P2 Configuration Guide

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ProTalk – a division of Circa Enterprises Inc.
#220, 550 – 71st Avenue SE
Calgary, Alberta, Canada
T2H 0S6

Phone: (403) 255-9544
Fax: (403) 259-2343
www.barnettprotalk.com
E-mail: sales@barnettprotalk.com

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1. Physical Connections

The B1285-P2 module has a single RS232 connector, a single RS485 connector, and three Ethernet connectors. The Ethernet connectors allow connection onto two separate networks with unique network address and subnet masks.

The PLC NETWORK has two connectors that are bridged together. This allows daisy-chain or ring networks to be configured. When "One Network" is selected in the configuration software a single network cable can be plugged into either the A or B connector of the PLC Network. All communications are available on this network connection:

ModbusTCP
EtherNet/IP
Webserver
Email
PC Link Configuration Software

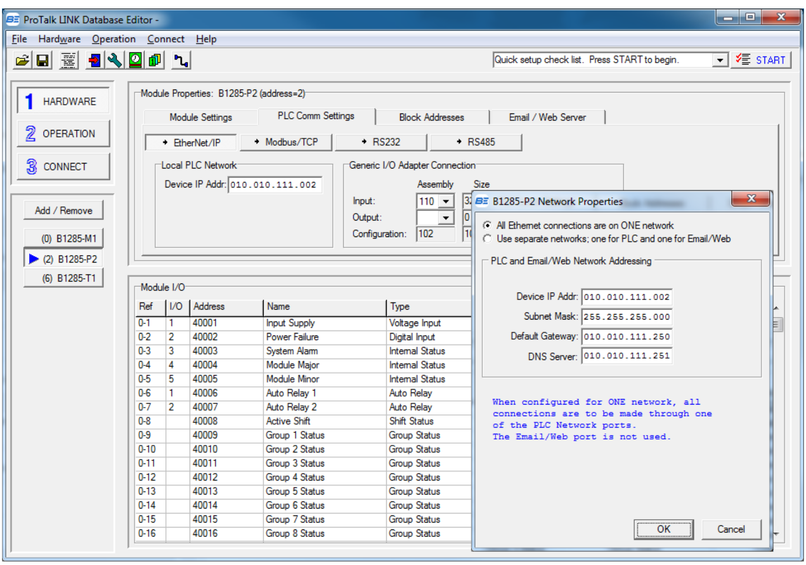

Figure 1-1: Single Ethernet Configuration

The EMAIL/WEB connector is used when "Use separate networks" is selected in the Link Configuration software. Using this configuration, cables from 2 separate networks are connected to the P2 module, one to the Email/Web connector and the other to either the A or B connector of the PLC Network. This setup is typically used when the PLC's are on an isolated internal network and e-mail alarm notifications to an external server are required.

The following are the connections available for each network.

PLC NETWORK:

- Modbus TCP
- EtherNet/IP
- PC Link Configuration Software
- E-mail (if email server on this network specified)
- Web Server (page 35)

EMAIL/WEB:

- PC Link Configuration Software
- E-mail (if external email server specified)
- Web Server (page 35)

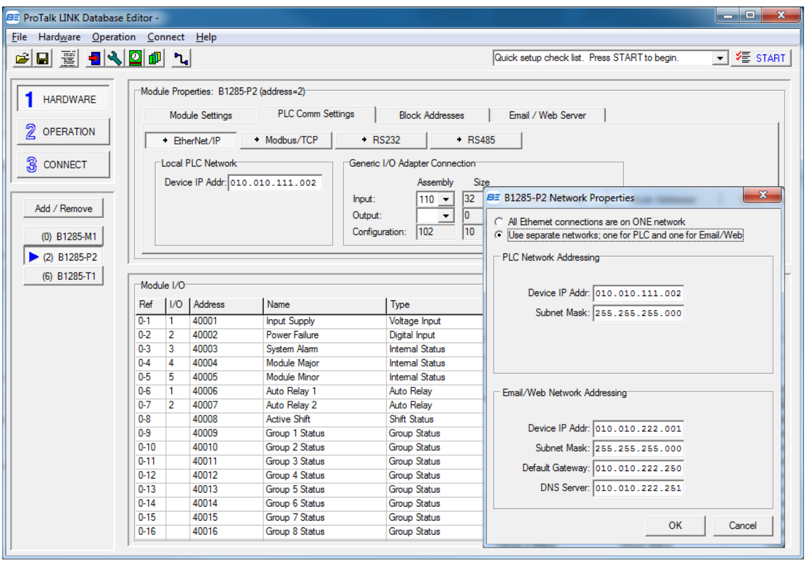

Figure 1-2: Dual Ethernet Configuration

2. Protocol Assignments

The ProTalk Link is a modular system that supports 512 alarm points. These are divided into 32 blocks of 16 points. Each hardware module consumes one block with all the remaining blocks assigned to the P2 module. Each block assigned to the P2 module can be individually configured for connection to a remote PLC using a specified protocol where the default for each block is unassigned.

The P2 module can be configured to run one or several protocols simultaneously connecting to the remote equipment. The combinations are:

RS232:
- Modbus RTU master, or
- Modbus RTU slave, or
- AB DF1 (both PLC5 and SLC500 series devices) – master only

plus RS485:
- Modbus RTU master, or
- Modbus RTU slave, or
- AB DF1 (both PLC5 and SLC500 series devices) – master only

plus Ethernet:
- Modbus TCP/IP master, or
- Modbus TCP/IP slave

plus Ethernet
- EtherNet/IP

with the restriction that the same protocol cannot be run over both the RS232 and RS485 networks.

3. Remote Status and Control Registers - Master

Even when the system is configured to use a protocol where the PLC is a slave unit, there are provisions for the PLC to receive status information as well as write control values. This is useful where it is desired for the PLC to acknowledge alarms, for instance.

To accomplish this, 16 consecutive analog registers must be allocated in the PLC to reflect the 16 alarm points in the M1 module. Then, using the Configuration Software and navigating to the Block Address tab of the P2 module, set Block 0 for the protocol, the remote PLC ID, and the Start Address of this set of registers.

Now, during normal operation, nine points in the M1 module (the Active Shift and Group Statuses 1 through 8) will be written to the PLC beginning at the allocated registers' Start Address + 7 allowing the PLC to monitor the operating state of the Link system.

The address and contents of the status registers, as found in the M1 module, are shown in Table 3-1. These values will be regularly written to the PLC as part of the Link's polling cycle.

Table 3-1: Status registers written to the PLC

Ref	Name	Written to PLC Address	Value written to PLC
0-1	Write Control Register	Start + 0	Only write 0 to clear
0-2		Start + 1	Not written
0-3		Start + 2	Not written
0-4		Start + 3	Not written
0-5		Start + 4	Not written
0-6		Start + 5	Not written
0-7		Start + 6	Not written
0-8	Active Shift	Start + 7	1 to 8
0-9	Group 1 Status	Start + 8	0 to 3 *
0-10	Group 2 Status	Start + 9	0 to 3 *
0-11	Group 3 Status	Start + 10	0 to 3 *
0-12	Group 4 Status	Start + 11	0 to 3 *
0-13	Group 5 Status	Start + 12	0 to 3 *
0-14	Group 6 Status	Start + 13	0 to 3 *
0-15	Group 7 Status	Start + 14	0 to 3 *
0-16	Group 8 Status	Start + 15	0 to 3 *

* Group Status value:

0 = Disabled
1 = Idle
2 = Alarming
3 = Acknowledged

The register located at the Start Address + 0 is used by the PLC to send control signals into the Link system. This register contains a 16-bit number interpreted where the lower 8 bits contain the destination point in the Link alarm memory and the upper 8 bits contain the new value.

- bits 0..7 = point offset, calculated as (block * 16) + point ref offset
- bits 8..15 = new value (0 to 255)

The address and contents of register used by the Link system for control is shown in Table 3-2. This value will be continuously read as part of the polling cycle. If a non-zero value is detected, the Link attempts to execute the control and then re-writes the register to zero indicating completion (whether the request was valid or not).

Table 3-2: Control register read from the PLC

Ref	Name	PLC Address	Read Value
0-1	Write Control Register	Start + 0	Only write 0 to clear

As an example, for the PLC to change the active shift to using Shift 4:

- Current Shift is at Ref 0-8, so offset = (0*16) + 8 = 0x08
- New shift value = 0x04
- Register = Value | offset = 0x 04 | 08 = 0x0408

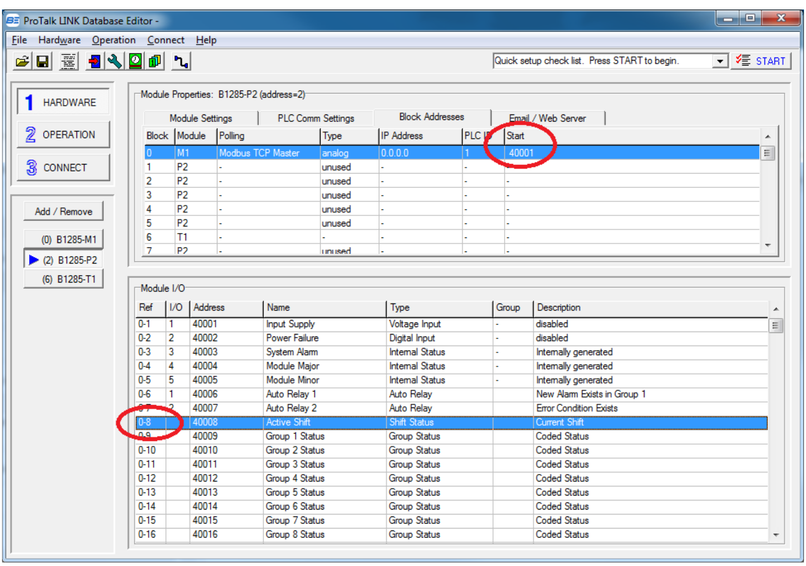

Figure 3-1: Active Shift is at Ref 0-8 and Control Register is Modbus address 40001.

