

DX100 OPTIONS INSTRUCTIONS

FOR ETHERNET FUNCTION

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

MOTOMAN INSTRUCTIONS

MOTOMAN--□□□ INSTRUCTIONS
DX100 INSTRUCTIONS
DX100 OPERATOR'S MANUAL
DX100 MAINTENANCE MANUAL

The DX100 Operator's manual above corresponds to specific usage.
Be sure to use the appropriate manual.

Part Number: 157130-1CD
Revision: 1



MANDATORY

- This manual explains the Ethernet function of the DX100 system and general operations. Read this manual carefully and be sure to understand its contents before handling the DX100.
- General items related to safety are listed in Chapter 1: Safety of the DX100 Instructions. To ensure correct and safe operation, carefully read the DX100 Instructions 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.

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Notes for Safe Operation

Read this manual carefully before installation, operation, maintenance, or inspection of the DX100.

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



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



To ensure safe and efficient operation at all times, be sure to follow all instructions, even if not designated as "CAUTION" and "WARNING".



WARNING

- Before operating the manipulator, check that servo power is turned OFF pressing the emergency stop buttons on the front door of the DX100 and the programming pendant. 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.

Fig. : 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.

Fig. : Release of Emergency Stop



- Observe the following precautions when performing teaching operations within the P-point maximum envelope of the manipulator:
 - 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 person is present in the P-point maximum envelope of the manipulator and that you are in a safe location before:
 - Turning ON the power for the DX100.
 - 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 is a problem.

The emergency stop buttons are located on the right of front door of the DX100 and the programming pendant.



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 DX100 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 DX100 Instructions before operating the manipulator:

Definition of Terms Used Often 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:

| Equipment | Manual Designation |
|--|---------------------|
| DX100 controller | DX100 |
| DX100 programming pendant | Programming pendant |
| Cable between the manipulator and the controller | Manipulator cable |

DX100

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

| Equipment | | Manual Designation |
|---------------------|-----------------------------|---|
| Programming Pendant | Character Keys | The keys which have characters printed on them are denoted with []. ex. [ENTER] |
| | Symbol Keys | The keys which have a symbol printed on them are not denoted with [] but depicted with a small picture. ex. page key  The cursor key is an exception, and a picture is not shown. |
| | Axis Keys Number Keys | “Axis Keys” and “Number Keys” are generic names for the keys for axis operation and number input. |
| | Keys pressed simultaneously | When two keys are to be pressed simultaneously, the keys are shown with a “+” sign between them, ex. [SHIFT]+[COORD] |
| | Displays | The menu displayed in the programming pendant is denoted with { }. ex. {JOB} |

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.

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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.

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1 Outline

Data transmission function of the DX100 is achieved by data exchange between the data transmission function which is the DX100 application, and the MOTOCOM32 which is the application of the personal computer. For the data transmission, Ethernet can be optionally used as a medium instead of RS-232C which is used as a standard. The DX100 data transmission function in case of using Ethernet for the transmission medium is peculiarly called the Ethernet function.

This instruction manual explains the settings and relevant information required in use of the Ethernet function.

1.1 Features

1.1.1 High-Speed Transmission

The Ethernet function with Ethernet (10/100 Mbps) for the transmission medium enables a faster transmission compared to RS-232C (max. 9600 bps).

1.1.2 Communication Station Switchable with Software

unlike RS-232C which requires a device to physically switch the stations, the Ethernet function can switch the communication station easily by changing the destination for connection with a software. (Note, however, that it is unable to communicate with one or more station simultaneously.)

1.1.3 Easy Setup

The DX100 is provided with the Ethernet connector RJ-45 for data transmission as standard equipment. Therefore, the Ethernet function can be used without adding any extra hardware.

