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 the EtherNet/IP Safety of the 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

- Some drawings in this manual are shown with the protective covers or shields removed for clarity. Be sure all covers and shields are replaced before operating this product.
- 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”.

---

**PROHIBITED**

- Do not use or keep the board in the following environmental conditions.
  - Where exposed to direct sunshine
  - Where vibration or impact occurs
  - Where high humidity exists
  - Where a strong magnetic field exists
  - Where much dust exists
  - Where a sudden change in the temperature occurs
  - Where corrosive gases occur
  - Where condensation occurs

Improper usage of the board may damage the board.
WARNING

• Before operating the manipulator, check that servo power is turned OFF when the emergency stop buttons on the front door of the DX200 and programming pendant are pressed. When the servo power is turned OFF, the SERVO ON LED on the programming pendant is turned OFF.

Injury or damage to machinery may result if the emergency stop circuit cannot stop the manipulator during an emergency. The manipulator should not be used if the emergency stop buttons do not function.

Figure 1: Emergency Stop Button

• Once the emergency stop button is released, clear the cell of all items which could interfere with the operation of the manipulator. Then turn the servo power ON.

Injury may result from unintentional or unexpected manipulator motion.

Figure 2: Release of Emergency Stop

• Observe the following precautions when performing teaching operations within the P-point maximum envelope of the manipulator
  – Be sure to use a lockout device to the safeguarding when going inside. Also, display the sign that the operation is being performed inside the safeguarding and make sure no one closes the safeguarding.
  – View the manipulator from the front whenever possible.
  – Always follow the predetermined operating procedure.
  – Keep in mind the emergency response measures against the manipulator’s unexpected motion toward you.
  – Ensure that you have a safe place to retreat in case of emergency.

Improper or unintended manipulator operation may result in injury.

• Confirm that no persons are present in the P-point maximum envelope of the manipulator and that you are in a safe location before:
  – Turning ON the DX200 power
  – Moving the manipulator with the programming pendant
  – Running the system in the check mode
  – Performing automatic operations

Injury may result if anyone enters the P-point maximum envelope of the manipulator during operation. Always press an emergency stop button immediately if there are problems. The emergency stop buttons are located on the right of the front door of the DX200 and the programming pendant.

• Before wiring, be sure to turn OFF the power supply and put up a warning sign, such as “DO NOT TURN ON THE POWER.”

Failure to observe this warning may result in an electric shock or an injury.
**WARNING**

- Do not touch the inside of the panel for 5 minutes after the power is turned OFF. The remaining charged voltage in the capacitor may cause an electric shock or an injury.
- Be sure to close the door and install the protection cover while the power is turned ON.

Failure to observe this warning may result in a fire or an electric shock.

**CAUTION**

- Perform the following inspection procedures prior to conducting manipulator teaching. If problems are found, repair them immediately, and be sure that all other necessary processing has been performed.
  - Check for problems in manipulator movement.
  - Check for damage to insulation and sheathing of external wires.
- Always return the programming pendant to the hook on the cabinet of the DX200 after use.

The programming pendant can be damaged if it is left in the manipulator's work area, on the floor, or near fixtures.

Read and understand the Explanation of Warning Labels in the DX200 Instructions before operating the manipulator:
- The wiring and mounting must be performed by authorized and qualified personnel.

Failure to observe this caution may result in a fire or an electric shock.
- Make sure that there is no foreign matter such as metal chips on the board.
In case of malfunction, etc. it may result in an injury or damage the board.
- Make sure that there is no damage or deflection of parts on the board.
In case of malfunction, etc. it may result in an injury or damage the board.
- Correctly connect each cable and connector.
Failure to observe this caution may result in a fire or damage the board.
- Set the switches, etc. correctly.
Malfunction, caused by an incorrect setting, may result in an injury or damage the board.
- Never touch the mounting surfaces of the board parts directly with fingers.
The generated static electricity may damage the IC.
- Never touch the soldered surfaces of the board directly with fingers. Protrusions on the soldered surface may result in an injury.
- No shock to the board.
The shock may damage the board.
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></td>
</tr>
<tr>
<td>Character Keys/ Symbol Keys</td>
<td>The keys which have characters printed on them are denoted with [ ]. ex. [ENTER]</td>
</tr>
<tr>
<td>Axis Keys/ Number Keys</td>
<td>&quot;Axis Keys&quot; and &quot;Number Keys&quot; are generic names for the keys for axis operation and number input.</td>
</tr>
<tr>
<td>Keys pressed simultaneously</td>
<td>When two keys are to be pressed simultaneously, the keys are shown with a &quot;+&quot; 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 EtherNet/IP Safety Function, 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
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1 Outline

This manual explains settings and other information required for EtherNet/IP Safety communication.

EtherNet/IP Safety communication uses the EtherNet/IP communication function using the standard LAN port of YCP21 board (CN104 connector) (hereinafter, referred to as EtherNet/IP (CPU board)).

The use of the EtherNet/IP Safety enables safety signals to be transferred to and from the safety PLC.

**NOTE**

This manual explains the setting procedures when communicating the EtherNet/IP Safety to the safety PLC manufactured by Rockwell Automation, Inc. For settings, "RSLogix 5000" which is manufactured by Rockwell Automation, Inc., is necessary.

1.1 System Configuration

The safety PLC will be the safety scanner for EtherNet/IP Safety communication. The DX200 machine safety unit will be the safety adapter. The EtherNet/IP (CPU board) relays data between the safety scanner and the safety adapter as the standard adapter for EtherNet/IP communication. In addition, the standard scanner for EtherNet/IP communication usually works within the safety PLC which is the safety scanner.

The DX200 can activate a non-safety adapter and a non-safety scanner at the same time as the safety adapter. For the details of the non-safety adapter and the non-safety scanner, refer to "DX200 OPTIONS INSTRUCTIONS EtherNet/IP COMMUNICATION FUNCTION (FOR STANDARD LAN PORT)*."

When using EtherNet/IP Safety, the Boot version of the machine safety unit should be 2.00 or more. When the version is lower than 2.00, the alarm 510 software version unmatch [30] occurs.
1.2 Restrictions

Simultaneous usage of EtherNet/IP Safety communications functions with other functions is described below.

Functions that can be used simultaneously

- Ethernet server function
- MotoPlus
- Communication with digital welding machine

Functions that cannot be used simultaneously

- CIP message communication
2 Hardware Specifications

Refer to "DX200 OPTIONS INSTRUCTIONS EtherNet/IP COMMUNICATION FUNCTION (FOR STANDARD LAN PORT)" for the information on the EtherNet/IP (for standard LAN port) hardware specifications.
3 Connecting of the Communication Cable

Refer to "DX200 OPTIONS INSTRUCTIONS EtherNet/IP COMMUNICATION FUNCTION (FOR STANDARD LAN PORT)" for how to connect the communication cable for the EtherNet/IP (for standard LAN port).

