The purpose of this document is to aid in the configuration and setup of the communications between a ProSoft Technology Modbus communications module and an Endress+Hauser Promass flow meter.

This document assumes the user has a reasonable understanding Modbus, RS485 communications, and Rockwell Software's RSLogix product line.

The examples on the next few pages refer to an MVI46-MCM communicating with a Proline Promass 83.

Refer to the appropriate Endress+Hauser manual for setting up the RS485 Modbus communications (RTU/ASCII, baud rate, parity, node address, etc.) on the Promass unit. For this test, the manual used was the Device Functions Proline Promass 83.

Refer to the ProSoft Technology manual that is specific to the MCM module being used. For this test, the MVI46-MCM user manual was used.

Refer to the manual of both products for wiring specifications. For this example, the MVI46-MCM user manual and the Proline Promass 83 manuals were used.
***Note – The ProSoft Technology MVI products have a hardware jumper that must be set to RS485 mode.**

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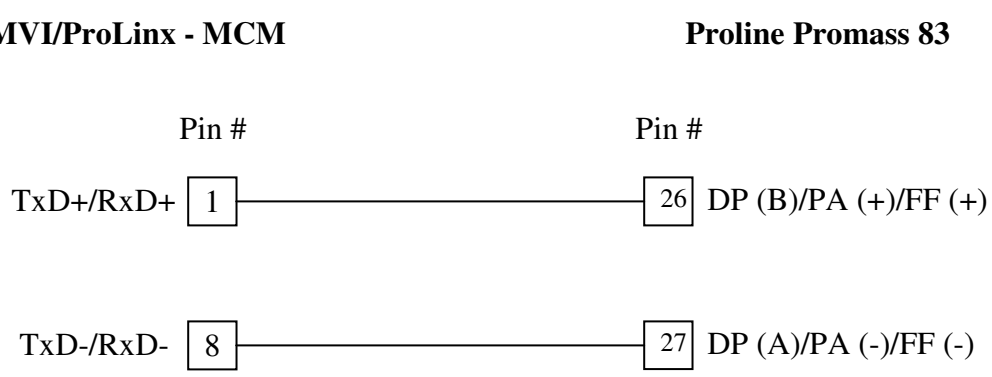
Refer to the diagram below for wiring the MVI46-MCM to the Promass 83.

Figure 1




# Reading From Promass

For this test, the sample MVI46-MCM ladder was used. The Promass 83 was setup for Modbus RTU, 19200 baud, Even parity and slave ID 247. Several items from the Promass 83 were polled, and they were:

Figure 2

| **Description** | **Modbus Address** |
|---|---|
| Mass Flow | |
| Volume Flow | 42009 |
| Corr. Volume Flow | 42011 |
| Density | 42013 |
| Reference Density | 42015 |
| Temperature | 42017 |

To read these values, a Modbus master command is used. The MVI46-MCM Modbus port 1 is detailed in figure 3 on the next page.

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The following diagram lists the setup parameters for the MVI46-MCM. Refer to the MVI46-MCM manual for a complete description of all the fields.

