

MICROFUSION COMMUNICATION CARD USER'S MANUAL



EtherNet/IP®



CONTROL CONCEPTS, INC. 2 YEAR LIMITED WARRANTY

CONTROL CONCEPTS, INC. warrants that the products delivered will be as described in the sales order or contract.

CONTROL CONCEPTS, INC. warrants to the original user that CONTROL CONCEPTS, INC. products will be free from defects in materials and workmanship for a period of two (2) years after the date CONTROL CONCEPTS, INC. ships such products.

If any CONTROL CONCEPTS, INC. product is found to be defective in material or workmanship during the applicable warranty period, CONTROL CONCEPTS, INC.'s entire liability, and purchasers sole and exclusive remedy, shall be the repair or replacement of the defective product at CONTROL CONCEPTS, INC.'s election. CONTROL CONCEPTS, INC. shall not be liable for any costs or expenses, whether direct or indirect, associated with the installation, removal or re-installation of any defective product. All shipping and freight costs are the responsibility of the customer. CONTROL CONCEPTS, INC.'s limited warranty shall not be effective or actionable unless there is compliance with all installation and operating instructions furnished by CONTROL CONCEPTS, INC., or if the products have been modified or altered without the written consent of CONTROL CONCEPTS, INC., or if such products have been subject to accident, misuse, mishandling, tampering, negligence or improper maintenance. Any warranty claim must be submitted to CONTROL CONCEPTS, INC. in writing within the stated warranty period.

CONTROL CONCEPTS, INC.'s limited warranty is made in lieu of, and CONTROL CONCEPTS, INC. disclaims all other warranties, whether expressed or implied, including but not limited to any IMPLIED WARRANTY OF MERCHANTABILITY, ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, any implied warranty arising out of a course of dealing or of performance, custom or usage of trade.

CONTROL CONCEPTS, INC. SHALL NOT, UNDER ANY CIRCUMSTANCES BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, LOSS OF PROFITS, REVENUE OR BUSINESS) OR DAMAGE OR INJURY TO PERSONS OR PROPERTY IN ANY WAY RELATED TO THE MANUFACTURE OR THE USE OF ITS PRODUCTS. The exclusion applies regardless of whether such damages are sought based on breach of warranty, breach of contract, negligence, strict in tort, or any other legal theory, even if CONTROL CONCEPTS, INC. has notice of the possibility of such damages.

By purchasing CONTROL CONCEPTS, INC.'s products, the purchaser agrees to the terms and conditions of this limited warranty.

WARNING: The Control Concepts, Inc. power controllers use power thyristors to switch voltage to the connected load. Line voltage must be assumed at the output terminals at all times, even when the control signal has been removed and the load voltage appears to be off. It has been mandated by the National Electrical Code and the Occupational Safety and Health Act of 1970 that a physical disconnect be opened ahead of all remotely actuated controls before performing any maintenance work on the controller or its connected load.

PROPRIETARY DATA

© Copyright 2025, Control Concepts, Inc. Chanhassen, MN 55317

The information and design disclosed herein are the property of Control Concepts, Inc. and may not be used, reproduced or disclosed in any form except as granted in writing by:

CONTROL CONCEPTS, INC
8077 CENTURY BLVD, CHANHASSEN, MN 55317
PHONE: (952) 474-6200
FAX: (952) 474-6070
www.ccipower.com

TABLE OF CONTENTS

1. GETTING STARTED	1
1.1 Configuration with Control Panel	1
1.2 Common Communication Parameters	2
1.2.1 Local Mode Enable [SP-120]	2
1.3 TCP/IP	2
1.3.1 IP Address	2
1.4 Network Timeout	3
1.4.1 Comm. Heartbeat Time [SP-125]	3
1.4.2 Network Timeout Action [SP-128]	3
1.4.3 Network Heartbeat Timer [MP-370]	4
1.4.4 Network Timeout Setpoint [SP-108]	4
1.4.5 Comm. Watchdog Time [SP-135]	4
1.4.6 Comm Watchdog Timer [MP-373]	4
1.5 Communication Module Status	4
2. MODBUS TCP	5
2.1 Overview	5
2.1.1 Wiring	5
2.2 Connection Settings	5
2.3 Parameters	6
2.3.1 Parameter Read / Write	6
2.3.2 Read Alarm Status or System Status	6
2.4 Modbus TCP with ModScan32	7
2.5 Modbus TCP with MicroLogix 1100 PLC	8
3. ETHERNET / IP	10
3.1 Overview	10
3.1.1 Wiring	10
3.2 Connection Settings	10
3.3 Parameters	11
3.3.1 EtherNet/IP Fieldbus Parameters	11
3.4 RSLinx Classic Software Configuration	12
3.5 EtherNet/IP with MicroLogix 1100 PLC	13
3.6 EtherNet/IP with CompactLogix L23E	18

4. PROFINET	21
4.1 Overview	21
4.1.1 Wiring	21
4.2 Connection Settings	21
4.2.1 Temporary vs Permanent IP Addresses Behavior	22
4.3 Input/Output Assemblies	23
4.4 GSDXML Configuration File	23
4.5 Parameters	23
4.5.1 PROFINET Fieldbus Parameters	24
4.6 PROFINET with Siemens CPU-315-2 PN/DP PLC	25
5. APPENDIX A: I/O ASSEMBLIES	29

1. GETTING STARTED

The MicroFUSION series power controllers can be configured with an optional internal fieldbus communication card: PROFINET, Modbus TCP, or EtherNet/IP. Only one type of fieldbus can be installed on each Controller and is shipped with a single RJ-45 jack. All MicroFUSION Controllers also ship with a dual port CCI-Link communications interface that uses the dual RJ-45 jacks. CCI-Link is not compatible with any other network protocol.

<PLACEHOLDER> --- network jack/cci-link jack pictures

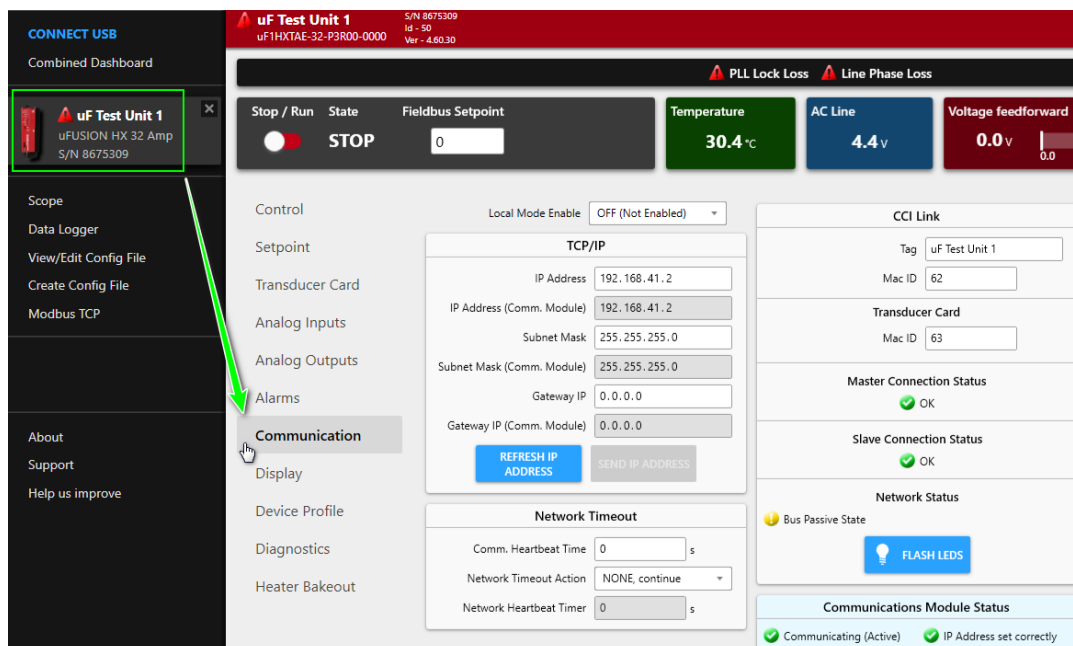
Refer to the appropriate chapter in this manual for additional information on configuration, wiring, and programming your fieldbus interface.

This Manual is intended to be supplemental to the MicroFUSION User's Manual and associated Control Panel Manual. Please consult those documents for additional information regarding configuration of the MicroFUSION Power Controller and installation and use of the Control Panel software application.

1.1 Configuration with Control Panel

Communication parameters are configured using the COMMUNICATION tab in the Control Panel Application.

A USB connection to the power controller is required to configure the initial network settings before the controller will respond to network command and control. Ensure the controller has 24VDC power and the power LED is on.



Connect with Control Panel and navigate to the Communications tab. Example shown with Modbus TCP fieldbus.

1.2 Common Communication Parameters

Parameters can be monitored and changed using the Control Panel Software application or if purchased separately, the Remote Display control. The Control Panel application will be used in all the examples in this manual.

Parameter Values:

Some values may have digits to the right of the decimal point, however the decimal point, or resolution, will not be part of the message. Rather, a parameter with one decimal place will be scaled x10, two decimal places scaled x100.

For example: 5.00, which has 2 decimal places, must be scaled and sent as 500 and will also need to be scaled down when read using a “scale-factor” of 100.

Parameter Sizes:

Parameters are most often 16-bit integer values. However, there are some parameters which use two registers for the value (32 bit value). For example, the parameter Load Power [MP 245] uses the two register protocol, [MP 245] is the HI word, and [MP 246] is the LO word. Any parameter that uses a long word situation (two registers) is clearly documented.

To combine MSW and LSW use the formula: (MSW x 65536) + LSW

Parameter Lists:

For a complete list of all settable and monitor parameters available on the MicroFUSION Controller refer to the MicroFUSION User’s Manual Appendix B, or the separate Parameter List document.

1.2.1 Local Mode Enable [SP-120]

Local Mode Enable OFF (Not Enabled) ▼

When enabled the controller will use its internal settings for digital setpoint and run/enable and ignore commands from external PLC’s or other devices.

While Local Mode is Enabled the following parameters can only be modified using the Control Panel software application or optional Remote Display keypad.

- Fieldbus Setpoint [SP-100]
- Keypad Setpoint [SP-101]
- Setpoint 1 and 2 Source [SP-102], [SP-103]
- Control Setpoint Select [SP-104]
- Feedback Unit Setpoint [SP-105]
- Non-volatile Keypad Setpoint [SP-107]
- Digital Run Enable [SP-129]

1.3 TCP/IP

Available TCP/IP parameters vary by fieldbus option. Parameters in the list include the IP address for the installed interface and if supported, addresses for the subnet mask and gateway address. (Modbus TCP)

1.3.1 IP Address

IP Address of the fieldbus module are set in this section, refer to the individual communications protocol chapter in this manual for specific settings for the installed network interface.

IP Address 192.168.41.4
IP Address (Comm. Module) 192.168.41.4

In the example on the right, the Comm Module is reporting it’s internal IP address is set to 192.168.41.4. If it reads 0.0.0.0, no IP address has been set or has failed to read from the interface. When changing the IP address a delay of several seconds may occur before the comm module updates.

1.4 Network Timeout

The Network Timeout section is common to all fieldbus options and allows the operator to set up timers and associated action(s) to execute if a network timeout occurs, and see the current timer counts. PROFINET and EtherNet/IP include an additional timer.

1.4.1 Comm. Heartbeat Time [SP-125]

Comm. Heartbeat Time s

default = 0 (OFF)

A value above zero sets the number of seconds the controller will wait for a message packet. If no msg packet is received a Heartbeat Timer Timeout is triggered and Comm Status parameter [MP-326] bit 7 is set. When a Heartbeat Timer Timeout occurs the selected Network Timeout Action is performed.*

* In MicroFUSION controllers purchased after 12/3/2020, Profinet and EtherNet/IP will reset the internal XPORT module on the first two consecutive timeouts before taking the Network Timeout Action. These resets may be seen as momentary network communication disruption.

1.4.2 Network Timeout Action [SP-128]

Network Timeout Action

default = 0 (None, Continue)

The Network Timeout Action designates what the controller will do in the event of a Network Timeout.

Setting	Description
Do nothing, Continue operation ¹	The controller will indicate a timeout has occurred but will continue to operate normally.
STOP, Enter Fault Shutdown ²	The controller will immediately halt, the event will be recorded in the fault history log that can be viewed in the Fault History in Control Panel in the Diagnostics Tab.
Use Network Timeout Setpoint	The value of Network Timeout Setpoint [SP-108] will be used as the setpoint for the controller output in the event of a network timeout. The range of this setpoint is determined by the Setpoint Resolution [SP-115] parameter.

Notes:

¹ Newer controllers will still attempt to reset the connection to the on-board communications module on the first two consecutive timeout events. (See 1.4.1 Comm. Heartbeat Time)

² The following applies if the Network Timeout Action [SP-128] is set to “STOP, Enter Fault Shutdown”: To restore communication when a Network Timeout occurs and the controller is in the inhibit state (when the Network Timeout Action [SP-128] setting indicates STOP, fault shutdown), perform the following steps:

- Find and address the issue/problem and confirm communication between the host and the controller.
- Once communication is established, cycle run/reset on P1 or click the “RESET” button in the Actions drop-down menu in Control Panel, to clear the fault.
- Toggle the “Stop/Run” switch on the control panel dashboard

In addition to the aforementioned options, it is possible to configure the device to notify an external signaling device, such as a light tower or alarm system. Perform the following steps to configure the device for this operation:

- Locate “System Relay Mask” in the “Alarms” category in the control panel.
- Check “Communications Error” in the “System Relay Mask” section.

1.4.3 Network Heartbeat Timer [MP-370]

Network Heartbeat Timer s

Read-only, the number of seconds since the last received message packet.

1.4.4 Network Timeout Setpoint [SP-108]

Network Timeout Setpoint

This parameter is only visible in Control Panel when the network timeout action is set to “Use Network Timeout Setpoint”

The digital setpoint value the controller should set its output to when a network timeout occurs. If the heartbeat timeout is cleared by the reception of a message packet, the Controller setpoint reverts to it's original value.

1.4.5 Comm. Watchdog Time [SP-135]

Comm. Watchdog time sec

Only available on PROFINET and EtherNet/IP

Maximum time allowed between commands from the master PLC before a Network Timeout event occurs. The master PLC must toggle bit 2 or write a new value for Digital Run Enable before the Comm. Watchdog Time expires. RUN command = 1 or 5, STOP command = 0 or 4

Important: The timer does not start until the controller detects the first “bit-toggle” event. If the bit change never occurs, this timer is ignored.

The first timeout event is indicated by the controller and the internal XPORT module is reset. The second consecutive timeout event will cause the controller to take the Network Timeout Action.

1.4.6 Comm Watchdog Timer [MP-373]

Comm. Watchdog Timer sec

Only available on PROFINET and EtherNet/IP

Read-only, displays the number of seconds from the last received message packet or command on the network. When this value reaches the Comm. Watchdog Time [SP-135] a Network Timeout occurs.

1.5 Communication Module Status

Displays live messages of fieldbus configuration and network status. Refer to this status block for error messages regarding current settings.

