

Installation and Operating Guide: Sol Chip Comm™ Wireless Solar Tag System Kit

Document version: 0.5

Document History

Date	Version	Version Description
February 26, 2017	0.1	Initial version
March 1, 2017	0.2	
March 8, 2017	0.21	Add box picture, removed comments
May 5, 2017	0.3	Updated with new IoT Portal
May 14, 2017	0.4	Added User Profile Settings
May 28 th , 2017	0.5	Portal Screenshot update

What You Can Do with this System Kit

Thank you for purchasing Sol Chip's remote sensor monitoring system kit, a full IOT ("Internet Of Things") system that you can quickly install by yourself in a simple way. After the quick installation of this pre-integrated kit, everything works automatically and you have a full-fledged wireless sensor monitoring system that periodically monitors the following parameters: soil moisture, air temperature, and air humidity, and sends these parameters to the internet Cloud. This real-time actionable sensors' data is an enabler of IOT applications such as Precision Agriculture, Smart Irrigation and Smart City applications. The system is capable of working for years with no need for any service or maintenance.



The installation is as simple as performing four straight forward steps:

1. Connect the sensors to the Wireless Solar Tags
2. Place the sensors in the desired locations
3. Install the wireless gateway and plug it to the AC power
4. Activate your account at the Sol Chip website

Once powered, the wireless gateway will connect to the cellular network and start pulling soil moisture air temperature and air humidity data from the sensors every 30 minutes and upload the retrieved data to Sol Chip's website.


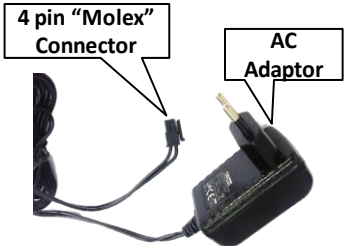
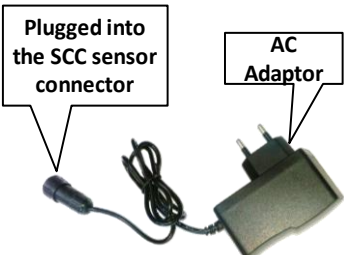


Once your Sol Chip website account is activated, you can access your sensors' data, and get customized graphs.

In the following paragraphs a step by step installation guide is provided.

Kit Content Detailed Description

Attention: Carefully unpack the Demo kit. When unpacking, care should be taken to prevent dropping

Item no.	Item name	Qty.	Description	Picture
1	Sol Chip Comm™ Wireless Solar Tag – SCC	2	The SCC is an all-weather, solar powered device that connects to the sensor, provides the sensor with power and wirelessly connects it to the wireless gateway. The sunlight energy is harvested during day light time and stored in an internal energy storage.	
2	Soil Moisture Sensor	1	The soil moisture is measured by injecting the 3 spokes into the ground. The sensor is controlled via the cable (which connects to one of the SCCs)	
3	Air Temperature and Humidity Sensor	1	The dual purpose sensor is controlled through the cable (which connects to the 2 nd SCC)	
4	433MHz Antenna	3	Magnet Base Antenna. Used for the 433MHz radio communication between the SCC's and the Wireless Gateways	
5	Sol Chip Comm™ Wireless Gateway	1	The Wireless Gateway collects the data from the sensors via the SCC and uploads to Sol Chip website via cellular communication. The device is AC powered and can be placed up to 1,500m (approx. 1 mile) from the SCC (in line of sight)	

Item no.	Item name	Qty.	Description	Picture
			conditions. Distance will be shorter in non-line of sight conditions)	
6	Cellular Antenna	1	Plugged into the gateway in order to access the cellular network	
7	Wireless Gateway Power Supply + Wall Adaptor	1	Powers the wireless gateway	
8	SCC Charger + Wall Adaptor	1	This accessory is provided to quickly charge the SCC if internal energy storage is depleted	
9	Magnet	1	This accessory can be used to manually activate sampling of data from the sensor and transmission to the gateway, as opposed to waiting up to 30 minutes for the next automatic transmission. This is done by A magnet touch the SCC (not used on a regular basis)	
10	User account Activation to the sensor visualization service	1	The system is already pre-integrated with Sol-Chip Portal. Locate the account activation email to start the registration process.	
11	Installation guide	1	This document	
12	Sol Chip SCC-S433 Wireless Solar Tag product brief	1		
13	Sol Chip Wireless Gateway user manual	1		