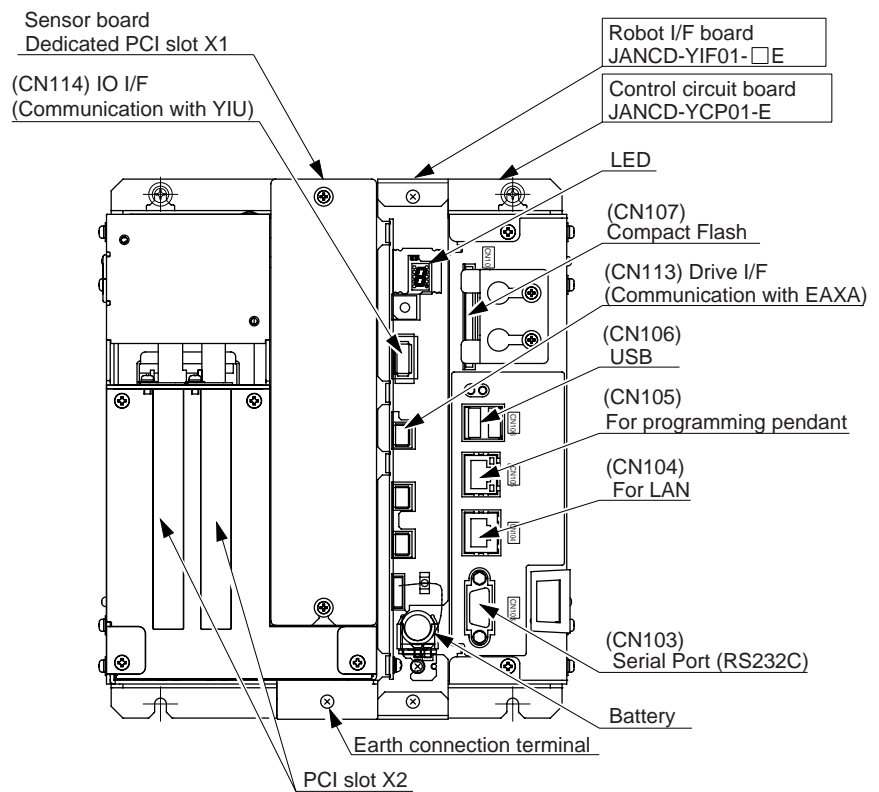
2 Ethernet Cable Connections

Connect the Ethernet cable (shielded cable; category 5 or more) to the CN104 RJ-45 LAN connector which is located on the front face of the YCP01 board inside the CPU rack.



There are two RJ-45 connectors at the front face of the YCP01 board, and CN104 on the bottom side is the one for the Ethernet function. Do not touch CN105 on the upper side since it is exclusively used for the programming pendant.

Fig. 2-1: Front Face



DX100

- 3 Ethernet Function Settings
- 3.1 Transmission Function Settings

3 Ethernet Function Settings

Perform the setting procedures below to make the DX100 Ethernet function available.

3.1 Transmission Function Settings

Set the parameters to enable the transmission function.

(The customers should not change the parameter settings themselves: contact your Yaskawa representative.)

3.2 Ethernet Function Settings

Set the parameters to enable the Ethernet function.

(The customers should not change the parameter settings themselves: contact your Yaskawa representative.)

3.3 Ethernet Communication Settings

3.3.1 Setting Procedure

Perform the following procedures for Ethernet communications.

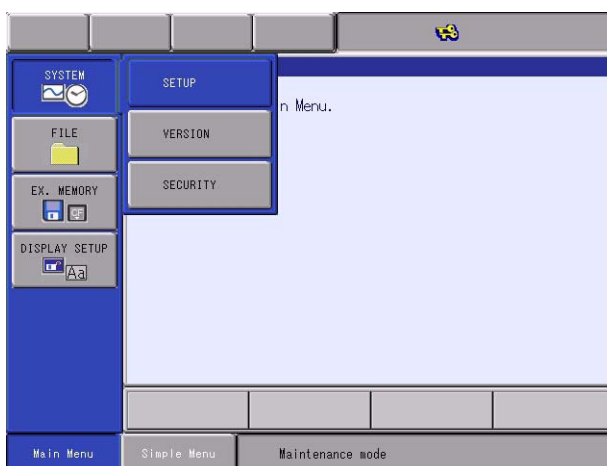


- Perform the Ethernet communication settings in the management mode.
- In the operation mode and the editing mode, the settings are for reference only.

