Addendum to *Verbatim Gateway* Owner's Manual

Gateway Ethernet Module Setup

Version 5.0

Verbatim Gateway

Revision History

Rev #	Description	Author/Editor	Date
3	Draft. Re-write of 2.0	Davey Hudson	4/10/2015
4	Draft. Re-write after SP review	Davey Hudson	4/10/2015
5	Updated bitmapping to match new firmware	Davey Hudson	8/03/2015

CONTENTS

1 Introduction

The information provided in this document helps the user setup and test the *Verbatim Gateway Ethernet Module*. The main purpose of connecting to the Ethernet network is to access the PLC data natively instead of connecting on other external network bridges.

This addendum is in effect a new section to the Industrial Networks section of the manual (Section 7 in the main *Verbatim Gateway* User Manual). Therefore, the content of this addendum covers all the requirements of connecting to the Ethernet network, which also includes all testing and diagnostics.

A. Prerequisites

Prior to starting this process, please ensure:

- The user is familiar with the basic operation and programming method of the *Verbatim Gateway (Gateway)* product. Only the Ethernet-specific features of the *Gateway* are described in this addendum.
- The *Gateway* is setup and functioning in accordance with the manual.
- The user has basic familiarity with Windows PCs and networking.
- The *Gateway* and PC are connected to a LAN and have the capability to communicate via TCP.
- The user has the appropriate IP configuration information for these devices.

B. Overview

Adding a *Gateway* to your PLC system is a simple 3-step process Connect and configure the *Gateway* to your specific network.

- Connect and configure the *Gateway* to your specific network (Section 2.A)
- Assign a *Gateway* alarm channel to the System Network Address (SNA) (Section 2.D)

- Testing that the *Gateway* responds to Ethernet commands. This is an optional procedure that requires ***ComTest Pro,*** a free third-party software program.(Section 3)

C. Requirements

Description	Name / Type	Version
Windows PC	Minimum requirements: --2.8GHz Pentium 4 processor, 2GB of memory, 16GB of storage and DirectX 9, with WDDM 1.0. --Windows 7 (32 or 64 bit) --Serial port or USB serial port adapter --Ethernet port	NA
Verbatim Gateway Operator's Manual	*Verbatim Gateway* Operator's Manual	NA
Verbatim Gateway CD-ROM	*Alarmware* (Ethernet version)	NA

D. Reference Links for Products and Networking

For further information about Raco products, please consult the ***Raco Manufacturing and Engineering*** web pages at www.racoman.com. The latest manuals, *Alarmware* software, and EDS-files can be downloaded from the online support sections of the web site.

Gateway **Downloads: http://www.racoman.com/protected/man_gateway.htm**

For more information concerning the *EtherNet/IP* network the *Open EtherNet/IP Vendor Organization* has a webpage. Please visit http://www.odva.org for more information about *EtherNet/IP*.

For more information concerning the *Modbus/TCP* network the Open Modbus Organization has a webpage. Please visit http://www.modbus.org for more information about *Modbus/TCP*.

The testing utility ***ComTest Pro*** is provided by ***BaseBlock Software*** as a free utility. Please visit their website for more information on the utility, the company, and its other products. www.baseblock.com RACO Manufacturing and Engineering is not affiliated with ***BaseBlock Software.***

2 Gateway Configuration

This section will cover setting up the *Gateway Ethernet Module* for your network and assigning alarm channels to the desired SNAs.

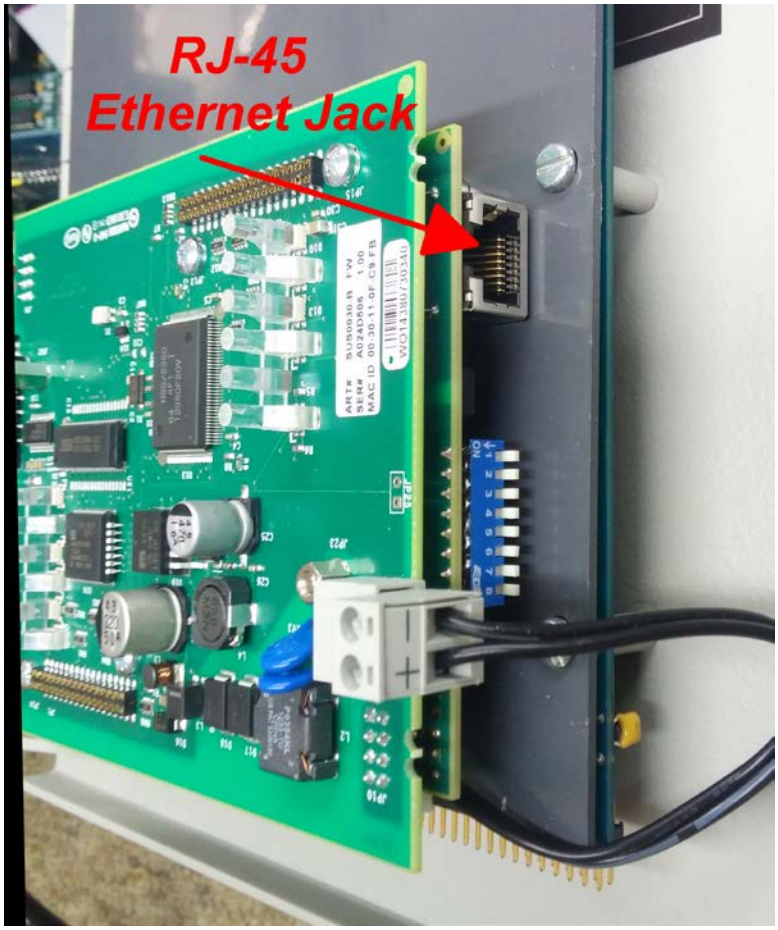
A Configuring the Gateway Ethernet Module IP Settings

The Ethernet Module's IP settings must be configured in order to connect to the network. The current Ethernet Module's IP address must initially be determined and then configured to correctly match your network setup.

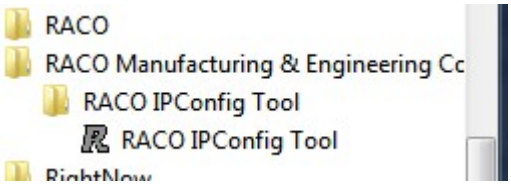
The Catalyst's Ethernet Module's IP settings must be configured in order to connect to the network. The current Ethernet Module's IP address must initially be determined and then configured to correctly match your network setup.

Determine and configure the IP Address

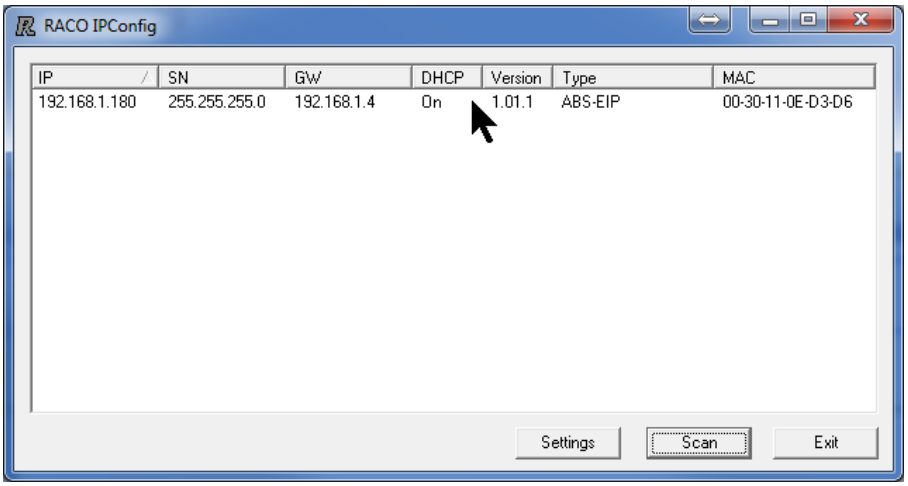
1. Connect a standard RJ-45 Ethernet cable to the Ethernet Module. This should be on a network that is accessible to the PC and the PLC to be monitored.



