Dealer Support Documentation

SmartRock 2 Sensors

The goal of this document is to provide additional guidelines to Giatec's dealers to impower them to act as the first layer of support in a situation where customers are facing some issues with the SmartRock 2 sensors, the phone application, and the Giatec 360 platform. In this case, the dealer can refer to this document 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 Tier 1 support, the Giatec Support Team will handle cases that escalate to 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 technical support at Giatec's main office. It involves accessing some of the users or project information through the backend of 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 the products' hardware or software.

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List of Potential Issues

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1. Sensor Bluetooth Connection

1.1 Cannot tag a new SmartRock 2 sensor

Description:
Customer gets sensor out of the box and cannot tag the sensor in the application.

Possible causes:

- Activation wires are not touching
- Using "Scan" instead of "Find" option in the application
- Bluetooth/location services are not turned on
- Don't know how to use the application
- Sensor already tagged in the same section/ project
- Dead battery
- Application issue
- Other

Additional comments:
This is extremely rare, but some clients still have SmartRock 1 sensors which are not compatible with the current SmartRock application. If this is the case, please contact Giatec support.

Troubleshooting		
#	**Questions/ Steps**	**Comments**
1	The Bluetooth on the smartphone device must be turned on.	The sensor communicates with the phone using Bluetooth, the Bluetooth on the phone must be activated to communicate with the sensor.
2	User should be using latest version of the smartphone application.	App version is located on the bottom of the main application menu in the "About" section (Appendix D.4). To update the application, use the Google Play store or iTunes App store.
3	Go to the application settings on their phone and ensure all permissions are turned on (camera, contacts, location, storage, telephone).	Android and iOS don't work the same, in order to make sure all functionalities of the application are on, make sure all the permissions are activated.
4	If it is the first time using the sensor, make sure they understand the steps of tagging a sensor.	A user cannot tag a sensor using the "Find Sensor Near Me" page. They must first select "Project", "Section" and "+ New Sensor". They must also twist the two metal wires in order to activate the sensor. Provide training video and installation guideline to the client (Appendix A.1).

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5	Use the option “Find” in the application to tag the sensor.	The option “Scan” is only applicable to SmartRock 3 sensors.
6	Ensure the two metal wires are twisted, if necessary, untwist and twist again.	Sometimes the electrical or physical connection between the wires is not good, make sure the wires are well twisted together, a least a couple of twists. Use the provided blue wire connectors to ensure proper electrical connection between the wires.
7	The sensor can only be tagged once in the same project.	Ensure that the user has not previously tagged this sensor in the same project. If this is the case, delete the previously tagged sensor.
8	Is the sensor visible in “Find Sensor Near Me” in the side menu?	If the sensor is visible in “Find Sensor Near Me”, refer to previous steps. If the sensor is not visible in “Find Sensor Near Me” move to the next step.
9	Close all applications and reopen SmartRock application.	Sometimes there are too many applications open on the phone, clearing the cache helps with connection.
10	Try another phone.	Try using another phone to tag the sensor, if possible, use a phone with a different model. (e.g. Android vs iOS)
If none of the above steps worked, please proceed below to escalate the issue to Tier 2 (Giatec Support Team)		
11	Send “Support Request” for project.	“Support Request” is available in the 3-dot option beside the project name (Appendix D.2).
12	Contact: support@giatec.ca.	Make sure to include all the information given by the client in the previous steps. Support will be receiving the “Contact Us” and “Support Request” information directly through email.

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1.2 Can receive Bluetooth signal from the sensor but unable to download data

Description:
The sensor signal strength is visible on the sensor but cannot connect to the sensor or download the data.

Possible causes:

- Very weak Bluetooth signal
- App issue
- The sensor was never tagged in a project and the customer wants to access the data through "Find Sensor Near Me"
- Phone issue (iOS or Android)
- The sensor is stuck in initializing or scanning mode in the sensor page

Troubleshooting		
#	**Questions/ Steps**	**Comments**
1	The sensor must have been previously tagged.	A sensor cannot be connected through "Find Sensor Near Me" if it was not previously tagged.
2	Get as close as possible to the sensor location and try to connect. Remove any debris that might be in the way on the concrete surface.	If the signal strength is low, the user might have some difficulty connecting (unstable connection).
3	User should be using latest version of the smartphone application.	App version is located on the bottom of the main application menu in the "About" section (Appendix D.4). To update the application, use the Google Play store or iTunes App store.
5	Try connecting to the sensor using "Find Sensor Near Me" in the side menu.	Use side menu-> "Find Sensor Near Me" to connect to the sensor that was previously tagged.
6	Try another phone.	Try using another phone to tag the sensor, if possible, use a phone with a different model (e.g. Android vs iOS).
7	Is this happening on multiple sensors?	Is this a consistent issue within the "Project"/ "Section" or is only one sensor causing the issue?
8	Understand the tagging process and conditions of tagging.	Where and how was the sensor installed? Follow guidelines in Appendix A.1 and Appendix C.1-5.
If none of the above steps worked, please proceed below to escalate the issue to Tier 2 (Giatec Support Team)		

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9	Send “Support Request” for sensor.	The “Support Request” is available in the 3-dot option beside the sensor name (Appendix D.1).
10	Contact: support@giatec.ca	Make sure to include all the information given by the client in the previous steps. Support will be receiving the “Contact Us” and “Support Request” information directly through email.

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1.3 Cannot connect to sensor after pour

Description:
The sensor is embedded in the concrete and it is not visible on the application for connection after the pour.

Possible causes:

- The sensor was installed s too deep (>5 cm/2 in)
- The user is too far away from the installation location
- Concrete is still at fresh stage and therefore the connection can be more difficult.
- Sensors were not secured to the rebar (rotated during the pour)
- The two metal wires got disconnected during the pour
- Metal formwork is on top of the sensor
- Wet curing (ponding), curing blankets/burlap or other elements are blocking the signal
- Bluetooth is not turned on in the phone's settings
- Using an older version of the app
- Not connecting to the right sensor (duplicate)
- Unaware of sensor location
- Steel fibers in concrete mix
- High strength concrete mix
- High density of the rebar mesh

Additional comments:
Securing the sensor on the second layer of rebar is a very common practice among the customers to reduce the risk of damage or rotation of the sensor if stepped on; but make sure that the barcode is facing away from the adjacent rebar. If the sensor is facing and touching the top layer rebar, there is a chance that the majority of the Bluetooth signal is absorbed into the rebar (Appendix A.1 and Appendix C).
Using wire connectors (blue connectors) ensures electrical connection between the two metal wires at all time. The connectors should be used if they are available, alternatively taping over the twisted wires can prevent potential disconnection of the metal wires (Appendix C.3).

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Troubleshooting		
#	**Questions/ Steps**	**Comments**
1	The Bluetooth on the smartphone device must be turned on.	The sensor communicates with the phone using Bluetooth, the Bluetooth on the phone must be activated to communicate with the sensor.
2	Try connecting to the sensor using “Find Sensor Near Me” in the side menu.	Use side menu-> “Find Sensor Near Me” to connect to the sensor.
3	Make sure there is no water, metal layer, or steel fibers covering the sensor.	Any metal layer (e.g. metal formwork), or very thick formwork layer or water layer significantly blocks the Bluetooth signal. If possible, they must be removed before trying to connect.
4	Describe or obtain pictures of installation (depth of installation, tape or no tape, wire twisted process, blue connectors).	Make sure the sensor was not installed more than 5 cm (2 in) deep in the concrete. Make sure zip ties or tape was used to further secure the sensor to the rebar. Understand if the metal wires were connected properly, what tools they used (blue connectors, hand tight).Provide installation guideline and training video (Appendix A and Appendix C).
5	Come back the next day and try again.	When the concrete is fresh it might be harder to connect to the sensor because of the presence of a large amount of water in the mix. Trying the next day, as concrete cures, the connection to the sensor gets easier.
6	Try another phone.	Try using another phone to connect to the sensor, if possible, use a phone with a different model (e.g. Android vs iOS).
If none of the above steps worked, please proceed below to escalate the issue to Tier 2 (Giatec Support Team)		
7	Send “Support Request” for the sensor.	Send “Support Request” using the 3 dots beside the sensor name (Appendix D.3).
8	Contact: support@giatec.ca	Make sure to include all the information given by the client in the previous steps. Support will be receiving the “Contact Us” and “Support Request” information directly through email.

