

Technical Support Guide

Lab Devices

Dealer Support Documentation - Lab Equipment

The goal of this document is to provide additional guideline to Giatec' s dealers to empower them to act as the first layer of support in a situation where customers are facing some issues with the Perma, RCON, SURF or SmartBox. In this case, the dealer can refer to this document for typical FAQ's and follow some troubleshooting steps that will either resolve the issue or will provide necessary information for the Giatec Support team to help solve the issue more efficiently. The dealers are involved in the Tier 1 support, Giatec support team will handle cases that are escalate to a Tier 2 or 3.

Tiers description:

TIER 1 (Dealer): Tier 1 support is the first level of support that can be provided by dealers, resellers, SmartRock Plus partners, sales team and technical support. It provides simple troubleshooting suggestions that the user can do or try to fix the issue. It also acts as a checklist for information required when the case is escalated to Tier 2.

TIER 2 (Giatec support): Tier 2 support is provided by the technical support at Giatec main office. It involves accessing some of the users or project information through the back end of the Giatec 360 or the support applications. It also requires testing and recreation of more complicated issues.

TIER 3 (Giatec support): If the root cause of the issue and possible solutions cannot be achieved in Tier 2, the case is escalated to Tier 3 for the product development team to take over. This might involve releasing a patch on the application or a modification on hardware or software.

List of potential issues

Perma2	3
1. Device is showing error messages	3
2. No readings - Metal wire mesh corroded	4
3. Temperature channel shows OH.....	5
4. Device is showing error messages on computer.....	6
5. One or more channels are not working.....	7
RCON.....	8
6. Device is not reading - Hardware.....	8
7. Device is not reading - Software	9
8. Device is not turning ON.....	10
SMARTBOX.....	11
9. App does not work properly	11
SURF	12
1. Variable measured results	12
2. OVF / CEE error messages	13
Recommendations	15
Perma2	15
RCON	16
SmartBox	17
SURF	20
APPENDIX A.....	21

1. Perma2

1.1 Device is showing error messages						
Description:						
The device is working but when making measurements, it presents error messages						
Possible causes:						
Current measurement circuit not functioning properly Short circuit Disconnected sensors / Over Current / Over Heat Software installation / Channel is broken						
Additional comments:						
The device can present different types of error messages. Each one has a different interpretation						
TIER 1 / Dealers			TIER 2		TIER 3	
#	Question	Comments	#	Analysis	#	Analysis
1	What is the device's Serial Number?	This will help us find the unit history	8	Propose to checking the continuity on all channels using a voltmeter	11	Provide device to Engineering
2	What type of error messages?	Ask the client what type of error	9	Issues could be related to leakage on the test cells. Ask the client to verify if everything was assembled correctly.	12	Investigate and identify causes
3	ADC Err.	Measurement circuit does not function properly - Ask the client to turn off the device and turn it on after a few seconds	10	If applicable, request the device to be sent to our laboratory for analysis		
4	short cir.	If positive and negative leads are short-circuited "short cir." message will appear - Turn off the device and remove the short circuit.				
5	DC	Disconnected sensor will appear if the temperature sensor is not connected. - Connect it again to solve the issue				
6	Over curr.	Overcurrent will appear when exceeds 506 mA. - Channel will be turned off. Check the test and the solution on the cells to verify if everything is in order.				
7	Over Heat	Ask the client to change the temperature sensor from the channel to verify if the issue persists - This issue could be related to leakage in the test cell, not to the device itself				