Communications Module Status	
 Communicating (Active)	 IP Address set correctly

2. MODBUS TCP

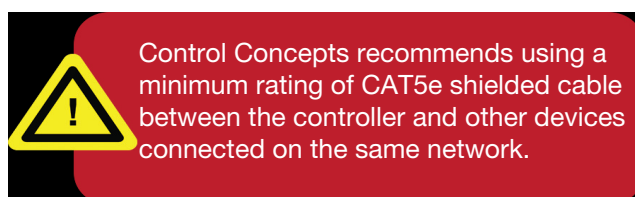
2.1 Overview

Control Concepts Modbus TCP implements the Modbus RTU protocol with a TCP interface that runs on Ethernet.

2.1.1 Wiring

MicroFUSION Modbus TCP uses a standard Ethernet pin-out shown in the table below.

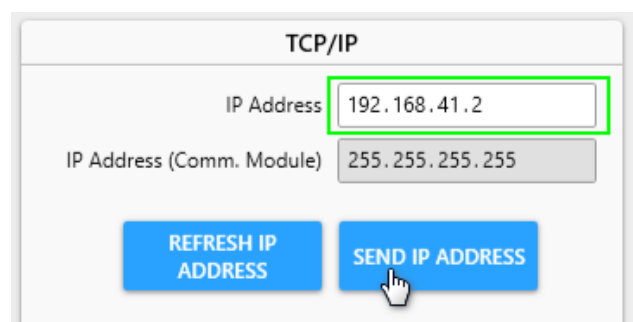
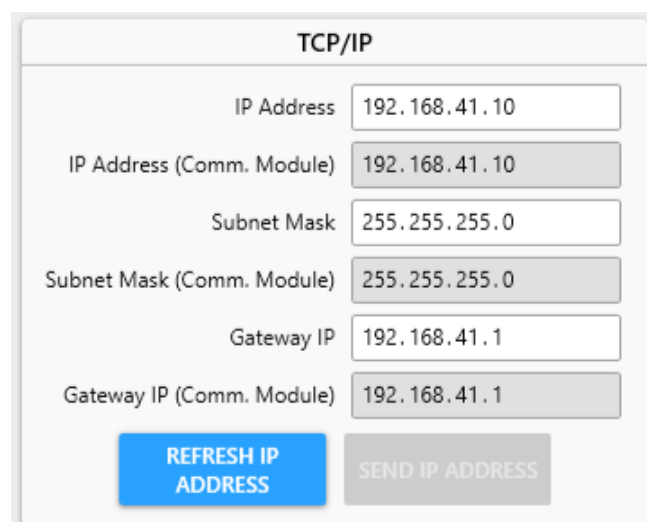
Ethernet 10/100BaseT (Twisted Pair)		
Pin #	Signal Name	Function
1	TD+	Transmit Data
2	TD -	Transmit Data
3	RD+	Receive Data
4	--	No Connection
5	--	No Connection
6	RD -	Receive Data
7	--	No Connection
8	--	No Connection



2.2 Connection Settings

Modbus TCP configuration with Control Panel consists of setting the local interface IP address, the IP subnet mask, and the network gateway address.

Enter each IP address in the appropriate field and press the “Send IP Address” button to transfer the new value to the Controller interface.

The new IP address should update in the Comm. Module field automatically after several seconds. If there is no update, press the Refresh IP Address button. Successfully programmed values should be displayed in the Comm Module fields.

Static IP addressing is recommended when using Modbus TCP. Use of DHCP in network configurations may prevent reliable network connections. The DHCP protocol is not supported by MicroFUSION controllers.

2.3 Parameters

Local Mode Enable [SP-120] - see section 1.2.1

Network Timeout

- Comm. Heartbeat Time [SP-125] - see section 1.4.1
- Network Timeout Action [SP-128] - see section 1.4.2
- Network Heartbeat Timer [MP-370] - see section 1.4.3
- Network Timeout Setpoint [SP-108] - see section 1.4.4

For additional MicroFUSION parameter definitions refer to the MicroFUSION User's Manual or Parameter List document. Both are available on the associated product page on the Control Concepts website

2.3.1 Parameter Read / Write

Read

- Modbus function 0x03 "Read Holding Registers"
- Allows reading of multiple parameters
- Parameter limit = 24 registers per message (controller limit, not Modbus)
- "Long Word" (32-bit) parameter values are returned using two consecutive integer slots, MSW first

Block reads of up to a maximum of 24 parameters are permissible with a recommended maximum polling rate of 4 Hz.

Write

- Modbus function 0x06 "Preset Single Register"
- Limited to one parameter that is integer-only (no larger values)

Write (Multiple)

- Modbus Function 0x10 "Preset Multiple Registers"
- Allows setting multiple parameters
- Parameter limit = 24 registers per message (limited by the Controller)
- Use two consecutive integer slots in the message to send "Long Word" (32-bit) parameter values to the parameters that accept a 32-bit value (MSW first)



MicroFUSION controllers use nonvolatile EEPROMs, and frequent writes to an individual parameter may wear out the EEPROM and cause the controller to fail.

It is recommended to allow an average of five minutes between consecutive writes to parameters with the exception of Setpoint Commands [SP-100] & [SP-101] and Digital System Command [SP 129].

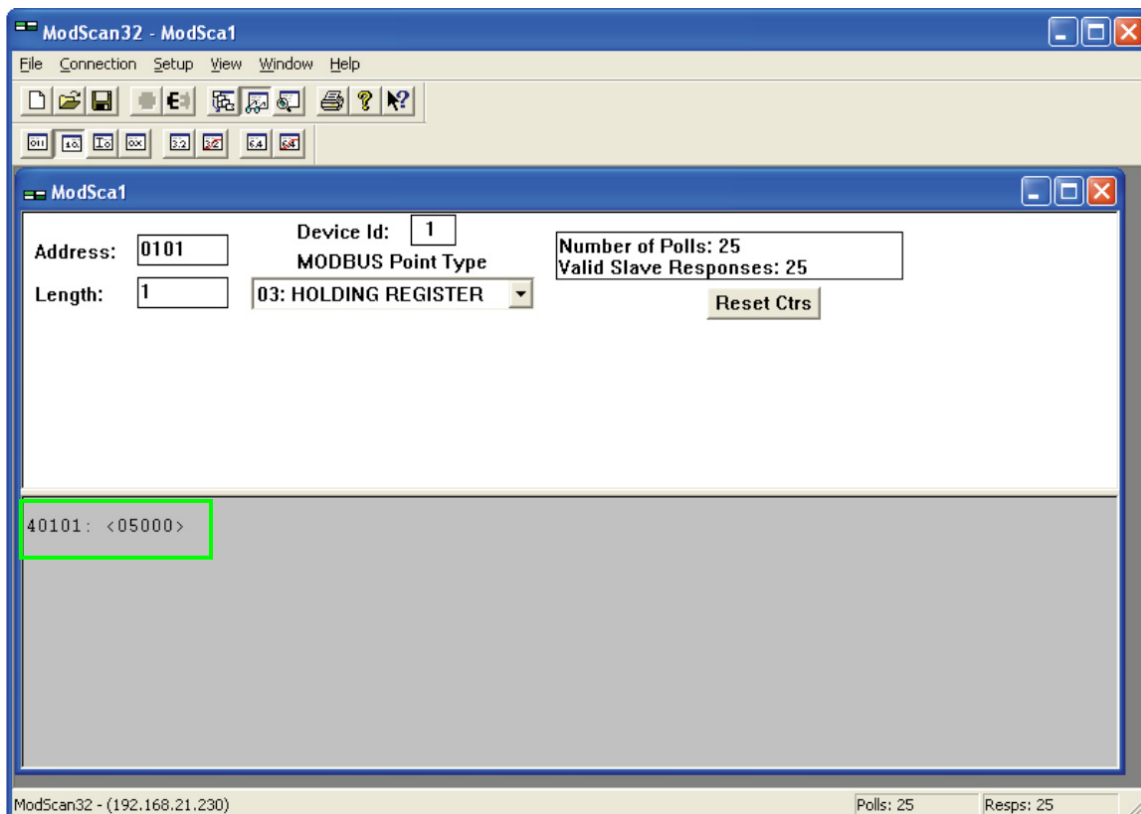
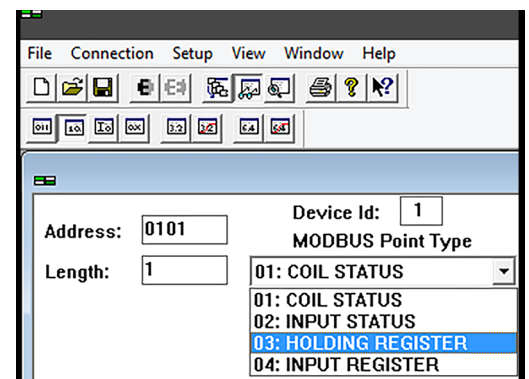
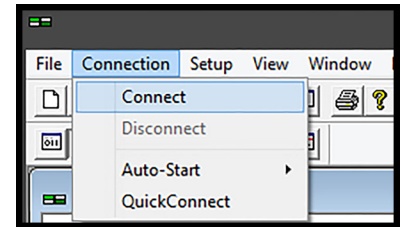
2.3.2 Read Alarm Status or System Status

- Modbus Function 0x07 "Read Exception Status"
- Response contains a single byte field that is used to return 8 status flags to indicate the status of the MicroFUSION controller.

2.4 Modbus TCP with ModScan32

ModScan32 can be found at: <https://www.win-tech.com/html/demos.htm> (Select the appropriate version of ModScan).

- 1) Run the ModScan application.
- 2) Click "Connection", then "Connect"
- 3) Enter in "Remote Modbus TCP Server" in the "Connect Using:" field
- 4) Enter the IP address for the appropriate device.
- 5) Verify/Change "Server Port": 502, and click "OK".
- 6) Enter in Address = 101 (equals parameter 100 Fieldbus Setpoint),
Length = 1
and select "03: HOLDING REGISTER"
- 6) Click "Setup", then "Extended", and then "Preset Regs"
- 7) Click 5000 for 50% setpoint and click "Update".
- 8) Should read 5000 from register and see 5000 on the display for "Fieldbus Setpoint".



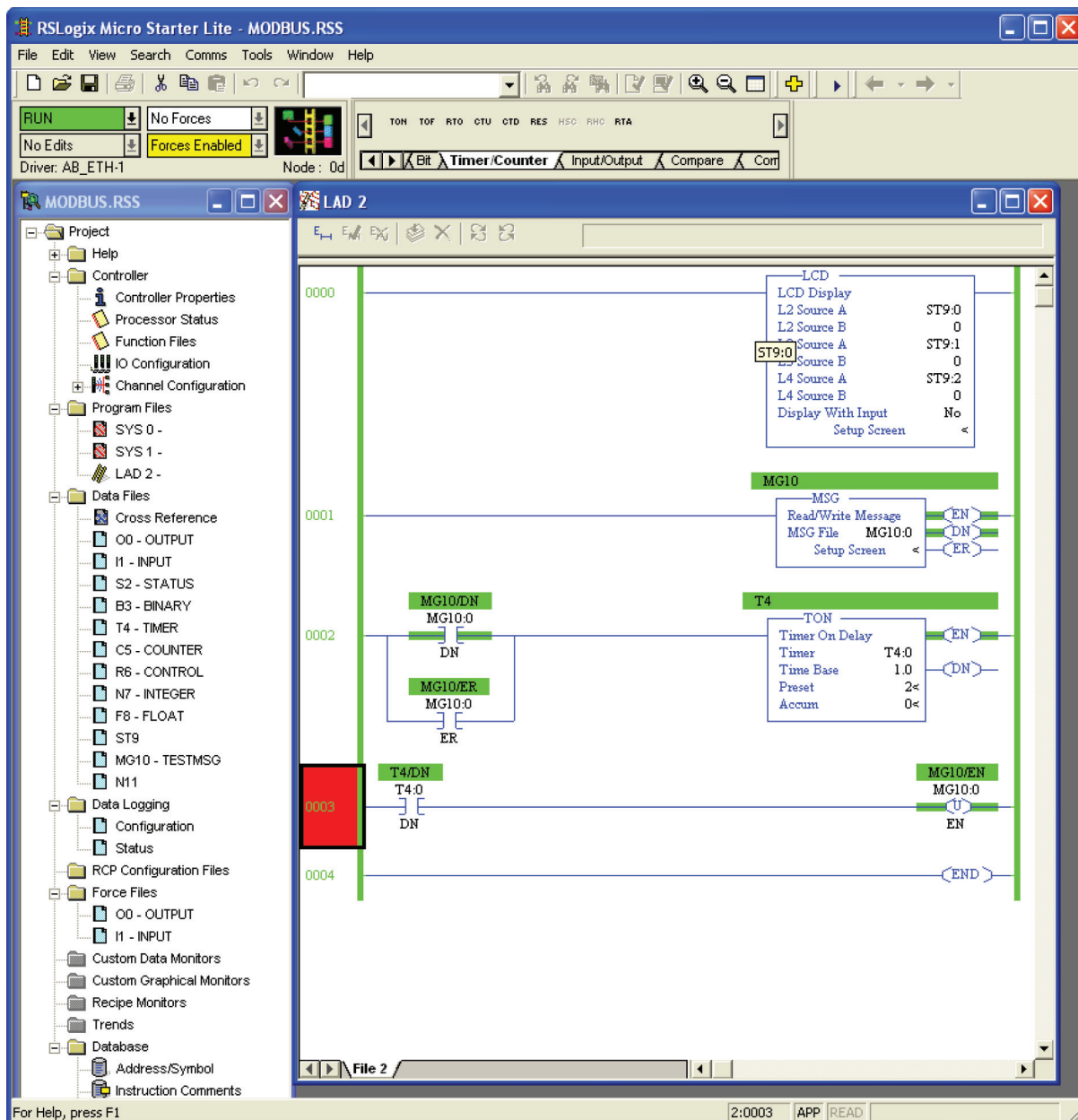
2.5 Modbus TCP with MicroLogix 1100

PLC: MicroLogix 1100 with Modbus Cable 1763 - NC01

PLC Software: RSLogix Micro Starter Lite

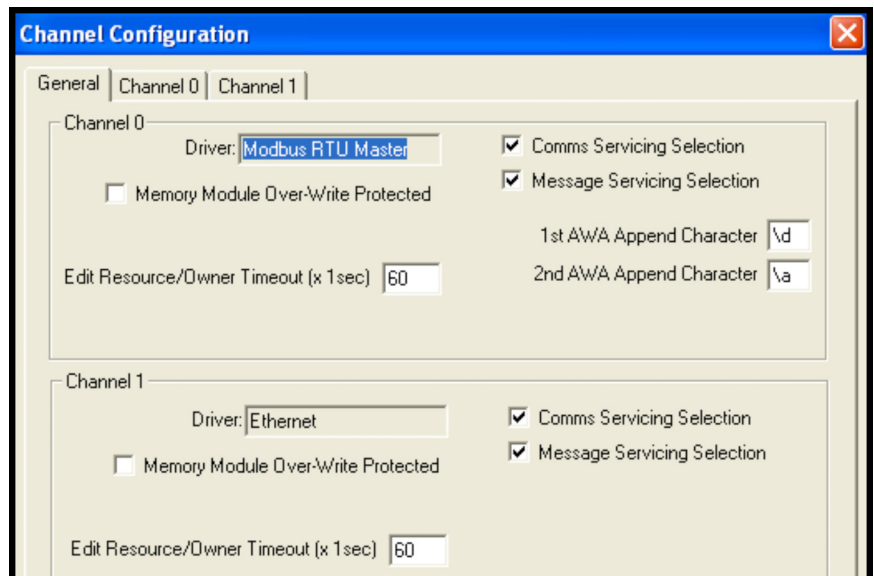
1) Enter the PLC commands listed below.