When using a switching hub to connect a communication cable, use the industrial switching hub which Yaskawa recommends.

Switching hub recommended by Yaskawa: Model type EDS-205 (made by MOXA Inc.)
4 Setting for EtherNet/IP Safety

4.1 Settings for DX200 Side

4.1.1 Displaying the EtherNet/IP (CPU Board) Setting Window

For the switching of whether to use an EtherNet/IP (CPU board) or not, customers cannot change it.

Contact your YASKAWA representative.

Perform the following settings in the management mode.

The settings cannot be performed in the operation mode or the edit mode.

For using an EtherNet/IP (for standard LAN port) in EtherNet/IP communication for the DX200, the optional function settings and the I/O module settings should be performed according to the following procedures.

1. Turn ON the power supply while pressing {Main Menu} simultaneously.
   - The maintenance mode starts-up.

2. Change the security mode to management mode.
3. Select {SYSTEM} under the main menu.
   – The sub menu appears.

4. Select {SETUP}.
   – The SETUP window appears.
5. Select {OPTION FUNCTION}.
   - The OPTION FUNCTION window appears.

6. Select {EtherNet/IP(CPU Board)}.
   - The EtherNet/IP(CPU Board) window appears.
4 Setting for EtherNet/IP Safety
4.1 Settings for DX200 Side

7. Select “DETAIL” for EtherNet/IP(CPU Board).
   - The EtherNet/IP(CPU Board) setting window appears.

   - Description of each setting items

   (1) EtherNet/IP(CPU Board)
       Set whether to use the standard LAN port or not.
       The setting of this item cannot be changed.

   (2) IO SIZE(IN/OUT)
       Displays the total of the IO size set for the adapter and the scanner. The IO size cannot be set in this window.

   (3) ETHERNET
       Perform the Ethernet settings. For details, refer to section 4.1.4 “Ethernet Settings”.

   (4) ADAPTER
       Perform the adapter settings. For details, refer to section 4.1.5 “Adapter Settings”.

   (5) SCANNER
       Perform the scanner settings. For details, refer to section 4.1.6 “Scanner Settings”.

   (6) EtherNet/IP Safety
       Indicates whether to use safety communication using EtherNet/IP Safety or not.
       The setting of this item cannot be changed. (Fixed to “USED”)

   (7) SAFETY IO SIZE
       Displays the IO size for the DX200 (safety adapter) used for EtherNet/IP Safety communication. (Fixed to “8 byte”)

   (8) VIRTUAL COMM
       This item is the mode which is used when the robot performs the test operation. When starting the DX200 without connecting the standard LAN port to the safety PLC, set this item as “VIRTUAL”.
       Only when setting this item, change the security mode to the safety mode.
4.1.2 Device Information List Settings

For the device information list settings, refer to section 4.2.2 “Setting the Device Information List” in “DX200 OPTIONS INSTRUCTIONS EtherNet/IP COMMUNICATION FUNCTION (FOR STANDARD LAN PORT)”. 

4.1.3 General Settings for EtherNet/IP(CPU Board)

1. Confirm that EtherNet/IP(CPU Board) is set to “USED”.

2. Confirm that EtherNet/IP Safety is set to “USED”.

4.1.4 Ethernet Settings

For the Ethernet settings, refer to section 4.2.4 “Ethernet Setting” in “DX200 OPTIONS INSTRUCTIONS EtherNet/IP COMMUNICATION FUNCTION (FOR STANDARD LAN PORT)”. 

4.1.5 Adapter Settings

For the adapter settings, refer to section 4.2.5 “Adapter Setting” in “DX200 OPTIONS INSTRUCTIONS EtherNet/IP COMMUNICATION FUNCTION (FOR STANDARD LAN PORT)”. 

4.1.6 Scanner Settings

For the scanner settings, refer to section 4.2.6 “Scanner Setting” in “DX200 OPTIONS INSTRUCTIONS EtherNet/IP COMMUNICATION FUNCTION (FOR STANDARD LAN PORT)”. 

**NOTE**

When performing the normal operation, make sure to set this item to “SAFETY”.

When the connection with the safety PLC is established with the setting remaining as “VIRTUAL”, the setting is automatically changed to “SAFETY”.

---

When performing the normal operation, make sure to set this item to “SAFETY”.

When the connection with the safety PLC is established with the setting remaining as “VIRTUAL”, the setting is automatically changed to “SAFETY”.

---

![Diagram](image)
4.1.7 IO Module Settings

If the standard LAN port settings are changed, the IO module needs to be set as well. Perform the IO module settings following the procedures below.

1. (the continuation of the standard LAN port settings)
   - The IO module window (the first half) appears.

   ![IO Module Window]

   - Confirm that the values, which are calculated by adding 8 to the IO size already set, are set to IO for DI and DO of ST#.
     However, the data size for the safety signals is not included.

2. Press [ENTER].
   - The IO module window (the latter half) appears.

   ![IO Module Window (Latter Half)]

   - Confirm that the values, which are calculated by adding 8 to the IO size already set, are set to IO for DI and DO of ST#.
     However, the data size for the safety signals is not included.
3. Press [ENTER].
   – The confirmation dialog box appears.

4. Select {YES}.
   – If the IO module is properly installed, select {YES}. The IO module settings will be updated, and the external IO setup window appears.
4.1.8 External IO Settings

1. The EXTERNAL IO SETUP window appears.

2. Select “AUTO” or “MANUAL” for the allocation mode.
   - After “AUTO”/“MANUAL” is selected, the selection menu appears.

If the allocation mode is changed from “MANUAL” to “AUTO”, the allocation data that has been set will be lost, and re-allocating will be executed in the auto mode. If the set allocation data needs to be kept, save the data in the external memory menu in advance.
3. Select an allocation mode to be set.
   - When allocating the I/O signal automatically, select “AUTO”. When allocating the I/O signal manually, select “MANUAL”.
   - The selected allocation mode will be set.

4. Select “DETAIL” of (EXTERNAL IO ALLOCATION).
   - When selecting “AUTO” for the allocation mode, the following steps 5 to 7 are not necessary. Perform the operation from step 8.
   - When selecting “MANUAL” for the allocation mode, perform the following steps 5 to 7 for the items necessary for manual settings.
4. Setting for EtherNet/IP Safety
4.1 Settings for DX200 Side

5. Select an external I/O signal number to be changed from the original. (*#20060* is selected in the setting example.)
   - The select menu appears.

6. Select “MODIFY” and enter a desired external input signal number to replace with the original. (*20200* is entered in the setting example.)
   - The external input signal number will be changed.

7. Select and change the external input signal number with the same steps.
   - Repeat the selecting and changing operation for the desired allocation.
8. Press [ENTER].
   - The external output signal allocation window appears.

9. Select and change an external output signal number by the same procedure as the external input signal number.
   - Repeat the selecting and changing operation for the desired allocation.