Item no.	Item name	Qty.	Description	Picture
14	Soil Moisture sensor data sheet	1		
15	Air Temperature and humidity sensor data sheet	1		

Kit Deployment Guidelines and Tips

Below is a general schematic showing multiple SCCs installed in a field, connected to a single Wireless Gateway which in turn sends the sensors' data to the Sol Chip website. The website is accessible to the user in real time via his/her mobile device, tablet or PC.



Please read this entire guide before installation of the system, then install according to the following the steps in this document.

While planning the deployment of the equipment, it is recommended to observe the following guidelines:

1. The sensors and the SCC are co-located, as they are connected to each other via the sensor cable
 2. The sensors and SCCs are all-weather (IP-67 compliant) hence can be placed outdoor, (e.g. in an agricultural field) and operate in temperatures from -20C to +80C, exposed to rain, etc.
 3. The SCC solar panels need few hours of sunlight each day. These few hours allow the tiny solar panels to harvest enough energy for continuous operation day and night, summer and winter, year after year. The more non-obscured sunlight the better of course. Light intensity within greenhouses is typically sufficient
 4. The higher the SCC 433MHz antenna will be placed the further the gateway can be located, up to 1,500m (approx. 1 mile) distance between the SCC and the wireless gateway in a non-obscured line of sight conditions.
 5. Make sure you have proper cellular coverage at the intended location for the wireless gateway
- The wireless gateway and its power adaptor need to be plugged into an AC outlet (100v-240v) and should be placed in a location that is protected from rain.

Detailed Installation Guideline

Prior to installation in the field, it is highly recommended to connect and activate the system in your office or lab. This will help you to get familiar with the system and make sure that everything is operational prior to placing it in the field.

In order to activate in your office / lab, perform the procedure below, skipping steps: 2a, 2b, 2c, 2e, and 3b. For your convenience, we marked these steps with “*”.

After verifying in the lab / office that the system is operational, you can go ahead and install the system in the desired site – where you should perform all the steps without skipping any.

1. Connect the sensors to the Wireless Solar Tags:

Attention: One should be very careful while handling the SCC Wireless Solar Tag output ports (black connector). The sensor connector pins are connected to the output of the internal energy storage and have a potential of ~3.3V. Shortening the ports may discharge the internal rechargeable battery very quickly, while damaging the internal circuitry

- a. Connect the soil moisture sensor cable to the SCC #1's sensor connector (black)
Similarly, connect the air temperature and humidity sensor cable to the second SCC #2

2. Place the sensors in the desired locations:

- a. * Stick the spokes of the soil humidity sensor into the soil its moisture you intend to monitor. In case you desire to measure the soil moisture close to the plant's roots it is possible to bury the entire sensor, as seen below:



Soil Moisture Sensor placed underground (to be covered with soil)

- b. * Place the air temperature and humidity sensor at the desired location (can be distant from the other SCC)