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1.4 Cannot connect to sensor after two months

Case description:
Cannot connect to the sensor two months after the sensor was activated.

Possible causes:

- Battery is dead
- The sensor is covered with more than 5 cm (2 in) of concrete (e.g.: column intersection)
- Cannot physically identify the installation location, or you are too far away from the installation location

Additional comments:
The sensor has a battery life of up to 4 months and is designed to have a battery life of at least two months. However, the temperature conditions, the number of connections and manufacturing date (e.g.. shelf life) of the sensor might affect its capability to have over 2-months of battery life.

Troubleshooting		
#	**Questions/ Steps**	**Comments**
1	Activation date of the sensor.	If it is older than 2 months, the sensor battery might be dead. The sensor will be dead after 4 months from activation.
2	The Bluetooth on the smartphone device must be turned on.	The sensor communicates with the phone using Bluetooth. The Bluetooth on the phone must be activated to communicate with the sensor.
3	Try “Find Sensor Near Me” in the side menu.	Use side menu-> “Find Sensor Near Me” to connect to the sensor.
4	Make sure the surface is clear of debris or other concrete elements.	After two months there might have been additional columns, walls, and non-structural elements covering the sensors (e.g. large metal garbage, pieces of equipment). Any large mass (especially metal) can significantly affect the Bluetooth signal of the sensor.
5	Try another phone.	Try using another phone to connect to the sensor, if possible, use a phone with a different model (e.g. Android vs iOS).
If none of the above steps worked, please proceed below to escalate the issue to Tier 2 (Giatec Support Team)		
6	Send “Support Request”.	Send “Support Request” using the 3 dots beside the sensor name.
7	Contact: support@giatec.ca	Make sure to include all the information given by the client in the previous steps. Support will be receiving the “Contact Us” and “Support Request” information directly through email.

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1.5 Sensor stopped working after a couple of days (less than 2 months)

Description:
The sensor was recording data and the client could connect to the sensor for a certain period of time in the concrete and suddenly they cannot connect to the sensor anymore.

Possible causes:
- Obstacles on top of the concrete
- Oxide film layer on metal wires which caused disconnection
- Dead battery

Troubleshooting		
#	**Questions/ Steps**	**Comments**
1	Are there any obstacles installed on top of the sensor location?	Any metal layer (e.g. metal formwork), or very thick formwork layer or water ponds can block the Bluetooth signal and must be removed before trying to connect.
2	Try “Find Sensor Near Me” in the side menu.	Use side menu-> “Find Sensor Near Me” to connect to the sensor.
3	For what period of time after the pour could the client connect to the sensor?	Identify if the client was not able to connect to the sensor right after the pour or a couple of days/ weeks after. When was the last connection with the sensor?
4	Step of installation (include pictures if possible).	If there are only a couple of data points in the concrete and the installation is not done according to the guidelines, provide additional training (Appendix A.1). If the installation is perfect and the sensor stopped “working” after a couple of days move to the next step.
5	How were the metal leads connected? Blue connectors, tape or manual twist?	Emphasize on the fact that a proper physical and electrical connection must be provided between the metal leads. Provide the client with blue connectors or ask to tape the leads after twisting them (Appendix C.3).
6	Wait a day and try to connect again.	
7	Try another phone.	Try using another phone to connect to the sensor, if possible, use a phone with a different model (e.g. Android vs iOS).
If none of the above steps worked, please proceed below to escalate the issue to Tier 2 (Giatec Support Team)		
8	Send “Support Request” for sensor.	Send “Support Request” using the 3 dots beside the sensor name (Appendix D.3).
9	Contact: support@giatec.ca.	Make sure to include all the information given by the client in the previous steps. Support will be receiving the “Contact Us” and “Support Request” information directly through email.

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2. Phone Application and Giatec 360

2.1 Unable to share project from a phone

Description:
The project was created on a phone, but the user cannot share the project with colleagues; the application prevents them from doing so.

Possible causes:

- too many applications open on the phone
- too much browser history/cached data on the phone
- no email set up on phone
- no Internet connection on the phone
- software issue
- phone or phone provider issue

Additional comments:
In order to share a project, the project must first be on the cloud. Before sharing, the application does a verification to make sure the project is properly uploaded to the cloud. If it is not, the application will prevent sharing.
If the user is using a Giatec 360 account, the sharing functionality is different as a user must be invited to the platform and sharing is done automatically.

Troubleshooting		
#	**Questions/ Steps**	Comments
1	Internet/ Wi-Fi connection.	Sharing is done through Wi-Fi or LTE connection. The phone must have Internet access in order to load the project on the cloud and send email.
2	Pull down for refresh.	Trigger the project to push to the cloud by pulling the project page down on the application (pull down for refresh).
3	Make sure they have an email address assigned to the platform they are sharing from or try another sharing method.	It is possible to share the project in many ways, email is usually the method of choice, make sure there is an email address assign to the phone or try another sharing option (e.g. text message).
4	Clear the cache/ close all other applications.	Sometimes there are too many applications open on the phone, clearing the cache helps with synching activities on the application.
If none of the above steps worked, please proceed below to escalate the issue to Tier 2 (Giatec Support Team)		

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5	Send “Support Request” for project.	Send “Support Request” using the 3 dots beside the sensor name (Appendix D.2).
6	Contact: support@giatec.ca.	Make sure to include all the information given by the client in the previous steps. Support will be receiving the “Contact Us” and “Support Request” information directly through email.

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2.2 Unable to open a shared project on a phone

Description:
Colleague cannot open the link provided in the email; the project doesn't download on their phone.

Possible causes:

- too many applications open on the phone
- too much browser history/cached data on the phone
- no Internet connection on the phone
- the project was previously deleted from the phone
- software issue
- phone or provider issue

Additional comments:
A project cannot be open on a computer, it must be open on a smartphone or a tablet device. If the user is logged into Giatec 360, it won't be possible for them to open the shared project

Troubleshooting		
#	**Questions/ Steps**	**Comments**
1	Internet/ Wi-Fi connection.	Sharing is done through Wi-Fi or LTE connection. The phone must be connected to the Internet to upload the project.
2	Pull down for refresh.	Trigger the project to push to the cloud by pulling the project page down on the application (pull down for refresh).
3	Copy and paste the link in an Internet browser.	Copy and paste the link received in the shared project email in an Internet browser. This should automatically open the application and the shared project.
4	Clear the cache/ close all other applications.	Sometimes there are too many applications open on the phone, clearing the cache helps with synching activities on the application.
5	Can they access the Giatec website on their phone? https://cloud.giatecscientific.com.	This indicates if the phone can connect to our server. If the link doesn't work, the problem is most likely related to the phone or provider.
If none of the above steps worked, please proceed below to escalate the issue to Tier 2 (Giatec Support Team)		
6	Send "Contact us" request.	Send "Support Request" using "Contact Us" in the side menu and provide a description of the issue (Appendix D.1).
7	Contact: support@giatec.ca.	Make sure to include all the information given by the client in the previous steps. Include the link of the project that the user is trying to import. Support will be receiving the "Contact Us" and "Support Request" information directly through email.

2.3 An error message appearing in the application

Description:
A pop up shows up on the top of the phone screen with an error message

Possible causes:

- synching issue
- no Internet connection
- other software issues

Additional comments:
This will most likely not cause any issues to the end user and is simply information for the application team.

