SOIL EC SENSOR
RY-C10
MANUAL

OVERVIEV

Ry-c10 soil conductivity sensor is a sensor developed to observe and study soil conductivity. The main components are graphite electrode and temperature compensated thermistor, it is simple structure, stable performance and accurate data etc.

Due to the vast territory of China, the salt composition of soil solution in each region is different. Each sensor must be calibrated in the laboratory before leaving the factory. The calibration process is carried out in KCl or NaCl solution. According to the salt composition of soil solution in the working area, a group of KCl or NaCl correction solutions with different concentrations are prepared, such as 0.01, 0.05, 0.1, 0.15, 0.2mol/l, The electrode constant of the instrument is adjusted at 1, and the temperature compensation is opened during the measurement.

A set of conductivity values at 25 ℃ are measured from the low concentration to the high concentration correction solution, respectively. Compared with a set of correction solution, a graph is made, and then a quadratic polynomial fitting is used to obtain the salt value with high accuracy. Users can cooperate with soil moisture sensor to complete the dynamic study of soil water and salt change.

It is widely used in water-saving agricultural irrigation, greenhouse, flowers and vegetables, grassland and pasture, soil rapid measurement, plant culture, scientific test, underground oil transportation, gas transmission pipeline and other pipeline corrosion monitoring and other fields.

TECHNICAL SPECIFICATION

▲Measuring range：0～20mS
▲Minimum resolution：0.01mS
▲Accuracy：5%（test temperature25℃，7.82mS/cm solution）
▲Power supply voltage：DC12V(voltage)； DC12V/24V（Current，485）
▲Working Current： DC12V <10ma(voltage)； DC12V <25ma(485) ； DC12V <35ma(Current)
▲Power Consumption：DC12V <0.1W(voltage)；DC12V <0.3W (485) ；DC12V <0.42W (Current)
▲Work environment：Temperature-10～60℃，Humidity≤95%RH
▲Respond time：＜1min (About 10min data stable）
▲Probe size：120*18.8mm(Effective measurement part)
▲Sealing material：ABS
▲Standard line length：2.5m
▲Farthest lead wire：Current 200 m、RS485 100 m、voltage 50m
▲Ingress Protection：IP65
▲Output：

RY-C10	RY-C10/S	RY-C10/485
Probe original output 0～2V	4-20mA	RS485modbus

COMMUNICATION PROTOCOL

Read station number command (fixed command)

Host send command format：

Device address Function code Start register address No. of registers CRCcheck

00 03 0001 0001 CRCloCRChi

Slave response command format：

Device address Function code Data length Data CRC check

00 03 02 00xx CRCloCRChi（XX=01-ff）

Example：

Command 00 03 00 01 00 01 D4 1B

Respond 00 03 02 00 FF C5 C4

Read data command:

Host send command format：

Device address Function code Start register address No. of registers CRCcheck

xx 03 0000 0001 CRCloCRChi

Slave response command format：

Device address Function code Data length Data CRC check

xx 03 02 00yy CRCloCRChi

Example：

Command FF 03 00 00 00 01 91 D4

Respond FF 03 02 00 0C 51 9C

Communication specification

Baud rate：9600

Data bit：8

Stop bit：1

Check bit：None

Flow control：None

Unified format of data package

（XX：Slave station No. 0x01-0xff; crclo crchi: CRC check code low byte first, high byte last）

Write station number command

Host send command format：

Device address Function code Start register address No. of registers Data CRC check

00 10 0001 0001 02 00xx CRCloCRChi（XX=0X01-0XFF）

Slave response command format：

Device address	Function code	Start register address	No. of registers	CRC check
00	10	0001	0001	CRCloCRChi

Example：

Command 00 10 00 01 00 01 02 00 33 EA 04

Respond 00 10 00 01 00 01 51 D8

EC：4th, 5th byte 00 0C

EC = 0C(H)=12(D)

Note: EC size = value / 100 = 12/100=0.12（mS/cm）

（Numerical range=0-20.00)

WIRING METHOD

voltage/Current output	
Red	Positive pole
Black	Negative pole
Yellow	Current output

RS485 output	
Red	Positive pole
Black	Negative pole
Yellow	A
Blue	B

INSTALLATION

Generally, there are two methods for field installation: excavation section and ground drilling.