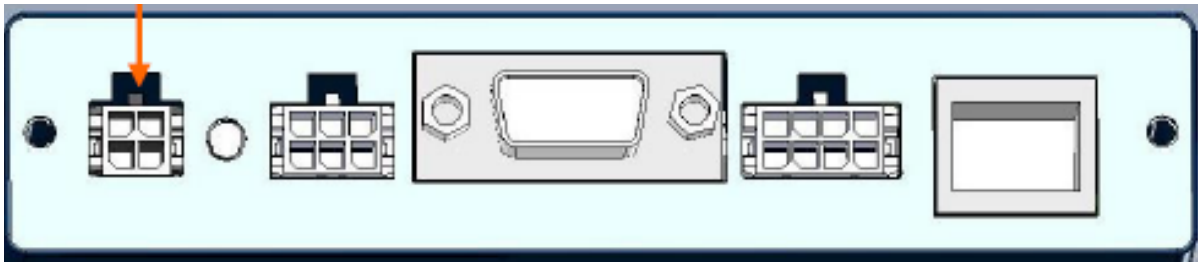
- c. * Place each of the SCCs in a place exposed to sun light, up to the maximum height from the sensor as per sensors' cables length. Best energy results are obtained when unit is pointed to area where maximal exposure to sunlight travel is obtained, (e.g. to the south at northern hemisphere countries). The devices should be placed vertically so that rain, snow or dirt will not build up on the solar panels. Use zip ties or iron wire to attach the SCCs to the desired place (e.g. plant, pole, etc.)
- d. Connect the cable of a 433MHz (magnetic base) antenna to each of SCCs' (golden) connectors
- e. * For best radio communication performance, it is recommended to place the 433MHz antennas highest as possible – to get minimal obstruction, by leaves, walls, etc. The antenna has a magnet base that will make installation on a metal surface very easy. While attaching the antenna base to a metallic surface is perfectly OK, please note that metal elements that are located *between* the SCC antenna and the gateway might seriously affect the radio communication or even totally block it. For best communication it is desired to have a direct line-of-sight path free of metal obstacle between antenna and gateway. Both the gateway's and SCC's antennas should be installed in same, vertical orientation.
- f. The SCC's energy storage are pre-charged hence start working automatically, and transmit their respective sensor's data every 30 minutes

3. Install the wireless gateway and plug it to the AC power:

Below is a drawing of the wireless gateway front panel. Note that in some models the “RF2” connector is not populated.



- a. Connect the cable of the 433MHz (magnet base) antenna to “RF” connector
- b. * For best radio communication performance, it is recommended to place the 433MHz antennas highest as possible – to get minimal obstruction, by leaves, walls, etc. The antenna has a magnet base that will make installation on a metal surface very easy. While attaching the antenna base to a metallic surface is perfectly OK, please note that metal elements that are located *between* the SCC antenna and the gateway might seriously affect the radio communication or even totally block it. For best communication it is desired to have a direct line-of-sight path free of metal obstacle between antenna and gateway. Both the gateway's and SCC's antennas should be installed in same, vertical orientation.
- c. Connect the cellular antenna to “Cellular” connector
- d. Connect the AC power adaptor to the 4-pin “Molex” connector on the left of the Wireless Gateway Panel, as shown below:



- e. Plug the gateway to AC power

Attention: While the Wireless Gateway is operational, one should note that in order to avoid permanent damage, neither cellular devices, nor SCC tags should be brought near the gateway's immediate surroundings (less than 20 centimeters)

Attention: The Wireless Gateway has limited lightning protection and it is the user's responsibility to install surge protection on the antenna and lightning protection near the gateway unit

- f. The gateway has an internal SIM card. Upon power-up the gateway will automatically connect to the 2 SCC units and to the cellular network. Upon successful connection, expect to see within 1 minute the following LED indications:

Cellular A (Red LED)	ON
Cellular B (Green LED)	Slow Blink (every ~2 seconds)

"Cellular A" Red LED:

ON: The Gateway is connected to the server

OFF: The Gateway is not connected to the server



"Cellular B" Green LED:

Blinks quickly (~2 times per second) or ON: search for cellular network
Blinks slowly (every 2 seconds): connected to a cellular network

"RF B" Green LED:

Blinks upon reception of data from SCC

4. Activate your account at the Sol Chip IoT Portal (powered by Telit deviceWISE)

<https://solchip.devicewise.net>



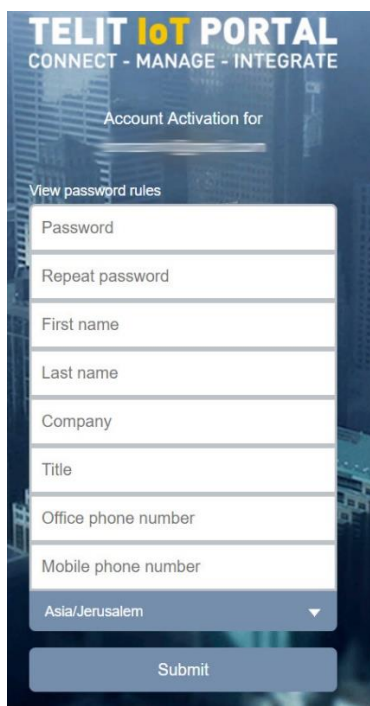
The image shows the login page of the Sol Chip IoT Portal. At the top is the SOLCHIP logo with the tagline 'Everlasting Solar Battery'. Below the logo is a login form with two input fields: 'Email address' and 'Password'. Below these fields is an orange 'Login' button.