10. Press [ENTER].
    - The confirmation dialog box appears.
11. Select {YES}.

- Return to the setting window after the setting contents are confirmed.

Settings for DX200 side are completed here.

Proceed to create an ESD file.
4.2 Creating an EDS File

When setting the communication of EtherNet/IP Safety, the EDS file (Electronic Data Sheet) may be required. (It depends on the safety scanner to be used.) Use the EDS file created in the following procedures. For the details of the EDS file, refer to the specifications of EtherNet/IP and CIP. For how to use the communication master, the communication setting tool (network configurator), and the created EDS file, refer to the instruction manual of each equipment.

4.2.1 Creating Procedures of EDS File

1. Turn ON the power supply while pressing {Main Menu} simultaneously.
   – The maintenance mode starts-up.

2. Select {EX. MEMORY} in the Main Menu.
   – The sub menu appears.

3. Select {SAVE}.
   – The SAVE window appears.

---

![Main Menu](image1)

**Please select a Main Menu.**

![SAVE Window](image2)

**SAVE**

- UN-USED MEMORY 2,5183
- USER 
  - FOLDER

![SAVE Window](image3)

**SAVE**

- Controller Information
- EDS/GOOSE FILE SAVE
- SYSTEM UPLOAD
4. Select “EDS FILE SAVE”.

- The EDS FILE LIST window appears.

5. Select “Ethernet/IP CPU(Resolutes).

- "★" appears to the selected board.
4. Setting for EtherNet/IP Safety
4.2 Creating an EDS File

6. Press [Enter].
   - The confirmation dialog box appears.

7. Select {YES}.
   - An EDS file is created in the currently valid device (CompactFlash or USB memory).
4.3 Settings for PLC side

For performing EtherNet/IP communication settings for EtherNet/IP Safety, the following software manufactured by Rockwell Automation, Inc. is necessary.

- RSLogix 5000 programming software
- RSLinx software

This section explains the setting procedures using software manufactured by Rockwell Automation, Inc. The software which is used as an example is “RSLogix 5000 (V20.01.00 (CPR 9 SR 5))”. For more information of the setting procedures, refer to the instruction manual for software manufactured by Rockwell Automation, Inc.

4.3.1 Setting Environment

As shown in the figure below, confirm that the PC, PLC, and DX200 are connected using Ethernet cables, and after performing the procedure described in section 4.1 “Settings for DX200 Side”, confirm that the DX200 is operating in Online mode.

4.3.2 Safety PLC Settings

When setting the safety scanner, the EDS file for DX200 EtherNet/IP Safety (for standard LAN port) may be required. (Depending on the safety scanner used.) Use the EDS file created in section 4.2 “Creating an EDS File”.

This section explains the setting procedures when using the safety PLC manufactured by Rockwell Automation, Inc. “Logix 5572S Automation Controller 4M/2M 1756-L72S” + “Logix L7SP SIL3 Ple Safety Partner 1756-L7SP” + “CLX HI-CAP ENET/IP MODULE-TP 1756-EN2T” as the safety scanner as an example.

When using equipment which is not manufactured by Rockwell Automation, Inc., refer to the instruction manual of each equipment.

At the time of creating this instructions, the settings for “CLX HI-CAP ENET/IP MODULE-TP 1756-EN2T” used in this section are as follows:

- IP address 192.168.1.xxx
- Subnet mask 255.255.255.0
- Gateway address 0.0.0.0

Before performing settings, check the network environment to use and the information on equipment to use.
4. Setting for EtherNet/IP Safety

4.3 Settings for PLC side

1. Start RSLogix 5000.

2. Select {File} - {New…}, and then create a new project.

3. Enter a project name in {Name}, and then select {OK}.

4. Right-click {I/O Configuration}, and then select {New Module…}. 
5. Select 1756-EN2T, and then select {Create}.

6. Enter a module name in {Name} and an IP address in {IP Address}, and then select {OK}.

7. Select {Close}.
8. Right-click {Ethernet}, and then select {New Module...}.

9. Select ETHERNET-SAFETY MODULE, and then select {Create}. 
4 Setting for EtherNet/IP Safety
4.3 Settings for PLC side

10. Select {Change...}.

11. In the {Module} tab, perform the following settings.

- Vendor: 44
- Product Type: 140
- Product Code: 1282
- Major Revision: 1
- Minor Revision: 1
- Electric Keying: Compatible Module

**NOTE** Only in case the DX200 system version is DN1.30.00A-35 or DN1.31.00A-35, set Product Code to 1281.
12. When the above settings are completed, select {Connection}.

13. In the {Connection} tab, perform the following settings.

Safety Input:
- Input Assembly Instance: 776
- Output Assembly Instance: 1024
- Size(8-bit): 8

Safety Output:
- Input Assembly Instance: 1024
- Output Assembly Instance: 904
- Size(8-bit): 8
- Configuration Assembly Instance: 1024
4. Setting for EtherNet/IP Safety

4.3 Settings for PLC side

14. After settings, select {OK}.

![Module Definition dialog box]

15. When the following dialog box appears, select {Yes}.

![RSLogix 5000 dialog box]

16. Enter a module name in {Name} and an IP address in {IP Address}, and then select the {Safety} tab.

![Module Properties dialog box]
17. Uncheck {Configuration Signature} in {Safety} tab, set the value of {Requested Packet Interval(RPI)(ms)} in {Safety Input} to 16 or more, and then select {OK}.

18. The value of {Requested Packet Interval(RPI)(ms)} in {Safety Output} can be set in Safety Task. Right-click {Safety Task}, and then select {Properties}.
19. Select {Configuration} tab.

20. The value set in {Period} becomes the value of {Requested Packet Interval(RPI)(ms)} in {Safety Output}. Set 16 or more.

For the values of {Requested Packet Interval(RPI)(ms)} in {Safety Input}/{Safety Output}, set 16 or more.
21. Right click ([0] 1756-L72S) and press {Properties}.

22. Press {Date/Time} tab.
23. Check {Enable Time Synchronization}, and then press {OK}.

24. Turn ON the power supply of PLC, and then select {Communications} - {Who Active} while the Ethernet cable is connected.
4. Setting for EtherNet/IP Safety

4.3 Settings for PLC side

25. Select PLC which is to be connected to the Ethernet network, and then select {Go Online}.

26. When the following dialog box appears, select {Download}.
27. When the following dialog box appears, select {Download}.

28. When the following dialog box appears, select {No}.
29. Right-click (ETHERNET-SAFETY MODULE), and then select (Properties).

30. Select {...}.

![Screenshot of SCADA interface showing EtherCAT Safety Module configuration.](image)
31. When {Set} cannot be pressed as shown below, select {Cancel}. When {Set} can be pressed, the performing of steps 32 to 42 is not required. Perform the procedure from step 43.