Troubleshooting		
#	**Questions/ Steps**	**Comments**
1	User should be using latest version of the smartphone application.	App version is located on the bottom of the main application menu in the "About" section. To update the application, use the Google Play store or iTunes App store (Appendix D.4).
2	Is the error message preventing them from any further action, describe?	If the error is not preventing them from performing any steps in the application, this is not an issue and most like indicates poor Internet connectivity. If the error is preventing the user from any functionality, go to next step.
3	Take note of the error message (#, screenshot) and when the errors occur.	Each error message is associated with a number and a description; take a note of that information. Also, provide information if this is a recurring error message and on what page or specific activity it is appearing.
If none of the above steps worked, please proceed below to escalate the issue to Tier 2 (Giatec Support Team)		
4	Send "Support Request".	Send "Support Request" using "Contact Us" in the side menu and provide a description of the error message (Appendix D.1).
5	Contact: support@giatec.ca.	Make sure to include all the information given by the client in the previous steps. Include the link of the project that the user is trying to import. Support will be receiving the "Contact Us" and "Support Request" information directly through email.

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2.4 Application crashing

Description:
The application shuts down randomly

Possible causes:
- old version of the application
- too many applications open on the user's phone
- user is using an unsupported smartphone/ tablet
- older version of smartphone/ tablet
- application bug

Additional comments:
If the user is not on Giatec 360, do not delete the application unless technical support gives you permission.

Troubleshooting		
#	**Questions/ Steps**	**Comments**
1	User should be using latest version of the smartphone application.	App version is located on the bottom of the main application menu in the "About" section. To update the application, use the Google Play store or iTunes App store.
2	Clear the cache/ close all other applications.	Sometimes there are too many applications open on the phone, clearing the cache helps with synching and activities on the application.
3	Turn the phone on and off.	
4	On what page or during what action/event is the application crashing?	Describe as much as possible.
If none of the above steps worked, please proceed below to escalate the issue to Tier 2 (Giatec Support Team)		
5	Send "Contact Us".	Send "Support Request" using "Contact Us" in the side menu and provide a description of the error message. If the app keeps crashing this might not be possible (Appendix D.1).
6	Contact: support@giatec.ca.	Make sure to include all the information given by the client in the previous steps. Support will be receiving the "Contact Us" and "Support Request" information directly through email. If it was not possible to complete Step 5, send as much information as possible including name of project in the phone, type and version of the phone.

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2.5 Colleague cannot see updated information on their phone

Description:
Information on the phone has been updated but colleagues with shared project cannot see them (e.g. data collection, new sensor added…)

Possible causes:

- Poor or no Internet connection from the collector
- Poor or no Internet connection from "receiver" phone
- Not working on the same project, two projects were created with the same name
- Phone needs to be updated
- Service provider issue
- Bug in the app

Additional comments:
All the data must be sent to the cloud so everyone sharing the project has access.
The first step is to identify where the link is broken (is the sender/editor not sending or the receiver not receiving?). This can happen when two users are not on the same project even if they have the same name, this can be verified by Giatec support.

Troubleshooting		
#	**Questions/ Steps**	**Comments**
1	Make sure everyone is connected to the Internet, Wi-Fi.	No Internet connection will prevent data from being uploaded to the cloud. The person updating the data and the person receiving the data must have an Internet connection.
2	Swipe down in the app to refresh (both receiver and sender).	This will trigger the action of synching and the data should be updated to the cloud or from the cloud.
3	What information is not getting updated?	Get more information on what field or data is not getting updated.
4	How many people are having the issue?	Is only one person having this issue or multiple people?
5	Can they access the Giatec website on their phone? https://cloud.giatecscientific.com	This indicates if the phone can connect to our server.
If none of the above steps worked, please proceed below to escalate the issue to Tier 2 (Giatec Support Team)		
6	Send "Support Request".	Send "Support Request" using the 3 dots beside the project name.
7	Contact: support@giatec.ca.	Make sure to include all the information given by the client in the previous steps. Support will be receiving the "Contact Us" and "Support Request" information directly through email.

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2.6 Project/section/sensor is deleted from the phone

Description:
A “Project”/ “Section” or sensor was deleted or disappeared from the application and the client wants it back.

Possible causes:
- user accidentally deleted the "Project" / "Section"/ sensor
- user deleted and re-downloaded the app
- Giatec 360 login issue

Additional comments:
The user cannot re-download a project that was previously deleted on their phone, unless they delete the app and reinstall it. The project is shown to be deleted on a certain unique phone ID. By deleting the app and re-downloading it, a new UUID is given to the phone. In Giatec 360, the information can only be deleted by an editor or user with higher permission. If this is done by mistake, Giatec’s support can reactivate it.

Troubleshooting		
#	**Questions/ Steps**	**Comments**
1	If the user is on Giatec 360 make sure they are logged into the application.	In the side menu, the user should see their account name.
2	If the user is not on Giatec 360, did they previously delete the project on their phone?	If the project was deleted by the user by mistake, they will need to re-download the application and ask someone to share the project again with them. If the user has too many projects on their phone proceed to Step 4.
If none of the above steps worked, please proceed below to escalate the issue to Tier 2 (Giatec Support Team)		
3	Send “Support Request”.	Send “Support Request” using the 3 dots beside the project name if the project is not the deleted item. Otherwise use “Contact Us in the side menu” (Appendix D).
4	Contact: support@giatec.ca.	Make sure to include all the information given by the client in the previous steps. Support will be receiving the “Contact Us” and “Support Request” information directly through email.

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2.7 Giatec 360 functionality issues

Description:
For more information refer to the support documentation for 360.

Possible causes:

- Software issue

Additional comments:
Also report feature requests.

Troubleshooting		
#	**Questions/ Steps**	**Comments**
1	Get a full description of the issue (what, where, when).	Is this a functionality question, an issue, an error or a request? Provide training if applicable, otherwise follow next step.
2	Screenshots of the issue if necessary.	
3	Name of the account.	
4	Contact: support@giatec.ca.	Make sure to include all the information given by the client in the previous steps.

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3. Calculation / Maturity Calibration

3.1 No strength or maturity information on sensor page

Description:
When connecting to the sensor the maturity and strength display “empty” or zero

Possible causes:

- haven’t connected to the sensor after the pour
- mix calibration and pouring time has not been selected for the sensor
- incorrect pouring time has been selected (too far in the future or before start time of the sensor)
- the maturity is too low to display any concrete strength based on the calibration
- wrong calibration information provided

Troubleshooting		
#	**Questions/ Steps**	**Comments**
1	Make sure there is a pouring time and mix associated with the sensor.	In order to calculate the maturity and strength, a pouring time and a mix must be assigned to the sensor. That information can be assigned to the sensor on the main sensor page. The user can also rely on Roxi to provide information on the pouring time.
2	Make sure there is a right pouring time associated with the sensor.	Make sure the pouring time assigned doesn’t indicate a date in the future or at the end of the data points. The date is indicated on the sensor main page, the pouring time can also be viewed in the graph section where the shaded area is the time before pouring. All the information before pouring time is ignored in the calculations.
3	Get "Project" / "Section" sensor data.	Visualize the data. Make sure there is more than a couple of data points after pouring in the temperature profile. The concrete will not start gaining strength until it sets.
If none of the above steps worked, please proceed below to escalate the issue to Tier 2 (Giatec Support Team)		
4	Get mix information.	Ask for the name of the mix or share it with support.
5	Send “Support Request” for sensor.	Send “Support Request” using the 3 dots beside the sensor name (Appendix D.3).
6	Contact: support@giatec.ca.	Make sure to include all the information given by the client in the previous steps. Support will be receiving the “Contact Us” and “Support Request” information directly through email.

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3.2 Maturity calibration questions

Description:
The client is having issues with completing or inputting the maturity calibration information.

Possible causes:
- Lack of training
- Lack of/wrong information

Additional comments:
If the dealer feels comfortable with the maturity method and the implementation process, they can go ahead and help the client. Otherwise, the Giatec Support Team can provide help and guidance.

