Manual

Wise Lite Sol soil water content and conductivity sensor

CODE 06140291

Sensor for reading soil water content (VWC) and soil electrical conductivity using the three stainless steel spikes.

The WISE LITE SOL sensors work with a 4-20 mA current output and are installed horizontally to obtain readings in any soil profile and in any crop.

This sensor measures the electrical conductivity of the soil solution, its salinity, and this can vary depending on the moisture content of the soil.

It also measures the volumetric content of water in soil that indicates the water that is available to plants and is the relationship between the water volume in the soil and the soil volume.

Technical specifications

Power supply	
Power supply:	+12 Vdc to + 30 Vdc
Minimum power supply time	1 second

Outputs	
Output range %	4 – 20 mA
EC output range	4 – 20 mA

Reading	
Reading range %	0 – 50%
EC reading range	0 – 10.0 mS/cm
Precision %	0.03%
EC precision	10 μs/cm

Environment	
Temperature	-40°C to +85°C
Input	IP68

Sensor dimensions	
Length	126 mm
Width	45 mm
Thickness	16 mm
Weight (approx.)	0.3 kg
Cable	4 metres

Soil type
Suitable for saline/alkaline soil

Distance	
Maximum programmer-sensor distance [m]	Minimum wire section [mm²]
100	0.25
250	0.60
500	1.20
750	1.70
1000	2.25

Sensor parts

The following image shows the parts of the sensor.

Sensor body

Spikes
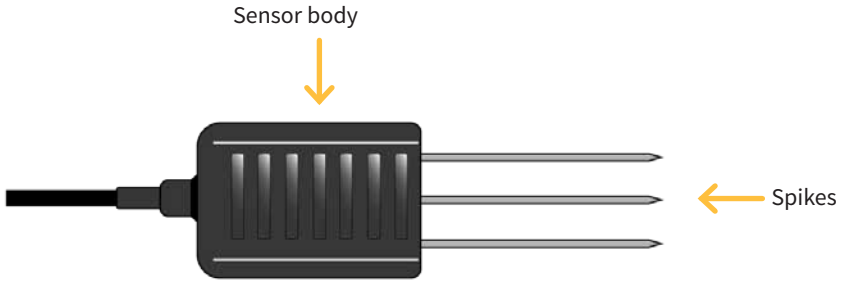
Installation

When selecting the location of the sensor, it is very important to remember that the volume of soil in contact with it has the greatest influence on the sensor reading. Any air pocket or excessive compaction around the sensor can also influence the measurements taken. Avoid creating preferential channels for water to pass between the sensor and the volume of soil in contact.

IMPORTANT

Do not install the sensor in contact with any metal surface, since the sensor's electromagnetic field may be attenuated and therefore affect the measurement result.

Recommendations to always take into account:

- Take the diameter of the soil particles around the sensor into account and make sure there are no large stones that could negatively affect the measurements.
- Maximise the contact between the sensor surface and the soil at the time of installation. The more homogeneous the terrain, the more precise the measurements that can be taken.
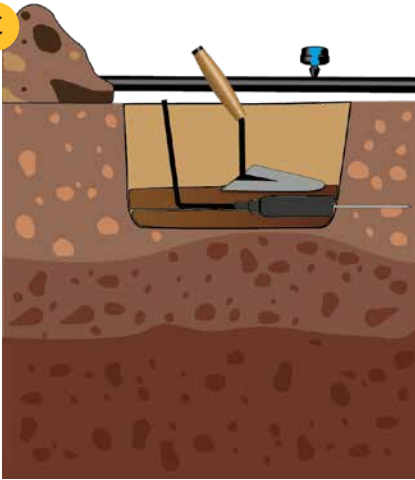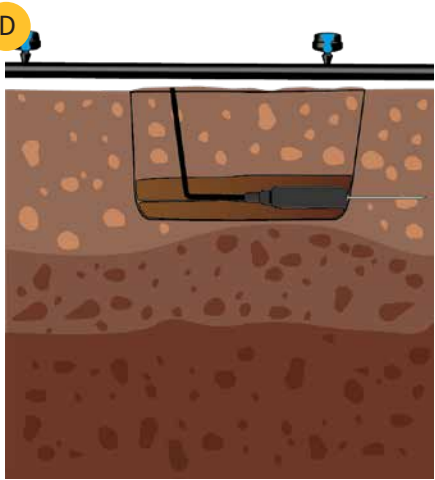
1. Use a hoe to make a trench in the soil at the point where the probe is to be installed and at the desired depth, normally about 30 cm.

