

WattPlot™

VisualMATE

version 5.1.3

Real-Time Animated Graphical
Display of Performance Data from
MATE and MATE3 Devices by
OutBack Power Systems

USER'S GUIDE

Revised April, 2017

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Overview

The OutBack inverters and charge controllers that control your renewable energy system are very sophisticated pieces of technology. There are many settings possible that alter the behaviour and performance of these devices and, consequently, your entire system. Each installation and situation is different for every installed system. The circumstances of your solar and/or wind exposure, combined with the individual characteristics of your battery banks, utility grid (if connected), generators (if used), all contribute to a renewable energy system that is unlike any other. Unique systems call for unique settings to get the most out of your investment. Knowing what your system is doing and where power is flowing is the first step to understanding how well the system is serving your needs.

The OutBack MATE, MATE3, and AXS Port devices were created to supply this kind of information, but their display capabilities are very limited, both in terms of display clarity, volume of information, and location.

WattPlot™ VisualMATE gives you a picture of your entire system at a single glance. Animated power flow tells you instantly where your power is coming from and going to. The program can also be connected to watch remote systems thousands of miles away.

Main Features

The WattPlot™ VisualMATE software was created with sophisticated tools to give you maximum MATE/MATE3/AXS Port connection flexibility and a very friendly user interface. Features include:

- ✓ Connect to any OutBack MATE/AXS device, using Serial, USB, TCP/IP, or UDP/IP connectivity protocols. The software will guide you through the configuration.
- ✓ Monitor your system in real time, from any other time zone, on computer connected to your Outback Communication device directly, by network, or over the internet.
- ✓ See all system components and power flow summarized on single colorful graphic screen. The speed of the animated power flow indicates the amount power flowing.
- ✓ Built-in TCP/IP server so that other WattPlot tools can connect into the same OutBack system data by piggy-backing on VisualMATE's data stream.

The [Getting Started](#) section that follows provides a step-by-step guide to getting your software installed and configured right away.

The [Using WattPlot VisualMATE](#) section provides more detailed information on each feature.



What's New in Version 5.1?

WattPlot™ VisualMATE version 5.0 brought the program up to the same level of sophistication as other tools in the WattPlot suite. The following are the main enhancements for version 5.1:

- VisualMATE can now run unlicensed as a TCP Client, receiving its data stream from a separate licensed WattPlot application. (*see page 18*)
- VisualMATE supports the Modbus/TCP connection option for the MATE3. (*see page 22*)
- VisualMATE can also get its data stream from an OutBack AXS Port device, using the Modbus protocol. (*see page 12*)
- The MATE Data Source dialog box has been simplified, with new scanning and display functionality. (*see page 19*)

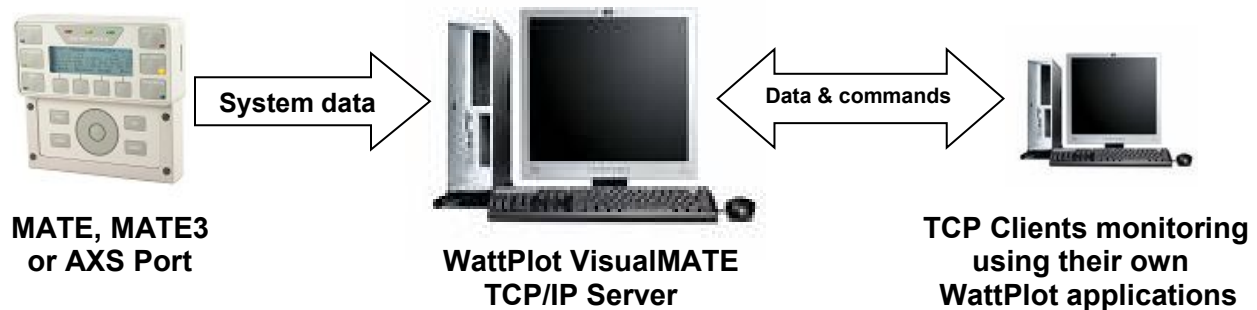


Getting Started

WattPlot™ VisualMATE is part of the **WattPlot™ 5** suite of software tools for monitoring and controlling renewable energy devices such as inverters and charge controllers from OutBack Power Systems.

WattPlot™ VisualMATE can...

- ✓ Connect to an OutBack MATE or MATE3 monitoring device, display dynamic snapshots of the renewable energy performance data, and show animations of power flow within the system.
- ✓ Summarize data by device type to show full system performance at a glance.
- ✓ Make data streams available to compatible TCP clients via a built-in TCP/IP Server.



*NOTE: Although VisualMATE has no function to send commands to the MATE/MATE3, its TCP/IP Server **will** pass on any commands received from external WattPlot tools.*

This **Getting Started** section will guide you through the installation and configuration of the software. The [Using the WattPlot VisualMATE Program](#) section that follows provides more detailed information on each feature.

If you have any questions not answered in this document, or would like to send us feedback or suggestions, you can contact us at:

intallact

techsupport@WattPlot.com
<http://WattPlot.com>



System Requirements

In order to monitor an OutBack system using any **WattPlot™** software, you will need at least four things:

- An OutBack MATE, MATE2, MATE3, or AXS Port monitoring device
- A cable for getting data OUT of the MATE. For a MATE or MATE2 this must be an appropriate serial cable (see [Appendix A – Serial Cable Specifications](#)). For a MATE3, you will need a standard CAT5 network cable (unless you have the optional USB card installed). AXS Ports connect via a network cable (serial modbus protocol).
- A computer running Microsoft Windows (XP or later), or equivalent emulation
- A way of getting data IN to the computer. This might be no more than the cable referred to above, or it *might* include some combination of the following:
 - Serial/USB conversion cable and software
 - Serial modem(s) and phone/cellular connection
 - Serial-to-IP converter (and router?)
 - Internet access

The MATE and MATE2 monitoring devices are technologically equivalent. This User's Guide will usually just refer to these device types as a MATE. The MATE3 device, on the other hand, is very different, as is the AXS Port device:



MATE



MATE2



MATE3



AXS Port

Software Download

All of our software may be downloaded from: <http://WattPlot.com/download.htm>

For VisualMATE, download and save `VisualMATESetup.msi` – a Windows Installer Package which will guide you through the installation process when you get to that step in the setup process.

If you are connecting WattPlot VisualMATE to a MATE/MATE2 device, proceed to the [next section](#).

If you're connecting to a MATE3 device, skip down to the [MATE3 Connection Options section](#).

If you're connecting to an AXS Port device, skip down to the [AXS Port Connection](#) section.

If you're connecting to another WattPlot application's TCP Server, skip to the [TCP Client Setup section](#).

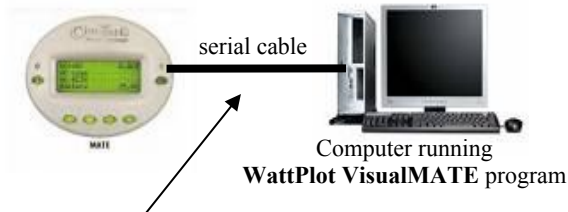


MATE/MATE2 Connection Options

There are different ways to connect your MATE to a computer. The best option for your installation depends on individual circumstances, and may require assistance from your local network professional.

Option 1 – Local Serial Connection:

The most common scenario has the WattPlot VisualMATE program running on a computer at the same location as the MATE and connected directly to it by a single serial or serial/USB cable.

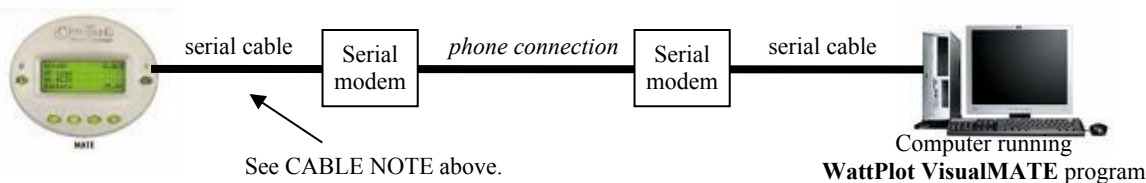


CABLE NOTE: A serial cable (with pins 2, 3, 4, 5, and 7 straight through) must be connected between a serial port on the back of your computer (or modem) and the DB09 serial connector on the bottom of your OutBack MATE (next to where the network cable runs from your MATE to your OutBack system). If you have a MATE2 unit, you may have to open the case to break-out the serial port access opening.

If your computer doesn't have a 9-pin serial port, there are some third-party products that convert a serial connection to a USB connection. Not all serial-to-USB conversion products work with the OutBack MATE. We post the products we know about (either that work or that don't) at <http://WattPlot.com/faq.htm#USB>.

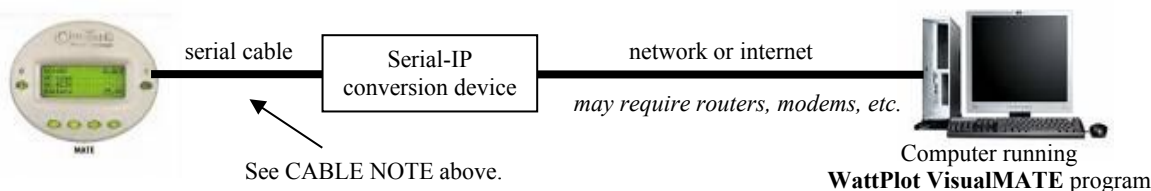
Option 2 – Remote Serial Connection:

A similar connection might also be accomplished for a MATE at a remote location, using a pair of serial modems to connect the two devices through a telephone connection:



Option 3 – TCP/IP Connection:

Another option is to use a Serial-IP conversion device to convert the MATE's serial signal to TCP/IP, which can communicate with the WattPlot VisualMATE program running on a computer locally (over a Local Area Network (LAN) or remotely (over the internet):



You can read about one such device in a PDF document at http://WattPlot.com/WattPlot_IP.pdf. Some Serial-to-IP converters come with bundled software that allows you to convert the TCP/IP data back to a virtual serial COM port on the monitoring computer. If this is between COM1 and COM16, then WattPlot can access this data just as if it were connected directly by a serial cable. The virtual COM port is **not** required however – WattPlot can get data directly from a specified IP Address and port.



MATE/MATE2 Setup

- STEP 1. Take note of your MATE serial number. You will need this for the **Activation** process (unless you are only running VisualMATE unlicensed in TCP Client Only mode to show the data stream from another WattPlot application). You can get the unit to display the serial number by unplugging the **network** cable (leading to your Outback system) from your MATE and then plugging it back in. It is also printed on a sticker found on the back of most MATE units. (The sticker is internal for MATE2 units.) It is also generally written on the box or in the documentation that you received with your Outback components.
- STEP 2. Ensure that your MATE device is properly connected to your OutBack inverter, charge controller, or HUB, depending on your specific system configuration. (Refer to your MATE manual for details.)
- STEP 3. The default setup of the OutBack MATE is **not** configured to transmit performance data. You must turn on this feature. From the main menu on the MATE select **SETUP**, then **MATE**, then **PG2**, then **COMM**, then **PC**, and then **ON**, to activate the serial communications port on the MATE.
- STEP 4. If your system includes a FLEXnet DC monitor, only Shunt 1 (A) is enabled by default. If you are using Shunt 2 (B) and/or Shunt 3 (C), then they **must be enabled on the MATE** in order to receive data for them. This is done from the MATE's ADV/DC/SHUNT menu entry.
- STEP 5. Connect your MATE to the monitoring computer (or modem or serial-IP conversion device) using a serial cable. (See **MATE/MATE2 Connection Options** above.)

NOTE: For MX-60 charge controller data reception, the MX itself must be displaying the **Status** screen. Going to another screen on the MX (e.g. the MISC screen) can lock data values, resulting in invalid PV Amps being reported. This is a known OutBack bug which does not apply to FLEXmax charge controllers.

Your MATE is now ready. Proceed to STEP 6 under **WattPlot VisualMATE Program Installation** on page 12.

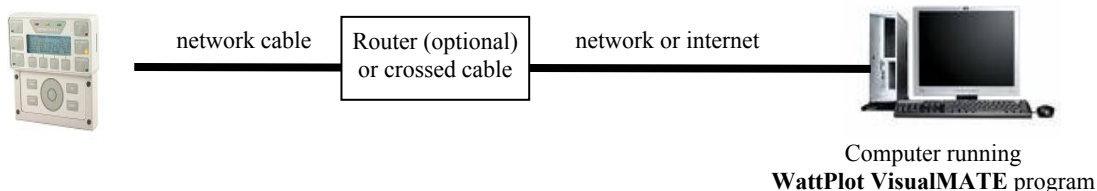


MATE3 Connection Options

There are three different ways to connect your MATE3 to a computer. The best option for your installation depends on individual circumstances, with some **key functionality differences**, as noted below.

