# Micro850 Modbus TCP to MicroLogix 1400

This guide will show you how to set a Micro850 as a Modbus TCP Master in order to talk to a ML1400 and share data

**Hardware (Used for this guide):**

- Micro850 controller (FRN 4.11 or greater required).
- ML1400 Series B (Only ML1400 units shipping with Series B FRN, shipping since late 2010, will support Modbus TCP).

**Software (Used for this guide):**

- Connected Components Workbench (4.00 or greater)
- RSLogix 500 version 8.4 (version 8.3 or greater required)

**Reference:**

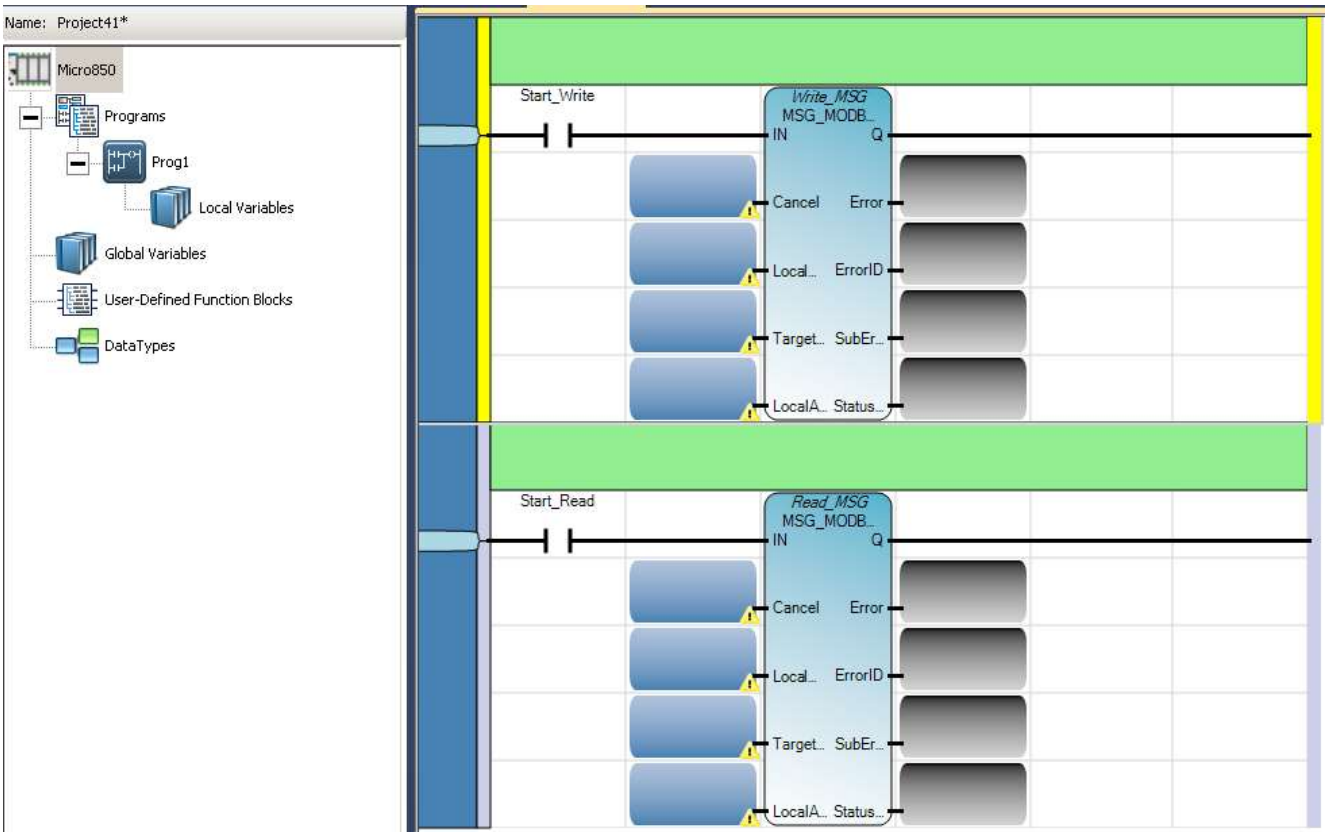
- Getting Started with CIP Client Messaging http://literature.rockwellautomation.com/idc/groups/literature/documents/qs/2080-qs002_-en-e.pdf
- KnowledgeBase Article 20543 https://rockwellautomation.custhelp.com/app/answers/detail/a_id/20543
- Micro800 reference Manual http://literature.rockwellautomation.com/idc/groups/literature/documents/rm/2080-rm001_-en-e.pdf

In this guide, we will set the Micro850 as a Modbus TCP Master to talk to a ML1400 Modbus TCP slave.

