

## Quick Start and Changing Settings on the WM-485-232

Revision November 10, 2010



**Figure 1: WM-485-232 Module**

### Introduction

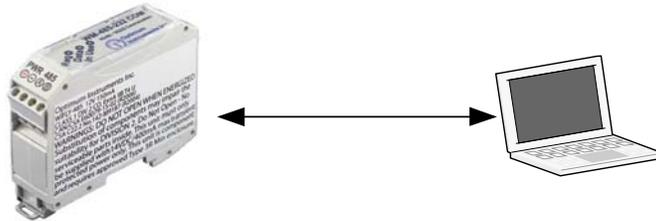
The WM-485-232 uses Wi-Fi technology to wirelessly enable equipment in hard to reach or dangerous locations. The WM-485-232 is Class 1 DIV 2 groups C and D rated.

### Overview and Requirements

The following technical document covers the connection of a RS-485 (or RS-232) equipped device to the WM-485-232 module for wireless (WiFi) communication to PC with Wi-Fi capabilities. It will also list some commands used to change settings in the module using a terminal program from a PC with a COM port using either RS-232 or RS-485 directly connected to the module. For remote communication to a PC the WM-485-232 module may be used in either of two modes. These are Ad-Hoc Mode and Infrastructure Mode.

### ***Ad-Hoc Mode***

In **ad-hoc mode** wireless devices can directly communicate with each other. Operating in ad-hoc mode allows all wireless devices within range of each other to discover and communicate in peer-to-peer fashion without involving central access points (including those built in to broadband wireless routers). This will allow communication between the WM-485-232 module (connected to a Scanner 2000) and the Wi-Fi device found on most PCs.

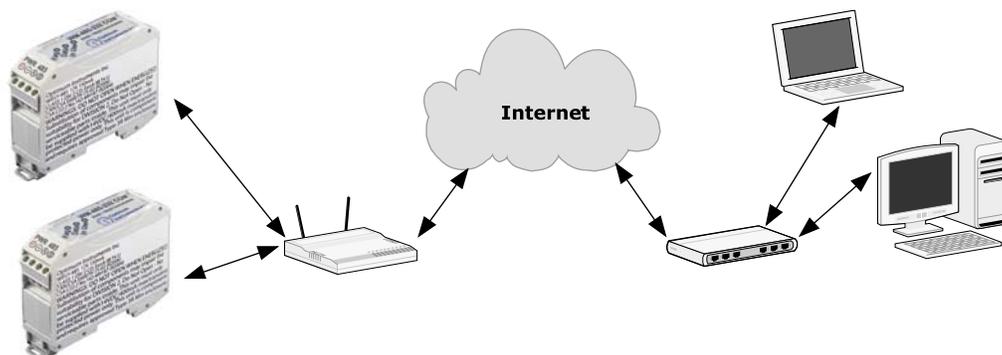


***Figure 2: Ad-Hoc Mode direct wireless connection***

### ***Infrastructure mode***

In **Infrastructure mode** the WM-485-232 can bridge (join) a wireless network on a wired Ethernet network. Infrastructure mode wireless also supports central connection points for WLAN clients. This would allow remote data access to any devices connected to the WM-485-232 (such as a Scanner 2000 or Scanner 1100 series flow computer).

A wireless access point (AP) is required for infrastructure mode wireless networking. To join the WLAN, the AP and all wireless clients must be configured to use the access points SSID. The AP is then cabled to the wired network to allow wireless clients access to, for example, Internet connections or printers. Additional APs can be added to the WLAN to increase the reach of the infrastructure and support any number of wireless clients. Multiple WM-485-232 (in a limited area) modules could be connected to a single AP to allow connection to a router for remote access.



***Figure 3: Infrastructure Mode going through the Internet with multiple devices***

## Connections

The WM-485-232 has two sets of screw terminals on either side.



**Figure 4: Screw Terminals**

### **Connecting a suitable power source to the module**

The **PWR** set of terminals on the WM-485-232 must be a DC source in the range of 6-32 Volts. The current necessary from the module is low, and a typical 12V 500mA adaptor would be ideal. Ensure that the + and – terminals are correctly wired or there may be permanent damage caused to the unit.

### **485 or 232**

The WM-485-232 is both RS-232 and RS-485 communication capable. Either can be used with the WM-485-232 but in order to guarantee correct operation, only use one or the other at a time and do not leave both sets of terminals connected simultaneously.