Option 1 – UDP/IP Connection:

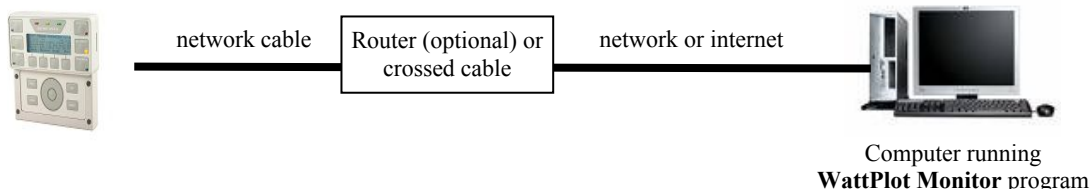
The MATE3 offers a UDP/IP data stream via a CAT5 network cable. Please refer to your MATE3 Owner’s Manual for detailed instructions on completing this connection. Note that the MATE3 ‘pushes’ data out to a single IP Address. When you are setting up the UDP Network Data Stream on the MATE3, you will be supplying **the IP Address and Listening IP Port of the monitoring computer, not the MATE3**.



This connection option comes standard with the MATE3. It has one significant limitation: **You cannot send MATE3 commands or program MATE3 settings using the connection method.**

Option 2 – Modbus/TCP Connection:

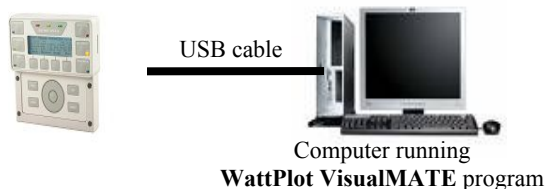
The MATE3 also offers a Modbus/TCP connection via a CAT5 network cable. (Your MATE3 Owner’s Manual may not say much about this connection.) This functionality is similar to the OutBack AXS Port device, in that it does not specifically supply a data stream. Instead, WattPlot polls it for data every second. (The polling frequency may be user-adjustable in future releases.) The physical connection is exactly the same as for the UDP/IP connection described above.



This connection option is also standard with the MATE3, and supports remote commands and system setting programmability. The WattPlot tools take advantage of these capabilities, with more commands being added all the time.

Option 3 – USB Connection:

An optional USB Card may be purchased and installed into the MATE3, allowing you to connect to it using a standard USB cable. Please refer to the MATE3 USB Card Manual for detailed instructions on completing this connection.



Note that a USB connection **does** support MATE3 commands, including the programming of some MATE3 settings. The WattPlot tools take full advantage of these capabilities.



MATE3 Setup

- STEP 1. Take note of your MATE3 serial number. You will need this for the **Activation** process. It is printed on a sticker on the back of the MATE3. It is also generally written on the box or in the documentation that you received with your Outback components.
- STEP 2. Ensure that your MATE3 device is properly connected to your OutBack inverter, charge controller, or HUB, depending on your specific system configuration. (Refer to your MATE3 manual for details.)
- STEP 3. The default setup of the OutBack MATE3 is not configured to transmit performance data. You must turn on this feature. From the MATE3’s **Main Menu**, go to **Settings, System**, then **Data Stream** to setup the Network Data Stream. The setup will depend on whether you are using the UDP/IP (Network) connection or the USB (Serial) connection, as shown below.

Settings for UDP/IP (Network)

Data Stream	
Serial Data Stream	Disabled
Serial Baud Rate	19200
Network Data Stream	Enabled
Destination IP	192.168.000.003
Destination Port	57027

This primarily involves enabling the **Network Data Stream** and putting in the **Destination IP** – that being the IP address of the computer running WattPlot VisualMATE.

NOTE that the MATE Data Source dialog box of the WattPlot VisualMATE program supplies information like the computer’s IP Address and recommended IP Port number, which you will need to supply in the MATE3 Network Data Stream setup.

Settings for USB (Serial)

Data Stream	
Serial Data Stream	Enabled
Serial Baud Rate	19200
Network Data Stream	Disabled
Destination IP	192.168.000.003
Destination Port	57027

All you have to do is enable the **Serial Data Stream** and ensure the USB driver that came with the card is installed and set to the correct baud rate.

Note that it is acceptable to enable both Network and Serial Data Streams.

You can ignore the **Ethernet Addresses** screen on the MATE3 for now. That information has no impact on incoming data communications. Remember, WattPlot VisualMATE does not actively connect to the MATE3 for its data streams (i.e. pull data in) – instead, the MATE3 actively sends (pushes) the data to the listening WattPlot VisualMATE PC.

Please refer to your MATE3 Owner’s Manual for more detailed instructions on configuring and enabling the Network or Serial Data Stream.

- STEP 4. If your system includes a FLEXnet DC monitor, only Shunt 1 (A) is enabled by default. If you are using Shunt 2 (B) and/or Shunt 3 (C), then they **must be enabled on the MATE3** in order to receive data for them. This is done from the **Main Menu/Settings Menu/Battery Monitor/Shunt Enable** screen on the MATE3.
- STEP 5. Connect your MATE to the monitoring computer (or router) using a CAT5 network cable. (See **MATE3 Connection Options** above.)



NOTE: For MX-60 charge controller data reception, the MX itself must be displaying the **Status** screen. Going to another screen on the MX (e.g. the MISC screen) can lock data values, resulting in invalid PV Amps being reported. This is a known OutBack bug which does not apply to FLEXmax charge controllers.

(At this time, you may also want to turn on the MATE3's own internal data logging capabilities. See [MATE3 Data Logging](#) for more details.)

Your MATE3 is now ready. Proceed to STEP 6 under [WattPlot VisualMATE Program Installation](#).

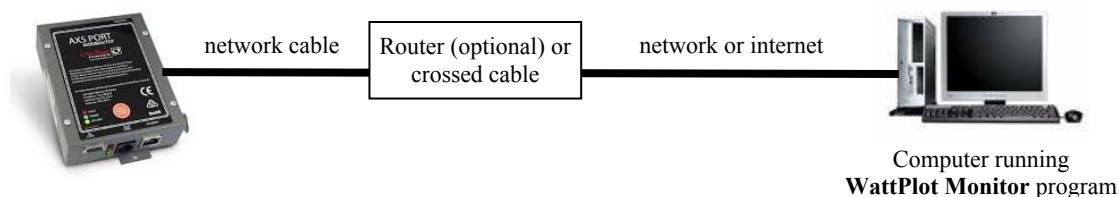


AXS Port Connection

The AXS Port device uses the Modbus protocol to create a link between your system and your computer. By adding it to your local network, WattPlot can query the device for system data on a regular basis.

TCP/IP Connection:

The AXS Port communicates via a CAT5 network cable. Please refer to your AXS Port Owner’s Manual for detailed instructions on completing this connection. Note that unlike the MATE and MATE3 devices, the AXS Port does not specifically supply a data stream. Instead, WattPlot polls it for data every second. (The polling frequency may be user-adjustable in future releases.)



The AXS Port does support remote commands and system setting programmability, however that functionality is not implemented in WattPlot at this time.

AXS Port Setup

- STEP 1. Ensure that your AXS Port device is properly connected to your OutBack inverter, charge controller, or HUB, depending on your specific system configuration. (Refer to your AXS Port manual for details.)
- STEP 2. Connect your AXS Port to the network (or computer) using a CAT5 network cable.
- STEP 3. The AXS Port is accessed by an IP Address. This can be dynamically set automatically by the local network (DHCP), or you can program a static IP address into the device. The DHCP setting is the default for the AXS Port device. While WattPlot supports both options, the static IP address option assumes that other software was used to program it into the AXS Port. WattPlot does not currently support this capability.

Proceed to STEP 6 under [WattPlot VisualMATE Program Installation](#).



TCP Client Setup

Instead of connecting WattPlot VisualMATE directly to a MATE or MATE3 device, you can use it as a remote or auxiliary display of the data stream flowing into a separate (licensed) WattPlot application. No VisualMATE activation license is required to use it in this way.

- STEP 1. Install and run a separate licensed WattPlot application that supports the WattPlot TCP Server functionality (such as WattPlot Monitor, NetMATE, or another copy of VisualMATE).
- STEP 2. Connect your other WattPlot application to a MATE or MATE3 device, following the instructions in the User's Guide for that product
- STEP 3. Run the WattPlot TCP/IP Server from the MATE Data Source Dialog box of the other WattPlot program. (Refer to the User's Guide of that program for details.)
- STEP 4. Note the TCP/IP address of the computer running the other WattPlot application and the TCP/IP port number used by the remote WattPlot TCP Server. You will need these to connect this WattPlot VisualMATE as a TCP Client.
- STEP 5. Leave the other WattPlot program running so that VisualMATE will have something to connect to.

Your data stream should now be ready and available from the other WattPlot program's TCP Server. Proceed to STEP 6 under [WattPlot VisualMATE Program Installation](#) on the next page.



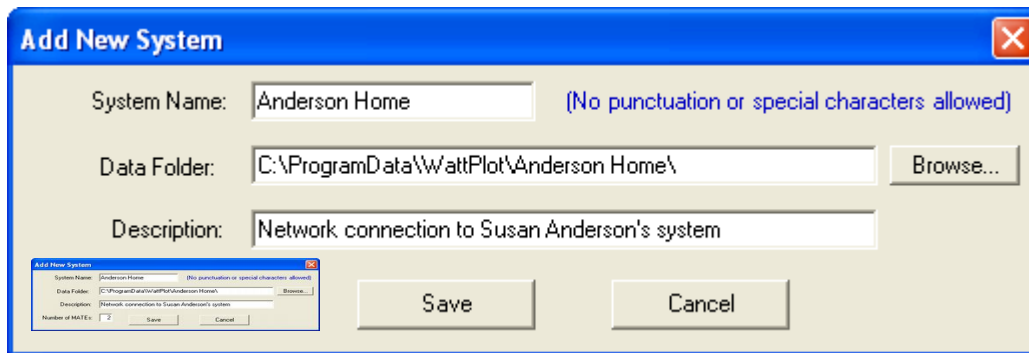
WattPlot VisualMATE Program Installation

If you've completed the steps for **MATE Setup** or **MATE3 Setup**, you can continue with program installation:

- STEP 6. From <http://WattPlot.com/VisualMATE.htm>, download the WattPlot VisualMATE setup application, called `VisualMATESetup.msi`.
- STEP 7. Save the downloaded file on your computer and run `VisualMATESetup.msi` (a Windows Installer Package). The setup program will guide you through the installation process. We recommend installing the program (`VisualMATE.exe`) in the default folder specified, which is `Program Files\WattPlot`. The installation process will also add a shortcut and other Resources to your Windows Start menu.
- STEP 8. To run the program, click on the WattPlot VisualMATE entry of the Windows Start menu (under All Programs... WattPlot). When WattPlot VisualMATE is first run, you may be asked to **Accept** the End User License Agreement, a copy of which is included in this manual.

The remaining steps may or may not be prompted for, depending on whether this is your first WattPlot software installation, or if WattPlot VisualMATE can use settings that you already have on file.

- STEP 9. If your computer is connected to the internet, then you will be prompted to enter your email settings. (See the **Email Settings** section.)
- STEP 10. You will then be prompted to enter a brief descriptive System Name for this installation:



The **System Name** identifies this particular MATE connection and the OutBack system that it monitors. It will be included in any emails that WattPlot software sends out.

NOTE: System Names cannot be easily changed after they have been defined. Please contact WattPlot Support if a change is required.

The **Logs Folder** specifies where WattPlot will store configuration data. It is recommended that you accept the default. You can always change this location later.

If you are defining multiple systems or connection methods, use the **Description** field to



provide more details.

- STEP 11. You will next be prompted for the serial number of your OutBack MATE unit. (See STEP 1 of the MATE or MATE3 Setup sections.) The full serial number is required, including any leading letters.

NOTE: If you want to run WattPlot VisualMATE as an unlicensed TCP Client only, getting its data stream from a separate licensed WattPlot program, simply enter “UL” as the MATE serial number.

- STEP 12. After the MATE serial number has been verified, you must activate the WattPlot VisualMATE program with a license code from [intallact](#), unless you entered a serial number of “UL”. (See [Activation](#) below.)
- STEP 13. Configure the MATE Data Source for WattPlot VisualMATE. (See [MATE Data Source Definition](#) below.)
- STEP 14. Finally, if you are using the built-in WattPlot VisualMATE TCP Server to supply the data stream to other monitoring computers or programs, you will need to configure that. (See the [WattPlot TCP/IP Server](#) section. Not available for unlicensed installs of this program.)