The timer is set to poll the connected device once every two seconds.

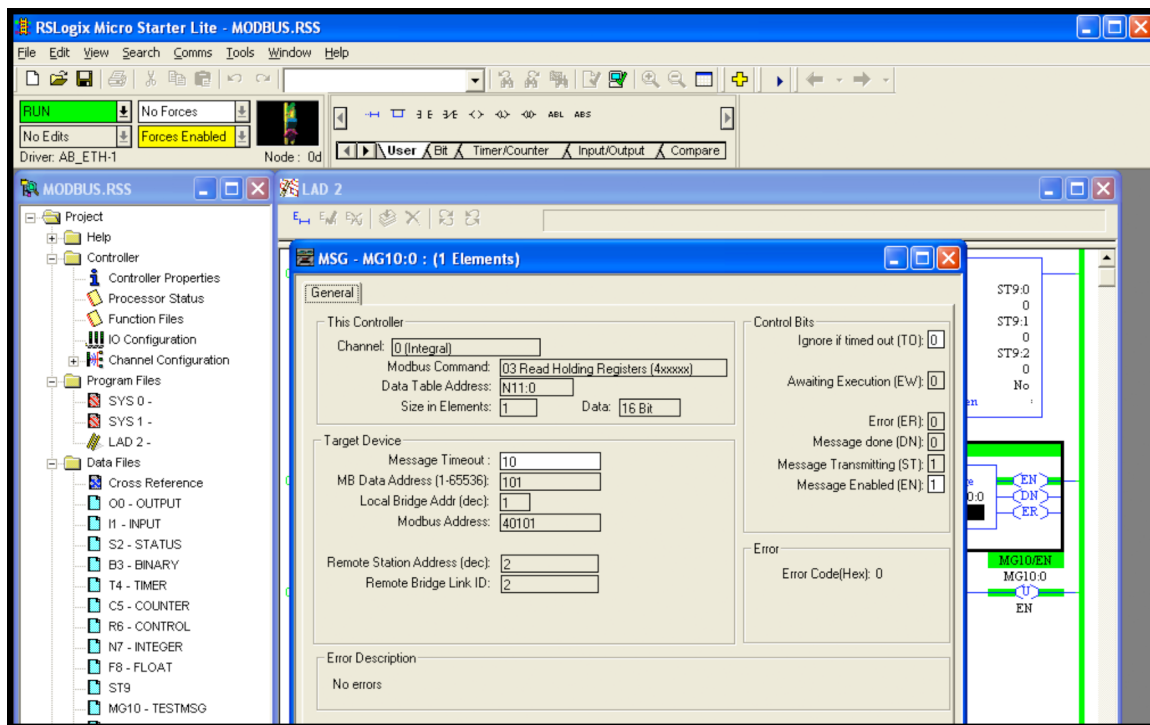


2) Set the Channel Configuration

Configure the driver to Modbus RTU Master and set the proper Baud rate



3) In “Target Devices” set the Modbus message (MB Data Address) to: 101 (read fieldbus setpoint).



4) Program PLC and set to “RUN”

5) Check that the proper data appears in the Data Table Address and that it matches the device display (if applicable) for “Fieldbus Setpoint”.

3. ETHERNET / IP

3.1 Overview

The maximum recommended sampling rate is 5 Hz.

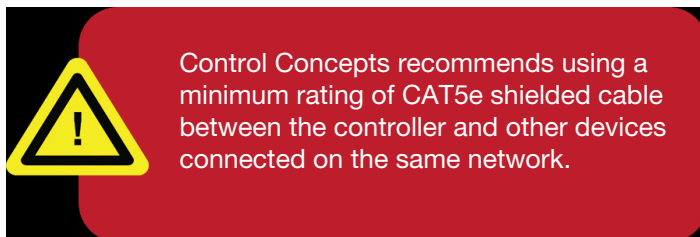
EtherNet/IP is little-endian (least significant byte will appear first) by specification.

Only Fieldbus Setpoint and Digital Run/Stop Enable parameters can be controlled by the PLC.

3.1.1 Wiring

MicroFUSION with EtherNet/IP uses the standard Ethernet pin-out shown in the table below.

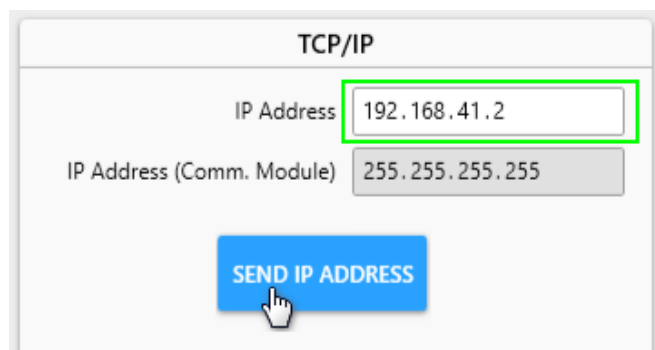
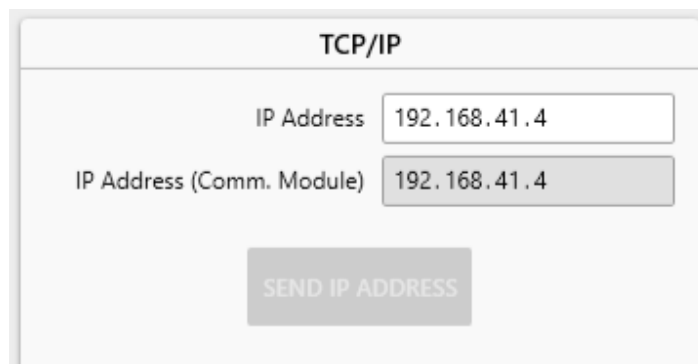
Ethernet 10/100BaseT (Twisted Pair)		
Pin #	Signal Name	Function
1	TD+	Transmit Data
2	TD -	Transmit Data
3	RD+	Receive Data
4	--	No Connection
5	--	No Connection
6	RD -	Receive Data
7	--	No Connection
8	--	No Connection



3.2 Connection Settings

EtherNet/IP configuration with Control Panel consists of setting the local interface IP address.

Enter the IP address and press the “Send IP Address” button to transfer the new value to the Controller.

The Comm. Module display will update with the current interface IP address after successfully programming a new address. Updates can take several seconds.

The new IP address should update in the Comm. Module field automatically after several seconds. This indicates the new value was successfully programmed in the XPORT module. If there is no update, press the Refresh IP Address button.

3.3 Parameters

Local Mode Enable [SP-120] - see section 1.2.1

Network Timeout

Comm. Heartbeat Time [SP-125] - see section 1.4.1

Network Timeout Action [SP-128] - see section 1.4.2

Network Heartbeat Timer [MP-370] - see section 1.4.3

Network Timeout Setpoint [SP-108] - see section 1.4.4

EtherNet/IP also includes an additional timer (Communications Watchdog)

Comm. Watchdog Time [SP-135] - see section 1.4.5

Comm. Watchdog Timer [SP-373] - see section 1.4.6

EtherNet/IP Assemblies

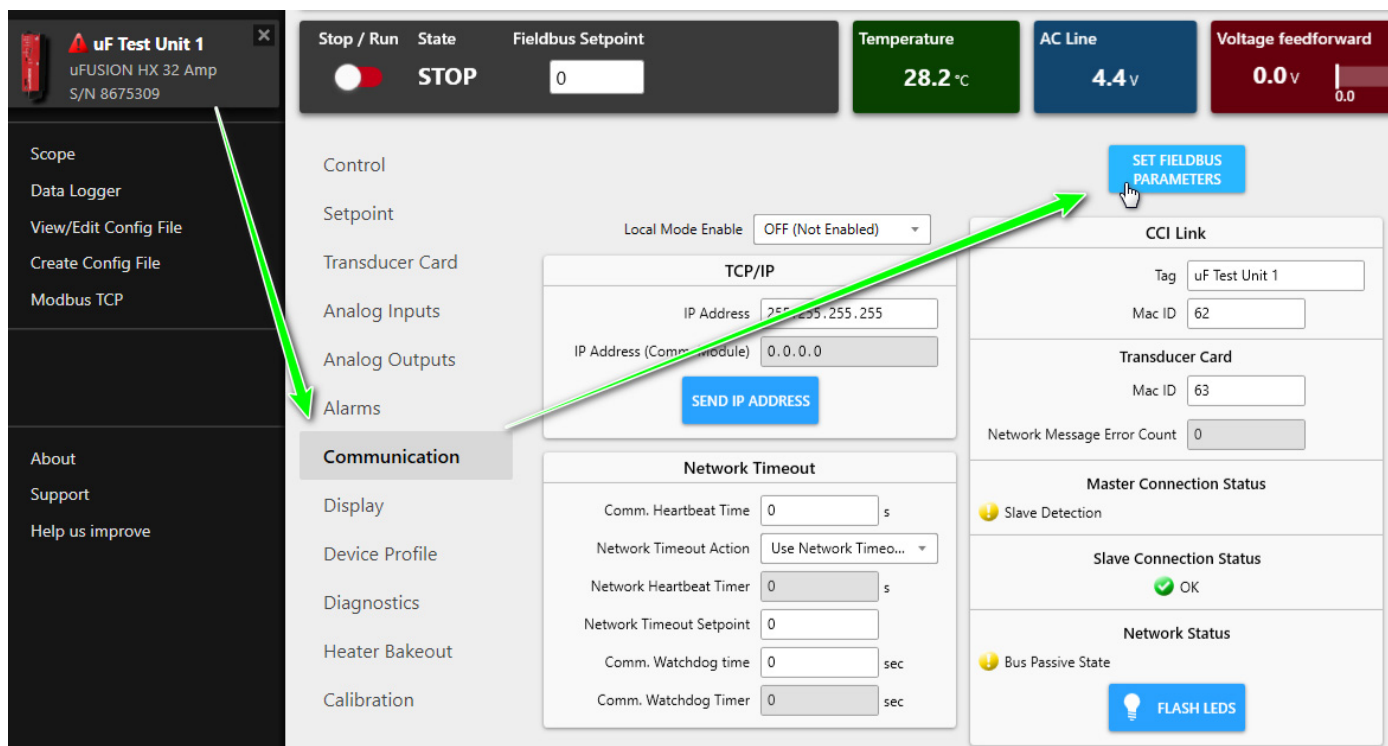
Input/Output Assembly List - see section 5

For additional MicroFUSION parameter definitions refer to the MicroFUSION User's Manual or Parameter List document. Both are available on the associated product page on the Control Concepts website

3.3.1 EtherNet/IP Fieldbus Parameters

MicroFUSION controllers have a default list of parameters that will be read over EtherNet/IP by the host. These parameters can be modified if using the Control Panel software application.

To modify the EtherNet/IP parameters, connect to the controller using the Control Panel software via the micro USB connection on the device. Click the "Communication" tab. Then click the "SET FIELDBUS PARAMETERS" button.



The screenshot displays the MicroFUSION Control Panel software interface. On the left is a sidebar menu with options: Scope, Data Logger, View/Edit Config File, Create Config File, Modbus TCP, About, Support, and Help us improve. The main area shows the 'Communication' tab selected. At the top, there's a status bar with 'uF Test Unit 1', 'uFUSION HX 32 Amp', 'S/N 8675309', and a 'STOP' button. Below this, the 'Communication' tab contains several sub-sections: 'TCP/IP' with fields for IP Address (255.255.255.255) and IP Address (Communication module) (0.0.0.0), a 'SEND IP ADDRESS' button, 'Network Timeout' with fields for Comm. Heartbeat Time, Network Timeout Action, Network Heartbeat Timer, Network Timeout Setpoint, Comm. Watchdog time, and Comm. Watchdog Timer, and a 'SET FIELDBUS PARAMETERS' button. To the right of the 'Communication' tab is a 'CCI Link' section with fields for Tag (uF Test Unit 1), Mac ID (62), Transducer Card Mac ID (63), and Network Message Error Count (0). Below this is a 'Master Connection Status' section showing 'Slave Detection' and 'Slave Connection Status' (OK). At the bottom right is a 'Network Status' section showing 'Bus Passive State' and a 'FLASH LEDS' button. A green arrow points from the 'Communication' tab to the 'SET FIELDBUS PARAMETERS' button.

Selecting the “SET FIELDBUS PARAMETERS” button opens the Parameter List window. The column on the right represents the parameters that are currently programmed for EtherNet/IP, while the column on the left shows the parameters that are available for programming.

Note: It is possible to change the EtherNet / IP parameters using the Connect Gateway Module. To do this, select the necessary device from the “Device” list in the Control Panel connected devices (listed on the left column of the application). and navigate to “SET FIELDBUS PARAMETERS” on the Connect Module’s Communication tab.

To update/change the parameter list:

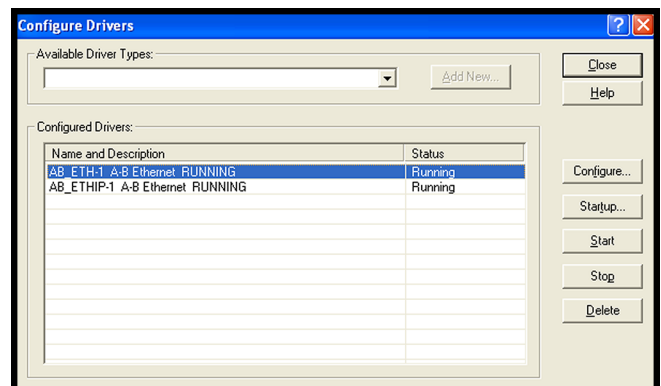
- Select any parameter from the left column, and drag it over to the right (vice versa to take a parameter off).
- Select or remove as many parameters as necessary and then select “PROGRAM” at the bottom of the dialog window.
- The control panel will then ask the user to select which connected controllers should be updated with the new parameter list. Select the appropriate controller(s) and select OK. The selected controllers will update with the selected parameters.