1.2 No readings - Metal wire mesh corroded						
Description:						
Cannot perform readings due to metal wire mesh corroded						
Possible causes:						
Wire mesh is corroded No contact between wire mesh and connectors Burned power supply						
Additional comments:						
A particular property of the Perma2 device is the connection with the mesh. If the connectors are not touching the wire mesh, the mesh will start to corrode. Refer to Appendix B						
TIER 1 / Dealers			TIER 2		TIER 3	
#	Question	Comments	#	Analysis	#	Analysis
1	What is the device's Serial Number?	This will help us find the unit history	8	Propose to check the continuity using a voltmeter	12	Provide device to Engineering
2	Is the wire mesh in contact with the connectors?	If they are not touching, corrosion can happen	9	Refer to Page 9 in the User Manual for illustration	13	Investigate and identify causes
3	Are the connectors tightened?	Make sure the connector is tight.	10	If the issue remains, send a quote of new wire mesh and connectors		
4	There are one or two washers on the connectors?	If there are two washers, remove one to enable contact between the mesh and the connector	11	If applicable, request the device to be sent to our laboratory for analysis		
5	Disassemble the test cells, removing all parts of it	The intention is to locate any signs of rust or dirt on the wire mesh				
6	Clean the steel mesh and parts with CLR solution to remove all the rust	Make sure there is no rust/corrosion left				
7	Assemble again making sure the connectors are tightened and the metal head of the connector inside the cell is completely in contact with the wire mesh	When the connector is in contact with the wire mesh, no corrosion will occur.				

1.3 Temperature channel shows OH						
Description:						
The device is working but the temperature in one of the channels is showing OH						
Possible causes:						
Cable / Sensor defective						
Channel is broken						
Loose connection between the cable and the cell						
Additional comments:						
This is a very rare case and it is probably related to the connection between the connections						
TIER 1 / Dealers			TIER 2		TIER 3	
#	Question	Comments	#	Analysis	#	Analysis
1	What is the device's Serial Number?	This will help us find the unit history	7	Analyze Tier1 info and proceed with troubleshooting	9	Provide device to Engineering
2	Request pictures/videos of the issue	The images will help the troubleshooting	8	Ask the client to ship the device to our laboratory for analysis	10	Investigate and identify causes
3	Is the wire mesh in contact with the connectors?	Ensure that they are in contact				
4	In how many channels the issue is happening?	Could be an issue related to one channel only				
5	In which channel the issue is happening?					
6	Ask the client to change the temperature sensor from the channel to verify if the issue persists	If the issue disappears, it is a cable issue				

1.4 Device is showing error messages on computer						
Description:						
When performing readings with the device connected to the computer, the software shows error messages						
Possible causes:						
Software installation						
Channel is broken						
Additional comments:						
This is a very rare case and it is probably related to the connection between the device and the PC						
TIER 1 / Dealers			TIER 2		TIER 3	
#	Question	Comments	#	Analysis	#	Analysis
1	What is the device's Serial Number?	This will help us find the unit history	8	If applicable, send the PC installation file	11	Provide device to Engineering
2	Request pictures/videos of the issue	The images will help the troubleshooting	9	Check if the device works on the stand-alone layout	12	Investigate and identify causes
3	What type of error messages the device is showing?	Both on the device and the computer screen	10	Ask the client to ship the device to our laboratory for analysis		
4	Shutdown the computer and device and disconnect the cables	Firstly shut down and then disconnect				
5	Connect the cables and then turn the device on	Make sure that the cables are connected before turning the device and the computer on				
6	If the error persists, try to use a NEW USB cable.	The cable should be the same as implemented in most printers				
7	Test if the USB port on the computer is working	Try the USB port by connecting another device/pen drive to check.				

1.5 One or more channels are not working						
Description:						
The red light above the channel is not turning on and the channel does not pass verification						
Possible causes:						
Broken cable Loose connection Fried channel						
Additional comments:						
If only one channel is not working properly, the user can try verifying the continuity in his end. Most likely this issue is not a problem with the device, but with the cable.						
TIER 1 / Dealers			TIER 2		TIER 3	
#	Question	Comments	#	Analysis	#	Analysis
1	What is the device's Serial Number?	This will help us find the unit history	6	Analyze provided information	9	Provide device to Engineering
2	Does the device pass verification?	Ask the client to perform verification using the verification kit.	7	Ask the client to perform a measurement on the verification kit to check if the channel works (NOTE: less than a minute to prevent damaging the verification kit)	10	Investigate and identify causes
3	Request pictures/videos of the issue	The images will help the troubleshooting	8	Ask the client to ship the device to our laboratory for analysis		
4	Ask the client to interchange cables of the other channels to verify if it is a cable issue	If it is a cable issue, when changing the cables, the faulty channel should start to work				
5	Ask the client to verify the readings in another channel	Check if other channels are properly working				