That’s it! WattPlot VisualMATE is now ready to monitor your MATE or MATE3 data stream and display real-time information, etc.

More information is available in the [Using the WattPlot VisualMATE Program](#) section.

Release Announcements and other Special Notifications

Installations of WattPlot VisualMATE that are connected to the internet will check for new releases of the software and other special notifications from WattPlot. You will be advised if a new version of WattPlot VisualMATE has been released into production when you first run the program.

You can adjust how often WattPlot VisualMATE checks for such notifications, using the dropdown menu at the bottom of the notification screen, or even turn them off all together. (See [Check for New Release](#).) Note that installations with AutoStart turned on will **not** receive these notifications, allowing the program to go directly to work when Windows starts.

You can also request a manual check for a new release and other special notifications, using the [Check for New Release](#) entry of the File menu.



Email Settings

WattPlot VisualMATE has a built-in email capability. Email can be used to:

- Activate your software automatically.
- Send error messages to WattPlot’s technical support for fast resolution.

The Email Settings dialog box will be presented early in the installation process. You can also access it later from the Email Settings entry of the Options menu.

Local (From) Address This is the email address that you normally send from. Emails sent by WattPlot VisualMATE will have this address as the ‘reply-to’. It will also be the address system event notifications will be sent to if no Default ‘TO’ Addresses are specified.

Default ‘TO’ Address(es) You can specify one or more email addresses which will receive WattPlot VisualMATE’s system event notifications. If none are specified, the Local (From) Address will be used. All email addresses must be of the “account@domain.ext” format.

SMTP Login

The second section is where you specify your SMTP Server, Port number (if required), SSL Option, User Account, and Password. (The Common Providers menu has the settings for AOL, AT&T, Comcast, Gmail, Hotmail, Lycos, Outlook.com, Verizon, and Yahoo.) The server, user account, and password must be present in order to save the data on this screen. If you are not sure what these settings should be,



you can often get them by looking at the settings in your regular e-mail program. If you read your mail on-line through a browser, those sites will often have instructions on how to send via SMTP as well.

Some common SMTP Host servers (such as “smtp.gmail.com”) are recognized by WattPlot and will have various other settings defaulted in for you.

Your SMTP Login password and other settings are stored securely in WattPlot’s local data folder in a file called `vbmail.dat`. WattPlot VisualMATE will only ever transmit data or settings specific to the WattPlot software. Login settings will never be transmitted.

Test

It is strongly recommended that you test your SMTP settings. You can test them by clicking the **Test** button. A test email message will be sent using the specified **Local (From) Address** as both the sender and recipient. If all of the settings are correct, you should see the test email message when you check your email at that address. Note that there may be a slight delay while the SMTP server processes the email.

System Configuration

WattPlot VisualMATE needs to know the MATE communication set-up that you are using, and what OutBack components are connected to your system. The communication parameters are specified in the **MATE Data Source dialog box**, which will be offered the first time that WattPlot is run on your computer.

Most connection types require a valid activation, which will be prompted for when you attempt an active connection. See [Activation](#).

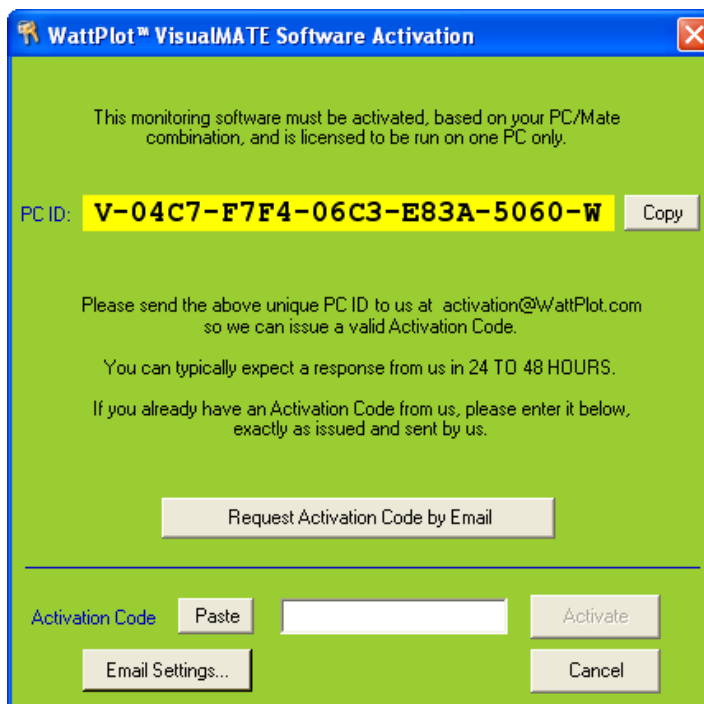


Activation

WattPlot VisualMATE does not require an Activation if you are using the program as a TCP Client to piggy-back off a WattPlot TCP/IP Server, but the WattPlot tool that is running the TCP/IP Server to be connected to will have to be licensed.

Otherwise, it will ask if you want to initiate the Activation procedure, starting with a prompt to enter your MATE serial number. (See STEP 1 of the MATE or MATE3 Setup sections.) The full serial number is required, including any leading letters. (This prompt may not apply for Modbus connections.)

After the device serial number has been verified, the program will display a Unique PC ID for your computer and prompt for an Activation Code, as shown at right.



If you have entered [Email Settings](#), and your computer can access the internet, WattPlot VisualMATE can automatically register your system and issue you with a trial Activation Code, as indicated by the large button labeled **Request Immediate Trial Activation by Email**. If WattPlot can request an activation but cannot issue an automatic one for any reason, then this button may be labeled **Request Activation Code by Email**, which means that we will have to issue an Activation Code manually (usually within 24-48 hours). If email is not possible for some reason, then no such button will be visible.

If WattPlot cannot automatically email your activation request, please take note of the unique PC ID that is displayed (which will be different from the one shown above) and then click **Cancel**. You will have to email that PC ID to us at **activation@WattPlot.com** so that we can get a valid Activation Code to you. You can typically expect a response with your Activation Code in **24 to 48 hours**.

When you receive your Activation Code, run the program again and enter the code at this prompt EXACTLY as you received it. (We suggest a copy-and-paste from our email directly into the activation screen input field.) Click **Activate**.

Note: If you are currently working with an evaluation copy of WattPlot, and have purchased a permanent license, you can recall this window to enter your new permanent Activation Code by selecting **License Activation** from the **File** menu.

IMPORTANT NOTICE

WattPlot Activation Codes are issued ONCE. If you later want to move this license to a different PC, you can do that yourself. (See [Moving your WattPlot™ License](#) section.)



MATE Data Source Dialog Box

The MATE Data Source dialog box is accessed from the MATE menu. It defines where WattPlot will be getting its data from, and the communication protocol to be used. The following table gives a summary of the possible Data Sources and the corresponding Communication protocols:

Data Source	Communication Protocol	Notes
MATE / MATE2	Serial cable to COM port	Simple serial cable connection from 9-pin MATE connector to PC COM port.
	Serial/USB converter	Conversion cable connection from 9-pin MATE serial connector to PC USB port (with driver to create a virtual COM port).
	TCP/IP using Serial-to-IP converter	Serial cable connection from 9-pin MATE connector to Serial-to-IP converter. Resulting TCP/IP data stream is accessible by a specific IP address and port.
	Virtual COM port using Serial-to-IP converter	Serial cable connection from 9-pin MATE connector to Serial-to-IP converter. Resulting TCP/IP connection is converted to a virtual COM port on receiving computer.
MATE3	Network cable(UDP/IP)	This is the standard protocol for the MATE3. Data is sent through a CAT5 network cable to the specified IP Address and IP port.
	DHCP (MATE3 Modbus IP address assigned by network)	WattPlot will access the MATE3 via a Modbus TCP/IP address assigned by the local network. (The default setting for MATE3 Modbus.)
	Static (MATE3 Modbus IP address set by you)	WattPlot will access the MATE3 via a Modbus TCP/IP address specifically programmed into the device.
	USB (optional MATE3 USB card installed)	Optional connection method for the MATE3. (Requires a USB card to be installed in the MATE3.) Data is sent directly from the MATE3 to a USB port.
AXS Port	DHCP (AXS IP address assigned by network)	WattPlot will access the AXS Port via an IP address assigned by the local network. (This is the default setting on the AXS Port.)
	Static (AXS IP address set by you)	WattPlot will access the AXS Port via an IP address specifically programmed into the device. (This assumes other software was used to program the AXS Port. WattPlot does not currently support this capability.)
TCP Server	TCP/IP to a remote WattPlot program	This application will run as a TCP Client to a WattPlot TCP Server running on another computer.
	TCP/IP to another WattPlot app. on this PC	This application will run as a TCP Client to a WattPlot TCP Server running on this computer.
Data File	Packets read from file (simulation)	Instead of getting live data from a MATE, WattPlot can work from data previously captured and stored in a text file. (See Advanced Settings for how to use WattPlot to create these files.)



To define a new connection, begin by selecting the **Data Source** from the dropdown menu at top left of the MATE Data Source dialog box. The **Communication** menu next to it will then contain the possible protocols for the selected data source.

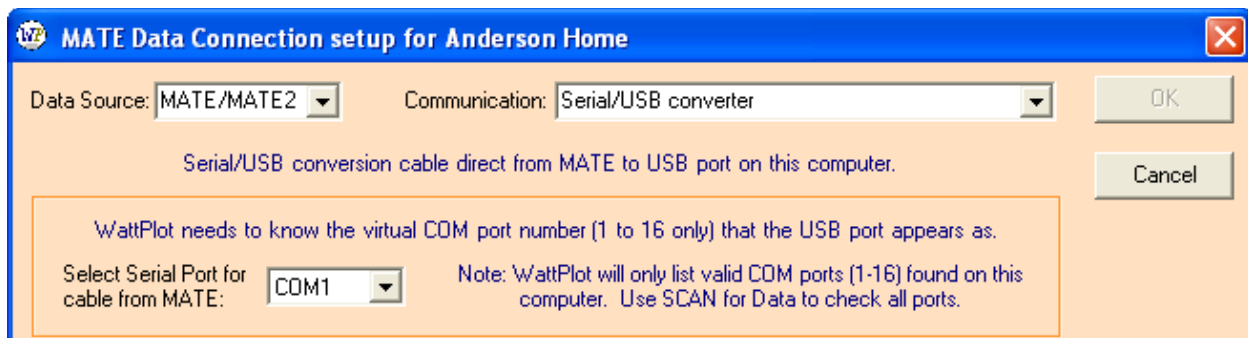
The next section of the screen will change to accept the additional settings required for the selected communication protocol, as described separately below.

(Note that the WattPlot Connection Wizard, available in past versions of WattPlot, has now been replaced by this simplified and more sophisticated MATE Data Source dialog box.)

Serial Connection (MATE/MATE2)

Serial cable to COM port
or Serial/USB converter
or Virtual COM port using Serial-to-IP converter

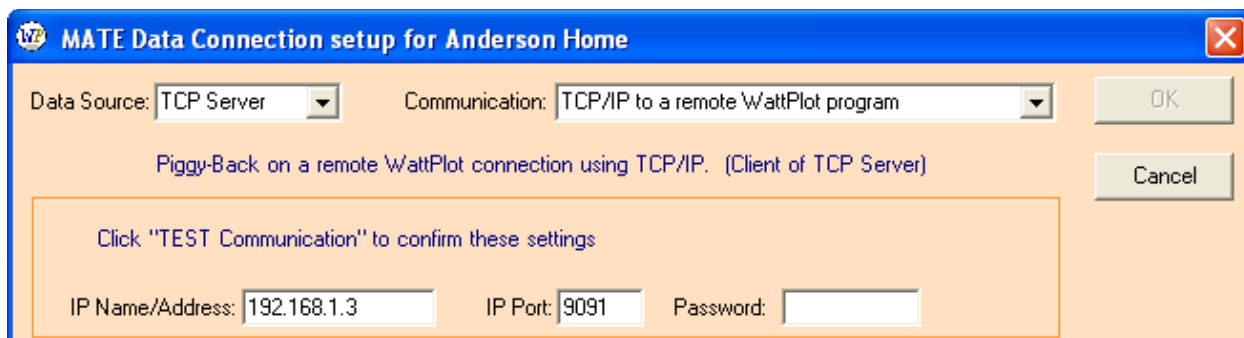
The default setup of the original OutBack MATE is **not** configured to transmit performance data. You must turn on this feature. From the main menu on the MATE select **SETUP**, then **MATE**, then **PG2**, then **COMM**, then **PC**, and then **ON**, to activate the serial communications port on the MATE.