2. After making the hole, prepare a mud paste with some of the soil extracted from the hole and blend it with water to obtain a mud texture.

3. Place a first layer of the mixture in the hole covering the entire surface.

4. Install the sensor horizontally as shown in drawing "C", drive the spikes into the side wall and press down to ensure good contact with the first layer of mud.

5. Place a second layer of the mixture on top of the already installed sensor and compact it using a trowel.

6. To install a second probe, repeat steps 4 and 5.

7. Finally, put back the excess soil respecting the order in which it was extracted.

Once the sensor is installed, it is recommended to infiltrate the soil to achieve saturation and thus be able to view the field capacity value from the programmer.

This infiltration varies with soil texture and will be faster in sandy soils and slower in clay soils.

A ring-shaped container with a diameter and a height of approximately 30 cm is needed. You will also need a bucket of about 20-litre capacity to pour water into the container.
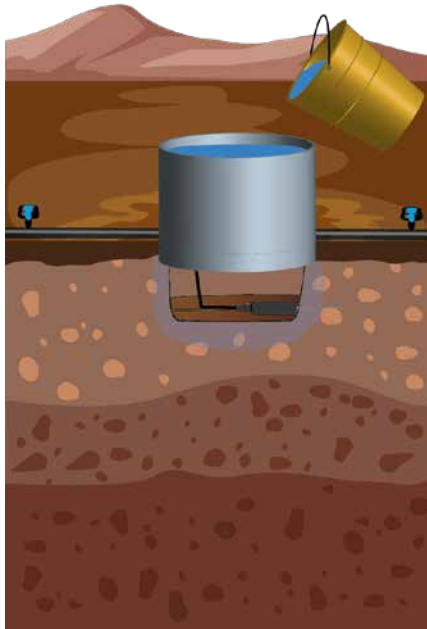

The steps to follow to infiltrate the soil are:

- Place the container in the centre where the Wise Lite Sol probe is located and bury it about 10 cm.
- Pour 20 litres of water inside the ring in different doses and as the water infiltrates. This operation will take more or less time depending on the type of soil.
- Observe, through the programmer, the reading in % of water content in the soil of each of the sensors at different depths. The expected saturation values for each soil must be higher than the values marked as FC (Field Capacity) in the following table.

Indicative values of the type of soil texture for:

TEXTURE	VWC (FC) % Field capacity	VWC (pmp) % Wilting point	CRAD % Available water retention capacity
Sand	15	6	9
Clayey sand	18	8	10
Sandy marl	21	9	12
Marl	31	14	17
Silty loam	35	16	19
Sandy clayey marl	29	14	15
Sandy clay	33	16	17
Loamy clay	36	17	19
Silty clay loam	40	19	21
Silty clay	40	19	21
Clay	44	22	22

Source: New Mexico State University Climate Centre
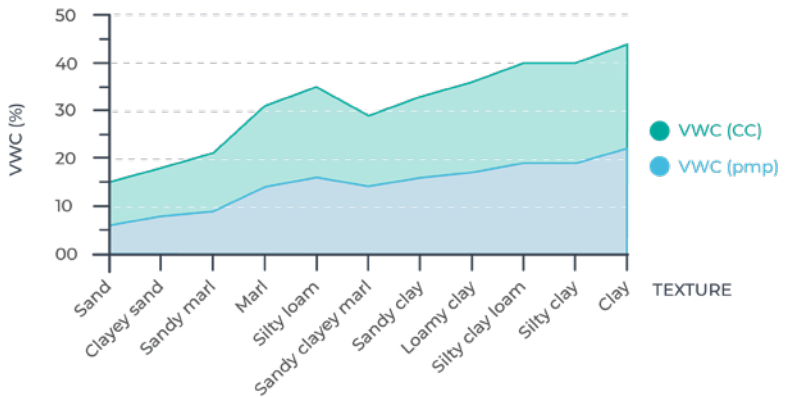
Connections