32. Select {Connection} tab.

33. Check {Inhibit Connection}, and then select {Apply}.
34. When the following dialog box appears, select {Yes}.

After selecting {Yes}, if the alarm "AL1871 M-SAF SEQUENCE WATCH ERROR" occurs at the DX200, cycle the control power of the DX200 OFF/ON, start in Online mode, and then perform the following operations.

35. Select {Safety} tab.

36. Select {Reset Ownership}. 
4. Setting for EtherNet/IP Safety

4.3 Settings for PLC side

37. When the following dialog box appears, select {Yes}.

And then, when the following dialog box appears, select {Yes}.

38. Select {Connection} tab.

39. Uncheck {Inhibit Connection}, and then select {Apply}. 

---

EtherNet/IP Safety Function
40. When the following dialog box appears, select {Yes}.

![Dialog Box]

41. Select {General} tab.

![General Tab]

42. Select {...}.
43. Select {Set}, and then set a TUNID (Target Unique Network Identifier) for the DX200 safety adapter. The TUNID is generated by the safety adapter’s SNN (Safety Network Number: the unique number allocated to each node of the safety network) and IP address. The value of the SNN specified in this step can be confirmed on the screen of the programming pendant. For confirming procedures, refer to section 4.4 “Confirming SNN”.

44. Select {YES}.
45. Select {Tools} - {Safety} - {Generate Signature}, and then create Safety Signature.

46. Change the operation mode to {Run Mode}.

47. Select {Yes}.
48. Select {Safety Unlocked} - {Safety Lock/Unlock...}.

49. Select {Lock}.

50. When the check box of {I/O OK} turns to green for RSLogix 5000, it means that communication is established.
4.4 Confirming SNN

The procedures of confirming the SNN specified in the step 43 of section 4.3.2 “Safety PLC Settings" are described below.

1. Start up the DX200 in the online mode.
2. Select {SYSTEM} under the main menu.
3. Select {FIELDBUS INFORMATION}.
   – The value of the SNN currently set is shown in hexadecimal notation.

![Screenshot of Fieldbus Information]

Safety Network Number 3C77_0200_7542
5 Safety Signals

5.1 Safety Signal Specifications

Among safety signals handled by EtherNet/IP Safety, there are an 8-byte safety output signal output from the safety PLC to the DX200, and an 8-byte safety input signal input from the DX200 to the safety PLC. These signals can be used for safety logic circuits and for functional safety.

Specifications for the safety signals are as follows.

- When communication between the safety PLC and the DX200 has not been established, or when a communication error has occurred, the value of the DX200 safety output signal will be set to OFF (0) regardless of the safety PLC output signal.
- The safety PLC output signal is duplicated within the machine safety unit. When a duplicated signal value mismatch is detected, the value of the DX200 safety output signal will be set to OFF (0) regardless of the safety PLC output signal.
- When a major alarm occurs at the machine safety unit, the safety output signal and safety input signal values are set to OFF (0) regardless of their actual values.
### 5.2 Safety Signal Allocation

The data for safety signals is allocated to concurrent I/O Internal Control Status Signals. Control status signals are allocated as follows.

#### 5.2.1 Output Signal from Safety PLC (8 byte)

<table>
<thead>
<tr>
<th>Bit 7</th>
<th>Bit 6</th>
<th>Bit 5</th>
<th>Bit 4</th>
<th>Bit 3</th>
<th>Bit 2</th>
<th>Bit 1</th>
<th>Bit 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>80527</td>
<td>80526</td>
<td>80525</td>
<td>80524</td>
<td>80523</td>
<td>80522</td>
<td>80521</td>
<td>80520</td>
</tr>
<tr>
<td>Safety signal (Byte 0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bit 7</th>
<th>Bit 6</th>
<th>Bit 5</th>
<th>Bit 4</th>
<th>Bit 3</th>
<th>Bit 2</th>
<th>Bit 1</th>
<th>Bit 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>80537</td>
<td>80536</td>
<td>80535</td>
<td>80534</td>
<td>80533</td>
<td>80532</td>
<td>80531</td>
<td>80530</td>
</tr>
<tr>
<td>Safety signal (Byte 1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bit 7</th>
<th>Bit 6</th>
<th>Bit 5</th>
<th>Bit 4</th>
<th>Bit 3</th>
<th>Bit 2</th>
<th>Bit 1</th>
<th>Bit 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>80547</td>
<td>80546</td>
<td>80545</td>
<td>80544</td>
<td>80543</td>
<td>80542</td>
<td>80541</td>
<td>80540</td>
</tr>
<tr>
<td>Safety signal (Byte 2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bit 7</th>
<th>Bit 6</th>
<th>Bit 5</th>
<th>Bit 4</th>
<th>Bit 3</th>
<th>Bit 2</th>
<th>Bit 1</th>
<th>Bit 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>80557</td>
<td>80556</td>
<td>80555</td>
<td>80554</td>
<td>80553</td>
<td>80552</td>
<td>80551</td>
<td>80550</td>
</tr>
<tr>
<td>Safety signal (Byte 3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bit 7</th>
<th>Bit 6</th>
<th>Bit 5</th>
<th>Bit 4</th>
<th>Bit 3</th>
<th>Bit 2</th>
<th>Bit 1</th>
<th>Bit 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>80567</td>
<td>80566</td>
<td>80565</td>
<td>80564</td>
<td>80563</td>
<td>80562</td>
<td>80561</td>
<td>80560</td>
</tr>
<tr>
<td>Safety signal (Byte 4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bit 7</th>
<th>Bit 6</th>
<th>Bit 5</th>
<th>Bit 4</th>
<th>Bit 3</th>
<th>Bit 2</th>
<th>Bit 1</th>
<th>Bit 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>80577</td>
<td>80576</td>
<td>80575</td>
<td>80574</td>
<td>80573</td>
<td>80572</td>
<td>80571</td>
<td>80570</td>
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<tr>
<td>Safety signal (Byte 5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bit 7</th>
<th>Bit 6</th>
<th>Bit 5</th>
<th>Bit 4</th>
<th>Bit 3</th>
<th>Bit 2</th>
<th>Bit 1</th>
<th>Bit 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>80587</td>
<td>80586</td>
<td>80585</td>
<td>80584</td>
<td>80583</td>
<td>80582</td>
<td>80581</td>
<td>80580</td>
</tr>
<tr>
<td>Safety signal (Byte 6)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bit 7</th>
<th>Bit 6</th>
<th>Bit 5</th>
<th>Bit 4</th>
<th>Bit 3</th>
<th>Bit 2</th>
<th>Bit 1</th>
<th>Bit 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>80597</td>
<td>80596</td>
<td>80595</td>
<td>80594</td>
<td>80593</td>
<td>80592</td>
<td>80591</td>
<td>80590</td>
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<tr>
<td>Safety signal (Byte 7)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 5.2.2 Input Signal to Safety PLC (8 byte)