Other points in the ProTalk LINK system can be read or written the same way using the same destination formula. Common examples might be:

- Acknowledge Group 1:

  - Group 1 Status = Ref 0-9, offset 9 (0*16) + 9 = 0x09
  - New value = 3 (acknowledge) (note: this is the only permitted value)
  - Write register value = 0x 03 | 09 = 0x0309
- Turn on Relay 2 of a T1 module found at block position 6:
  - Relay output 104 = Ref 6-10, offset = (6*16) + 10 = 0x6A
  - New value = 1 (on)
  - Write register value = 0x 01 | 6A = 0x016A

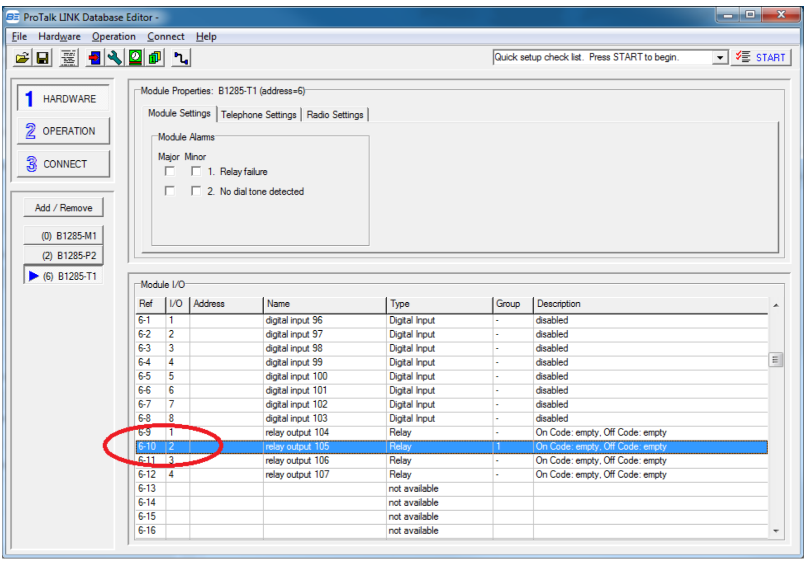

Figure 3-2: Relay 2 is at Ref 6-10

4. Remote Status and Control Registers – Slave/Server

When configured as a Modus TCP slave, Modbus RTU slave, or EtherNet/IP Adapter, the Link presents to the PLC a fixed address for each block.

For Modbus, the block zero registers 40001 to 40016 can all be read by the PLC and registers 40008 to 40016 can be written to change shifts and acknowledge alarms.

The value of the Group Status register can be interpreted as:

- 0 = disabled
- 1 = Idle
- 2 = Alarming
- 3 = Acknowledged (note: this is the only value that can be written)

For example, if you wanted to acknowledge the alarms in group 2, the PLC would write 0x03 to Modbus address 40010.

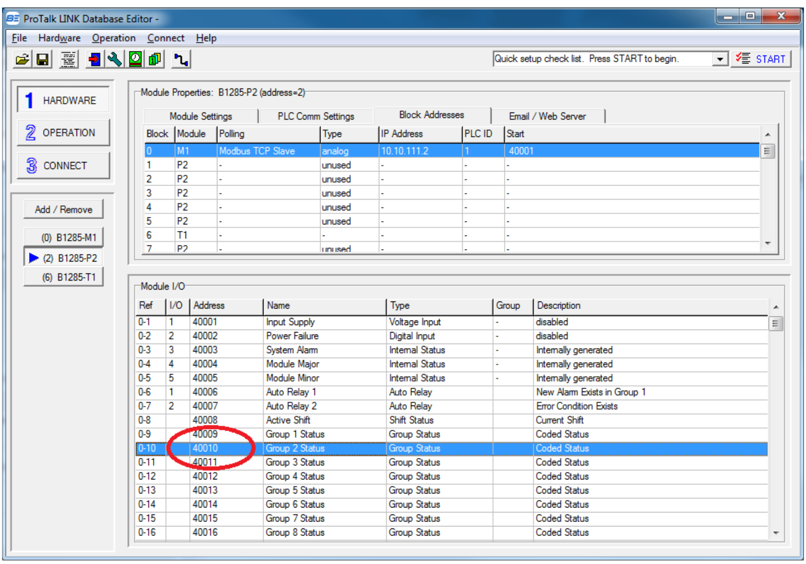

Figure 4-1: Acknowledge Group 2 by writing to Modbus address 40010.

For EtherNet/IP, Assembly 101 or 110 map over Block 0 and the values written to locations data[7] to data[15] will initiate a control operation.

5. Modbus TCP/IP Master

On any Modbus network, queries are initiated by a single master device and responded to by one of possibly many slave devices. The ProTalk Link B1285-P2 module can be configured to be the Modbus master device using an Ethernet network (Modbus TCP/IP) communicating to one or many slave devices.

Protocol	LED	State	Description
TCP Master	TCP	Off	Protocol is not used
		Yellow	Receive an invalid response
		Green	Receive a valid response
		Red	Transmit a query

When the ProTalk Link module is configured as the master device, it regularly reads from remote devices to obtain the data that will be evaluated for alarm conditions. In this configuration, the PLC program does not need to be modified; the ProTalk Link is programmed with the location of the relevant data in the remote slave PLCs.

The ProTalk Link can monitor 512 alarms that are divided into 32 blocks. A few of these blocks will be populated by local I/O in the Link hardware. The remainder are available to create alarms from the memory contents of remote PLCs.

The alarm data can be read as a discrete value where the value dictates alarming or not, or the data can be read as an integer value. The ProTalk Link compares the integer against programmed setpoints and generates alarm conditions if the value is considered too high or too low.

A hybrid type (bit array) makes all 16 points in the block Input Bit types but communicates with the PLC using a register message. The 16-bit register value is in bit-packed format where the least significant bit maps to the first alarm in the block.

As a master device, the B1285-P2 polls remote devices using the following rules:

- One poll for each block with enabled alarms
- The poll length is calculated from the starting address of the block to the highest enabled alarm in the block
- TCP sockets are opened as needed and remain open
- TCP sockets are closed on no-response or an exception response
- the Poll Interval is the time from a valid response to the start of a new query

The following example illustrates polling for Modbus Coil type alarms. Here, the B1285-P2 will poll for 5 bits starting at address 00033. (start address of block to highest enabled alarm)

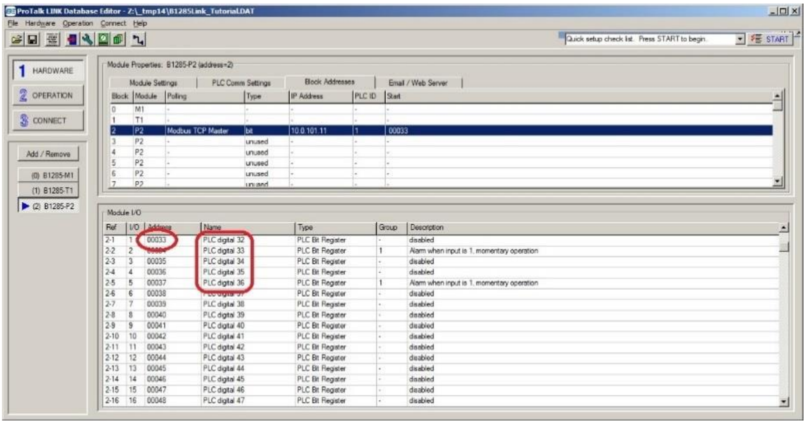

Figure 5-1: Modbus TCP Master polls for 5 coils

6. Modbus TCP/IP Slave

On any Modbus network, queries are initiated by a single master device and responded to by one of possibly many slave devices. The ProTalk Link P2 module can be configured to be one of the Modbus slave devices using an Ethernet network (Modbus TCP/IP). This protocol can be assigned on individual blocks

Protocol	LED	State	Description
TCP Slave	TCP	Off	Protocol is not used
		Yellow	Transmit an exception response
		Green	Transmit a valid response
		Red	After 1 second of inactivity

When the B1285-P2 module is configured as a slave device, it is expected to receive Modbus write commands from a remote master that contains the alarm data. In this configuration, the remote PLC must be programmed to write alarm information on regular intervals or when a condition changes.

The ProTalk Link can monitor 512 alarms, divided into 32 blocks. A few of these blocks will be populated by local I/O in the Link hardware. The remainder are available to create alarms from the memory contents of remote PLCs.

The alarm data can be written as a discrete value (bit) where the value dictates alarming or not, or the data can be written as an integer value (analog). The ProTalk Link compares the integer against programmed setpoints and generates alarm conditions if the value is considered too high or too low.

A hybrid type (bit array) makes all 16 points in the block Input Bit types but communicates with the PLC using a register message. The 16-bit register value is in bit-packed format where the least significant bit maps to the first alarm in the block.
An alternate set of register addresses can be selected when assigning the block as a bit array. This allows multiple blocks to be accessed sequentially.