1. Turn ON the power supply again while pressing [MAIN MENU] simultaneously.
 - The maintenance mode window appears.



2. Select {SYSTEM} under the main menu.
 - The sub menu appears.



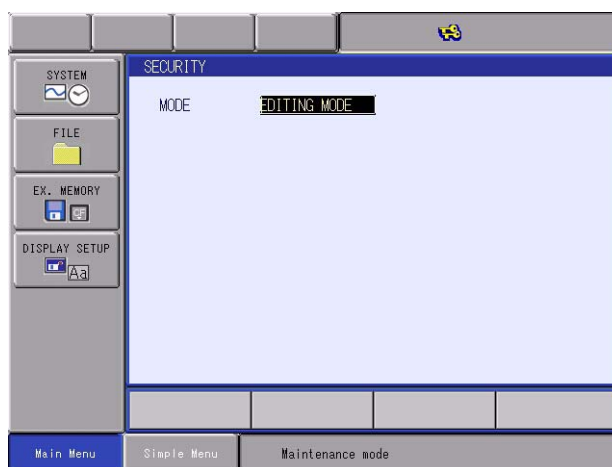
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3 Ethernet Function Settings

3.3 Ethernet Communication Settings

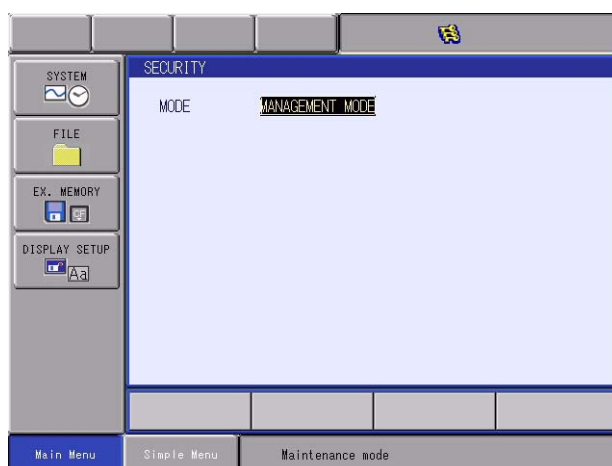
3. Select {Security}.

- The Security setting window appears.



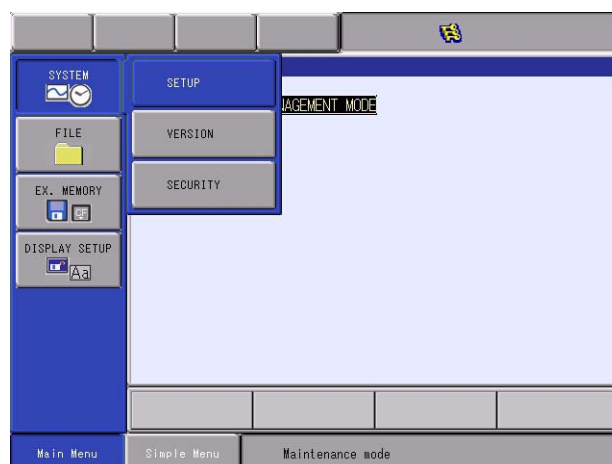
4. Set the security mode to the "MANAGEMENT MODE".

- Security mode is set to "MANAGEMENT MODE".



5. Select {SYSTEM} under the main menu.

- The sub menu appears.