The Wise Lite Sol sensor can be connected to almost all units. A terminal/connector or a cable hose is provided for each unit that enables the different connections to be made easily with no need to access the inside of the unit. They all use the following colour legend:

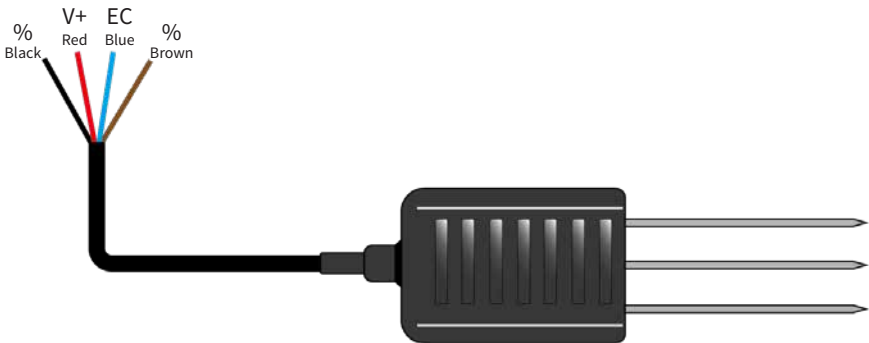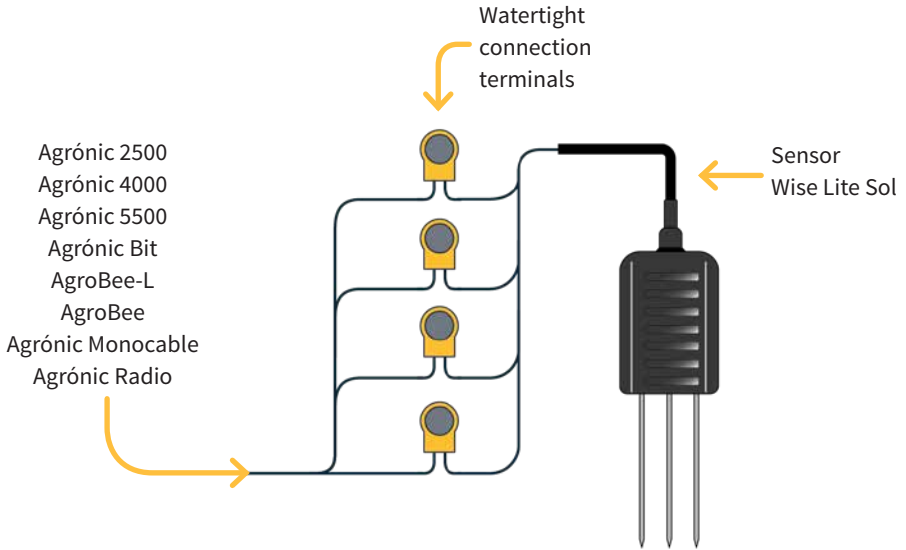|	Wise Lite Sol Sensor			
	0 Black	V+ Red	CE Blue	% Brown
Agrónic 2500	Pin 4 (2 analog input) (SDI-12)	Pin 3 (2 analog input) (SDI-12)	Pin 1 (2 analog input) (SDI-12)	Pin 2 (2 analog input) (SDI-12)
Agrónic 4000	CA	V+	Input 1-5 Input 7-11	
Agrónic 5500	CA (SDI-12)	+VA (SDI-12)	A1-A12 (SDI-12)	A1-A12 (SDI-12)
Agrónic Bit	0V (BIT DIN) CA (BIT CON) CA (BIT CAB)	VA1 o + (BIT DIN) +VA (BIT CON) +VA (BIT CAB)	A1-A7(BIT DIN) A1-A3 (BIT CON) A1-A2 (BIT CAB)	
Agrobee-L	0V (3MA) CA1/2 (9SD-6SD) 0V (2SD2ED1EA) CA1/2 (GNS 2SD1ED2EA)	V1/2/3 (3MA) +V1/2 (9SD-6SD) +V1 (2SD2ED1EA) +V1/2 (GNS 2SD1ED2EA)	A1/2/3 (3MA) A1/2 (9SD-6SD) A1 (2SD2ED1EA) A1/2 (GNS 2SD1ED2EA)	
Agrobee	0V (3MA) 0V (9SD-6SD) 0V (2SD2ED1EA)	V1/2/3 (3MA) V1/2 (9SD-6SD) V1 (2SD2ED1EA)	A1/2/3 (3MA) A1/2 (9SD-6SD) A1 (2SD2ED1EA)	
Agrónic Monocable	- battery (Join - from battery with 0/CA of the module)	+ battery	A1 (MAM 2/5/8-10-1) A1/2 (MAM 2-22) A1/2 (MAM 5/8-7/10-2)	
Agrónic Radio	0V	VA1/2	A1-A2	