# Micro850 Modbus TCP Master

We will create a program in CCW that will write to a ML1400 and read date from it.

1) Start a new project in CCW and in the Program Ladder, place a Direct Contact (normally open contact) and assign a Bool Variable for it. Following the contact, place a MSG_MODBUS2 function block, and do the same on a second rung. We will call the MSG_Modbus2 in rung one “Write_MSG” and the MSG_MODBUS2 in rung two “Read_MSG”. The program should now look as follows:




2) Create the variables (Local or Global) that will be assigned to the MSG_MODBUS2 sub-blocks. Keep in mind the each MSG block will need its own individual variable.
So for the Write MSG, we will create the following variables for this guide:

| Name | Data Type | Dimension | Initial Valu | Alias | Attribute |
|---|---|---|---|---|---|
| Cance_Write_MSG | BOOL | | | | Read/Write |
| LocalPar_Write | MODBUS2LOCPARA | | ... | | Read/Write |
| TargetPar_Write | MODBUS2TARPARA | | ... | | Read/Write |
| LocalAdd_Write | MODBUSLOCADDR | | ... | | Read/Write |
| Start_Write | BOOL | | | | Read/Write |

And for the Read MSG, we will create the following variables:

| | | | | | |
|---|---|---|---|---|---|
| Cancel_Read_Msg | BOOL | | | | Read/Write |
| LocalPar_Read | MODBUS2LOCPARA | | ... | | Read/Write |
| TargetPar_Read | MODBUS2TARPARA | | ... | | Read/Write |
| LocalAdd_Read | MODBUSLOCADDR | | ... | | Read/Write |
| Start_Read | BOOL | | | | Read/Write |

3) Assign the variables to the specific MSG_Modbus sub-blocks. The ladder should now look similar to this:

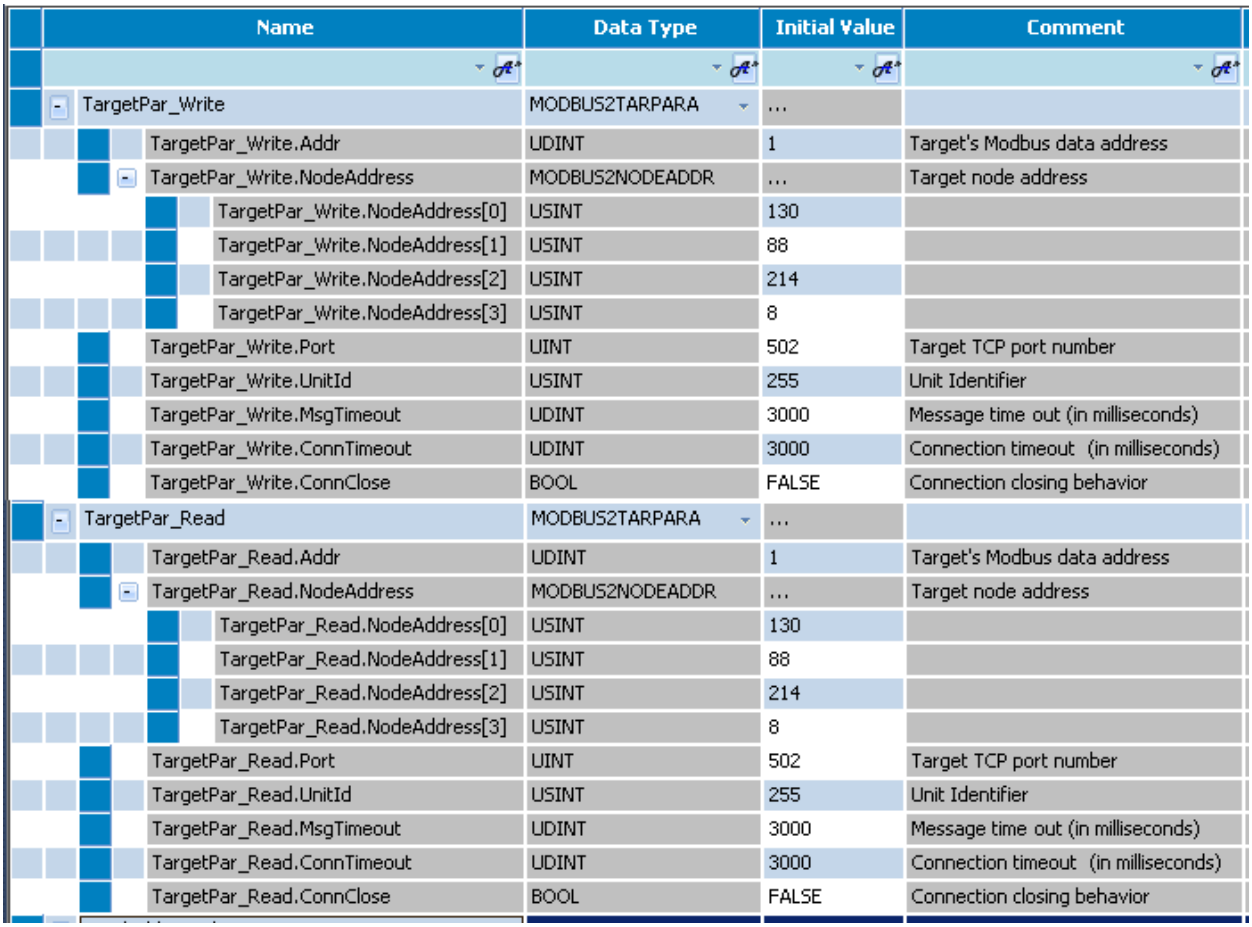
4) Next, we will configure the variables we created in order to be able to read/write to the specified ML1400.

- We will start with the **LocalPar_Write** and **LocalPar_Read**:

| Name | Data Type | Initial Value | Comment |
|---|---|---|---|
| Cance_Write_MSG | BOOL | | |
| LocalPar_Write | MODBUS2LOCPA | ... | |
| LocalPar_Write.Channel | UINT | 4 | Local Channel number |
| LocalPar_Write.TriggerType | UDINT | 0 | 0 = Trigger once, n = Cyclic Trigger |
| LocalPar_Write.Cmd | USINT | 16 | Modbus command |
| LocalPar_Write.ElementCnt | UINT | 2 | No. of elements to Read/Write |
| LocalPar_Read | MODBUS2LOCPA | ... | |
| LocalPar_Read.Channel | UINT | 4 | Local Channel number |
| LocalPar_Read.TriggerType | UDINT | 0 | 0 = Trigger once, n = Cyclic Trigger |
| LocalPar_Read.Cmd | USINT | 3 | Modbus command |
| LocalPar_Read.ElementCnt | UINT | 2 | No. of elements to Read/Write |

| Parameter | Data type | Description |
|---|---|---|
| Channel | UINT | Local Ethernet port number:<br>• 4 for Micro850 & Micro820 embedded Ethernet port |
| TriggerType | UDINT | Message trigger type:<br>• 0: Msg Triggered Once (when IN goes from False to True)<br>• 1 to 65535 - Cyclic trigger value in milliseconds. Message triggered periodically when IN is true and the previous message execution completes.<br>• Set the value to 1 to trigger messages as quickly as possible. |
| Cmd | USINT | Modbus command:<br>• 01: Read Coil Status (0xxxx)<br>• 02: Read Input Status (1xxxx)<br>• 03: Read Holding Registers (4xxxx)<br>• 04: Read Input Registers (3xxxx)<br>• 05: Write Single Coil (0xxxx)<br>• 06: Write Single Register (4xxxx)<br>• 15: Write Multiple Coils (0xxxx)<br>• 16: Write Multiple Registers (4xxxx)<br>• Others: See MODBUS2LOCPARA custom command support |
| ElementCnt | UINT | Limits<br>• For Read Coil/Discrete inputs: 2000 bits<br>• For Read Register: 125 words<br>• For Write Coil: 1968 bits<br>• For Write Register: 123 words |