### **Wireless Connection**

Wireless configuration is also possible. Use the connection settings that follow in this document in order to connect directly through Wi-Fi. The module will be in Ad-Hoc mode by default and will have to be set up to connect to an existing wireless network if infrastructure mode is needed.



## LED Descriptions



*Figure 7: Registration*

Once the module is powered up, it will slow blink the **Reg** to show that it has power. When the module is in **Command Mode** the **Reg** LED will blink quickly.



*Figure 8: In Use*

If the module has made a connection with a PC (with a wireless connection) the **In Use** LED will go ON to indicate that a PC is connected to the WM-485-232.



*Figure 9: Data*

When connected the **Data** LED will blink on bytes transmitted or received to indicate there is activity on the connection. It will also blink on characters transmitted while in **Command Mode** but note that the **In Use** LED will not be lit if the module is being configured through either the RS-485 or RS-232 port.

## Configuration

### ***Connecting to the module for configuration***

With the module connected to a power source and a PC one can enter command mode in order to change and check settings.

In this tech note a shareware available program “Terminal” is the tool used to configure the module. The program is available on the internet from the author’s website: <https://sites.google.com/site/terminalbpp/> This tool is not made or supported by Optimum Instruments Inc., it is presented as a free and convenient terminal program option which may be used for this purpose.

Determine to which COM port on the PC the module is connected and set up the terminal application to connect with the following settings: 9600 baud, 8 bits, no parity, 1 stop bit and hardware flow control disabled.

Once connected to the WM-485-232 enter command mode by typing **\$\$\$** and a response of “**CMD**” will be returned. Pressing return at this point will give a prompt **<2.21>** or similar.

### ***Commands to change settings***

Settings are changed with **SET** commands and checked with **GET** commands. Successful requests are followed with an “**AOK**”. In order to commit your settings to the module, use “**save**” and “**reboot**”. To return to the command mode after a reboot, use **\$\$\$**. **Save** may also be followed by a name to save a specific settings profile, for example “**save mysettings**” will create a settings profile with the name “mysettings” which can be loaded with the command “**load mysettings**”.

### ***Sleep Timers***

There are two commands to set the sleep and wake periods of the module:

**“set sys sleep”**  
**“set sys wake”**

**“set sys sleep <x>”** is used to tell the module for how long in seconds after it is awake to go back to sleep and **“set sys wake <x>”** tells the module after how long in seconds it is asleep to wake back up. When using the **wake** and **sleep** settings, set “**WAKE**” **FIRST** and “**SLEEP**” **SECOND** otherwise the module will go to sleep and not have a timer set to wake back up. For example at the prompt **<2.21>** type:

**“set sys wake 90”**

and press return. An **AOK** response will indicate success, and then type:

**“set sys sleep 30”**

and hit return. Again an **AOK** indicates success a **save** and **reboot** will apply these sleep timers to the module. Use **\$\$\$** to return to command.

The following is an illustration to provide a simple example of how the sleep and wake timers interact.

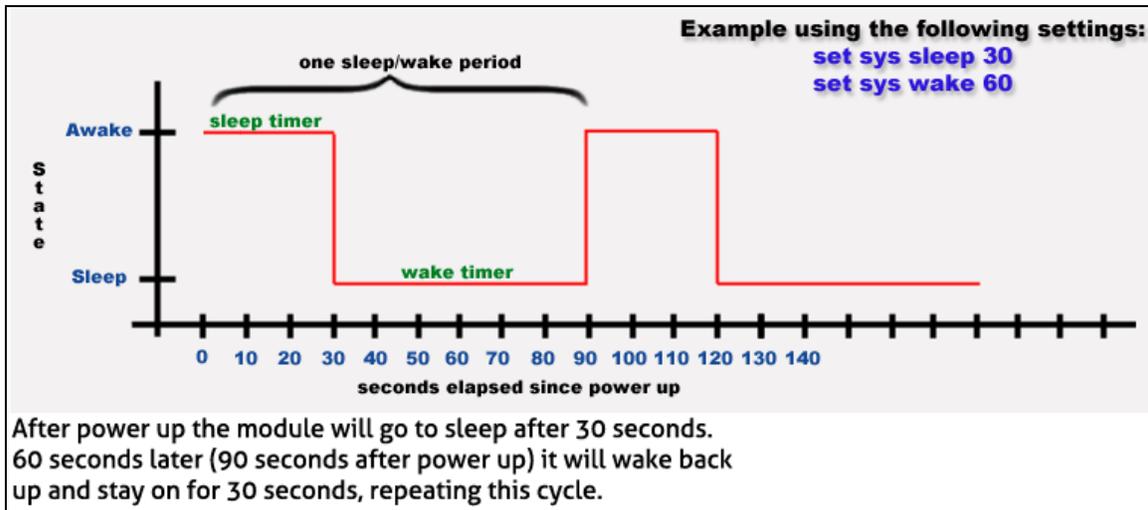


Figure 10: Sleep and Wake Example

### Port Settings

In order to set the baud rate, use the following command:

