

## Application Note

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### Commissioning the Yaskawa AC Drive “EtherNet/IP” Option with the Rockwell BOOTP/DHCP Server

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Applicable Products:

***EtherNet/IP***<sup>™</sup> conformance tested CM092/CM093 Option Kits

Subject: Application Note

Product: CM092/CM093

Doc#: AN.AFD.10

Title: Commissioning the Yaskawa AC Drive “EtherNet/IP” Option with the Rockwell BOOTP/DHCP Server Utility.

## INTRODUCTION

The following document describes configuring the CM092/CM093 EtherNet/IP option kit for Yaskawa AC Drives with a BOOTP/DHCP Server Utility supplied with most of Rockwell Software PLC programming tools and utilities. In this example, the following information describes the use of the BOOTP/DHCP Server to configure the Yaskawa AC Drive’s EtherNet/IP option for operation in order to control, program and monitor the Yaskawa AC Drive over the EtherNet/IP network.

Since each system application is typically different, the following may be accomplished in different ways, yet the basic principles shown may be built on for the specific system application requirements. This is just one of the tools that may be used to allocate an IP address to the CM092/CM093 option from it’s DHCP factory default condition which is set according to ODVA Publication EtherNet/IP Addressing Methods and tested for meeting EtherNet/IP Advisory Level requirements. Other network management tools and network infrastructure components are openly available and may accomplish the same result in different ways, since the CM092/CM093 conforms to the DHCP and BOOTP standard implementations.

## INTENDED AUDIENCE

This document assumes that the reader is familiar with Yaskawa 5 and 7 Series AC Drives, EtherNet/IP and Ethernet technical terminology and operation, and is also familiar with networking utility tools.

## CM092 / CM093 OPTION CONFIGURATION

The following describes the process of configuring a sample CM092/CM093 option with RS BOOTP/DHCP Server Utility. Please refer to the following figure for a diagram of the example system.

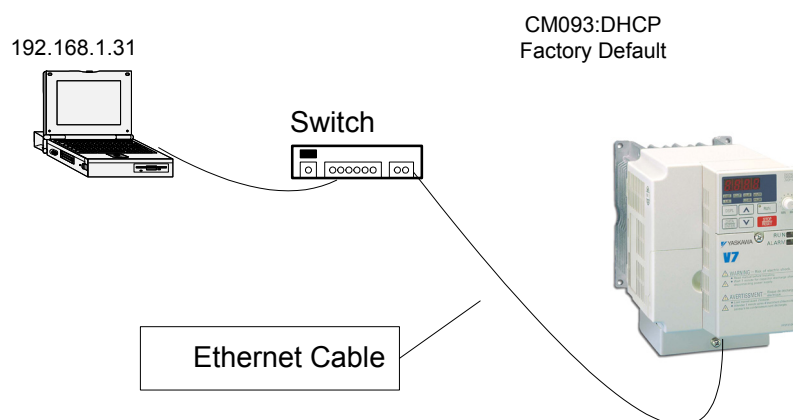


Figure 1: Example system

Subject: Application Note	Product: CM092/CM093	Doc#: AN.AFD.10
Title: Commissioning the Yaskawa AC Drive “EtherNet/IP” Option with the Rockwell BOOTP/DHCP Server Utility.		

Install the CM092 or CM093 option on the AC Drive as indicated in the Installation guide (IG.AFD.26 or IG.V7.26) associated with the correct drive model.

## Background:

In general DHCP or Dynamic Host Configuration Protocol is used to assign IP addresses to nodes on a TCP/IP Network. The use of a DHCP server allows configuration and control of how those nodes obtain an IP address from a DHCP server for use on the network. DHCP servers may come in several variations. Some are programs that are run on a PC or server, and some are integrated into routers and network infrastructure equipment.

The following are some notes and cautions regarding running a DHCP server on your PC or Laptop. If you are currently connected to a corporate network it is very likely that a DHCP server may already be running. Therefore due to conflicts you should **Not** run a local DHCP server on your PC when connected to that other network. The rule is normally one DHCP server per local network. However if using your PC or Laptop to configure some equipment as outlined in the following instructions and is similar to the example 1 diagram, you may run the DHCP without any conflicts.