WattPlot will ask you to specify the serial COM port that applies to the MATE connection. It could be a physical COM port, or it might be a virtual COM port created by the specific communications software that you are using. Only COM ports found by WattPlot on your computer (from COM1 to COM16) will be presented as options. See the [Data Source Dialog Box Remainder](#) for more information (including what to do if you are not sure of the COM Port).

TCP/IP Connection

TCP/IP using Serial-to-IP converter
or TCP/IP to a remote WattPlot program
or TCP/IP to another WattPlot app. on this PC



WattPlot will ask you to specify the IP Name/Address and IP Port, corresponding to your Serial-TCP/IP conversion device or [WattPlot TCP/IP Server](#). If this is a TCP client/server connection, it will also prompt for the optional Password. See the [Data Source Dialog Box Remainder](#) for more information.

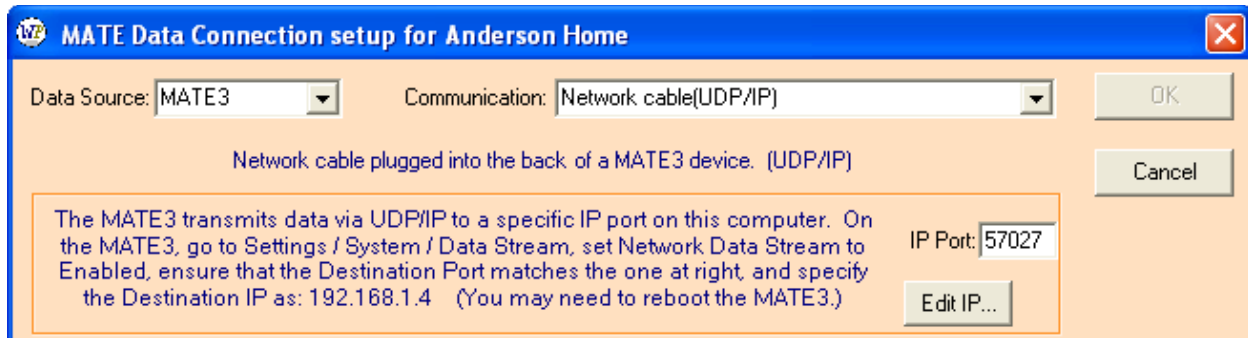
- IP Name/Address** Enter the IP name or address of your Serial-TCP/IP conversion device (or separate WattPlot TCP/IP Server). Note that you cannot use TCP/IP to connect directly into your MATE3. The MATE3’s TCP/IP address is for web browsers only. See the [UDP/IP Connection](#) instead.
- IP Port** This is the IP port corresponding to your Serial-TCP/IP conversion device (or separate WattPlot TCP/IP Server – default is 9091).
- Password** If you are connecting into a separate WattPlot TCP/IP Server with restricted access, you will need to enter the corresponding password here.

UDP/IP Connection (MATE3)

Network cable(UDP/IP)

The typical connection method for MATE3 devices is UDP/IP. This protocol involves the MATE3 ‘pushing’ data out to an IP Address and port that you specify in the MATE3 settings. This is described in Step 3 of the [MATE3 Setup](#). From the MATE3’s Main Menu, go to **Settings, System**, then **Data Stream** to setup the Network Data Stream:

Data Stream	
Serial Data Stream	Disabled
Serial Baud Rate	19200
Network Data Stream	Enabled
Destination IP	192.168.001.028
Destination Port	57027



The IP Address of the PC in this example is 192.168.1.4. The only setting that WattPlot needs to know is the IP port that the MATE3 will be pushing data out to. See the [Data Source Dialog Box Remainder](#) for more information.

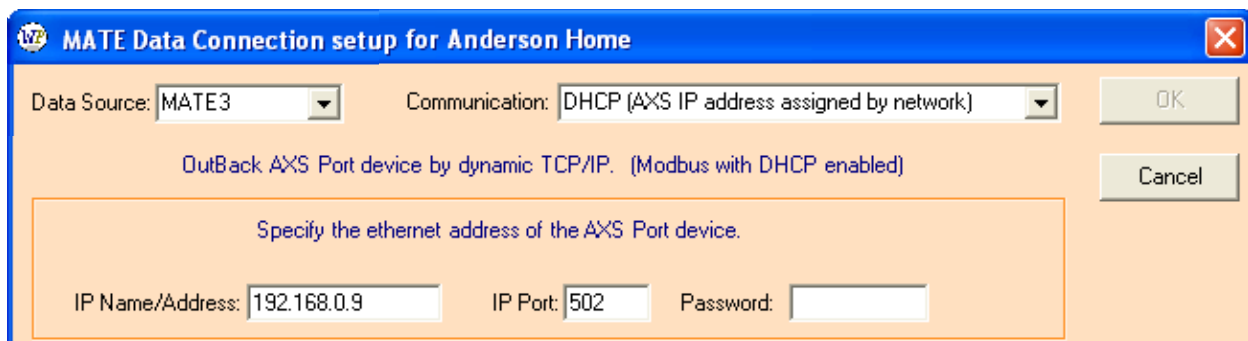
IP Port This port should be the same port that you specified on the MATE3 as the Destination Port. (Default is 57027.)

Edit IP The MATE3 needs a Destination IP – that being the local IP address of this computer – in this format: ###.###.###.###. Normally WattPlot can easily determine the IP address of the computer that it’s running on, and it will display it in the instructions, as shown above. However, in rare circumstances (such as when WattPlot is being run under Windows emulation software), you will have to determine the IP address yourself. (The IP address can usually be determined by going to the Windows Command Prompt and running “ipconfig”.) You can then supply it here by clicking the **Edit IP** button so WattPlot has a record of it, but remember – it is the MATE3 that needs this setting, not WattPlot!

Modbus/TCP Connection (MATE3)

- DHCP (MATE3 Modbus IP set network)
- Static (MATE3 Modbus IP set by you)

The MATE3 can also be accessed by Modbus/TCP, either at an IP address assigned by the network (with DHCP enabled) or at a user-specified IP address (with DHCP disabled).



WattPlot will ask you to specify the MATE3 IP Name/Address and IP Port. See the [Data Source Dialog Box Remainder](#) for more information (including what to do if you are not sure of the IP address).



IP Name/Address	Enter the IP name or address of your MATE3 device.
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.

Note that under the Modbus protocol, MATE3 data is polled by WattPlot. The default frequency for monitoring system data is once per second. This can be modified in Advanced Settings (see [Advanced Settings](#)).

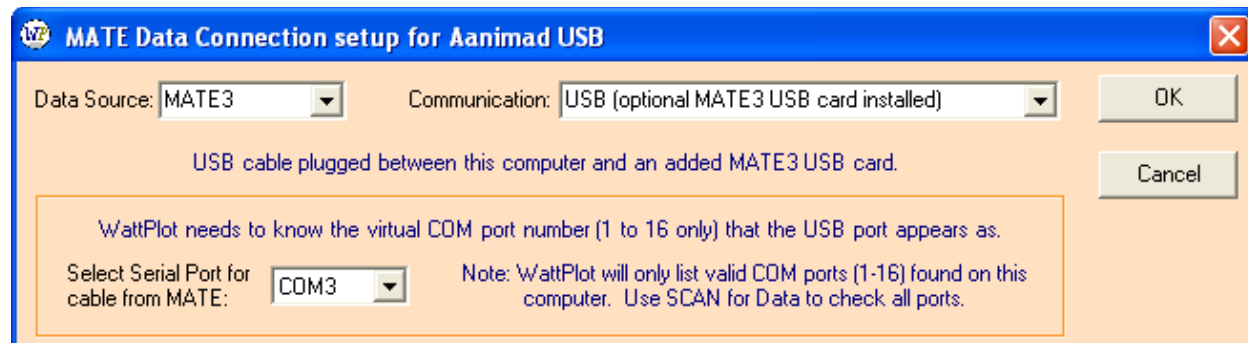
USB Connection (MATE3)

USB (optional MATE3 USB card installed)

By installing the optional MATE3 USB Card from OutBack, you can add a new level of powerful connectivity to your MATE3, including support for sending commands to control your MATE3 remotely. The MATE3 setup for USB is described in Step 3 of the [MATE3 Setup](#). From the MATE3’s Main Menu, go to **Settings, System**, then **Data Stream** to enable the Serial Data Stream:

Data Stream	
Serial Data Stream	Enabled
Serial Baud Rate	19200
Network Data Stream	Disabled
Destination IP	192.168.001.028
Destination Port	57027

You will also need to install the USB driver that came the USB card on to your computer. This driver will make the MATE3 USB connection available as a regular serial COM port. See your MATE3 Owner’s Guide for details.



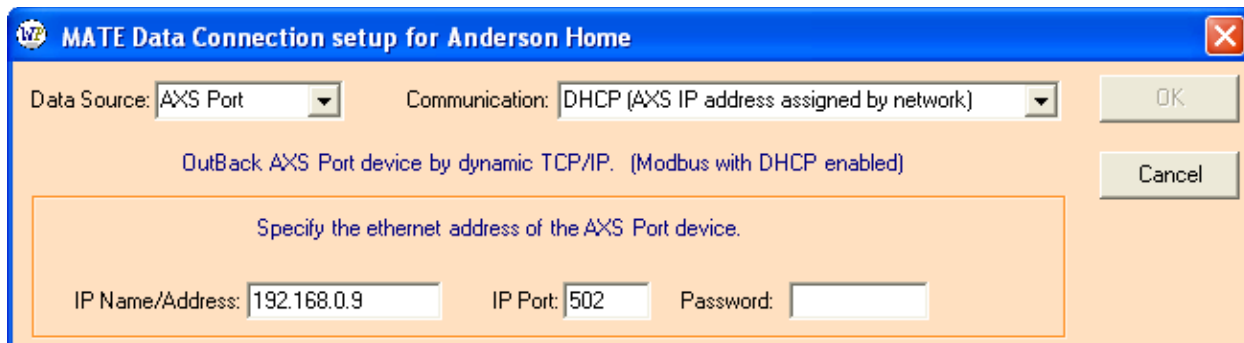
WattPlot will ask you to specify the serial COM port that was created by the USB driver. Only COM ports found by WattPlot on your computer will be presented as options. See the [Data Source Dialog Box Remainder](#) for more information (including what to do if you are not sure of the COM Port).



AXS Port Connection

- DHCP (AXS IP address assigned by network)
- Static (AXS IP address set by you)

The OutBack AXS Port device is accessed by TCP/IP, either at an IP address assigned by the network (with DHCP enabled) or at a user-specified IP address (with DHCP disabled).



WattPlot will ask you to specify the AXS Port IP Name/Address and IP Port. See the [Data Source Dialog Box Remainder](#) for more information (including what to do if you are not sure of the IP address).

IP Name/Address	Enter the IP name or address of your AXS Port device.
IP Port	This is the IP port that your AXS Port is using for Modbus communication. (The default is 502.)
Password	If you have programmed your AXS Port with a password, you will also need to supply it here.

Note that AXS Port data is polled by WattPlot. The default frequency for monitoring system data is once per second. This can be modified in Advanced Settings (see [Advanced Settings](#)).

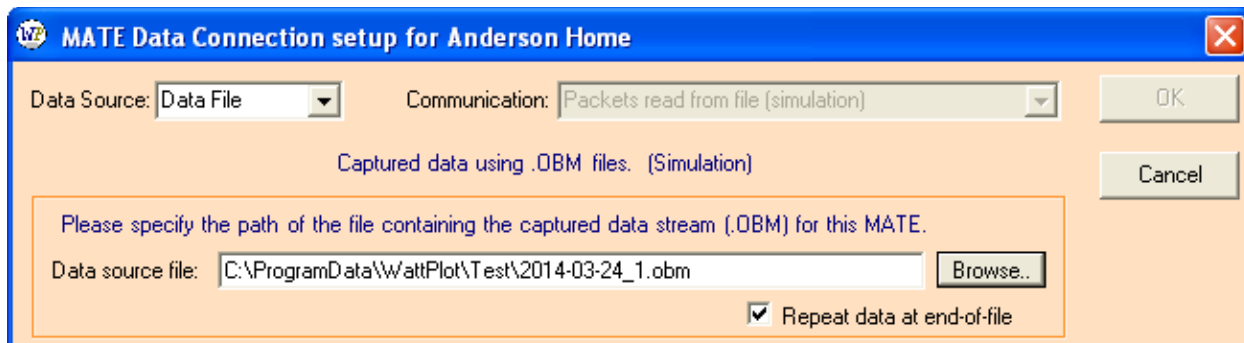
Data File Connection

Packets read from file (simulation)

It is sometimes useful to be able to demonstrate the operation of WattPlot when there is no live MATE currently connected to the system, especially when trying to explain the operation of the program or of the OutBack system. This simulation functionality is built into WattPlot.