Troubleshooting		
#	**Questions/ Steps**	**Comments**
1	Provide information on maturity calibration.	Use videos provided and documentation (Appendix A.1-2).
2	Provide training.	Giatec can join an online meeting if required.
3	Special case.	The client is using a special type of concrete and needs additional guidelines.
If none of the above steps worked, please proceed below to escalate the issue to Tier 2 (Giatec Support Team)		
4	Get mix information.	Ask for the name of the mix or share it with support.
5	Contact: support@giatec.ca.	Make sure to include all the information given by the client in the previous steps. Support will be receiving the “Contact Us” and “Support Request” information directly through email.

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4. Temperature Profile

4.1 Extreme positive and/or negative temperature measurements

Description:
The sensor reads a consistent temperature that is extremely high in the range of 385°C (725 °F) or extremely low -40°C (-40 °F), review Appendix B1-2.

Possible causes:
- Typical behavior of a damaged cable (fully cut)
- Potential hardware damage

Additional comments:
- Cable cut during or after placement (on purpose or by mistake).
- Typical behavior of spliced sensors
- Metal rebar ties twisted too tightly around the temperature cable during installation
- Excessive tension in the temperature cable during installation
- Cable placement during installation (unsupported)
- Mishandling of the sensor before the installation

Troubleshooting		
#	**Questions/ Steps**	**Comments**
1	Was the black box installed inside or outside the concrete?	If the black box is installed outside the concrete, it is highly prone to physical damages during the concrete placement and finishing or any other activity around the element. The cable could have easily been cut. When it is possible, we always recommend placing the black box inside the concrete. Are there any signs of damage from the outside?
2	Request pictures of installation (if available) or a description of installation.	Analyze if the temperature cable was placed as described in the installation guideline (Appendix C.5). The cable cannot be tied with metal ties as this can cut the wires (use tape or zip-ties). Also, make sure the cable was not unsupported for a long span of time as this could have caused high stresses in the cable during placement or if someone steps on it. When the sensor was initially installed, make sure that there was not excessive tension in the temperature cable, especially around the exposed blue and red wires. Send installation videos and guidelines (Appendix A.1).
3	Obtain the temperature profile and identify where, in time, does the issue occur?	If the cable shows to be broken before or around the pouring time, this is a sign of a physically damaged cable. This could have occurred during the placement, as the environment is harsh. If

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	(Get "Project" / "Section" and sensor name).	the temperature starts showing extreme values at a later time when the concrete is fully hardened, go to the next step.
4	Any special activity on-site at the time of the temperature change?	Understand if there was any drilling or cutting activity around the sensor location at this specific time period.
If none of the above steps worked, please proceed below to escalate the issue to Tier 2 (Giatec Support Team)		
5	Send “Support Request” for sensor.	Send “Support Request” using the 3 dots beside the sensor name (Appendix D.3).
6	Contact: support@giatec.ca.	Make sure to include all the information given by the client in the previous steps. Support will be receiving the “Contact Us” and “Support Request” information directly through email.

4.2 Low temperature readings

Description:
The sensor shows low temperatures that would be abnormal for the time of year and location. The low temperature behavior occurs in the first couple of hours after the concrete pour (Appendix B.3).

Possible causes:
- Partially damaged cable
- Cable partially damaged during or after placement.
- Metal rebar ties twisted too tightly around the temperature cable during installation
- Excessive tension in the temperature cable during installation
- Cable placement during installation (unsupported)
- Mishandling of the sensor before the installation
- Although rare, one point at lower temperature could be caused by condensation

Additional comments:
If it is a partially cut cable, negative behavior would show only after the cable is in contact with the concrete. If the cable is partially cut and left in the air (ambient), the user won't see any difference in the temperature measurement.

Troubleshooting		
#	**Questions/ Steps**	**Comments**
1	Was the black box installed inside or outside the concrete?	If the black box is installed outside the concrete, it is highly prone to physical damage during the concrete placement and finishing or any other activity around the element. The cable could have easily been cut or damaged. When it is possible, we always recommend placing the black box inside the concrete.
2	Request pictures of installation (if available) or a description of installation.	Analyze if the temperature cable was placed as described in the installation guideline (Appendix C.5). The cable cannot be tied with metal ties as this can cut the wires (use tape or zip-ties). Also, make sure the cable was not unsupported for a long span of time as this could have caused high stresses in the cable during placement or if someone steps on it. Send installation videos and guidelines (Appendix A.1).
3	Obtain the temperature profile and identify where, in time, does the issue occur?	If the cable shows to be broken before or around the pouring time, this is a sign of a physically damaged cable. This most likely occurred during the placement as the environment is harsh.
If none of the above steps worked, please proceed below to escalate the issue to Tier 2 (Giatec Support Team)		
4	Send "Support Request" for sensor.	Send "Support Request" using the 3 dots beside the sensor name (Appendix D.3).

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5	Contact: support@giatec.ca.	Make sure to include all the information given by the client in the previous steps. Support will be receiving the “Contact Us” and “Support Request” information directly through email.

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4.3 Only first temperature measurement is abnormal

Description:
The sensor only shows the first temperature measurement to be off, usually 385 °C (725°F), all subsequent points appear to be within range (Appendix B.4).

Possible causes:
- Wrong data when the sensor was first activated. This will occur only on the first point.

Additional comments:
If only the first point shows an abnormal temperature, usually 385 °C (725°F), this is not a cable or sensor issue. The sensor is fully functional and can be used. Ignore the first measurement point for future analysis and move forward using the sensor.

Troubleshooting		
#	**Questions/ Steps**	**Comments**
1	Obtain the temperature profile. (Get "Project" / "Section" and sensor name)	If the sensor only shows the first point to be 385 °C (725°F) and all the subsequent points appear to be within normal ambient and concrete temperature range, ignore the first point and set the pouring time after that value.
2	If the subsequent point shows abnormal temperature behavior.	Follow steps in Section 4.1 and 4.2

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4.4 Temperature data appears to be missing

Description:
Unusual gap between two consecutive temperature measurements, abnormal fluctuation in temperature or missing data points.

Possible causes:

- Twist and untwist the leads
- Synching issue

Troubleshooting		
#	**Questions/ Steps**	**Comments**
1	Installation procedure.	Was the sensor properly secured following the steps in Appendix C.3? If the metal wires get disconnected the sensor stops recording data until the wires get reconnected. Obtain pictures if possible.
2	Was the sensor installed inside or outside the concrete?	If the sensor is installed outside, the sensor can get physically disconnected by workers or someone can tamper with it.
3	Describe the issue (when?).	Provide as much information on the issue and why they believe there is missing data.
4	Any abnormal site activities?	Any activities, such as post-tensioning, large vibrations, extreme weather conditions during that period?
If none of the above steps worked, please proceed below to escalate the issue to Tier 2 (Giatec Support Team)		
5	Send “Support Request” for sensor.	Send “Support Request” using the 3 dots beside the sensor name (Appendix D.3).
6	Contact: support@giatec.ca.	Make sure to include all the information given by the client in the previous steps. Support will be receiving the “Contact Us” and “Support Request” information directly through email.

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5. Others

5.1 Change in pouring time

Description:
When opening the sensor page, the user is prompted to change the pouring time. The pouring time was changed to the wrong time and date.

Possible causes:
- Someone within the shared project edited the sensor pouring time
- The sensor was untwisted and twisted again
- Roxi is proposing the wrong pouring time
- Sensor issue

Additional comments:
The sensor doesn't have an internal clock and only has information on the number of data points. The dates are back calculated based on the current time on the phone and the number of points in set intervals. If the wires are twisted and untwisted this will cause a shift in dates. The pouring time cannot be a date before activation time of the sensor. Roxi, Giatec's artificial intelligence tool, is designed to identify the pouring time, however, it is possible it makes a mistake.

