



## PM-WCS-3-I2C I2C Capacitive soil moisture, temperature sensor

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### FEATURES

- Arduino and Raspberry Pi client software libraries.
- Dust and waterproof
- Calibration functions for EC and Dielectric permittivity
- Low cost and easy to use.
- Fairly accurate readings





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### ELECTRICAL PROPERTIES

	Min/Sleep	Typical	Max
Supply voltage (VCC), V	2.2	3.3	5v
Working current (VCC=3.6V), mA	-	12	14
Operating Temperature Range, Celsius	-20	25	70

In case your application needs to power up sensor before measurement, time to wait before taking measurement is 100ms (1.7s for old version before v1.1).

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### MEASUREMENT PROPERTIES

	Resolution	Range /avg Tolerance
Dielectric permittivity ( $\epsilon$ ) (Temperature corrected)	0.1 $\epsilon$	1 (air) to 80 (water) /5%
Volumetric water content - VWC calculation from Dielectric permittivity $\epsilon$ . $VWC = 0.002974 * \text{pow}(\epsilon, 2) + 0.07424 * \epsilon - 1.295$ ;		
Electrical Conductivity (mS/m) (0.1 mS/m = 1 uS/cm)	0.1 mS/m	0...300 mS/m 20% 300...800 mS/m 40%
Temperature (°C)	0.1°C	-20 to 70°C/3%
Degree of water saturation in the soil	0.1%	0 - 100% /8%

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### PHYSICAL PROPERTIES

Sensor dimensions 114 x 24 x11  
Cable length 1.5m

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### RASPBERRY PI

#### wiring to Raspberry Pi connector:

Raspberry Pi pin #1 - sensor **red** (3.3v)  
Raspberry Pi pin #3 - sensor **green** (SDA)  
Raspberry Pi pin #5 - sensor **white** (SCL)  
Raspberry Pi pin #9 - sensor **black** (GND)  
Raspberry Pi pin #9 - sensor shield(GND)

#### Enable i2c interface in Raspberry Pi

see [this manual](#)

#### Get software

This sample software demonstrates how to make command line interface for the sensor. Sensor default I2C address is 0x63.

To get software execute following on Raspberry Pi:

```
git clone https://github.com/tinovi/i2cRaspberry
```

```
cd i2cRaspberry
```

```
chmod 777 *.sh to add permissions for execute
```

```
./mk.sh to make demo executable
```

```
./read.sh to read data from sensor
```

```
./svcs 0x63 addr 0x65 ( optional) to change default address 0x63 to new I2C address: 0x65
```

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### CALIBRATION RASPBERRY

- 1) Download and install raspberry pi software described in previous section
- 2) **cd i2cRaspberry** - cd to software directory
- 3) **./read.sh** - read data
- 4) **./cal\_air.sh** - hold sensor in the air, and execute this command to calibrate sensor in the air
- 5) **./cal\_water.sh** - submerge sensor in the water or soil with the water, and execute this command to calibrate water.
- 6) **./cal\_ec.sh <ec uS/m>** - put sensor to the soil or calibration fluid with known uS/m and write correct uS/m
- 7) **./read.sh** - read data



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### ARDUINO

**SDA and SCL lines require pullup resistors ~4.7k**

#### wiring to Arduiono:

Arduiono pin #3V3 - sensor **red** (3.3v)

Arduiono pin #A4 - sensor **green** (SDA)

Arduiono pin #A5 - sensor **white** (SCL)

Arduiono pin #GND - sensor **black** (GND)

Arduiono pin #GND - sensor shield (GND)

#### Get software

This sample software demonstrates how to read data from sensor.

Sensor default I2C address is 0x63.

Download Arduino library from [there](#).