Figure 3

| | | | | |
|---|---|---|---|---|
| Port 1 Setup | N10:10 | 11 | Enable | This parameter is used to define if this port will be used. If the parameter is set to 0, the port is disabled. A value of 1 enables the port. |
| | N10:11 | 12 | Type | This parameter defines if the port emulates a master or slave device. Enter 0 to emulate a master device and 1 to emulate a slave device. |
| | N10:12 | 13 | Float Flag | This flag specifies if the floating-point data access functionality is to be used. If the float flag is set to Y, Modbus functions 3,6, and 16 will interpret floating point values for registers as specified by the two following parameters. |
| | N10:13 | 14 | Float Start | This parameter defines the first register of floating-point data. All requests with register values greater than or equal to this value will be considered floating-point data requests. This parameter is only used if the Float Flag is enabled. For example, if a value of 7000 is entered; all requests for registers 7000 and above will be considered floating-point data. |
| | N10:14 | 15 | Float Offset | This parameter defines the start register for floating-point data in the internal database. This parameter is only used if the Float Flag is enabled. For example, if the Float Offset value is set to 3000 and the float start parameter is set to 7000, data requests for register 7000 will use the internal Modbus register 3000. |
| | N10:15 | 16 | Protocol | 0=full duplex, 1=half duplex |
| | N10:16 | 17 | Baud Rate | This is the baud rate to be used on the port. Enter the baud rate as a value. For example, to select 19K baud, enter 19200. **Exceptions:** 38400 baud, enter 384. 57600 enter 576. 115000 enter 115. |
| | N10:17 | 18 | Parity | This is the parity code to be used on the port. The coded values are as follows:<br>0=None<br>1=Odd<br>2=Even |
| | N10:18 | 19 | Data Bits | This parameter sets the number of data bits for each word used by the protocol. Enter a value in the range of 5 to 8. |
| | N10:19 | 20 | Stop Bits | This parameter sets the number of stop bits to be used with each data value sent. Enter a value of 1 or 2. |
| | N10:20 | 21 | RTS On Delay | This parameter sets the number of milliseconds to delay after RTS is asserted before the data will be transmitted. Enter a value in the range of 0 to 65535. |
| | N10:21 | 22 | RTS Off Delay | This parameter sets the number of milliseconds to delay after the last byte of data is sent before the RTS modem signal will be set low. Enter a value in the range of 0 to 65535. |
| | N10:22 | 23 | Minimum Response Delay | This parameter sets the number of milliseconds to wait before a response message is sent out of the port. This parameter is required when interfacing to a slow responding device. Enter a value in the range of 0 to 65535. |
| | N10:23 | 24 | Use CTS Line | This parameter specifies if the CTS modem control line is to be used. If the parameter is set to 0, the CTS line will not be monitored. If the parameter is set to 1, the CTS line will be monitored and must be high before the module will send data. Normally, this parameter is required when half-duplex modems are used for communication (2-wire). |
| | N10:24 | 25 | Slave ID | This parameter defines the virtual Modbus slave address for the internal database. Any requests received by the port with this address will be processed by the module. Be certain each device has a unique address on the network. |
| | N10:25 | 26 | Bit Input Offset | This parameter specifies the offset address in the internal Modbus database that is to be used with network requests for Modbus function 2 commands. For example, if the value is set to 150, an address request of 0 will return the value at register 150 in the database. |
| | N10:26 | 27 | Word Input Offset | This parameter specifies the offset address in the internal Modbus database that is to be used with network requests for Modbus function 4 commands. For example, if the value is set to 150, an address request of 0 will return the value at register 150 in the database. |

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Setup Parameters – Continued

| | | | | |
|---|---|---|---|---|
| | N10:27 | 28 | Output Offset | This parameter specifies the offset address in the internal Modbus database that is to be used with network requests for Modbus function 1, 5, or 15 commands. For example, if the value is set to 100, an address request of 0 will return the value at register 100 in the database. |
| | N10:28 | 29 | Holding Register Offset | This parameter specifies the offset address in the internal Modbus database that is to be used with network requests for Modbus 3, 6, or 16 commands. For example, if the value is set to 50, an address request of 0 will return the value at register 50 in the database. |
| | N10:29 | 30 | Command Count | This parameter specifies the number of commands to be processed for the port. Enter a value of 0 to 100. |
| | N10:30 | 31 | Minimum Command Delay | This parameter specifies the number of milliseconds to wait between the initial issuance of a command. This parameter can be used to delay all commands sent to slaves to avoid "flooding" commands on the network. This parameter does not affect retries of a command as they will be issued when failure is recognized. Enter a value in the range of 0 to 65535. |
| | N10:31 | 32 | Command Error Pointer | This parameter sets the address in the internal Modbus database where the command error data will be placed. If the value is set to –1, the data will not be transferred to the database. Enter a value of 0 to 4999. |
| | N10:32 | 33 | Response Timeout | This parameter represents the message response timeout period in 1 ms increments. This is the time that a port configured as a master will wait before re-transmitting a command if no response is received from the addressed slave. The value is set depending on to communication network used and the expected response time of the slowest device on the network. |
| | N10:33 | 34 | Retry Count | This parameter specifies the number of times a command will be retried if it fails. Enter a value in the range of 0 to 10. |
| | N10:34 | 35 | Error Delay Count | This parameter specifies the number of polls to be skipped on the slave before trying to re-establish communications. After the slave fails to respond, the master will skip commands to be sent to the slave the number of times entered in the parameter. Enter a value in the range of 0 to 65535. |
| | N10:35 | 36 | Reserved | |
| | N10:36 | 37 | Use Guard Band Timer | Use packet gap timeout for messages (Yes or No). Use only in multi-drop applications. |
| | N10:37 | 38 | Guard Band Timeout | A value of 0 uses the default baud rate or you can set a value in milliseconds (0 to 65535) |