- Then the **TargetPar_Write** and **TaretPar_Read**:

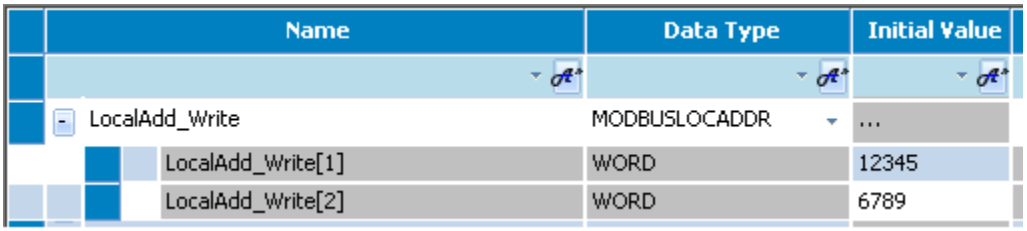


| Name | Data Type | Initial Value | Comment |
|---|---|---|---|
| TargetPar_Write | MODBUS2TARPARA | ... | |
| TargetPar_Write.Addr | UDINT | 1 | Target's Modbus data address |
| TargetPar_Write.NodeAddress | MODBUS2NODEADDR | ... | Target node address |
| TargetPar_Write.NodeAddress[0] | USINT | 130 | |
| TargetPar_Write.NodeAddress[1] | USINT | 88 | |
| TargetPar_Write.NodeAddress[2] | USINT | 214 | |
| TargetPar_Write.NodeAddress[3] | USINT | 8 | |
| TargetPar_Write.Port | UINT | 502 | Target TCP port number |
| TargetPar_Write.UnitId | USINT | 255 | Unit Identifier |
| TargetPar_Write.MsgTimeout | UDINT | 3000 | Message time out (in milliseconds) |
| TargetPar_Write.ConnTimeout | UDINT | 3000 | Connection timeout (in milliseconds) |
| TargetPar_Write.ConnClose | BOOL | FALSE | Connection closing behavior |
| TargetPar_Read | MODBUS2TARPARA | ... | |
| TargetPar_Read.Addr | UDINT | 1 | Target's Modbus data address |
| TargetPar_Read.NodeAddress | MODBUS2NODEADDR | ... | Target node address |
| TargetPar_Read.NodeAddress[0] | USINT | 130 | |
| TargetPar_Read.NodeAddress[1] | USINT | 88 | |
| TargetPar_Read.NodeAddress[2] | USINT | 214 | |
| TargetPar_Read.NodeAddress[3] | USINT | 8 | |
| TargetPar_Read.Port | UINT | 502 | Target TCP port number |
| TargetPar_Read.UnitId | USINT | 255 | Unit Identifier |
| TargetPar_Read.MsgTimeout | UDINT | 3000 | Message time out (in milliseconds) |
| TargetPar_Read.ConnTimeout | UDINT | 3000 | Connection timeout (in milliseconds) |
| TargetPar_Read.ConnClose | BOOL | FALSE | Connection closing behavior |

****Note: Target's Modbus Data Address is the beginning address you want to read/write to. For example: If I want to start writing to address 40001, then the Target's Modbus data address is 1. ****