**“set uart baud”**

Available baud rate settings are 2400, 4800, 9600, 19200, 38400, 57600, 115200. For example if your equipment communicates at 19200 baud, use the command:

**“set uart baud 19200”**

The baud rate will not commit until a **save** and **reboot**. Be sure to change your Terminal settings in order to communicate with the module at the new baud rate. RS-232 and RS-485 are set together, because they use the same baud rate within the module.

### Wireless Settings

There are two ways of using the WM-485-232. It can be set up in either an Ad-Hoc mode in which the module creates its own network for a PC to join and connect through, or it can be used in Infrastructure mode in which the module will connect to a router. The following commands are used in setting up the wireless communications:

**“set wlan ssid”**  
**“set wlan auth”**  
**“set wlan join”**  
**“set wlan channel”**  
**“set wlan phrase”**  
**“set ip localport”**  
**“set ip address”**  
**“set ip gateway”**  
**“set ip netmask”**  
**“get ip”**

### **Ad-Hoc Mode**

The module must have a name to use as its network SSID (service set identifier). By default this will be set to **WM-485-232**. In order to change it, the command is used as such:

**“set wlan ssid MyModule”**

To tell the module to create an Ad-Hoc network, use the command:

**“set wlan join 4”**

Choose a channel for the Wi-Fi network to broadcast on and set it. Continuing the example use:

**“set wlan channel 4”**.

Set up the IP address, port, gateway and netmask with:

**“set ip localport 2000”**  
**“set ip address 169.254.175.54”**  
**“set ip gateway 169.254.175.1”**  
**“set ip netmask 255.255.0.0”**

To allow connections to the module we will set the authorization to open with the command:

**“set wlan auth 0”**

DHCP is not used in Ad-hoc mode so confirm it is turned off with the command:

**“set ip dhcp 0”**

Now **save** and **reboot** and the module will be broadcasting an Ad-Hoc network. Entering command mode with **\$\$\$** one can determine the current IP and port settings in order to connect wirelessly to the module in the future.

Using the command:

**“get ip”**

will display now will display modules IP settings used to connect with in such programs as Serial/I.P. from Tactical Software. By default the IP is set to **169.254.175.54** and the connection port is **2000**.

### **Infrastructure Mode**

In order to join an existing network you will need to know its SSID, security type, and either the security passphrase or WEP key and index. Setting the SSID is the same as in Ad-Hoc:

**“set wlan ssid MyNetwork”**

Depending on the security type, the join mode has to be set. Use the following chart to determine which value is necessary to match the routers security. The best option, if there is the ability to configure the router, is WPA2-PSK.

<u>Value</u>	<u>Authentication Mode</u>
0	Open (Default)
1	WEP-128
2	WPA1
3	Mixed WPA1 & WPA2-PSK
4	WPA2-PSK
6	Join an Ad-Hoc network

In this example, use the best security by using the following command to set your module for WPA2-PSK:

**“set wlan auth 4”**

The passphrase that the router uses must then be set (“myphrase” being inserted here) with the following command:

**“set wlan phrase myphrase”**

If the router is using WEP security, then one must set the 128 bit WEP key. As an example this would look like the following:

**“set wlan key 112233445566778899AABBCCDD”**

Also if using WEP the WM-485-232 must be told which key is being used in the range of 1-4. For example the key might be the second one so this would be set as such:

**“set wlan num 2”**

Tell the module to scan for which channel the router is using by setting:

**“set wlan channel 0”**

Enable DHCP mode to have the WM-485-232 get an IP Address and network settings from the router with:

**“set ip dhcp 1”**

And finally to tell the module to join your network, use:

**“set wlan join 1”**

Now we can **save** and **reboot** and the module will join your existing network. Once again **\$\$\$** so we can determine the current IP and port settings in order to connect wirelessly to the module.

Using the command:

**“get ip”**

will display the modules IP settings used to connect with in such programs as Serial/IP from Tactical Software.

## Using the WM-485-232 as a Wireless Bridge

### *What is Needed*

Software capable of COM port redirection such as Serial/IP COM Port Redirector by Tactical Software at <http://www.tacticalsoftware.com/products/serialip/index.htm> will be necessary to use existing software as normal with the WM-485-232.



