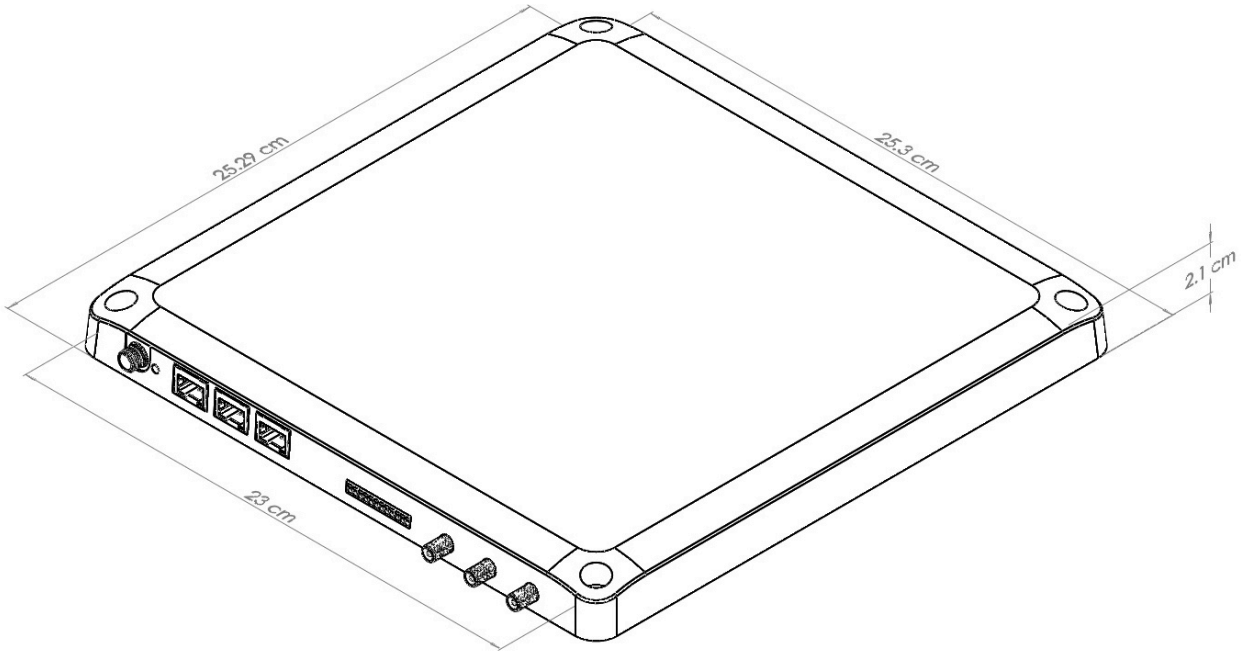
SensThys Install Troubleshooting Guide



Legal Notices

FCC Compliance

This equipment has been tested and found to comply with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Any change or modification to this product voids the user’s authority to operate per FCC Part 15 Subpart A. Section 15.21 regulations.

Industry Canada Compliance

This device complies with Industry Canada License-exempt RSS standards. Operation is subject to the following two conditions: (1) this device may not cause interference and (2) this device must accept any interference, including interference that may cause undesired operation of the device. This device has been designed to operate with a variety of different gain (dBi). The reader maximum output power is set by the gain of the antenna. Using an antenna having a higher gain is strictly prohibited per regulations of Industry Canada. In addition, using the reader at a power exceeding the maximum output power for a given antenna is also strictly prohibited. The required antenna impedance is 50 ohms. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that required for successful communication.