Where the B1285-P2 module is configured as a slave device, a block of alarms that is mapped to local I/O can be read or written to by a remote PLC. The hardwired inputs on a Link module (T1, W2, W3, D1, A1 modules) can be read by accessing the assigned memory location but cannot be written to. The hardwired outputs on a Link module, however, can be read or written to through the assigned memory location. Outputs are defined as the relays on T1, W2, or W3 modules and as the upper 9 locations on the M1 module (block 0) consisting of the Current Shift and the Group Statuses.

As a slave device, the B1285-P2 receives messages from remote devices:

- The following commands are supported:
  - READ_COILS
  - READ_HOLDING_REGISTERS
  - WRITE_SINGLE_REGISTER
  - WRITE_MULTIPLE_REGISTERS
  - WRITE_AND_READ_REGISTERS
  - WRITE_SINGLE_COIL
  - WRITE_MULTIPLE_COILS
- disabled alarms are still considered allocated memory
- Contiguous blocks can be read or written with a single read or write command
- exception responses are returned for invalid memory addresses and commands
- two TCP sockets are available for connection with remote devices

Bit Array blocks use a single register to represent 16 digital alarms. The default slave addressing places these registers 16 addresses apart. Multiple contiguous bit array blocks would require a separate Modbus poll for each block.

A duplicate set of contiguous registers is provided allowing a single read or write operation to span multiple bit array blocks. The duplicate registers can optionally be displayed as shown below.

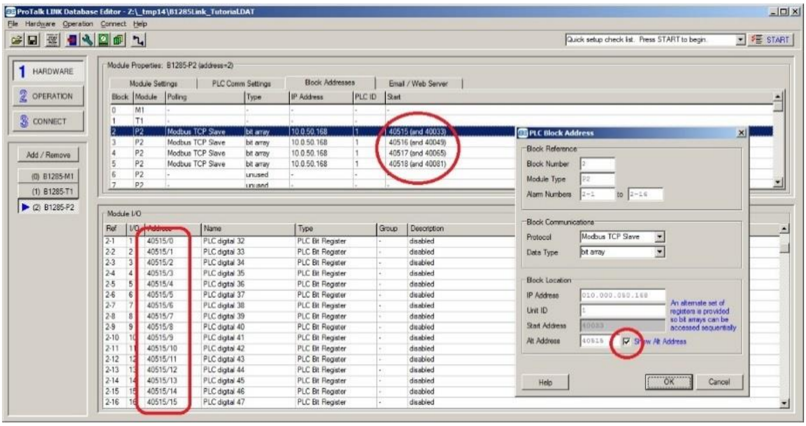

Figure 6-1: Modbus TCP Slave Bit Arrays have an alternate address.

7. Modbus RTU Master

On any Modbus network, queries are initiated by a single master device and responded to by one of possibly many slave devices. The ProTalk Link B1285-P2 module can be configured as a Modbus master device on an RS232 or RS485 network (Modbus RTU).

Protocol	LED	State	Description
RTU Master	RS232 or RS485	Off	Protocol is not used
		Yellow	Receive an invalid response
		Green	Receive a valid response
		Red	Transmit a query

When the ProTalk Link module is configured as the master device, it regularly reads from remote devices to obtain the data that will be evaluated for alarm conditions. In this configuration, the PLC program does not need to be modified; the ProTalk Link is programmed with the location of the relevant data in the remote slave PLCs.

The ProTalk Link can monitor 512 alarms that are divided into 32 blocks. A few of these blocks will be populated by local I/O in the Link hardware. The remainder are available to create alarms from the memory contents of remote PLCs.

The alarm data can be read as a discrete value where the value dictates alarming or not, or the data can be read as an integer value where the ProTalk Link compares it against programmed setpoints and generates alarm conditions if the value is considered too high or too low.

A hybrid type (bit array) makes all 16 points in the block Input Bit types but communicates with the PLC using a register message. The 16-bit register value is in bit-packed format where the least significant bit maps to the first alarm in the block.

As a master device, the B1285-P2 polls remote devices using the following rules:

- 1 poll for each block with enabled alarms
- The poll length is calculated from the starting address of the block to the highest enabled alarm in the block
- the Poll Interval is the time from a valid response to the start of a new query
- hardware handshaking is not used

The following example illustrates polling for Modbus Register type alarms. Here, the B1285-P2 module will poll for 5 registers starting at address 40033 (start address of block to highest enabled alarm).

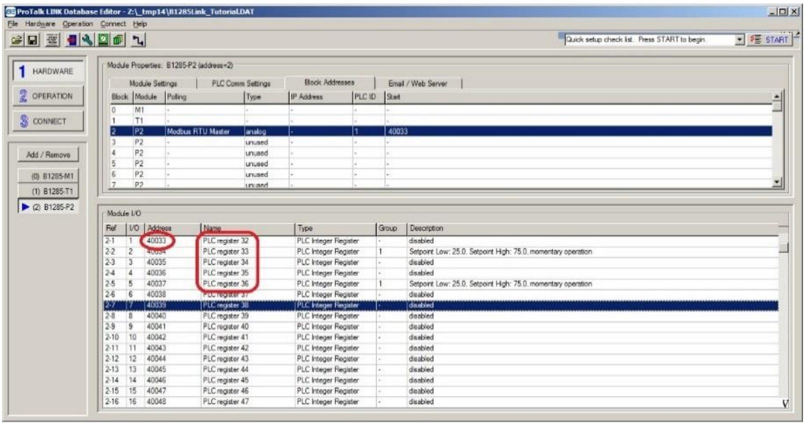

Figure7-1: Modbus RTU Master polls for 5 coils

The Modbus RTU Master protocol can be setup to run on either the RS232 or RS485 interface.

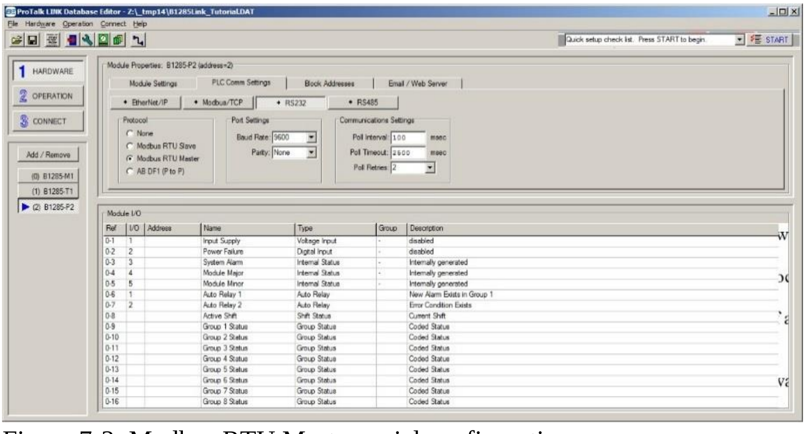

Figure 7-2: Modbus RTU Master serial configuration screen

8. Modbus RTU Slave

On any Modbus network, queries are initiated by a single master device and responded to by one of possibly many slave devices. The ProTalk Link P2 module can be configured to be either the master or one of the slaves on a network.

Protocol	LED	State	Description
RTU Slave	RS232 or RS485	Off	Protocol is not used
		Yellow	Transmit an exception response
		Green	Transmit a valid response
		Red	After 1 second of inactivity

When the B1285-P2 module is configured as a slave device, it is expected to receive Modbus write commands from a remote master that contains the alarm data. In this configuration, the remote PLC must be programmed to write alarm information on regular intervals or when a condition changes.

The ProTalk Link can monitor 512 alarms, divided into 32 blocks. A few of these blocks will be populated by local I/O in the Link hardware. The remainder are available to create alarms from the memory contents of remote PLCs.

The alarm data can be written as a discrete value (bit) where the value dictates alarming or not, or the data can be written as an integer value (analog) where the ProTalk Link compares it against programmed setpoints and generates alarm conditions if the value is considered too high or too low.

A hybrid type (bit array) makes all 16 points in the block Input Bit types but communicates with the plc using a register message. The 16-bit register value is in bit packed format where the least significant bit maps to the first alarm in the block.
An alternate set of registers can be selected when assigning the block as a bit array.
This allows multiple blocks to be accessed sequentially.

Where the B1285-P2 module is configured as a slave device, a block of alarms that is mapped to local I/O can be read or written to by a remote PLC. The hardwired inputs on a Link module (T1, W2, W3, D1, A1 modules) can be read by accessing the assigned memory location but cannot be written to. The outputs on a Link module can be read or written to by accessing the assigned memory location. Outputs are defined as the relays on T1, W2, or W3 modules and as the upper 9 locations on the M1 module (block 0) consisting of the Current Shift and the Group Statuses.

As a slave device, the B1285-P2 receives messages from remote devices:

- The following commands are supported:
    - READ_COILS
    - READ_HOLDING_REGISTERS
    - WRITE_SINGLE_REGISTER
    - WRITE_MULTIPLE_REGISTERS
    - WRITE_AND_READ_REGISTERS
    - WRITE_SINGLE_COIL
    - WRITE_MULTIPLE_COILS
- disabled alarms are still considered allocated memory
- Contiguous blocks can be read or written with a single read or write command
- exception responses are returned for invalid memory addresses and commands

Bit Array blocks use a single register to represent 16 digital alarms. The default slave addressing places these registers 16 addresses apart. Multiple contiguous bit array blocks would require a separate Modbus poll for each block.

A duplicate set of contiguous registers is provided allowing a single read or write operation to span multiple bit array blocks. The duplicate registers can optionally be displayed as shown below.