The image below shows the N10 file used for this application note.

Figure 4

| Offset | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| N10:0 | 0 | 0 | 0 | 0 | 0 | 2000 | 0 | 0 | 0 | 0 |
| N10:10 | 1 | 0 | 0 | 0 | 0 | 0 | 19200 | 2 | 8 | 1 |
| N10:20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 |
| N10:30 | 0 | 1100 | 1000 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| N10:40 | 0 | 1 | 0 | 0 | 0 | 0 | 9600 | 0 | 8 | 1 |
| N10:50 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| N10:60 | 0 | -1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| N10:70 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| N10:80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| N10:90 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

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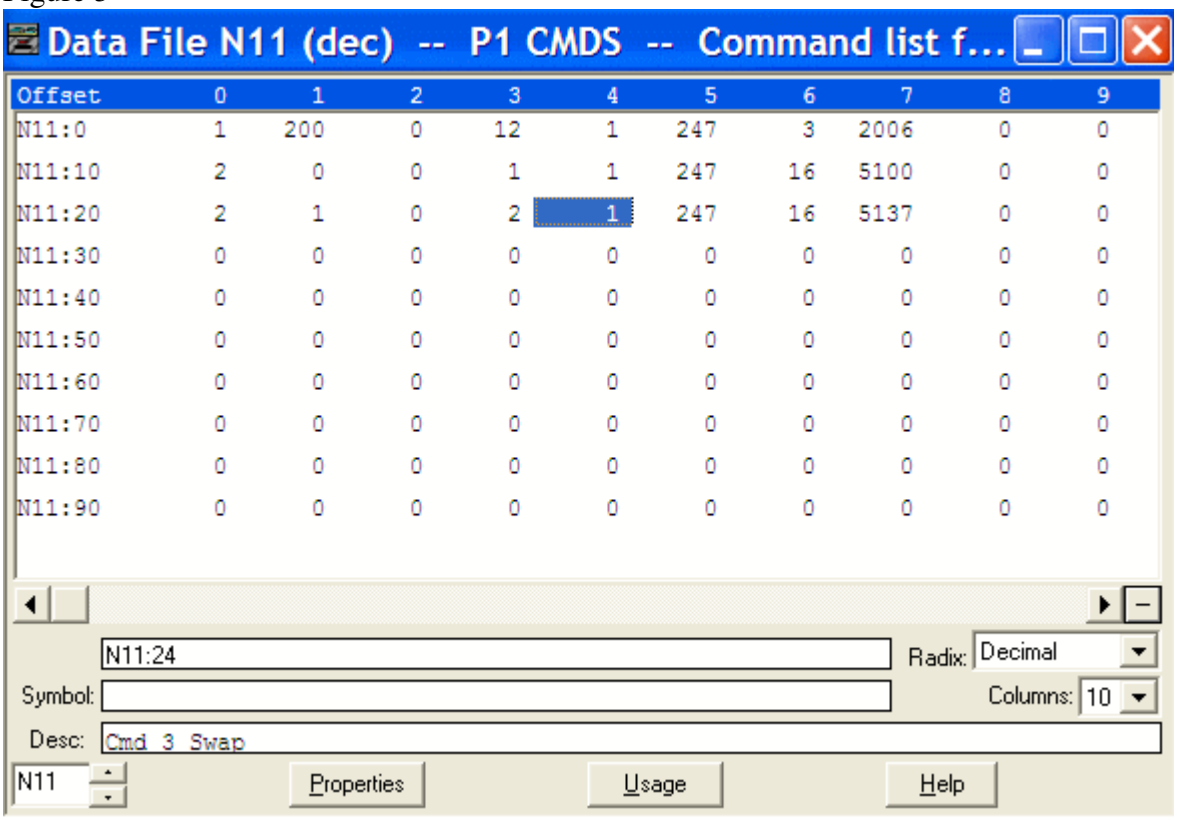
The N11 file below lists the three commands.