To use existing data instead of a live system connection, select **Data File** as the Data Source. WattPlot will prompt you for a Data Source file (with an `.OBM` extension – see [Advanced Settings](#) for how to create these). The Advanced Settings will also let you select a data stream running at twice the normal speed for faster simulations.

Note that any changes made to the various WattPlot settings (such as display options, window placement, etc.) will be saved to the configuration file, just as if WattPlot was running live.



See the [Data Source Dialog Box Remainder](#) for more information.

Data source file The file containing the raw MATE data strings, created by an earlier run of the Monitor program or other WattPlot tool. These files typically have an .OBM extension (for OutBack MATE data). If the file exists, then the first few lines of data will be shown in the display window.

NOTE: If the devices in the data file don't match the devices in your system, it is recommended that you create a new [System Definition](#) so that you can keep the configurations separate.

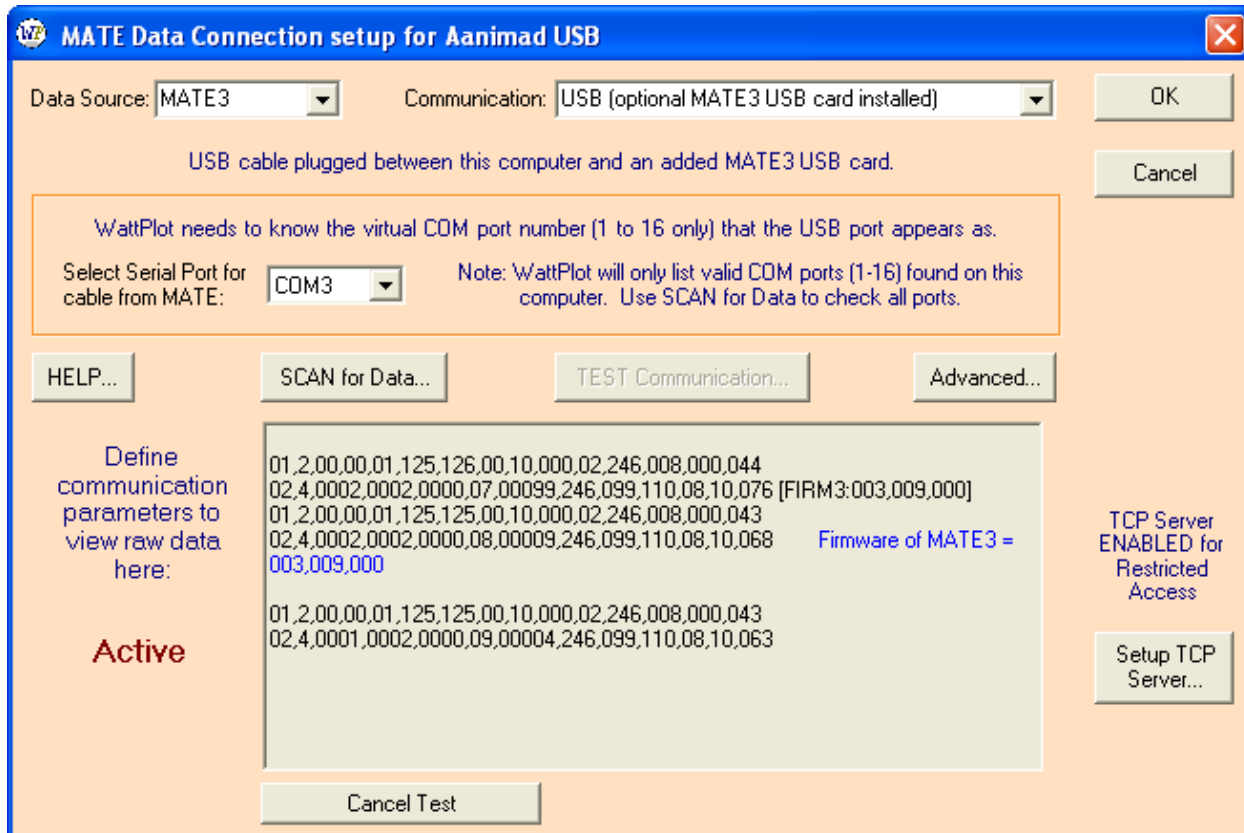
Browse Allows you to find the Data source file you want to use.

Repeat data at end-of-file If this option is checked, then when WattPlot reaches the end of the captured data, it will return to the beginning. If the option is not checked, then WattPlot will stop when it gets to the end of the data.



Data Source Dialog Box Remainder

WattPlot only allows you to click the OK button when the communication settings have been confirmed. In this case, you will typically see OutBack system data in the large results window, and the status in the lower left will be **Active**, as shown:



There are also a few other features worth noting:

HELP

Some communication protocols require special set ups on the connection device itself. Clicking the HELP button will display any special set up instructions.

SCAN for Data

If you are not certain of the connection parameters, but all hardware connections have been made, WattPlot can do some sophisticated scanning of your PC communication ports in an attempt to find the correct settings. For example, if the selected protocol uses a COM port, WattPlot can scan COM ports 1 through 16, looking for OutBack system data.

Better yet, if you are unsure of an 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.



- TEST Communication** After you have changed some communication parameters, you can test the new settings by clicking this button. You may have to click this button in order to enable the **OK** button so that you can save your settings.
- Advanced** Takes you to advanced settings, described in the **Advanced Settings** section.
- Cancel Test/Port Scan** Click this button to cancel a communication test or port scan, and suspend any data stream.
- Setup TCP Server** Click this button to configure the **WattPlot TCP/IP Server**.

The large Results Window in the center of the MATE Data Source dialog box will show the progress of your setup activities. The contents are color-coded:

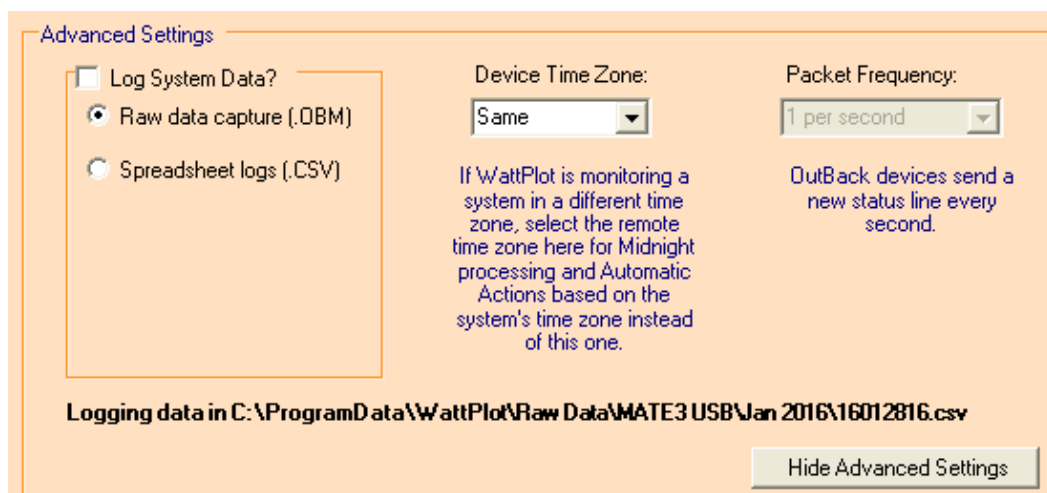
- Black** Actual system data coming over the link
- Green** Requests or actions being undertaken by WattPlot
- Blue** Information derived by WattPlot
- Red** Error messages

WattPlot TCP/IP Server

It is typically only possible to connect one computer to a MATE, MATE3, or AXS Port, however there are ways in which multiple computers can access the same OutBack system data in real time. WattPlot has a built-in TCP/IP Server (configured from the MATE Data Source window by clicking the **WattPlot as TCP Server** button), allowing other programs to ‘piggy-back’ on to this program’s system data stream. For more information on how to set this up, see [Monitoring Another Copy of WattPlot](#).

Advanced Settings

Clicking the **Advanced** button of the Data Source dialog box takes you to Advanced Settings:





Advanced settings presently consist of the following:

Log System Data	WattPlot can capture raw system data and write it to text files. This capability is applicable to all connection types (except Data File), and is turned on or off with the Log System Data box. There are two supported formats:
Raw data capture (OBM)	There is one file per MATE per day, found in the WattPlot Data folder and named <i>yyyy-mm-dd_n.obm</i> , where <i>yyyy-mm-dd</i> is the date and <i>n</i> is the number of the MATE (typically “1”). Files of this format can be used for simulations, using a Data Source of Data File . NOTE: The MATE transmits approximately 3 KB per minute for each device , so the captured data file will grow by over 175 KB per device every hour .
Spreadsheet logs (.CSV)	Creates the equivalent of the MATE3 SD Card data files (compressed format). There is one file per hour, found in the WattPlot Data folder and named <i>yyymmddhh.csv</i> , where <i>yyymmddhh</i> is the date and hour. (This option is not available to systems defined with more than one MATE.) NOTE: Each hourly data file will be about 185 KB per device every hour .
Device Time Zone	Certain events and tally resets take place at midnight. If the system you are monitoring is in a different time zone, you can select it here in order to keep your data and automatic actions synchronized with the actual system events. Otherwise, we recommend that you just leave it as “ Same ”.
Packet Frequency	Some communication protocols (AXS Port and Data File) support variable data frequency. This allows less frequent polling of an AXS Port , or faster simulations from data files. Most OutBack devices are fixed at status data being sent every second. NOTE: The TCP/IP Server function is not available when using the Fast setting for Data File simulations, since clients will not be expecting data packets at twice the frequency.
Hide Advanced Settings	Hides the Advanced Settings panel and returns you to the full Data Source dialog box.

The bottom of line of the Advanced Settings panel tells you where WattPlot is logging system data. This can be altered from the **Options** menu.

NOTE: WattPlot only allows you to click the **OK** button when the communication settings have been confirmed. In this case, you will typically see OutBack system data in the results window and a Status of **Active** in the bottom left of the dialog box. Even if you have not changed you communication parameters, you may in some cases have to click the **Test Communication** button in order to enable the **OK** button so that you can save other settings.



When you have completed the definition of your connection using the MATE Data Source dialog box, click **OK** to save your setup. (This dialog box can be recalled by selecting **MATE Data Source** from the **Options** menu.)

Setup Complete!

You have now installed the VisualMATE program, and it is ready to display and record performance data from your system!

Click **OK** to proceed to the main program interface.

More information is available in the [Using The WattPlot VisualMATE Program](#) section.



Using WattPlot™ VisualMATE

General Operation Overview

Most systems with more than one OutBack component (inverters, charge controllers, etc.) will include an OutBack HUB networking device. The OutBack MATE or MATE3 collects data from the OutBack components through this HUB device. Alternatively, the MATE/MATE3 can be connected directly to a single OutBack component.

The origin of all real-time data gathered by WattPlot VisualMATE is the data stream of a MATE/MATE3 device connected to a system with OutBack components.

Once all of the communications are configured, WattPlot VisualMATE can be run at any time to display the activity of your system. When started, the program will immediately make a connection with the MATE and start showing power flow.