Conformité d'Industrie Canada

Cet appareil est conforme aux normes RSS exemptées de licence d'Industrie Canada. L'opération est soumise aux deux conditions suivantes: (1) cet appareil ne doit pas provoquer d'interférence et (2) cet appareil doit accepter toute interférence, y compris les interférences susceptibles de provoquer un fonctionnement indésirable de l'appareil. Cet appareil a été conçu pour fonctionner avec une variété de gains différents (dBi). La puissance de sortie maximale du lecteur est définie par le gain de l'antenne. L'utilisation d'une antenne ayant un gain plus élevé est strictement interdite par règlement d'Industrie Canada. En outre, l'utilisation du lecteur à une puissance supérieure à la puissance de sortie maximale pour une antenne donnée est également strictement interdite. L'impédance d'antenne requise est de 50 ohms. Afin de réduire les interférences radio potentielles avec d'autres utilisateurs, le type d'antenne et son gain devraient être choisis de manière à ce que la puissance éloignée isotropiquement (EIRP) équivalente soit supérieure à celle requise pour une communication réussie.

Caution

Reader antennas should be positioned so that personnel in the area for prolonged periods may safely remain at least 31 cm (12.2 in) in an uncontrolled environment from the antenna’s surface. See FCC OET Bulletin 56 “Hazards of radio frequency and electromagnetic fields” and Bulletin 65 “Human exposure to radio frequency electromagnetic fields.”

Vorsicht

Reader Antennen sollten so positioniert werden, dass das Personal im Bereich über einen längeren Zeitraum kann sicher bleiben mindestens 31 cm (12.2 Zoll) entfernt von der Antenne Oberfläche, in einer unkontrollierten Umgebung. Siehe FCC OET Bulletin 56 "Gefahren der Radiofrequenz und elektromagnetische Felder" und Bulletin 65 "Human Exposition gegenüber hochfrequenten elektromagnetischen Feldern."

Introduction

Congratulations on your selection of the SensArray platform! We have designed this equipment to be the foundation of next-generation IoT RFID systems. This is a highly integrated solution that fully supports your system integration and operation while reducing deployment cost. Let's get started!

This document is designed for use by RFID system integrators, IT professionals, and software developers experienced with IoT devices and enterprise networking infrastructure.

We've all had the experience of turning on something new, for the very first time, and having it fail. In large IoT installations, this can lead to enormous stress. Making this worse is the fact that there are lots of different players involved – the facilities manager, the IT group, the component suppliers, and the integration team that is responsible.

The intent of this document is to aid the process of getting an RFID system employing SensThys readers up and running in the real world.

The Goals

1. The reader operating as intended in the end-customer infrastructure.
2. A structure for figuring out issues in getting the reader operational.

Homework

For the reader, or any IoT device, to be considered to be functional in the field, several conditions have to be met.

1. Power. Does the device turn on?
2. Basic function. Does the device do what it is supposed to?
3. Data delivery. Does the device output its data like it is supposed to?
4. Data receipt. Does the data get to the right place?

The homework here is to have a portable system, comprised of a laptop, a power supply for the reader as illustrated in Figure 1. We'll call that the TEST KIT.

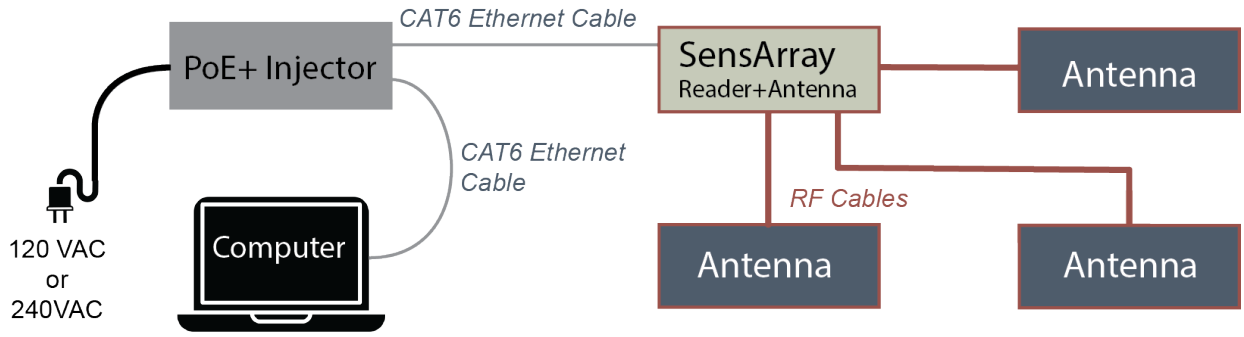


Figure 1 The basic TEST KIT, comprised of a laptop, reader, PoE injector, cabling and antennas.