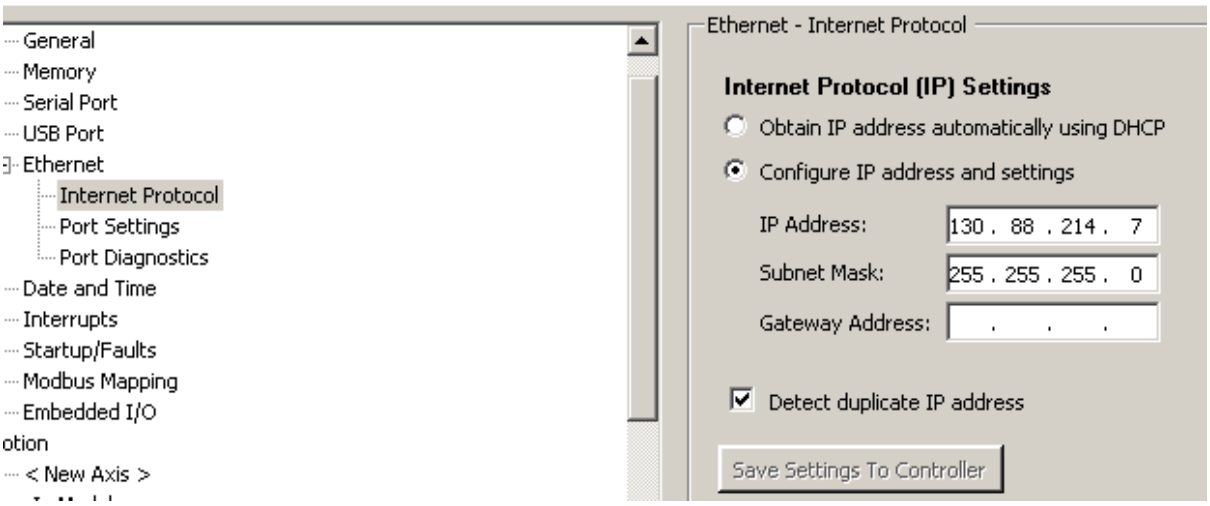
| Parameter | Data type | Description |
|---|---|---|
| Addr | UDINT | Target device's Modbus data address:<br>• 1 - 65536.<br>• Decreases by one when sending.<br>• Firmware uses low-word of address if the address value is greater than 65536. |
| NodeAddress[4] | USINT | Target device's IP address. The IP address should be a valid unicast address and cannot be 0, multicast, broadcast, local address or loop back address (127.x.x.x).<br>For example, to specify 192.168.2.100:<br>• NodeAddress[0]=192<br>• NodeAddress[1]=168<br>• NodeAddress[2]=2<br>• NodeAddress[3]=100 |
| Port | UINT | Target TCP port number. Standard Modbus/TCP port is 502.<br>1 - 65535<br>Set to 0 to use the default value 502 |
| UnitId | USINT | Unit Identifier. Used to communicate with slave devices through a Modbus bridge. Refer Modbus specification for more details. Note that Micro800 shall not attempt to validate this value.<br>0 - 255<br>Set to 255 if Target device is not a bridge. |
| MsgTimeOut | UDINT | Message timeout (in milliseconds). Amount of time to wait for a reply for an initiated command.<br>• 250 - 10,000<br>• Set to 0 to use the default value 3000.<br>• A value less than 250 (minimum) will be set to 250.<br>• A value greater than 10,000 (maximum) will be set to 10,000.<br>See also Modbus/TCP message timeout timers (on page 213). |
| ConnTimeOut | UDINT | TCP Connection establishment timeout (in milliseconds). Amount of time to wait for establishing successful TCP connection to the Target device.<br>• 250 - 10,000<br>• Set to 0 to use the default value 3000.<br>• A value less than 250 (minimum) will be set to 250.<br>• A value greater than 10,000 (maximum) will be set to 10,000.<br>See also Modbus/TCP message timeout timers (on page 213). |
| ConnClose | BOOL | TCP connection closing behavior.<br>• True: Close the TCP connection upon message completion.<br>• False: Do not close the TCP connection upon message completion [Default].<br>See also Modbus/TCP message connections (on page 213). |

- And finally, we will give the data value we want to write to the ML1400 under **LocalAdd_Write**:



| | | | |
|---|---|---|---|
| LocalAddr | Input | MODBUSLOCADDR | MODBUSLOCADDR data type is a 125 Word array that is used by Read commands to store the data (1-125 words) returned by the Modbus slave and by Write commands to buffer the data (1-125 words) to be sent to the Modbus slave. |