2. RCON

2.1 Device is not reading - Hardware						
Description:						
When the device is on, only few information appears on the screen						
Possible causes:						
Damaged LED screen Start button is not working						
Additional comments:						
The issue could be minor - Related to a damaged LED screen or faulty start button						
TIER 1 / Dealers			TIER 2		TIER 3	
#	Question	Comments	#	Analysis	#	Analysis
1	What is the device's Serial Number?	This will help us find the unit history	11	Analyze Tier1 information and perform other troubleshooting steps	13	Provide device to Engineering
2	Request pictures/videos of the issue	The images will help the troubleshooting	12	Ask the client to ship the device to our laboratory for analysis	14	Investigate and identify causes
3	Does the device pass verification?	Ask the client to perform verification				
4	Check the voltage in the terminals of the device					
5	Check the voltage between the inputs					
6	Check the voltage between the left and ground of the power outlet					
7	Check the voltage between the right and ground of the power outlet					
8	Check if all characters of the front screen are working	The device could be reading without displaying the information on the front screen				
9	Try using the PC software and make measurements using a computer	If the device reads using the computer, the issue is not with the functionality of the unit - Only a LED screen issue				
10	Check if the start button of the unit is working	The issue could be related to a malfunctioning of the start button, which is not initializing the test				

2.2 Device is not reading - Software						
Description:						
When the device is on, only few information appears on the screen						
Possible causes:						
Software issue						
Improper installation of the software on the computer						
Additional comments:						
This issue could be simply related to a miscommunication between the device and the computer / Improper installation of the software						
TIER 1 / Dealers			TIER 2		TIER 3	
#	Question	Comments	#	Analysis	#	Analysis
1	What is the device's Serial Number?	This will help us find the unit history	7	Analyze provided information	11	Provide device to Engineering
2	Request pictures/videos of the issue	The images will help the troubleshooting	8	If applicable, send the installation file for computer to check if there is something wrong with the software the client is using	12	Investigate and identify causes
3	Does the device work on the stand-alone setup?	If yes, the device is working properly and the issue is between the device and the PC	9	Check if the device is within or out of warranty		
4	Ask the client to uninstall and install the software		10	Ask the client to ship the device to our laboratory for analysis		
5	Check the voltage between the left and ground of the power outlet					
6	Check the voltage between the right and ground of the power outlet					

2.3 Device is not turning ON						
Description:						
The device has no power on display						
Possible causes:						
Problem with the 5V power adapter						
Cable issue						
Problem with the power input						
Additional comments:						
This is most likely a hardware issue. The objective in this troubleshooting is to identify if the device was submitted to any sort of power surge/overcharge.						
TIER 1 / Dealers			TIER 2		TIER 3	
#	Question	Comments	#	Analysis	#	Analysis
1	What is the device's Serial Number?	This will help us find the unit history	9	Analyze Tier1 information	12	Provide device to Engineering
2	Request pictures/videos of the issue	The images will help the troubleshooting	10	Check if the device is within or out of warranty	13	Investigate and identify causes
3	Was the device submitted to a different condition since it started being used?	Any sort of electrical overcharge could damage the device.	11	Ask the client to ship the device to our laboratory for analysis		
3	Check the voltage in the terminals of the device					
4	Check the voltage between the inputs					
5	Check the voltage between the left and ground of the power outlet					
6	Check the voltage between the right and ground of the power outlet					
7	Check the power connection	If the power cable has been held in a sharply curved position for too long, it could have forced the female port in the back, thus preventing electricity to supply the device				
8	Try other power cables to check if it is a cable issue					