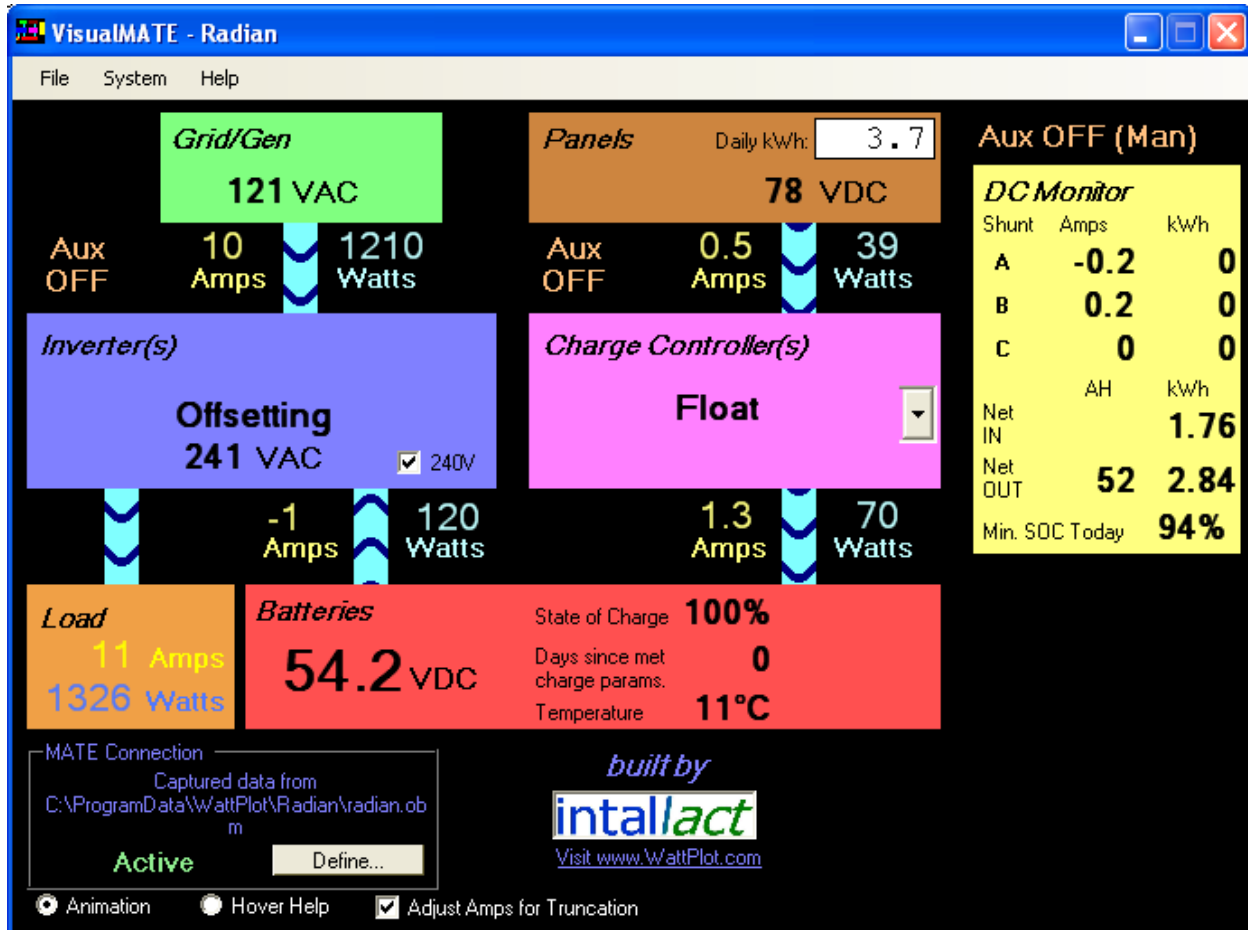
If you have a MATE3, then you can also monitor that device live with WattPlot VisualMATE, and you can also have perform data gathering. The MATE3 has its own built-in ability to log full status data on an SD memory card – no computer or running WattPlot is required. The drawback of this system is that the raw data written to the SD card is extensive and difficult to interpret. You might want to consider easy to use tools such a WattPlot SumMATE (available separately) that can read the SD card, analyse and summarize the data, and turn it into powerful information. You should also note that our flagship application, WattPlot Monitor, has all of the capabilities of WattPlot VisualMATE and SumMATE (and a whole lot more) all in one package.



Program Interface

The main program display is a graphical view of the components found in the data stream:

European users please note: WattPlot supports international decimal formats. What will appear in this manual as “25.6” will be displayed as “25,6” etc., if your computer is setup for European decimal format.



(Note that some components may be absent for your system.)

Grid/Gen The green box represents the external power grid or generator (i.e. an AC power source). The box indicates the current **incoming** voltage.

Below this box, the amperage, wattage, and direction of any power flow between the AC power source and the Inverter(s) will be indicated.

Inverter(s) The blue box represents any inverter(s) found in the data stream. The main text (e.g. Pass Through) indicates the current operating mode of the master inverter. If there are other inverters, a dropdown list will show their operating modes. The voltage shown is the **outgoing** voltage of the master inverter. This box will also indicate any warning or error conditions detected. For domestic Radian hybrid inverters, a check box will allow you to choose 240V (versus 120V) wiring.



The **Aux ON/OFF** message above this box shows the present state of the master inverter’s Aux port.

Below this box, AC power flow to the Load and the **AC amperage** and wattage of any power flow between the inverter(s) and the Batteries will be indicated. **NOTE:** These values are often confusing to users. They indicate the AC power being produced by the inverter(s) from battery power, **NOT** the DC amps being drawn from the batteries.

Load The orange box represents any load connected to the system. If there is a load drawing power from the Inverter(s), the amperage and wattage will be given in this box.

Panels The brown box represents generated power sources supplying power to the Charge Controller(s). This is typically photovoltaic panels. The box indicates the current DC voltage from the PV array, as measured at the charge controller(s) input terminals. The accumulated total Daily kWhs, as reported by the charge controller(s), will also be shown. (With later MATE revisions, hovering your mouse over the Daily kWh value will also show the Daily AmpHours.)

Below this box, the amperage and wattage of any incoming power flow into the Charge Controller(s) will be indicated.

Charge Controller(s) The pink box represents any charge controller(s) found in the data stream. The main text (e.g. **Silent**) indicates the current operating mode of the first charge controller. If there are other charge controllers, a dropdown list will show their operating modes (as indicated by the arrow button in the screen example above. This box will also indicate any warning conditions detected.

Below this box, the amperage and wattage of any power flow from the charge controller(s) and the Batteries will be indicated.

Batteries The red box represents the Batteries connected to the system, and indicates the present (non-temperature-compensated) DC voltage of the battery bank.

If there is a FLEXnet DC Monitor included in the system, then this box will also show the present State of Charge, the Days since the charge parameters were last met, and the present battery bank Temperature (if a Remote Temperature Sensor is connected). If the temperature is available, then hovering the mouse over this field will show both Celsius and Farenheit values, and the temperature compensated voltage. Otherwise if there is no RTS or the temperature is out of range (-10 to 60 °C), then “n/a” will be displayed.

If there is no FLEXnet DC, then the increments of the DC voltage value will depend on the nominal voltage of the battery bank (0.1 for 12V systems, 0.2 for 24V, and 0.4 for 48V).

DC Monitor The yellow box displays extra battery bank data, as provided by a FLEXnet DC Monitor (FnDC), if one is present. The first six values are the **present amps** flowing through the three shunts, and the corresponding **accumulated net kilowatt-hours** flowing through each shunt since the last reset (done when charge parameters are met).

The lower half of the box shows today’s battery **net input and output** kilowatt-hours



(and amp-hours), as summed by the FnDC from *all* shunts, since midnight (by the clock on the MATE). It also shows the lowest State-of-Charge (as a percentage) recorded by the FnDC for the battery since midnight.

The **Aux ON/OFF** message above this box shows the present state of the FnDC’s Aux port, and whether it is in Manual (**Man**) or Automatic (**Auto**) mode.

MATE Connection

The black box at bottom left shows a description of the data connection to the MATE or MATE3 device (e.g. **Serial connection to COM1**), and the current status of the connection (e.g. **Active**). Click the Define button to open up the MATE Data Source Dialog Box for configuring the data connection.

Animation

VisualMATE offers a choice between **Animation** or **Hover Help**. The **Animation** option turns on the movement of the blue arrows, indicating power flow between components. The speed of the arrows is roughly proportional to the amount of power flow.

Hover Help

VisualMATE offers a choice between **Animation** or **Hover Help**. The **Hover Help** option turns on the display of additional information when you hover the mouse over certain fields.

Adjust for amps truncation

Most OutBack devices *truncate* their reported amperage value to the next **lower** integer

Adjust Amps for Truncation

Most OutBack devices *truncate* their reported amperage value to the next **lower** integer value, rather than *rounding* it to the nearest integer value. This can result in under-reported currents and wattages. WattPlot can compensate for this by adding 0.5 Amps to appropriate reported values when devices are in relevant operating modes, resulting in more accurate power summaries. See the next **Display of Values Adjusted for Truncation** section for more details.



Program Menus

File – License Activation

When you first download and install WattPlot VisualMATE, you can choose to run it in unlicensed (TCP Client only) mode, or you can be issued a trial activation, good for about two weeks. If you later decide to order a permanent activation, WattPlot will issue you with a permanent activation key, which must be entered from this menu option. Selecting **Licence Activation** will present you with the **Activation dialog box**, where you may enter the activation key.

File – Move License to New PC

(Please see the section on **Moving Your WattPlot Monitor License**.)

File – Check for New Release

If WattPlot VisualMATE is running on a computer with internet access, you can ask it to automatically check for new releases of the program itself. This is similar to what it already does automatically when you first run the program. All notifications will include a few notes about the program changes, and a link to read more details and to download the latest version. (NOTE that if the program auto-starts, this step will be bypassed, allowing the program to run unattended.)

The frequency with which you will be informed of a new release is configurable using the drop-down menu at the bottom of the Special Notifications screen. Depending on the option selected, when a new version of VisualMATE is released into production, the program will notify you no more often than every 10, 24 (default), or 90 days. If the fourth option (Disable all release and special notifications) is selected, you will not be automatically notified of any new releases or special notifications. **If you select this option, it is recommended that you do a manual check from the Options menu every 6 months.**

Note that normally special notifications are one-time messages that only appear once (at program start up) and will not be repeated. However, if you use this menu option to check for new releases and special notifications, all current special notifications will be shown.

If your computer is not connected to the internet, or you have disabled this feature, you can check for software updates yourself by going to <http://WattPlot.com/update.htm>.

File – MATE Data Source

Invokes the **MATE Data Source Dialog Box** to configure the connection to the MATE. This dialog box also gives access to configuring the WattPlot TCP/IP Server.

File – Exit

Suspends data reception and exits the application.

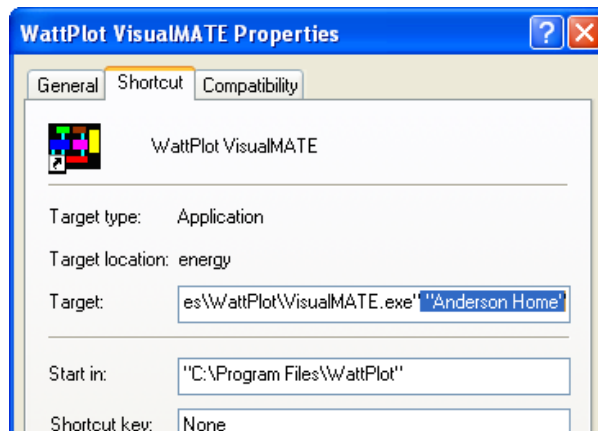


System – System Name

WattPlot VisualMATE can work with data from several different MATEs. Each is defined by a separate System Name. The default system for this session is indicated by a check mark. If you are working with data from a different system, it is recommended that you change the default system by selecting the new one from this menu.

If you have multiple systems defined, VisualMATE will prompt you for which system’s data you want to work with when it is first run. You can create shortcuts specific to a pre-selected system which will bypass this prompt. To do so, create a new Windows shortcut for Monitor, then go to the Properties window of the shortcut, and append a space and the System Name (in quotes) to the Target, as shown in the screen fragment at right.

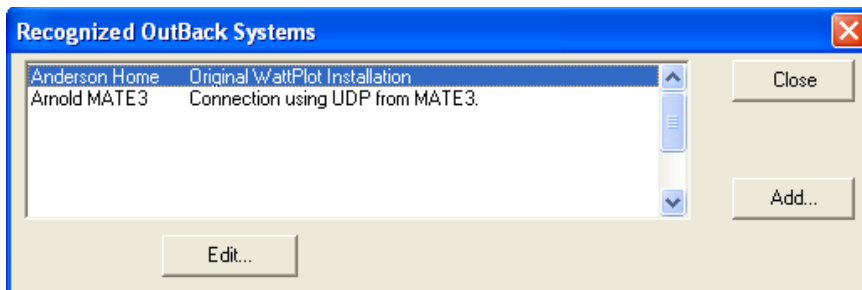
(Note that the full target is not shown – "C:\ Program Files\WattPlot\VisualMATE.exe".)