3 Ethernet Function Settings

3.3 Ethernet Communication Settings

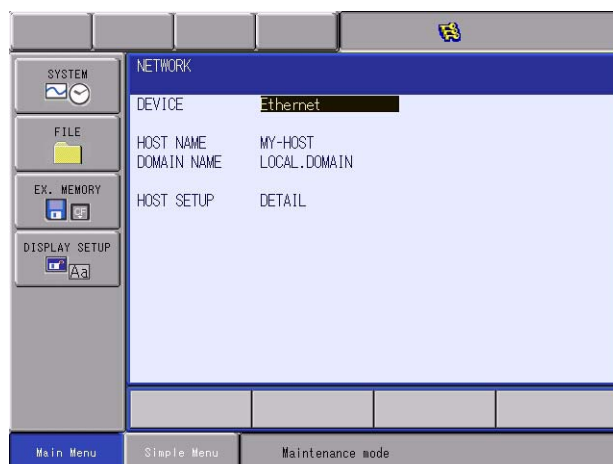
6. Select {SETUP}.
 - The SETUP window appears.



7. Select {OPTION FUNCTION}.
 - The function selection window appears.



8. Select {DETAIL} of {NETWORK}.
 - The network function setting window appears.



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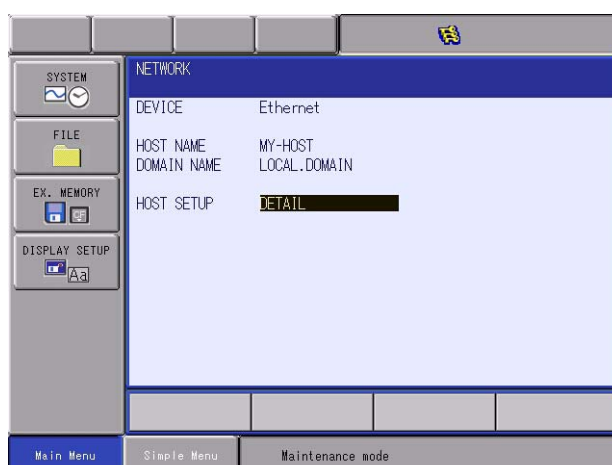
3 Ethernet Function Settings

3.3 Ethernet Communication Settings

9. Set host name/domain name.
 - Set host name/domain name as appropriate.
 - Refer to *chapter 3.3.2 “Description of setting items (Network function setting window)” at page 3-7* for further details of each item.
10. Select {DETAIL}.
 - The Ethernet communication setting window appears.



11. Select the communication parameter to be changed.
 - When pull-down menu is used, items become selectable.
 - When direct entering, virtual keyboard is enabled for entry.
12. Input the new communication parameter value.
 - When pull-down menu is used, select an appropriate item.
 - When directly entering, use virtual keyboard or numeric keys for entry.
 - Refer to *chapter 3.3.3 “Description of setting items (Ethernet communication setting window)” at page 3-8* for further details of each item.
13. Press [ENTER].
 - The network function setting window appears.

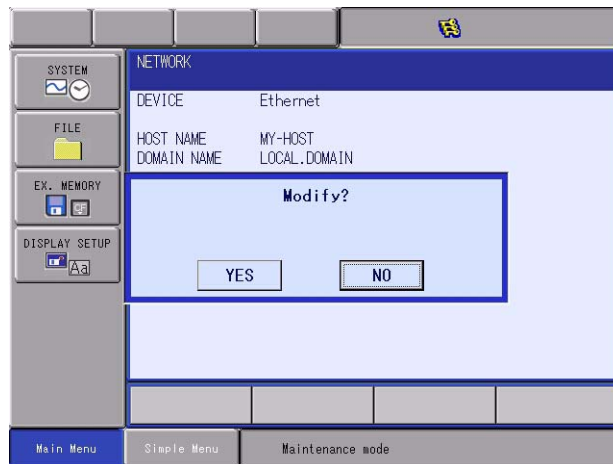


3 Ethernet Function Settings

3.3 Ethernet Communication Settings

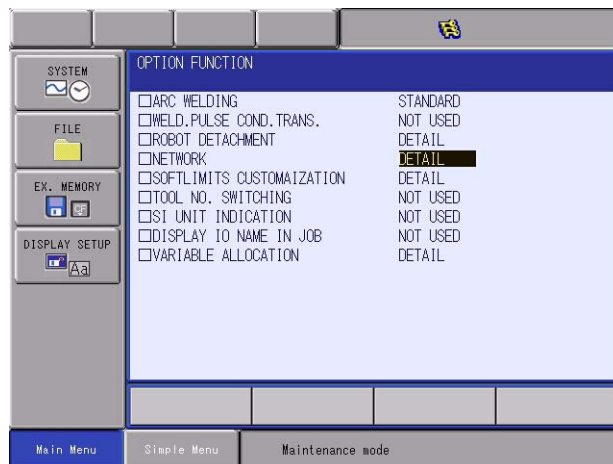
14. Press [ENTER].