<table>
<thead>
<tr>
<th>Safety Signal (Byte 0)</th>
<th>Bit 7</th>
<th>Bit 6</th>
<th>Bit 5</th>
<th>Bit 4</th>
<th>Bit 3</th>
<th>Bit 2</th>
<th>Bit 1</th>
<th>Bit 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>80607</td>
<td>80606</td>
<td>80605</td>
<td>80604</td>
<td>80603</td>
<td>80602</td>
<td>80601</td>
<td>80600</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Safety signal (Byte 1)</th>
<th>Bit 7</th>
<th>Bit 6</th>
<th>Bit 5</th>
<th>Bit 4</th>
<th>Bit 3</th>
<th>Bit 2</th>
<th>Bit 1</th>
<th>Bit 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>80617</td>
<td>80616</td>
<td>80615</td>
<td>80614</td>
<td>80613</td>
<td>80612</td>
<td>80611</td>
<td>80610</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Safety signal (Byte 2)</th>
<th>Bit 7</th>
<th>Bit 6</th>
<th>Bit 5</th>
<th>Bit 4</th>
<th>Bit 3</th>
<th>Bit 2</th>
<th>Bit 1</th>
<th>Bit 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>80627</td>
<td>80626</td>
<td>80625</td>
<td>80624</td>
<td>80623</td>
<td>80622</td>
<td>80621</td>
<td>80620</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Safety signal (Byte 3)</th>
<th>Bit 7</th>
<th>Bit 6</th>
<th>Bit 5</th>
<th>Bit 4</th>
<th>Bit 3</th>
<th>Bit 2</th>
<th>Bit 1</th>
<th>Bit 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>80637</td>
<td>80636</td>
<td>80635</td>
<td>80634</td>
<td>80633</td>
<td>80632</td>
<td>80631</td>
<td>80630</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Safety signal (Byte 4)</th>
<th>Bit 7</th>
<th>Bit 6</th>
<th>Bit 5</th>
<th>Bit 4</th>
<th>Bit 3</th>
<th>Bit 2</th>
<th>Bit 1</th>
<th>Bit 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>80647</td>
<td>80646</td>
<td>80645</td>
<td>80644</td>
<td>80643</td>
<td>80642</td>
<td>80641</td>
<td>80640</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Safety signal (Byte 5)</th>
<th>Bit 7</th>
<th>Bit 6</th>
<th>Bit 5</th>
<th>Bit 4</th>
<th>Bit 3</th>
<th>Bit 2</th>
<th>Bit 1</th>
<th>Bit 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>80657</td>
<td>80656</td>
<td>80655</td>
<td>80654</td>
<td>80653</td>
<td>80652</td>
<td>80651</td>
<td>80650</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Safety signal (Byte 6)</th>
<th>Bit 7</th>
<th>Bit 6</th>
<th>Bit 5</th>
<th>Bit 4</th>
<th>Bit 3</th>
<th>Bit 2</th>
<th>Bit 1</th>
<th>Bit 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>80667</td>
<td>80666</td>
<td>80665</td>
<td>80664</td>
<td>80663</td>
<td>80662</td>
<td>80661</td>
<td>80660</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Safety signal (Byte 7)</th>
<th>Bit 7</th>
<th>Bit 6</th>
<th>Bit 5</th>
<th>Bit 4</th>
<th>Bit 3</th>
<th>Bit 2</th>
<th>Bit 1</th>
<th>Bit 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>80677</td>
<td>80676</td>
<td>80675</td>
<td>80674</td>
<td>80673</td>
<td>80672</td>
<td>80671</td>
<td>80670</td>
<td></td>
</tr>
</tbody>
</table>
## 5.2 Safety Signal Allocation

### 5.2.3 Output Signal Status from Safety PLC (1 byte)

<table>
<thead>
<tr>
<th>80847</th>
<th>80846</th>
<th>80845</th>
<th>80844</th>
<th>80843</th>
<th>80842</th>
<th>80841</th>
<th>80840</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Consumer Data Variables**

- **Init_Complete_Out**: It notifies initialization completion status of the safety adapter.
  - (0: Not completed 1: Completed)
- **S_Con_Flt_C_Out**: It notifies failure detection in the safety adapter.
  - (0: Fault 1: OK)
- **S_Run_Idle_Out**: It notifies execution status of the safety adapter.
  - (0: Idle 1: Run)

### 5.2.4 Input Signal Status to Safety PLC (1 byte)

<table>
<thead>
<tr>
<th>80857</th>
<th>80856</th>
<th>80855</th>
<th>80854</th>
<th>80853</th>
<th>80852</th>
<th>80851</th>
<th>80850</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Run_Idle**: It notifies input connection status.
- (0: Idle 1: Run)
### 5.2.5 Status Information (43 byte)