Figure 5




The section below shows the command structure for the MVI46-MCM.

| Parameter | Description |
|---|---|
| Enable<br>Word 0<br>example..N11:0 | This parameter is used to define if the command is executed or disregarded. The following values are valid: 0=Disables the command and it will not execute. 1=The command will be considered for execution each scan of the command list and will be controlled by the **PollInt** parameter. And 2=The command will only execute if the data associated with the command has changed since the command was last issued. This option is only available for write commands. |
| IntAddress<br>Word 1<br>example..N11:1 | This parameter specifies the starting internal register address to be associated with the command. Valid entry for this parameter is 0 to 9999. |
| PollInt<br>Word 2<br>example..N11:2 | This parameter defines the minimum number of seconds to wait between the execution of continuous commands (Enable=1). This poll interval command can be used to lighten the communications load on a busy network. Valid entry for this parameter is 0 to 65535. |

| | |
|---|---|
| Count<br>Word 3<br>example..N11:3 | This parameter defines the number of registers to be considered by the command. Valid entry for this parameter is dependent on the Modbus specification for the command. |
| Swap<br>Word 4<br>example..N11:4 | This parameter is used to specify if the data used in the command must be altered when a Modbus function code 3 is used to read data from a node on the network. Values that can be assigned are as follows: 0=no swapping of data, 1=swap word values, 2=swap word and byte values and 3=swap byte values. This option is used when interfacing the module with ASCII and floating-point data on other devices. |
| Node<br>Word 5<br>example..N11:5 | This parameter is used to assign the Modbus slave node address for the module to reach with the command on the Modbus network. This parameter can be assigned values from 0 to 255. Most Modbus networks limit the upper value to 247. |
| Func<br>Word 6<br>example..N11:6 | This parameter specifies the Modbus function to be performed by the command. Valid entries are 1, 2, 3, 4, 5, 6, 15 and 16. |
| DevAddress<br>Word 7<br>example..N11:7 | This parameter defines the starting address in the device being considered by the command. Values entered in this field are dependent on the node's database definition. Refer to the specific manufacture's database definition for the device to determine the location of the data to be interfaced. |