Troubleshooting		
#	**Questions/ Steps**	**Comments**
1	Did someone change the pouring time by mistake?	If the user doesn't have a Giatec 360 account, editorial changes can be made by anyone.
2	Accept the new pouring time suggested.	When accepting the new pouring time suggested, this will show in the temperature profile, does the shaded area fit the time before the pour?
3	Was the sensor installed inside or outside the concrete?	If the sensor is installed outside, the sensor can get physically disconnected by workers or someone can tamper with it.
4	Installation procedure.	Was the sensor properly secured following the steps in Appendix C.3? If the metal wires get disconnected the sensor stops recording data until the wires get reconnected. Obtain pictures if possible.
If none of the above steps worked, please proceed below to escalate the issue to Tier 2 (Giatec Support Team)		

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5	Send “Support Request” for sensor.	Send “Support Request” using the 3 dots beside the sensor name (Appendix D.3).
6	Contact: support@giatec.ca.	Make sure to include all the information given by the client in the previous steps. Support will be receiving the “Contact Us” and “Support Request” information directly through email.

5.2 Other application/ phone issues

Description:
Any other application or phone issue not described in this document.

Possible causes:

- Software issue
- Hardware issue
- Phone issue

Additional comments:
Provide feature request to the Giatec Support Team.

Troubleshooting		
#	**Questions/ Steps**	**Comments**
1	User should be using latest version of the smartphone application.	App version is located on the bottom of the main application menu in the “About” section (Appendix D.4). To update the application, use the Google Play store or iTunes App store.
2	Get a full description of the issue (what, where, when).	The more information the better.
3	Provide screenshots and/or videos.	
If none of the above steps worked, please proceed below to escalate the issue to Tier 2 (Giatec Support Team)		
4	Send “Support Request” for "Project" / "Section" or “Contact Us”.	Send “Support Request” using the 3 dots anywhere in the application or “Contact Us” in the side menu (Appendix D).
5	Contact: support@giatec.ca.	Make sure to include all the information given by the client in the previous steps. Support will be receiving the “Contact Us” and “Support Request” information directly through email.

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5.3 Other sensor hardware issues

Description:
Any other sensor issue not described in this document.

Possible causes:
- Hardware issue
- Software issue

Additional comments:
Provide feature request to the Giatec Support Team.

Troubleshooting		
#	**Questions/ Steps**	**Comments**
1	User should be using latest version of the smartphone application.	App version is located on the bottom of the main application menu in the “About” section (Appendix D.4). To update the application, use the Google Play store or iTunes App store.
2	Get a full description of the issue (what, where, when).	The more information the better.
3	Provide screenshots and/or videos.	
If none of the above steps worked, please proceed below to escalate the issue to Tier 2 (Giatec Support Team)		
4	Send “Support Request” for "Project" / "Section" or “Contact Us”.	Send “Support Request” using the 3 dots anywhere in the application or “Contact Us” in the side menu (Appendix D).
5	Contact: support@giatec.ca.	Make sure to include all the information given by the client in the previous steps. Support will be receiving the “Contact Us” and “Support Request” information directly through email.

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Appendix A

A.1 Training videos

1. SmartRock 2/SmartRock Plus - Hardware (2 min)

https://www.youtube.com/watch?v=50IagMW4V_Y&feature=youtu.be

2. SmartRock 2/SmartRock Plus - Installation (4 min)

https://youtu.be/G_9FChOGyII

3. SmartRock 2/SmartRock Plus - Phone Application (5 min)

https://youtu.be/i9Z8bXTVQqc

A.2 Maturity videos

1.Maturity concept, calibration, and application (22 min)

https://www.youtube.com/watch?v=UaUJk65UV8E

2.Maturity calibration (10 min)

https://www.youtube.com/watch?v=XTtNN8Ikfe4

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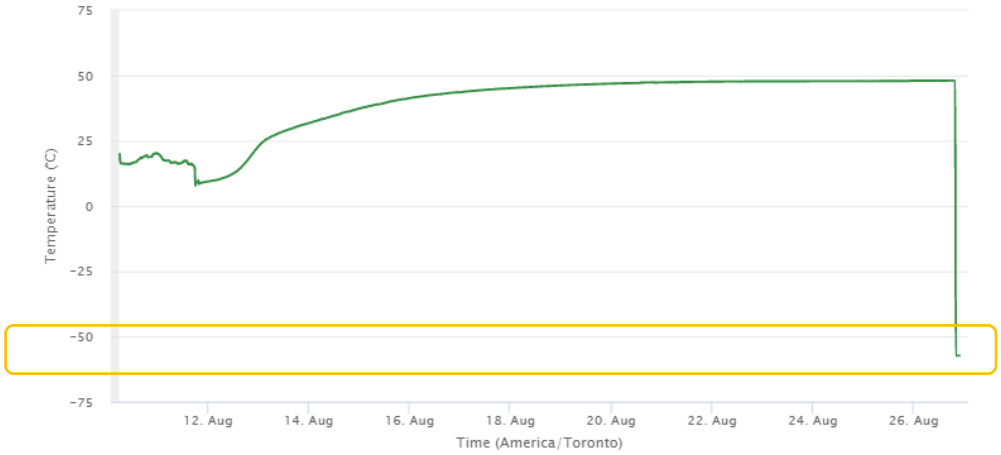
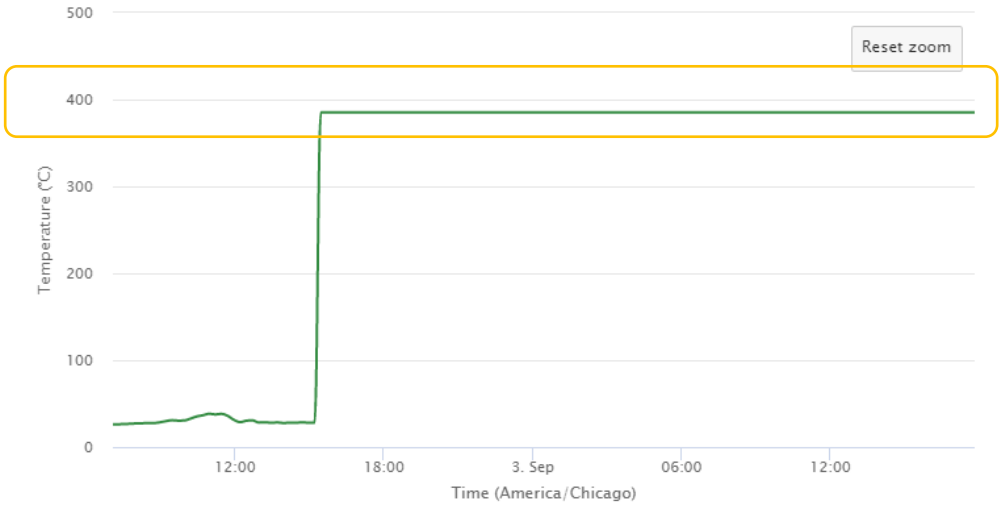
Appendix B

B.1 Extreme low temperature profile



The sensor reads a consistent temperature that is extremely low in the -40°C (-40 °F) range. This indicates a fully cut cable.

B.2 Extreme high temperature profile



The sensor reads a consistent temperature that is extremely high in the range of 385°C (725 °F). This indicates a fully cut cable.