<table>
<thead>
<tr>
<th>Control Input</th>
<th>Name</th>
<th>Description</th>
<th>Valid States</th>
<th>Size (bytes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>80860 to 80867</td>
<td>Input Connection Status</td>
<td>Value indicating run status of the software's safety input connection.</td>
<td>0x00 - Unallocated : no connection established</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0x01 - Initializing : connection started, but not fully established</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0x02 - Established : connection fully established</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0x03 - Closed (Fail) : connection failed</td>
<td></td>
</tr>
<tr>
<td>80870 to 80877</td>
<td>Input Connection Error</td>
<td>If Input Connection Status is in 'Closed (Error)' state, then this value indicates the reason for the dropped connection.</td>
<td>0x00 - No Error : no error detected</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0x01 - Timeout : final consumer timed out</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0x02 - CRC Error : final consumer dropped due to CRC error</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0x03 - Packet Error : final consumer dropped due to error received in Time Coordination Message (other than CRC check failure).</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0x04 - Data Error : all consumers dropped due to inconsistencies in the DATA_IN_A and DATA_IN_B buffers.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0x05 - General Stack Error : all consumers dropped due to error encountered inside CIP stack or layers below (Network Control Process or interface firmware).</td>
<td></td>
</tr>
<tr>
<td>80880 to 80887</td>
<td>Input Connection Consumer Count</td>
<td>The number of consumers the input connection is currently servicing (read only).</td>
<td>0x00 - 0x0F : Valid number of consumers.</td>
<td>1</td>
</tr>
<tr>
<td>80890 to 80897</td>
<td>Input Connection Data Size</td>
<td>The number of safety data bytes the input connection is currently servicing (read only).</td>
<td>0x00 - 0x08 : Valid number of data bytes.</td>
<td>1</td>
</tr>
<tr>
<td>80900 to 81047</td>
<td>Producing Connection Status Bytes (one byte for each possible consumer, 1 through 15)</td>
<td>Bit 0: Consumer_Active_Idle Indicates to the Customer Safety Application if valid Time Coordination Message information has been received for this consumer.</td>
<td>0x00:Idle 0x01:Active</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bit 1: S_Connection_Fault Indicates to the Customer Safety Application if the safety connection to the consumer is OK or Faulted.</td>
<td>0x00:Fault 0x02:OK</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bit 2,3,4,5,6 and 7: Reserved</td>
<td>0x00 : Reserved</td>
<td></td>
</tr>
<tr>
<td>81050 to 81057</td>
<td>Output Connection New Data Flag</td>
<td>CIP Safety Stack shall set this value (write a 1) only if it is read as zero. Customer Safety Application can set this to any zero to determine when data has been updated by the CIP Safety Stack.</td>
<td>0x00 : Output data has not been updated 0x01 : Output data has been updated</td>
<td>1</td>
</tr>
<tr>
<td>Control Input</td>
<td>Name</td>
<td>Description</td>
<td>Valid States</td>
<td>Size (bytes)</td>
</tr>
<tr>
<td>---------------</td>
<td>-----------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>--------------</td>
</tr>
</tbody>
</table>
| 81060 to 81067 | Output Connection Status    | Value indicating run status of the software's safety output connection.     | 0x00 - Unallocated : no connection established  
0x01 - Initializing : connection started, but not fully established  
0x02 - Established : connection fully established  
0x03 - Closed (Fail) : connection failed | 1             |
| 81070 to 81077 | Output Connection Error     | If Output Connection Status is in 'Closed (Error)' state, then this value indicates the reason for the dropped connection. | 0x00 - No Error : no error detected  
0x01 - Timeout : final consumer timed out  
0x02 - CRC Error : final consumer dropped due to CRC error.  
0x03 - Packet Error : final consumer dropped due to error received in Time Coordination Message (other than CRC check failure).  
0x04 - Data Error : all consumers dropped due to inconsistencies in the DATA_IN_A and DATA_IN_B buffers.  
0x05 - General Stack Error : all consumers dropped due to error encountered inside CIP stack or layers below (Network Control Process or interface card/ firmware). | 1             |
| 81080 to 81087 | Output Connection Data Size | The number of safety data bytes the output connection is currently servicing (read only). | 0x00 - 0x08 : Valid number of data bytes. | 1             |
| 81090 to 81097 | Safety Supervisor Device Status | Safety Supervisor device status | 0x00:Undefined  
0x01:Self-Testing  
0x02:Idle  
0x03:Self-Test Exception  
0x04:Executing  
0x05:Abort  
0x06:Critical Fault  
0x07:Configuring  
0x08:Waiting for TUNID | 1             |
| 81100 to 81117 | General Stack Status        | Bits indicating status of various software attributes. If bit is set then attribute is TRUE, if bit is reset then FALSE. | Bits shall be included for the following:  
Interface Card Detected  
Network Cable Detected  
Network-level stack Loaded OK  
Network-level stack Asserted | 2             |
| 81120 to 81137 | General Stack Error         | Error code noting which stack element caused a general error. Software shall write a new error code only if this value is read as 0. Customer Safety Application must clear this value (to 0) for any new error code to appear. | File ID Code. | 2             |
| 81140 to 81157 | Firmware Assertion MainCode | Main code of the firmware assertion | N/A | 2             |
| 81160 to 81197 | Firmware Assertion AddCode  | Additional code of the firmware assertion | N/A | 2             |
### EtherNet/IP Safety Function

#### 5 Safety Signals

##### 5.3 Standard I/O Signal Allocation

<table>
<thead>
<tr>
<th>Control Input</th>
<th>Name</th>
<th>Description</th>
<th>Valid States</th>
<th>Size (bytes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>81240 to 81257</td>
<td>Safety Message Tx Count</td>
<td>Counter value of the sent safety I/O message</td>
<td>N/A</td>
<td>2</td>
</tr>
<tr>
<td>81260 to 81277</td>
<td>Safety Message Rx Count</td>
<td>Counter value of the received safety I/O message</td>
<td>N/A</td>
<td>2</td>
</tr>
<tr>
<td>81280 to 81287</td>
<td>Activity Check</td>
<td>A flag for checking the execution status of the software</td>
<td>N/A</td>
<td>1</td>
</tr>
</tbody>
</table>

#### 5.2.6 Communication Status (1 Byte)

<table>
<thead>
<tr>
<th>Control Input</th>
<th>Name</th>
<th>Description</th>
<th>Valid States</th>
<th>Size (bytes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>81317 to 81310</td>
<td>EtherNet/IP Safety processing status</td>
<td>Communication establishment status between the safety scanner (safety PLC) and the safety adapter (machine safety unit). (0: establishment failure 1: establishment completion)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>81311 to 81310</td>
<td>EtherNet/IP Safety communication status</td>
<td>Safety communication status after establishing communication between the safety scanner (safety PLC) and the safety adapter (machine safety unit). (0: not during communication 1: during communication)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>81312 to 81310</td>
<td>Specifying virtual communication mode</td>
<td>Specifying the virtual communication mode which is set in the maintenance mode (0: not used 1: used)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>81313 to 81310</td>
<td>Virtual communication execution status</td>
<td>Actual communication mode (0: during virtual communication 1: during safety communication)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>81314 to 81310</td>
<td>EtherNet/IP Safety processing status</td>
<td>EtherNet/IP Safety processing status (0: error 1: normal)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE**

The concurrent I/O is not the function for the safety product. For this reason, the signals allocated to the Internal Control Status Signal cannot be used as the safety-related signals.

#### 5.3 Standard I/O Signal Allocation

For how to allocate the standard I/O signal, refer to the “DX200 OPTIONS INSTRUCTIONS EtherNet/IP COMMUNICATION FUNCTION (FOR STANDARD LAN PORT) (165838-1CD)".
6 LED Status Display

As EtherNet/IP Safety does not have LEDs that indicate board status (module status and network status), these statuses are indicated using specific output signals.

The specific output signals can be displayed as quasi-LEDs on the programming pendant screen by using the interface panel function.