With the TEST KIT…

Learn to operate the TEST KIT with the SensThys Console. This can be downloaded here: https://www.sensthys.com/downloads/. This tests basic operation and is a baseline tool that can be used during debug or bring-up. Several User Guide videos are posted on the SensThys website to assist in using the SensThys Console and related hardware and can be found here: https://www.sensthys.com/videos/user-guide/.

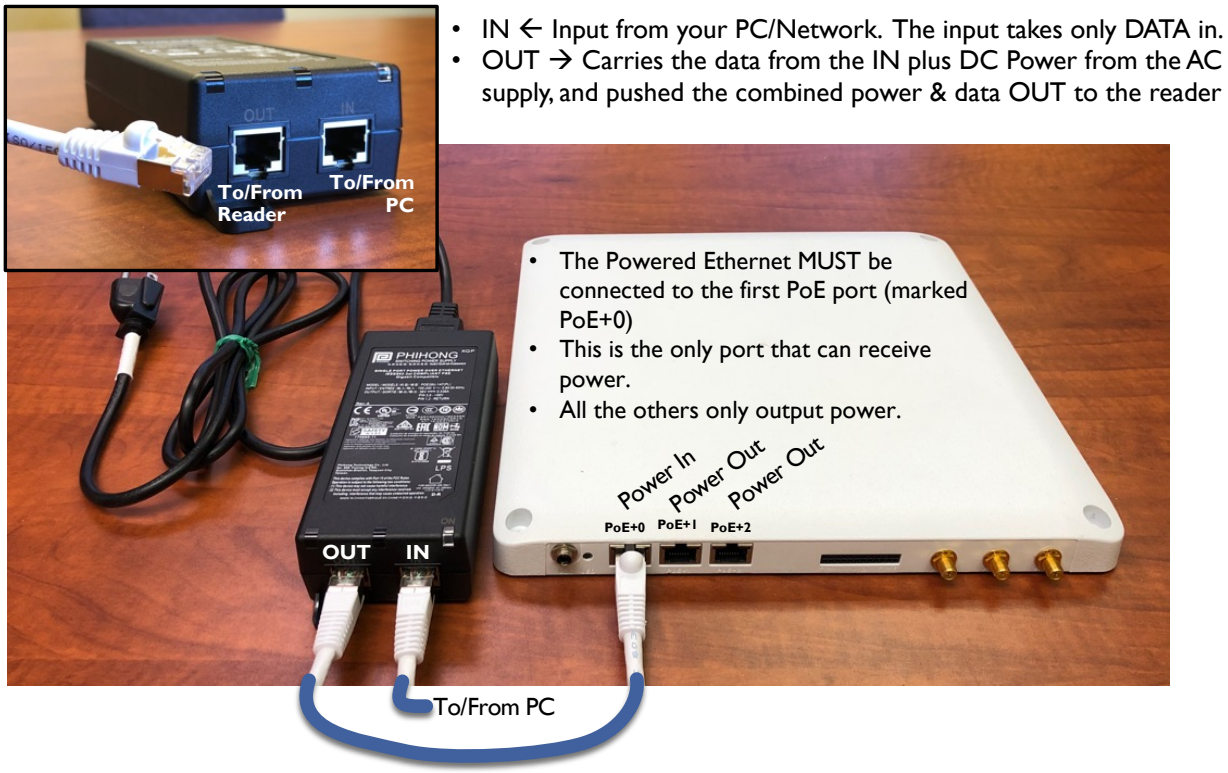


Figure 2 - Basic SensArray PoE power Delivery

Many of our customers use different systems to run the reader. These systems include building their own from scratch using our SDK/API, while others include MQTT, LLRP, RESTful API, AutoSens, etc. It is important to be able to test the operation of the reader, on premise, while running in the environment intended for deployment.