## DHCP Server Utility and PC/Laptop Setup:

First, download and install on a PC or Laptop the BOOTP/DHCP Server Utility from the following link:  
(Please follow the instructions on the web site page for installation information)

[www.ab.com/networks/ethernet/bootp.html](http://www.ab.com/networks/ethernet/bootp.html)

One of the next things to complete is setting up your PC or Laptop to run the DHCP server. You can do this by first confirming that your Ethernet Adapter is configured correctly for the local network that you will be operating on. In the example we are using a standard Class C TCP/IP network with the address's of 192.168.1.XXX. The PC is configured for address 192.168.1.31 and the CM092 /CM093 is set in it's factory default settings, as acquiring the IP Address through DHCP.

To use the DHCP server please configure your PC's networking connections as outlined in the document IG.AFD.26 or IG.V7.26 in section “Configuring the PC Network Connection”, however use the IP address: 192.168.1.31.

Note: You can also use the address defined in the installation guide, however to match our Example system described in Figure 1, we are using the 192.168.1.31 PC address setting.

Subject: Application Note

Product: CM092/CM093

Doc#: AN.AFD.10

Title: Commissioning the Yaskawa AC Drive “EtherNet/IP” Option with the Rockwell BOOTP/DHCP Server Utility.

After the hardware setup and PC Setup is complete you can run the BOOTP/DHCP server, and you should see the following main screen for the utility:

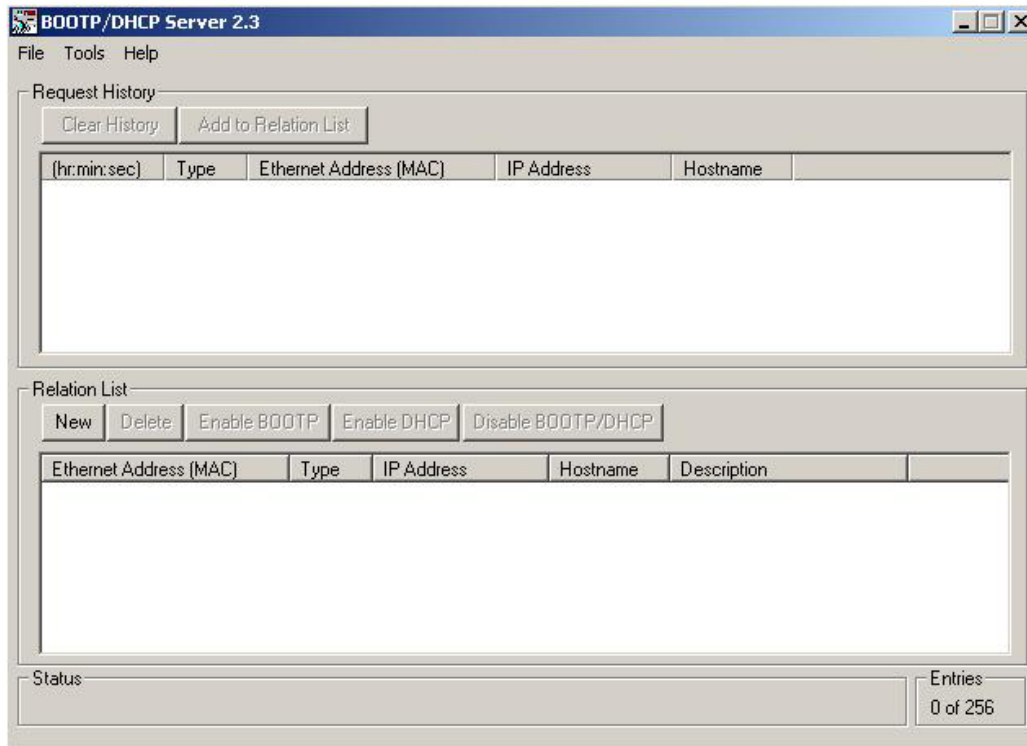


Figure 2: BOOTP/DHCP Server Utility

Next, under the “Tools” menu, please click on the “Network Settings” menu item and configure the contents of the “Subnet Mask” and “Gateway” as defined in Figure 3. Click the OK button after complete to accept the settings and close the Network Settings configuration. This completes the PC/Laptop setup section.

