LEARN KEPSERVEREX USING A SIGMA TILE GUIDE

Apps: V8.2 or later
KepServerEX: 6.3 or later
Sigma Tile: V5
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INTRODUCTION

In this guide you will learn how to connect a Sigma Tile to a computer or server running Kepware KEPserverEX.

After downloading and configuring the free trial version of Kepware KEPserverEX, you will be able to experience the power of the Industrial IoT with your Sigma Tile acting as PLC communicating to your server via MODBUS and representing a device, an asset or a line streaming its sensor data: temperature, humidity, pressure, acceleration and acting like a real production asset. You will also be able to control the Sigma Tile LED display from KEPserverEX.

If you are new to the Sigma Tile and want to better understand what it is and intended application, go to Appendix A.

SYSTEM REQUIREMENTS

Before proceeding with this guide, ensure that you have the required hardware, software and that the following requirements are met:

HARDWARE REQUIREMENTS

- Sigma Tile
- WIFI router / network
- Computer running Windows (you must have administrative privileges on the computer.)

OPERATING SYSTEMS REQUIREMENTS

Servers:
- Windows Server 2012 R2
- Windows Server 2008 R2 SP1

Clients:
- Windows 7
- Windows 8.1
- Windows 10

If you are going to install the ThingWorx Manufacturing Apps in a Virtual Machine, ensure that you have the latest VM tools installed. You will need at least 4 cores and 16GB of RAM.

RECOMMENDED BROWSERS

- Chrome 51 (recommended)
- Firefox ESR 47+
- Internet Explorer 11
STEP 1 - CONNECTING YOUR SIGMA TILE TO A NETWORK

1. Power your Sigma Tile with the Micro-USB cable. Within about 15 seconds a WIFI symbol will be displayed on the LED display, indicating that the Sigma Tile is searching for a network.

![Sigma Tile with WIFI symbol](image)

2. Connect the Sigma Tile to a network using one of the following methods:

   a. Ethernet:
      i. Connect to a network via an Ethernet cable in the Sigma Tile Ethernet port.
      ii. Watch the LED display of the Sigma Tile for its IP address. The IP address will be displayed 3 times after a connection to the network is established.
      iii. Make note of the IP address: __. __. __. __

   b. WIFI:
      i. Connect a mouse, keyboard, and monitor to your Sigma Tile. You may have to turn-off and repower the Sigma Tile to be able to connect to the monitor.
      ii. Log in: -user: pi -password: raspberry
      iii. Use the pixel GUI to configure the Sigma Tile with your network.
      iv. Watch the LED display of the Sigma Tile for its IP address. The IP address will be displayed 3 times after a connection to the network is established.
      v. Make note of the IP address: __. __. __. __

3. Wait for the white disk icon to be displayed on LED display. Your Sigma Tile is now ready to be connected to Kepware KEPServerEX and the ThingWorx Manufacturing Apps.
1. From your computer connected to a **network with internet access**, navigate to Kepware.com (https://www.kepware.com)

2. Select My Kepware

![My Kepware Customer Self-Service Portal](image)

3. Log in using your PTC credentials:

   **My Kepware Customer Self-Service Portal**

   Already have a My Kepware Account?

   Email Address: [ ]

   Password: [ ]

   Log In

   Need a My Kepware Account? Sign up here

   Forgot Your Password?

   Information Request Form

4. In the **DOWNLOADS** section for KEPServerEX, select and download **KEPServerEX 6.3**.
5. Copy the file **KEPServerEX-6.3.XXX.0.exe** to your computer / server.

6. Run KEPServerEX-6.3.279.0.exe to install.

7. Select the language.

8. Select **Next** to allow the KEPServer EX 6 Setup Wizard to run.
9. Accept the End-User License Agreement and select **Next**.

10. Choose the Destination Folder and select **Next**.
11. Choose the Application Data Folder and select **Next**.

12. Allow configuration of desktop shortcut and select **Next**.
13. Select **Typical** install.

14. Ensure Full Installation choice ("**Entire feature will be installed on local hard drive**"), is selected.
15. Review Setup External Dependencies and click **Next**.

