Upon receipt of the product and prior to initial operation, read these instructions thoroughly, and retain for future reference.

The DX200 Operator’s manual above corresponds to specific usage. Be sure to use the appropriate manual.
MANDATORY

• This manual explains GUARDLOGIX PLC requirements for a scanner using the EtherNet/IP Safety for a DX200. Read this manual carefully and be sure to understand its contents before handling the DX200.

• General items related to safety are listed in Chapter 1: Safety of the DX200 Instructions. To ensure correct and safe operation, carefully read the DX200 Instruction before reading this manual.

CAUTION

• The drawings and photos in this manual are representative examples and differences may exist between them and the delivered product.

• YASKAWA may modify this model without notice when necessary due to product improvements, modifications, or changes in specifications. If such modification is made, the manual number will also be revised.

• If your copy of the manual is damaged or lost, contact a YASKAWA representative to order a new copy. The representatives are listed on the back cover. Be sure to tell the representative the manual number listed on the front cover.

• YASKAWA is not responsible for incidents arising from unauthorized modification of its products. Unauthorized modification voids your product's warranty.
We suggest that you obtain and review a copy of the ANSI/RIA National Safety Standard for Industrial Robots and Robot Systems (ANSI/RIA R15.06-2012). You can obtain this document from the Robotic Industries Association (RIA) at the following address:

Robotic Industries Association  
900 Victors Way  
P.O. Box 3724  
Ann Arbor, Michigan 48106  
TEL: (734) 994-6088  
FAX: (734) 994-3338  
www.roboticsonline.com

Ultimately, well-trained personnel are the best safeguard against accidents and damage that can result from improper operation of the equipment. The customer is responsible for providing adequately trained personnel to operate, program, and maintain the equipment. NEVER ALLOW UNTRAINED PERSONNEL TO OPERATE, PROGRAM, OR REPAIR THE EQUIPMENT!

We recommend approved Yaskawa training courses for all personnel involved with the operation, programming, or repair of the equipment.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.
Notes for Safe Operation

Read this manual carefully before installation, operation, maintenance, or inspection of the DX200.

In this manual, the Notes for Safe Operation are classified as “DANGER”, “WARNING”, “CAUTION”, “MANDATORY”, or “PROHIBITED”.

- **DANGER**: Indicates a imminent hazardous situation which, if not avoided, could result in death or serious injury to personnel.

- **WARNING**: Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury to personnel.

- **CAUTION**: Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury to personnel and damage to equipment. It may also be used to alert against unsafe practices.

- **MANDATORY**: Always be sure to follow explicitly the items listed under this heading.

- **PROHIBITED**: Must never be performed.

Even items described as “CAUTION” may result in a serious accident in some situations.

At any rate, be sure to follow these important items:

**NOTE**: To ensure safe and efficient operation at all times, be sure to follow all instructions, even if not designated as “DANGER”, “WARNING” and “CAUTION”. 
Definition of Terms Used In this Manual

The MOTOMAN is the YASKAWA industrial robot product.
The MOTOMAN usually consists of the manipulator, the controller, the programming pendant, and supply cables.

In this manual, the equipment is designated as follows:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Manual Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>DX200 controller</td>
<td>DX200</td>
</tr>
<tr>
<td>DX200 programming pendant</td>
<td>Programming pendant</td>
</tr>
<tr>
<td>Cable between the manipulator and the controller</td>
<td>Manipulator cable</td>
</tr>
</tbody>
</table>

Descriptions of the programming pendant, buttons, and displays are shown as follows:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Manual Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programming Pendant</td>
<td>Character Keys/Symbol Keys: The keys which have characters printed on them are denoted with [ ]. ex. [ENTER]</td>
</tr>
<tr>
<td></td>
<td>Axis Keys/Number Keys: “Axis Keys” and “Number Keys” are generic names for the keys for axis operation and number input.</td>
</tr>
<tr>
<td></td>
<td>Keys pressed simultaneously: When two keys are to be pressed simultaneously, the keys are shown with a “+” sign between them, ex. [SHIFT]+[COORD]</td>
</tr>
<tr>
<td>Displays</td>
<td>The menu displayed in the programming pendant is denoted with { }. ex. (JOB)</td>
</tr>
</tbody>
</table>

Description of the Operation Procedure

In the explanation of the operation procedure, the expression “Select • • •” means that the cursor is moved to the object item and the SELECT key is pressed, or that the item is directly selected by touching the screen.

Registered Trademark

In this manual, names of companies, corporations, or products are trademarks, registered trademarks, or brand names for each company or corporation. The indications of (R) and TM are omitted.
Customer Support Information

If you need assistance with any aspect of your Router Configuration Guide system, please contact Motoman Customer Support at the following 24-hour telephone number:

(937) 847-3200

For routine technical inquiries, you can also contact Motoman Customer Support at the following e-mail address:

technicalsupport@motoman.com

When using e-mail to contact Motoman Customer Support, please provide a detailed description of your issue, along with complete contact information. Please allow approximately 24 to 36 hours for a response to your inquiry.