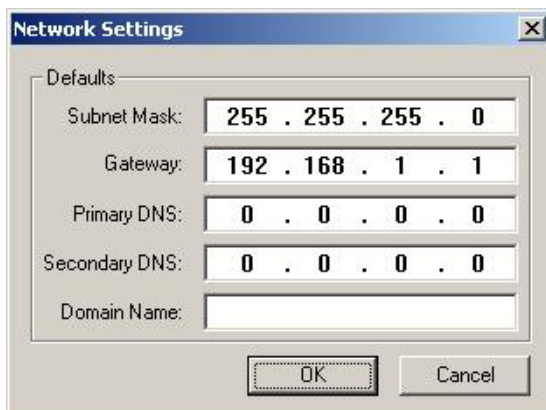


Figure 3: Network Settings

Subject: Application Note

Product: CM092/CM093

Doc#: AN.AFD.10

Title: Commissioning the Yaskawa AC Drive “EtherNet/IP” Option with the Rockwell BOOTP/DHCP Server Utility.

## CM092/CM093 Configuration:

To begin the configuration of the CM092/CM093 EtherNet/IP option either cycle the power to the Yaskawa AC drive, making sure that the LED's turn completely off before returning the power, or if the AC drive was not powered, turn the power on to the AC Drive and network option.

After the power is on you will see the BOOTP/DHCP server utility screen update with some information, in the request history section of the BOOTP/DHCP Server screen. Please refer to Figure 4.

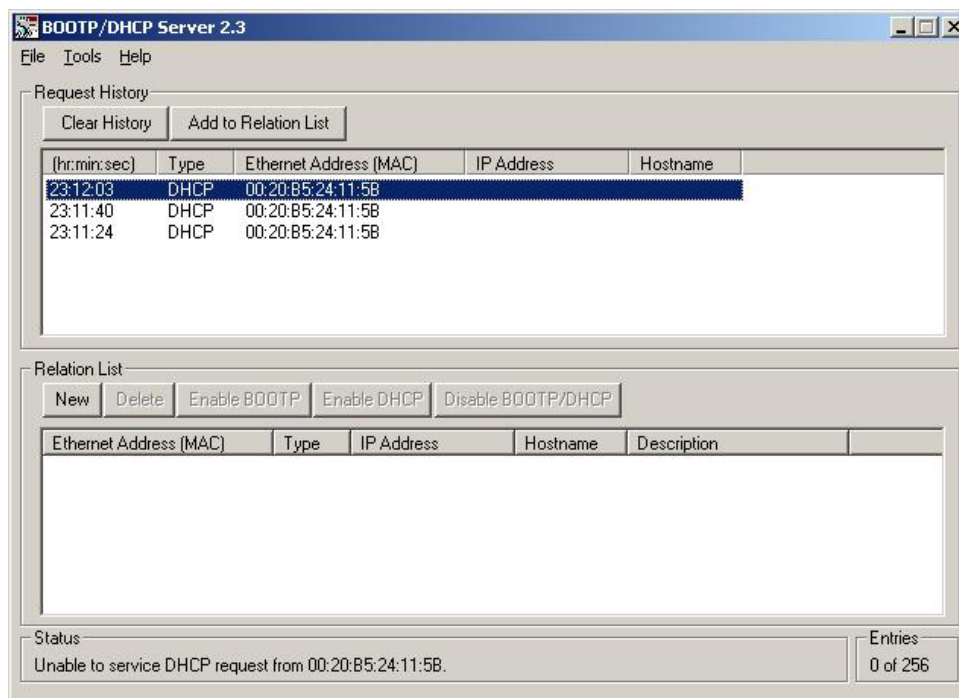


Figure 4: Request an Address

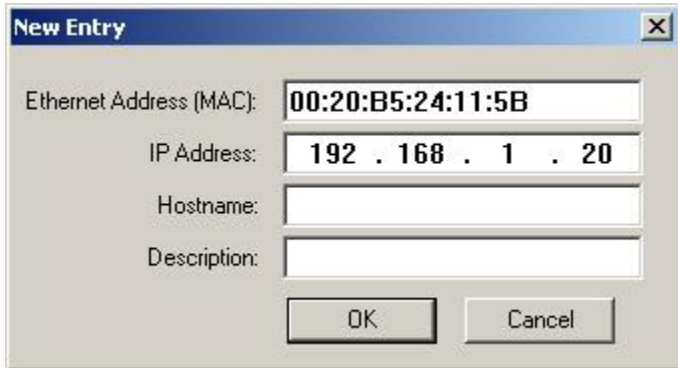
This information indicates that the CM092/CM093 option has sent a request for an IP Address and has provided the MAC Address as an identifier. By Highlighting one of the entries and double clicking the highlighted entry the DHCP Server will display a New Entry dialog box, which you can assign an IP address to the CM092/CM093 option with. Please refer to Figure 5.

