



Application Note: Centurion Solar Raspberry Pi initial setup and Setup with Axpert and Pylon



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1) Introduction:

The Centurion Solar monitoring system is the ideal monitoring solution for Kodak inverters in a Off-Grid solution. The main purpose of the module is to provide accurate monitoring and the ability to remote monitor when used with a Kodak inverter. The monitoring solution offers the ability to connect to the Pylontech BMS and by doing so the inverter can be controlled by the Raspberry Pi based on the SOC reported by the BMS.

Adding the Centurion Solar monitoring system greatly improves the cycling efficiency of the Kodak inverters with Pylontech batteries, as the module will use the SOC reported by the BMS of the Pylontech battery to control when the inverter will use grid or battery, rather than relying on the inaccurate measurements of the inverter. By using SOC based control, the system will be able to use the full rated capacity of the Pylontech battery if set to do so. Maximising the energy available from the battery means the inverter will delay switching to the grid for as long as possible, ensuring maximum return on investment.



The monitoring solution will therefore increase the overall value and performance of the system as the full depth of discharge of the Pylontech can be used in a self-consumption battery cycling setup. On the US2000/US3000 series of batteries an 80% DOD can be used, while the US2000C/US3000C series supports a 95% DOD.

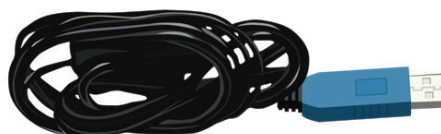


Figure 1: Pylontech US3000C cable for monitoring module

This short guide demonstrates how to setup and access the Centurion Solar monitoring solution as part of your storage installation.

2) Options, capabilities and limitations:

To use the module with a Pylon battery, you would need to order the following product from the Segen Portal:

- Centurion Solar monitoring solution (Raspberry Pi 3 b+)

The solution offers the following features:

- Real-time monitoring of all the different power sources in use in a solar system (solar panels, batteries, grid power, etc).
- Everything happening in the entire system is recorded and can be interrogated at any point in time.
- Can monitor and uniquely program up to 9 inverters in parallel.
- Support for a host of different Kodak inverters, including the new Kodak King, as well as the newly released Kodak OG-7.2 inverter.
- Can send instant messages regarding the system on Telegram or email.
- Support for Pylontech batteries with true SOC and voltage monitoring.
- Hourly trend analysis of the load, the solar panels, the batteries as well as the utility consumption and/or production.
- Configurable fault alerts per inverter type, ensuring that the installers know of any problem long before his client does.



Figure 2: One of the dashboards provided with the system

When using the Centurion Solar monitoring solution and Pylon with the intention to implement battery control, a few things must be taken into consideration:

The Pylontech battery control function can only be used in a scenario where grid backup is available, while in off-grid the monitoring solution can only be used for monitoring, because there will be no grid to fail over to.

The on-grid control only comprises the battery cycling. The monitoring module will take over the cycling control logic and will not rely on the inverter logic. The commands to go to grid or go to battery will be sent to the inverter based on the SOC reported by the battery BMS.

Please note: When using the Centurion Solar monitoring solution and Pylon for Grid connected self-consumption applications, the system will run the risk of the batteries shutting down in the event of a power failure. If the battery shuts due to the low-voltage cutout protection, the battery will have to be manually turned on once a charging source is available. This can be done by simply pressing the RED button on the master battery. During grid connected cycling, the US2000b and US3000 batteries will be limited to 80% DoD and during a grid outage the DoD will be limited to 90%. The new US3000C batteries will have a 95% DOD.



Figure 3: The master battery is defined as the battery with Link Port 0 OPEN as per the picture above.

Centurion Solar offers mobile monitoring and can be used on Android and iOS. The information displayed can be customized to the user's needs.



Figure 4: Cellphone Monitoring

3) Initial Setup:

The Raspberry Pi plugs in using a normal AC adaptor and the adaptor must be plugged into a circuit connected to the backup of the inverter. In other words, the module must be powered by the inverter.