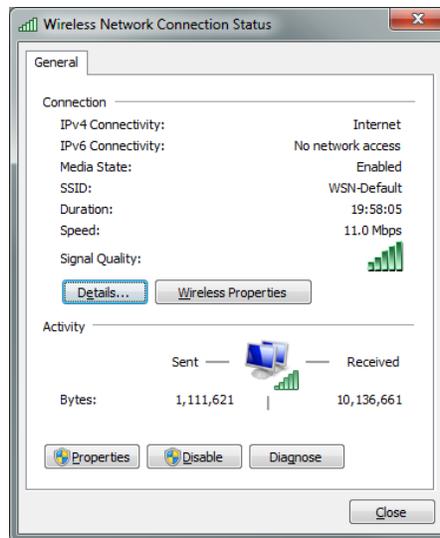
**Figure 11: Typical Connection**

Power the module and the Reg LED on top of the module will begin to blink to indicate that the network is up. Ad-hoc mode will be used in this example so refresh the network list on a PC and the module will be in the available list. Connect to this network.



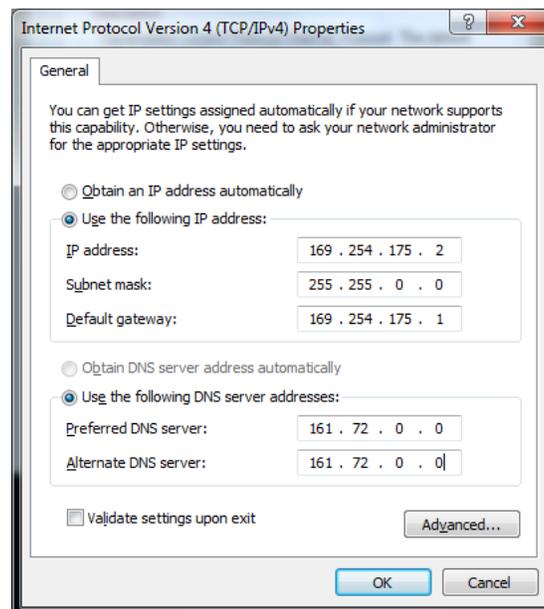
**Figure 12: Wireless Networks**

It will be quicker and more convenient to use a static IP when connecting to a WM-485-232. This is done in **Wireless Network Connection Status** in Windows.



**Figure 13: Wireless Settings**

Press **Properties** and select “**Internet Protocol Version 4 (TCP/IPv4)**” and press **Properties** again and match the values to what are in the WM-485-232 and assign an IP address to the PC such as 169.254.175.2.



**Figure 14: IP Settings**

The PC should now be on the Ad-hoc network with an IP address of 169.254.175.2.

## Serial-IP

Installation of Serial/IP is straightforward and will not be covered. From the Start Menu, go to the Serial-IP and click the icon for Control Panel.

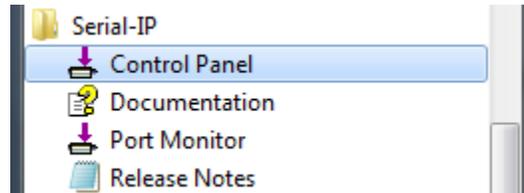


Figure 15: Serial/IP

This will then bring up the Control Panel allowing set up of a virtual COM port that will communicate with the WM-485-232. Click on **“Select Ports...”** and a new window comes up where one can select the number of the port to be created. Choose an available one, for example **“COM10”** and press **“OK”**. **COM10** now appears in the list on the left side for set up. Note that some older software might not support higher COM port numbers and may be limited to 1-4.