3.4 RSLinx Classic Software Configuration

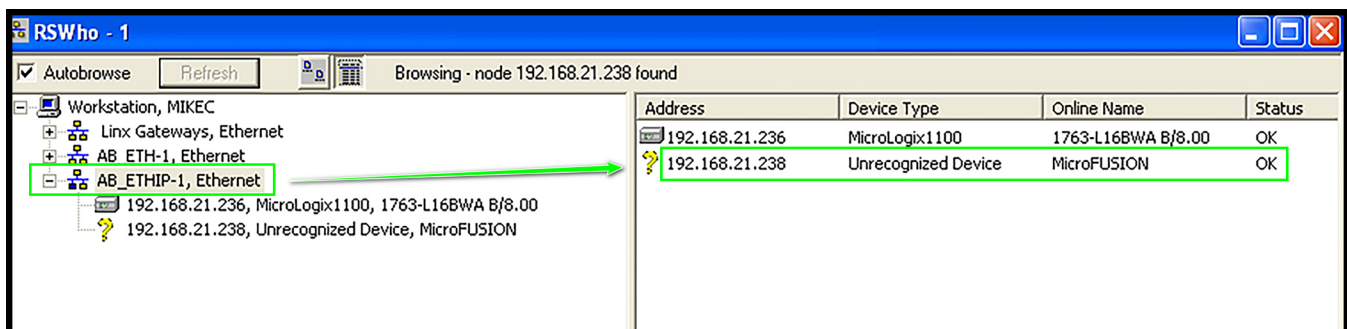
PLC Software: RSLinx Classic Lite

1) In RSLinx Classic Lite: Click Communications -> Configure Drivers and set ETHIP and ETH driver to run.



2) Next click Communications, then select RSWho.

- Set the IP address of the controller in Control Panel.
- Verify that a MicroFUSION controller is present in Output Window.



3.5 EtherNet/IP with MicroLogix 1100 PLC

PLC: AB MicroLogix 1100

PLC Software: RSLogix Micro Starter Lite

MicroFUSION Ethernet/IP is compatible with many PLC models and manufacturers.

The example below demonstrates configuring the MicroLogix 1100 using the RSLogix Micro Starter Lite software suite. For questions regarding other models or software, we recommend contacting the PLC manufacturer for additional support.

The following configuration will test for proper communication between the PLC and a MicroFUSION controller connected on the same Ethernet/IP network. The Fieldbus setpoint displayed on the Control Concepts Control Panel software application should respond and display the value sent from the PLC controller on completion of the steps below.

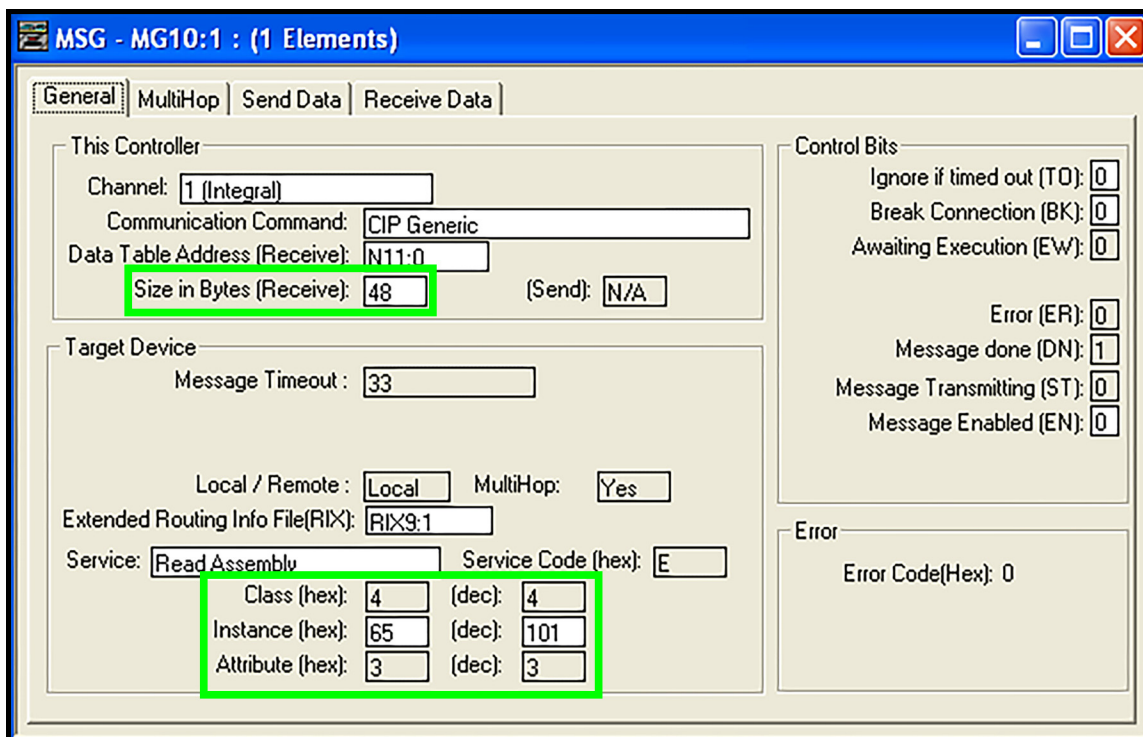
Connect the MicroFUSION controller to a PC running the Control Concepts Control Panel application using an appropriate micro USB cable.

Observe the Fieldbus setpoint reading in the control panel dashboard during the test.

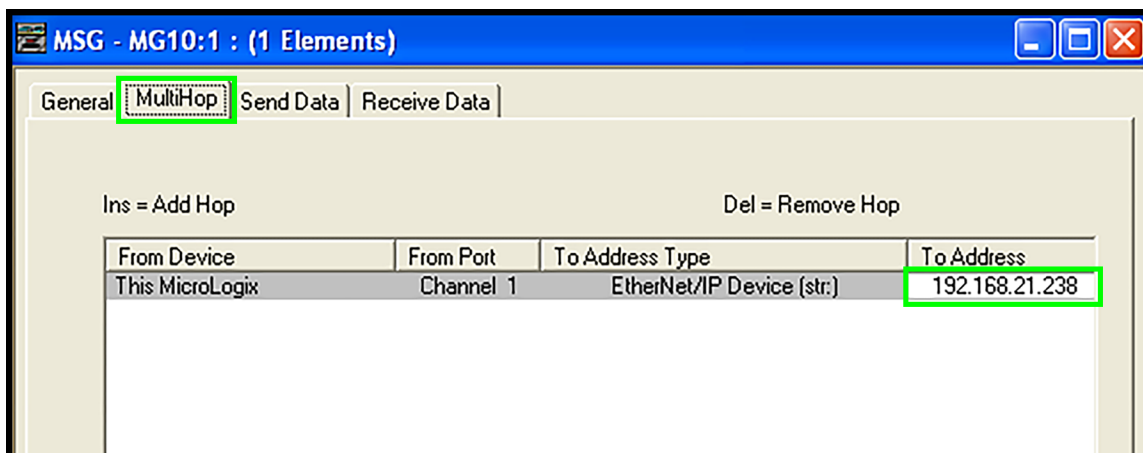


1) Create a Data Buffer and a Message to Read Input Assembly.

The data buffer size will be 48 bytes: Class 0x04, Instance 0x65, and Attribute 0x03.



2) Add the IP address of the MicroFUSION unit in the MultiHop tab



MSG - MG10:1 : (1 Elements)

General **MultiHop** Send Data Receive Data

Ins = Add Hop Del = Remove Hop

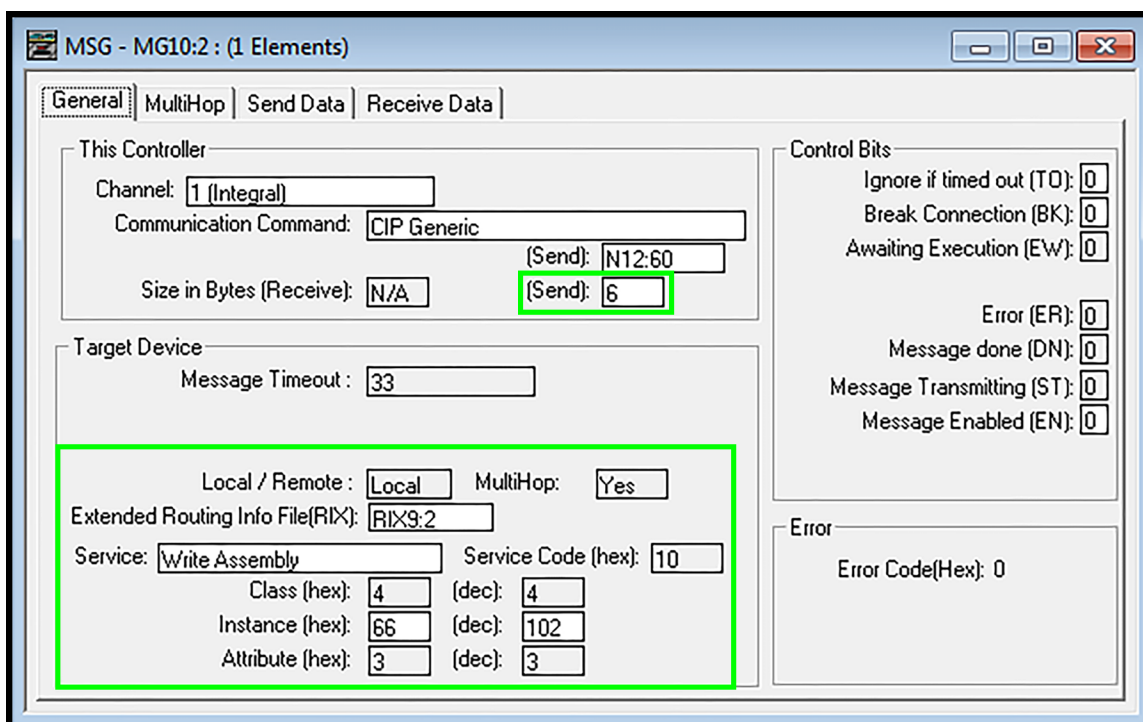
From Device	From Port	To Address Type	To Address
This MicroLogix	Channel 1	EtherNet/IP Device (str.)	192.168.21.238

3) Create another Data Buffer to contain the Data Values to Write to the controller:

The buffer size will need to be 3 integers (6 bytes) in size. Create another message rung for the Write Assembly message. (The example below is set to MG10:2).

Fill in the message confirmation to write to: Class 0x04, Instance 0x66, Attribute 0x03.

Add the IP address of the MicroFUSION controller in the MultiHop tab, the same as in MG10:1.



MSG - MG10:2 : (1 Elements)

General MultiHop Send Data Receive Data

This Controller

Channel: 1 (Integral)

Communication Command: CIP Generic

Size in Bytes (Receive): N/A

Target Device

Message Timeout: 33

Control Bits

Ignore if timed out (TO): 0

Break Connection (BK): 0

Awaiting Execution (EW): 0

Error (ER): 0

Message done (DN): 0

Message Transmitting (ST): 0

Message Enabled (EN): 0

Error

Error Code(Hex): 0

Local / Remote: Local MultiHop: Yes

Extended Routing Info File(RIX): RIX9:2

Service: Write Assembly Service Code (hex): 10

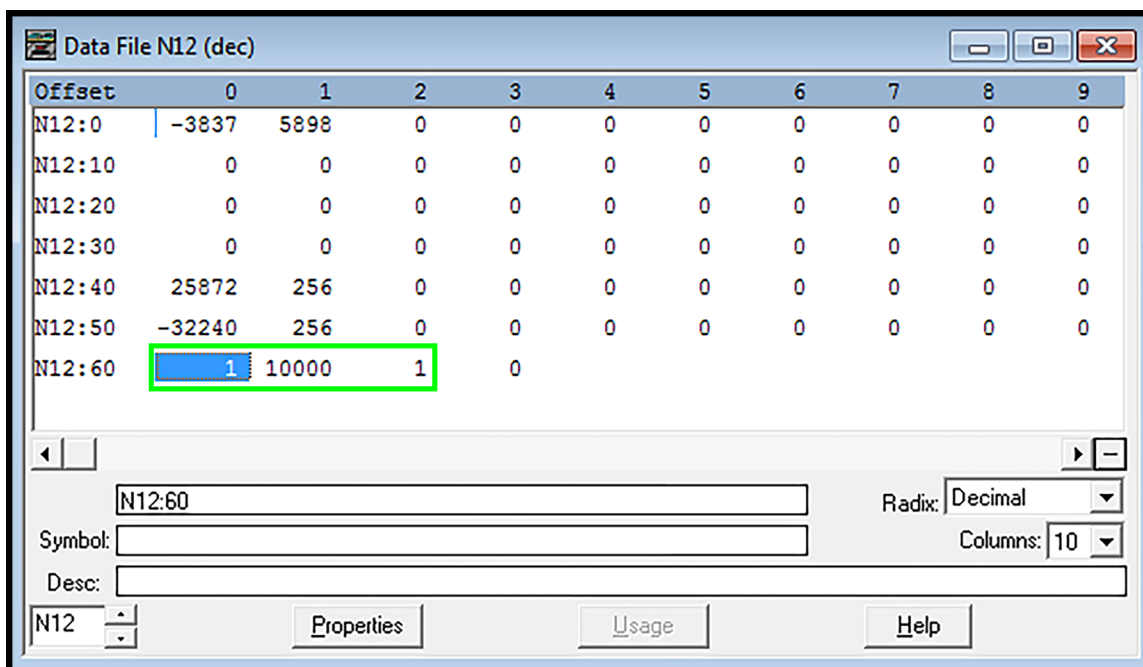
Class (hex): 4 (dec): 4

Instance (hex): 66 (dec): 102

Attribute (hex): 3 (dec): 3

Data Block N12:60 is used to contain the data to send:

Integer 0 (always) = 1, Integer 1 [Fieldbus Setpoint] = 10000, Integer 2 [Digital Run/Stop] = 1 for run or 0 for stop



Offset	0	1	2	3	4	5	6	7	8	9
N12:0	-3837	5898	0	0	0	0	0	0	0	0
N12:10	0	0	0	0	0	0	0	0	0	0
N12:20	0	0	0	0	0	0	0	0	0	0
N12:30	0	0	0	0	0	0	0	0	0	0
N12:40	25872	256	0	0	0	0	0	0	0	0
N12:50	-32240	256	0	0	0	0	0	0	0	0
N12:60	1	10000	1	0						

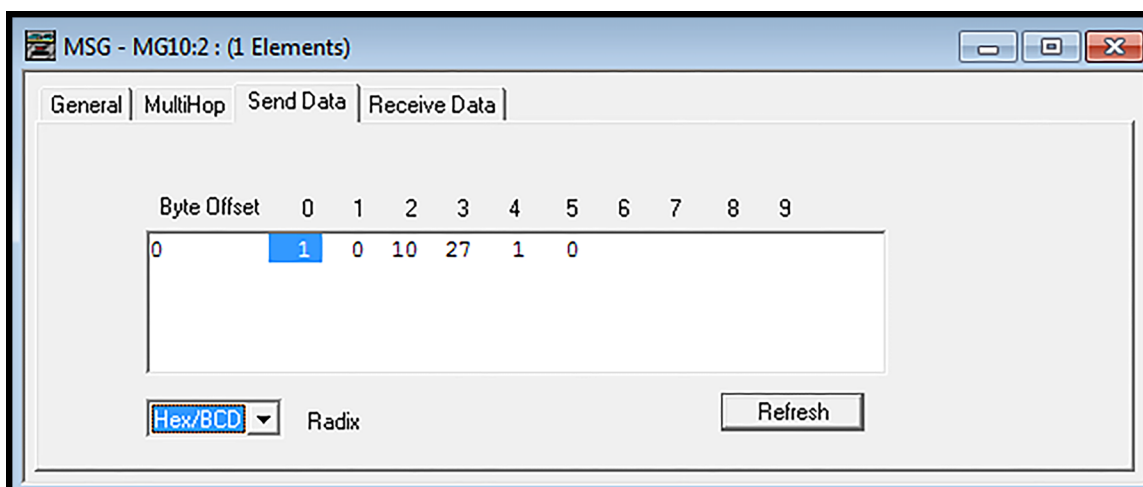
N12:60
 Symbol:
 Desc:
 N12

Radix: Decimal Columns: 10

Properties Usage Help

The data can be viewed and verified on the Send Data tab of the Message (MG10:2).

