**Application Note** 

# Adding an MPiec Controller as an EtherNet/IP Adapter to Allen Bradley CompactLogixL32E

## Applicable Product: MPiec, CompactLogix5332E

Yaskawa Electric America 2121 Norman Drive South Waukegan, IL 60085 1-800-927-5292

Doc#:AN.MCD.08.110



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#### 1. Application Overview

This application note illustrates how to add an MPiec motion controller as an EtherNet/IP Adapter (Generic EIP Device) to Allen Bradley's CompactLogix 5332E using RSLogix 5000 PLC application software and MotionWorksIEC. Additionally, a detailed description of how to create, link and verify communication via I/O variables is provided.

#### 2. Application Requirements

The requirements for this application note include using the MPiec motion controller as an EIP Adapter (Slave) device to talk to and exchange data with an Allen Bradley CompactLogix PLC Scanner (Master). The example explained in this note describes an implicit I/O message connection between the MPiec and the AB PLC. No function blocks or PLC logic is necessary, since the data connection is open once the Assembly instances are correctly configured.

#### Components:

- MPiec Controller
- AB RSLogix5000© version 13.0
- AB CompactLogix 5332E with 1769-L32E Ethernet Port (Revision 13.21)

#### 3. Application Solution and Benefits

- This configuration will allow the user to exchange data between the Allen Bradley CompactLogix 5332E
   PLC and the MPiec Motion Controller using EtherNet/IP as the protocol.
- Both Input and Output data tags are supported.



#### 4. System layout

#### Figure 1 details the goal of this project



Figure 1: System Layout

## 5. Configuring the Scanner (AB CompactLogix 5332E)

This document explains configuration of the EtherNet/IP Module and the EtherNet/IP Assembly instances on both the MPiec device (Adapter) and the AB PLC device (Scanner).

In RSLogix 5000, start a new project. Enter the controller details as shown in Figure 2

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New Controller	•	x
Vendor:	Allen-Bradley	
Туре:	1769-L32E CompactLogix5332E Control 🗸	OK
Revision:	13 💌	Cancel
	Redundancy Enabled	Help
Name:		
Description:	A	
Chassis Type:	<none></none>	
Slot:		
Create In:	C:\RSLogix 5000\Projects	Browse

Figure 2: Starting a new project

The next step is to configure the AB PLC with its IP address and verify that all devices on the network are recognized. Since the Ethernet module is built in, double click on the Ethernet port entry under I/O Configuration and enter the IP address of the scanner (CompactLogix PLC). (Figure 3)



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Controller CompactLogix Controller Tags Controller Fault Handler Power-Up Handler Tasks MainTask MainProgram Unscheduled Programs Unscheduled Programs Ungrouped Axes Ungrouped Axes Ungrouped Axes Ungrouped Axes Strings CompactBus Local	Module Prop General Conr Type: Vendor: Parent: Na <u>m</u> e: Description: Sl <u>o</u> t:	erties - Controller:1 (1769-L32E Ethernet Port 13.1) ection RSNetWorx Module Info Port Configuration Port Diagnostics 1769-L32E Ethernet Port 10/100 Mbps Ethernet Port on CompactLogix5332E Allen-Bradley Controller Address / Host Name Address: 132 . 168 . 2 . 82 Berler Major Revision: 13	×		

Figure 3: IP address of AB scanner

To verify the devices on the network, click on the communications tab and select 'Who Active'.



Figure 4: Verification of online devices on the network

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Figure 5 illustrates how the two devices on the network are displayed. The MPiec controller (adapter) is at IP address 192.168.2.1 and the AB scanner PLC is at 192.168.2.82.

🔏 Who Active	
Autobrowse Refresh	
Image: Second system         Image: Second system <th><u>Go Online</u> <u>Upload</u> <u>D</u>ownload Update <u>F</u>irmware Close Help</th>	<u>Go Online</u> <u>Upload</u> <u>D</u> ownload Update <u>F</u> irmware Close Help
Path:     AB_ETHIP-1       Path in Project: <none></none>	Set Project Path Clear Project Path

Figure 5: Online devices

Next, the MPiec needs to be added as a Generic EIP device. Right Click on [1] 1769-L32E Ethernet Port Local ENB under I/O Configuration > Click on 'New Module', and select the following from the 'Select Module Type' dialog:

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Select Module Type		×
Type: ETHERNET-MODU	JLE	
Type D	Description	
1769-L32E Ethernet Port 1	0/100 Mbps Ethernet Port on CompactLogix5332E	
1769-L35E Ethernet Port 1	0/100 Mbps Ethernet Port on CompactLogix5335E	
1788-EN2DN/A 1	788 Ethernet to DeviceNet Linking Device	
1788-ENBT/A 1	788 10/100 Mbps Ethernet Bridge, Twisted-Pair Media	
1788-EWEB/A 1	788 10/100 Mbps Ethernet Bridge w/Enhanced Web Services	
1794-AENT/A 1	794 10/100 Mbps Ethernet Adapter, Twisted-Pair Media	
Drivelogix5730 Ethernet 1	0/100 Mbps Ethernet Port on DriveLogix5730	
EtherNet/IP S	ioftLogix5800 EtherNet/IP	
ETHERNET-MODULE G	ieneric Ethernet Module	
ETHERNET-PANELVIEW E	ithernet/IP Panelview	
PowerFlex 700 Vector-2I P	PowerFlex 700 Vector Drive (208/240V) via 20-COMM-E	
PowerFlex 700 Vector-4I P	owerFlex 700 Vector Drive (400/480V) via 20-COMM-E	
PowerFlex 700 Vector-6I P	PowerFlex 700 Vector Drive (600V) via 20-COMM-E	
PowerFlex 700-200V-E P	PowerFlex 700 Drive (208/240V) via 20-COMM-E	•
Show		
Vendor: All	💌 🔽 Other 🔽 Specialty I/O 🛛 Select Al	I I
🔽 Analog 🔽 Digital	Clear All	
	OK Cancel Help	

Figure 6: Selecting the adapter module type

Right Click on the newly created ETHERNET-MODULE and edit the properties as shown in Figure 7

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The following dialog should be displayed to configure the MPiec EIP Adapter:

Module Prope	rties - LocalENB (ETHERNET-MODU	LE 1.1)				×
Type: Vendor: Parent:	ETHERNET-MODULE Generic Etherne Allen-Bradley LocalENB	t Module				
Name:	MP2300Siec_EIPSlave	– Connection Par	ameters Assembly	Cierry		
Description:		Input:	Instance:	64	(16-bit)	
Comm Format	Data - INT	Output: Configuration	1	1	국 (16-bit) 극 (8-bit)	
Address / H	lost Name ess: 192 . 168 . 2 . 1	Status Input:		, 		
C Host Na	ime:	Status Output				
	Cancel < Back	< Next >	Finis	h>>	Help	

Figure 7: Ethernet Module (adapter) properties

Notes about the Generic Ethernet Device Properties:

- 1. IP Address is for the EIP Adapter.
- 2. Assembly Instances are referenced to the Master, meaning Input in this context is input to the Scanner (Master), output to the Adapter (Slave).

Note: Special attention needs to be paid to the assembly instances and their sizes. If the sizes are not compatible, an error in communication will result. In this case sixty four sixteen bit registers make up the 128 bytes that instances 101 and 111 are made up of. This is compatible with the 128 eight bit registers on the MPiec side.

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3. Configuration is not used on the MPiec controller. Therefore, this can be set to Assembly Instance #1, Size 1 since the assembly number can not be left blank.

Finally, configure the RPI (Requested Packet Interval) on the Master to dictate the polling rate to which the Master will update new packet information from the Slave. **The minimum value for the MPiec is 10ms.** Click on the 'Connection' tab in the Module Properties dialog

Module Properties - EIP_Master (ETHERNET-MODULE 1.1)
General Connection Module Info
<u>R</u> equested Packet Interval (RPI): 10.0 = ms (1.0 - 3200.0 ms)
Major Fault On Controller If Connection Fails While in Run Mode
Module Fault
Status: Offline OK Cancel Apply Help

Figure 8: RPI properties

Verify the created project by clicking on the verify button as shown in Figure 9.





Figure 9: Verify

Download the project to the controller by verifying the path to download. Communications > Who Active

👫 RSLogix 5000 - CompactLogix in CompactLogix_Scanner.ACD [1769-							
File Edit View Search Logic	Con	nmunications	Tools	Win	idow Help		
	몲	<u>W</u> ho Active					
		<u>S</u> elect Rece	nt Path.				
Rem Run 🛛 🚺 🗖 Run Mode					h: AB_ETHIP-		
No Forces 🕒 🗖 Controller (		<u>G</u> o Offline					
No Edits A Battery OK		Upload					

Figure 10: Verify path for download

Select the controller to which this project is going to be downloaded and click download as in Figure 11.





Figure 11: Download to CompactLogix

Once downloaded, go online.

At this point, the scanner device (AB PLC) is configured to talk with the MPiec as an adapter. Additionally, the RSLogix 5000 software automatically adds the words configured for the EIP module. These can be located in the 'Controller Tags' node under the 'Controller' node in the project tree:

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Figure 12: Controller tags for I/O variables

### 6. Configuring the Adapter (MPiec)

The next steps illustrate how to create a project in MotionWorks IEC and add I/O variables to talk with the AB PLC.

Since Assembly Instances #101 (Scanner Inputs) and #111 (Scanner Outputs) were configured on the scanner device, the next task is to implement the data exchange between the scanner and the adapter. To do this, we need to add I/O variables using the pre-defined address ranges as specified in the MPiec Project Template. This is the template that opens when a user chooses to open a new project in MotionWorksIEC as shown in Figure 13 a.

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Figure 13 a: New project in MotionWorksIEC

Launch the Configuration tool and verify the IP address of the MPiec adapter device as shown in figures 13 b and c. Then select the instances that will be available for the scanner as shown in figures 13 d.