Please use e-mail for routine inquiries only. If you have an urgent or emergency need for service, replacement parts, or information, you must contact Motoman Customer Support at the telephone number shown above.

Please have the following information ready before you call Customer Support:

- System Ethernet/IP Safety Function
- Robots ___________________________
- Primary Application ___________________________
- Controller DX200
- Software Version Access this information on the Programming Pendant’s LCD display screen by selecting {MAIN MENU} - {SYSTEM INFO} - {VERSION}
- Robot Serial Number Located on the robot data plate
- Robot Sales Order Number Located on the DX200 controller data plate
The Problem

RSLogix 5000 does not allow a single EtherNet/IP scanner card (such as 1756-ENBT) to reference the same IP address more than once. Due to this limitation it is impossible to reference the robot controller’s EtherNet/IP Safe connection and general EtherNet/IP connection to the GuardLogix PLC when both adapters are configured to use the same IP address. Additionally, the robot controller only has one IP address. One solution is to include two EtherNet/IP scanner cards in the PLC - but this is expensive, consumes an additional PLC slot, and often comes at a surprise to the end user at the time of integration.

This document describes a hardware based solution to allow connection to the robot controller in two different ways as both a:

- **Numeric IP Address**: used for the Ethernet/IP-Safety connection
- **Host Name**: used for the general Ethernet/IP-Safety connection

The solution that is documented in this publication uses an EtherNet router that is configured to use a Dynamic Name Service (DNS) which allows an alphanumeric name to be resolved through an IP address.

This publication was developed to overcome a specific limitation in the RSLogix 5000 software. It is known that this limitation exists in software version 24 and older. This limitation may also exist in newer software, it should be tested! Rockwell is also aware of this limitation and suggests this approach as a workaround.
2 Hardware Required

This document will reference specific hardware to complete the configuration. Other EtherNet router solutions may work, but the steps may need some adjustment. If different hardware is used, the manufacturer of that hardware should be consulted for assistance. Yaskawa Motoman Customer Service will not be able to provide support for this portion of the EtherNet/IP network configuration.

<table>
<thead>
<tr>
<th>Item/ Description</th>
<th>Manufacture</th>
<th>Item Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC with Windows 7</td>
<td>Various</td>
<td>Various</td>
</tr>
<tr>
<td>Router with DNS</td>
<td>Red Lion Controls</td>
<td>RAM-6021 (Yaskawa Part No. 175158-1)</td>
</tr>
<tr>
<td>GuardLogix PLC</td>
<td>Rockwell Automation</td>
<td>Configuration as Tested:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Slot 0: 1756-L61S (tested firmware:19.11)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Slot 1: 1756-LSP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Slot 2: 1756-ENBT/A (tested firmware: 5.1)</td>
</tr>
<tr>
<td>RSLogix 5000 v19 (software)</td>
<td>Rockwell Automation</td>
<td></td>
</tr>
</tbody>
</table>
3 Setup the Physical Network

First we need to define the physical topology of the network, using the Red Lion Controls router. This document uses a Red Lion Controls router, model #: RAM-6021, to do all configurations.

Below are two sample network configurations, these are only an example and not an exhaustive implementation.

3.1 Example A: One Router

3.2 Example B: One Router and Two Switches

In this case it is important that the PLC is attached directly to a router EtherNet port. Packets from the other devices must go through the router before being directed to the PLC for Host Name resolution.
4 Red Lion Router Settings:

This section defines the process to "map" a static IP address to a Host Name in the Red Lion Controls RAM-6021 router. This will use the Dynamic Name Service (DNS) function in the router. Other routers may have a similar function, but the approach will vary for each manufacturer's device.

1. Default router IP address is: 192.168.1.1
2. Configure PC to be on same subnet, for instance set PC to 192.168.1.20.
3. Enter this address into web browser on a PC.
   - http://192.168.1.1:10000
4. Login with following credentials
   - User Name: admin
   - Password: <last six digits of the unit's serial number>
5. From the upper menu bar, go to "Network -> DNS Settings"
6. Enter the router's IP address as the primary DNS server (1) then:
   a) press [Save] button (2).
   b) press [Apply] button (3).

7. Add the Static Hosts/robot controller(s) to the configuration. These are the connection items that the RSLogix needs to define both the “General EtherNet/IP connection” and the “Safety EtherNet/IP connection.”
   a) Press the [Add] button below the “Static Hosts” area:
Red Lion Router Settings:

b) For each robot controller enter the required information:
   - **Host Name:** Robot
   - **Enter Domain:** <skip for this application>
   - **Enter IP Address:** 192.168.1.31

c) Press the [Finish] button when complete.

8. Confirm the “Static Host” information entered is correct.

**Static Hosts**

<table>
<thead>
<tr>
<th>Host Name</th>
<th>Domain</th>
<th>IP Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robot</td>
<td></td>
<td>192.168.1.31</td>
</tr>
</tbody>
</table>

9. Repeat step 5 and step 6 for all entries as required.
10. Press the [Save] button and [Apply] button when complete with registering the settings in the router.
5 PC Settings

This section is used to confirm that the router is setup. This will confirm that the Host Name is configured and increase the chances of successful communication with the PLC and robot controller.