- a. You should have received an email with an invitation to activate your account.
Look for the following email:

From: Telit IoT Portal <noreply@devicewise.com>

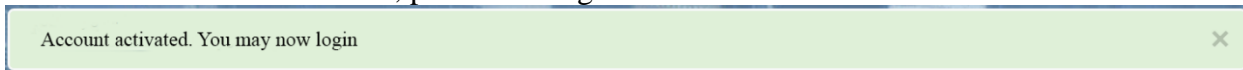
Subject line: Welcome to the Sol-Chip Portal (powered by deviceWISE)

* If you cannot locate the email, contact your distributor or support@sol-chip.com
- b. In the email, click on the activation link and proceed to create your account.
 - Make sure to enter all of your information, select your time-zone and click Submit



The image shows the account activation form on the Telit IoT Portal. The header reads 'TELIT IoT PORTAL' with the tagline 'CONNECT - MANAGE - INTEGRATE'. Below this is a section titled 'Account Activation for' followed by a blank line. There is a link 'View password rules'. The form contains several input fields: 'Password', 'Repeat password', 'First name', 'Last name', 'Company', 'Title', 'Office phone number', and 'Mobile phone number'. At the bottom is a dropdown menu for 'Asia/Jerusalem' and a 'Submit' button.


- c. Your account is now activated, proceed to login



- d. After login, please review and agree to the general terms and conditions, and privacy policy of the portal.




- e. After approving both pages, you will be taken to the Dashboard





For support
Please email support@sol-chip.com

Instructions:
Scroll down the page to see all your devices
Click on the 'eye' icon to see device current and historical data




Download our latest user guide (PDF)
- v0.4 5/15/2017

[Download](#)

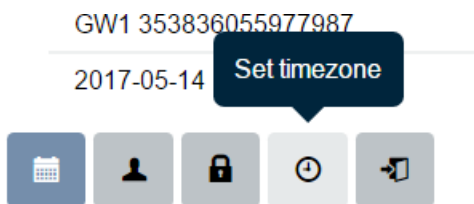
SCC1 Tags (Air Temp & Humidity Sensors)

Name ↓	Description	Temp	Humidity	RSSI	Voltage	Updated on
 00000 SCC1 771961377	Demo Unit	24.4	59	-4	3.33	2017-05-15 1 2:31:30

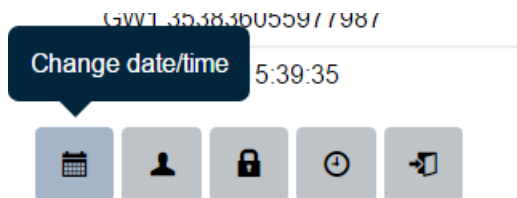
5. Using the Sol Chip IoT Portal (powered by Telit deviceWISE)

Please note, we are constantly updating and improving the Portal, please watch for release updates by email or in the Main Dashboard.

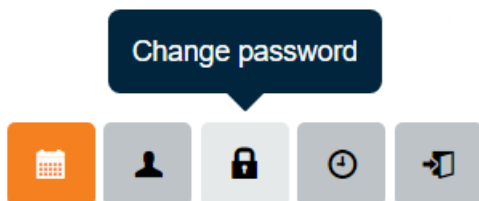
- a. To login, go to <https://solchip.devicewise.net> and enter your login information
 - If you forgot your password, use the “Recover account / Reset password” link to reset your password. If you are still having trouble, contact your distributor or support@sol-chip.com
- b. Use the tool bar at the bottom of the screen to change your preferences
 - To change time zone to view the data in the dashboard



- To select the time range of the graphs you can also use this tool:



- To update password



- To log out from your account



Operation

On-going operation:


The operation of the system is essentially seamless. Once everything is connected, each SCC automatically reads its sensor every 30 minutes and immediately upload their data to the Sol Chip IoT Portal. This data is stored and is accessible for viewing by the user.