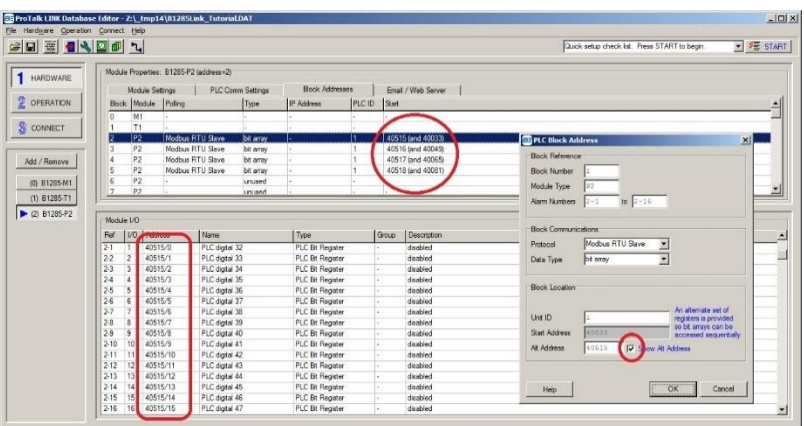

Figure 8-1: Modbus RTU Slave Bit Arrays have an alternate address.

The Modbus RTU Slave protocol can be setup to run on either the RS232 or RS485 interface. The Unit ID is the address assigned to the Link when operating as a slave.

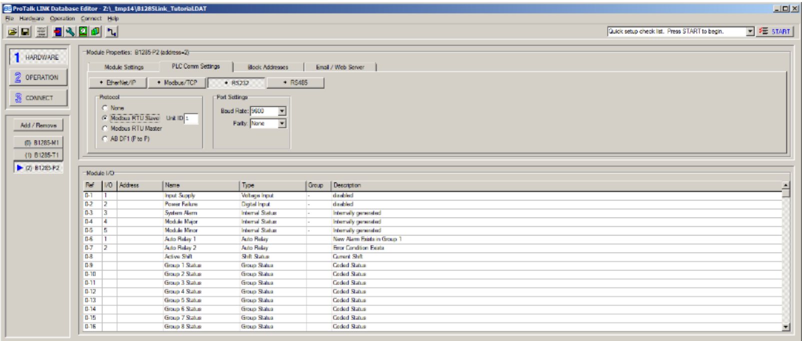

Figure 8-2: Modbus RTU Slave serial configuration screen

9. AB-DF1 – Full-duplex Master to PLC5 or SLC500 devices

When connecting with an Allen-Bradley PLC over an RS232 or RS485 network, the ProTalk Link B1285-P2 module can be used as a DF1 full duplex master device. In this configuration, the ProTalk Link connects point-to-point and will regularly read data from remote PLC5 or SLC500 series PLCs to obtain the alarm data. The PLC5 and SLC500 series PLCs use slightly different commands, so the type of device must be specified at the same time as the address of the remote data.

Protocol	LED	State	Description
DF1 Master	RS232 or RS485	Off	Protocol is not used
		Yellow	Receive an invalid response
		Green	Receive a valid response
		Red	Transmit a query

When the ProTalk Link module is configured as the master device, it regularly reads from remote devices to obtain the data that will be evaluated for alarm conditions. In this configuration, the PLC program does not need to be modified; the ProTalk Link is programmed with the location of the relevant data in the remote slave PLCs.

The ProTalk Link can monitor 512 alarms that are divided into 32 blocks. A few of these will be populated by local I/O in the Link hardware. The remainder are available to create alarms from the memory contents of remote PLCs.

The alarm data can be read as a discrete value where the value dictates alarming or not, or the data can be read as an integer value where the ProTalk Link compares it against programmed setpoints and generates alarm conditions if the value is considered too high or too low.

A hybrid type (bit array) makes all 16 points in the block Input Bit types but communicates with the PLC using a 16-bit Integer register message. The 16bit register value is in bit-packed format where the least significant bit maps to the first alarm in the block.

As a master device, the B1285-P2 polls remote devices using the following rules:

- 1 poll for each block with enabled alarms
- The poll length is calculated from the starting address of the block to the highest enabled alarm in the block
- the Poll Interval is the time from a valid response to the start of a new query.
- the Poll Timeout is the length of time the P2 will wait for a response.

- the Poll Retries is the number of times the poll query or write command will be reissued.

The following example illustrates AB DF1 register type alarms for a PLC5. Note that even though only 2 alarms are enabled the poll length will be 5. (start address of block to highest enabled alarm)

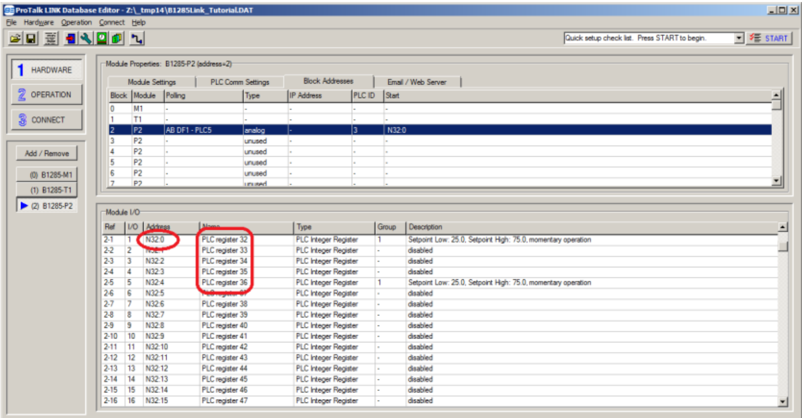

Figure 9-1: AB DF1 polls for 5 bit alarms

The Allen Bradley DF1 protocol can be setup to run on either the RS232 or RS485 interface. The Node Num is the Node Address assigned to the Link system.

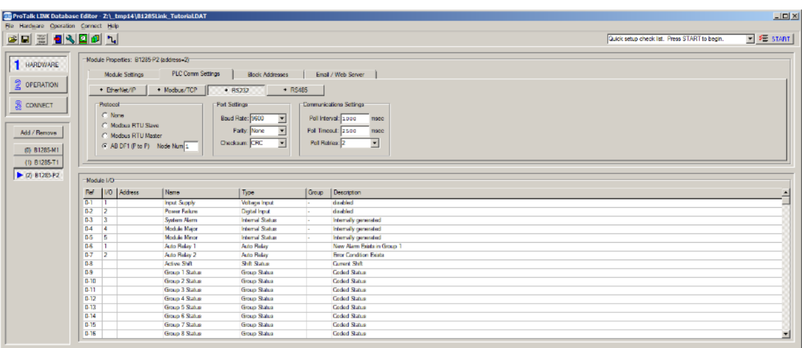

Figure 9-2: AB DF1 serial configuration screen

10. EtherNet/IP – Remote I/O Adapter

When connecting to a device that communicates using CIP over EtherNet, the ProTalk Link B1285-P2 module can be treated as a Generic EtherNet Module where it functions as a Remote I/O Adapter. In this configuration, the ProTalk Link acts as a server that receives data from remote devices to indicate the alarm conditions.

Protocol	LED	State	Description
EtherNet/IP	CIP	Off	Protocol is not used
		Green	Transmit Input Assembly contents
		Green	Receive changed Output Assembly contents
		Red	After 1 second of inactivity

The B1285-P2 module contains several Output Assemblies for use in different applications. By knowing how many alarms are desired in the system, the minimum sized Output Assembly can be used; any unused Assemblies will be ignored. This offers the flexibility of having multiple devices connect to separate Output Assemblies on this module.

The alarm data can be written as a discrete value where the value dictates alarming or not, or the data can be written as an integer value where the ProTalk Link compares it against programmed setpoints and generates alarm conditions if the value is considered too high or too low.

A list of all available assemblies is found in Table 10-1 thru 10-4.

Along with writing data to the B1285-P2, important status data can also be read from this module. When setting up an EtherNet/IP connection, the required Input Assembly will be the block of integers that contains the data found in Block 0 (mapped to the B1285-M1 module) of the available alarms. A description of these integers is found in Table 10-5 and Table 10-6.