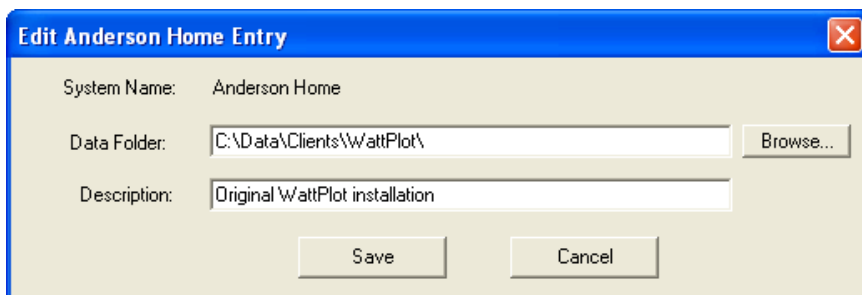
You may also wish to rename the shortcut so that you know which system it refers to.

System – Add/Edit/Remove System

When WattPlot VisualMATE is first installed and run, it will prompt you for the first System Name. For most installations, this is the only System Name that will ever be needed. If you work with data from multiple MATEs, you may wish to define more systems. Selecting this menu option will present you with a list of defined systems, as shown at right.



Choose the Add button to add a new system definition, or the Edit button to edit the selected system. The Add and Edit functions use the screen shown at right.



System Name

This is a brief descriptive name identifying a specific MATE connection and the OutBack system it monitors. It will be included in any emails that WattPlot VisualMATE sends out. Note that System Names are set in the Add screen and are not editable in the Edit screen. To change the name, add a new system under the new name and remove the old one.



Logs Folder	This specifies where WattPlot will store configuration data. It is recommended that you accept the default, unless you already have WattPlot data elsewhere, or you have a particular need to store data in a separate location. The folder will be created when you click the Save button, if it is not already present.
Description	Use this free text field to give a more detailed description of the system.

Once a new system is added, it will be appended to the list under the WattPlot **System** menu.

Options – Windows AutoStart

If WattPlot VisualMATE is to run unattended and/or full-time, you may want the program to be started automatically when Windows starts. To do this, simply click on the **Windows Autostart** entry of the **Options** menu to click it ON (indicated by a check mark). VisualMATE will create a shortcut in your Windows Startup menu called “WPVisualMateAutoStart *systemname*.lnk”, where *systemname* is the name of the currently selected system.

You use the same menu entry to turn AutoStart OFF and remove the shortcut.

Options – Email Settings

WattPlot VisualMATE can use its built-in email functionality to activate your software and send error messages to WattPlot’s technical support for fast resolution. The PRO version can send information on demand or send emails in response to user-programmed triggers. For details on configuring this functionality, see [Email Settings](#).

Options – Data Log Folder

VisualMATE can log all incoming system data in a daily raw data file (with a .OBM extension) or hourly MATE3 SD card format files (with a .CSV extension). See [Advanced Settings](#) of the [MATE Data Source dialog box](#) for more information on turning this option on or off, or for changing the file format. Use this menu entry to change the default folder that the program will use to store these daily files.

Options – Fahrenheit Temperature

If this menu entry is checked, then battery temperature (if available through a FLEXnet DC device display) will be shown in degrees Fahrenheit. Otherwise it will be shown in degrees Celcius. Use this menu entry to toggle between the two settings.

Help – VisualMATE User’s Guide

This menu entry will call up this User’s Guide as a hyperlinked and searchable PDF file.

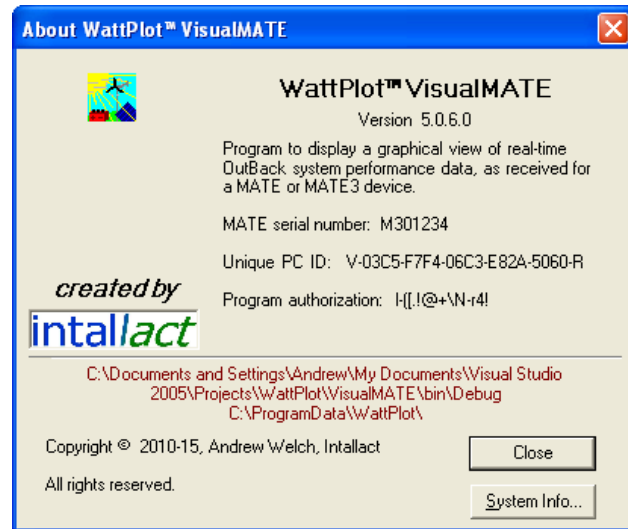


Help – About

WattPlot VisualMATE’s About screen provides useful information such as the current program version number, the unique PC ID, etc., as shown at right. The two paths in red indicate where the program EXE file is running from and what the default data folder is for the current system.

Help – WattPlot.com

This menu entry has a sub-menu with three options. Each one will take you directly to a different page of the WattPlot website: Frequently Asked Questions, Home Page, and VisualMATE Update History Page.





Display of Values Adjusted for Truncation

OutBack inverters (and the older MX-60 charge controller) truncate their reported amperages to the nearest whole number. This means that a reported value of 2 amps might really represent any value between 2.0 and 2.9 amps. WattPlot can compensate for this by using a better average value (2.5 amps) for its wattage calculations, etc. This adjustment will only be applied when the device’s operating mode makes such compensation meaningful.

The table below shows four examples of how truncation compensation adjustments are applied:

Device	FX-1	FX-2	Inverters	CC
Actual Volts (real world voltage)	119	121	120	30
Actual Amps (real world current)	3.0 - 3.9	1.0 - 1.9	4.0 - 5.9	7.0 - 7.9
MATE Reported Amps (truncated value)	3	1	n/a	7
Displayed Amps (with compensation OFF)	3	1	4	7
Watts accumulated/plotted (with compensation OFF)	357	121	480	210
Adjusted/Calculated Amps	3.5	1.5	5.0	7.5
Watts accumulated/plotted (with compensation ON)	416.5	181.5	600	225
Actual Wattage (real world power)	357 - 475	121 - 241	478 - 716	210 - 239

Note that actual Amps and actual Wattages are a range. The truncated value reported by the MATE means that the real value could be anywhere in that range. With compensation turned OFF, only the lowest value in the range is used. With compensation turned ON, the middle value of the range is used.

MATE Data Resolution

The resolution (precision) of the data provided by the MATE is actually determined by the OutBack component that is feeding data to the MATE. This can vary, based on other factors, as tabled below:

OutBack Component	Battery Bank	DC Voltage Resolution	DC Current Resolution	AC Volt. Res.
FX inverter (120V systems)	12V	0.1 VDC	1.0 amps	1.0 VAC
FX inverter (120V systems)	24V	0.2 VDC	1.0 amps	1.0 VAC
FX inverter (120V systems)	48V	0.4 VDC	1.0 amps	1.0 VAC
MX charge controller	-	1.0 VDC (PV) 0.1 VDC (Battery)	1.0 amps	-
FLEXmax 60/80 charge controller	-	1.0 VDC (PV) 0.1 VDC (Battery)	1.0 amps (PV) 0.1 amps (Charger)	-
FLEXnet DC monitor	-	0.1 VDC (Battery)	0.1 amps	-
FX-E inverter (230V systems)	12V	0.1 VDC	0.5 amps	2.0 VAC
FX-E inverter (230V systems)	24V	0.2 VDC	0.5 amps	2.0 VAC
FX-E inverter (230V systems)	48V	0.4 VDC	0.5 amps	2.0 VAC

European users please note: WattPlot supports international decimal formats. What will appear in this manual as “25.6” will be displayed as “25,6” etc., if your computer is setup for European decimal format.

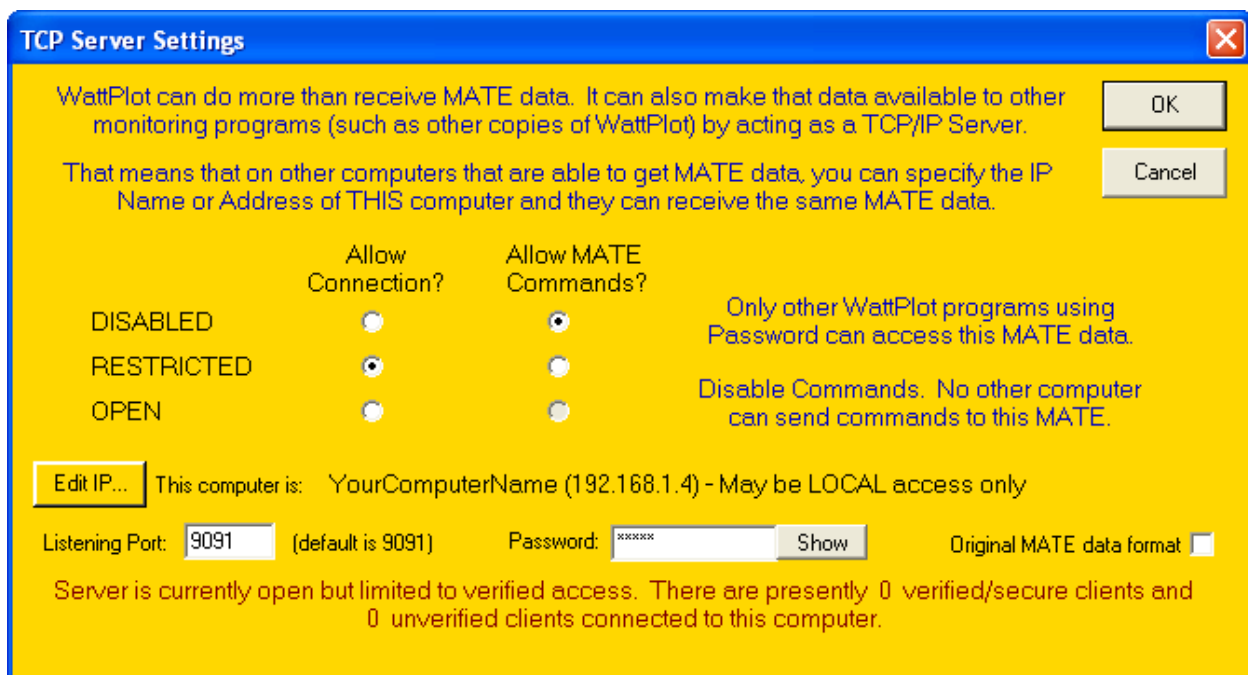


Copying the Data Stream to Another WattPlot Tool

It is typically only possible to connect one computer to the MATE, however there are ways in which multiple computers can access the same MATE data in real time. WattPlot allows you to PiggyBack via TCP/IP on to the MATE data stream of another running WattPlot program, allowing for **multiple-PC simultaneous monitoring**. To do this, you need to configure and enable the TCP/IP Server of the primary WattPlot program so that it can pass on the MATE data as it is received. (Tools with TCP/IP server capability include WattPlot Monitor, NetMATE, and VisualMATE.) You then need to point the secondary WattPlot programs to the IP address and port of the primary WattPlot.

WattPlot TCP/IP Server

The first step in sharing WattPlot data between computers is to setup the built-in WattPlot TCP/IP Server. This is done from the **MATE Data Source dialog box** (of the WattPlot already connected to the MATE) by clicking the WattPlot as TCP Server button, which will present the following window:



OK

Click this button to save your settings and to immediately apply them, including restarting the TCP server. For example, if you change the password or restrict access, then all current TCP clients will be disconnected and they will have to reconnect using the new password.

Allow Connection?

There are three levels of Server access, which determine which TCP/IP clients will be able to connect in to this program’s data stream:

DISABLED.....No connections will be accepted.

RESTRICTED...Only WattPlot connections using the Password defined on this screen will be accepted.

OPEN.....All connections will be accepted.



- Allow MATE Commands?** There are three levels of MATE command access, which determine which TCP/IP clients will be able to send commands to the MATE being monitored by this program:
- DISABLED.....No MATE commands will be accepted.
 - RESTRICTED...Only WattPlot connections using the Password defined on this screen can send commands.
 - OPEN.....Any connections can send a MATE command (**NOT RECOMMENDED**).
- Edit IP** A potential TCP Client needs a Server IP – that being the local IP address of this computer – in this format: ###.###.###.###. Normally WattPlot can easily determine the IP address of the computer that it’s running on, and it will display it in the instructions, as shown above. However, in rare circumstances (such as when WattPlot is being run under Windows emulation software), you will have to determine the IP address yourself. (The IP address can usually be determined by going to the Windows Command Prompt and running “ipconfig”.) You can then supply it here by clicking the **Edit IP** button so WattPlot has a record of it, but remember – it is the TCP Client that needs this setting, not the Server!
- This computer is** The IP name and address of this computer will be shown. If the IP address begins with “192.168...”, then this is likely a local network address that is not accessible outside the network (i.e. over the internet). Contact your network administrator and/or internet service provider to inquire about Static internet-accessible IP addresses.
- When you are configuring another WattPlot to connect in to this TCP Server, this is the IP address that you will specify to use for that connection.
- Listening Port** This is the IP port where this TCP server will be listening for connection requests from outside TCP clients. Your computer may be using various IP ports for a variety of tasks. We recommend using the default (9091) unless you are familiar with IP networking.
- When you are configuring another WattPlot to connect in to this TCP Server, this is the IP port that you will specify to use for that connection.
- Password** If you have specified **RESTRICTED** access for either the data or MATE commands, you will need to specify the password required.
- When you are configuring another WattPlot to connect in to this TCP Server, this is the password that you will specify to use for that connection.
- Show/Hide** Click this button to temporarily unmask this password display.