3. SMARTBOX

3.1 App does not work properly						
Description:						
When trying to perform measurements, it is not possible to use the app						
Possible causes:						
Language is not set in English SmartPhone issue						
Additional comments:						
The SmartBox app does not operate when the phone language is set in another language other than English.						
TIER 1 / Dealers			TIER 2		TIER 3	
#	Question	Comments	#	Analysis	#	Analysis
1	What is the device's Serial Number?	This will help us find the unit history	7	Analyze Tier1 information	10	Provide device to Engineering
2	What language is the phone set?	If the phone is set in another language other than English - Change the phone's Language.	8	Check if the device is within or out of warranty	11	Investigate and identify causes
3	Restart the phone	If the issue persists after changing the language, restart the phone - It should fix the issue	9	Ask the client to ship the device to our laboratory for analysis		
4	What type of issue is the client having?	The smartphone is not connecting to the device, the device is not performing the readings.				
5	Try a different device	Try installing the app in a different device with the language set in English already.				
6	Send pictures or videos of the issue	This will help us understand what might be happening				

4. SURF

4.1 Variable measured results						
Description:						
When performing the measurements on the Cylinder, the results vary a lot						
Possible causes:						
Too many voids on the concrete surface Aggregates exposure on the surface Concrete is dry						
Additional comments:						
The SURF device measures the Electrical Resistivity on the surface of the concrete Cylinder. If there are surface imperfections, results can vary.						
TIER 1 / Dealers			TIER 2		TIER 3	
#	Question	Comments	#	Analysis	#	Analysis
1	What is the device's Serial Number?	This will help us find the unit history	7	Analyze Tier1 information	10	Provide device to Engineering
2	Is the concrete wet or SSD (Saturated Surface Dry) when performing the measurements?	If the concrete is dry, Resistivity results will be higher than those obtained when the concrete is wet.	8	Check if there is an issue with the unit or if it is just a sample issue	11	Investigate and identify causes
3	Are there aggregates exposure on the surface?	If the aggregates are exposed and the electrodes contact them directly, the results will be higher than expected. This is because aggregates are denser than the concrete average density, resulting in higher resistivity	9	Ask the client to ship the device to our laboratory for analysis		
4	Are there voids or casting imperfections on the concrete cylinders?	Voids will also affect the readings, as the electrodes will not be truly in contact with the concrete surface				
5	Ask the client to rotate the sample inside the device	Rotating the sample might help to measure the regions with better surface condition				
6	Ask the client to send pictures of the testing samples	Pictures will help us visualize the type and condition of the sample				

4.2 OVF / CEE error messages						
Description:						
When performing the measurements the device shows OVF or CEE error messages						
Possible causes:						
Concrete is too dry / Very high resistivity						
Bad connection between the cables and the electrodes						
Inner Electrodes are not in contact with the surface of the concrete						
Additional comments:						
Errors are mainly caused by a very dry electrode or lack of contact with inner electrodes.						
TIER 1 / Dealers			TIER 2		TIER 3	
#	Question	Comments	#	Analysis	#	Analysis
1	What is the device's Serial Number?	This will help us find the unit history	12	Analyze Tier1 information	10	Provide device to Engineering
2	What type of error message?	Find if it is OVF or CEE error messages	13	Check if there is an issue with the unit or if it is just a sample issue	11	Investigate and identify causes
3	OVF Error - Are all electrodes in contact with the concrete sample?	OVF error can occur due to poor connection between electrodes and concrete surface	14	Ask the client to ship the device to our laboratory for analysis		
4	OVF - Is the concrete too dry?	If the concrete is very dry, it could cause the error				
5	OVF - Try with another test sample with a lower electrical resistivity	If the device reads, it indicates that the testing sample is higher than the device's measurement range				
6	OVF - Turn off the device and check the connection of the cables to the electrodes.	Also, check the connection plugs to the rear panel of the device - Than turn on the device.				
7	OVF - If the issue persists, move to Tier2					
8	CEE - Check if the electrodes in the corresponding channel are properly sitting on the concrete surface (full contact)	If the electrodes are not touching the entire sample, the device will show error messages.				
9	CEE - Check if there is water in excess on the surface	Excess water creates a short circuit on the surface, producing the error				

10	CEE - If the concrete surface is too dry, use more conductive gel on the tip of the electrodes to improve electrical connectivity	Lack of contact creates the issue		
11	CEE - If the issue persists, move to tier 2			

Recommendations

Perma™

a) LEAKAGE TEST

After filling the cells with the solution (NaOH and NaCl), the user must perform a leakage test. To do so, follow the steps below:

Control the level of liquids inside each container. If the level of the liquids is not constant within ten minutes, or if any dripping is observed below the cell, there may be a leak between the gasket and the specimen surface or between the test cell and connectors. Any leakage problem should be fixed before starting the test.