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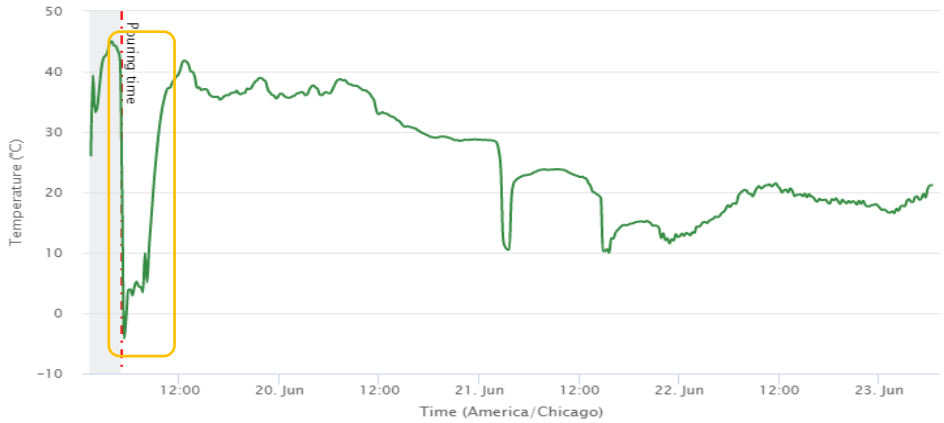
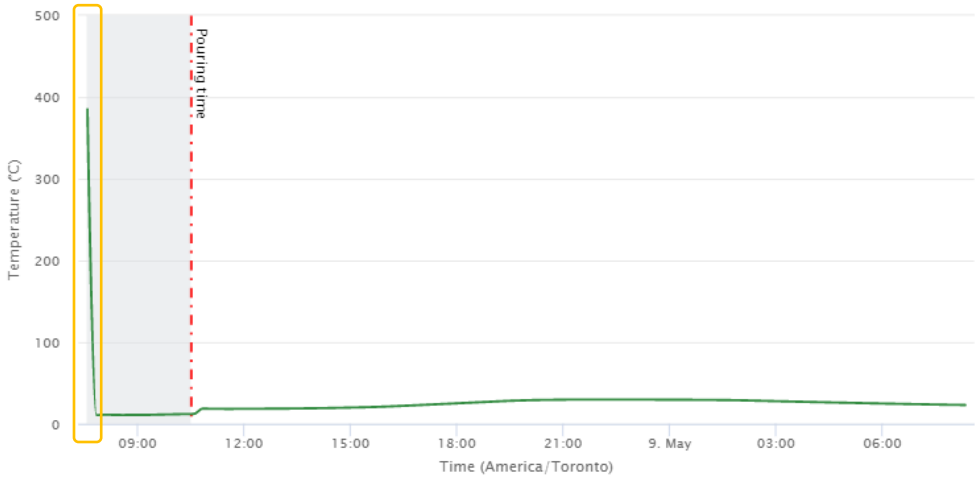
B.3 Low temperature profile



The sensor shows low temperatures that would be abnormal for the time of year and location. The low temperature behavior occurs in the first couple of hours after the concrete pour.

B.4 Temperature profiles- abnormal first temperature point



The sensor only shows the first temperature measurement to be off (usually 385 °C (725°F),), all subsequent points appear to be within range.

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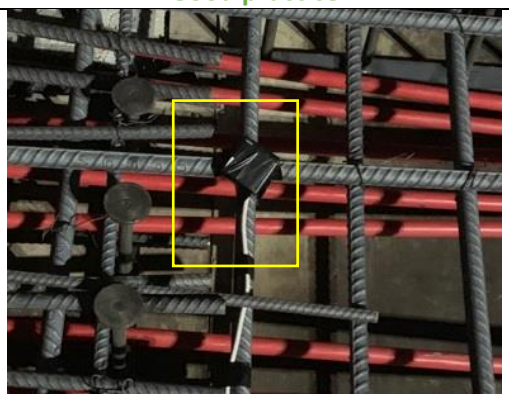
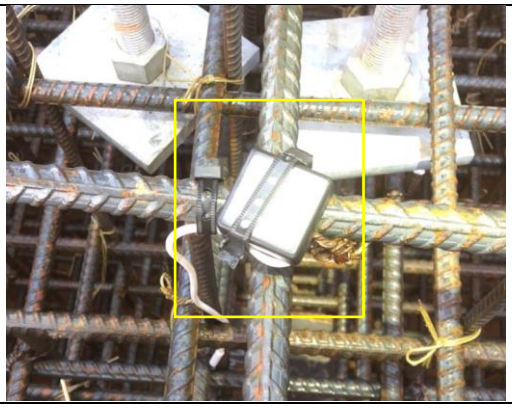
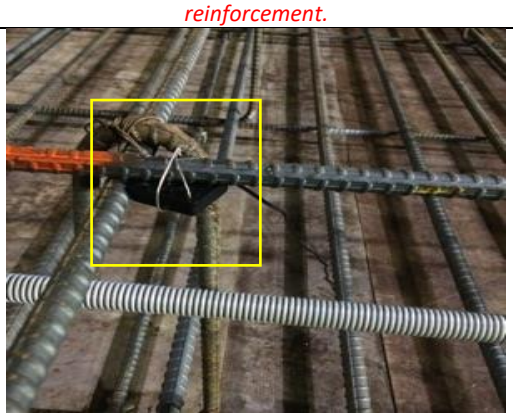
Appendix C

C.1 Black Box orientation Procedures

The black box must have the white label facing up and must be installed at a maximum of 5cm (2in) below the concrete surface to obtain Bluetooth signal outside the concrete. The Bluetooth signal comes out of the white label; if the sensor is placed with the label facing the opposite way this considerably reduces the Bluetooth signal range and will most likely prevent connection to the sensor.

Good practice	Bad practice
	
Black box secured at an intersection with tape to prevent rotation, label is facing towards the concrete surface.	*Sensor rotated almost 180°, label is not facing toward the concrete surface. Sensor is not properly secured to the reinforcement.*
	
Black box secured at an intersection with a zip tie to prevent rotation, label is facing towards the concrete surface.	*Sensor is installed upside down, where the label is not facing the surface of the concrete.*

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Sensor properly secured to reinforcement using zip ties. The sensor is also clearly indicated which will prevent workers from stepping on it prior to the pour. Sensor installed with the label facing the concrete surface.	*Sensor rotated by 90° in a position where the label is not facing the surface of the concrete. The sensor is not properly securred to the reinforcement.*

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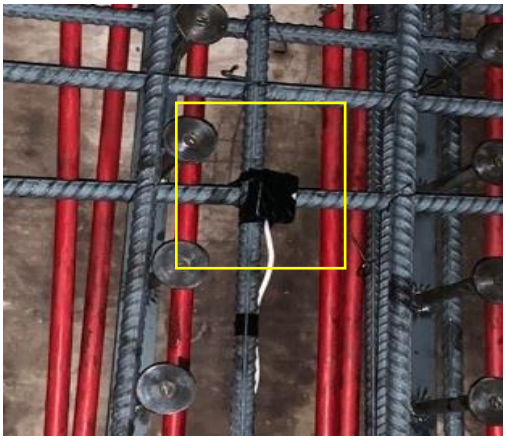
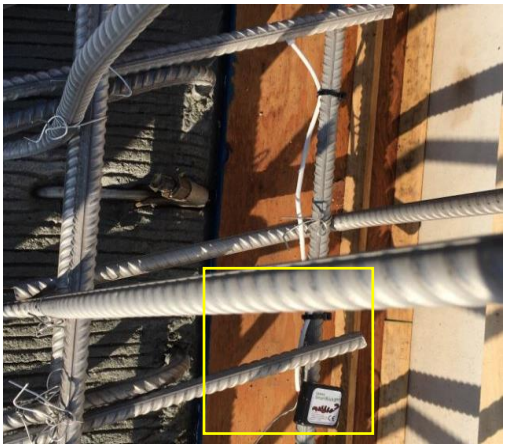
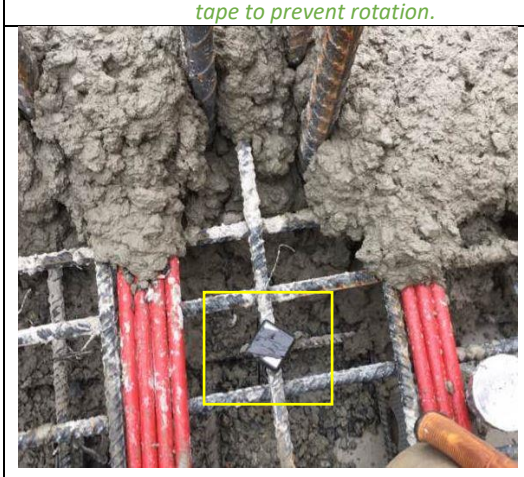
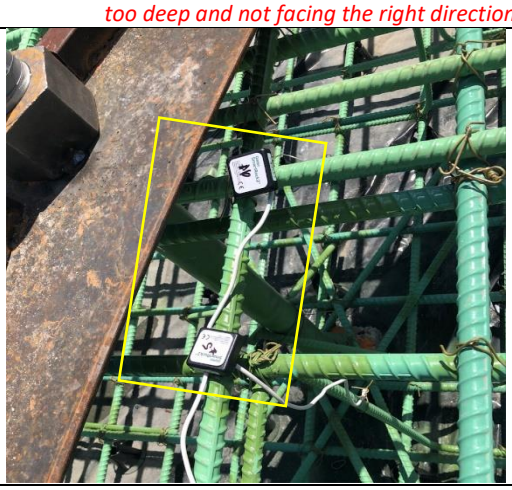
C.2 Black box securing procedure

If only the twisting action on the two metal wires is provided, it is possible for the sensor to rotate during concrete placement. For this reason, the sensor must be well secured. Using additional tape or zip ties will further secure the sensor and prevent rotation.
Installing the SmartRock 2 sensor at a rebar intersection facilitates the installation and can further prevent rotation.