2. **Click** Start > All Programs > Raco Manufacturing & Engineering Company > RACO IPConfig Tool > RACO IPConfig Tool

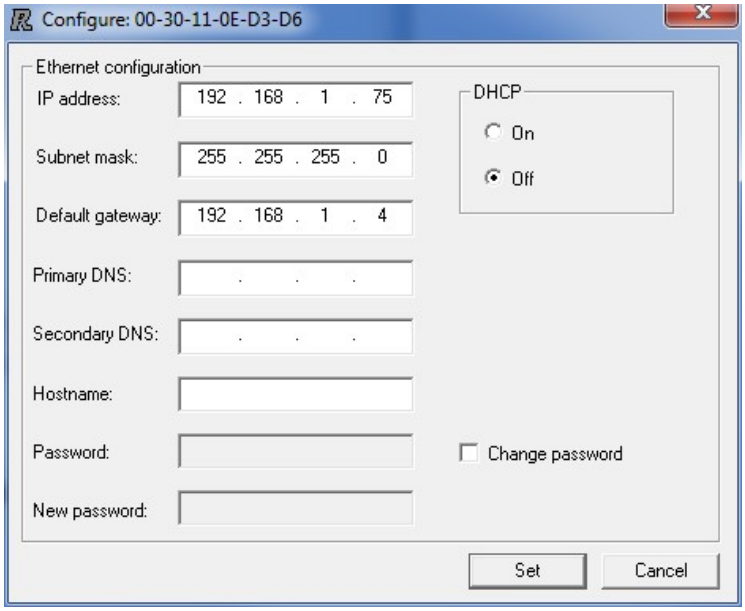


1. The tool will scan the local subnet and display information on any *Gateway*s that it finds:



3. If more than one *Gateway* is found, you may need to temporarily disconnect one or more of them to determine which the correct one is. Alternatively, you can compare the MAC address printed on the Ethernet module to the displayed MAC.

4. **Double-Click** on the line containing the IP address of the *Gateway* that you want to configure. The configuration window will appear.



5. It is highly recommended that the *Gateway* and PLC be assigned static IP addresses to avoid loss of connectivity if the DHCP server assigns a different IP than the system was configured to use.

   For a static IP: enter the IP address, Subnet mask, and Default gateway provided by your IT Department. You can leave the DNS entries blank.

   For a Dynamic IP: (DHCP) select the DHCP On option button. You do not have to enter the remaining fields.

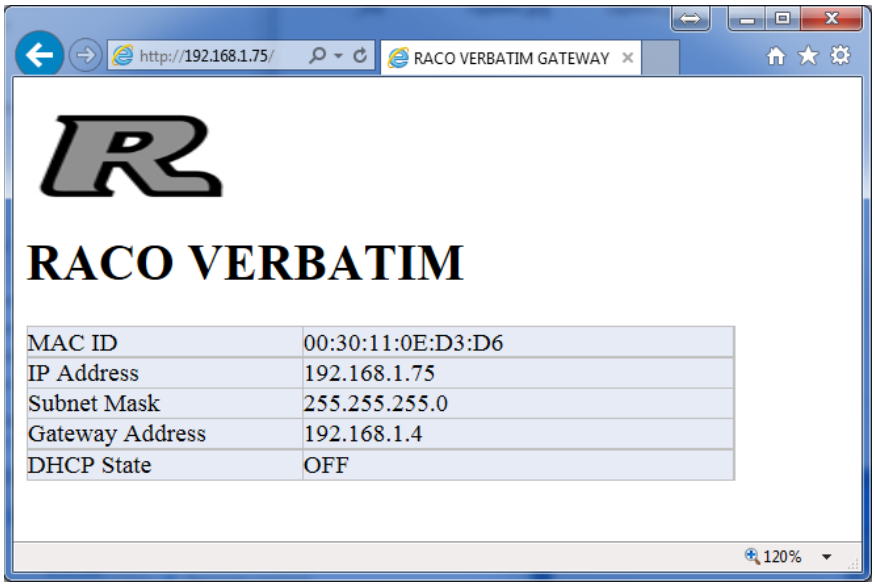
6. Close the configuration window and **Exit** the IPConfig tool.

Caution: If DHCP is left on, the PLC can lose connection with the Gateway if the DHCP server changes the Gateway's IP settings

2.

E. Test the Gateway Ethernet Module connectivity

1. Open a browser on the PC and enter in the *Gateway's* IP in the address bar. The browser should display a page similar to this one. If it does not, or if the displayed configuration is incorrect, then there is a problem that needs to be rectified before the *Gateway* will be able to connect.



The Gateway Ethernet Module is now configured and ready to receive data from other devices on the network.

B *Gateway* Data Register SNA Addressing

It is helpful to have a basic understanding of the Gateway addressing system to configure alarms successfully.

What is an SNA?

The PLC sends alarm data to the Gateway via the Gateway Ethernet Module's IP address in conjunction with a unique SNA (System Net Address) address. The SNA consists of a Network number, a Node number, and an address on that node. SNA 1*2*00001 would identify Network 1, Node 2, Address 00001. For the Gateway Ethernet Module, the Network is always 1 and the Node is always 2: 1*2*xxxxx.

The Gateway can read 1968 addresses in the range from 1*2*00001 to 1*2*01968. Each of those addresses corresponds to one bit (coil). Any of these addresses can be assigned to any Gateway alarm channel. This also can be represented as a range of 123 16-bit analog addresses in the range of 1*2*40001 to 1*2*40123. The relationship between discrete and analog addressing is described in the following sections.

SNA Data Types

The Gateway determines if the SNA represents discrete or analog data by the first digit of the SNA. If the first digit is a 0 (1*2*00001) then the data is a single discrete bit. This can be considered as the equivalent of a PLC coil. If the first digit is a 4 (1*2*40001) then the data is a 16-bit integer register that represents an analog reading like pressure or temperature.

SNA Discrete and Analog Register Addressing

This SNA numbering convention is just two different ways of looking at the same data registers. The 16-bit register at 1*2*40001 is composed of the 16 single bit registers 1*2*00001 to 1*2*00016. In other words, SNA 1*2*00001 refers to a bit in the 16-bit register 1*2*40001. SNA 1*2*000016 would be another bit in the SNA 1*2*40001 register. SNA 1*2*000017 would be a bit in the SNA 1*2*40002 register. The exact mapping is covered in Section 2.C.e.

For simplicity in avoiding conflicts, we suggest that you assign the Discrete channels to the lower registers plus some margin for additions and then assign the Analog channels above that range.

- **To allocate space for 50 Discrete alarms:** Each Analog register requires 16-bits. 50 divided by 16 = 3.125 so that would make the first 4 Analog registers unavailable. The first Analog SNA free would be 1*2*40005 as well as all the registers above that.
- **To determine the exact bits used by an Analog channel:** The first bit is found by this equation {(Analog SNA -40001)* 16} +1. Analog SNA 1*2*40005 would be {(40005-40001)* 16} +1 = 65. The Discrete bits used would be SNA

1*2*00065 and the next 15, ending at 1*2*00080.

SNA Discrete to Analog Register Bit Position Mapping

Each Analog register consists of 16 individual bits, numbered from 0 15. There are numerous ways that that the single bit Discrete register addresses can be mapped to these bit positions and can vary with different PLCs. We will discuss the common options here. If these do not match your scenario, please contact Technical Support and we will gladly assist you.

Determining the mapping

Numerous standards and variables can make determining the end-to-end mapping that your system uses. Rather than going through the process of determining the exact mapping that your system uses, it can be faster to do a quick test to locate the correct mapping to find a specific bit. This will also verify that the system is working properly.

1. **Verify the correct Analog Register address:** Monitor the status of the bit in question. Write FFFF-hex to the Analog register that you suspect contains that bit. The bit in question should be set to 1 as FFFF-hex will set all the bits in that register to 1 since FFFF-hex= 1111 1111 1111 1111). If not, then the addressing is incorrect, or there are other issues that must be resolved before continuing. A common problem is that the addressing is off by one, so try the Analog registers that are immediately before and after it.