Subject: Application Note

Product: CM092/CM093

Doc#: AN.AFD.10

Title: Commissioning the Yaskawa AC Drive “EtherNet/IP” Option with the Rockwell BOOTP/DHCP Server Utility.



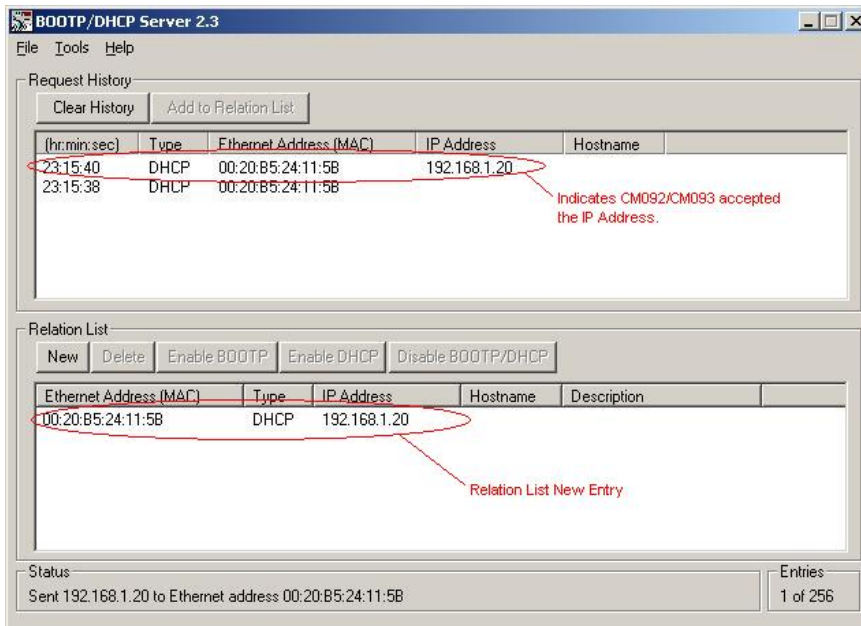
The 'New Entry' dialog box contains the following fields and buttons:

- Ethernet Address (MAC):** 00:20:B5:24:11:5B
- IP Address:** 192 . 168 . 1 . 20
- Hostname:** (empty)
- Description:** (empty)
- Buttons:** OK, Cancel

Figure 5: New Entry Setting

Enter the IP Address you wish to associate with the Ethernet Address (MAC) that you are configuring. In our example we would like the address to be “192.168.1.20”. Click ‘OK’ to accept the settings and you will notice that the New Entry Dialog box will disappear and a new entry will appear in the relation list. What this indicates is that every time that a DHCP request comes in on the network, from the node with the Ethernet Address (MAC) that is in the list, the corresponding IP address will be sent to that node which should use that IP address to communicate with.

You will be able to confirm that the CM092/CM093 option has accepted the IP address when the Request History section of the BOOTP/DHCP server screen is updated as in Figure 6.



The 'BOOTP/DHCP Server 2.3' window displays the following sections:

- Request History:**
  - Buttons: Clear History, Add to Relation List
  - Table:

(hr:min:sec)	Type	Ethernet Address (MAC)	IP Address	Hostname
23:15:40	DHCP	00:20:B5:24:11:5B	192.168.1.20	
23:15:38	DHCP	00:20:B5:24:11:5B		
- Relation List:**
  - Buttons: New, Delete, Enable BOOTP, Enable DHCP, Disable BOOTP/DHCP
  - Table:

Ethernet Address (MAC)	Type	IP Address	Hostname	Description
00:20:B5:24:11:5B	DHCP	192.168.1.20		
- Status:** Sent 192.168.1.20 to Ethernet address 00:20:B5:24:11:5B
- Entries:** 1 of 256

Figure 6: Updated Request History

Subject: Application Note	Product: CM092/CM093	Doc#: AN.AFD.10
Title: Commissioning the Yaskawa AC Drive “EtherNet/IP” Option with the Rockwell BOOTP/DHCP Server Utility.		