We are constantly updating our services, always check the latest version of the user guide on our website at <https://solchip.devicewise.net>

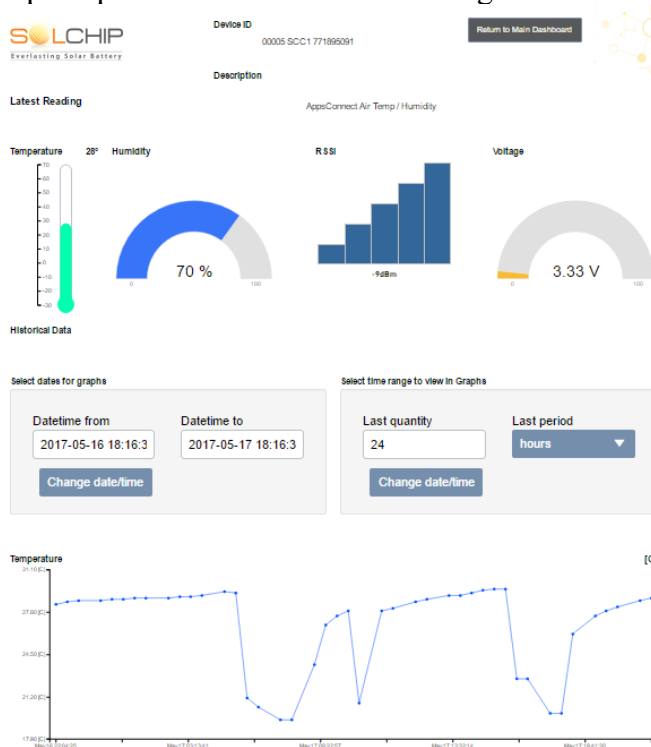
Navigating sensor data

After login, you will see the main dashboard with the latest information at a glance.

SCC1 Tags (Air Temp & Humidity Sensors)

Name ↓	Temp (c)	Humidity (%)	RSSI	Voltage	Last communication
 00021 SCC1 7719 62142	23.8	49	-13	3.33	1 hour, 39 minutes ago

1. To see in depth information for each of the SCCs, click on the view icon () at the left side
2. A new dashboard will open up with current sensors' reading and historical data

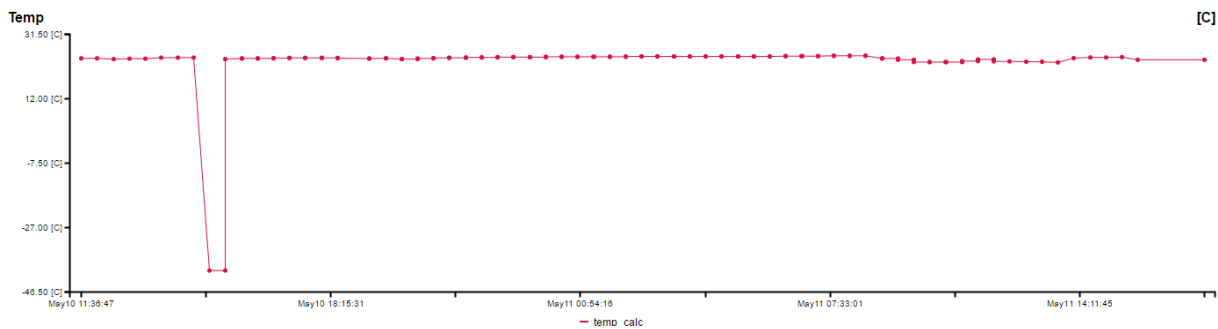


3. To return to the Main Dashboard, click on the Return to Dashboard button

Return to Main Dashboard

Sensor visualization service:

Below is an example of a Temperature sensor graph.