Good practice	Bad practice
	
Sensor installed on intersection and secured with electrical tape to prevent rotation.	*No additional security measure were provided, sensor installed too deep and not facing the right direction.*
	
Sensor secured with electrical tape to secure intersection.	*No additional security measures provided to the sensor which makes it prone to rotation during the pour.*

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	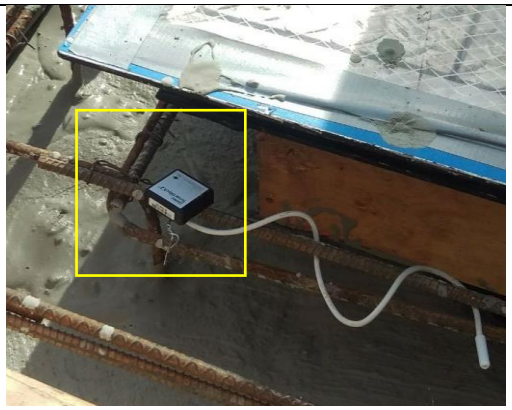
Zip ties used to secure the sensor at the rebar intersection.	*No additional security measures provided to the sensor which makes it prone to rotation during the pour, especially when the sensor is not installed at an intersection.*

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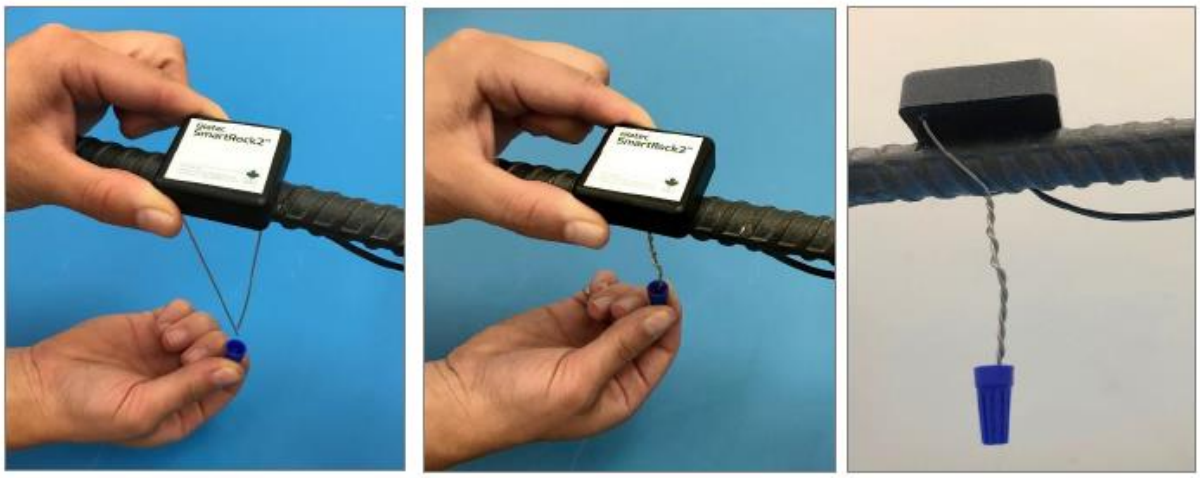
C.3 Twisting metal wire procedure

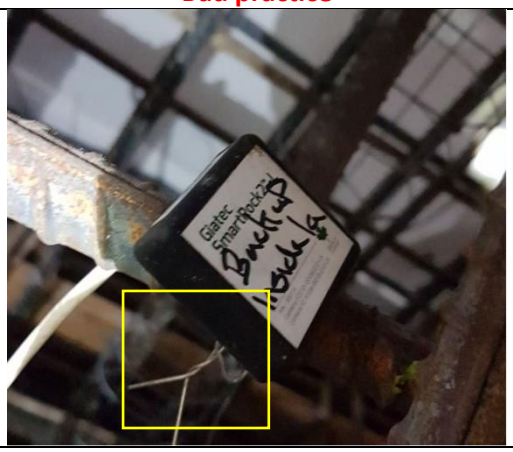
Twisting the two metal wires together activate the sensor. If the metal wires get disconnected, the sensor will stop working. The two metal wires must be twisted together the whole length of the wire. Additional blue connectors are highly recommended, the blue connectors will ensure an electrical connection between the wires at all times. Taping the metal wires is another solution if blue connectors are not available.

Good practice



The wires are twisted along their full length. A blue connector is provided to ensure electrical connection is constant for the entire life of the sensor.

Bad practice



Only a few twists along the length of the wire were done. The twisting is loose and upon movement can be prone to cause disconnection of the wires, deactivating the sensor. No additional blue connectors or tape is provided.

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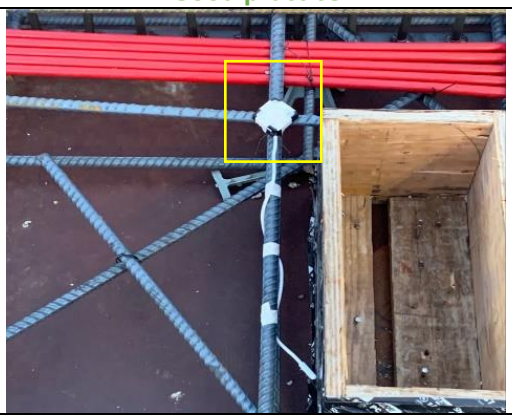
C.4 Installation depth

The sensor must be installed within the first 5cm (2 in) from the concrete surface to ensure a good Bluetooth signal range. The closer to the surface, the stronger the Bluetooth signal will be. The black box of the sensor can be left outside the concrete in certain cases, but this will result in a higher chance of damage during finishing procedures or during the completion of the project. If the sensor is installed deeper than 5cm (2 in) it is not guaranteed that the user will be able to connect to the sensor.