Note: If for some reason the DHCP request from the CM092/CM093 option has timed out and is not updating the “Request History” list, Re-cycle the power to the Yaskawa AC drive and the request will be sent on power up and resolve the IP Address.

After the IP Address is acquired, you can verify that the CM092/CM093 option card is accessible on the network by accessing the internal Web Page on the CM092/CM093 EtherNet/IP option. Open Internet Explorer and type <http://192.168.1.20/> in the Address Bar and press Enter. This will display the Yaskawa AC Drives internal web page interface. Please refer to Web Page Display in Figure 7.

At this point you will also be able to verify that the CM092/CM093 option is correctly configured, by checking the LED Status. When card is configured with an IP Address, and ready for operation the following will be true.

- The PWR LED will be on Solid GREEN.
- The MS LED will be on Solid GREEN.
- The NS LED will be on either Flashing GREEN or Solid GREEN.  
(Depending if there is an established control connection)

Note, in this Example the NS LED will be on Flashing GREEN.

If you wish, you may also communicate to the drive through the Ethernet connection with the Yaskawa’s Drive Wizard application.

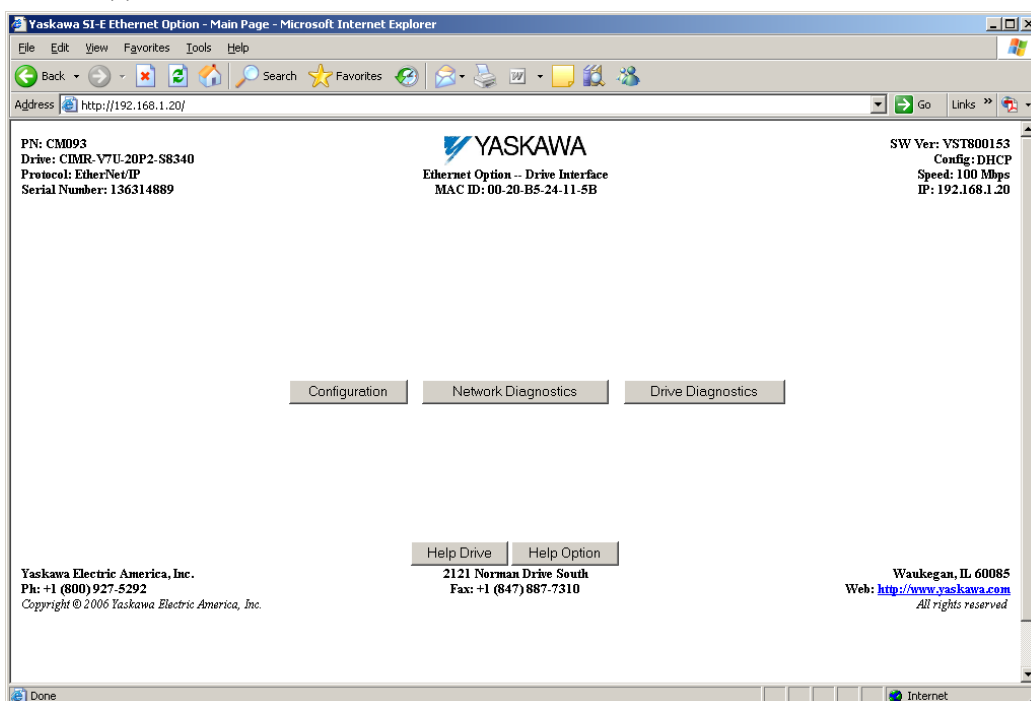


Figure 7: Web Page Display



Subject: Application Note

Product: CM092/CM093

Doc#: AN.AFD.10

Title: Commissioning the Yaskawa AC Drive “EtherNet/IP” Option with the Rockwell BOOTP/DHCP Server Utility.

## DHCP or USER Configuration Startup:

At this point the system and configuration of the IP Address for the Option is complete. However you may want to either continue using DHCP, or save the recently acquired IP Address in Non-Volatile memory of the CM092/CM093 option card, and change the startup configuration to USER mode. In this case the Examples “192.168.1.20” IP Address will be saved and automatically used at initialization the next time the drive power is cycled.