2. **Locate the correct byte:** Sequentially write F000, 0F00, 00F0, and 000F to the Analog register. Note which value turns the bit on. The bit will be set to 1 when F (1111) is written the byte that contains it.

3. **Locate the correct bit:** Sequentially write 1, 2, 4, and 8 to the byte positon that turned the bit on in step 2. If the bit came on when you wrote 0F00, write 0800, 0400, 0200, and 0100 to the register. The bit in question will turn on. Converting the number to binary will show the correct bit. If 0400 turned on the bit, then the bit location would be where

the 1 occurs in the binary representation: 0000 0**1**00 0000 0000

RACO Bit Addressing

RACO Gateway bit addressing for *Modbus TCP* and *EtherNet/IP* both conform to the Modbus standard order for consistency. The Discrete registers (bits) are addressed sequentially starting at the most significant bit position (little endian order)

Modbus TCP and EtherNet/IP Bit Addressing

16-bit (Analog) Register 1*2*40001			1 bit (Discrete) Register
Rockwell Tag	**Bit Position**	**Hex Value**	**SNA**
Raco:O.Data[0].15	0	8000	1*2*00001
Raco:O.Data[0].14	1	4000	1*2*00002
Raco:O.Data[0].13	2	2000	1*2*00003
Raco:O.Data[0].12	3	1000	1*2*00004
Raco:O.Data[0].11	4	0800	1*2*00005
Raco:O.Data[0].10	5	0400	1*2*00006
Raco:O.Data[0].9	6	0200	1*2*00007
Raco:O.Data[0].8	7	0100	1*2*00008
Raco:O.Data[0].7	8	0080	1*2*00009
Raco:O.Data[0].6	9	0040	1*2*00010
Raco:O.Data[0].5	10	0020	1*2*00011
Raco:O.Data[0].4	11	0010	1*2*00012
Raco:O.Data[0].3	12	0008	1*2*00013
Raco:O.Data[0].2	13	0004	1*2*00014
Raco:O.Data[0].1	14	0002	1*2*00015

Raco:O.Data[0].0	15	0001	1*2*00016

Gateways shipped prior to 08/01/2015 use a different firmware version. The Modbus TCP mapping is that same as described above. However, the EtherNet/IP mappings are different. RACO will provide a free firmware upgrade if you prefer the new mapping.

EtherNet/IP Bit Addressing

(Gateways shipped prior to 8/01/15)

16-bit (Analog) Register 1*2*40001			1 bit (Discrete) Register
Rockwell Tag	**Bit Position**	**Hex Value**	**SNA**
Raco:O.Data[0].7	0	0080	1*2*00001
Raco:O.Data[0].6	1	0040	1*2*00002
Raco:O.Data[0].5	2	0020	1*2*00003
Raco:O.Data[0].4	3	0010	1*2*00004
Raco:O.Data[0].3	4	0008	1*2*00005
Raco:O.Data[0].2	5	0004	1*2*00006
Raco:O.Data[0].1	6	0002	1*2*00007
Raco:O.Data[0].0	7	0001	1*2*00008
Raco:O.Data[0].15	8	0080	1*2*00009
Raco:O.Data[0].14	9	4000	1*2*00010
Raco:O.Data[0].13	10	0200	1*2*00011
Raco:O.Data[0].12	11	1000	1*2*00012
Raco:O.Data[0].11	12	0008	1*2*00013
Raco:O.Data[0].10	13	0004	1*2*00014
Raco:O.Data[0].9	14	0200	1*2*00015
Raco:O.Data[0].8	15	0100	1*2*00016

Ethernet Fail Bit

The Gateway Ethernet Module constantly monitors the status of the Ethernet connection. If the connection is good (the Ethernet cable is connected and the Gateway is actively receiving data from the PLC) the adapter will set address 1*2*01992 to 0. If the Gateway is not connected or is not receiving data, the adapter will set address 1*2*01992 to 1 indicating a failure in the Ethernet connectivity.

We recommend that the first SNA that you configure is the Ethernet_Fail bit so that you can easily verify that the connection is good for the remainder of the setup. It is usually set to the last alarm channel in your Gateway to leave the lower channels open for standard alarms, e.g. Ch. 56 in a 56 channel Gateway.

F. Assigning an SNA to a Channel

The user must assign an address to a channel for each register they want to monitor. They must also specify the alarm condition when configuring each channel

The process will only be briefly reviewed here as it is covered in detail in the *Gateway* manual.

Set the system and default parameters.

1. Short the two pins of the Reset Jumper JB3 for 5 seconds to clear all memory back to the factory defaults. See the User' manual Appendix E.11. ***Caution! This will delete all user programming.***

3.

2. On the *Gateway* keyboard, enter these commands:

   4906 2*5 (enter) / Set the Net 2 protocol to Modbus

   4930 *2 (enter) / Checks the "Communication Normal" status. This checks the serial port connection between the *Gateway* and its internal Ethernet adapter. It does not check the connection between the *Gateway* and the PLC.

   4910 2 (enter) / Set Net 2 as the default for addressing. This allows us to enter the address number without having to specify the Net each time. It is always 2

for the Ethernet option.

4911 2 (enter) / Set Node 2 as the default for addressing. This allows us to enter the address number without having to specify the Node each time. It is always 2 for the Ethernet option.

Assign and Configure a Discrete Channel

1. To assign a channel we need to specify a channel number and SNA using command 45:
   45*zz* * <SNA>* (enter)

2. Example: to set alarm channel ***32*** to alarm when SNA ***2*2*01992*** (the Ethernet_Fail bit) is set:

   45*3201992*** (enter)

   We can omit “2*2*” since we set those as defaults previously.

3. The Gateway will not generate any alarms by default. The user must define the alarm conditions for every channel that they want to generate an alarm. To define an alarm condition, set the normal state of the channel using command 45:
   45zz 1 (enter) if the normal state is 1 (alarm on 0)
   45zz 2 (enter) if the normal state is 0 (alarm on 1)

   Example- to set channel 32 to alarm when there is no Ethernet connection:

4. **4532 2** (enter)

   Since the Ethernet_Fail is 0 when there is a good connection, we set the normal state to be 0)

   If the connection fails, the Ethernet_Fail bit will be set to 1. This will trip the channel 32 alarm since it is no longer in the state that we defined as normal

To check the actual state of the channel:

40zz (enter)

Example:

4032

At this point the Gateway is fully configured to send an alarm on channel 32 if communication between the PLC and Gateway is lost.

Repeat these steps to add additional alarms. You may configure other options as described in the Gateway's user manual.

Assign and Configure an Analog Channel

1. To assign a channel we need to specify a channel number and SNA using command 45. To identify it as an integer Analog value we use a 4xxxx series address:

   45*zz* * <SNA>* (enter)

   Example: to set alarm channel ***5*** to alarm depending upon the integer value of **SNA** 2*2***40001**:

   45<u>05</u>*<u>40001</u>* (enter)

   We can omit "2*2*" since we set those as defaults previously.

2. The setpoint value for an alarm condition needs to be set using command: **45zz 5** or **6** before a channel can give an alarm for that channel. Since the register is 16-bit, the maximum value that can be entered is 65535.

   45*zz* 5 <Low Setpoint Value> (enter) and/or

   45*zz* 6 <High Setpoint Value> (enter)

5. Example: To set the low setpoint of channel **<u>5</u>** to **<u>1275</u>**:

   45**<u>05</u>** 5 **<u>1275</u>** (enter)

   Example: To set the high setpoint of channel 5 to 1500:

   45**<u>05</u>** 6 **<u>1500</u>** (enter)

To check the state of the channel:

40*zz* (enter)

Example:

40**05** (enter)

3. Repeat these steps to add additional alarms.

At this point the Gateway is fully configured to send an alarm on channel 32 if communication between the PLC and Gateway is lost. You may configure other options for the channel as described in the *Gateway's* user manual.