The process is as follows:

- Make sure the batteries and inverter(s) are powered down. The inverter, battery and Raspberry Pi module must be off when connecting the communication cables.
- Connect the USB cable to the module and to the inverter. The USB cable is included in the box with the inverter, except in the case of the Axpert King of Og-7.2 Max series, in which case a micro-USB to USB cable needs to be supplied by the user. Please ensure that this cable is a DATA cable and not a charge cable only.
- Now connect the Pylon communication cable to the monitoring module and to Pylon battery.
IMPORTANT: Make sure to plug the cable into the CONSOLE port on the battery. Connecting to any other port will damage the cable and void the warranty. The size of the console port differs between the US2000/US3000 and the new US3000C series. Please ensure that the correct cable is used. The US2000/US3000 series cable is included in the Centurion Solar Monitoring Kit. The US300C cable can be bought separately using this link.

Everything is now ready to be powered on.



Figure 5: Connecting the Pylontec cable to the console port

Please ensure that the settings on the inverter are set to the User Specified settings. When using the system for cycling, then Program 12 & 29 will be set to 46V (or 45.5V if 46V does not work). This will bypass the inverter control and will allow the monitoring module to control the cycling.

Connecting the module to the internet – Method 1:

The next step will be to connect the monitoring module to a network with internet access.

Step 1: The easiest and most reliable way to do this is to connect the unit to an ethernet cable directly from the router. Once done, the unit may be turned on.

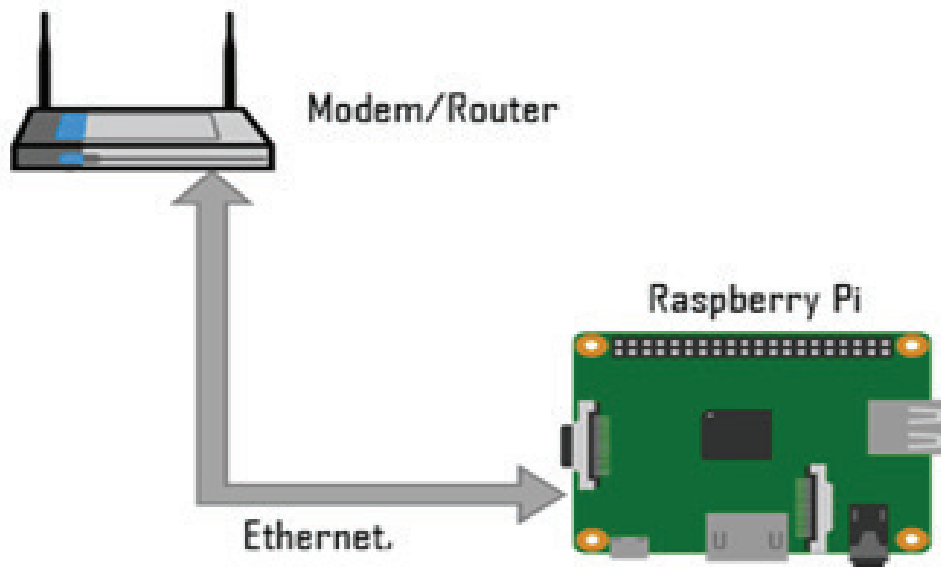


Figure 6: Ethernet connection

Step 2: Look at the Raspberry Pi. Notice that it has a cover/lid at the top that can be easily removed. Under the cover there will be a sticker with the name of the unit written on it. Simply contact Centurion Solar on **+27 83 452 5006** and they will guide you through the setup from there, give you access to the module and explain how it can be accessed from anywhere in the world.