Original MATE Data Format If the Server is monitoring a MATE3 data stream, it is possible by checking this option to have it send the same data out to all TCP Clients in the original MATE data format (which is slightly different. Now that all WattPlot tools can recognize both formats, this legacy feature should no longer be required.

The WattPlot TCP Server will automatically start every time the program is run, so long as **Allow Connection?** is set to **Restricted** or **Open**. Exiting the program will close the TCP server.

NOTE: You may get a warning message from your resident protection software, informing you that the WattPlot program has opened a TCP port to the outside world. As this could be a security issue if the program were doing it without your knowledge, you may be asked to confirm permission for the WattPlot TCP Server to make data available to other programs.

WattPlot as a TCP/IP Client

Once an IP-accessible WattPlot Monitor (or NetMATE or VisualMATE) program is running, with the TCP server enabled, then any other WattPlot real-time monitoring tool can access the same MATE data. They do this by becoming TCP/IP clients and 'piggy-backing' on to the main program's data. The first time you do this, you will have to create a system entry that defines the remote system being monitored:

1. Create a new system definition using the **Add/Edit/Remove System** option of the **System** menu. See the **Managing and Monitoring Multiple Sites** section.
2. Call up the **MATE Data Source Dialog Box** to define the connection.
3. Select a **Data Source** of **TCP Server**, and enter the IP name or address of the computer now monitoring the MATE with the TCP Server enabled. You will also need to enter the IP port that you defined on the TCP Server as the 'Listening' port, and the password if you defined one. See the **MATE Data Source dialog box** section for details.
4. Click **Test Communication**. WattPlot will then attempt to connect to the remote computer. If the connection is successful, then the Client system can receive not only system data but also a copy of the system definition, components, and power summaries from the remote WattPlot Server system.
5. Once this process is complete, the secondary WattPlot tool will begin monitoring the MATE data, and might also start loading some accumulated data from the remote system so that you will be viewing accurate wattages in power summaries, etc.

To later return to monitoring any defined system via a TCP PiggyBack connection, simply select the newly defined remote system from the **System** menu.



Licensing and Updates

Once your one-time license fee payment is received and processed, you will be sent a permanent activation code by email. The WattPlot VisualMATE software will be licensed to run for a specific combination of PC and OutBack MATE/MATE3. However, once WattPlot VisualMATE has been activated, it can monitor **any** MATE/MATE3 data stream.

At this time, updates to any of the application programs may be downloaded free of charge, from <http://WattPlot.com/update.htm>, and do not require repeat licensing. If the program is running on a computer that has internet access, you will be informed of significant updates automatically, or you can have the program check on request using the **Manual Release Check** function.

Moving your WattPlot™ VisualMATE License

Your WattPlot VisualMATE program license is unique to the PC and hard drive that you installed it on. If you wish to move VisualMATE to another computer or hard drive, you will need to remove the current license and get a new activation. In some situations, you can do this yourself, so long as you have configured WattPlot's **Email Settings** and your computer can access the internet. Otherwise, when you remove the license, VisualMATE will issue you with a temporary license so that you may continue to use the product while waiting for the new activation from *intallact*.

Note that certain hardware changes to a computer can render a VisualMATE license invalid. If WattPlot detects this condition, it will revert to a temporary license so that you may continue to use the product while waiting for a license update from *intallact*. If you know that you will be changing the hard drive where VisualMATE is installed, we recommend doing a license move first, if possible, even if you have not yet installed WattPlot VisualMATE in the new location.

If you have to move your license back to the original location, this can also be done, but it typically requires us to process the new Activation Code and send it to you. Or you can simply order a new license if you will require more than one.

The WattPlot Licence Move function is initiated by selecting the **Move License to New PC** option, under the **File** menu. Note that this is a license *move*, not *copy*. VisualMATE will no longer be licensed at the old location after the move. The following steps outline the recommended procedure for removing your current license and moving it to a new location. Please follow whichever steps are possible in your situation.

1. If applicable, fully install the WattPlot VisualMATE program on the new computer or hard drive, as described in the **WattPlot VisualMATE Program Installation** section at the start of this manual. [**Note** that the version of program running in the new location must be at least equal to or more recent than the version of the currently licensed copy.]
2. Run WattPlot VisualMATE in the new location in order to get the Unique PC ID. Write this down carefully.



3. Run WattPlot VisualMATE at the old location, where it is already licensed, and select the **Move License to New PC** option, under the **File** menu. A confirmation message will be displayed. Click the **Yes** if you have the new Unique PC ID. Otherwise, click **No** to complete the first step of removing the current license.
4. The **Activation Dialog Box** will be displayed. If you have the new PC ID, enter it now (including hyphens) in the yellow PC ID field, and then press the Enter key.
5. The main action button of the Activation Dialog Box will show the next possible step, based on your current situation. The button will have one of the following labels:

Receive New Activation Code by Email

You can move this license yourself. Your new activation code will be emailed to you automatically within minutes.

Request New Activation Code by Email

You can remove your current license and receive an immediate interim activation. Intallact will be given your new PC ID and will send you a new Activation Code (usually within 24-48 hours).

Proceed With License Move or Remove This Activation License

You can remove your current license and receive an immediate interim activation. When you have your new PC ID, you will have to email us at **activation@WattPlot.com** so that we can get a valid Activation Code to you. Note that we will also need to know your old PC ID and the License Removal Confirmation Code, as issued by this process.

6. You will probably want to copy the contents of the WattPlot folder to your new computer or hard drive, in order to retain all of your current system settings (most of which can be found in your `WPConfig.ini` and `SystemName config.ini` files).
7. When you receive your new Activation Code, go to the new installation of WattPlot VisualMATE and use the new Activation Code to activate your license, as described in the **Activation** section.

Updating your WattPlot™ VisualMATE Software

At this time, updates to any of the application programs may be downloaded free of charge, from <http://WattPlot.com/update.htm>, and do not require repeat licensing.

All updates are performed by downloading a copy of the new executable file (`VisualMATE.exe`) and saving it in your WattPlot program folder (typically `c:\Program Files\WattPlot`), overwriting the older copy. Do not rename the executable files – they will not work if they are renamed.



Problems, Feedback, & Suggestions

You will quickly learn that intallact is one of the most responsive developers around. We are driven by the comments and ideas from our users, and rapidly address problems or implement enhancements.

Questions

If you have questions about how to use any of the WattPlot suite of programs, or what they can do, your best resource is to start with the Frequently Asked Questions section of our web site. Go to:

<http://WattPlot.com/faq.htm>

If the question or answer you seek is not there, please refer to one of the other resources described below.

Solving or reporting problems

Your first step in resolving a problem is to review this User’s Guide. You can access it by selecting **View User’s Guide** from the program’s **Help** menu.

If this guide doesn’t have an answer for you that works, or you encounter some other difficulty, you are encouraged to contact us by email. A screen shot is often useful, acquired by holding down the **Alt** key and pressing the **Print Scrn** key. (You can then Paste the screen shot into an email or Word document, sent as an attachment.) We will work hard to get your issue resolved as soon as possible.

WARNING: Do NOT try to uninstall and reinstall the software. It won’t help and you will likely corrupt your system and data files. Contact WattPlot support first.

Making suggestions

If there is anything in this User’s Guide that you find unclear, missing, or incorrect, *please* let us know so that we can set the matter straight for you and future users.

If you have an idea about how we can improve our applications or you have a specific need, we would love to try and implement your idea. Send us an email!

intallact

techsupport@WattPlot.com
<http://WattPlot.com>

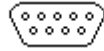


Appendix A - Serial Cable Specifications

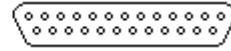
Your OutBack MATE must be connected to your computer in order for the monitor program to receive data from your MATE. This connection is via a serial cable. The serial port on the MATE is a female 9-pin (DB09) connector underneath the menu buttons and next to the network cable port. You will therefore need a serial cable with a male DB09 end at the MATE end. The other end of the cable plugs into an RS-232 serial communications port on your computer. Serial ports on computers come in three types:



USB Port



9-pin (DB09)



25-pin (DB25)

USB port

The latest standard found on computers are USB ports. Adaptors can be purchased at computer accessories suppliers to convert USB ports to conventional serial ports, however not all adaptors or associated software will work with the MATE. The adaptor will convert it to either a 9-pin or a 25-pin serial port (see below).

9-pin (DB09) port

Until recently, many computers came with a male 9-pin serial port on the back. If your computer has one of these, then the computer end of your serial cable should be a female 9-pin. Note that the serial cable uses pins 2, 3, 4, 5, and 7 (as shown at right).

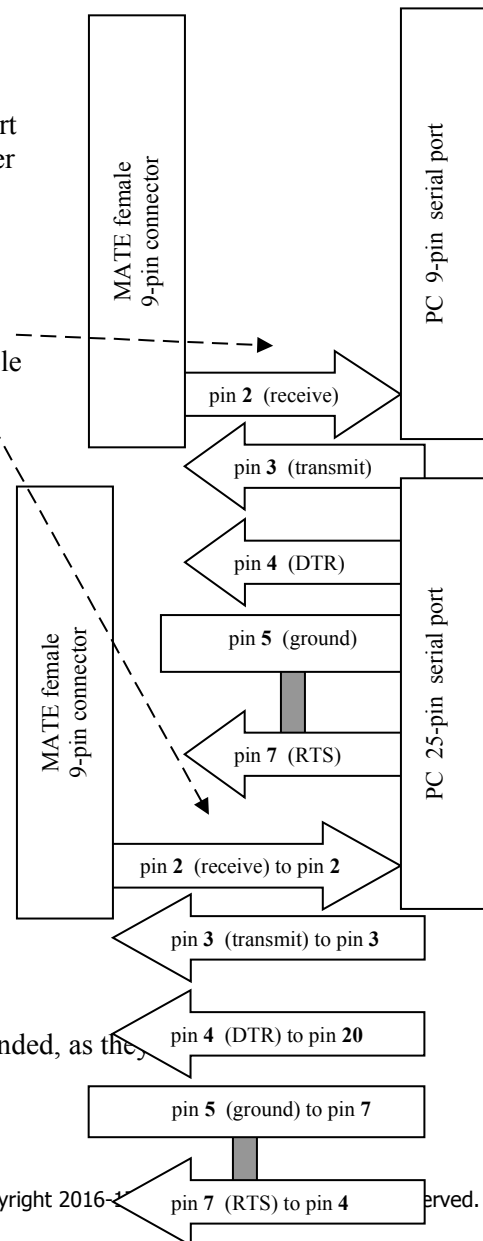
All pins are straight through with no jumpering. However, we have encountered instances where jumpering pin 5 and 7 together makes an incompatible cable function correctly with the MATE.

25-pin (DB25) port

Older computers came with a (typically) male 25-pin serial port on the back. This should not be confused with the typically female 25-pin parallel (printer) ports. If you have one of these 25-pin male serial ports, you will need an adapter to convert from 9-pin to 25-pin. This adapter must produce the result shown, where the pin numbers on the left are for the 9-pin and those on the right are for the 25-pin:

Note that computer accessories suppliers also sell male-to-female and female-to-male converters (for both 9-pin and 25-pin types) if you need to change the kind of end found on your cable.

Serial cable lengths in excess of 25 feet are not usually recommended, as they cause communication errors.





Appendix B - Troubleshooting Serial COM port

The most common serial COM port problem is that the MATE is not sending data at all. The default setup of the original OutBack MATE is **not** configured to transmit performance data. You must turn on this feature. From the main menu on the MATE select **SETUP**, then **MATE**, then **PG2**, then **COMM**, then **PC**, and then **ON**, to activate the serial communications port on the MATE.

If the MATE is not the problem, there are three serial COM port problems that WattPlot can detect: Port Already in Use by Another Program, Invalid Port Number, and No Serial COM Ports accessible from Windows environment.

If none of the above applies or fixes the problem, you may have a cable issue to resolve. (See **Appendix A – Serial Cable Specifications.**)