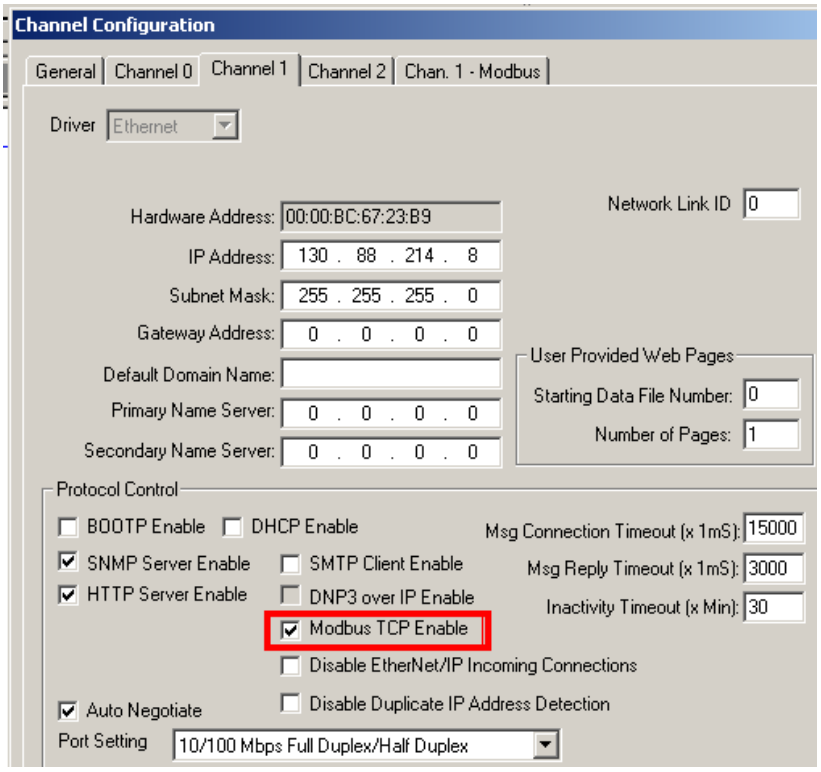
5) Go to the Internet Protocol Settings under the General Micro850 settings window and assign the Micro850 an IP address within the same network as the ML1400. In This sample we assigned the Micro850 an IP address of 130.88.214.7.



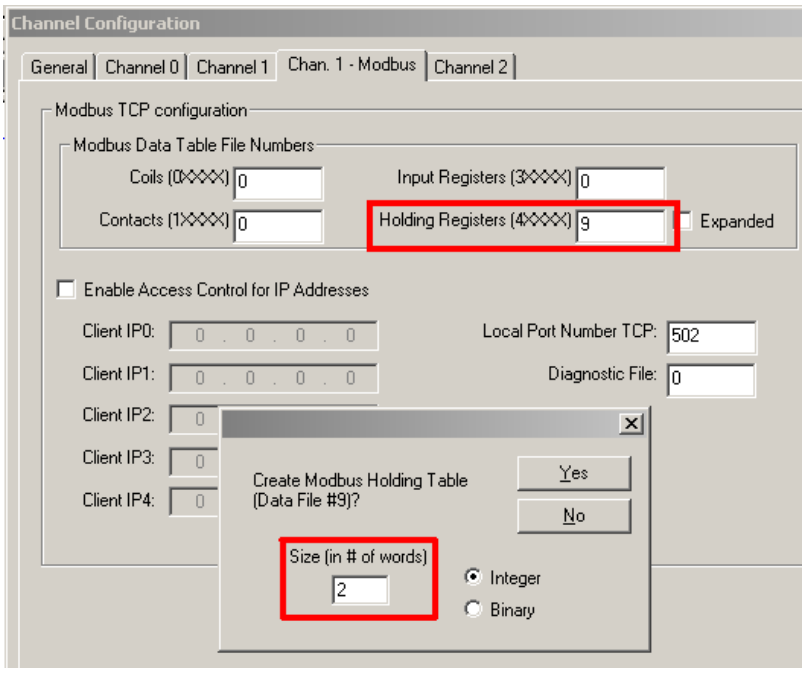

6) Build, Save, then Download the program into the Micro850

7) Open RSLogix500 and create a new project for the ML1400 controller

8) Go to Channel 1in Channel Configuration and set the IP address of the controller (in this sample it is 130.88.214.8). Then check the checkbox for Modbus TCP Enable in order to allow the ML1400 to accept Modbus TCP protocol.