Connecting the module to the internet – Method 2:

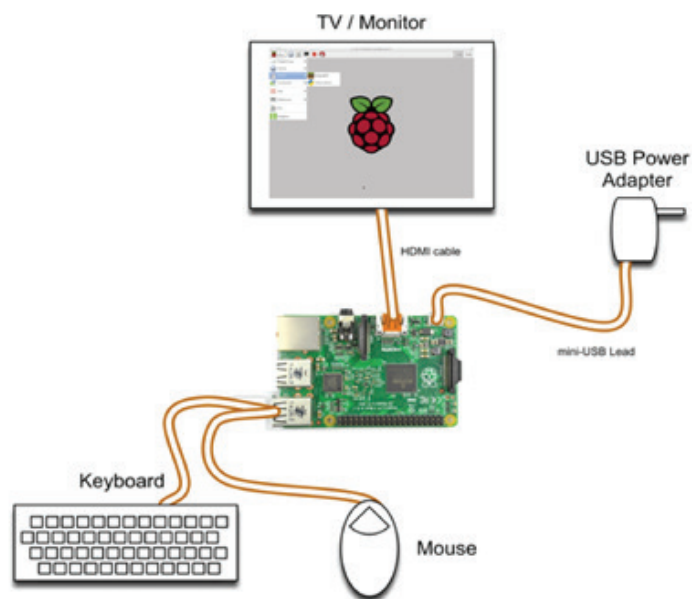


Figure 7: Connecting to the unit using a screen, keyboard and mouse

Step 1: Connect an HDMI monitor, keyboard and mouse to the module. Ensure that the HDMI screen is has a resolution of at least 1920 x 1200.

Step 2: Wireless connections can be made via the network icon at the right hand side of the menu bar.

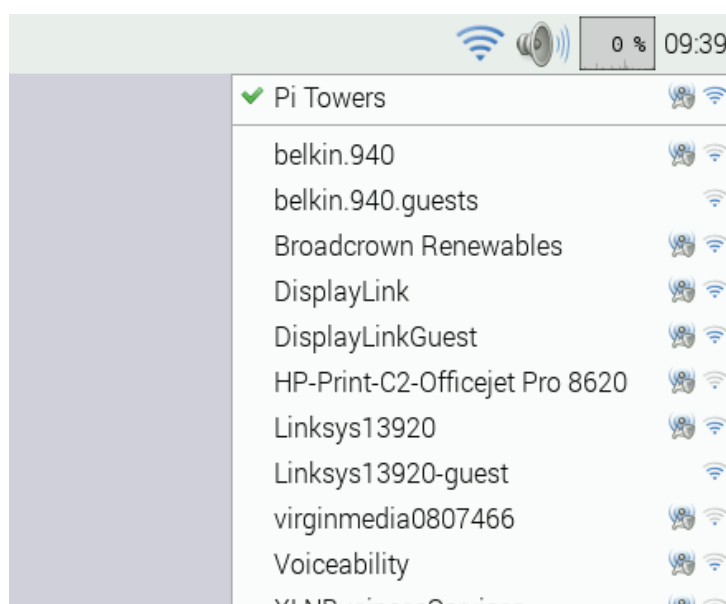


Figure 8: Connect to WiFi network example.

The icons on the right show whether a network is secured or not, and its signal strength. Click the network that you want to connect to. If it is secured, a dialogue box is will prompt you to enter the network key:

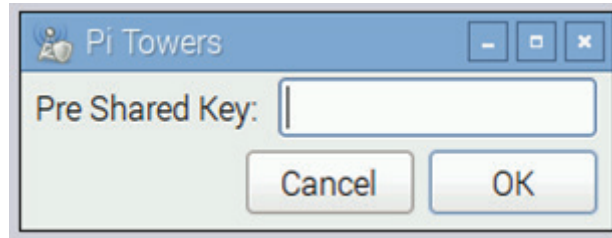


Figure 9: Enter network key/password.

Enter the key and press OK, then wait a couple of seconds. The network icon will flash briefly to show that a connection is being made. When it is ready, the icon will stop flashing and show the signal strength. At this point the Centurion Solar monitoring solution is ready to be configured.

Step 3: Look at the Raspberry Pi. Notice that it has a cover/lid at the top that can be easily removed. Under the cover there will be a sticker with the name of the unit written on it. Simply contact Centurion Solar on **+27 83 452 5006** and they will guide you through the setup from there, give you access to the module and explain how it can be accessed from anywhere in the world.