To accomplish this, use the BOOTP/DHCP Server Utility. You simply highlight the “192.168.1.20” entry in the lower “Relation List” section of the screen and then click on the “Disable BOOTP/DHCP” button. Please refer to Figure 8.

You can confirm the operation completed successfully by recycling the power to the Yaskawa AC drive, *after the Status message in the lower left corner of the application indicates, “[Disable DHCP] Command Successful”*. Please refer to Figure 9.

After the drive powers up, check the LED states and the internal web page for correct operation. This will indicate the current Non-Volatile startup configuration (DHCP or USER) of the CM092/CM093 option in the upper right hand corner of the web page.

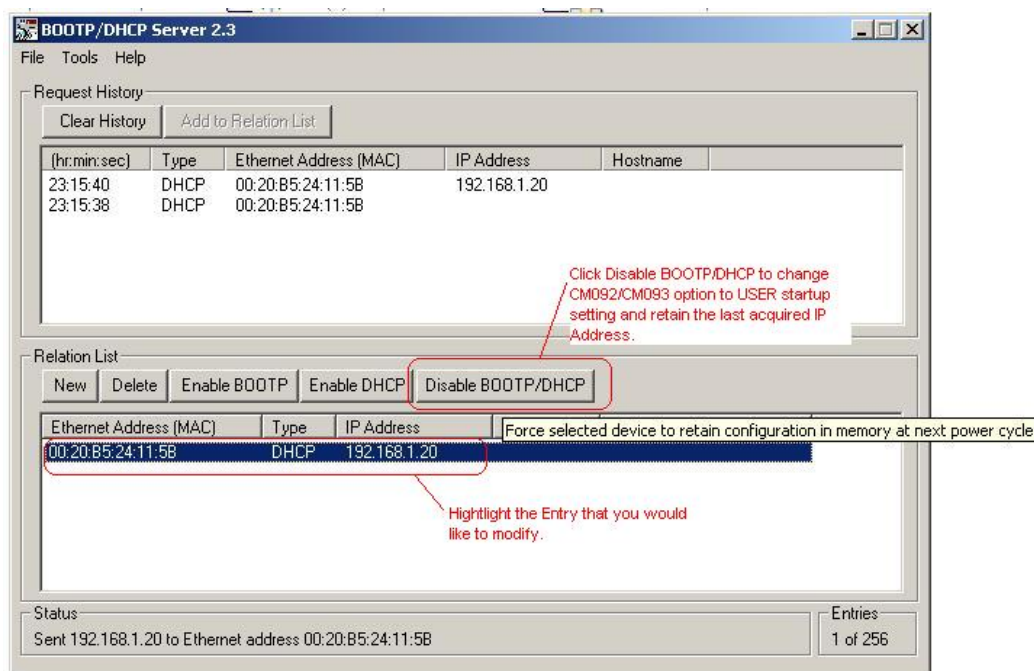


Figure 8: Selecting DHCP or USER Mode Startup



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Doc#: AN.AFD.10

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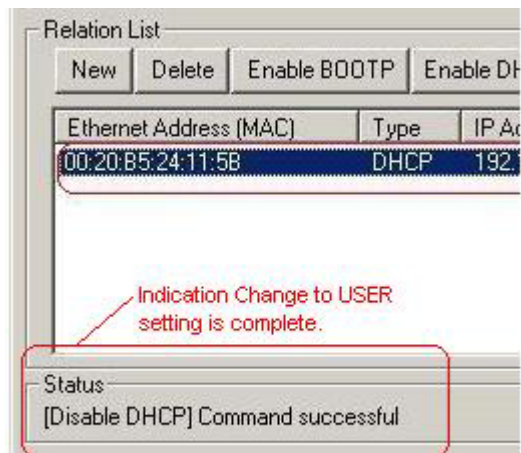


Figure 9: Disable DHCP Command Successful

In Summary, the information and example shown in the above instructions, indicate how you would configure the Yaskawa Series Drives by utilizing the CM092 or CM093 EtherNet/IP option interface and a DHCP Server.

For questions or comments regarding this example, please feel free to contact Yaskawa Electric America, Inc. For support please call: 1-800-YASKAWA.

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