Table 10-1: Assemblies available on the B1285-P2 module

Assembly	Size (word=16 bits)	Function	Description
101	16 words	Input	Read Block 0 information
102	10 bytes	Configuration	reads all 0's
103	0	Heartbeat Input	not used
104	0	Heartbeat Output	not used
105	32 bytes	Explicit Messaging	not used
110	32 words	Input	Assy 101 + seconds clock
201-216	various	Output Integer	N blocks of analog alarms
301-316	various	Output Bit	N blocks of discrete alarms
401-402	dynamic	Control + Output	control plus alarm data

Table 10-2: Output Integer Assemblies

Assembly	Size (word=16 bits)	Function	Description
201	16 words	Output Integer	1 block of analog alarms
202	16 words	Output Integer	1 block of analog alarms
203	16 words	Output Integer	1 block of analog alarms
204	16 words	Output Integer	1 block of analog alarms
205	32 words	Output Integer	2 blocks of analog alarms
206	32 words	Output Integer	2 blocks of analog alarms
207	32 words	Output Integer	2 blocks of analog alarms
208	32 words	Output Integer	2 blocks of analog alarms
209	64 words	Output Integer	4 blocks of analog alarms
210	64 words	Output Integer	4 blocks of analog alarms

211	128 words	Output Integer	8 blocks of analog alarms
212	128 words	Output Integer	8 blocks of analog alarms
213	192 words	Output Integer	12 blocks of analog alarms
214	192 words	Output Integer	12 blocks of analog alarms
215	240 words	Output Integer	15 blocks of analog alarms
216	240 words	Output Integer	15 blocks of analog alarms

Table 10-3: Output Bit Assemblies

Assembly	Size (word=16 bits)	Function	Description
301	16 bits	Output Bit	1 block of discrete alarms
302	16 bits	Output Bit	1 block of discrete alarms
303	16 bits	Output Bit	1 block of discrete alarms
304	16 bits	Output Bit	1 block of discrete alarms
305	32 bits	Output Bit	2 blocks of discrete alarms
306	32 bits	Output Bit	2 blocks of discrete alarms
307	32 bits	Output Bit	2 blocks of discrete alarms
308	32 bits	Output Bit	2 blocks of discrete alarms
309	64 bits	Output Bit	4 blocks of discrete alarms
310	64 bits	Output Bit	4 blocks of discrete alarms
311	128 bits	Output Bit	8 blocks of discrete alarms
312	128 bits	Output Bit	8 blocks of discrete alarms
313	192 bits	Output Bit	12 blocks of discrete alarms
314	192 bits	Output Bit	12 blocks of discrete alarms

315	256 bits	Output Bit	16 blocks of discrete alarms
316	512 bits	Output Bit	32 blocks of discrete alarms

Table 10-4: Output Assemblies with Control

Assembly	Size (word=16 bits)	Function	Description
401	dynamic	control plus Output Bits	write control integers for block 0 registers plus write discrete alarms
402	dynamic	control plus Output Bits or Integers	write control integers for block 0 registers plus write discrete or analog alarms

Table 10-5: Assembly 101 Contents

Word (16 bit)	Name	Value
data[0]	Input Supply Voltage	0 (0.0V) to 4095 (30.0V)
data[1]	Power Fail Alarm	0 (idle), 1 (alarm)
data[2]	System Alarm	0 (idle)
data[2].0	Vocabulary	0x01 (memory fail)
data[2].1	Database	0x02 (memory fail)
data[2].2	User voice	0x04 (memory fail)
data[2].3	Clock	0x08 (memory fail)
data[2].4	Expander	0x10 (fail)
data[3]	Major Alarm	0 (idle), 1 (alarm)
data[4]	Minor Alarm	0 (idle), 1 (alarm)
data[5]	Auto Relay 1	0 (off), 1 (on)
data[6]	Auto Relay 2	0 (off), 1 (on)
data[7]	Active Shift	1 to 8
data[8]	Group 1 Status	0 (disabled), 1 (idle), 2 (alarming), 3 (acked)
data[9]	Group 2 Status	0 (disabled), 1 (idle), 2 (alarming), 3 (acked)
data[10]	Group 3 Status	0 (disabled), 1 (idle), 2 (alarming), 3 (acked)
data[11]	Group 4 Status	0 (disabled), 1 (idle), 2 (alarming), 3 (acked)
data[12]	Group 5 Status	0 (disabled), 1 (idle), 2 (alarming), 3 (acked)

data[13]	Group 6 Status	0 (disabled), 1 (idle), 2 (alarming), 3 (acked)
data[14]	Group 7 Status	0 (disabled), 1 (idle), 2 (alarming), 3 (acked)
data[15]	Group 8 Status	0 (disabled), 1 (idle), 2 (alarming), 3 (acked)

Table 10-6: Assembly 110 Contents

Word (16 bit)	Name	Value
data[0]	Input Supply Voltage	0 (0.0V) to 4095 (30.0V)
data[1]	Power Fail Alarm	0 (idle), 1 (alarm)
data[2]	System Alarm	0 (idle)
data[2].0	Vocabulary	0x01 (memory fail)
data[2].1	Database	0x02 (memory fail)
data[2].2	User voice	0x04 (memory fail)
data[2].3	Clock	0x08 (memory fail)
data[2].4	Expander	0x10 (fail)
data[3]	Major Alarm	0 (idle), 1 (alarm)
data[4]	Minor Alarm	0 (idle), 1 (alarm)
data[5]	Auto Relay 1	0 (off), 1 (on)
data[6]	Auto Relay 2	0 (off), 1 (on)
data[7]	Active Shift	1 to 8
data[8]	Group 1 Status	0 (disabled), 1 (idle), 2 (alarming), 3 (acked)
data[9]	Group 2 Status	0 (disabled), 1 (idle), 2 (alarming), 3 (acked)
data[10]	Group 3 Status	0 (disabled), 1 (idle), 2 (alarming), 3 (acked)
data[11]	Group 4 Status	0 (disabled), 1 (idle), 2 (alarming), 3 (acked)
data[12]	Group 5 Status	0 (disabled), 1 (idle), 2 (alarming), 3 (acked)
data[13]	Group 6 Status	0 (disabled), 1 (idle), 2 (alarming), 3 (acked)
data[14]	Group 7 Status	0 (disabled), 1 (idle), 2 (alarming), 3 (acked)
data[15]	Group 8 Status	0 (disabled), 1 (idle), 2 (alarming), 3 (acked)
data[16]	Clock Seconds	value increments each second
data[17]	reserved	not defined
data[18]	reserved	not defined
data[19]	reserved	not defined
data[20]	reserved	not defined

data[21]	reserved	not defined
data[22]	reserved	not defined
data[23]	reserved	not defined
data[24]	reserved	not defined
data[25]	reserved	not defined
data[26]	reserved	not defined
data[27]	reserved	not defined
data[28]	reserved	not defined
data[29]	reserved	not defined
data[30]	reserved	not defined
data[30]	reserved	not defined

Table 10-6: Contents of Assembly 401/402 (first 16 words)

Word (16 bit)	Name	Value
data[0]	Input Supply Voltage	unused
data[1]	Power Fail Alarm	unused
data[2]	System Alarm	unused
data[3]	Major Alarm	unused
data[4]	Minor Alarm	unused
data[5]	Auto Relay 1	unused
data[6]	Auto Relay 2	unused
data[7]	Active Shift	0 (no change), 1 to 8
data[8]	Group 1 Status	0 (no change), 3 (acknowledge alarms)
data[9]	Group 2 Status	0 (no change), 3 (acknowledge alarms)
data[10]	Group 3 Status	0 (no change), 3 (acknowledge alarms)
data[11]	Group 4 Status	0 (no change), 3 (acknowledge alarms)
data[12]	Group 5 Status	0 (no change), 3 (acknowledge alarms)
data[13]	Group 6 Status	0 (no change), 3 (acknowledge alarms)
data[14]	Group 7 Status	0 (no change), 3 (acknowledge alarms)
data[15]	Group 8 Status	0 (no change), 3 (acknowledge alarms)

11. Configurating a Link for EtherNet/IP

The B1285-P2 has several features that make it quite flexible. Even for a basic EtherNet/IP setup, a few key steps are required to create a working database.

The minimum setup requires:

1. Configure the list of modules in this Link system to include a B1285-P2 module.
    a. In the Hardware Menu select Add/Remove.
    b. Choose a Module Address and set the Module Type to be B1285-P2.

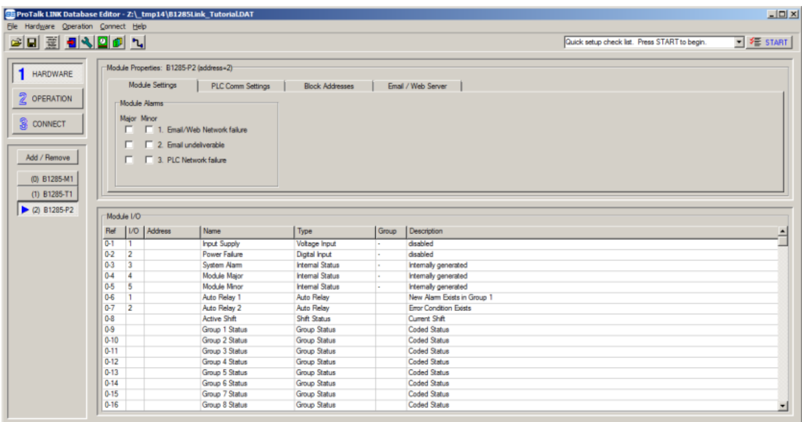

Figure 11-1: EtherNet/IP setup – Add a B1285-P2 module

2. Configure the IP Address of this unit on your network.
    a. In the Module Properties area of the screen, select then PLC Comm Settings and EtherNet/IP tabs.
    b. In the Local PLC Network section click on the Device IP Addr box. A Network Properties box will appear.
    c. Enter at least an IP Address and Subnet Mask for this device on the network.

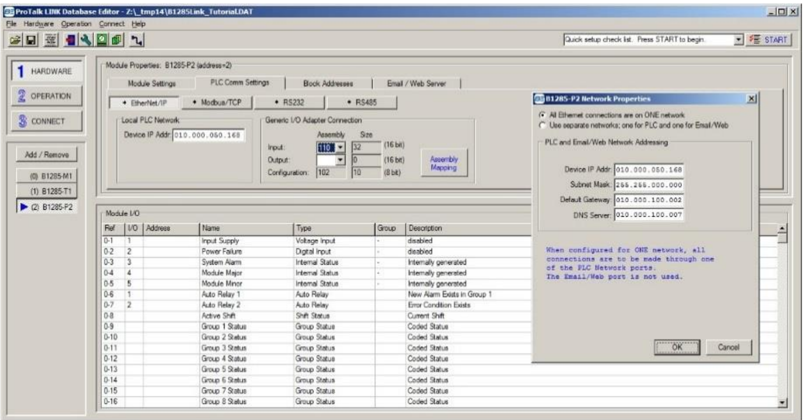

Figure 11-2: EtherNet/IP setup – Configure the IP address

Configure the mapping of the starting block of alarms.

d. Select the Block Addresses tab.

e. Double click a line to open a PLC Block Address configuration window. Blocks starting at this line will be mapped to an assembly.

f. In the Block Communications area of the new window, change the Protocol to use "EtherNet/IP Adapter".

g. The default Data Type should show "bit". If not, change it.

h. In the Block Location section, the IP Address should reflect the address entered in the previous step.

i. In the Assembly control, choose an assembly that is sufficiently large for your system. Choosing an assembly that is larger than you need will not cause problems but will result in unused data being transferred.

j. The data offset for this block defaults to 0, the beginning of the assembly.

