METER

AROYA® SOLUS Common Troubleshooting Issues and Questions

INTRODUCTION

The AROYA SOLUS kit (ZSC and compatible sensors) requires accurate installation and configuration to effectively measure soil properties. SOLUS is offered by METER Group as part of the comprehensive AROYA system. This troubleshooting guide is meant as a resource for distributors to provide support for customers in using the device as designed. All support of SOLUS should be handled directly by the distributor. METER will support the distributor in turn if the distributor deems additional assistance is necessary. Potential RMAs will be handled according to the written agreement signed between METER and the distributor.

ZSC CONFIGURATION

Problem	Possible Solutions
ZSC cannot connect to Android over Bluetooth	Ensure location services are enabled on the Android™ device. Ensure Bluetooth® is enabled on the device. Ensure the device supports using Bluetooth Low Energy (BLE). Check the Android operating system (OS) and confirm it is version 4.3 or higher. Upgrade the OS if necessary. Confirm the LED on the ZSC turns on after the button is pressed. If the light does not come on, replace the batteries in the ZSC.
ZSC cannot connect to iPhone over Bluetooth	Ensure Bluetooth is enabled on the device. Ensure that the device supports using Bluetooth Low Energy (BLE). Check the iPhone operating system (OS) and confirm it is version 10 or higher. Upgrade the OS if necessary. Confirm the LED on the ZSC turns on when after the button is pressed. If the light does not come on, replace the batteries in the ZSC.
SOLUS app not working	Ensure the device is connected to cell data or Wi-Fi® network.
LED will not turn on	Change the batteries in the ZSC (two AA alkaline).
ZSC disconnects from smartphone	ZSC will disconnect after some time to preserve battery life. For continuous monitoring, visit aroya.io to learn more about the AROYA offering.

Can I connect multiple ZSC devices at once?

No. The SOLUS app does not allow multiple ZSC to be connected at once. However, all ZSC devices within range will show up in the dropdown list and can be connected to and disconnected from freely.

How do I determine which ZSC is which in the list of units within range on the SOLUS app?

The ZSC devices do not have the serial number printed on them. Connect to one ZSC at a time, making sure the blinking blue LED turns solid and appears in the SOLUS app. Mark the ZSC with the serial number or some other identifying feature before connecting to the next ZSC.

NOTE: A connected ZSC will have a solid blue light.

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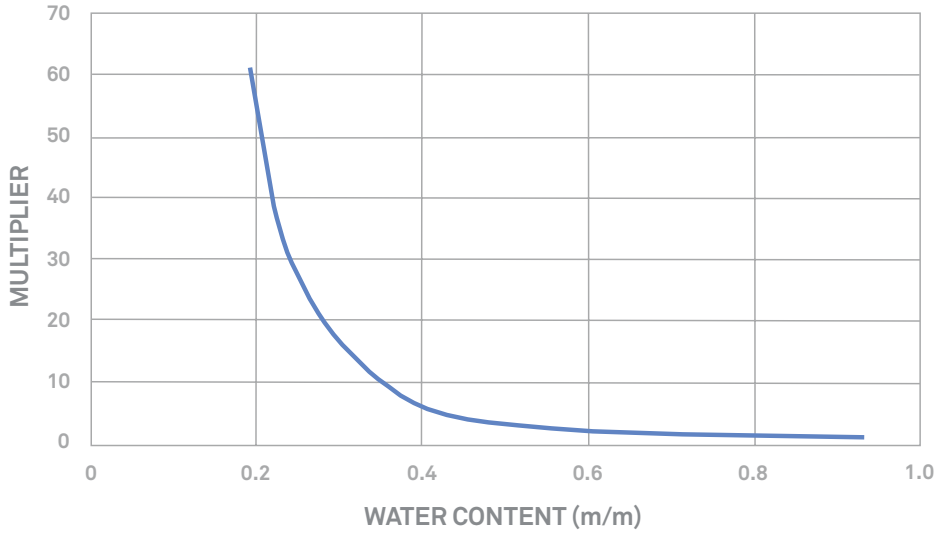
TEROS 12 MEASUREMENTS

Problem	Possible Solutions
Measurements will not show up on app	Ensure the TEROS 12 sensor connector is fully inserted into the ZSC port.
Measurements look wrong	Ensure the TEROS 12 sensor connector is fully inserted into the ZSC port. Ensure the TEROS 12 sensor is properly inserted in the substrate. Choose the TEROS 12 sensor placement in the substrate carefully as the TEROS 12 sensor measures only where placed. Use the Alignment Tool as a guide when installing the TEROS 12 sensor.
EC measurement looks wrong	The TEROS 12 sensor will provide less reliable EC values when the water content drops below a certain percentage (see the first question below or the TEROS 12 User Manual for more information).

How do I measure electrical conductivity of porous materials in low water content?

Electrical conductivity (EC) is often used to determine the concentration of nutrient solution in soils and soilless media, such as rockwool. The concentration of interest is that of the water in the soil pores (called pore water EC, or EC_w), but this can only be directly measured by squeezing water out of the medium and measuring the EC of that water. The EC of the bulk medium (called bulk EC, or EC_b) can be measured with in situ sensors. Bulk EC will always be less than pore water EC, because the porous medium and any air spaces in it will interfere with its ability to conduct electricity. Bulk EC will therefore depend on pore water EC, but its value will also depend on the solids and air in the medium.

Pore water EC is calculated as the product of bulk EC and a multiplier that depends on the solids and air content of the medium. Empirical relationships have been obtained for that multiplier. The multipliers used in AROYA are shown in the following graph.



At high water content, the multiplier is close to 1.0, but as water content decreases, the multiplier rapidly increases. For water contents above 0.4, the multiplier is <5.0, and estimates of pore water EC are quite reliable. However, as the water content decreases below those values, the multiplier becomes much larger and the estimates are much less reliable. At high water content, the multiplier is reliable and less dependent on the properties of the medium. At low water content, the multiplier becomes much larger, less reliable, and more dependent on the properties of the medium. At water contents below about 0.12, the multiplier becomes negative, which is clearly nonphysical, but even well above that value, the EC values the graph predicts should be treated as uncertain.