16. Review setup Settings and click **Next**.
17. Select **Install**.

18. The following screen indicates successful setup, select **Finish**.
STEP 3 - CONFIGURING KEPWARE TO COMMUNICATE WITH THE SIGMA TILE

1. If it is not already the case, connect your computer to the same network as your Sigma Tile.

2. Open Kepware. If you have the shortcut, it looks like this:

3. Download SigmaTile_SenseHat_v5.opf to a location accessible from Kepware configuration.

4. In Kepware, navigate to and open the project SigmaTile_SenseHat_v5.opf. A dialogue box may pop up asking if you want to replace your current project. Select Yes.

5. Select Channel1 in the left-hand menu, and double click on the SigmaTile1
device to update the IP address to the one that scrolled across the Sigma Tile screen.

6. Open up the Quick Client by selecting Tools > Launch OPC Quick Client and ensure data flow from the Sigma Tile by selecting Channel1.SigmaTile1 and verifying that values are streaming. Check, for example, the Temperature value.

Troubleshooting Tips:
If you do not see any values updating in the value column, check the following:
- Your Sigma Tile and KepServerEX (computer) are on the same network.
- You can ping your Sigma Tile from your computer.
- Your KEPServerEX license (or trial license) has not expired. If you are using a trial license of Kepware, keep in mind that it will expire every 2 hours. To reinitialize the trial period, follow these steps:
  1. Locate the KEPServerEX icon in your system tray.
  2. Right click on the KEPServerEX icon and click "Stop Runtime Service". The system will ask you to confirm that you want to stop the runtime service, say "Yes".
  3. Right click again on the KEPServerEX icon and click "Start Runtime Service".
  7. Change the LED display on the Sigma Tile’s screen by right-clicking on the tag labeled Screen_Control, and select Synchronous Write.

Apply any value between 0-5 and observe what happens on the Sigma Tile display. Each icon corresponds to a different state detailed in the table below:

<table>
<thead>
<tr>
<th>LED Display</th>
<th>Status Description</th>
<th>KEPServerEX “Screen_Control” tag value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not configured</td>
<td>0</td>
</tr>
<tr>
<td>!</td>
<td>Warning</td>
<td>1</td>
</tr>
<tr>
<td>✔</td>
<td>Running</td>
<td>2</td>
</tr>
<tr>
<td>✔</td>
<td>Planned downtime</td>
<td>3</td>
</tr>
</tbody>
</table>
STEP 4 – FAMILIARIZE YOURSELF WITH THE FEATURES OF THE SIGMA TILE

1. Using the joystick in front of the Sigma Tile:

   a. Toggle between the different value of possible “Error Code” by moving the joystick up or down. Note the value change in the Quick Client: Channel1.SigmaTile1.ErrorCode. The ErrorCode tag can be used, as you will see in the Learn the ThingWorx Manufacturing Apps using a Sigma Tile guide to trigger different alerts and messages in the ThingWorx Manufacturing Apps.
b. Toggle the **LED display mode** by moving the joystick left or right to change the information displayed between Status, Temperature, Humidity and Pressure. Note that you will have to wait for the text to fully scroll through the Sigma Tile LED display to see a change in the mode after clicking the joystick left or right. Observe, for example, the value of the temperature displayed on the LED screen and the value shown in the **Quick Client**.

2. **Understand the Status mode.**
   The Status Mode on the LED display indicates, via an icon, the status of the Asset or Line that the Sigma Tile represents as defined and calculated in the **ThingWorx Manufacturing Apps**. See the Learn the ThingWorx Manufacturing Apps using a Sigma Tile guide, to learn how to configure your Sigma Tile as an Asset in the Apps. The status value is controlled by a tag (Screen_Control tag) in KEPServerEX as you have seen in Step 2 above.