If the leakage is between the gasket and the specimen surface, try tightening the bolts and refilling the cell containers. If the source of the leakage is between the cell and connectors, try tightening the connector, if it is possible. Otherwise, use silicon glue to seal the space between the connector and the cell. You may also need to adjust the position of the rubber gaskets and ensure they are properly located within the Plexiglas cell part to fix the leakage problem.

b) SAMPLE IS SMALLER THAN 100mm

If the end-user has a sample smaller than 100 mm, he can use epoxy around the rubber gasket. The epoxy should be placed where the gap/space is located. The intention to use epoxy is to seal the test cell from leakage. In addition, as long as all gaps are closed, the test can be performed without any further issues.

RCON™

a) BULK FOR OTHER SHAPE SAMPLES

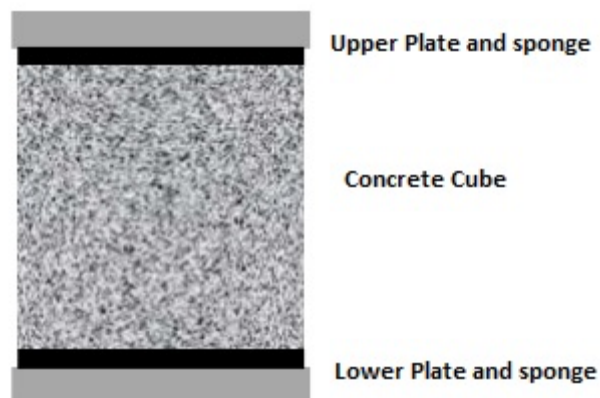
If the end-user wants to perform Bulk Electrical Resistivity in other samples other than 100x200mm cylinders, it is possible to adapt the unit. To do so, follow the steps below:

- Acquire to stainless steel or copper plates for the end connections. Please note that the plates need to cover the entire area of the sample
- Clip the electrical terminal to the plate. Wel can be used to install the electrical terminal on the plates
- Use sponges big enough to fit the new plates and ensure that the cubes are fixed between the plates
- With the new connectors attached to the new plates, perform measurements following the same procedure as for 100x200mm cylinders.

It is also possible to use a weight on top of the upper plate to ensure that there is full contact between the sample and the plates.

b) BULK FOR CONCRETE CUBES

If the end-user wants to test the bulk electrical resistivity on a Concrete Cube, it is possible to follow the same procedure and described previously. In addition, a schematic view of the test on a Concrete Cube can be found below:



Schematic view of Bulk Resistivity test for concrete cubes

SmartBox™

a) TEST SPACER

If a client wants to manufacture its own test spacer, he can. To do so, it is a matter of ensuring that the spacer correctly holds the test rods and maintain the rods in the same position throughout the test. In addition, the test spacer cannot be of wood, metal or any conductive material. Preferably the material used to create a test spacer is plastic. If conductive material is used, the current will be drawn to the material which will compromise the test and produce invalid data.

We do not recommend, but the client can use the caps of the plastic mould and drill holes to fix the rods in the position for the test.

b) LOG INTERVALS

Users should be cautious with the log interval selected. The memory capacity of the SmartBox is 1024 data points and the standard log is:

- First 24 hours: Every 5 minutes
- Next 72 hours: Every 1 hour
- After 96 hours: Every 6 hours