6. Note: Since the 16-bit Analog register 2*2*40005 consists of the 16 Discrete bits 2*2*00065 to 2*2*00080, those are not available for use as Discrete alarms. Refer to **Section C: *SNA Discrete and Analog Register Addressing***.

G. Channel Interlinking and Network Bridging

The Channel Settings also allows the status of an incoming SNA to be interlinked to a SNA output channel. Once each scan cycle, the value of the input SNA is written to the output SNA. Refer to the **Advanced Channel Settings** section of the *Gateway* manual for information for further information and configuration instructions.

H. Testing the *Gateway Ethernet* Functionality

This completes the *Gateway* Setup. You may now perform the "Testing the *Gateway Ethernet* Functionality" procedure to verify its operation. This consists of using a PC based program to simulate reading and writing the *Gateway* SNA addresses.

3 Gateway Testing

The test consists of using a testing utility to read and write the *Gateway's* SNA registers. This test will tell if the *Gateway* is properly configured and is responding to Modbus TCP commands prior to connecting it to a PLC. Since the *Gateway* uses the same hardware and configuration internally for Modbus TCP and EtherNet/IP, this will also test EtherNet/IP *EtherNet/IP EtherNet/IP* systems.

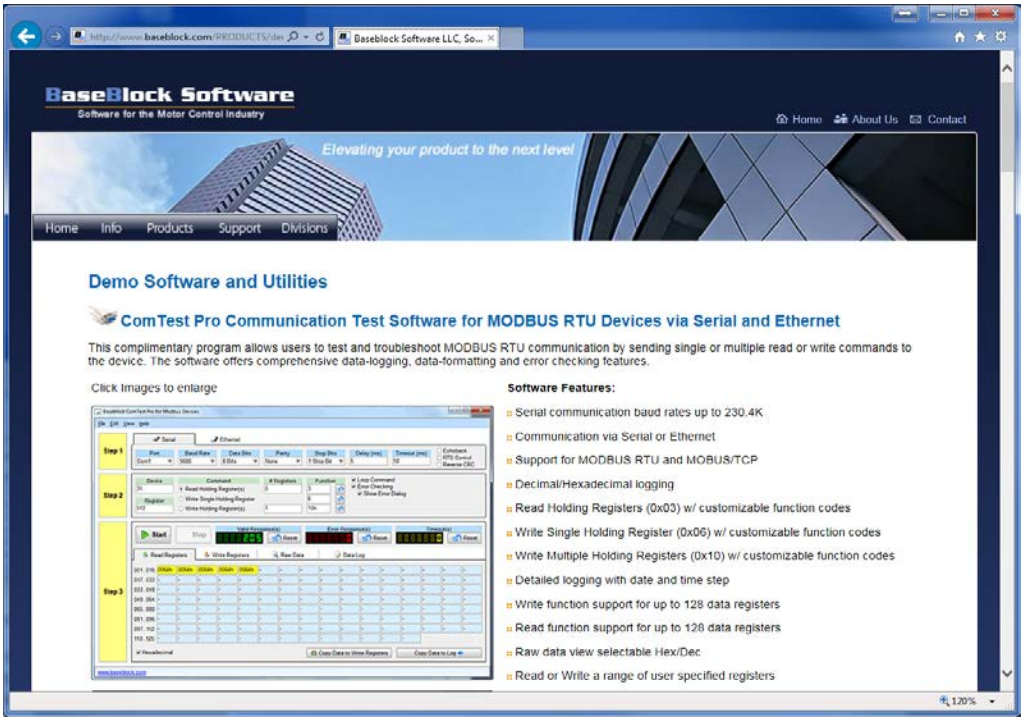
If the *Gateway* passes this test and the PLC is still not able to set alarms then investigate the connectivity between the PLC and *Gateway* and that the PLC is writing to the correct address.

Caution: The testing software must be run from a PC that is on the same subnet as the *Gateway*. It is strongly advised that the PC and the *Gateway* be on an isolated network during testing. Since the test software can send out Modbus commands, there's a small chance that the user could accidentally send commands to a PLC on the same network. This could result in equipment damage and personnel injury.