- The confirmation dialog box appears.



15. Select {YES}.

- If the Ethernet communication settings are correct, select {YES}.
- The function selection window appears.



16. Turn ON the power supply again.

- The normal operation mode starts.

| | | |
|-------|-----|---------------------------------|
| DX100 | 3 | Ethernet Function Settings |
| | 3.3 | Ethernet Communication Settings |

3.3.2 Description of setting items (Network function setting window)

3.3.2.1 HOST NAME



Host name is not used in communication.

Set the host name assigned for the DX100.

Enter using one-byte alphanumeric characters, hyphen (-) and underscore (_).

Then, be sure to include at least an alphabetic character.

3.3.2.2 DOMAIN NAME



Domain name is used when DNS is enabled.

Set the domain name to which DX100 belongs to.

Enter using one-byte alphanumeric characters, hyphen (-), underscore (_), and period (.).

| | | |
|-------|-----|---------------------------------|
| | 3 | Ethernet Function Settings |
| DX100 | 3.3 | Ethernet Communication Settings |

3.3.3 Description of setting items (Ethernet communication setting window)

3.3.3.1 IP ADDRESS SETTING

In "IP ADDRESS SETTING", specify a method to set DX100 IP address.

Select either "MANUAL SETTING" or "DHCP SETTING" from the pull-down menu.

When "MANUAL SETTING" is selected, be sure also to set "IP ADDRESS" and "SUBNET MASK".



"MANUAL SETTING" cannot be selected in "IP ADDRESS SETTING" if "DHCP SETTING" is selected in "DNS SETTING" or "SNTP SETTING".

(Selecting "MANUAL SETTING" causes an error "DHCP is already set to use for another item" to occur.)

Select other than "DHCP SETTING" in "DNS SETTING" and "SNTP SETTING" beforehand when selecting "MANUAL SETTING" in "IP ADDRESS SETTING".



DX100 does not support NetBIOS, WINS (Windows Internet Name Service) and Dynamic DNS etc.

Consequently, obtaining DX100 IP address via DHCP can cause external access to become difficult.

In order to enable easy external access even while obtaining IP address via DHCP, take action on the DHCP server side as appropriate such as making the same IP address be leased.



DX100 only supports IPv4.

IPv6 is not supported.



DX100 does not support [10.0.0.xx] (xx is a decimal number from 0-255) among local IP addresses.

Therefore, don't use [10.0.0.xx] for IP address.

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3 Ethernet Function Settings
3.3 Ethernet Communication Settings

■ **IP ADDRESS**

Enter the IP address to set for DX100 in the format [xx.xx.xx.xx] (xx is a decimal number from 0 to 255) using one-byte numeric characters and period (.).

If "DHCP SETTING" is selected in "IP ADDRESS SETTING", the setting made here is neglected.

■ **SUBNET MASK**

Enter the subnet mask to set for DX100 in the format [xx.xx.xx.xx] (xx is a decimal number from 0 to 255) using one-byte numeric characters and period (.).

If "DHCP SETTING" is selected in "IP ADDRESS SETTING", the setting made here is neglected.

■ **DEFAULT GATEWAY**

When communicating with TCP/IP with a terminal on different network (or different subnet), setting a default gateway is required.

Enter the default gateway to set for DX100 in the format [xx.xx.xx.xx] (xx is a decimal number from 0 to 255) using one-byte numeric characters and period (.).

Set the value at "0.0.0.0" if the default gateway will not be used.