The user can set the time window to view historical data and horizontal zoom (shorter time → higher time resolution), by clicking on the date picker

Select time range for Graphs

Datetime from: Datetime to:

May - 2017

Sun	Mon	Tue	Wed	Thu	Fri	Sat
30	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	1	2	3

16:00
17:00
18:00
19:00
20:00
21:00

Select time range for Graphs (Relative)

Last quantity: Last period:

Soi
Inv: [%]

Troubleshooting

Please note that each SCC System Kit was fully tested as a system prior to shipment. If you have issues, please identify the indication you observe in the table below and follow the relevant troubleshooting procedure:

Procedure	Indication	Potential cause(s):	Steps
A	“Cellular A” red LED at the gateway is OFF	Gateway is not connected to the server	<ol style="list-style-type: none"> 1. Verify that the gateway is connected to the cellular network (see no. 2 below) 2. Assuming that the gateway is connected to the cellular network, restart the gateway by disconnecting the power source and connecting again, and wait for 1 minute 3. From your PC / mobile, browse to https://solchip.devicewise.net and verify that the gateway is connected in the Main dashboard page. 4. If none of the above solves the problem, contact Sol Chip support at support@sol-chip.com
B	“Cellular B” green LED at the gateway blinks quickly (~2 times per second), or constantly lit ON	The gateways is searching for network	<ol style="list-style-type: none"> 1. Verify with your mobile device that there is proper cellular coverage. If there are no networks available, change the gateway location to a place with proper coverage 2. Note that if you observe a cellular signal in your mobile device, it may be that the SIM in the gateway is configured to roam to a different network 3. If none of the above solves the problem, contact Sol Chip support
C	No sensor data is collected, while the gateway is connected to the server	Issue with the gateway; No communication between SCC and gateway; The sensors are not properly connected to the SCC tag; SCC internal energy storage is depleted; SCC is malfunctioning	<p>Perform the checks in the following order. After each step, check if the problem still exists:</p> <ol style="list-style-type: none"> 1. Verify that the gateways is operational, by following the procedures A and B above 2. Perform manual activation of the SCC tag by touching it with a magnet (see below). Watch the “RF B” green LED – it blinks once upon reception of data from the SCC. 3. If the LED blinks upon passing the magnet, the SCC, the gateway, and the RF communication between them are OK – now check that the sensor connector is properly screwed and that the sensors appear visually undamaged. <p>If the “RF B” green LED does not blink upon passing the magnet, continue as follows:</p> <ol style="list-style-type: none"> 4. Check 433MHz antennas on both the SCC and gateway. Make sure that the connectors are properly screwed and not damaged, and that the antennas are both vertical, try to activate the SCC by passing the magnet

			<ol style="list-style-type: none"> 5. Check if there are metallic or other obstructions between the SCC and the gateway; try to activate the SCC by passing the magnet 6. Bring the SCC closer to the gateway; try to activate the SCC by passing the magnet 7. The SCC internal energy storage might be depleted – check latest record of the SCC energy storage voltage level (in Sol Chip’s portal). If depleted, disconnect the sensor and connect the SCC charger instead; charge the SCC for 6 hours. Disconnect the SCC charger and connect the sensor again. try to activate the SCC by passing the magnet 8. If none of the above solves the problem, contact Sol Chip support
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Manually forcing a transmission of the SCC:

If you want to get immediate reaction from the sensor, use the magnet to activate the SCC as follows:

1. Bring the magnet close to the SCC at this point
2. “RF B” (Green) LED at the Wireless Gateway’s panel will blink once
3. You will see transmission at the web site within few seconds



Attention!

Please familiarize yourself with the important safety related notes below:

1. Carefully unpack the Demo kit. When unpacking, care should be taken to prevent dropping
2. One should be very careful while handling the SCC output ports. The sensor connector pins are connected to the output of the internal energy storage and have a potential of ~3.3V. Shortening the ports may discharge the internal rechargeable battery very quickly, while damaging the internal circuitry
3. While the Wireless Gateway is operational, one should note that in order to avoid permanent damage, neither cellular devices, nor SCC tags should be brought near the gateway’s immediate surroundings (less than 20 centimeters)
4. The Wireless Gateway has limited lighting protection and it is the user’s responsibility to install surge protection on the antenna and lighting protection near the gateway unit
5. The SCC-S433 contains a rechargeable battery. Whenever this unit is transported, the carrier’s shipping constraints should be followed
6. Do not open any of the kit components. Any damage created due to opening the components is not under Sol Chip’s responsibility

Support

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