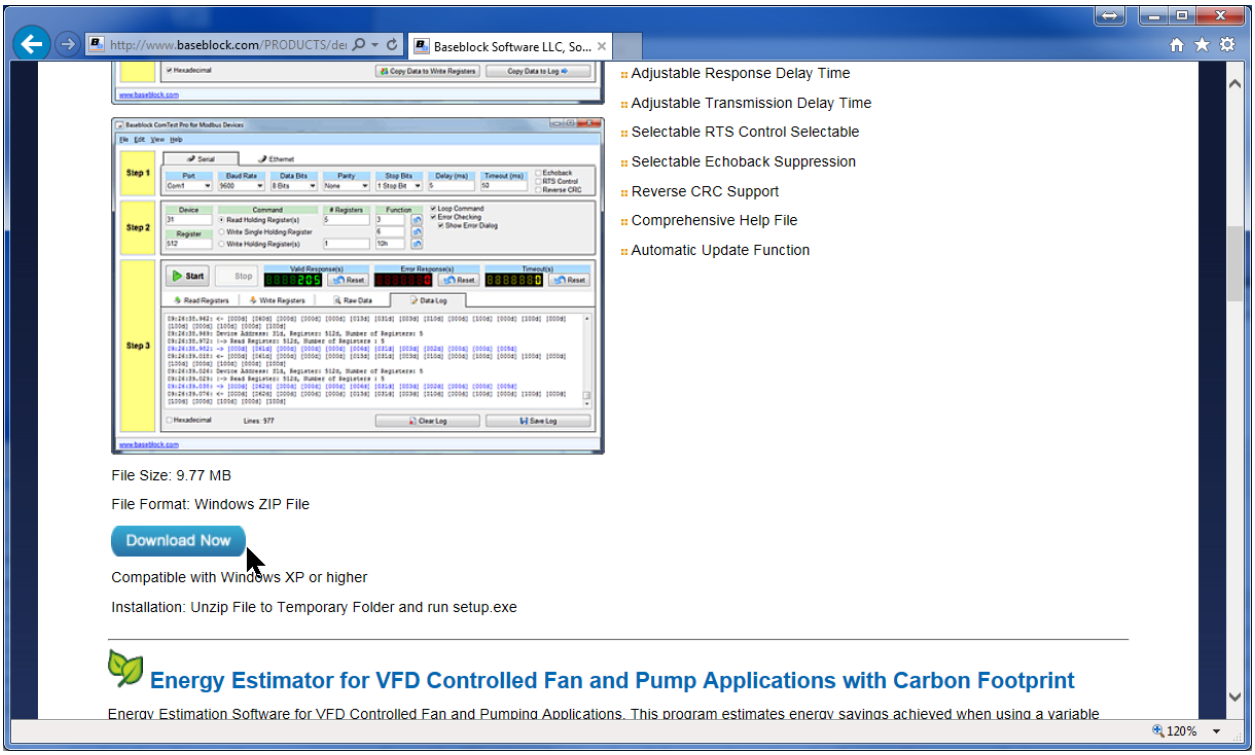
A Test Software Setup

Install the utility

1. Enter this URL into a browser:
2. http://www.baseblock.com/PRODUCTS/demosoftware.htm



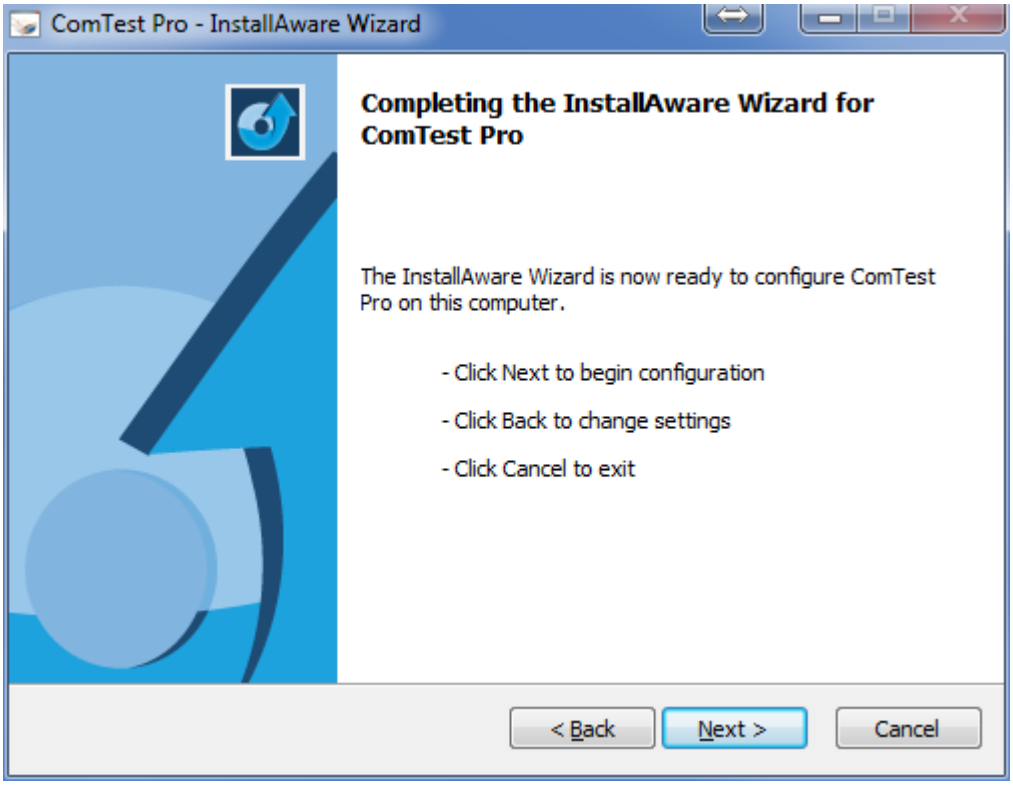
Scroll down and **Click** the **Download Now** button.



3. Download the file **BBCOMTESTPRO.zip** file to your computer. This process will vary depending on your browser.

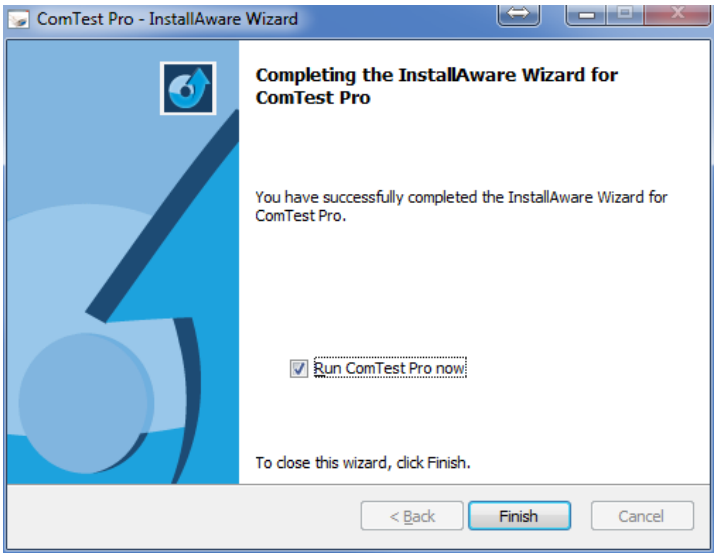
4. **Double-Click** the zip file to open the zip file. **Double-Click** the **setup.exe** file that's inside the zip file. You do not need to extract the zip file contents.

   When the setup starts **Click Yes** at the Windows **User Access Control** window and the *ComTest Pro* installation will continue.



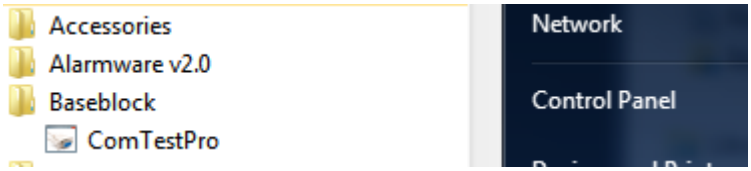
5. **Click Next**. If the installer notifies you that a restart is necessary, then restart your computer. Otherwise the completion window will appear. Uncheck the check box if you don't want to run the program now. **Click Finish.**

6.

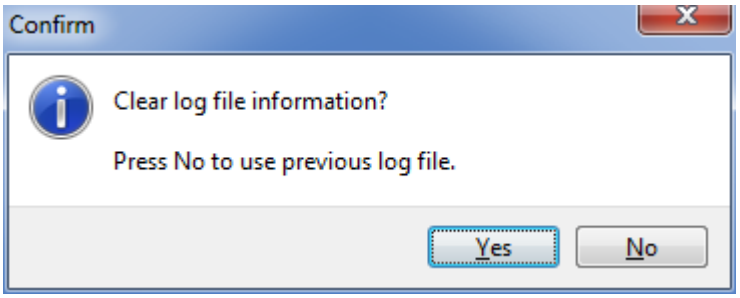


Configuring ComTest Pro

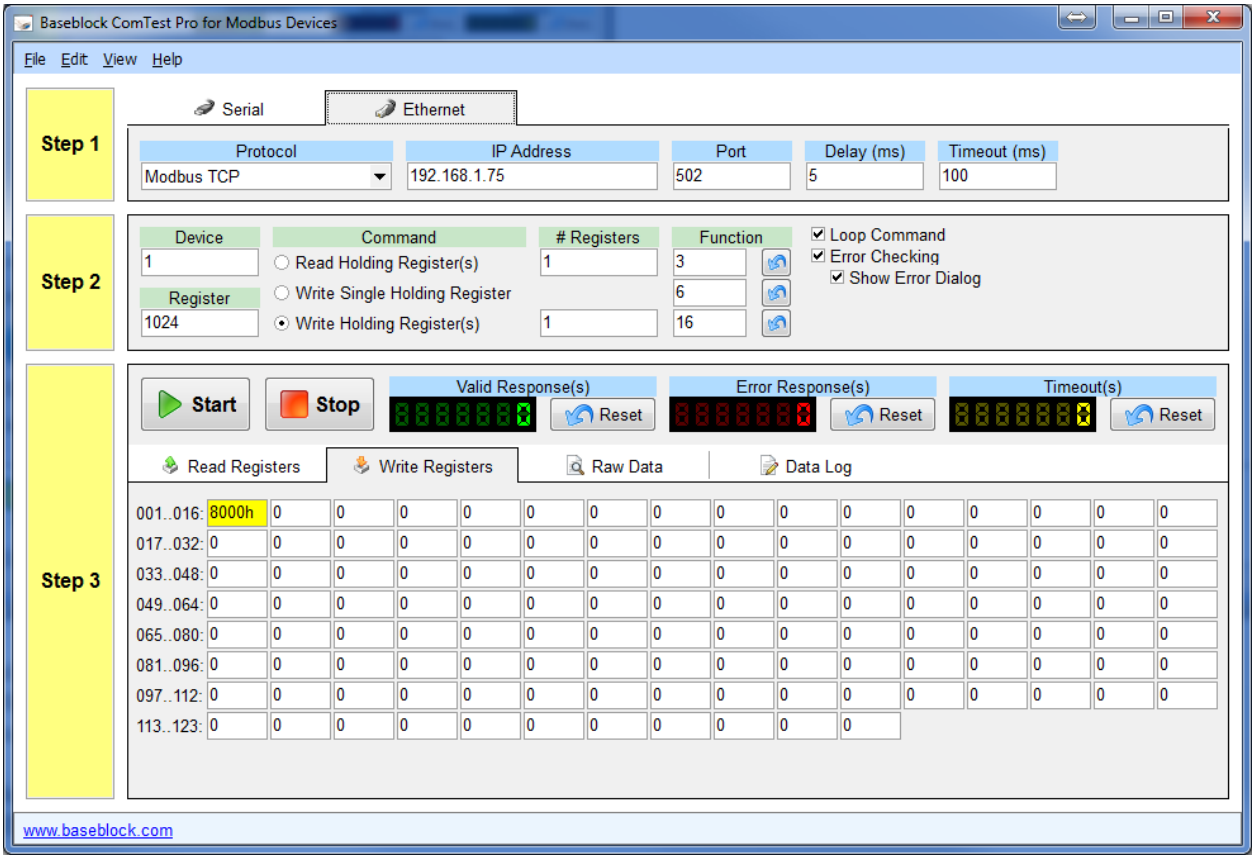
1. If *ComTest Pro* is not running, start it by **Click**ing:
   Start Menu > All Programs > BaseBlock > ComTest Pro.