NOTE	It is recommended that the cables that remain loose are also connected with a spare 3M connector to avoid possible short circuits or getting wet. These connectors are supplied together with the sensor.

To ensure the water tightness of the module's hose wire connections, it is recommended to use waterproof terminals. The connection through these terminals must be made without stripping the cable wires.

As connection elements, those of the 3M Scotchlok series (www.3m.com) can be used; ES Caps from TYCO Electronics (www.tycoelectronics.com); or the Cellpack splicing and resin diversion kits (www.cellpackiberica.com).

Watertight connection terminals

Agrónic 2500
Agrónic 4000
Agrónic 5500
Agrónic Bit
AgroBee-L
AgroBee
Agrónic Monocable
Agrónic Radio

Sensor
Wise Lite Sol

Compatibility table

AGRÓNIC 2500	AGRÓNIC 4000	AGRÓNIC 5500	AGRÓNIC 7000	AGRÓNIC BIT
✅	✅	✅		✅

AGROBEE-L	AGROBEE	A. MONOCABLE	AGRÓNIC RADIO
		+ 5 W panel + 7A battery + regulator	
✅	✅	✅	✅

Sensor configuration

The sensor acts by delivering a current or a voltage proportional to what it measures. The format indicates the sensor units and the relationship between the voltage read by the input and the sensor reading values.

A format with at least two calibration points needs to be configured for the sensor calculation and is configured from the programmer menu as follows.

Go to:

Function | Settings | Analogue Sensors | Formats (Always validate with the Enter key)

Once in the "**Formats**" menu, configure the settings as shown in the table.

- For A-2500, A-5500 and A-Bit units, choose format numbers between 22 and 31.
- For the A-4000 unit, choose format numbers between 21 and 26.

Setting	Wise Lite Sol sensor format		
	Format Value 1 VWC [%]	Format Value 2 EC [mS/cm]	Value 3 Temperature [°C]
No. of integers	2	2	-
No. of decimals	1	1	-
Sign	no	no	-
Units	%	ms	-
Calibration Point 1			
Real value	800 mV	800 mV	-
Logical value	00.0%	00.0 mS/cm	-
Calibration Point 2			
Real value	4000 mV	4000 mV	-
Logical value	50.0%	10.0 mS/cm	-

Troubleshooting

THE SENSOR DOES NOT RESPOND

- Check the supply voltage that the device supplies to the sensor.
  - If the voltage is **equal to or greater than 10 V**, it is correct.
  - If the voltage is **less than 10 V**, there is an over-consumption and the problem is possibly in the sensor or sensors.

- Check that the AgroBee, AgroBee-L and A-Radio devices have a minimum power-on time of 1 second configured.

- Check that the connection is correct according to the table detailed in this manual (page 7).

SENSOR READING TOO HIGH

- Check that the soil is not too compacted during installation. Too high a density can cause the sensor reading to be higher.

SENSOR READING TOO LOW

- Check that there are no air pockets around the sensor body.

Further information

VIDEO FOR INSTALLATION WITH TRENCH

For further information about the sensor, please see the manufacturer's generic video:

www.youtube.com/watch?v=1bls55gewnY