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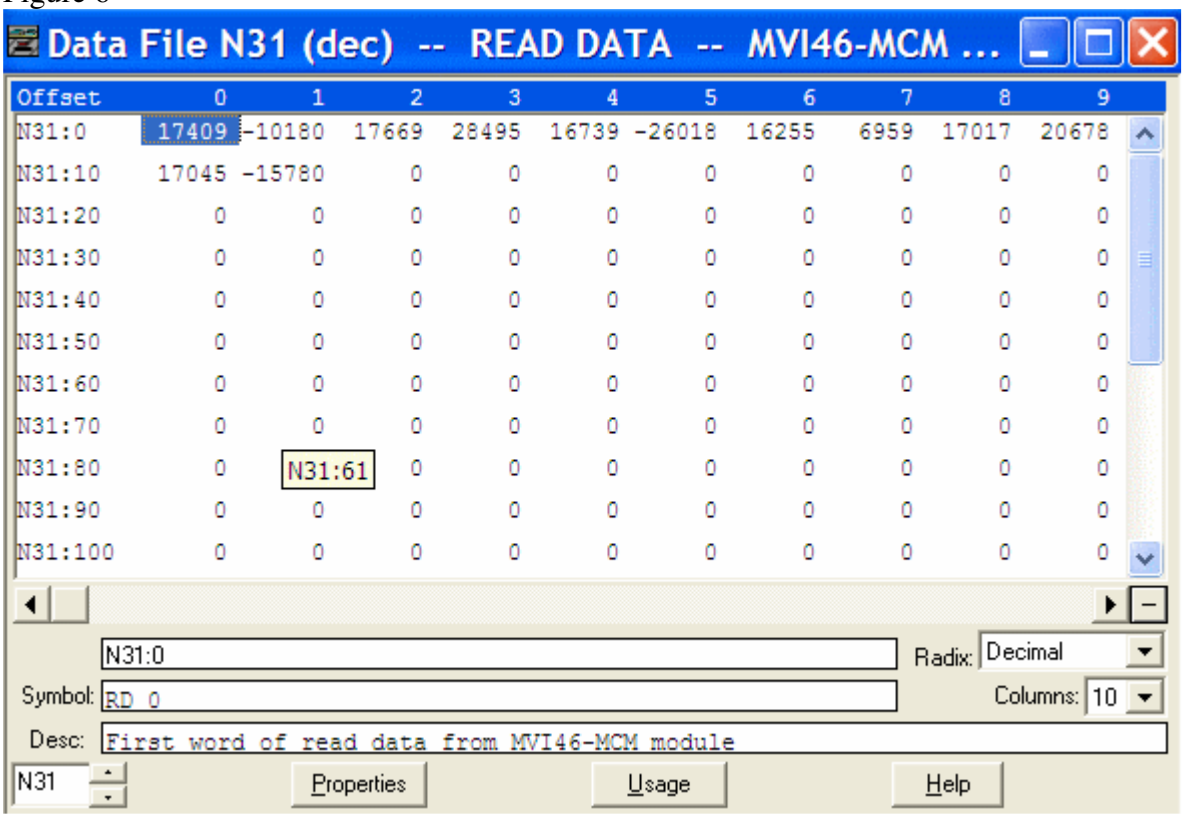
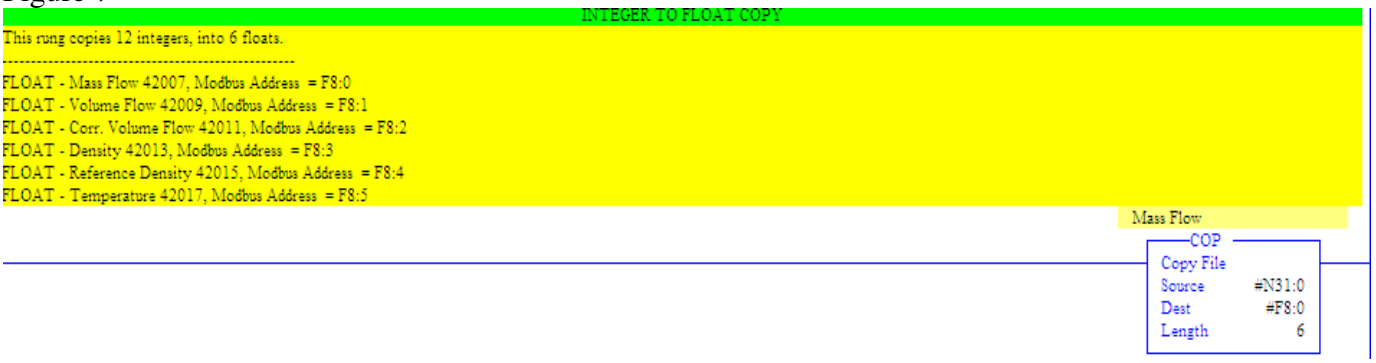
The values read from the above N11 commands are floating point values; and we known that a 32-bit float is comprised of two integers. These values are read in to the N31 file of the MVI46-MCM ladder.