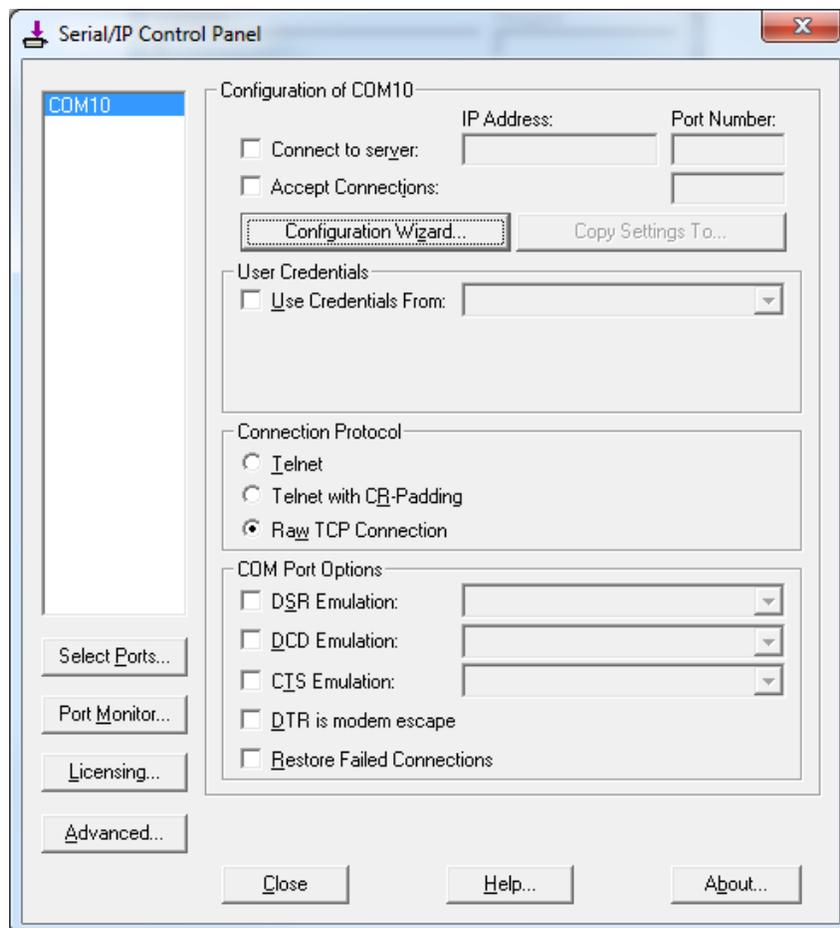


Figure 16: Serial/IP Control Panel

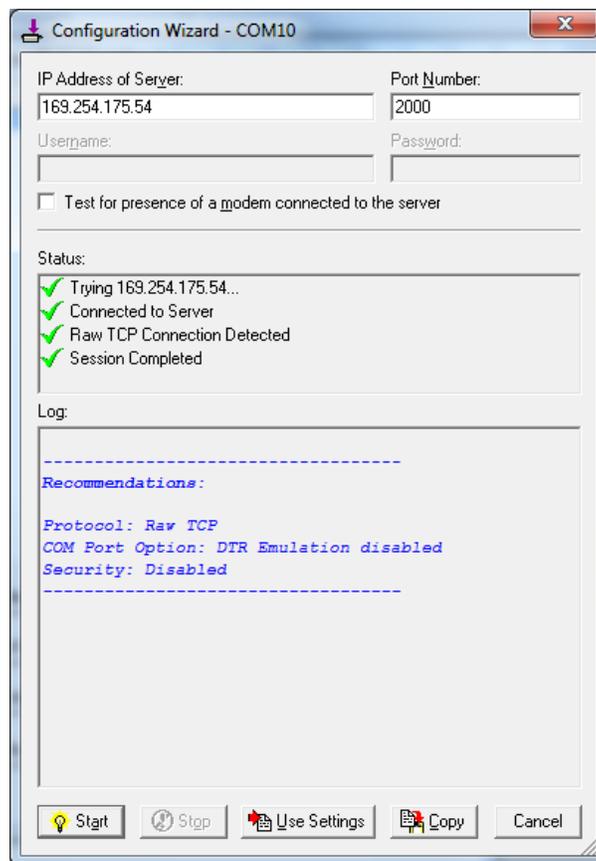
To connect the virtual COM port to the module, press the button labeled “**Configuration Wizard...**” and a new window will come up to set it up.

Use these settings from before:

**IP Address: 169.254.175.54**  
**Port Number: 2000**

This will only have to be set up once, but the wizard can be used to confirm the connection before using normal software.

Press “**Start**” and the program will connect to the module and then indicate whether it was successful or not. Once you see “**Session Completed**” press the “**Use Settings**” button to finish.