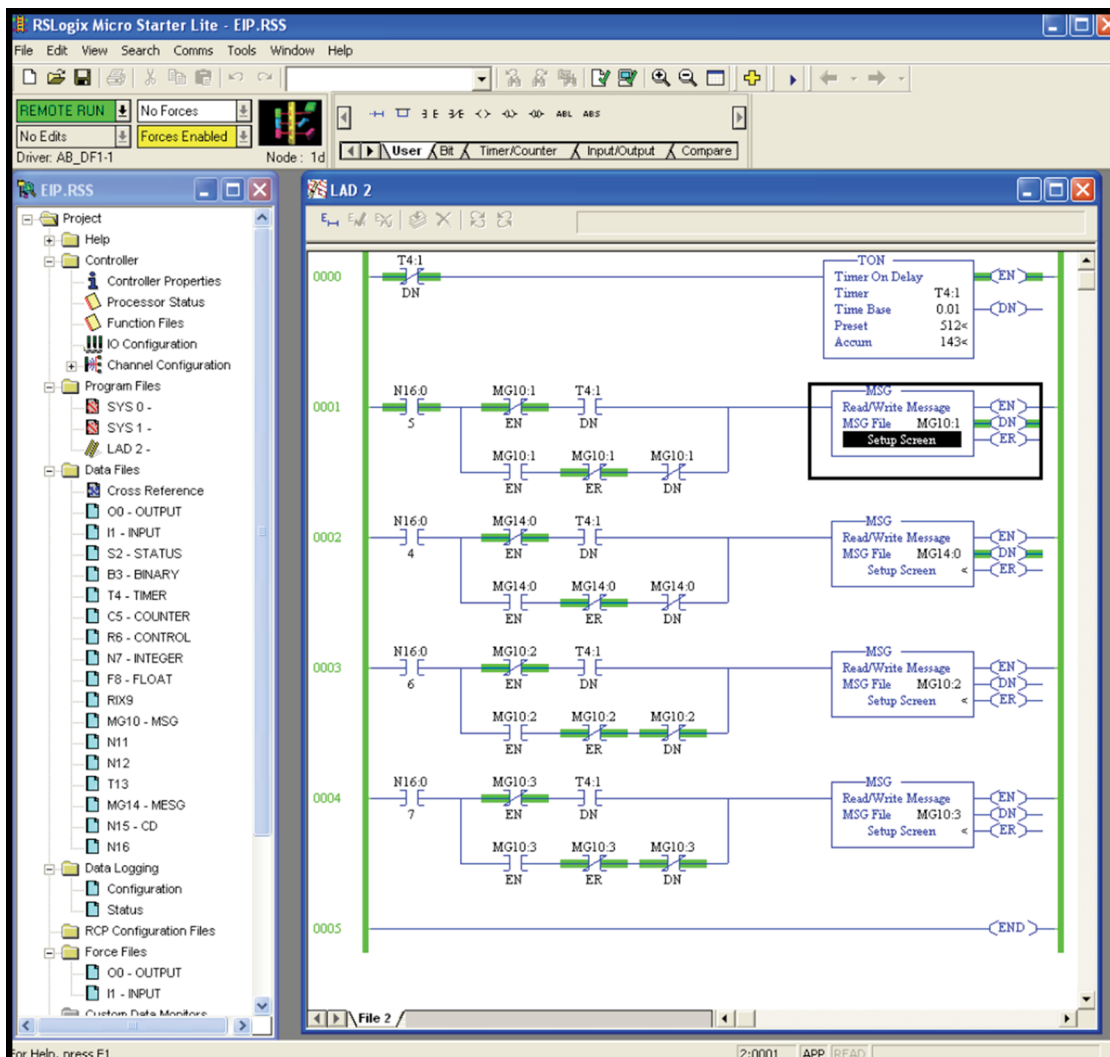
This will display the 6 bytes that will be written to the controller.



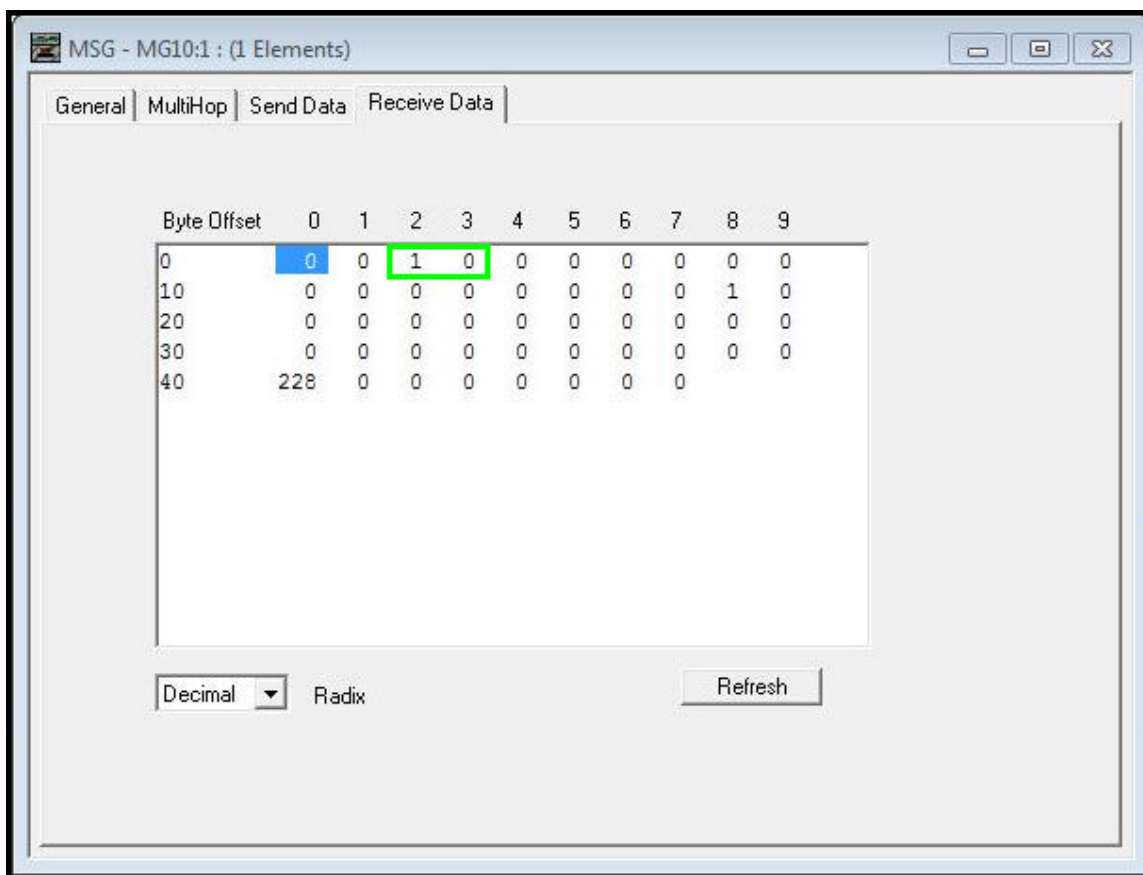
Byte Offset	0	1	2	3	4	5	6	7	8	9
0	1	0	10	27	1	0				

Hex/BCD Radix Refresh

4) Create a timer and send a message every timer tick. Maximum recommended sampling rate is 5 Hz.



- 5) In MSG - MG10:1 check that byte 2 and 3 of the data buffer is 1,0.
EtherNet/IP is Little Endian by specification (least significant will appear first).

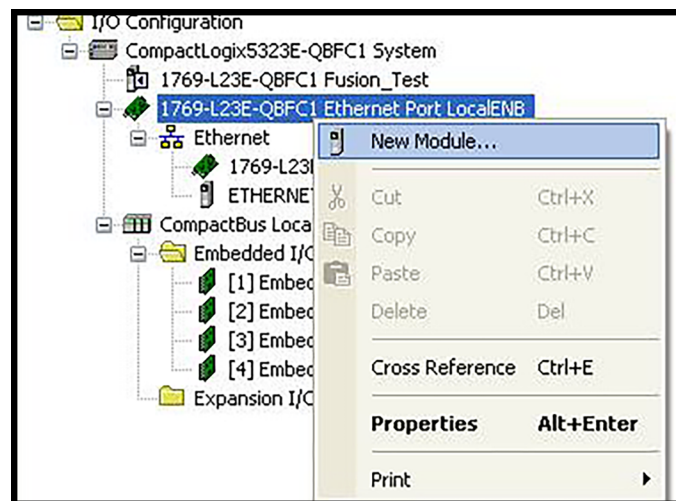


3.6 EtherNet/IP with CompactLogix L23E

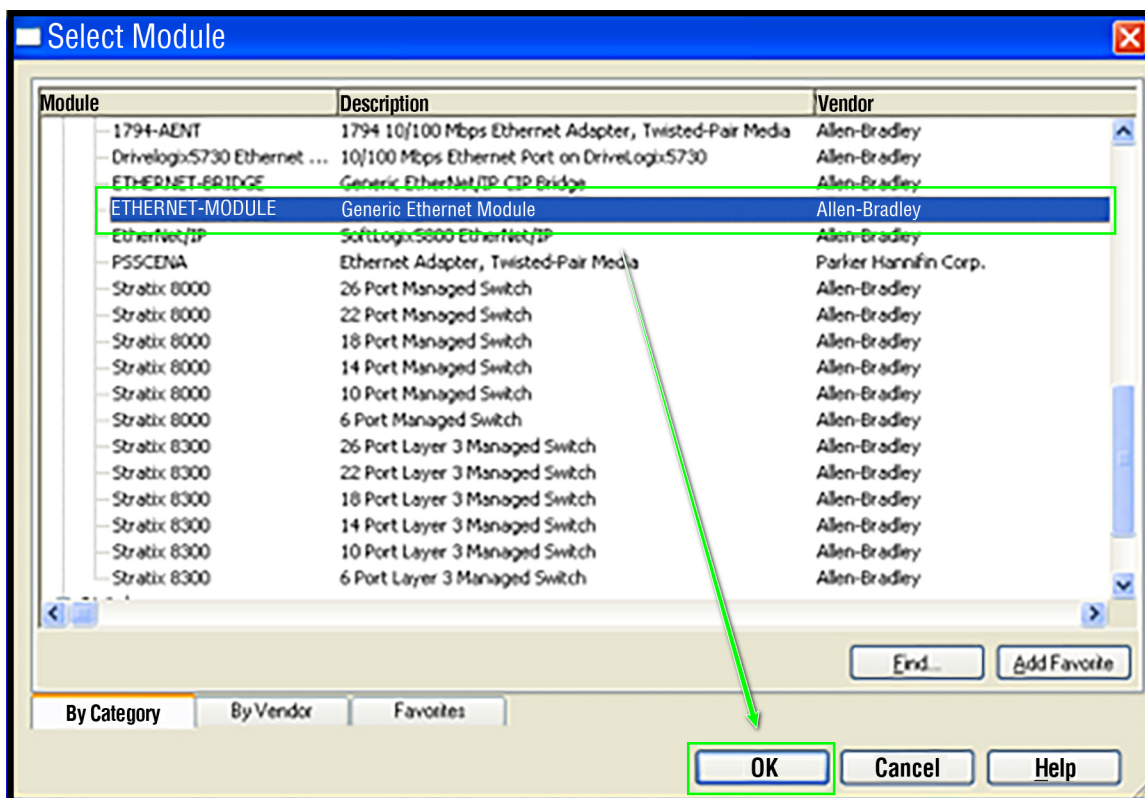
PLC: CompactLogix L23E-QBFC1B

PLC Software: RSLogix 5000

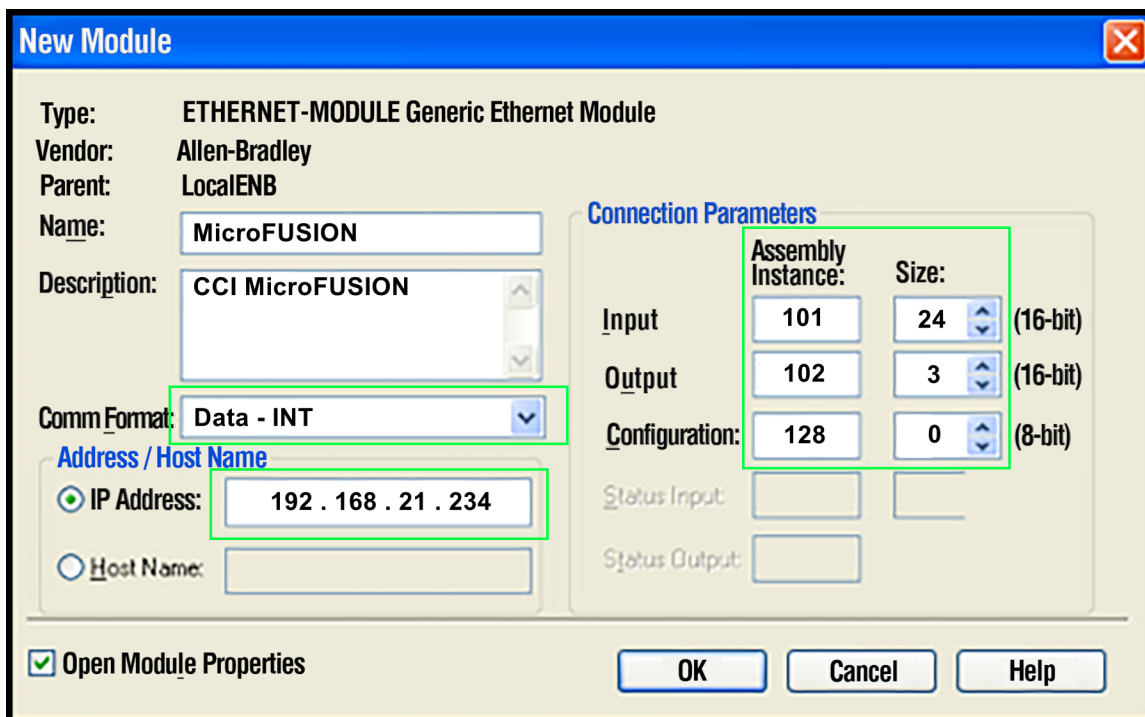
- 1) Open RSLogix 5000 software
Right click the Ethernet port, and select "New Module".



- 2) Find "Generic Ethernet Module" and click OK.