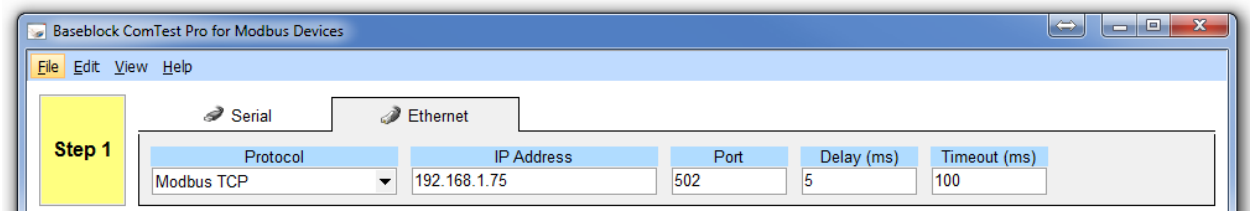
2. At the **Confirm** window **Click Yes**.



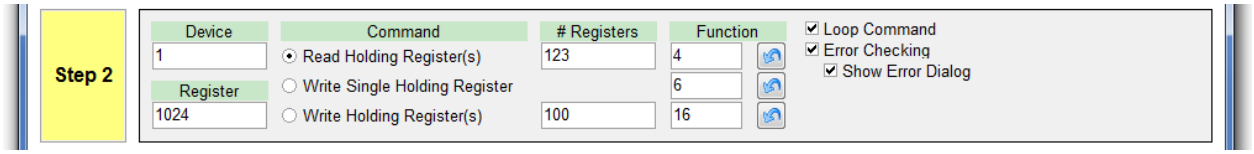
3. The main *ComTest Pro* window will open. The Help menu (**F1**) has a very good explanation of the program options so they will not be repeated in detail here. The initial screen may differ slightly from this example. **Click** the Ethernet tab.



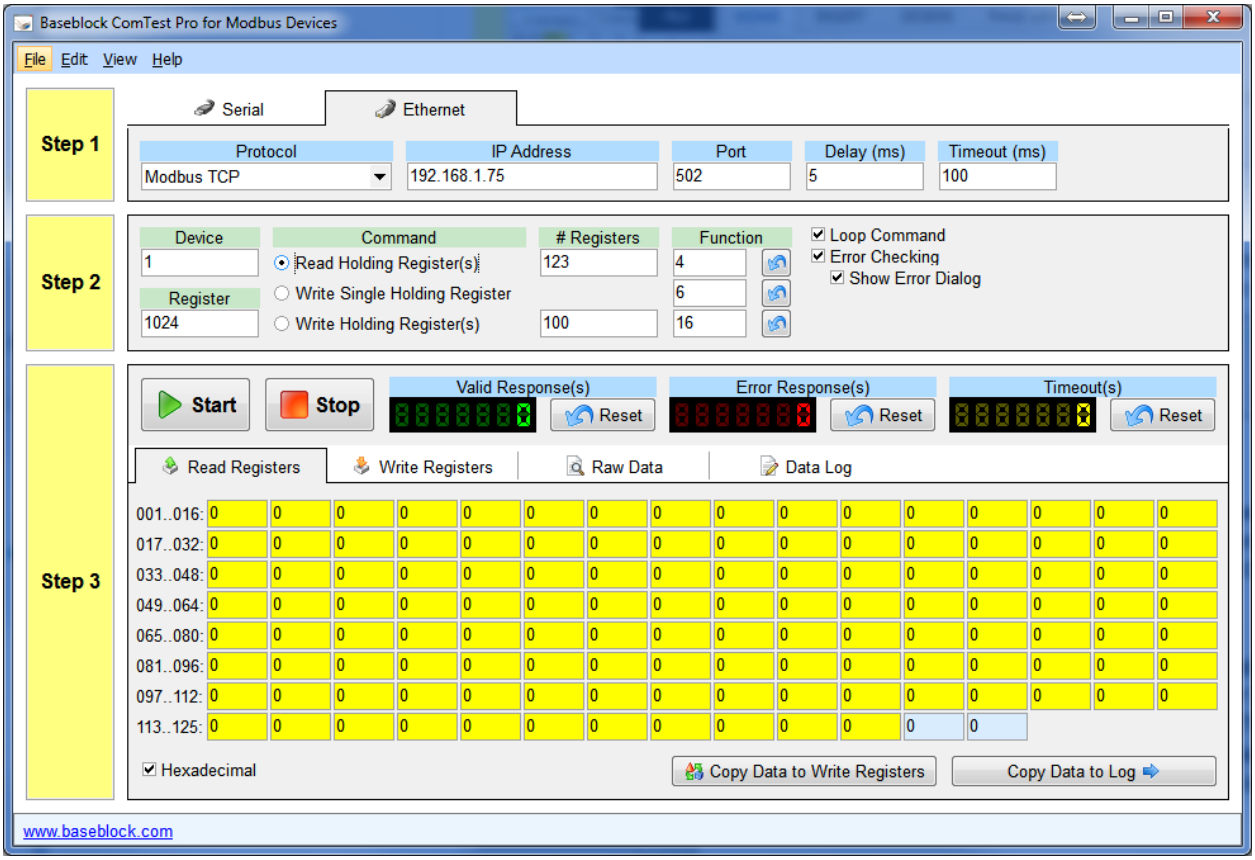
4. In Step 1, enter the settings as shown here, except enter the actual IP Address of your *Gateway*.



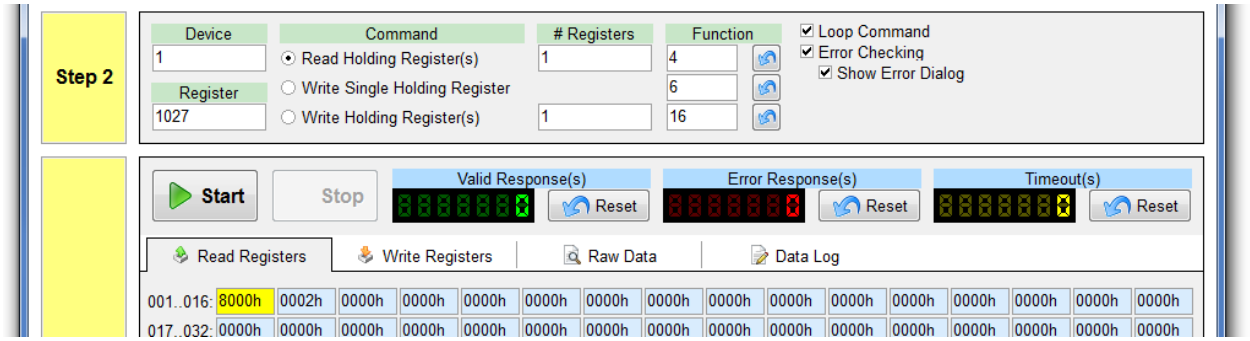
5. In Step 2, select **(*) Read Holding Register(s**). Enter the settings as shown here for testing. *ComTest Pro* register 1024 corresponds to SNA 2*2*40001 in the *Gateway*.



6. The registers that are selected to be read will be highlighted in yellow. ***ComTest* Pro** is now configured to read 123 registers from 1024 to 1147 (SNA 2*2*40001 – 40123) in the *Gateway*) or to force 100 registers 1024 to 1124 (SNA 2*2*40001 – 40123). This is the standard testing setup.