The image below shows how those values might look in integer format:
Figure 6




A simple copy instruction in ladder is used to convert these values to their original floating point format.
Figure 7

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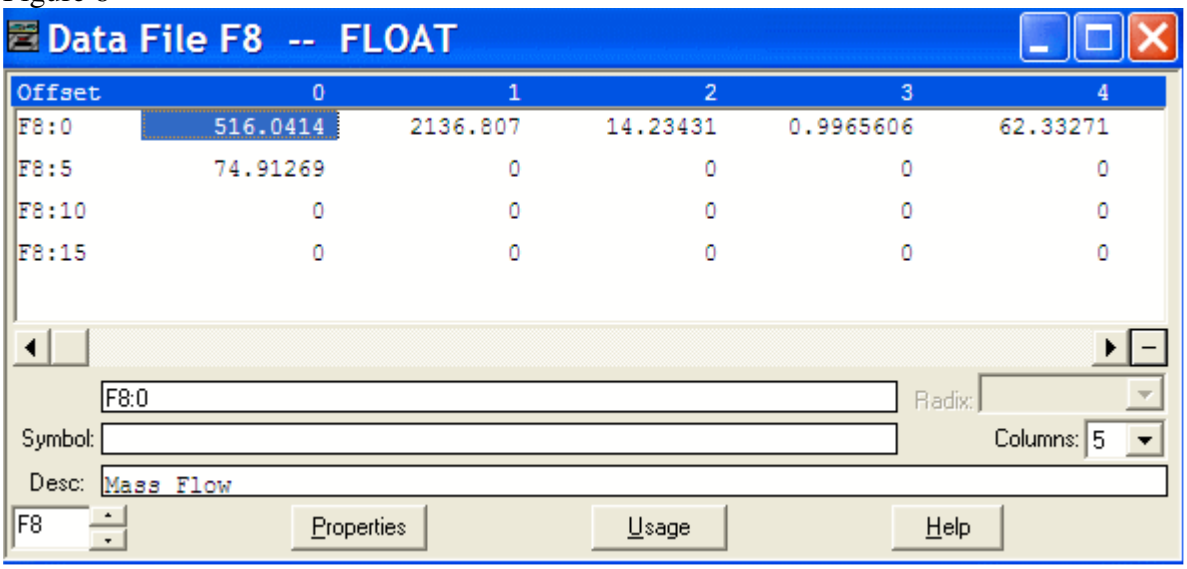
The image below shows the result of the copy instruction.
Figure 8




FLOAT - Mass Flow 42007, Modbus Address = F8:0
FLOAT - Volume Flow 42009, Modbus Address = F8:1
FLOAT - Corr. Volume Flow 42011, Modbus Address = F8:2
FLOAT - Density 42013, Modbus Address = F8:3
FLOAT - Reference Density 42015, Modbus Address = F8:4
FLOAT - Temperature 42017, Modbus Address = F8:5

# Writing to Promass

The section on the next page shows the N11 files, which is used to define Modbus master commands.