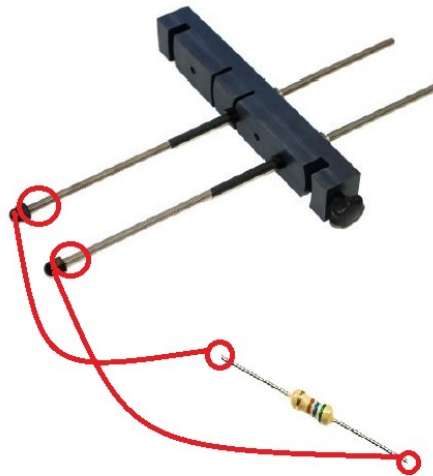
If the user selects a shorter log interval (i.e. 1 minute), the device will not have memory for 1 day of data collection. We strongly recommend using the standard log interval to ensure the proper acquisition of the required data.

c) SHAPE FACTOR

The user should consider the shape factor when using the device to perform measurements. Furthermore, the rods need to be as parallel as possible to one another. If they are not, the distance between the electrodes will vary, which will ultimately lead to unreliable results.

d) VERIFICATION

SmartBox does not have a verification kit, however, if the user wants to check the unit, there is an option to verify. With a resistor of a know electrical resistance, install each one of the ends of the wires on the metal rods of the SmartBox. Please refer to the schematics below:



Schematic view of the installation of the resistor on the metal rods of the SmartBox

Knowing the resistor resistance, smart the measurements of the SmartBox and they should match the never-changing electrical resistance of the resistor.

e) TEST RODS

The SmartBox device comes with 10 pairs of test rods. After those are used, the user can either purchase more rods directly from Giatec or manufacture on his end.

To do so, the user needs to follow the specification below:

f) **CYLINDERS IMMERSSED IN WATER**

If the cylinders in testing are immersed in water, the current can be drawn onto the water and the results will be lower than expected. This happens because water is very conductive, directly affecting the measurements.

g) **CASTING THE CYLINDER / CONCRETE SAMPLE**

When installing the SmartBox in a concrete cylinder, be careful to tap the sides of the cylinder to ensure all voids are filled. If the metal rods are not fully in contact with the concrete, the results might not be precise. The caution is even more necessary when testing low slump mixes.

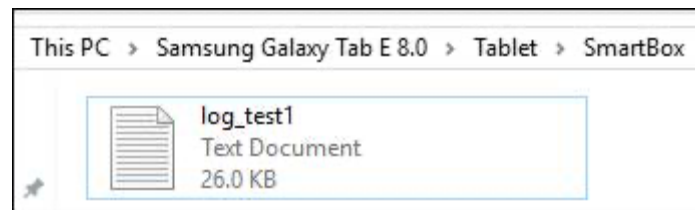
h) **EXPORT REPORT - CSV/XLS FORMAT**

The SmartBox app does not provide an option to export the report in a csv or xls format. The work-around is to export the file in a .txt file and than copy the information to a Excel spreadsheet. This way the client will be able to manage the data.

i) SAVING AND MANAGING DIFFERENT PROJECTS

When saving a new project, the app does not show a list of saved projects. To mitigate this issue we recommend building a list of the created projects associated with the device. Furthermore, there is another available option to access the projects that have already been created:

- Plug the tablet to a computer and enable USB connection
- In the computer options, access: >Samsung tablet >SmartBox. The files of all created projects will be archived in that folder.



Folder location – PC visualization

SURF™

a) CONDUCTIVE PADS

The device comes with extra conductive pads for the electrodes. If they fall, the spare ones can be re-attached. In the case of continuous use of the device, the user might end out of pads, in this case, it is possible to re-attach the pads using conductive electrical glue. One example of the type of glue can be found below:

https://www.amazon.com/Silver-Conductive-Electrically-Adhesive-Repair/dp/B07PMJZY2P/ref=sr_1_1?keywords=Conductive+Wire+Glue&qid=1569002077&s=gateway&sr=8-1 [amazon.com]

b) HANDLE INSTALLATION

In some cases, if the user is using the device very frequently, the action of opening and closing the unit might be hard. If the end-user prefers, he glues a handle onto the enclosure, being careful not to damage any of the cables or connections. One example of this end-user enhancement is presented below:



APPENDIX A

The metal faceplate/wire mesh should always be in contact with the red and black connectors. If they are not in contact, a corrosion process can start which will ultimately affect the readings.



Example of corrosion on the metal faceplate due to lack of contact with the connector