1. On the local PC, go to the Control Panel and view the network settings. Open the local network adapter that will be used on the PLC/Robot/Automation network.

2. Press the [Properties] button.

3. Find “Internet Protocol Version 4 (TCP/IPv4)” and open the setting
4. The static IP is probably configured. The missing step here is to add the DNS server. Enter the IP address of the Red Lion router.
6 Set-up Host Name and Gateway on DX200 Robot Controller

This section will use the PC to confirm that the DNS function is operating in the router and that the robot controller will respond to Host Name requests. Two different tools will be used.

1. Boot the controller in Maintenance Mode.

2. Under security settings, login as Manager.

3. Go to menu buttons: SYSTEM → SETUP
   a) Select: OPTION FUNCTION
   b) Move down to NETWORK and press “Select” key on DETAIL
   c) At the NETWORK screen enter these details
      • HOST NAME: Robot (Must match settings above)
      • DOMAIN NAME: <leave empty>
      • HOST SETUP: Press “Select” at DETAIL
      • Enter 192.168.1.1 for the “DEFAULT GATEWAY” value. This must be the IP address of the router.
   d) Accept all changes and Modify prompts.

4. Because the FSU is enabled, Flash Reset will need to be executed.
   a) Reboot into Normal Mode.
   b) Confirm the settings.
      i) Login to Management Mode
      ii) Go to SYSTEM ' NETWORK SERVICE
      iii) Confirm the settings match what was added in Maintenance Mode, for instance:
7 Test Host Name Settings

This section will use the PC to confirm that the DNS function is operating in the router and that the robot controller will respond to Host Name requests. Two different tools will be used.

1. Cycle power to the PLC, Robot, and Router. This seems to yield best results after registering the above settings.

   **NOTE** Frequently the test below fail when step 1 is skipped.

2. Do a simple ping command. Try to ping the Host Name defined above.
   - In this supplement, “Robot” is defined as the Host Name.
   - Windows requires a period (".") be added after the Host Name for this to work, see the example below.

   ![Ping Example](image)

3. Try an IP address scanning tool.
   - Download and install "Angry IP Scanner" (freeware)
     - [http://angryip.org/download/#windows](http://angryip.org/download/#windows)
   - Using this tool to find active IP addresses on the network and report any Hostname available.

4. Adjust the IP Range to match the expected addresses on the network.
   - For example, from: 192.168.1.0 to 192.168.1.40
5. Press the [Start] button and wait for the Scanning complete dialog.

**NOTE**

After pressing the [Start] button it will take approximately six seconds for the Scanning complete dialog to appear for 40 host.

6. Examine the scan results, verifying the IP address is found and the Hostname is configured.
RSLogix 5000 Settings

After all communication settings are confirmed the Rockwell PLC portion can be configured with confidence.

1. A PLC program must be prepared and downloaded to the PLC. Some of these settings must be changed while online with the PLC.
2. Go online with the PLC.

If you cannot go online, you will not see these values. If offline the below screen shot will show all values disabled (greyed out.)

3. In the I/O Configuration tree, select the 1756-ENBT card to be used for communicating with the robot controller.
   a) Right click on the card and select “Properties.”
   b) Change the tab to “Internet Protocol.”
   c) Enter the “Primary DNS Server Address.” This will be the IP address of the router. In this case enter 192.168.1.1.

4. Press the [Set] button in the bottom right corner of this module’s properties.
5. Save the project and confirm upload tag values.
6. Go offline with RSLogix5000.
7. Add the general EtherNet/IP adapter. Use the “Host Name” of the Robot Controller.
   
   a) Enter values for the IO Size and Instance IDs. (The values shown below can be changed based on the I/O size requirements for each system configuration.)

   • The “Host Name” is selected for the general connection.
   • The safety module value MUST use a numeric IP.
   • The important part of this guide is the “Host Name” value!
   • The IO Size and Instance IDs can vary depending on the configuration.

8. When setting up the EtherNet/IP - Safety connection, follow the procedures in the “EtherNet/IP-Safety Manual” (170559-1CD) For example:
9. Download the PLC project after completing the EtherNet/IP-Safe settings.

10. Upon executing the correct commands it is possible to have both communication schemes (safe and non-safe) to the robot from one PLC Scanner card. Successful communication is indicated by the following events:

- No yellow triangles appear next to the EtherNet/IP communication interfaces
- The “I/O OK” indicator stays solid green.

The “I/O OK” indicator indicates communication for all dependent devices in the network. For the configuration below, both connections to the robot are working correctly. If other devices are present, and are not configured communication faults could occur.
DX200 OPTIONS SUPPLEMENT

FOR EtherNet/IP SAFETY FUNCTION
(ROUTER CONFIGURATION GUIDE:
ALLOW ROCKWELL GUARDLOGIX PLC
WITH ONE ETHERNET/IP SCANNER CARD)

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for ongoing product modifications and improvements.