Good practice	**Bad practice**
	
Sensor installed on a top layer intersection, within 5 cm (2in) from the concrete surface.	*The sensors are installed deep in the concrete form, additionally, the sensors are located at a column slab intersection, which means more concrete will be placed on top of the sensor, resulting in a depth much greater than 2 in (5 cm).*
	
Sensor installed on first layer of the reinforcement within 2 in (5 cm) from the surface.	*Sensor installed deep in the formwork, well beyond the concrete surface from every angles.*

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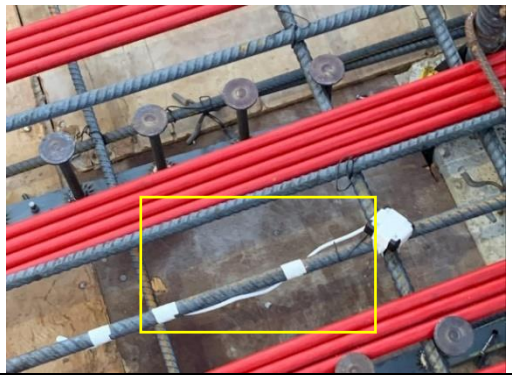
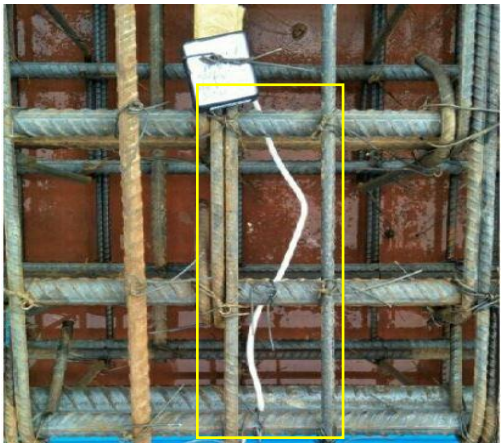
C.5 Temperature cable Installation Procedures

<table>
<tr><td colspan="2">Temperature cable must be secured to the rebar. Loose or unsupported cables are prone to damage during the concrete placement (pumping, vibration, and traffic). Metal ties shouldn’t be used for securing the cables, metal ties tend to be overtight and damage the temperature cable.</td></tr>
<tr><th>Good practice</th><th>Bad practice</th></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Cable well secured below the rebar (for protection) and attached with tape to prevent movement.</td><td>Cable not secured and prone to movement and damage during the concrete pour.</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Cable well secured below the second layer of rebar (for protection) and attached with tape to prevent movement.</td><td>Cable is unsupported on its length and secured with metal tie wires.</td></tr>
</table>

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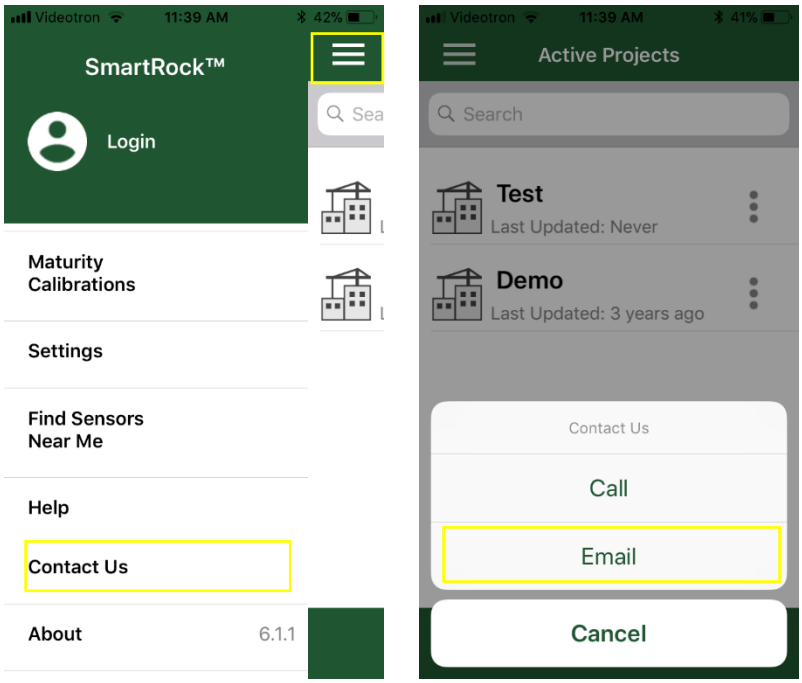
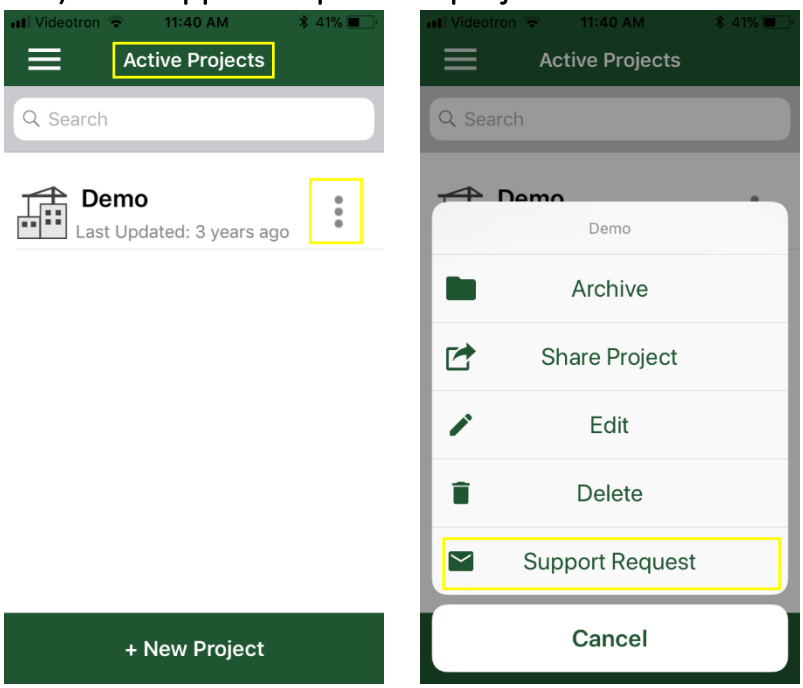
Appendix D

a) D.1 Contact us from phone application



b) D.2 Support request for project



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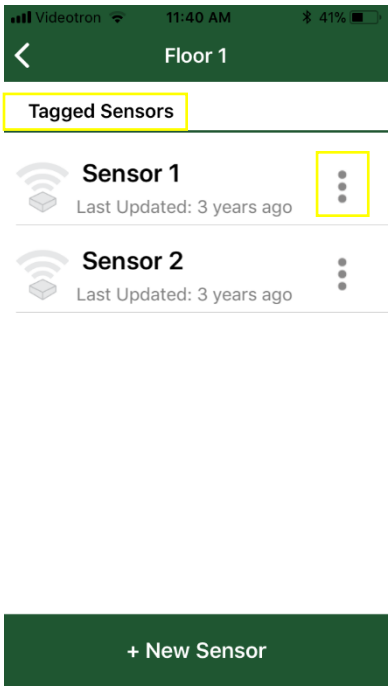
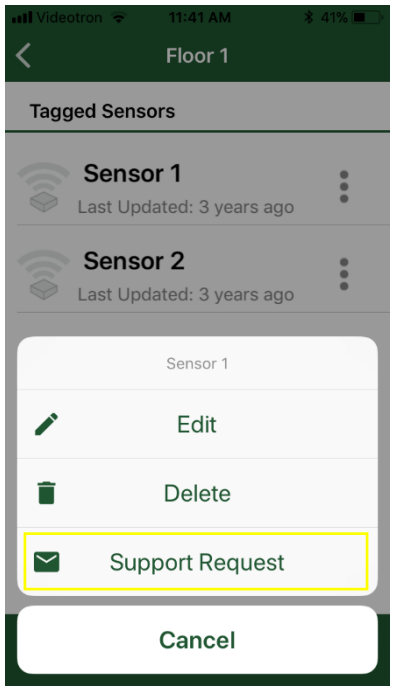
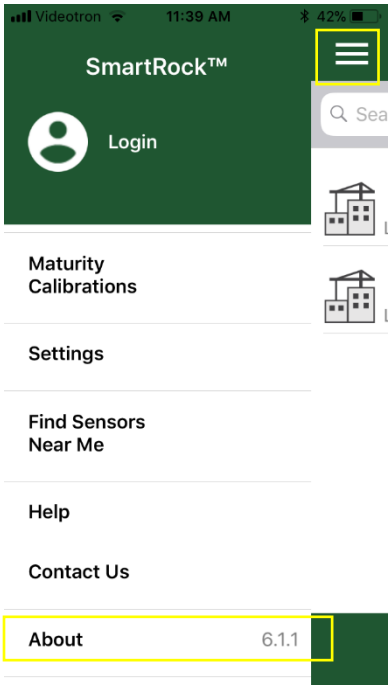
D.3 Support request for sensor





D.4 Application version (About)



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