

490NBX – Quick Start Guide

Revision 2

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Overview

This document will explain a sample setup for a 490NBX gateway to communicate to a CompactLogix processor.

This document does not explain the basic ladder logic setup. For that, please refer to the 435_490NBX_LadderLogix.pdf which can be found on the provided CD.

ASCII / CompactLogix Example

Description

Main Page

Device Configuration:

Device Description:	<input type="text" value="Setting Up Communication from ASCII to ControlLogix on Port 0"/>	Ethernet Link:	<input type="text" value="Auto-Negotiate"/>
IP Address:	<input type="text" value="192.168.0.100"/>	MAC Address:	<input type="text" value="00:03:F4:08:FA:09"/>
Subnet:	<input type="text" value="255.255.255.0"/>	Build Date:	<input type="text" value="May 27 2015"/>
Default Gateway:	<input type="text" value="0.0.0.0"/>		

Setting up Communications for a CompactLogix PLC

PLC Configuration

PLC Type:	<input type="text" value="CompactLogix"/>
IP Address:	<input type="text" value="192.168.0.10"/>
Controller Slot:	<input type="text" value="0"/> 0-49; Integrated Ethernet use 0
Communication Mode:	<input type="text" value="Connected (Class 3 Explicit)"/>

Optional

Inter-Message Delay:	<input type="text" value="0"/> 0-60000 ms
Heartbeat Tag/File:	<input type="text"/> INT Tag / N Register

With the above setup, the 490NBX is set up to communicate to a CompactLogix PLC with an IP Address of 192.168.0.10.

The Processor is in Slot 0.

We are using Connected Messaging to ensure that the data is moving as reliably as possible.

The inter-message delay is set to 0ms, meaning the 490NBX will communicate with the PLC as fast as possible.

There is no heartbeat tag configured.

Setting up TCP/IP Configuration

Ethernet TCP/IP Configuration

Help

	Enable	Client	IP Address	TCP Port 0-65535	Inactivity Timeout 0-3600 sec (0 disable)	Reconnect Delay 0-60 sec
0:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	192.168.0.50	9000	0	0
1:	<input type="checkbox"/>	<input type="checkbox"/>	0.0.0.0	0	0	0
2:	<input type="checkbox"/>	<input type="checkbox"/>	0.0.0.0	0	0	0
3:	<input type="checkbox"/>	<input type="checkbox"/>	0.0.0.0	0	0	0
4:	<input type="checkbox"/>	<input type="checkbox"/>	0.0.0.0	0	0	0
5:	<input type="checkbox"/>	<input type="checkbox"/>	0.0.0.0	0	0	0
6:	<input type="checkbox"/>	<input type="checkbox"/>	0.0.0.0	0	0	0
7:	<input type="checkbox"/>	<input type="checkbox"/>	0.0.0.0	0	0	0
8:	<input type="checkbox"/>	<input type="checkbox"/>	0.0.0.0	0	0	0
9:	<input type="checkbox"/>	<input type="checkbox"/>	0.0.0.0	0	0	0

Save Parameters

With the above setup, the 490NBX will communicate with a single device.

On Port 0, the 490NBX acts as a Client and will try to connect to a device with IP Address 192.168.0.50 on TCP Port 9000.

The Inactivity Timeout is set to 0, meaning that the gateway will not close the connection after a certain amount of inactivity on the network. The connection will stay open until the Server device closes it.

The Reconnect Timeout is set to 0, meaning that the gateway will not delay between losing a connection and attempting to reestablish the connection.