6.1 Status Display Pattern

<table>
<thead>
<tr>
<th>Status</th>
<th>Module Status</th>
<th>Network Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>When the power supply is off (cannot display)</td>
<td>Off</td>
<td>Off</td>
</tr>
<tr>
<td>Self-diagnostic underway</td>
<td>Alternating red and green blinking (0.5 sec intervals)</td>
<td>Off</td>
</tr>
<tr>
<td>TUNID waiting status</td>
<td>Alternating red and green blinking (0.5 sec intervals)</td>
<td>Undefined</td>
</tr>
<tr>
<td>TUNID waiting status (After receiving Propose_TUNID service)</td>
<td>Alternating red and green blinking (0.5 sec intervals)</td>
<td>Alternating red and green blinking (0.25 sec intervals)</td>
</tr>
<tr>
<td>Idle status (Waiting for establishment of communication)</td>
<td>Green blinking (0.5 sec intervals)</td>
<td>Undefined</td>
</tr>
<tr>
<td>Communication occurring</td>
<td>Green lights up</td>
<td>Green lights up</td>
</tr>
<tr>
<td>For example, when the DX200 IP address was changed after setting the TUNID.</td>
<td>Red blinking (0.5 sec intervals)</td>
<td>Undefined</td>
</tr>
<tr>
<td>Duplicate IP address with other device</td>
<td>Red blinking (0.5 sec intervals)</td>
<td>Red lights up</td>
</tr>
<tr>
<td>EtherNet/IP Safety major alarm occurring</td>
<td>Red lights up</td>
<td>Undefined</td>
</tr>
</tbody>
</table>

**6.2 Specific Output Signal Allocation**

<table>
<thead>
<tr>
<th>EtherNet/IP Safety LED status</th>
<th>51227</th>
<th>51226</th>
<th>51225</th>
<th>51224</th>
<th>51223</th>
<th>51222</th>
<th>51221</th>
<th>51220</th>
</tr>
</thead>
<tbody>
<tr>
<td>NS red LED</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NS green LED</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MS red LED</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MS green LED</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NS: Network Status           MS: Module Status

**NOTE** Interface panel function is a purchased option. Contact your Yaskawa representative when using this function.
6.3 Interface Panel Setting Method (Purchased Option)

In order to perform the following signal allocation, use the procedure below to make the settings.

<table>
<thead>
<tr>
<th>I/F Panel Display Contents</th>
<th>Specific Output Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>NS(RED)</td>
<td>#51223</td>
</tr>
<tr>
<td>NS(GREEN)</td>
<td>#51222</td>
</tr>
<tr>
<td>MS(RED)</td>
<td>#51221</td>
</tr>
<tr>
<td>MS(GREEN)</td>
<td>#51220</td>
</tr>
</tbody>
</table>

1. Turning ON the DX200 Power
2. Change the security mode to management mode.
3. Select {SYSTEM} under the main menu.
   – The sub menu appears.
4. Select {I/F PANEL SETUP}.
   – The I/F PANEL SETUP window appears.
5. Check that the following settings have been made.

- **GROUP NAME**: Panel 1
- **ARRANGE**: 1A

6. Perform settings using the following procedure. (Use the initial values for settings other than those described below.)

   1. **PANEL COLOR**: RED
   2. **PANEL NAME**: NS(RED)
   3. **INPUT(DISP)**: SIGNAL #51223 A
   4. **SETUP**: VALID
6. LED Status Display

6.3 Interface Panel Setting Method (Purchased Option)

7. Select "ARRANGE: 1A" to display the arrangement selection screen, and then select "1B".

8. Perform settings using the following procedure. (Use the initial values for settings other than those described below.)

1. PANEL COLOR : RED
2. PANEL NAME : MS(RED)
3. INPUT(DISP) : SIGNAL #51221 A
4. SETUP : VALID
9. Select "ARRANGE: 1B" to display the arrangement selection screen, and then select "2A".

10. Perform settings using the following procedure. (Use the initial values for settings other than those described below.)

   (1) PANEL COLOR : GREEN
   (2) PANEL NAME : NS(GREEN)
   (3) INPUT(DISP) : SIGNAL #51222 A
   (4) SETUP : VALID
11. Select "ARRANGE: 2A" to display the arrangement selection screen, and then select "2B".

12. Perform settings using the following procedure. (Use the initial values for settings other than those described below.)

(1) PANEL COLOR : GREEN
(2) PANEL NAME : MS(GREEN)
(3) INPUT(DISP) : SIGNAL #51220 A
(4) SETUP : VALID
13. Press \(\text{(I/F Panel)}\) at the lower left of the programming pendant display to display the interface panel.
EtherNet/IP Safety Function

7 Requirements for CIP Safety

EtherNet/IP is a function to secure safety as an entire system including the DX200 and peripheral safety devices. Each device has a different setting method for safety. This chapter shows notes and reminders to configure the safety system with the DX200 as the main component.

Normally, setting for safety of the DX200 is performed by using the programming pendant and saved in the DX200. It is impossible to make settings for the DX200 by using Safety Network Configuration Tool (SNCT).

Please keep in mind following items when you use the DX200:

• The replacement of safety devices requires that the replacement device be configured properly and operation of the replacement device shall be user verified.

• If you choose to configure safety connections with an SCID=0, you are responsible for ensuring that originators (data senders) and targets (data receivers) have the correct configurations. SCID (Safety Configuration Identifier) enables to identify the safety configuration. SCID is not used in the DX200.

• The user should assign SNNs (Safety Network Numbers) for each safety network or safety sub-net that are unique system-wide. An SNN is a unique number allocated to each node on the safety network.

• Please clear any pre-existing configuration from any safety device before installing it onto the safety network. For the clearing procedures, refer to the Rockwell Automation, Inc. manual “GuardLogix Controllers User Manual (1756-UM020I-EN-P – August 2012),” chapter 5 “Add, Configure, Monitor, and Replace CIP Safety I/O.” When using a safety PLC manufactured by a company other than Rockwell Automation, Inc., refer to that manufacturer’s manual.

• Please confirm a valid and unique IP address is assigned for each safety device before installing it onto the safety network. For the IP address confirming procedures, refer to the Rockwell Automation, Inc. manual “GuardLogix Controllers User Manual (1756-UM020I-EN-P – August 2012),” chapter 5 “Add, Configure, Monitor, and Replace CIP Safety I/O.” When using a safety PLC manufactured by a company other than Rockwell Automation, Inc., refer to that manufacturer’s manual.

• Please test safety connection configurations after they are applied in an originator to confirm the target safety connection is operating as intended.

• Please note that LEDs are NOT reliable indicators and cannot be guaranteed to provide accurate information. They should ONLY be used for general diagnosis during commissioning or troubleshooting. Do not attempt to use LEDs as operational indicators.

• Please note that originators that have an “automatic” SNN setting feature can use that feature only when the safety system does not rely on the feature to secure safety.
The following points about the safety system are described for informational purposes:

- When a SIL3 device is configured directly from a workstation, please compare the transferred SCID and safety setting data with the SCID and safety setting data originally viewed in the workstation.

- Please note that user testing is the means by which all downloads are validated. Also, before using the system, confirm that all safety functions are operating as intended.

- Please note that the signature should only be considered “verified” (and configuration locked) after user testing. For information on safety signatures, refer to the Rockwell Automation, Inc. manual “GuardLogix Controllers User Manual (1756-UM020I-EN-P – August 2012),” chapter 6 “Develop Safety Applications.” When using a safety PLC manufactured by a company other than Rockwell Automation, Inc., refer to that manufacturer’s manual.