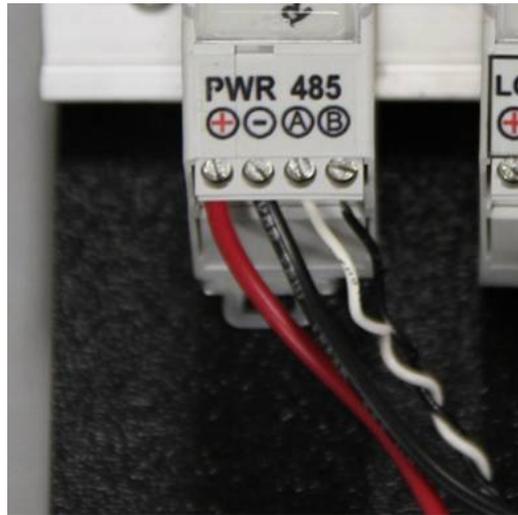
**Figure 17: Connection Test**

If this part of setup fails, check that the PC is associated to the WM-485-232 network and Windows has an IP Address. This can be verified in the Network and Sharing Center within Windows.

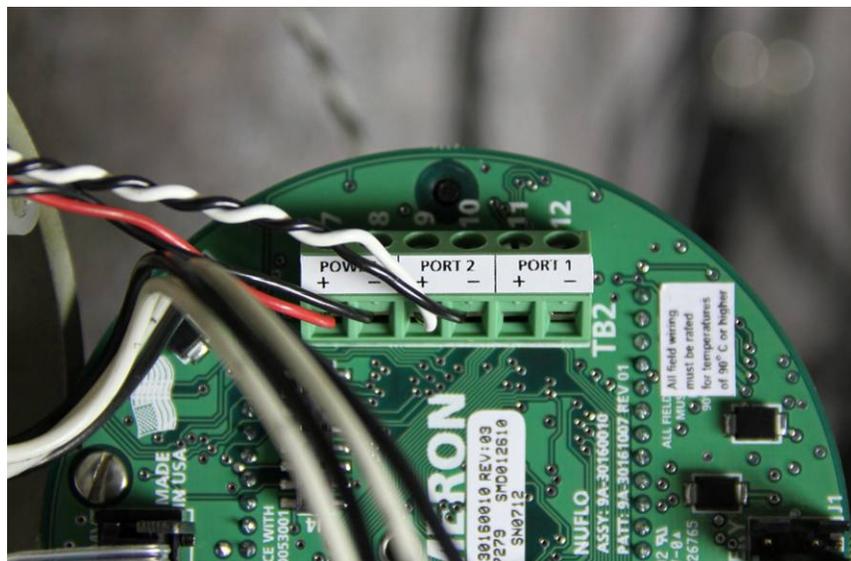
The COM port is now set up and the normal use of software can now begin. Select the new virtual COM port in software and the equipment now has wireless capability.

## Using the WM-485-232 with NuFlo Scanner 2000

Ensure the RS-485 (A and B) wires are connected to the meter on Port 2 (+ and -). Backwards connection will not damage the equipment. If communications with the meter does not initially work, double check the wiring and flip if necessary.



*Figure 18: WM-485-232 Terminals*



*Figure 19: Scanner 2000 Terminals*

Launch the **ModWorX Pro** software.

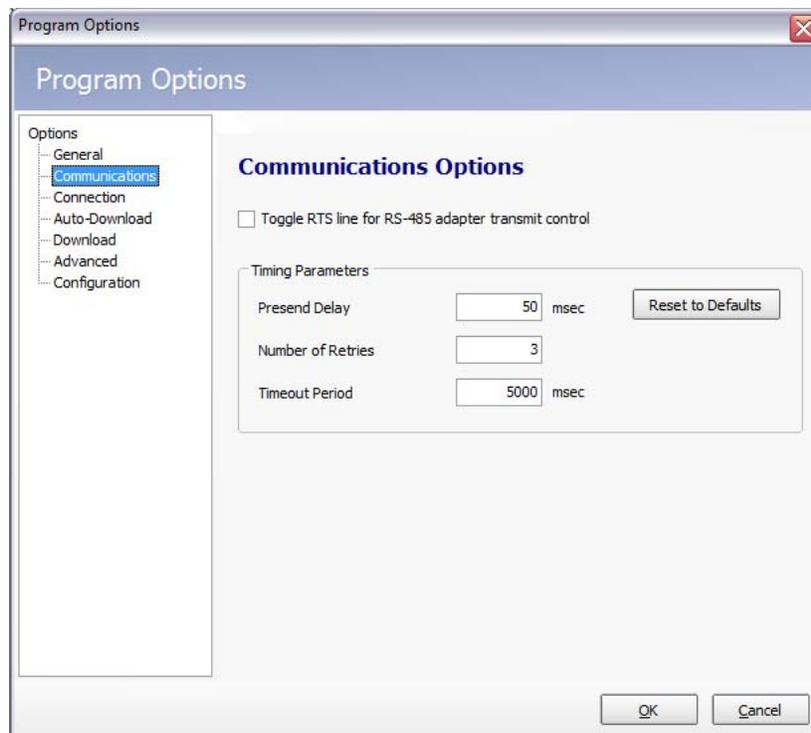
## Setup

With the software running, the following screen is initially show. In order to tell the software to use the WM-485-232, some settings must be changed.



