

Application Note:

Centurion Solar Raspberry Pi initial setup and Setup with Axpert and Pylon

1) Introduction:

The Centurion Solar monitoring system is the ideal solution for Pylon when used with Axpert in an on-grid solution. The main purpose of the module is to provide accurate monitoring and the ability to remote monitor when used with an Axpert or InfiniSolar inverter. Alternatively, 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 Axpert with Pylontech, as the module will use the SoC reported by the BMS of the Pylontech battery to control when the Axpert will use grid or battery, rather than relying on the Axpert measuring the very narrow battery voltage range. 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. This is especially useful for Axpert inverters because they can't supply loads from mixed power sources. Maximising the energy available from the battery means the inverter will delay switching to the grid for as long as possible.



*Illustration only, actual product may vary

The monitoring solution will therefore increase the overall value 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, and 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).
- All data is captured, stored and can be exported for a specific time period Specific monitoring of the batteries in use.
- Can monitor up to 9 inverters in parallel.
- Support for a host of different Voltronic inverters, including the new InfiniSolar 4 Super inverter, Axpert King, as well as the newly released Axpert MAX.
- Can monitor grid tie as well as hybrid inverters.
- 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.
- Easy setup now requiring only a network cable or a screen, keyboard and mouse.

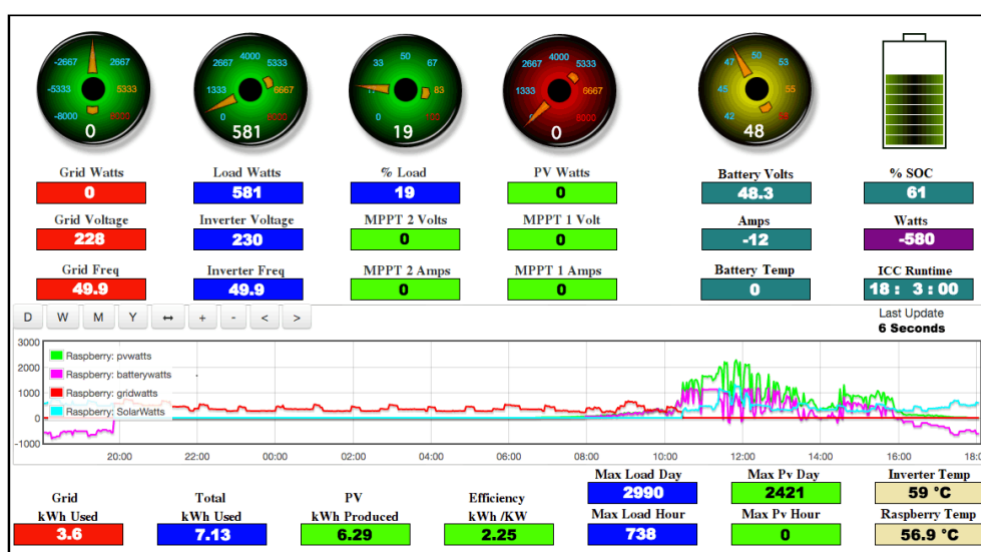


Figure 2: One of the dashboards provided with the system

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 an on-grid application, 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 parameters "to Battery" and "to Grid" will be controlled by the Raspberry Pi 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 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 US3000C 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.

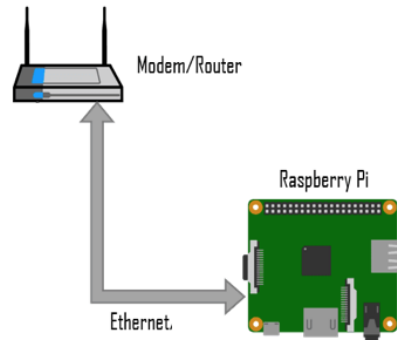


Figure 6: Ethernet connection

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 them 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:

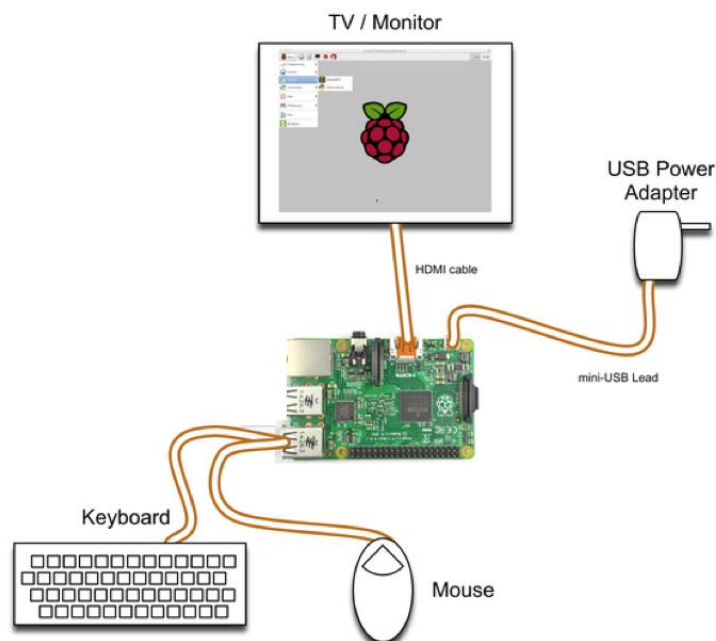


Figure 7: Connecting to the unit using a screen, keyboard and mouse

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.

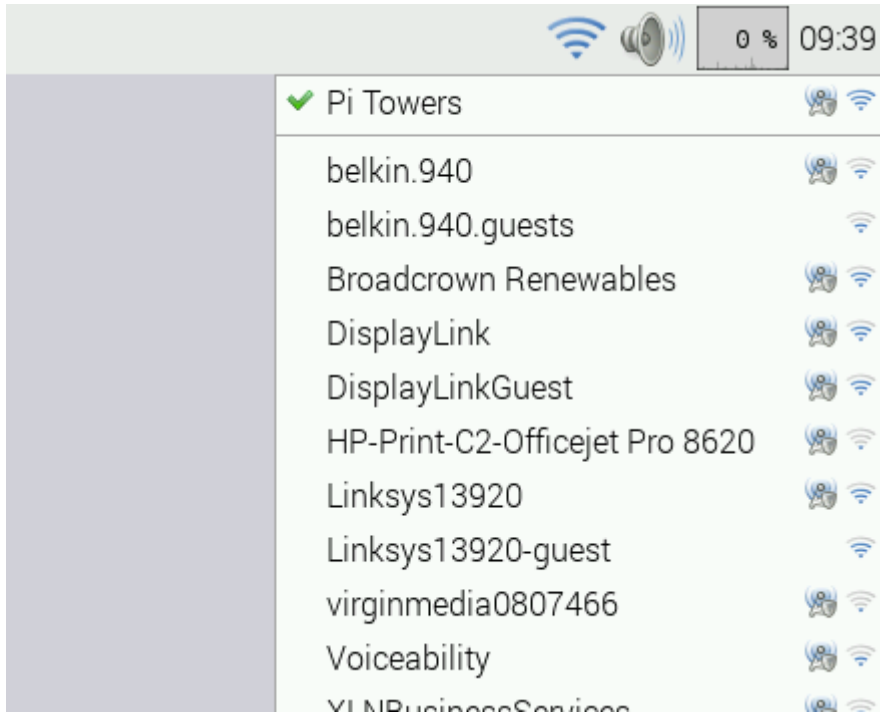


Figure 8: Connect to WiFi network example.

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:

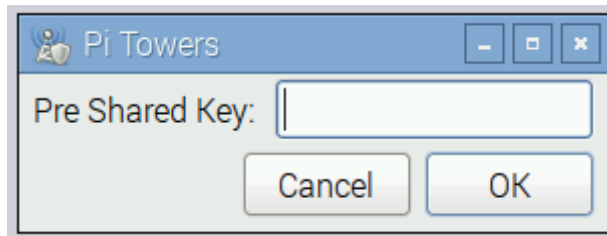


Figure 9: Enter network key/password.

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 them 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 poertal 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 login details can be found inside the module packaging.

Go to the link specified on the paper that came in the module packaging, and use the accompanying username and password to log in. Note that both the username as well as the password are case sensitive.

Once logged in, the cellphone apps for both android and IOS can be configured. Download the app for Android or IOS using the following links:

iOS APP link: <https://itunes.apple.com/us/app/emoncms/id1169483587?ls=1&mt=8>

Android APP link: <https://play.google.com/store/apps/details?id=org.emoncms.myapps>

Once done, the user can follow the video examples of how to connect his phone to the portal.

IOS: <https://youtu.be/a0hTODY8gLO>

Android: <https://youtu.be/5QZVV24zGVM>

The image shows a screenshot of a web portal interface on the left and mobile app registration information on the right. In the web portal, the 'Setup' menu item is highlighted with a red box, and the 'My Account' button is also highlighted with a red box. The mobile app section features a QR code, also highlighted with a red box, and buttons for downloading the app from the App Store and Google Play. Below the QR code, it says 'Or using a barcode scanner scan to view MyElectric graph'.

Figure 10: Mobile App Registration

4) Documentation:

Further documentation as well as the recommended packages with which the module will work can be found by going into the link for the module and then simply clicking on any one of the Pylontech combinations to purchase your compatible battery setup

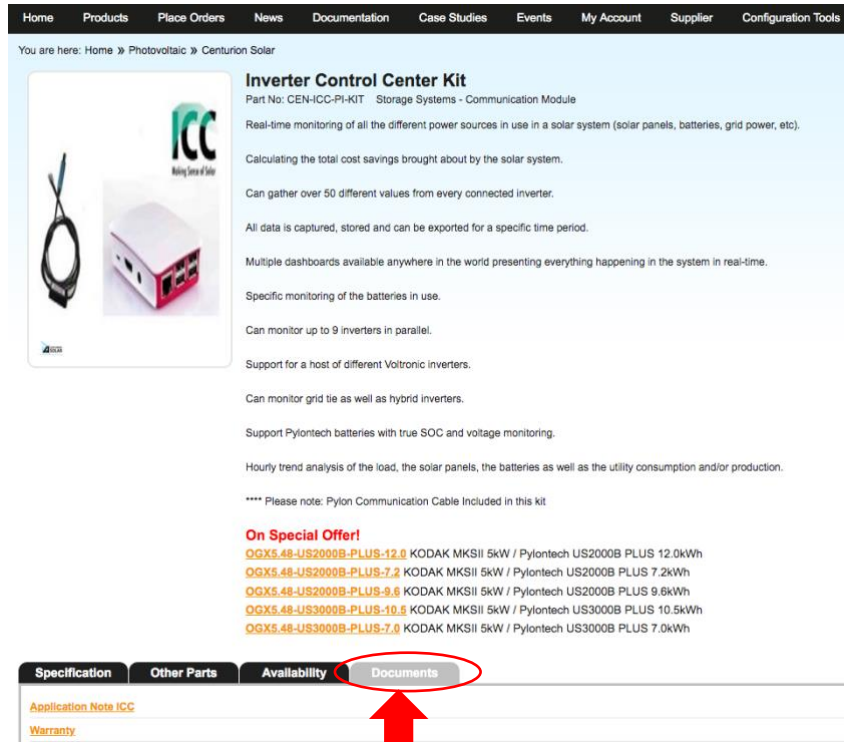


Figure 11: Centurion Solar Monitoring Module Documents Page

Centurion Solar Monitoring Module recommended packages:

- [Kodak Solar 7kW Max Off-Grid/Pylontech US3000 14.2kWh](#)
- [Pylon US3000C 3.5kWh Li-Ion Solar Battery \(excl. brackets\)](#)
- [KODAK King UPS 5kW / Pylontech US3000B PLUS 7.0kWh](#)
- [KODAK MKSII 5kW / Pylontech US3000B PLUS 7.0kWh](#)
- [KODAK King UPS 5kW / Pylontech US2000B PLUS 7.2kWh](#)
- [KODAK MKSII 5kW / Pylontech US2000B PLUS 7.2kWh](#)
- [KODAK King UPS 5kW / Pylontech US2000B PLUS 9.6kWh](#)
- [KODAK MKSII 5kW / Pylontech US2000B PLUS 9.6kWh](#)
- [KODAK MKSII 5kW / Pylontech US3000B PLUS 10.5kWh](#)
- [KODAK King UPS 5kW / Pylontech US2000B PLUS 12.0kWh](#)
- [KODAK MKSII 5kW / Pylontech US2000B PLUS 12.0kWh](#)

All the above-mentioned packages include the mentioned Mecer Axpert inverter, mentioned [Pylontech battery pack](#), [Interactive IT Battery Cabinet](#), and [Centurion Solar Monitoring Module](#) with Pylon Communication Cable.

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

YouTube Video: [Initial Setup](#) assist with connecting to the monitoring solution using VNC and how to change basic settings.

YouTube Video: [Configuring cloud-based monitoring](#) is a guide on everything regarding monitoring.

YouTube Video: [How to use monitoring module + Pylontech Cable](#) assists with the setup with Centuiron Solar monitoring solution and Pylontech.

All documents involving Axpert, Pylon and the monitoring solution can be found on the documents tab on all Axpert and Pylontec packages.

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 Axpert 5kva inverter, but over time a wide variety of Voltronics inverters have been added, including the Axpert 5kVA in parallel (up to 9 inverters), the new InfiniSolar 4Super, 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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