7. Alternativly you can read a single specific register by setting # **Regsiters** to **1** and entering the desired register in the **Register** box. We recommend that you test the addresses that we provide in this procedure first. This will verify the operaion without adding additional variables to the testing. For example, the setting below will read and write only register 1027 (SNA 2*2*40004) and display the result in the 00001h textbox that is highlighted in yellow:



I. Preparing the *Gateway* for Testing

This procedure sets up the *Gateway* to give an alarm when it receives the correct data from *ComTest Pro.*

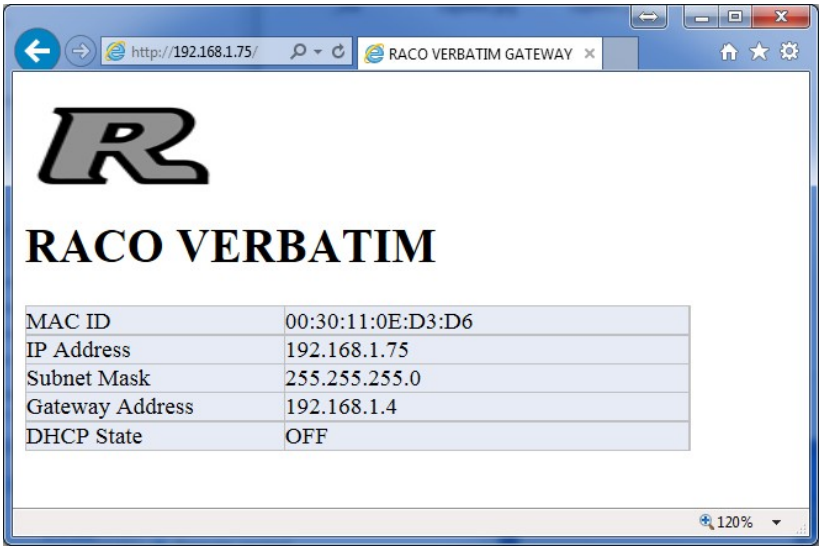
Verify the Gateway's Ethernet Connectivity

This section is a brief recap of the *Gateway* setup in **Section 2**. If you have just completed that section you may skip these steps.

1. Connect the *Gateway* to the same Ethernet subnet as the PC that *ComTest Pro* is running on.

2. Check that the IP setting of the *Gateway* using the Raco IP Config tool.

3. Enter the IP address of the *Gateway* into a web browser on the PC and verify that the *Gateway* status screen is displayed similar to this:



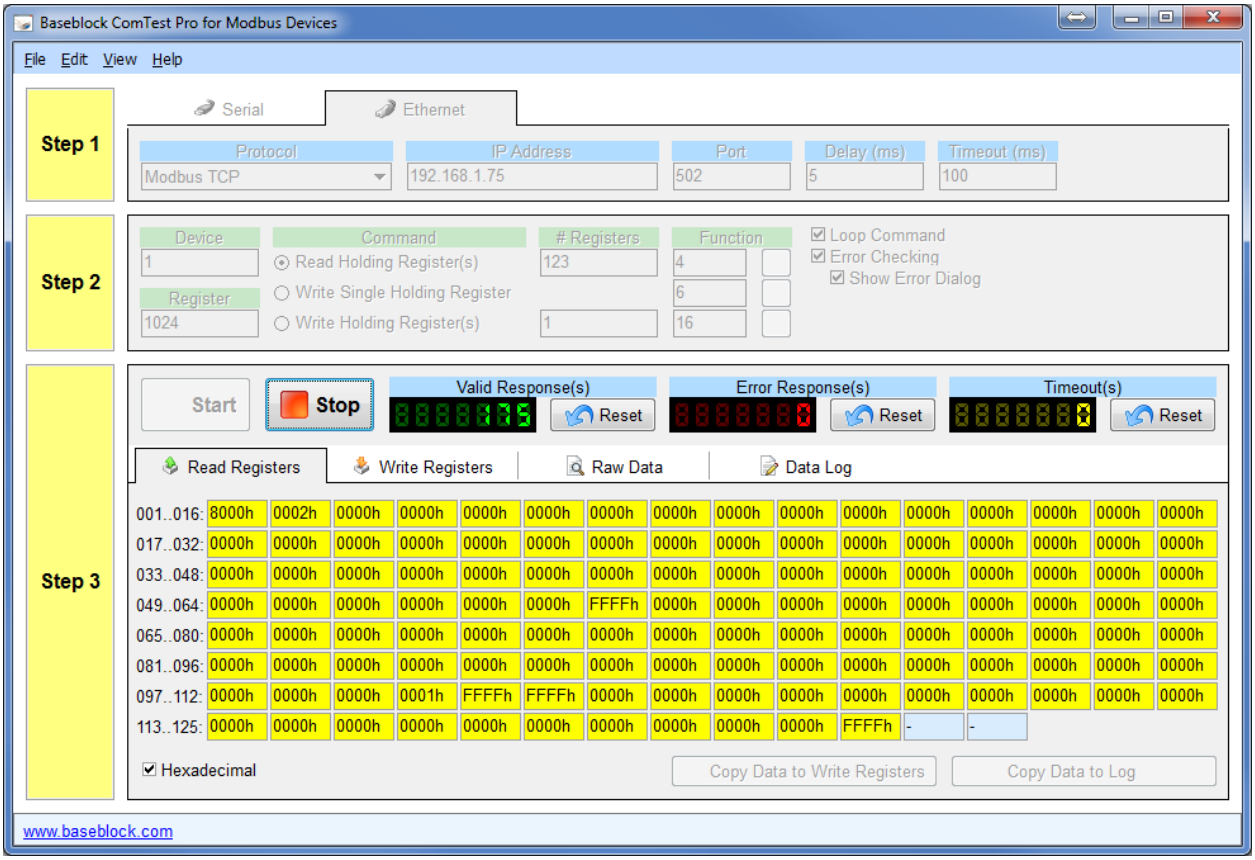
Assign the SNA to Alarm Channel

1. If there are no alarm channels assigned to the Ethernet SNAs, setup an alam channel to monitor the desired SNA, for example here: Channel 5 set to monitor SNA 2*2*00001. This process is described in **Section 2.D.b.**

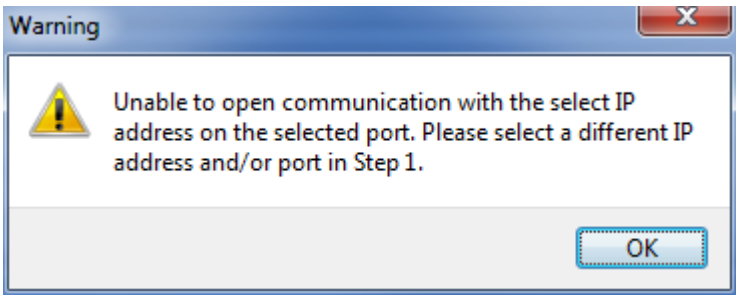
J. Testing the *Gateway*

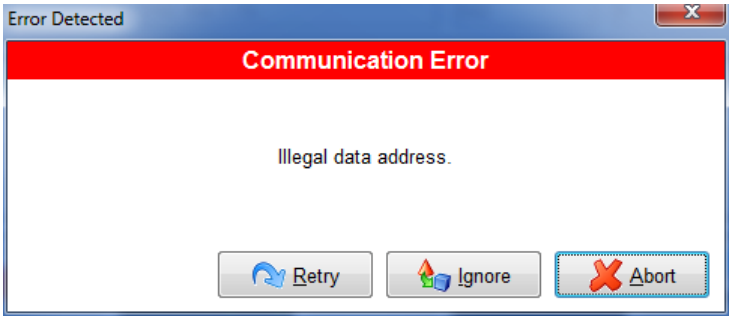
Read Testing

1. Read testing verifies the basic connectivity and functionality of the *Gateway*.
2. Check that *ComTest Pro* and the *Gateway* are still setup as described in the previous steps.
3. **Click** the **Start** button in Step 3 of the *ComTest Pro* screen. The program will start repeatedly reading and displaying the selected registers' values. The **Valid Response(s)** counter should start incrementing about once a second. This indicates that the program can successfully read from the *Gateway*.