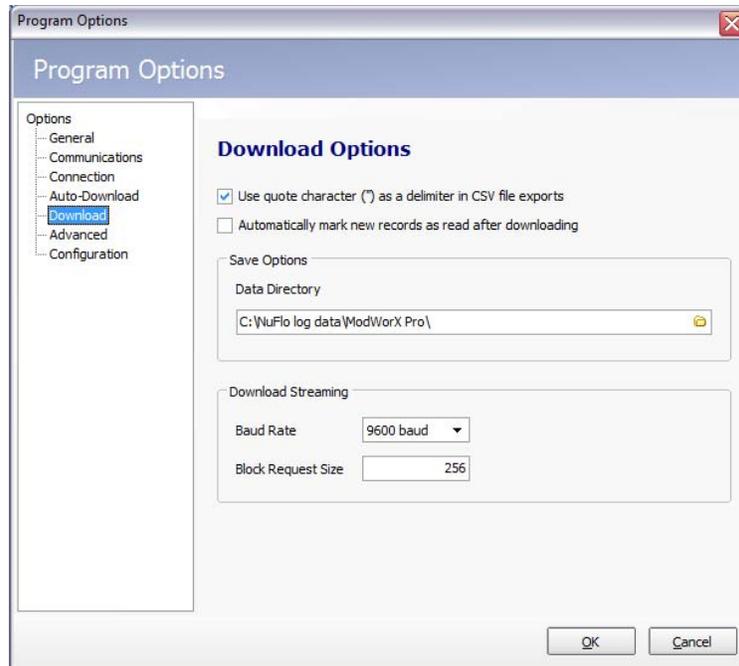
**Figure 20: Splash Screen**

First go to “**Tools**”, and then “**Options**”, and then click “**Communications**”. Match them with the following screen.



**Figure 21: Communications Options**

Under “**Download**”, set the baud rate to be 9600 if it is not already to match the WM-485-232 and the Scanner 2000 meter.



**Figure 22: Download Options**

Press “**OK**” and again go to “**Tools**” and then “**Select COM Port...**”.



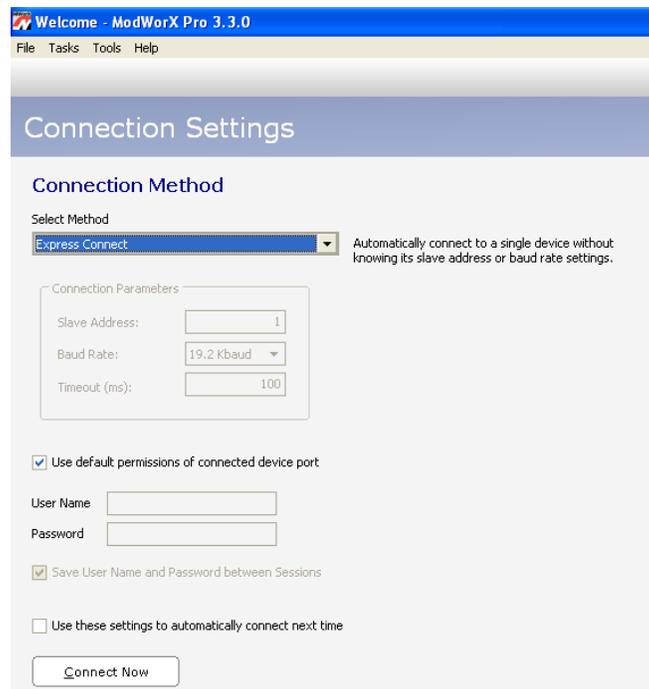
**Figure 23: COM Port**

Match this selection with the COM port previously set up in Serial/IP. To continue with the example in this manual, selected is COM10.



**Figure 24: Select COM Port**

Press “OK” and now on the main screen press “Connect”.



**Figure 25: Connect Now**

From the “**Select Method**” choose “**Express Connect**” and then press “**Connect Now**”.



