 00010{13}{10}
...
```

Now you add 16 to the number with the identifier IF (10 in this case) and send the command !F26 to the weather station.

This forces the weather station to listen to its GPS input and expecting data of a Reinhardt sensor instead of GPS data.

The next step is to send the following commands, each line is sent by pressing the ENTER key.:

```
!K21,20,BA
!K22,21,BB
!K23,22,BC
!K24,23,BD
!K25,24,BE
!K21,P0
!K23,P0
```

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At last you perform a reset for the weather station with the command !*.
When restarting the weather station is recognizing the Soil Sensor 140 and adds the 5 temperature values into the data string with the identifiers BA, BB, BC, BD and BE.

The data string of the Soil Sensor 140 itself looks like following:
&A-01.2, BB000.9, BC012.0, BD0013.4, BE014.4,

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3 Technical details

3.1 The sensors

The Soil Sensor 140 contains 5 temperature sensors with I²C interface which is continuously read by the micro controller of the Soil Sensor 140 and transferred each 5 seconds in an ASCII string via the serial RS-232 port as described above.

3.2 Accuracy of the sensors

Temperature: ± 0.5 °C (between -30°C and +50°C)

3.2.1 Measuring range

Temperature: from -50 °C to +50 °C, resolution 0,1 °C

3.3 Dimensions

Outer diameter: 22 mm, closure cap at the bottom 31mm
Length: 150cm
Weight: app. 1.2 kg

3.4 Power Supply

Via weather station or sensor, 8..20VDC, app. 10mA.



CAUTION! Only use the supplied cable, as a 5V voltage regulator is integrated in the plug of the cable, which regulates the supply voltage from 8..20VDC to the voltage of 5VDC required by the sensor.

If a cable without a voltage regulator is used, the soil sensor 140 will be destroyed!

3.5 Data format

The data format of the transmitted data looks like follows:

Example of a data set:

&A-01.2, BB000.9, BC012.0, BD0013.4, BE014.4,

Each 5 seconds the Soil Sensor 140 sends a data set, which contains the 5 temperature values separated by comma in the following order:

Temperature +30cm (?A), temperature +5cm (BB), temperature -5cm (BC),
temperature -50cm (BD), temperatur -100cm (BE),

The data string ends with <CR><LF>.

Baudrate: 9600 baud.

This order and also the baudrate cannot be changed! If you have set your weather station to another baudrate you'll need to set the baud rate of your weather station to 9600 baud too.

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4 Pin Assignment

4.1 Connecting cable

The connection cable contains a 5V voltage regulator, which is built into the plug of the cable!
This voltage regulator is absolutely necessary, without it the soil sensor 140 will be destroyed!

5 pole Plug

Pin 1 (GND)

Pin 2

Pin 3

Pin 4 (Sensor data with 9600 baud)

Pin 5 (VCC 8-20VDC)

The data cable can be extended to maximum 50 meters.

I&OE / Specifications subject to change without prior notice !
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