- 3) Set the IP address of the MicroFUSION, and set the Assembly Instance size shown below.
 Ensure the Comm Format is set to "Data - INT"
 Click OK to continue



New Module

Type: ETHERNET-MODULE Generic Ethernet Module
 Vendor: Allen-Bradley
 Parent: LocalENB
 Name: MicroFUSION
 Description: CCI MicroFUSION

Comm Format: Data - INT

Address / Host Name
☒ IP Address: 192 . 168 . 21 . 234
☐ Host Name:

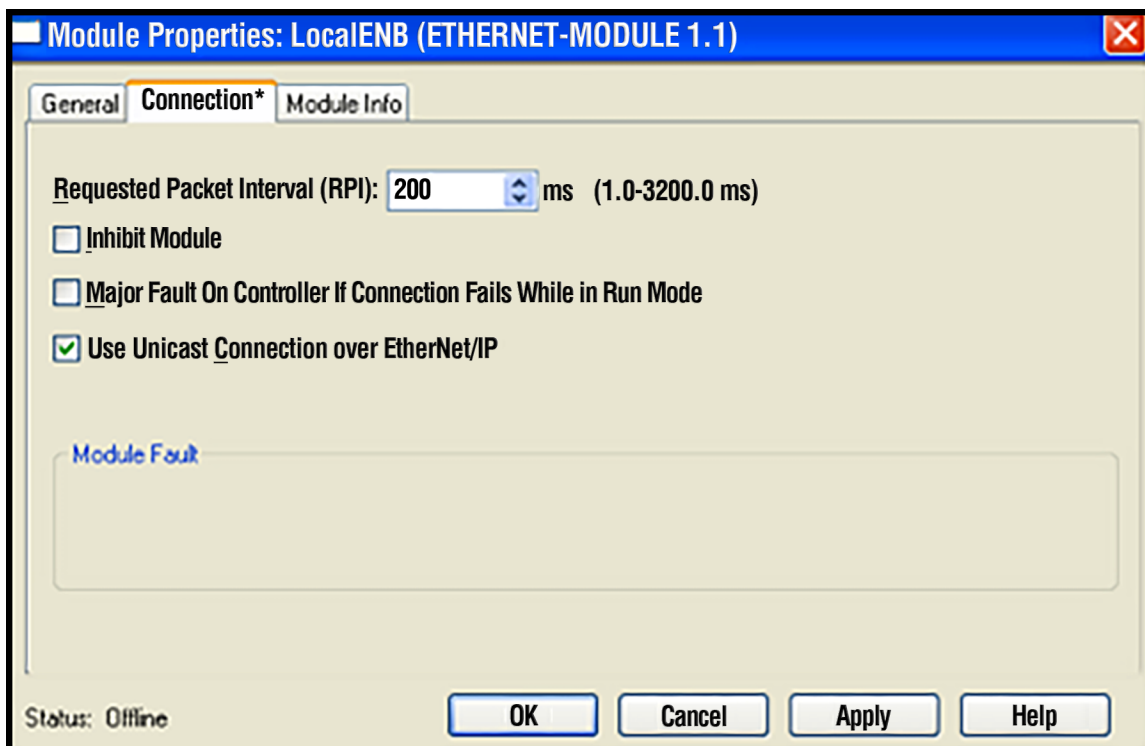
Connection Parameters

	Assembly Instance:	Size:	
Input	101	24	(16-bit)
Output	102	3	(16-bit)
Configuration:	128	0	(8-bit)
Status Input:			
Status Output:			

☒ Open Module Properties

OK Cancel Help

- 4) Set the Requested Packet Interval (RPI) to 200 ms, then select OK.



Module Properties: LocalENB (ETHERNET-MODULE 1.1)

General Connection* Module Info

Requested Packet Interval (RPI): 200 ms (1.0-3200.0 ms)

☐ Inhibit Module

☐ Major Fault On Controller If Connection Fails While in Run Mode

☒ Use Unicast Connection over EtherNet/IP

Module Fault

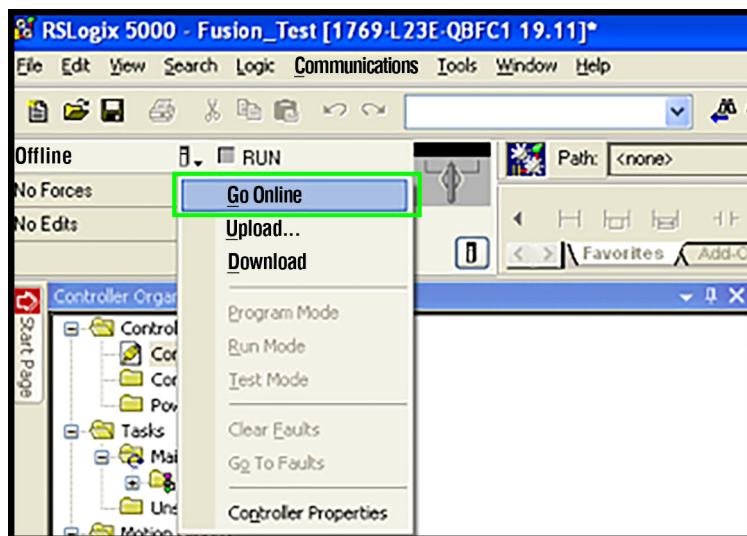
Status: Offline

OK Cancel Apply Help

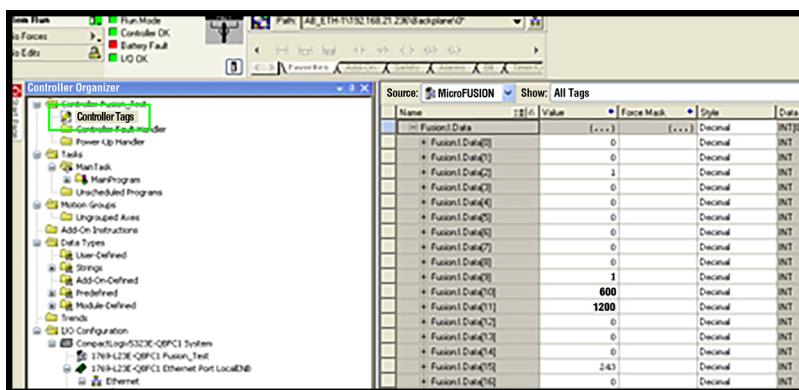
5) The MicroFUSION Ethernet module should appear. If the communication path is ready, set the PLC to Go Online.

Set the communication path in Communication -> Who's Active.

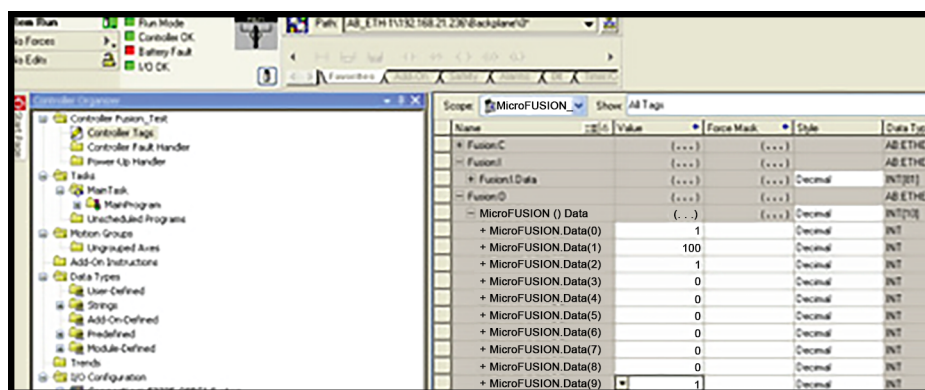
Download the project and set the PLC to Remote Run.



6) With the PLC set to Run, click the Controller Tags, and check the input data buffer. The line frequency (Integer 3) is 60 Hz (600) and Line Voltage (Integer 4) is 120V (1200).



7) Click the output data buffer in Controller Tags. Set Integer 0 (Output Enable) to 1, Integer 1 (Fieldbus Setpoint) to 100 (1%), and Integer 2 (Digital Run Enable) to 1.



8) Check the input data buffer. Integer 1 (Fieldbus Setpoint 1) should be set to 100 and Integer 2 (Digital Run Enable) should be set to 1.

4. PROFINET

4.1 Overview

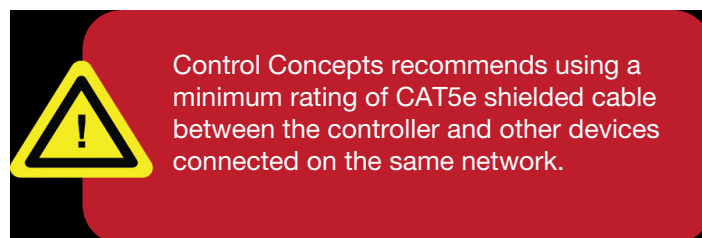
PROFINET configuration is accomplished using the Control Concepts Control Panel application, refer to the GETTING STARTED in chapter 1 for common settings and parameters. Connection settings are covered below in section 4.2

4.1.1 Wiring

MicroFUSION with PROFINET uses a standard Ethernet pin-out, as shown in the table below.

Ethernet 10/100BaseT (Twisted Pair)

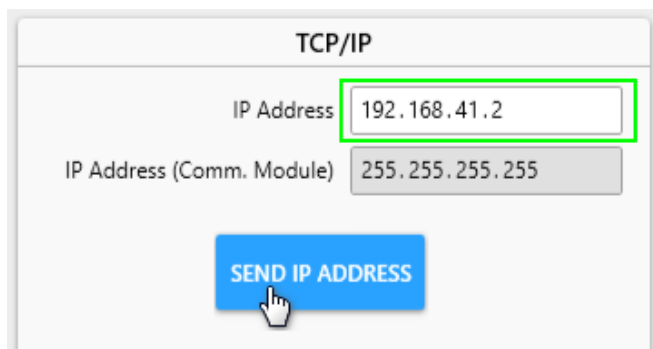
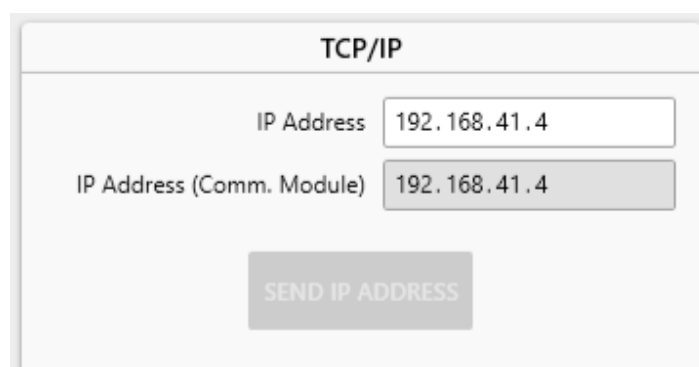
Pin #	Signal Name	Function
1	TD+	Transmit Data
2	TD -	Transmit Data
3	RD+	Receive Data
4	--	No Connection
5	--	No Connection
6	RD -	Receive Data
7	--	No Connection
8	--	No Connection



4.2 Connection Settings

PROFINET configuration with Control Panel consists of setting the local interface IP address.

Enter the IP address and press the “Send IP Address” button to transfer the new value to the Controller.

The Comm. Module display will update with the current interface IP address after successfully programming a new address. Updates can take several seconds.

The new IP address should update in the Comm. Module field automatically after several seconds. This indicates the new value was successfully programmed in the XPORT module. If there is no update, press the Refresh IP Address button.

4.2.1 Temporary vs Permanent IP Addresses

With PROFINET, the “Station Name” (sometimes referred to as “Device Name”) is more important than the IP address in device identification on the network. The Station Name of each device on the network must be unique.

The “DCP Set IP Address” command contains an option to set the IP address as “Permanent” or “Temporary”:

Permanent IP Address

The PROFINET module on the controller will save the IP address to non-volatile memory and begin using the IP address immediately.

Temporary IP Address

The PROFINET module on the controller will not save the IP address setting, but will begin using the IP address immediately. When the IP address has been set to “Temporary”, PROFINET-IO requires the device to use an IP address of 0.0.0.0 after the next power-cycle or device reset.

Often, PNIO PLCs set the IP address as “Temporary”. The PLC will use the device’s station name and MAC address to identify the device on the network and set the IP address of the device correctly, however it will be “Temporary”.

This may cause the following scenario to occur:

(in this scenario it is assumed that the IP address is initially set as permanent):

- Utilizing Control Panel software, the user sets the IP address of the controller, or using PNIO configuration software, the user searches for the controller device with the unique station name on the network and sets its IP address.
- After power is cycled to the controller, it retains the IP address as expected.
- Once the PLC is configured, it connects to the controller and communicates as expected. Then the PLC is powered down or disconnected, and power is cycled to the controller.
- The user attempts to “ping” the controller on the network at the IP address assigned and it does not respond.
- The user connects with the Control Panel software and finds that the IP address is displayed as 0.0.0.0 in the IP address (comm module) text box, then the user attempts to set the IP address of the controller, again, using the Control Panel software. Yet the controller continues to report an IP address of 0.0.0.0 in the (comm module) text box.

In this situation, the user will find that when they power-up and connect the PLC everything works as expected, and as long as they don’t cycle power to the controller they can ping it successfully at the expected IP address.

Example:

The IP address of the controller was set as temporary by the PLC, so after a power-cycle the IP address used by the PROFINET module on the controller is 0.0.0.0. When this happens, the only way to set the IP address of the PROFINET module is through PROFINET either by the PLC or by using the PNIO configuration software. This should not cause a problem since the PLC uses the station name of the controller and sets the IP address according to your network configuration when it establishes communication with the controller.

When the IP address of the PROFINET module on the controller has been set as “Temporary” and power has been cycled, the IP address stored in the controller itself and the IP address used by the PROFINET module on the controller may not match until the PLC sets the IP address of the PROFINET module via DCP set IP address command.

Note:

The IP address set in the controller must match the IP address for the controller set in the PLC.

Recommended solution:

- 1) Set the IP Address of the controller using the Control Panel software prior to connection and communication with the PLC.
- 2) Use the PNIO configuration software to set/verify the IP address of the controller so that it matches what was set using the Control Panel software prior to connection and communication with the PLC.

4.3 Input/Output Assemblies

Refer to Appendix A: I/O Assemblies for a complete list of input and output assembly values.

4.4 GSDXML Configuration File

Prior to connecting any modules to a Profinet IO capable (Siemens) PLC, a GSDXML configuration file needs to be installed in your PLC programming software (i.e. STEP 7 or TIA Portal). The GSDXML file contains, among other things, the definition of memory size required when connecting a module to a Siemens PLC with Profinet IO. When assigning an individual module to a PLC, you decide what memory address to use. The GSDXML file stipulates that each module requires 64 bytes of input data from the module to the PLC and 64 bytes of output data from the PLC to the module. When assigning an individual module to a PLC, you decide what physical PLC memory address to use as the beginning of these 64-byte blocks.

Control Concepts provides a GSDXML file¹ on the PROFINET digital interface product page on our website at:

[HTTPS://ccipower.com/products/digital-interfaces/microfusion-profinet](https://ccipower.com/products/digital-interfaces/microfusion-profinet)

¹ Registration (free) is required on the Control Concepts website to access this file.