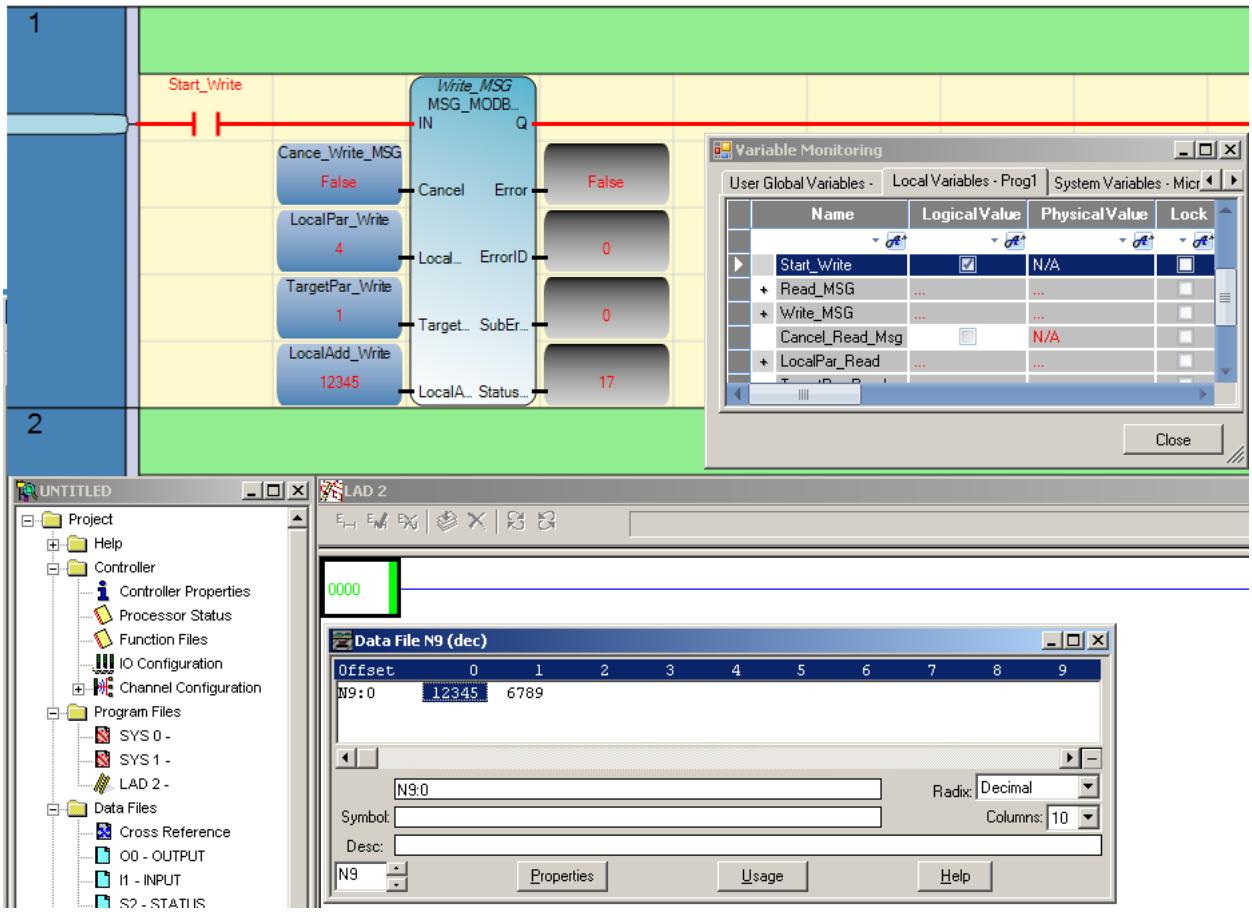



9) Go to the Chan. 1 – Modbus tab that appears in the Channel Configuration and assign an unused Data File number to the registers or coils you wish to read/write. For this guide, we will assign a value of 9 to Holding Registers (4xxxx) in order to create a Data File number 9 that will contain our registers. Hit enter, and then assign the Size (in # of words) to a value of 2, since we would like to write/read 2 registers from the ML1400.