Setting up Port 0 for Communication

Port 0 ASCII Configuration

[Help](#)
Copy From: Port 0

<< 0 1 2 3 4 5 6 7 8 9 >>

ASCII to CompactLogix

Enable Communication:

Data Type: STRING

Tag/File Name: A2PLC_port0

CompactLogix to ASCII

Enable Communication:

Data Type: STRING

Tag/File Name: PLC2A_port0

Define End Case

Character Count: 82 1-4096 chars
Timer: 100 0-30000 ms

Delimiters

Start	1	[STX] 2 0x02	[NUL] 0 0x00
End	2	[CR] 13 0x0d	[LF] 10 0x0a

Remove Delimiters from ASCII Message:

Add Delimiters to ASCII Message

Start	0	[NUL] 0 0x00	[NUL] 0 0x00
End	2	[CR] 13 0x0d	[LF] 10 0x0a

Message Queue

Queue Size: 5 0-20 messages
Queue Full Behavior: Discard New Data

Data Conversion

NULL Character Handling: None

NULL Character Handling: None

[Save Parameters](#)

ASCII to CompactLogix:

With the above setup, the gateway will start accepting data as soon as the ASCII device sends the character STX. Once the STX is received, the 490NBX will continue to accept characters until one of the following cases has been met:

1. Receive 82 characters.
2. There has been 100ms of no activity on the network.
3. End Delimiters of CR and LF (in that order) were received by the gateway.
 - i. Notice that the Remove Delimiters checkbox is checked, meaning that the STX, CR, and LF will not be passed to the PLC.

CompactLogix to ASCII:

With the above setup, the gateway will receive data only when the Length field of the "PLC2A_port0" tag in the PLC is set to a non-zero value. If a value is entered with more than 82 characters, the gateway will send only the first 82 characters to the ASCII device; the remainder will be discarded.

When the gateway receives the message, it will concatenate the CR and LF end delimiters defined onto the end of the message it transmits the ASCII device.

ASCII / CompactLogix Example Diagnostics Page

Once the PLC, TCP/IP, and ASCII parameters have been set, the gateway will start transmitting data between the CompactLogix PLC and the ASCII device.

To view the diagnostics page, click the **Diagnostics** button, navigate to Port 0, and select **ASCII to PLC** direction.



Figure 1

The above screen shot shows a connected status to the CompactLogix PLC. It took 1 attempt to connect to make the connection. If the number of Connection Attempts is incrementing there is an issue with the communication between the PLC and the 490NBX. This could be due to a timeout, error, or bad IP Address.



Figure 2

Figure 2 shows that the TCP/IP Connection is Connected. Data will not flow unless the TCP/IP Status says Connected.

ASCII to PLC Direction

Port 0 Diagnostics << 0 1 2 3 4 5 6 7 8 9 >> Help

TCP/IP Status: Connected **Connection Attempts:** 1

ASCII to CompactLogix ▾

Last message sent to CompactLogix (12 chars)

```
0000: 48 65 6C 6C 6F 20 57 6F 72 6C 64 21 Hello World!
```

Next message stored in ASCII queue (8 chars - 2/5 Messages Queued)

```
0000: 47 6F 6F 64 62 79 65 2E Goodbye.
```

Current message being processed (59 chars) ASCII message end case not yet met

```
0000: 57 61 69 74 69 6E 67 20 66 6F 72 20 65 6E 64 20 Waiting for end
0016: 64 65 6C 69 6D 69 74 65 72 73 2C 20 74 69 6D 65 delimiters, time
0032: 20 6F 75 74 2C 20 6F 72 20 4D 61 78 20 43 68 61 out, or Max Cha
0048: 72 61 63 74 65 72 73 2E 2E 2E 2E racters....
```

Clear Buffers

Send Test Message to CompactLogix

Send Test Message

Diagnostic Counters

ASCII Event	Ref 2	Delimiter: 3	Length: 0	Timeout: 0	Discards: 0
Read Handshake Message from CompactLogix		OK: 5178	Error: 0	Last Error:	
Write ASCII Message to CompactLogix		OK: 1	Error: 0	Last Error:	

Figure 3

Figure 3 shows the first message sent to the PLC, **Ref 1**, of “Hello World!” It was defined by end delimiters because the ASCII Event Delimiter Counter is incrementing, **Ref 2**. Each time a message is processed, its end state is recorded.

In the above example, 3 messages meeting the defined end delimiters have been received. The third complete message is not displayed because it is in the Queue buffer, **Ref 3**. This is identified in the gateway by “1/5 Messages Queued” next to the *Next message stored in ASCII queue* buffer. Only the next message to be sent to the PLC is visible in the queue.