Figure 13 b: Verifying IP settings of MPiec through the CT

Т	CP/IP Settings: MP23	00Siec
	— Static IP Settings —	
	IP Address	192.168.2.1
	Subnet Mask	255 . 255 . 255 . 0
	Default Gateway	192 . 168 . 2 . 253



Note: Pay special attention to ensure that the Default Gateway is set appropriately in both the CT and the web page.



Besource : MP2300Siec     Mechatrolink-II     Groups	Co	nfigure Contr	oller as an	EtherNet/IP A	dapter					
TCP/IP Settings		Input Assembly Instances (Originator to Target)					Output Assembly Instances (Target to Originator)			to Originator)
EtherNet/IP		Enable	Instance	Size (bytes)	I/O Task Assignment		Enable	Instance	Size (bytes)	I/O Task Assignment
		$\checkmark$	111	128	FastTsk		$\checkmark$	101	128	FastTsk
	17		112	256	FastTsk			102	256	FastTsk
			113	128	FastTsk			103	128	FastTsk
			114	256	FastTsk			104	256	FastTsk
			115	128	FastTsk			105	128	FastTsk
			116	256	FastTsk			106	256	FastTsk
		Set all insta	inces:				Output state	when PLC	stops:	
		10 T 1- 4-		E			<ul> <li>Retain last state</li> </ul>			
		I/U Task As	signment	Fast Isk	~		⊖ Set	all outputs	off	

Figure 13 d: Enable Instances

In the MotionWorksIEC new project, select the 'Global\_Variables' tab in the Project Tree

Name	Туре	Usage	Description	Address 🛛 🖓	Init
🗄 System					
🖃 E/IP Input Instance #111,	Qty: 128 Bytes, Add	ress Range: %IB(	D-%IB127		_
FromCL	INT	VAR_GLOBAL		%MV0	
EIP INPUT INSTANCE #112,	wy: 256 bytes, Add	ress kange: %IB1	128 - %IB383		
🖃 E/IP Input Instance #113,	Qty: 128 Bytes, Add	ress Range: %IB3	384 - %IB511		
🖂 E/IP Input Instance #114,	Qty: 256 Bytes, Add	ress Range: %IB(	512 - %QI767		
🖃 E/IP Input Instance #115, Qty: 128 Bytes, Address Range: %IB768 - %IB895					
🖂 E/IP Input Instance #116,	Qty: 256 Bytes, Add	ress Range: %IB8	896 - %IB1151		
🖃 E/IP Output Instance #10	1, Qty: 128 Bytes, Ad	ldress Range: %(	QB0 - %QB127		
ToCL	INT	VAR_GLOBAL		%QVV0	
E ENP Output Instance #102, Vty: 256 Bytes, Address Range: %VB128 - %VB383					
🖃 E/IP Output Instance #10	3, Qty: 128 Bytes, Ad	ldress Range: %(	QB384 - %QB511		

Figure 14: Global Variable list

Start adding I/O variables to the Global Variables table. In this example, we will be adding one input INT (16bit) variable and one output INT variable. A new variable can be created by right clicking on the grey input or output instance group name and choosing so.

Next, we assign each variable an address based on the variable group description range. Note: Addressing in the MotionWorks IEC project is based on byte offset; i.e. %QW0 = Word 0, %QW1 = Word 1, etc.

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The exercise carried out in this test project is as follows



Figure 15: Test exercise

Create the following logic on the slave MPiec controller. Download the program and run the controller.





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#### 7. Communication Verification

After both devices and variables are configured, each program can be run and tested using the debuggers on both the Master and Slave devices.

Enter an integer in the scanner output variable

🙀 RSLogix 5000 - CompactLogix in CompactLogix_Scanner.ACD [1769-L32E]*								
File Edit View Search Logic Communications	ools Window Help							
	<u> </u>							
Rem Run 📜 🗖 Run Mode	Run Mode     Ret     AB_ETHIP-1\192.168.2.82\Backplane\0     Bat							
No Edits I/O OK No Edits I/O OK I/O OK								
English Controller CompactLogix	Controller Tags - CompactLogix(controller)							
Controller Tags	Scope: CompactLogix(contr( Show: Show All Soft: Tag Name	•						
Power-Up Handler	Tag Name 🛆 Value 🗲 Force Mask 🗲 Style	Туре						
🗄 🖶 📇 Tasks		AB:ETHERNET						
📄 🤕 MainTask		SINT[400]						
🕀 🕀 MainProgram		AB:ETHERNET						
Makian Cround		INT[64]						
		AB:ETHERNET						
- Trends		INT[64]						
🛱 🛁 Data Types	Decimal	INT						
User-Defined	Decimal	INT						
🔢 🕀 🛄 Strings	Decimal	INT						

Figure 17: Scanner output variable

In debug mode, one can see the MotionWorksIEC program perform the addition as shown in Figure 17 a.

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Figure 17 a: Addition in MotionWorksIEC

The corresponding scanner input variable will have the value of the scanner output variable incremented by one. This addition took place in the MPiec controller.

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Figure 18: Scanner input variable

To verify the AB PLC has connected correctly to the MPiec controller and the configured Assembly Instances are functioning properly, there is a dialog in RSLogix that displays the status as shown in Figure 19.





Figure 19: Communication status display