## Glossary of Commands

Command	Description	Default Value (ad-hoc)	Default Value (infrastructure)
<b>\$\$\$</b>	Enter command mode.		
<b>save &lt;optional name&gt;</b>	Save to default or specific settings profile.		
<b>reboot</b>	Power cycles the WM-485-232 through software.		
<b>set comm idle &lt;seconds&gt;</b>	Number of seconds with no transmit or receive data before connection is closed automatically.	<b>300</b>	<b>300</b>
<b>set comm flush &lt;bytes&gt;</b>	The flush size for the UART.	<b>512</b>	<b>512</b>
<b>set sys trigger 0</b>	Set module so that the internal timers will trigger sleep and wake only.	<b>0</b>	<b>0</b>
<b>set sys sleep &lt;seconds&gt;</b>	Number of seconds after module is already awake in which it will go back to sleep.	<b>600</b>	<b>600</b>
<b>set sys wake &lt;seconds&gt;</b>	Number of seconds after module is already asleep in which it will wake back up.	<b>1</b>	<b>1</b>
<b>set sys autosleep 0</b>	Disable the UDP auto-sleep which is not being used. Disable to confirm will not interfere with normal sleep and wake.	<b>0</b>	<b>0</b>
<b>set broadcast interval 0</b>	Ensure module is not trying to broadcast itself to network devices with UDP which could get in the way of equipment.	<b>0</b>	<b>0</b>
<b>set adhoc beacon &lt;ms&gt;</b>	Ad-hoc beacon interval.	<b>100</b>	
<b>set adhoc probe &lt;secs&gt;</b>	Ad-hoc probe timeout in seconds waiting for probe responses.	<b>60</b>	
<b>set uart baud &lt;rate&gt;</b>	Baud rate for communications. (2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400)	<b>9600</b>	<b>9600</b>
<b>set wlan ssid &lt;name&gt;</b>	Modules Ad-hoc name, or router SSID.	<b>WM-485-232</b>	<b>CHANGEME</b>
<b>set wlan auth &lt;num&gt;</b>	Authentication mode when connecting to router. See page 9.	<b>0</b>	<b>4</b>
<b>set wlan join &lt;num&gt;</b>	Join mode. 0 – None 1 – Join Stored AP (Infrastructure Mode) 2 – Join any available network (Infrastructure Mode) 4 – Create network (Ad-hoc Mode)	<b>4</b>	<b>1</b>
<b>set wlan channel &lt;num&gt;</b>	Channel the Ad-hoc network will use, or channel of router in infrastructure mode.	<b>4</b>	<b>11</b>
<b>set wlan phrase &lt;passphrase&gt;</b>	Router security WPA passphrase if used.		<b>CHANGEME</b>

<b>set wlan key &lt;key&gt;</b> <b>set wlan num &lt;num&gt;</b>	Router security WEP key if used and WEP key number.		<b>1234567890</b> <b>1</b>
<b>set ip address x.x.x.x</b>	If DHCP off or Ad-Hoc used, specify the IP Address.	<b>169.254.175.5</b> <b>4</b>	
<b>set ip gateway x.x.x.x</b>	If DHCP off or Ad-Hoc used, specify the gateway.	<b>169.254.175.1</b>	
<b>set ip netmask x.x.x.x</b>	If DHCP off or Ad-Hoc used, specify the netmask.	<b>255.255.0.0</b>	

### Initial Ad-Hoc Mode Settings

```

Beacon=100
Probe=60
OPEN=
CLOSE=
REMOTE=
FlushSize=512
MatchChar=0
FlushTimer=10
IdleTimer=300
CmdChar=$
IF=DOWN
DHCP=OFF
IP=169.254.175.54:2000
NM=255.255.0.0
GW=169.254.175.1
HOST=0.0.0.0:2000
PROTO=TCP,
MTU=1460
FLAGS=0x7
BACKUP=0.0.0.0
DNS=161.72.0.0
Name=server1
Backup=backup2
FTP=208.109.78.34:21
File=wifly-GSX.img
User=roving
Pass=Pass123
SSID=WM-485-232
Chan=5

ExtAnt=0
Join=4
Auth=OPEN
Mask=0x1fff
Rate=0, 1 Mb
Linkmon=0
Passphrase=CHANGEME
SleepTmr=600
WakeTmr=1
Trigger=0x0
Autoconn=0
IoFunc=0x40
IoMask=0x21f0
PrintLvl=0x0
TimeEna=0
TIMEADR=129.6.15.28:123
Zone=7
Baudrate=9600
Flow=0x0
Mode=0x1
JoinTmr=1000
Replace=0x24
DeviceId=WM-485-232
Password=
Format=0x0
Sensors=0x0
BCAST=255.255.255.255:55555
Interval=0x0

```

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