3. **Understand the Sigma Tile GoodCount and BadCount tags**
   The program running on the Sigma Tile (Python script that starts automatically at startup) includes a routine that will increment the GoodCount and BadCount tag values as if the Sigma Tile were a real production asset or line producing parts at
an average rate of 35 parts / minutes under baseline conditions. But as the conditions of the Sigma Tile change (e.g. temperature and pressure) the production rate and quality will change. Specifically, as the temperature rises the ratio of bad parts to good parts will increase, representing a decrease in quality. You can observe the values of the GoodCount and BadCount tags in KepServerEX. In the Learn the ThingWorx Manufacturing Apps using a Sigma Tile guide you will use these tags to define the performance metrics of the asset and further observe this behavior.

4. Understand the VibrationAlert tag.

The VibrationAlert tag in KepServerEX is used to indicate any excessive vibration detected by the Sigma Tile. The Python script on the Sigma Tile has some code that uses the acceleration sensors to make that determination. If vibration is detected the VibrationAlert tag will be set to 1. If no vibration is detected the tag is set to 0.
STEP 5 - ADDING ANOTHER SIGMA TILE TO KEPSERVEREX

If you have another Sigma Tile, you can easily add it by following these steps.

1. In the Configuration app of KEPServerEX, select Channel1, right click on it, and select Copy.

2. Now, select Connectivity, right click and click Paste. You will now see a new channel automatically called Channel2 containing one device called “SigmaTile1”.

3. Right click on the “SigmaTile1” under Channel2 and select Properties. Rename this device to “SigmaTile2” and update the IP address of this device to match the value on the LED display of your second Sigma Tile.
Congratulations! You have completed this guide. You have learned how to install KepServerEX and configure a real device (Sigma Tile) and monitor its sensors readings. You have also learned more about the features of the Sigma Tile and how to use it including controlling the LED Display (Status) via KEPServerEX.

The next step is to setup and configure the ThingWorx Manufacturing Apps to experience the power of the ThingWorx Industrial Innovation Platform with the Sigma Tile acting as a Production Asset or as a Smart Connected Product. Check the Learn the ThingWorx Manufacturing Apps using a Sigma Tile guide for details.
WHAT IS A SIGMA TILE?

The PTC Sigma Tile is a very low cost, ultra-portable IoT device that you can build yourself. It is equipped with sensors and controls and can act as a Smart Connected Product or as the Industrial Controller (PLC) of a production asset or line. It is intended to be used for IoT demonstration and IoT applications development and testing purposes.

For a quick demo overview of the Sigma Tile in action, check out this video:

https://vimeo.com/246388214
(2-minute video)

GET STARTED

Step 1 – Learn Industrial Connectivity with KEPServerEX and a Sigma Tile

LearnKepServerEXUsingSigmaTileGuide.pdf

Install and configure the free trial edition of Kepware KEPServerEX to connect to the Sigma Tile and, in less than 10 minutes, stream real time readings from the Sigma Tile sensors: temperature, pressure, humidity… and control the Sigma Tile from KEPServerEX.

Step 2 – Learn ThingWorx Manufacturing Apps

LearnThingWorxMFGAppsUsingSigmaTileGuide.pdf

Download the ThingWorx Manufacturing Apps Free Trial and, in less than 60 minutes, experience the power of the Industrial IoT with your Sigma Tile acting as the PLC of a production asset or line.

SIGMA TILE FUNCTIONAL REFERENCE GUIDE
RESOURCES

- Sigma Tile related Guides – on ThingWorx Developer Portal (under Additional Resources):
- Kepware KepServerEX - Trial Edition:
  https://my.kepware.com/mykepware/Landing.aspx
- ThingWorx Manufacturing Apps Free Trial:

APPENDIX B: TECHNICAL SUPPORT

If you have any questions related to the Sigma Tile or this guide, (installation, configuration, capabilities), we invite to check our ThingWorx User Community page at the link below:


You will be able to search and view posts from other users, from PTC Subject Matter Experts. You will be able to ask questions, share your lessons learned and provide feedback. If you already a PTC customer, you probably already have an account. If you do not have an account, you will first have to login on the top right end side of the page.

If you have any questions related to the ThingWorx Manufacturing Apps, check the following Community page:

- https://community.ptc.com/t5/Manufacturing-Apps/bd-p/manufacturingapps

If you have any questions related to the KEPServerEX, check the Kepware Technical Support page: