How to configure a WattPlot connection to your MATE3 or AXS Port

(updated 09 February 2024)

WattPlot ACKcess connects to your MATE3(S) or AXS Port device using the Modbus/TCP protocol, over an Ethernet. Ethernet networking is non-trivial. There are many complex variables and pitfalls. I am not a networking expert, but I will attempt to take you through what I have learned over the years.

MATE3 or MATE3s Connections

> **After you have made any configuration changes on the MATE3/s unit itself (with respect to its connection to WattPlot ACKcess), I recommend leaving the unit alone for about 5 minutes – and perhaps powering it down by unplugging it from the OutBack system and then powering it back up – before attempting to connect to it with WattPlot ACKcess. It appears that changes can sometimes take a long time to settle in and take effect on the device.**

Connecting to a MATE3 (or MATE3s) is complicated by the historical Ethernet problems inherent with the MATE3 technology. OutBack Power Systems has also left some quirks in their device firmware that I am still trying to figure out.

OPTICSre/Modbus

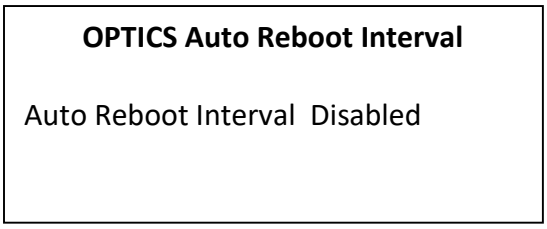
The default setup of the OutBack MATE3 does not have Modbus/TCP (known as the SunSpec interface) enabled. You must turn on this feature. From the MATE3's **Main Menu**, go to **Settings**, **System**, then **OPTICSre**:

OPTICSre	
OPTICSre	Enabled
SunSpec Interface	Enabled
Modbus Port	502

Theoretically, **OPTICSre** can either be **Enabled** or **Disabled**. However, the MATE3 does not always follow theory. If your local network is connected to the internet, you should probably set **OPTICSre** to **Enabled**. If you do not have local internet access, set **OPTICSre** to **Disabled**, so that the MATE3 does not attempt to connect to something that isn't there.

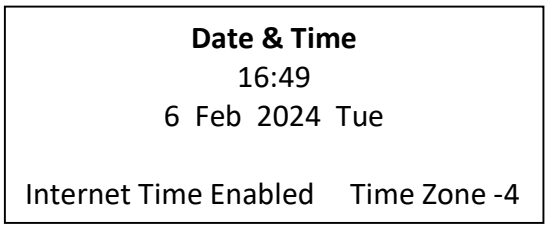
Set the **SunSpec Interface** to **Enabled**. The **Modbus Port** default of **502** is fine.

In an attempt to resolve systems that were locking up in the field while supplying data to their OPTICSre monitoring service, OutBack Power Systems introduced a primitive solution – a device reboot that automatically happens every specified number of hours. I recommend the least number of reboots (i.e. the longest time interval – 24 hours), or even better, if you can do without this feature, turn it off! From the MATE3's **Main Menu**, go to **Settings**, **MATE3**, then **OPTICS Auto Reboot Interval** to adjust it:



Internet

It seems to make a difference if your local network is connected to the internet or not. For example, the MATE3 has the ability to synchronize its internal clock with a website. If you do not have an internet connection, you might be better to turn this feature off (**Disabled**). Otherwise, if there is an internet connection, it is recommended that you **Enable Internet Time**. From the MATE3's **Main Menu**, go to **Settings**, **System**, then **Date & Time**:



Determining the Device IP Address

The IP address is assigned by the network (with DHCP enabled) or is user-specified (with DHCP disabled). DHCP enabled is the more common scenario.

On your MATE3(S), from the MATE3 home screen, press the PORT key. You should see something similar to:

```
IP Address 192.168.000.007
Netmask    255.255.255.000
Gateway    192.168.000.001
DNS-1      192.168.000.002
DNS-2      192.168.000.003
MAC        00:12:34:56:78:9A
```

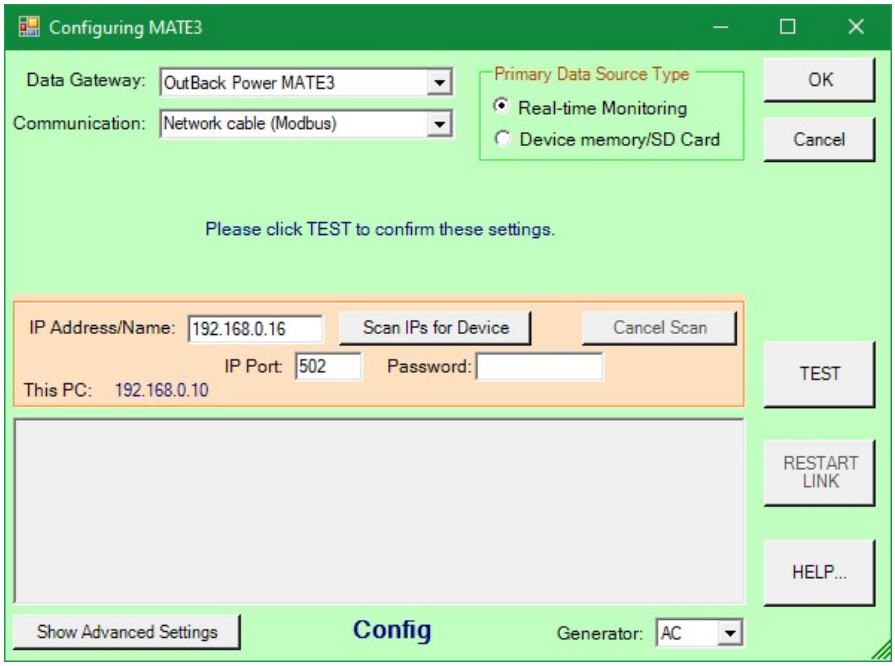
The first line (IP Address) is the value that WattPlot ACKcess expects to receive in the Communications Configuration screen (discussed below).

[Note that there is another IP Address associated with your MATE3 – typically 192.168.000.064. This is NOT the IP Address for Modbus communications. It is for viewing the current MATE3 performance with a web browser.]

If you are having trouble connecting to your device, the MAC Address at the bottom of the MATE3 PORT screen might be useful. See the AXS Port section below, starting at step 2.

WattPlot ACKcess Communications Configuration

This is the Communications Configuration screen for WattPlot ACKcess. The program will need to confirm the connection to your device before you can click OK to move on.



Data Gateway

Select what type of device you are connecting to. For the purposes of this particular document, valid options are:

OutBack Power AXS Port
OutBack Power MATE3
OutBack Power MATE3S

Communication

There are a number of options here, related to legacy systems. The only value presently supported is:

Network cable (Modbus)

IP Address/Name

This is the IP Address assigned to your MATE3(S)/AXS Port. NOTE: There is more than one IP Address associated with your device. It's important to get the right one. See **Determining the Device IP Address** above (for MATE3/s), or below (for AXS Port).

Scan IPs for Device

If you are unsure of the correct IP address **on a local network**, WattPlot can scan a range of addresses, based on the PC's own IP address, and assuming that the default IP port applies. Scans for data always display

	the results for each attempt. NOTE: Allowing for time-outs etc., this process can take a while. See **Determining the Device IP Address**.
IP Port	This is the IP port that your MATE3 is using for Modbus communication. (The default is 502.)
Password	If you have programmed your MATE3 Modbus with a password, you will also need to supply it here.
TEST	Clicking the TEST button tells ACKcess to connect to the specified IP Address and Port to see if it can find a compatible device. The results of the test will be shown in the window below the settings.

AXS Port Connections

My experience shows that the AXS Port is a far more robust connectivity device for monitoring an renewable energy system from OutBack Power Systems.

Determining the Device IP Address

The IP address is assigned by the network (with DHCP enabled) or is user-specified (with DHCP disabled). DHCP enabled is the more common scenario.

There should be two stickers on the side of your AXS Port device. One will have a MAC Address, which looks like this:

00 – 90 – EA - E0 - 2A - 30

The other will be the serial number of the device, which looks like this:

AX1412F0100314

It is the first value (MAC Address) that we are interested in for now.

1. Plug the AXS Port into your router by connecting a CAT5 network cable between your router and the AXS device's "ETHERNET" port. Also plug a separate CAT5 cable between the OutBack HUB/Inverter/Charge Controller/Battery Monitor and the AXS device's "HUB/DEVICE" port.

2. Connect to your router through your computer browser. (This is often done by directing your browser to "192.168.0.1".)

3. Navigate to the screen that shows your LAN Setup with your Connected Devices. (This will vary, based on the specific design of your router interface.)

4. Look for your device's MAC Address in the list of connected devices. If you find it, then the device's IP Address will be shown on the same line. If you can't find the MAC

Address, then your device is not correctly connected to your router, or is not operating correctly.

Why does my MATE3 connection keep dropping and rebooting?

A number of users experience a cycle (often with quite regular timing), where the connection runs for a while and then fails. WattPlot ACKcess is programmed to detect this and automatically restart the connection, if possible. But why does this happen?

There is nothing in the WattPlot ACKcess software that causes this. Years of testing has proven that the problem is very site specific. In some places, drops happen every 2 minutes; in others, it is every 16 minutes. The regularity of the issue indicates that it is something that either the MATE3 or the OPTICSre website is doing on a consistent basis to trip up the Modbus processing and/or the MATE3's internal Ethernet processor. The settings discussed earlier in this document are some things to try in order to improve the constancy of communications.

You can also run Check System Settings under the Tools menu to see if WattPlot ACKcess can detect any issues in the MATE3 settings for your particular site. Unfortunately, OutBack does not make all of the MATE3 settings available under Modbus, so things like OPTICSre enabled/disabled have to be checked on the MATE3 itself.

If the communication drops are more random, it may be a factor in the connection between your PC and your MATE3, which goes through a router and possibly other local (or remote, if applicable) network issues. Being a TCP/IP network connection, there will also be gremlins that accumulate and occasionally trigger a glitch.

Packet Frequency

Remember that WattPlot ACKcess is doing a large volume of processing, and requesting Modbus packets every second (by default). You can actually change the packet frequency so that the MATE3 is not having to respond to as many Modbus requests. To do this, go to the WattPlot ACKcess Communication Settings window and click on the Show Advanced Settings button in the bottom left corner.

42 Seconds to do a Warm Reboot

After years (literally) of trying to figure out why some connections drop at seemingly random intervals, I focussed at one point on at least recovering from these drops in the most efficient way. I determined that reconnect attempts caused further delays if the MATE3 was not yet ready to reconnect. I further discovered that 42 seconds seemed to be the optimum time to attempt a reconnect. So, WattPlot ACKcess actually waits 42 seconds after this kind of MATE3 drop before attempting (usually successfully) to reconnect.