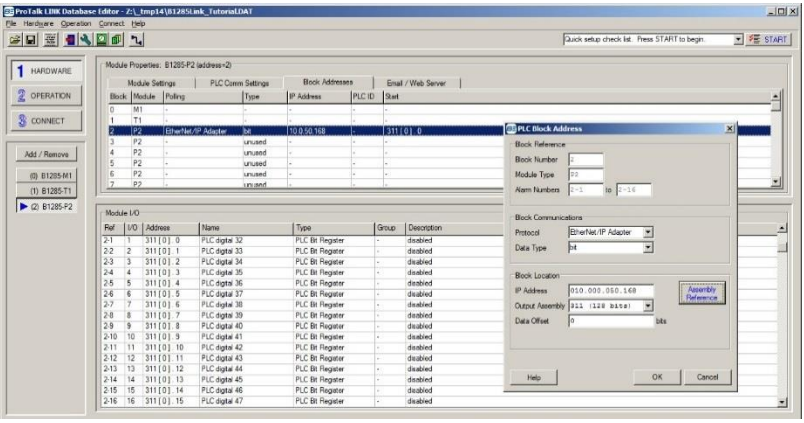

Figure 11-3: EtherNet/IP setup – Selecting an assembly to use

3. Configure the mapping of subsequent blocks.
    a. Double click the line showing the next block of alarms.
    b. In the configuration window that pops up, select the Protocol to be "EtherNet/IP".
    c. The software should 'assume' you are continuing from the previous block and fill in the Assembly number and Data Offset automatically.
    d. Continue until you have enough alarm points mapped or until the size of the assembly has been reached.

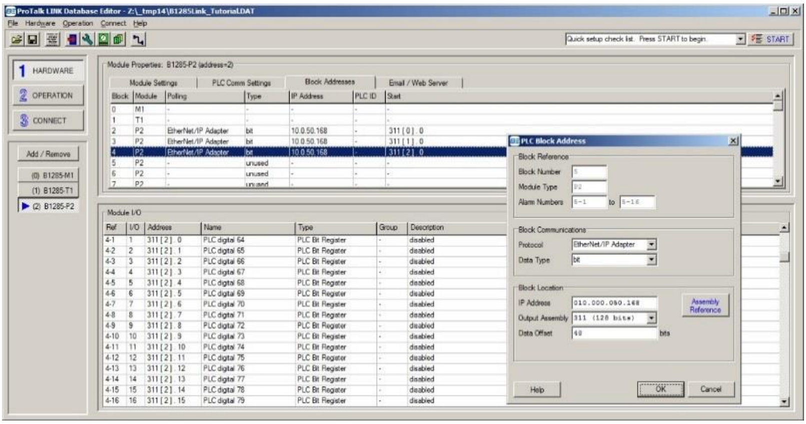

Figure 11-4: EtherNet/IP setup – Adding subsequent blocks to the same assembly

4. Programming the PLC.
   a. Refer to the Assembly Map or EtherNet/IP Connection Settings screen to verify the assembly instance numbers and size for configuring the PLC.

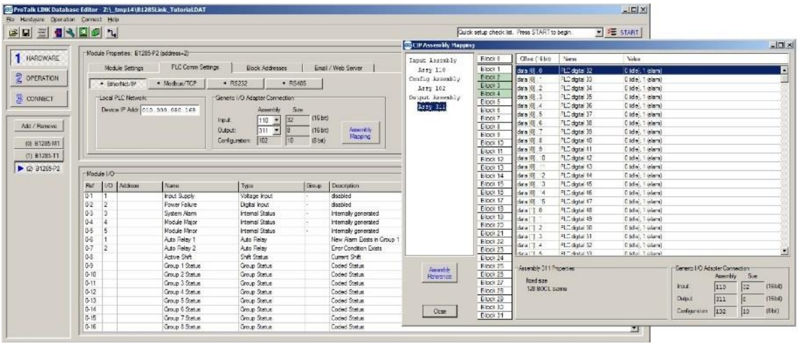

Figure 11-5: EtherNet/IP setup – View Assembly details to program the PLC

12. EtherNet/IP Example 1

The following example sets up an assembly with 32 discrete alarms and allows the PLC to acknowledge alarms and change shifts.

Referring to Table 10-4, either assembly 401 or 402 can be used to transfer both control information and alarm data. Assembly 401 is for discrete (digital) alarms only. Assembly 402 can have a mix of both digital and analog alarms. For this example, we will use assembly 401.

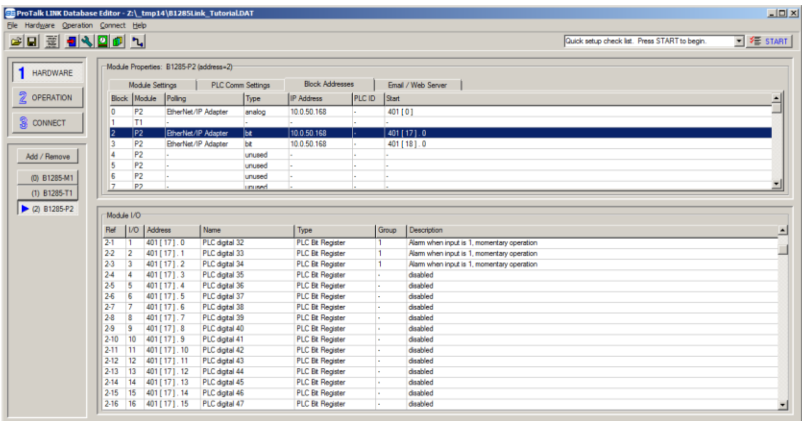

Figure 12-1: EtherNet/IP Example 1 – Choosing Assembly 401

Assembly 401 is the output assembly. Data written by the PLC to this assembly can be used to change shifts, acknowledge or trip alarms.

The first 16 16-bit words starting at offset zero are mapped to M1 module (block 0). The PLC can change the shift by writing the new shift number to the word at offset 7. To acknowledge an alarm in group 3, the PLC would write the value 3 (acknowledge) to the word at offset 10.

The 17th word "data[16]" maps to the T1 module and is unused. Data written to this location will be ignored.

The 18th and 19th words are expanded into bits with the LSB of each word mapping to the first alarm in the corresponding block.

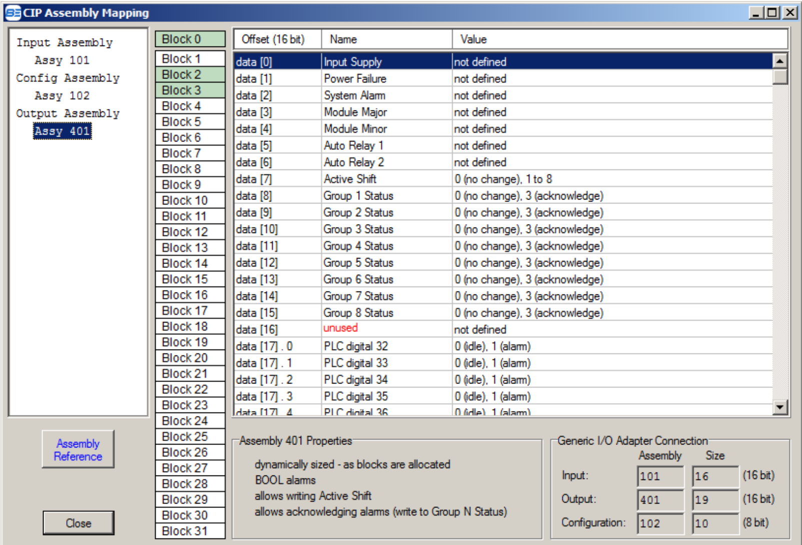

Figure 12-2: EtherNet/IP Example 1 –Assembly 401 mapping

The Input Assembly 101 is read by the PLC and allows the PLC to monitor the status of the Link system.

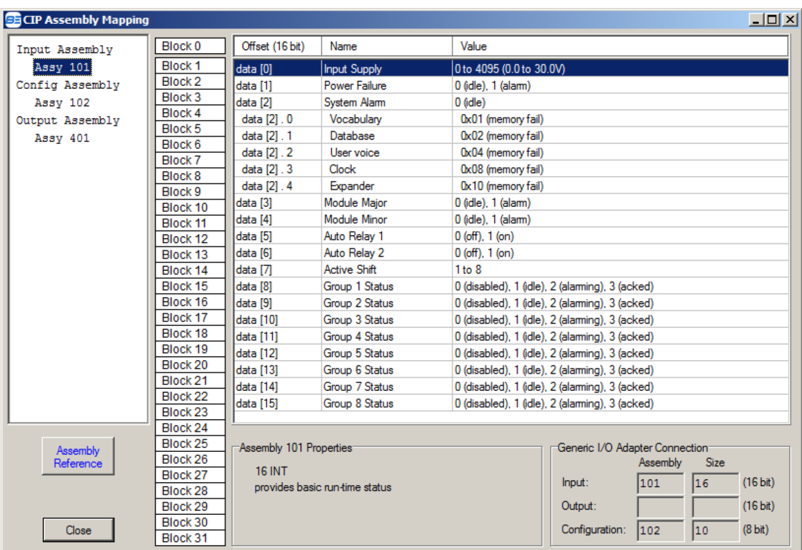

Figure 12-3: EtherNet/IP Example 1 – Assembly 101 mapping

Optionally Input Assembly 110 can be chosen. This assembly adds another 16 registers that get read by the PLC. The 17th word "data[16] contains a value that gets incremented every 1 second by the Link system.

The PLC can watch this value to verify that the Link system is still operational.

The remaining 15 words of Assembly 110 are reserved and unused.

Once the alarm configuration is complete the assembly size is calculated and displayed in Hardware -> B1285P2 -> PLC Comm Settings. These numbers are needed in RSLogix so that the PLC and Link both agree on the size of the assembly data block that gets transferred.

Click on the "Assembly Mapping" button to see the detailed assembly map.

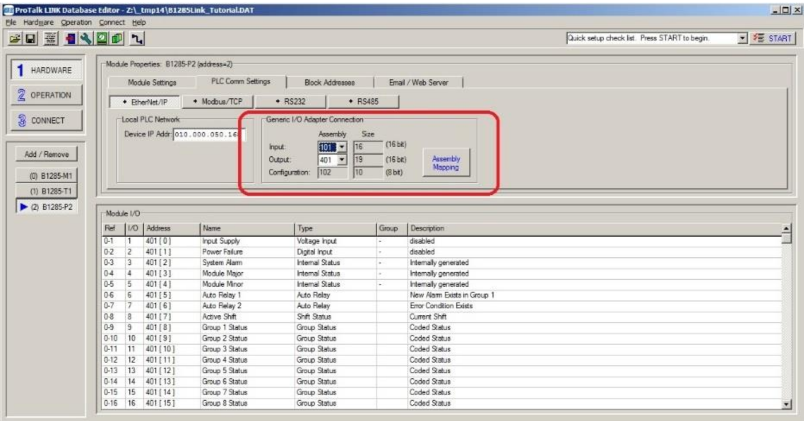

Figure 12-4: EtherNet/IP Example 1 – Adapter size

13. EtherNet/IP Example 2

This example uses assembly 311 to set up 128 discrete alarms.

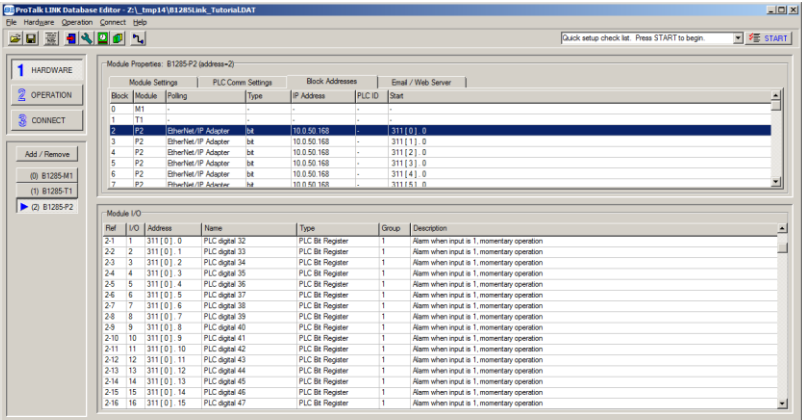

Figure 13-1: EtherNet/IP Example 2 – Assign Assembly 311 to blocks 2 thru 9

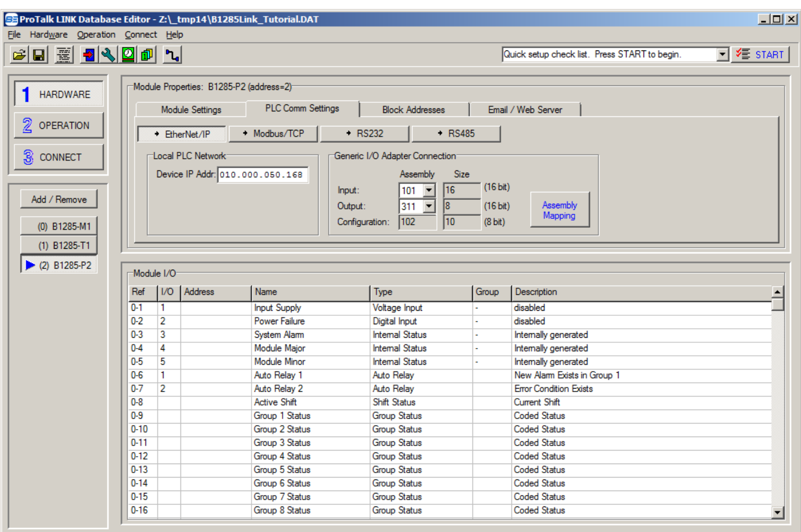

Figure 13-2: EtherNet/IP Example 2 – Noting the Adapters used and their sizes

14. EtherNet/IP PLC Configuration

The following series of RSLogix 5000 screenshots shows a representative PLC configuration for connection to the B1285-P2.

Note: Firmware for Rockwell controllers must be a minimum of Rev 18 to show the "Use Unicast Connection over EtherNet/IP" option. Older firmware may indicate error code 16#0203.