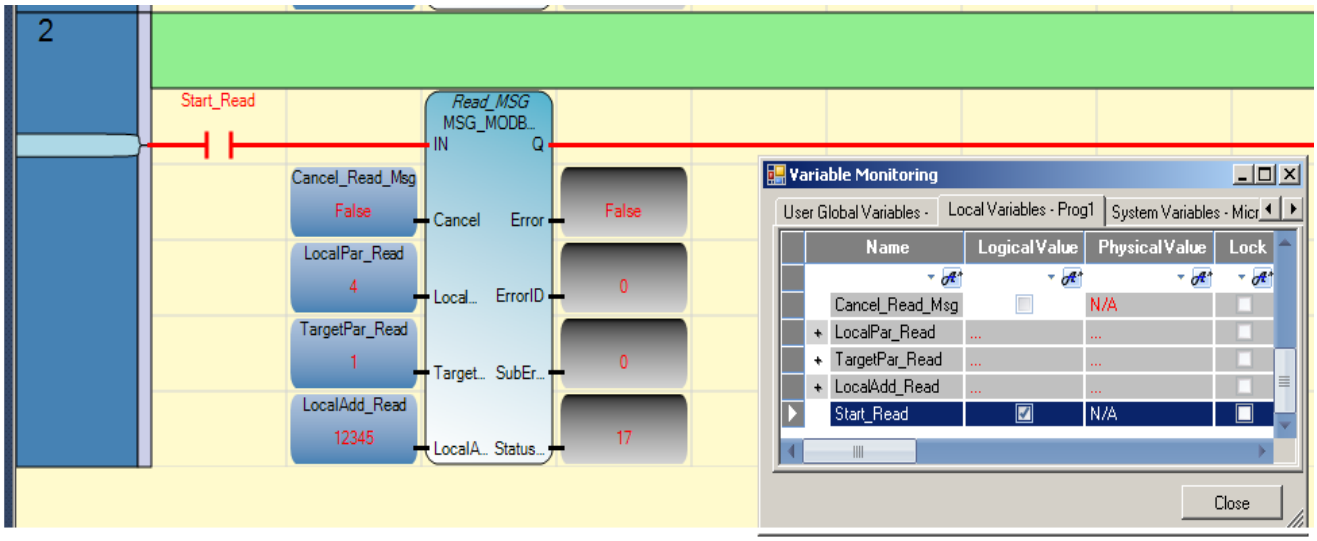


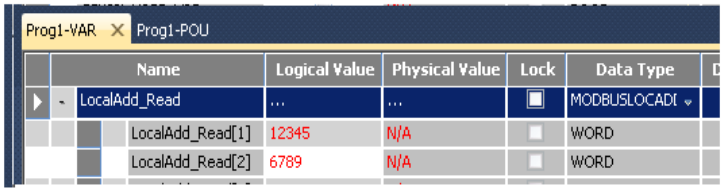
10) Verify the project and download it to the ML1400 (you will need to power cycle the ML1400 in order for the Ethernet changes to take effect). Go online with the ML1400 and open the N9 – Holding Data file that was created and monitor the values.

11) Put the Micro800 into Debug mode after having downloaded a program and toggle the **Start_Write** contact. You should see the *Write_MSG* FB complete without errors and the ML1400 should now display the values under **N9:0** and **N9:1**.




12) Now do the same for the *Read_MSG* FB and you should see the value that was read from the ML1400 be displayed under **LocalAdd_Read** in the Micro850 variables.


2
Start_Read
Read_MSG
MSG_MODB...
IN
Q
Cancel_Read_Msg
False
Cancel
Error
False
LocalPar_Read
4
Local...
ErrorID
0
TargetPar_Read
1
Target...
SubEr...
0
LocalAdd_Read
12345
LocalA...
Status...
17
Variable Monitoring
User Global Variables -
Local Variables - Prog1
System Variables - Micr
Name
LogicalValue
PhysicalValue
Lock
Cancel_Read_Msg
N/A
LocalPar_Read
TargetPar_Read
LocalAdd_Read
Start_Read
N/A
Close


Prog1-VAR
Prog1-POU
Name
Logical Value
Physical Value
Lock
Data Type
LocalAdd_Read
MODBUSLOCAD
LocalAdd_Read[1]
12345
N/A
WORD
LocalAdd_Read[2]
6789
N/A
WORD