Thus, the laptop should be able to communicate/control the reader using software/firmware to be used in deployment. As an example, if the reader is to be controlled via LLRP, then the basic operation of the reader should be controllable by the laptop using an LLRP-based application, with the data sent to the laptop using LLRP formatted messages. Be capable of operating the TEST KIT in the software environment to be used in deployment.

Step by Step

What we propose next is very structured, to the point that most integrators will read this section and roll their eyes. While we recognize that this isn't how many, if any, readers will actually be installed, please trust us that you can use the thinking behind these steps to rapidly diagnose certain problems. Once you are on site….

1. Set up a full TEST KIT, regardless of your planned final hardware configuration. This includes using the SensThys provided Class 4 or Class 8 PoE injector. Demonstrate basic operation of the reader by reading some tags.
2. Run the TEST KIT with your software environment (LLRP, RESTful API, etc).
3. Mount the antennas and readers. Verify operation.
4. For Pro or Enterprise, remove the injector. Run the PoE power (as will be used in the actual use case, regardless of whether this is an injector or a homerun from an IT closet) to Port 1, run the computer Ethernet line to Port 2. This will verify PoE handshaking and power to the reader in its deployed configuration. If the reader turns on, operate the reader with the laptop.
5. Remove the connection to the laptop. Operate the device as intended in full deployment.
6. Verify data delivered to endpoint.

Test Implications

If the reader fails in step 1, please check power, connections, etc. If the reader appears to be working – the green LED is flashing and the link lights on the Ethernet port are lit – but you are not seeing the reader heartbeat in the SensThys console, you will probably need to change the firewall settings on the laptop. Otherwise, if nothing is found, test another reader. If the second reader works, this implies the first reader has failed. → Contact SensThys.

If a failure occurs in step 2, it is time to get into the details of the configuration and settings needed to utilize the communication protocol that your application uses to communicate with the reader.

If a failure occurs in step 3, please check all connections. **Verify that the injector is grounded**. Verify that the injector has **shielded RJ45 connectors**. Verify the CAT6 to the reader is shielded with a drain, and has shielded connectors. NOTE: In this step the primary issue may be that the "ground" of the reader is now tied to some local ground.

Figure 3 - PoE Injector with metal shield socket and Ethernet cable with metal shield surround (see Step 3)

If a failure occurs in step 4, there is an issue with the PoE infrastructure. Verify that the injector is grounded. Verify that the injector has shielded RJ45 connectors. Verify the CAT6 to the reader is shielded with a drain, and has shielded connectors. NOTE: In this step the primary issue may be that the "ground" of the reader is now tied to some local ground that differs from the ground at the other end of the Ethernet cable. To verify if grounding issues are present, disconnect the antennas from the reader and remove the reader from its mount so that it is electrically floating. NOTE: We don't recommend floating devices for long term operation, this simply diagnoses a grounding problem needing to be fixed.

If a failure occurs in either step 5 or step 6, there are issues with data transport through the network infrastructure. The resolution of these problems is often difficult, as security protocols and network hardware behaviors are often not understood or easy to figure out. However, recognize that steps 1 and 2 were designed to verify that the reader is fully functional and delivers the expected data stream in a simple network environment. Steps 3 and 4 verify that the power source from the installation works and that the equipment works as mounted at the location.

What remains is networking. The troubleshooting needs to focus on what is blocking the reader message traffic. This will include looking at how the network hardware firewall rules as well as looking at alternative communication port assignments that might be allowed for communication on the network. These ideas are places to look but should not be considered comprehensive in terms of how or where to look for issues with the networking infrastructure.