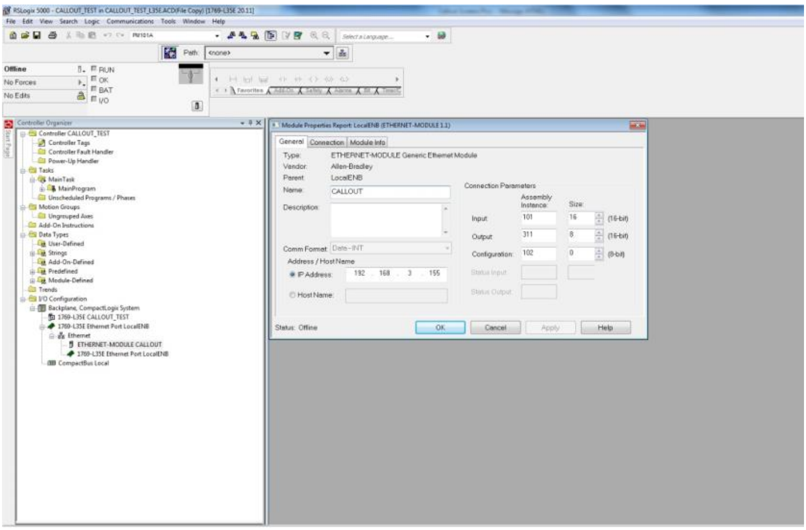

Figure 14-1: RSLogix Screenshot 1

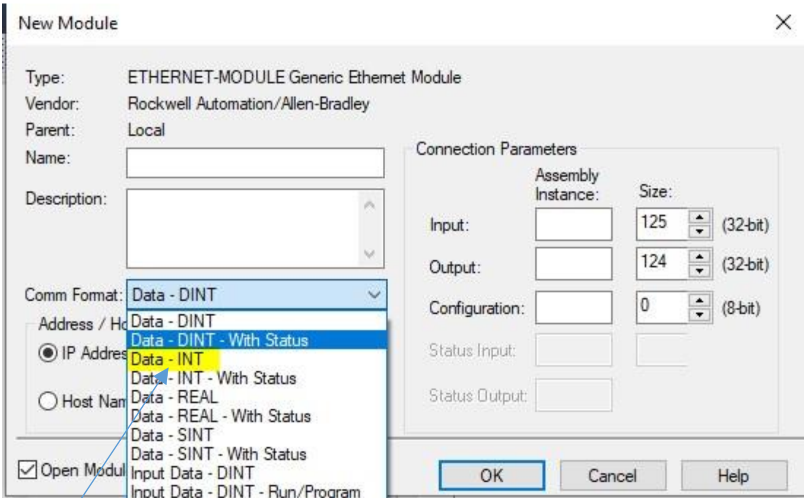

Figure 14-1: RSLogix Screenshot 2

Make sure to select 16bit Int

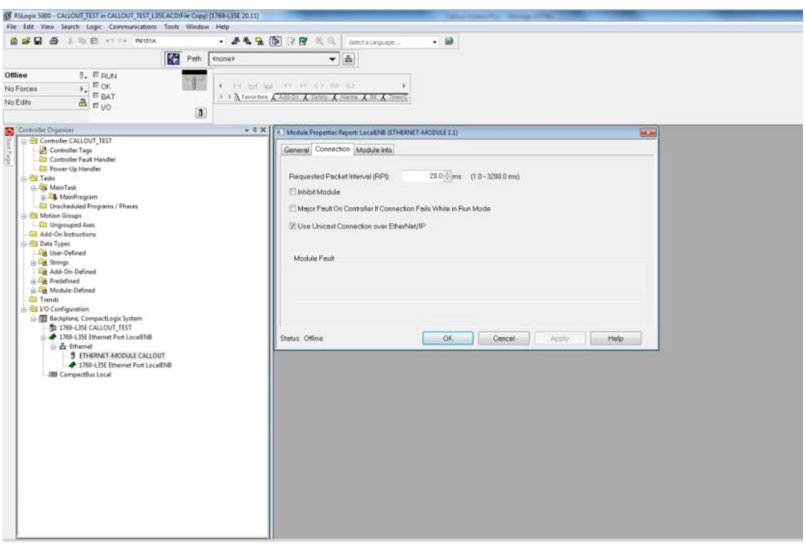

Figure 14-2: RSLogix Screenshot 3

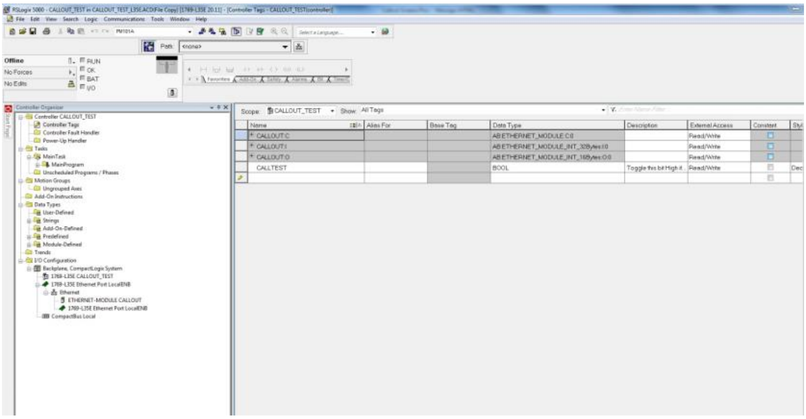

Figure 14-3: RSLogix Screenshot 4

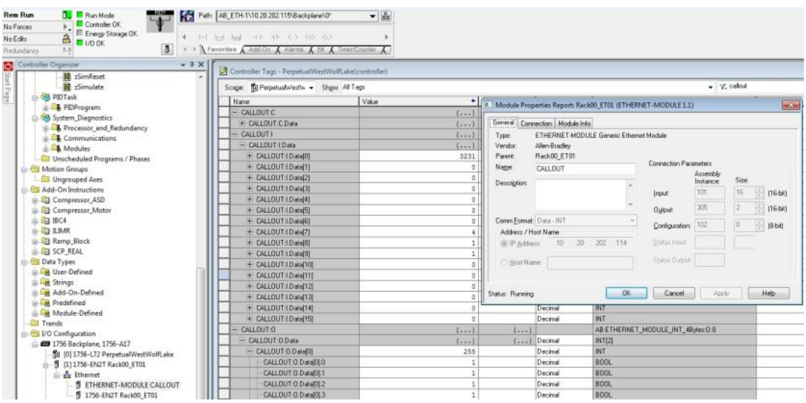

Figure 14-3: RSLogix Screenshot 5

15. Using the Web Server

The PLC Network settings will need to be configured using the programming software prior to accessing the Web Server.

While connected to your unit using the programming software, navigate to Hardware > B1285-P2 > PLC Comm Settings > EtherNet/IP. It is here that you will configure your network.

Once configured, the Device IP Address is the address you will use to connect to the B1285-P2.

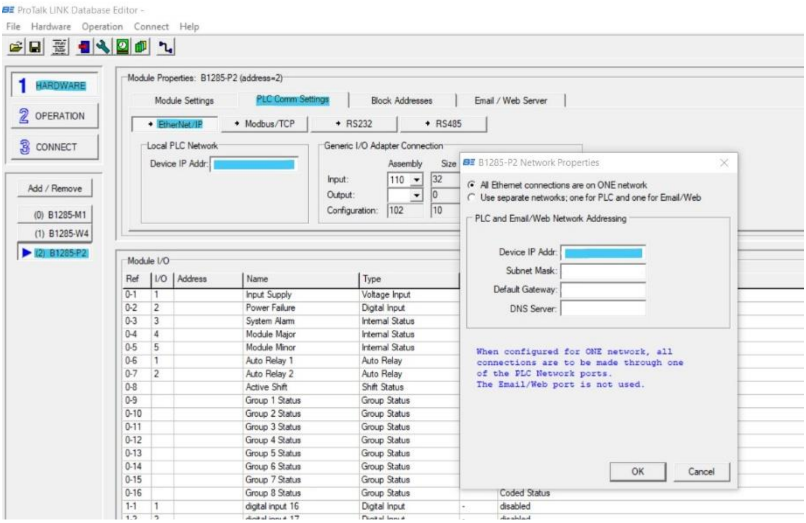

Figure 15-1 Network Configuration

Simply log in to your network and enter the Device IP Address in a browser search bar.

If you have multiple groups of alarms, the screen will show each group as a block.

Groups with an active alarm will appear in red, groups with acknowledged alarms will appear in yellow and groups that are idle will appear in blue.

Click View Details to see more information about the group or acknowledge alarms.

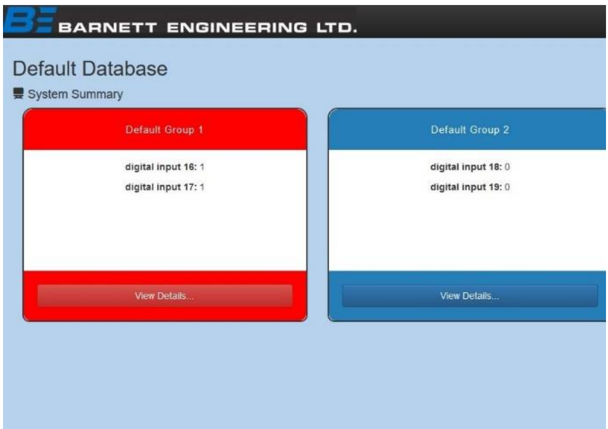

Figure 15-2 System Summary

Inputs within the group that are currently in an alarm state will be highlighted red. You can acknowledge the alarms for the selected group by clicking the acknowledge button.

Note: analog inputs will display a measured value; digital alarms are on or off.

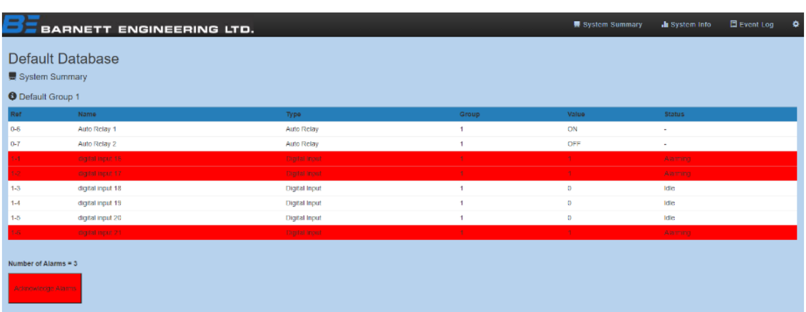

Figure 15-3 Group Inputs Alarm State

Acknowledged alarms appear in yellow. Inputs in an idle state will not be highlighted.

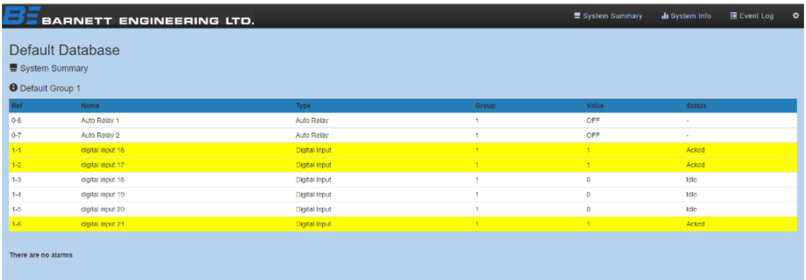

Figure 15-4 Group Inputs Acknoweldge State

Opening the Event Log will provide you with a limited event history for the unit.

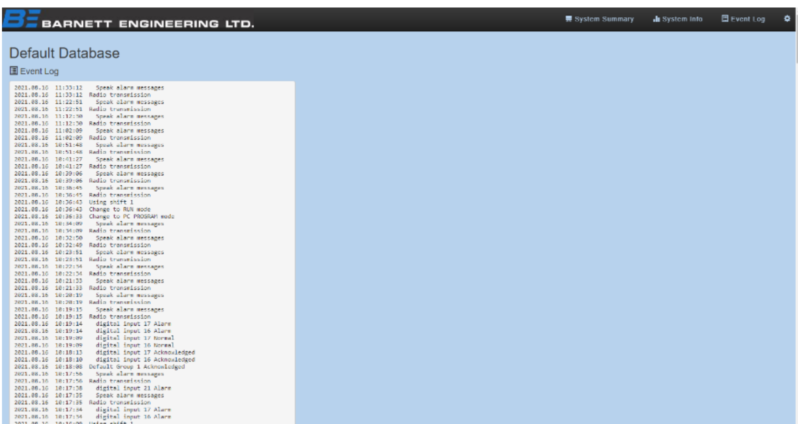

Figure 15-5 Event Log

System Info provides details about the individual modules in the system.

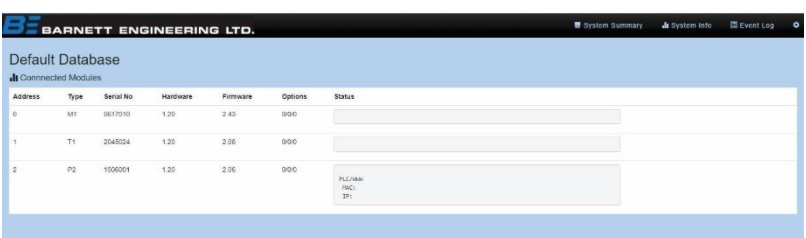

Figure 15-6 System Info