4. The registers will all read 0000h unless data has previously been written to them.If there is a communication or addressing problem ComTest Pro will display an error popup such as these. Investigate and resolve the problem before continuing**.**





5. If the read testing is successful, **Click Stop** and then proceed to the write testing.

Write Testing

Caution: Since the test software can send out Modbus commands, there's a small chance that the user could accidentally send commands to a PLC on the same network. This could result in equipment damage and personnel injury.

1. Determining the correct data to enter requires some math. We can skip the math by using these predetermined numbers to see if the *Gateway* is accepting data. Set the *Gateway* to alarm on SNA 2*2*00001. Enter 0001 in the first yellow box. The 'h' will be added automatically. Proceed to Step 3 below.

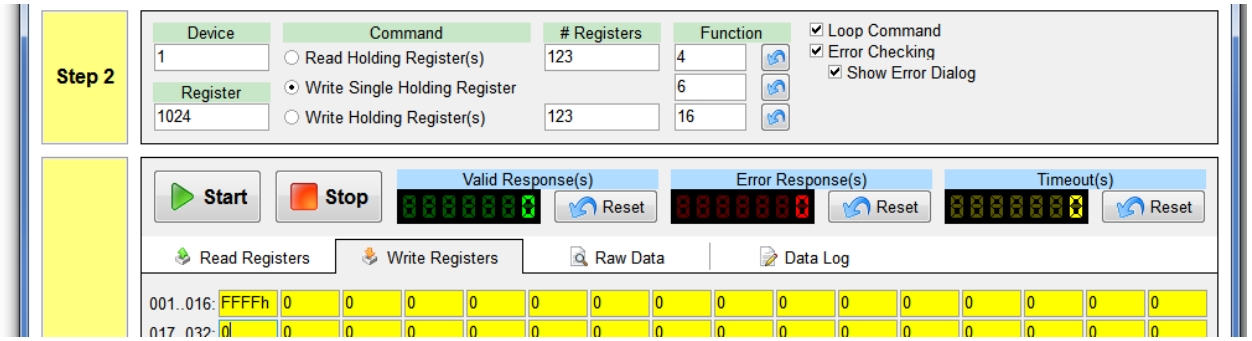
   To test a specific SNA, we need to determine the correct integer required to enable the specific alarm SNA. *ComTest Pro* can only write to a complete 16-bit register. It cannot write a single bit. To trigger a single bit discrete alarm SNA (2*2*00001 in our example) we must determine the 16bit HEX number that corresponds to that bit. Divide the address by 16 then add 1 to the quotient to determine which 16bit register that it is in.
   For 2*2*00001: 00001/16 = 0 R1. 0+1 = 1 so 00001 is located in the first register 001.

   The remainder will indicate the bit in that register. The HEX value that must be entered to turn that bit on is: 2^R (2 to the R power) converted to HEX. With

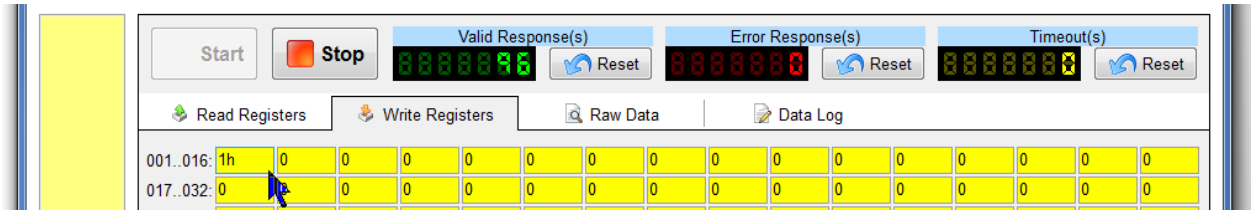
R1, 2^1 = 1 so enter 0000h in the first register square.

For 2*2*00147: 157/16 = 9 R13, 13+1=14 so use register 014. 2^13=8192d, = 2000 HEX so enter 2000h in register 014.

2. In Step 2 of the *ComTest Pro window*, select **(*) Write Holding Register(s**). Enter the settings as shown here for testing. *ComTest Pro* register 1024 corresponds to SNA 2*2*40001 in the *Gateway*. In Step 3, enter FFFF.



3. **Click** the **Start** button in Step 3. The program will start repeatedly writing the selected registers' values. The **Valid Response(s)** counter should start incrementing about once a second.



4. On the Gateway's keypad, check the state of the channel, enter:
   40zz* (enter)

   Example: **4005*** (enter)
   The state should report 1.

5. On the Gateway's keypad, check the state of the channel's alarm, enter:
   45zz (enter)

   Example: **4505** (enter)
   The state should report an alarm state.

6. **Click Stop**. Enter 0 in the *ComTest Pro* register and **Click Start** again.

7. On the *Gateway's* keypad, check the state of the channel:
   40zz* (enter)

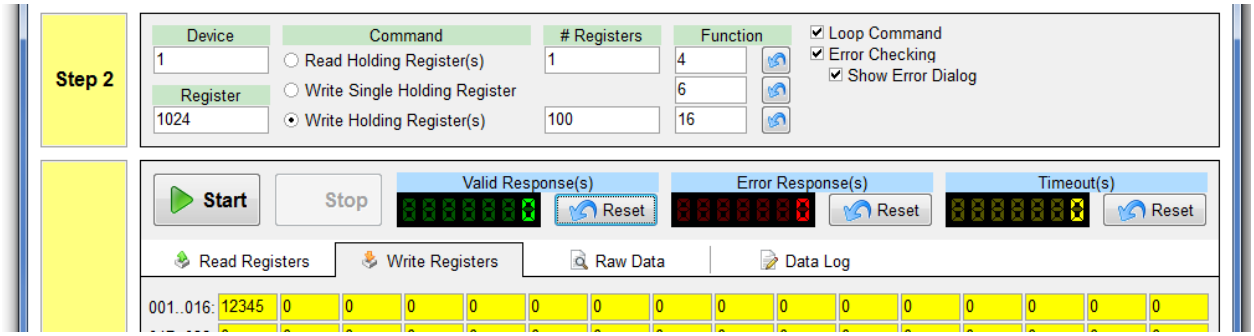
   Example: **4005*** (enter)
   The state should report 0.

8. On the Gateway's keypad, check the state of the channel's alarm:
   45zz (enter)

   Example: **4505** (enter)
   The state should report a normal state.

9. Repeat these steps for all the discrete SNAs to be tested.

10. To test an Analog channel enter a decimal integer value in the textbox of the register to be tested. A decimal value is entered by entering the number without the h suffix. (12345 in Register 1 for our example). Remember that Register 1 corresponds to SNA 2*2*40001 in the *Gateway*. Since the register is 16-bit, the maximum value is 65535. Any value entered greater that that will indicate 65535 on the *Gateway*.



11. **Click Start**. Observe the *Alarmware* **Direct Channel Reading** window. The **Raw value** should equal the same number that was entered in the *ComTest Pro* register. The **Report Value** applies any scaling that has been added; we had entered a gain of 2 in this example. See the *Gateway* manual for information on scaling and other aspects of the channel setup.

12. **Click Stop** to stop writing data.

13. Repeat these steps for all the Analog SNAs to be tested.

Once the read and write testing are completed satisfactorily, **Exit** the *ComTest Pro* program. You may now proceed to configuring and testing the PLC with the assurance that the *Gateway* is responding properly.

If this testing is successful but your PLC cannot activate alarms on the *Gateway* then there's a communication or addressing problem with the PLC. These problems are best resolved by contacting your networking and PLC support options. Raco Technical Support will work with you and them to resolve the issues as they relate to the *Gateway*.