4.5 Parameters

Local Mode Enable [SP-120] - see section 1.2.1

Network Timeout

Comm. Heartbeat Time [SP-125] - see section 1.4.1

Network Timeout Action [SP-128] - see section 1.4.2

Network Heartbeat Timer [MP-370] - see section 1.4.3

Network Timeout Setpoint [SP-108] - see section 1.4.4

PROFINET also includes an additional timer (Communications Watchdog)

Comm. Watchdog Time [SP-135] - see section 1.4.5

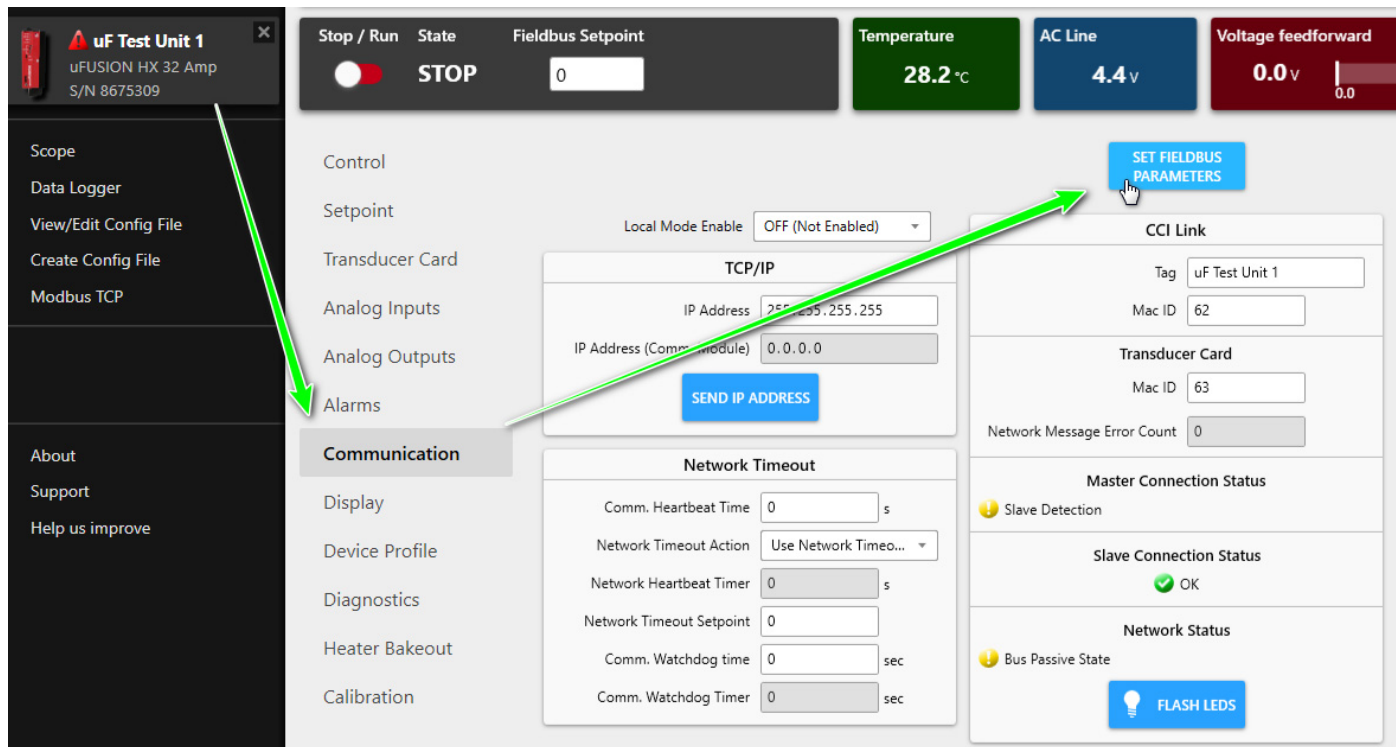
Comm. Watchdog Timer [SP-373] - see section 1.4.6

For additional MicroFUSION parameter definitions refer to the MicroFUSION User's Manual or Parameter List document. Both are available on the associated product page on the Control Concepts website.

4.5.1 PROFINET Fieldbus Parameters

MicroFUSION controllers have a default list of parameters that will be read over PROFINET by the host. These parameters can be modified if using the Control Panel software application.

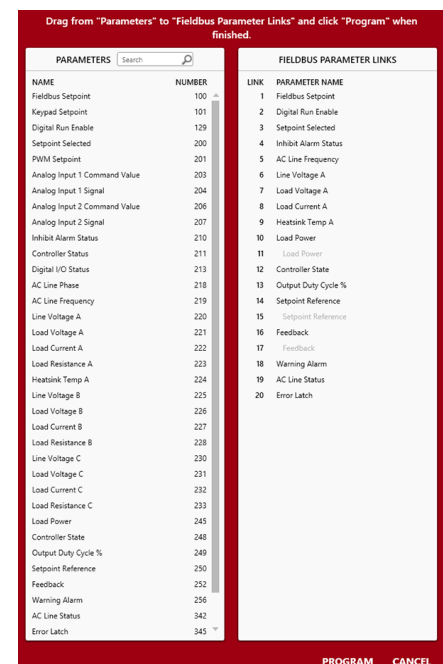
To modify the PROFINET parameters, connect to the controller using the Control Panel software via the micro USB connection on the device. Click the “Communication” tab. Then click the “SET FIELDBUS PARAMETERS” button.



Selecting the “SET FIELDBUS PARAMETERS” button opens the Parameter List window. The column on the right represents the parameters that are currently programmed for PROFINET, while the column on the left shows the parameters that are available for programming.

To update/change the parameter list:

- Select any parameter from the left column, and drag it over to the right (vice versa to take a parameter off).
- Select or remove as many parameters as necessary and then select “PROGRAM” at the bottom of the dialog window.
- The control panel will then ask the user to select which connected controllers should be updated with the new parameter list. Select the appropriate controller(s) and select OK. The selected controllers will update with the selected parameters.



4.6 PROFINET with Siemens CPU-315-2 PN/DP PLC

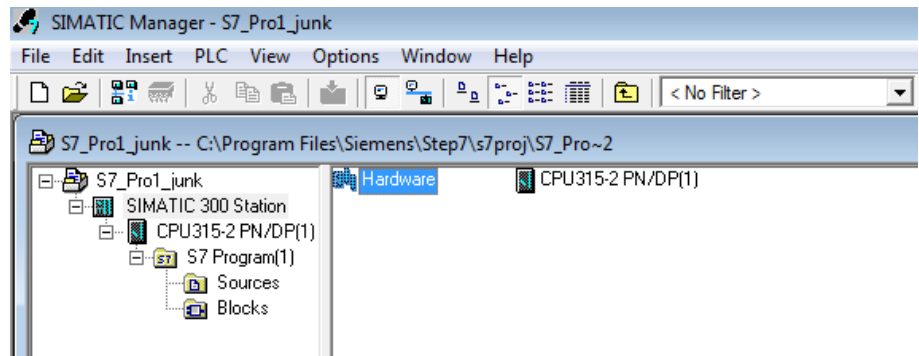
PLC: Siemens CPU-315 PN/DP PLC (6ES7 315-2EH13-0AB0)

PLC Software: SIMATIC STEP 7

Setup

- Verify that Simatic Manager is installed and operational, apply power to the PLC, and create a new S7 project.

- Double click on “Hardware”, this will bring up the “HW Config” window.



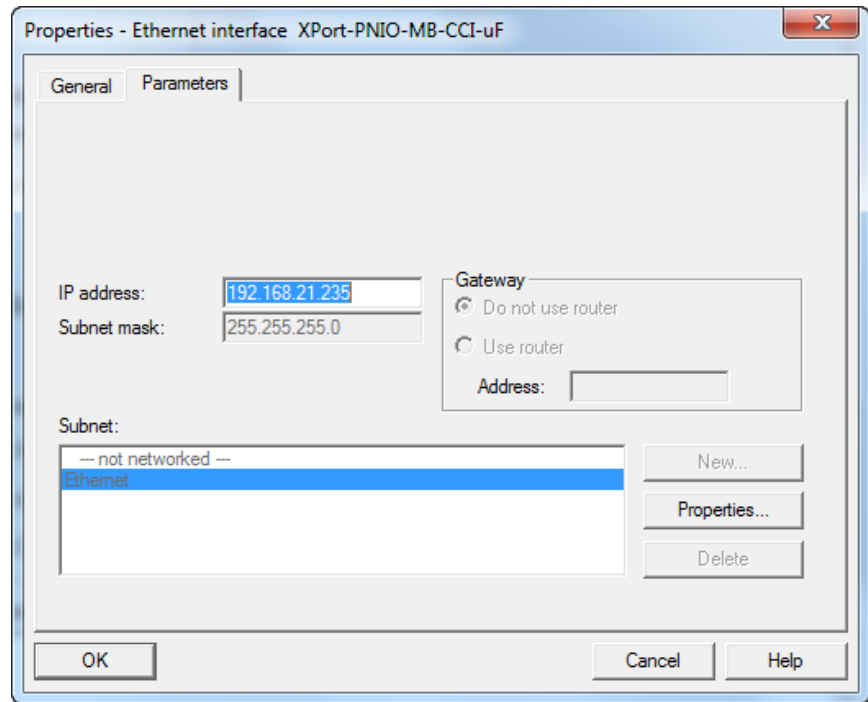
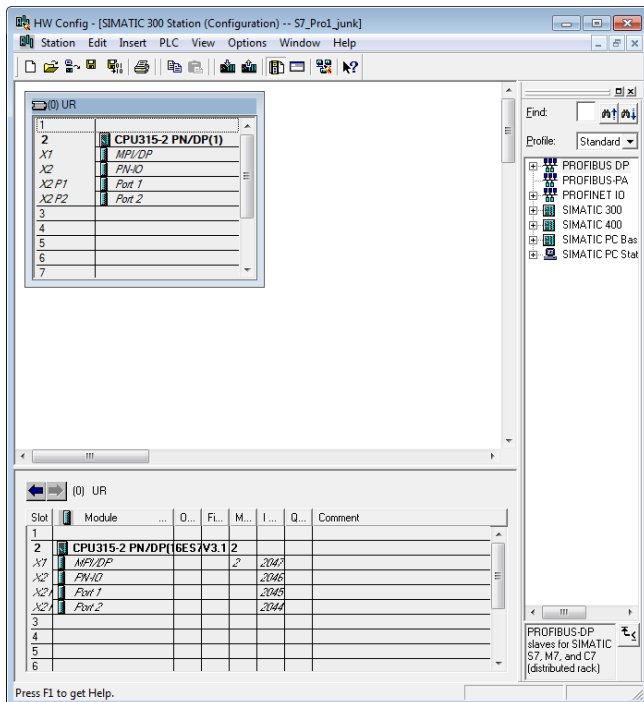
Select SIMATIC 300, then double click on “Hardware” in the right panel window to open the HW Config Window

HW Config Window

1) Set the IP Address

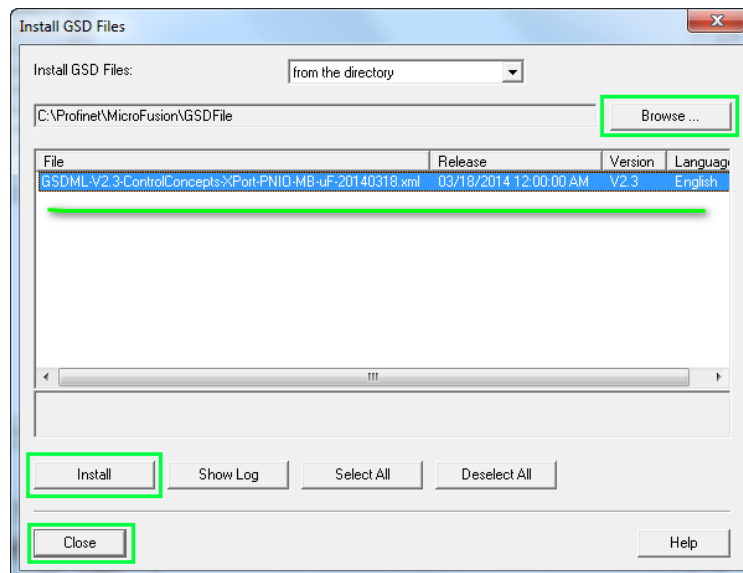
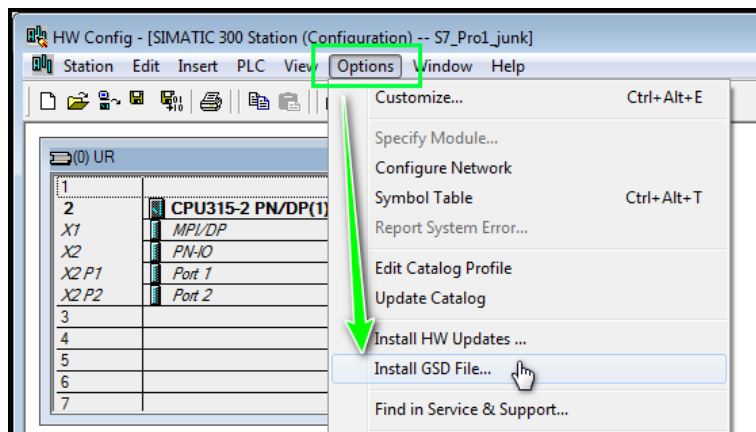
- Right click the X2 slot: Ethernet (PN-IO), select “Object Properties”.
- Stay on the “General” tab, and locate the “Interface” section and click “Properties”.
- Open the “Parameters” Tab, then assign the IP address of the PLC, in the “IP address:” text field.

Note: In the “Subnet:” section on the “Parameters” Tab, if no “Ethernet” subnet is present, navigate and select “New...” on the right side of the window. Then select “OK” if the settings are acceptable.