Now that the unit is connected to the internet, the remote monitoring can be used. This is normally the detail that the installer will give to the client, as the data uploaded to the cloud portal is read only, whereas the client that runs locally on the Raspberry Pi can be used to program the inverter(s). The cloud account is pre-registered and the account details can be found inside the module packaging. Please contact Centurion Solar with the registered account name (found on inside the packaging) so that the cloud portal details cloud portal details can be emailed to the client/installer.

The Centurion Solar monitoring solution is also available as a web-app, and can be configured with minimal effort. Please see video 4 on the following link detailing the functions and configuration steps of this feature: <https://centurionsolar.co.za/support>

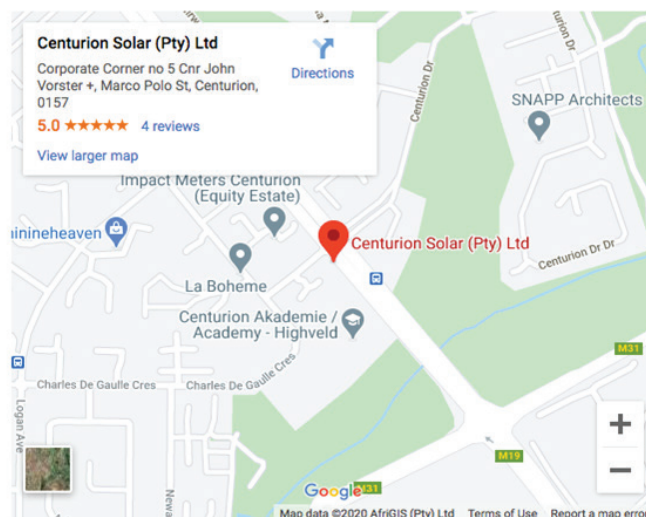
4) Documentation:

Further training material can also be viewed by visiting <https://centurionsolar.co.za/support> and wil give the client a quick overview of the entire system, it's capabilities and how to use and configure them.

Centurion Solar Monitoring Module recommended Kits: Off-Grid Kits

5) Technical Advice:

Most of what is needed to know on how to setup the monitoring solution is shown in the document above. If there is a need to access the Centurion Solar cloud dashboard to make changes, please refer to the Centurion Solar YouTube guides. Go to <https://centurionsolar.co.za> and click on support for a list of YouTube guides, or call them directly on **+27 83 452 5006**



GET IN TOUCH

Address: Corporate Corner no 5. Cnr John Vorster + Marco Polo Str,
Highveld, Centurion, 0157
Phone: +27 83 452 5006
Email: info@centurionsolar.co.za
Hours: Mon - Thu 8:00 to 17:00
Fri - 8:00 to 14:00
Weekends + Public Holidays - Closed

Figure 12: Contact Centurion Solar

6) Segensolar portal services:

The SegenSolar portal has a System Designer tool which allows installers to create their own battery packages:

<http://portal.segensolar.co.za/Reseller/PVDesigner>

Please speak to your account manager or technical support representative if you require training on how to use the System Design tool. The design tool will allow the user to create a quote quickly and easily with all the necessary components. All the available stock levels are shown as well as any incoming deliveries.

7) Further notes:

About Centurion Solar: The Centurion Solar monitoring solution came about after a long search for monitoring software that could gather and store information about Voltronics inverters. There simply wasn't a product that could record everything happening in the inverter, present it in real time, and allow the end user to make sense of their solar systems in an easy to understand fashion. This is where the monitoring solution was born.

Initially the software supported only the Aexpert 5kva inverter, but over time a wide variety of Voltronics inverters have been added, including the Aexpert 5kVA in parallel (up to 9 inverters), the new OG-7.2 Max, etc.

The dashboards can be accessed remotely, allowing the user to see exactly what's going on in the solar system. A copy of the data can even be sent to the installer to remotely monitor all the systems installed, and can be drilled down if any problems arise.

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