Port 0 Diagnostics << 0 1 2 3 4 5 6 7 8 9 >> Help

TCP/IP Status: Connected **Connection Attempts:** 1

ASCII to CompactLogix ▾

Last message sent to CompactLogix (12 chars)

```
0000: 48 65 6C 6C 6F 20 57 6F 72 6C 64 21      Hello World!
```

Next message stored in ASCII queue (8 chars - 2/5 Messages Queued)

```
0000: 47 6F 6F 64 62 79 65 2E      Goodbye.
```

Current message being processed (59 chars) **ASCII message end case not yet met**

```
0000: 57 61 69 74 69 6E 67 20 66 6F 72 20 65 6E 64 20      Waiting for end
0016: 64 65 6C 69 6D 69 74 65 72 73 2C 20 74 69 6D 65      delimiters, time
0032: 20 6F 75 74 2C 20 6F 72 20 4D 61 78 20 43 68 61      out, or Max Cha
0048: 72 61 63 74 65 72 73 2E 2E 2E 2E      racters....
```

Clear Buffers

Send Test Message to CompactLogix

Send Test Message

Diagnostic Counters

ASCII Event	Ref 1	Delimiter: 3	Length: 0	Timeout: 0	Discards: 0
Read Handshake Message from CompactLogix		OK: 5178	Error: 0	Last Error:	
Write ASCII Message to CompactLogix	Ref 2	OK: 1	Error: 0	Last Error:	Ref 3

The second message "GoodBye." will be held until the length field of the PLC string is set to 0. The non-zero length will also trigger the Read Handshake Message counter to increment, **Ref 1**.

The data in the *Current message being processed* buffer has not reached an end case. It will not be considered complete until the gateway receives a [CR][LF], 100ms pass after receiving a character, or the length reaches 82 characters.

The *Write ASCII Message to PLC OK* counter indicates the number of messages sent to the PLC, **Ref 2**. This value should be equal to ASCII Event Delimiter Count + Length Count + Timeout Count. If these values are not equal, then the length field in the PLC is non-zero.

If the *ASCII Event Discard* counter is incrementing, **Ref 3**, the gateway is receiving messages faster than the PLC is processing them.

PLC to ASCII Direction

To view the diagnostics page, click the **Diagnostics** button, navigate to Port 0, and select **PLC to ASCII** direction.

The screenshot shows the 'Port 0 Diagnostics' interface. At the top, there is a navigation bar with '<<' and '>>' buttons, a port number '0' and a sequence of numbers '1 2 3 4 5 6 7 8 9'. A 'Help' button is on the right. Below this, the 'TCP/IP Status' is 'Connected' and 'Connection Attempts' is '1'. A dropdown menu is set to 'CompactLogix to ASCII'. The 'Last message received from CompactLogix (42 chars)' section shows a hex dump and ASCII text: 'Sending Data From A PLC To An ASCII Device'. Below this is a 'Send Test Message to ASCII' input field and a 'Send Test Message' button. The 'Diagnostic Counters' section has two entries: 'Read ASCII Message from CompactLogix' with 'OK: 28229' and 'Error: 0', and 'Write Handshake Message to CompactLogix' with 'OK: 2' and 'Error: 0'. Red arrows point from 'Ref 1' to the 'Read ASCII Message' counter and from 'Ref 2' to the 'Write Handshake Message' counter. A 'Clear Counters' button is at the bottom right.

For moving data from the PLC to the ASCII device, the length field of the tag in the PLC needs to be set to non-zero. The gateway monitors the length field for a non-zero value. Once a non-zero value is seen, the gateway will process the data and send it to the ASCII device. It will also reset the length field to 0. This handshake lets the PLC know the data has been processed.

In the above example “Sending Data From A PLC to An ASCII Device” was written to a tag, changing the length field to 42. The non-zero length of 42 triggered the gateway to process the message.

The *Read ASCII Message from PLC OK* counter should always be incrementing. This is a heartbeat counter that increments every time the gateway reads the PLC tag length to determine if there is a new message, **Ref 1**.

The *Write Handshake Message to PLC OK* counter will increment when a message is received, **Ref 2**.