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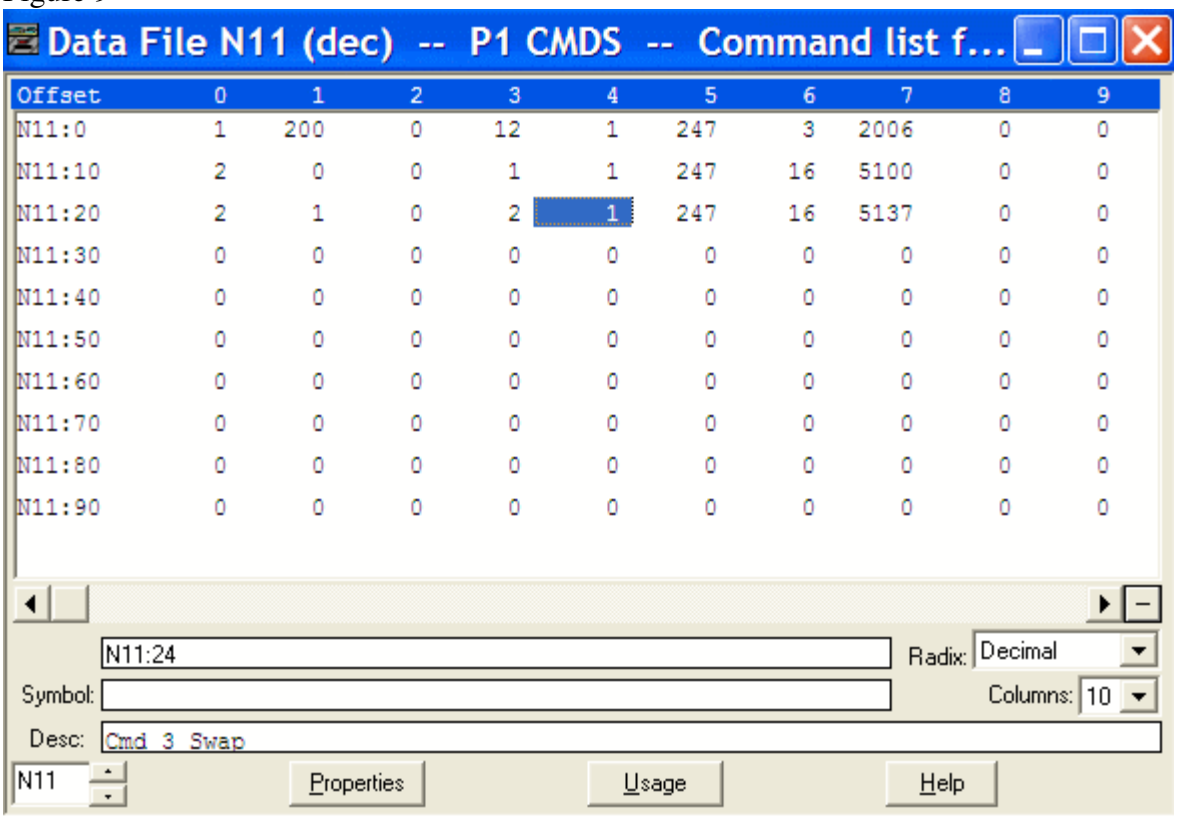
N11:0-N11:9 are for command 0 – FC code 3, Read Multiple Holding Registers
N11:10-N11:19 are for command 1 – FC code 16, Write Multiple Holding Registers
N11:20-N11:29 are for command 2 – FC code 16, Write Multiple Holding Registers

Figure 9

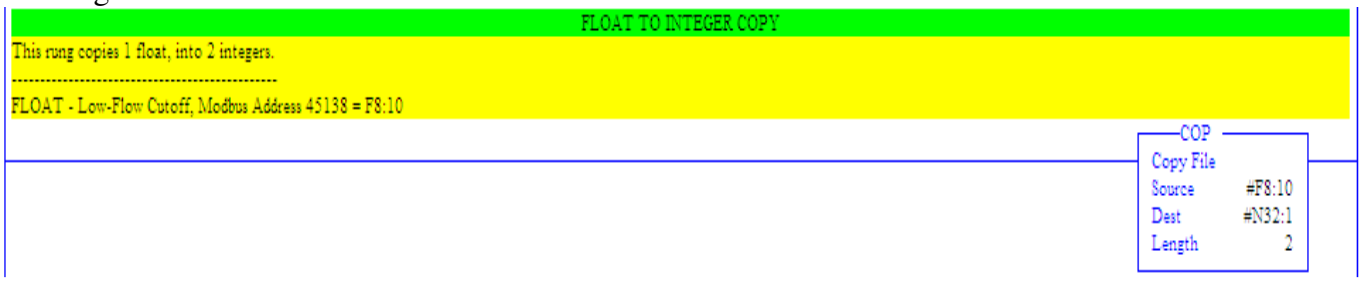



The example above shows N11:10 being a multiple register write command, and it's writing the value that is in address 0 of the MVI46-MCM to Modbus register address 45101, which is an integer.

The command starting at N11:20 is also a write command, but this time it's writing two values (as defined by the "Count", or N11:2)

To write an integer, no ladder modifications are required. To write a floating point value, you must first get the two integers in to floating point format.. see next page.

The example ladder and copy instruction below shows one floating point value being copied to an integer for a count of 2. ***The count always follows the destination.
Figure 10

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