- Please note that when the originator configures communication setting data and/or target setting data, these data must be downloaded to the target and be tested and verified. Only when the verification result is valid, SCIDs from the target can be confirmed. For the downloading procedures, refer to the Rockwell Automation, Inc. manual “GuardLogix Controllers User Manual (1756-UM020I-EN-P – August 2012),” chapter 7 “Go Online with the Controller.” When using a safety PLC manufactured by a company other than Rockwell Automation, Inc., refer to that manufacturer’s manual.

- Please completely test a device’s operation before setting the Lock Attribute. For information on the Lock Attribute, refer to the Rockwell Automation, Inc. manual “GuardLogix Controllers User Manual (1756-UM020I-EN-P – August 2012),” chapter 6 “Develop Safety Applications.” When using a safety PLC manufactured by a company other than Rockwell Automation, Inc., refer to that manufacturer’s manual.

- Please upload the setting data from each safety device and compare those with the data sent from the SNCT for verification before setting the Lock Attribute in each device. For the uploading procedure, refer to the Rockwell Automation, Inc. manual “GuardLogix Controllers User Manual (1756-UM020I-EN-P – August 2012),” chapter 7 “Go Online with the Controller.” When using a safety PLC manufactured by a company other than Rockwell Automation, Inc., refer to that manufacturer’s manual.

- Please lock the safety device which can be configured via the SNCT interface after verification has been completed.

- Please verify that all originator-configured safety devices which can be configured by a Type 1 SafetyOpen have their ownership assignments as part of the final verification process.

- Please visually verify that all configuration data was downloaded correctly. For the downloading procedures, refer to the Rockwell Automation, Inc. manual “GuardLogix Controllers User Manual (1756-UM020I-EN-P – August 2012),” chapter 7 “Go Online with the Controller.” When using a safety PLC manufactured by a company other than Rockwell Automation, Inc., refer to that manufacturer’s manual.
Setting the TUNID Used for RSNetWorx for EtherNet/IP

The software "RSNetWorx for EtherNet/IP" manufactured by Rockwell Automation, Inc. can be used to set the TUNID. When TUNID setting has already been performed by following steps 29 through 44 of the procedure in section 4.3.2 “Safety PLC Settings”, these settings are not required.

The software used in this section from Rockwell Automation, Inc. is "RSNetWorx for EtherNet/IP 21.01.00(CPR 9 SR 5.1)".

1. Start “RSNetWorx for EtherNet/IP”.

2. Install the EDS file.
   - Select (Tools) - (EDS Wizard...).
3. Select {Next}.

4. While {Register an EDS file(s).} is selected, select {Next}.
5. Set a path of the EDS file of the DX200 EtherNet/IP Safety, and then select {Next}.
   - For how to create an EDS file, refer to section 4.2 “Creating an EDS File”.

6. Select {Next}.

7. Select {Next}.
8. Select {Next}.

9. Select {Finish}.

10. Select {Network} - {Online}.
11. Select a network to which the PLC is connected, and then select {OK}.

12. Confirm that the connected PLC and the DX200 EtherNet/IP Safety Slave are displayed, and then check the checkbox of {Edits Enabled}.
   – When the DX200 EtherNet/IP Safety Slave is not displayed, check the wiring and confirm the DX200 starts-up normally.
13. While {DX200 EtherNet/IP Safety Slave} is selected, select {Device} - {Class Instance Editor...}.

14. Select {Yes}.

15. Confirm that a dialog box appears as below.

   - When a message appears in {Data received from the device}, close the dialog box. After a moment, start the dialog box again.
Setting the TUNID Used for RSNetWorx for EtherNet/IP

16. Check the value to be set to (Data sent to device) with using RSLogix 5000.

17. Display the property window by double-clicking ETHERNET-SAFETYMODULE for the RSLogix 5000, and then confirm the value in (IP Address) and (Safety Network Number).

In the above example, the values for each item are as below.

**IP Address**: 192.168.1.204 (hexadecimal value: C0.A8.01.CC)

**Safety Network Number**: 3C77_0200_75A2

When arranging those values byte by byte from behind in the “Safety Network Number—IP Address” order, the result becomes as below. This value is for (Data sent to the device).

**A2 75 00 02 77 3C CC 01 A8 C0**
18. Check TUNID currently designated.
Set a value to each item on {Class Instance Editor} shown at step 15, and then press {Execute}.

- Value: Cannot be set
- Description: Get Single Attribute

- Class: 39
- Instance: 1
- Attribute: 1B
- Send the attribute ID: Cannot be set

- Transmit data size: Cannot be set
- Data sent to the device: Cannot be set

- Output size format: Cannot be set
- Output radix format: Cannot be set
19. Equal to 10 byte from the beginning of the data indicated at (Data Received from the device) shows the present value of TUNID. In case “FF FF FF FF FF FF FF FF FF FF” is indicated, the following step 19 is unnecessary to perform. Skip it and resume the procedures from step 20.

20. Delete TUNID currently designated. Perform this step in case “FF FF FF FF FF FF FF FF FF FF” is not indicated on the window confirmed at the step 18. input values by as shown below, and then press {Execute}.

- Value: 54
- Description: Other
- Class: 39
- Instance: 1
- Attribute: Cannot be set
- Send the attribute ID: □ (Uncheck it)
- Transmit data size: Multiple bytes
- Data sent to the device:

```
01 xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx yy yy yy yy yy yy
```

- xx : If a password is not set, set “00”. (16byte)
- yy : Set TUNID currently designated (10byte)
- Output size format: Byte
- Output radix format: Hexadecimal
When the command is successfully sent, “The execution was completed” is indicated at (Data received from the device). And current value of TUNID becomes “FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF”. 

TUNID cannot be deleted when EtherNet/IP communication is being established. An error message appears to (Data received from the device) part in case a command to delete TUNID is sent while the communication is in the status of establishment. (And TUNID is not deleted. To delete TUNID, EtherNet/IP communication should be stopped.)
21. Set TUNID. After setting each value, select {Execute}.

- Value: 56
- Description: Other

- Class: 39
- Instance: 1
- Attribute: Cannot be set
- Send the attribute ID: □ (Uncheck it.)

- Transmit data size: Multiple bytes
- Data sent to the device: "Enter the value confirmed in the step 17."

- Output size format: Byte
- Output radix format: Hexadecimal

22. When the message displayed in (Data received from the device) is "The execution was completed." It means that a command is sent successfully.
23. Change the value in \{Value\} from 56 to 57, and then select \{Execute\}.

- Value: 57
- Description: Other
- Class: 39
- Instance: 1
- Attribute: Cannot be set
- Send the attribute ID: □ (Uncheck it.)

- Transmit data size: Multiple bytes
- Data sent to the device: "Enter the value confirmed in the step 17."

- Output size format: Byte
- Output radix format: Hexadecimal

24. When the check box of \{I/O OK\} turns to green for RSLogix 5000, it is considered that communication has been established.

TUNID can be also set by using a MSG instruction of ladders other than this procedure using Class Instance Editor.