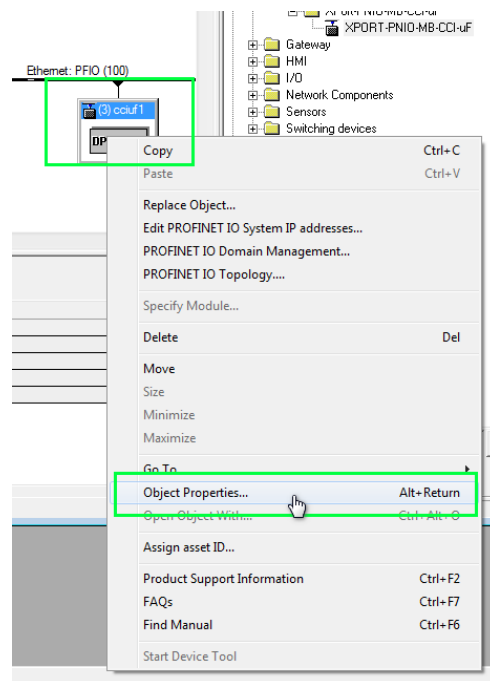
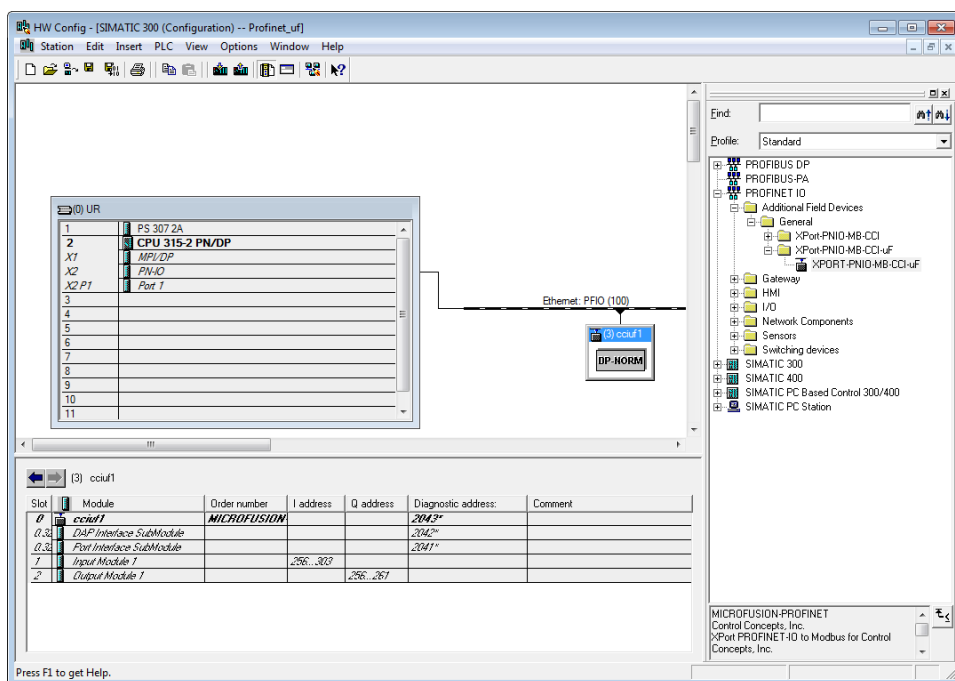
2) Install the MicroFUSION GSD file

- Under “Options”, select “Install GSD File”.
- After the install window appears, select “Browse...” and navigate to where the GSD file is stored
- Select the desired file and choose “Install”, then “Close” to continue



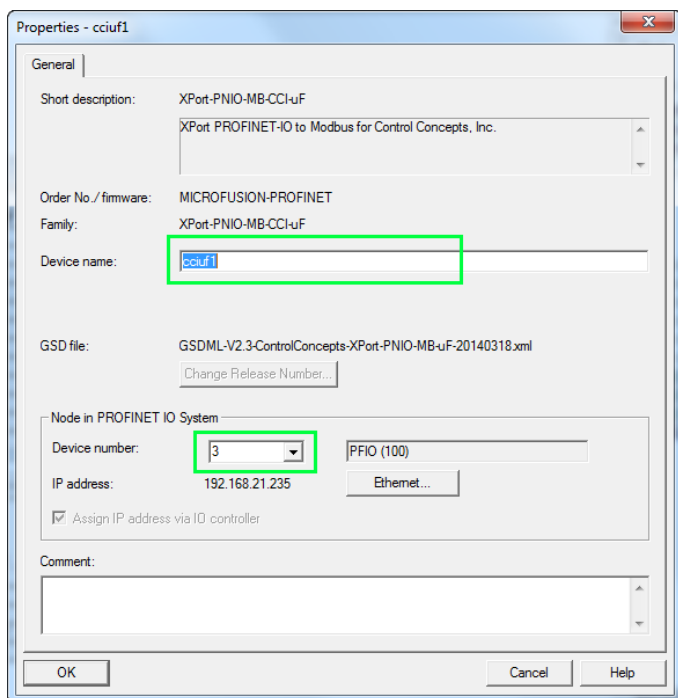
3) Initialize Profinet Bus

- Select: PROFINET IO --> Additional Field Devices --> General --> XPORT-PNIO-MB-CCI-uF.
- Click and drag the XPORT device into the PROFINET Bus
- Right click the newly created item and navigate to “Object Properties”



3) Initialize Profinet Bus (continued)

- E) Name the device a unique name on the network. The example uses the unique name “cciuf1”.
- F) Under the “Node in PROFINET IO System” section, change the “Device number:” to 3.



Device Name:

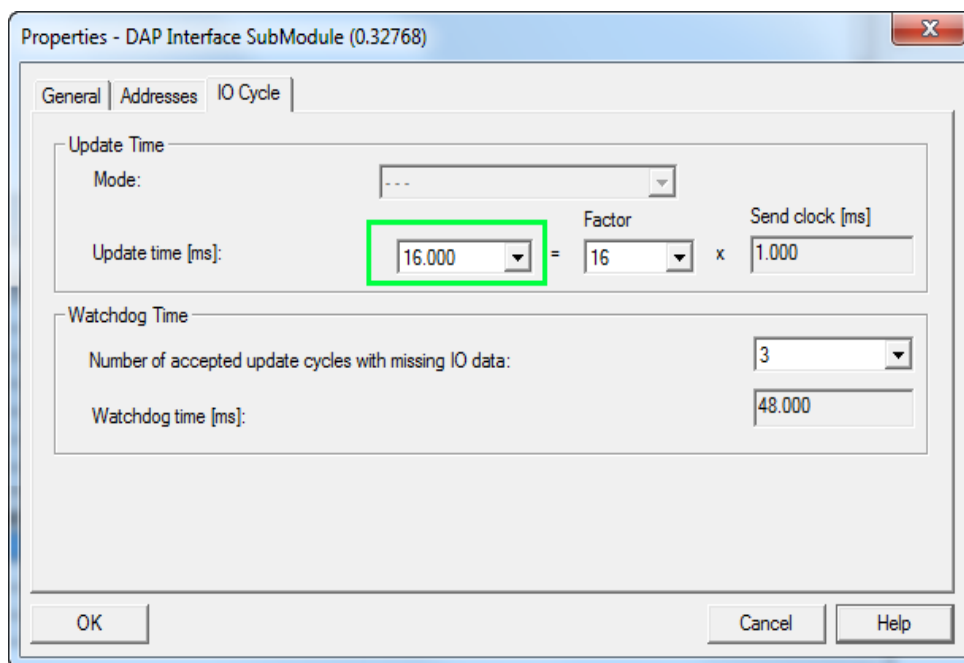
The name should be unique to all devices on the network.

IP Address:

Make sure that the IP address in “Node in PROFINET IO System” matches the address set in Control Panel. If it does not, under “Node in PROFINET IO System” select “Ethernet...” and change the IP address.

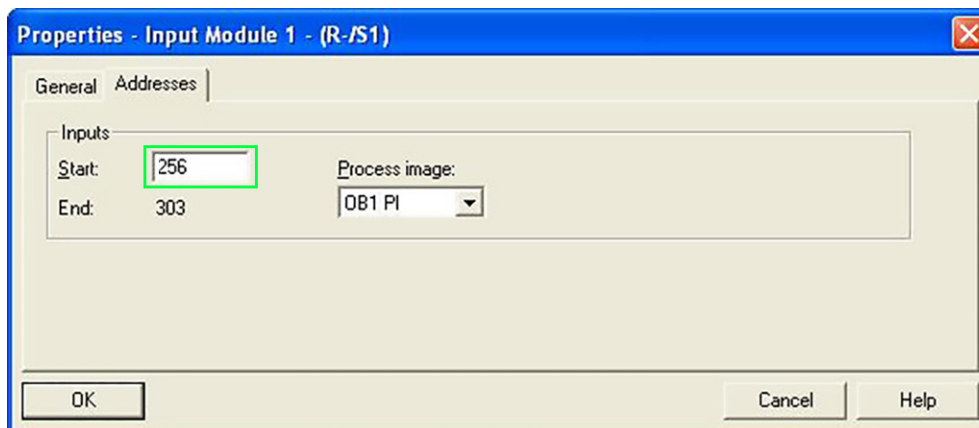
4) Update time [ms]

- A) From the HW Config Window, right Click on “DAP Interface Submodule” and select “Object Properties”
- B) Click on the “IO Cycle” Tab
- C) Under “Update Time”, in “Factor” enter 16 into the data field. This will change the update time to 16 ms.



5) Input/Output Start Address

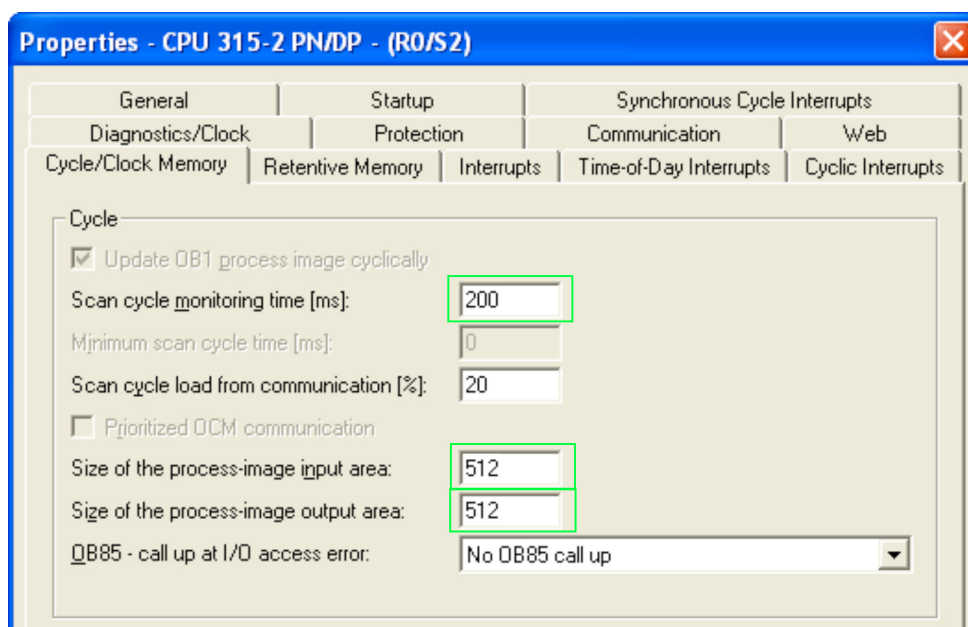
- Return to the HW Config Window, right click Slot 1 “Input Module”, and select “Object Properties”.
- Verify that the “Start:” field is set to 256.
- Repeat the same process for the “Output Module” in Slot 2.



Main Window

6) Cycle/Clock Memory Adjustment

- In the Main Window, right click “CPU 315-2 PN/DP” and choose “Object Properties”.
- Then navigate to the “Cycle/Clock Memory” tab.
- Under “Cycle” change the “Scan Cycle Monitoring time [ms]:” to 200
- Change both “Size of the process-image input area” and “Size of the process-image output area” to 512.



- Download the configuration to the PLC. If no bus faults are present, configuration is complete.

5. APPENDIX A: I/O ASSEMBLIES

PROFINET and EtherNet/IP only

Input / Output Range: Offset 0 - 4

*Offset 0 - Write Enable (Write)

Units:	N/A
Minimum:	0
Maximum:	1
Representation:	
0	Output Assembly values not written to controller
1	Output Assembly values written to controller

Note: Writing a '1' to this register to enable the values written to the output assembly registers to be written to the controller. Writing a '0' to this register prevents the values written to the output assembly registers from being written to the controller.

* Offset 0 - Module Communication Status (Read)

Bit	Description for when the bit is set (1), (0) = OK
0	Modbus Error = Controller is responding with error codes
1	Modbus Error = Communication with controller timed out
2	Modbus Error = Cannot communicate with the controller
3 - 7	Reserved (0)
8	Module is currently active with default configuration
9	Module has new configuration that will take effect at reset
10 - 15	Reserved (0)

Offset 2 [SP 100] Fieldbus Setpoint [RAM]

Units:	None (Counts)
Minimum:	0
Maximum:	64000 (See [SP 115] Setpoint Resolution Select)
Default:	0

Offset 4 [SP 129] Digital RUN/Stop [RAM]

Units:	N/A
Minimum:	0
Maximum:	1
Default:	See [XP 3401]
Selections:	
0	STOP
1	RUN

Parameters - Input Range: Offset 6 - 46

Offset 6 [MP 219] AC Line Frequency

Units:	Hz
Minimum:	0.0
Maximum:	99.9

Offset 8 [MP 220] Line Voltage A

Units:	RMS Volts
Minimum:	0.0
Maximum:	999.9

Offset 10 [MP 221] Load Voltage A

Units:	Volts RMS or Average
Minimum:	0.0
Maximum:	999.9

Offset 12 [MP 222] Load Current A

Units:	Amps RMS or Average
Minimum:	0.0
Maximum:	999.9

Offset 14 [MP 224] Heatsink Temp A

Units:	Degrees C
Minimum:	0.0
Maximum:	999.9

Offset 16 [MP 225] Line Voltage B

Units:	RMS Volts
Minimum:	0.0
Maximum:	999.9

Offset 18 [MP 226] Load Voltage B

Units:	Volts RMS or Average
Minimum:	0.0
Maximum:	999.9

Offset 20 [MP 227] Load Current B

Units:	Amps RMS or Average
Minimum:	0.0
Maximum:	9999.9

Offset 22 [MP 230] Line Voltage C

Units:	RMS Volts
Minimum:	0.0
Maximum:	999.9

Offset 24 [MP 231] Load Voltage C

Units:	Volts RMS or Average
Minimum:	0.0
Maximum:	999.9

Offset 26 [MP 232] Load Current C

Units:	Amps RMS or Average
Minimum:	0.0
Maximum:	9999.9

Offset 28 [MP 245] Load Power HI (MSW)

Units:	Watts or VA
Minimum:	0
Maximum:	32767

Offset 30 [MP 246] Load Power LO (LSW)

Units:	Watts or VA
Minimum:	0
Maximum:	65535

Offset 32 [MP 247] Line Power Factor

Units:	N/A
Minimum:	0.0
Maximum:	9.99

Offset 34 [MP 248] Controller State

Units:	N/A
Minimum:	0
Maximum:	3
Representation:	
0	STOP
1	RUN
2	FAULT
3	FAULT RESET

Offset 36 [MP 249] Output Duty Cycle%

Units:	% of Full ON
Minimum:	0.0
Maximum:	999.9

Offset 38 [MP 250] Setpoint Reference HI (MSW)

Units:	V, A, W
Minimum:	-99
Maximum:	99

Offset 40 [MP 251] Setpoint Reference LO (LSW)

Units:	V, A, W
Minimum:	0
Maximum:	65535

Offset 42 [MP 252] Feedback HI (MSW)

Units:	V, A, W
Minimum:	-99
Maximum:	99

Offset 44 [MP 253] Feedback LO (LSW)

Units:	V, A, W
Minimum:	0
Maximum:	65535

Offset 46 [MP 346] Alarms (combined)

Units:	N/A
Minimum:	0000000000000000 = 0
Maximum:	1111111111111111 = 65535 = FFFF _h
Representation:	
Bit	
MSB 15	I/O Power Supply Failure
14	Watchdog Timeout
13	Output % High or Tap Change Up
12	Output % Low or Tap Change Down
11	Line Phase Loss
10	PLL Lock Loss
9	Heatsink Over Temperature
8	Current Trip
7	Deviation
6	Low Output (at MAX output)
5	Load Imbalance
4	Shorted SCR
3	Heatsink Close to Over Temperature
2	Power Limiting
1	Current Limiting
LSB 0	Voltage Limiting