Excavation profile: excavate a soil profile where sensors need to be buried, determine the location and depth of sensors need to be buried on the profile, use a small-scale soil sampler with the same (or slightly larger) outer diameter as the sensor from the bottom to the top, and excavate about 10-20cm soil horizontally Hole, insert the sensor horizontally until the bottom of the hole, and then fill with soil to compact, close to ensure that the electrode section of the sensor is in close contact with the soil. It is better to lead the sensor wire out of the vertical section to the ground at a certain distance, so as to avoid rain water directly remaining around the sensor along the wire to affect the test results. After the sensor is buried, the section pit shall be backfilled and compacted according to the original soil layer order and unit weight, and the ground cover shall be the same as the original as far

as possible;;

Ground drilling: at the place where the sensor needs to be installed, use a soil sampler (Luoyang shovel, twist soil drill, etc.) to drill a soil hole from the ground down to a predetermined depth, use a fine rod with an opening at one end to support the sensor and insert it to the bottom of the hole, make it closely contact with the soil, take out the fine rod, and then backfill and compact in layers. In the same way, soil moisture sensor can be buried in the same way to obtain the dynamic change data of water and salt;

SENSOR CALCULATION AND CORRECTION METHOD

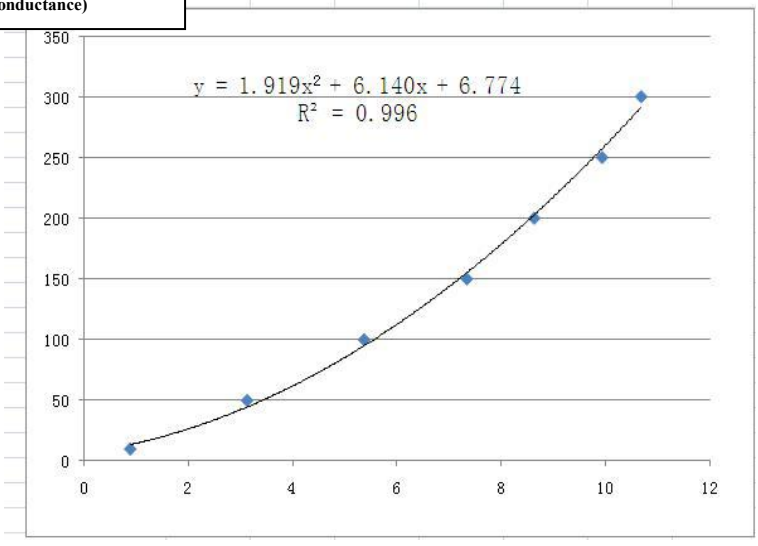
Sensor calculation formula:：（collect 4-20mA）：

（X-4）/（20-4）*（up limit- low limit）+low limit。

X: Measured current；

The sensor sent 0-2000mv linear corresponds to the 0-20ms conductivity. The salt score can be directly obtained by inputting the quadratic regression curve formula calibrated by a certain sensor in Excel. As below:

ma (Output current)	4.712	6.504	8.296	9.872	10.904	11.944	12.544
mS/cm(electric conductance)	0.89	3.13	5.37	7.34	8.63	9.93	10.68
	10	50	100	150	200	250	300



WARRANTY & SERVICE

Warranty commitment: the warranty period is 12 months from the delivery period (except for the product problems caused by the failure to operate according to the corresponding technical requirements or other human behaviors).

After sales commitment: users can consult relevant technical problems by phone and get clear solutions. If it is a quality problem, it can be returned to the factory for maintenance or replacement.

Service Phone：0310-8033736