If "DHCP SETTING" is selected in "IP ADDRESS SETTING", the setting made here is neglected.

3.3.3.2 DNS SETTING

In “DNS SETTING”, specify whether or not to use DNS (Domain Name System) client function and the DNS server setting method when using the DNS client function.

Select either “NOT USED”, “MANUAL SETTING” or “DHCP SETTING” from the pull-down menu.

When “MANUAL SETTING” is selected, be sure also to set “DNS SERVER”.



“DHCP SETTING” cannot be selected in “DNS SETTING” if “MANUAL SETTING” is selected in “IP ADDRESS SETTING”.

(Selecting “DHCP SETTING” causes an error “DHCP is not set to use” to occur.)

When selecting “DHCP SETTING” in “DNS SETTING”, select “DHCP SETTING” beforehand in “IP ADDRESS SETTING”.



When “MANUAL SETTING” is selected in “SNTP SETTING” and “SNTP SERVER” is set by a host name, “NOT USED” cannot be selected in “DNS SETTING”.

(Selecting “NOT USED” causes an error “DNS is already set to use for another item” to occur.)

When selecting “NOT USED” in “DNS SETTING”, confirm beforehand that there is no item set by host name.

■ DNS SERVER

Enter the IP address to set for DNS server in the format [xx.xx.xx.xx] (xx is a decimal number from 0 to 255) using one-byte numeric characters and period (.).

If “DHCP SETTING” or “NOT USED” is selected in “DNS SETTING”, the setting made here is neglected.

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3 Ethernet Function Settings

3.3 Ethernet Communication Settings

3.3.3.3 SERVER (HOST PC)

Specify the server (host PC) for when using standalone or DCI in data transmission function.

Enter the IP address to set for the server in the format [xx.xx.xx.xx] (xx is a decimal number from 0 to 255) using one-byte numeric characters and period (.).

3.3.3.4 SNTP SETTING

In "SNTP SETTING", specify whether or not to use SNTP(Simple Network Time Protocol) client function and the SNTP server setting method when using the SNTP client function.

Select either "NOT USED", "MANUAL SETTING", "BROADCAST" or "DHCP SETTING" from the pull-down menu.

When "MANUAL SETTING" is selected, be sure also to set "SNTP SERVER".



"DHCP SETTING" cannot be selected in "SNTP SETTING" if "MANUAL SETTING" is selected in "IP ADDRESS SETTING".

(Selecting "DHCP SETTING" causes an error "DHCP is not set to use" to occur.)

When selecting "DHCP SETTING" in "SNTP SETTING", select "DHCP SETTING" beforehand in "IP ADDRESS SETTING".

■ SNTP SERVER

Enter the IP address to set for SNTP server in the format [xx.xx.xx.xx] (xx is a decimal number from 0 to 255) using one-byte numeric characters and period (.).

If setting is made to use DNS client function, domain name can be entered (Fully Qualified Domain Name is acceptable).

One-byte alphanumeric characters, hyphen (-), underscore (_) and period (.) can be used for domain name entry.

Then, be sure to include at least an alphabetic character.

If "NOT USED", "BROADCAST", or "DHCP SETTING" is selected in "SNTP SETTING", the setting made here is neglected.

■ **TIME DIFFERENCE FROM UTC**

Time which can be obtained by NTP is UTC (Coordinated Universal Time).

Enter the time difference between UTC and local time for coordination.

Then, enter hour "(-)***" and minute "***" separately using one-byte minus sign (-) and numeric characters.

For example, when using JST (Japan Standard Time) as local time, set as +09:00.

If "NOT USED" is selected in "SNTP SETTING", the setting made here is neglected.

■ **INQUIRY INTERVAL**

Enter time intervals at which to make inquiry to the SNTP server. Enter in hour using one-byte numeric characters.

If "NOT USED" or "BROADCAST" is selected in "SNTP SETTING", the setting made here is neglected.

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3 Ethernet Function Settings

3.4 Settings confirmation

3.4 Settings confirmation

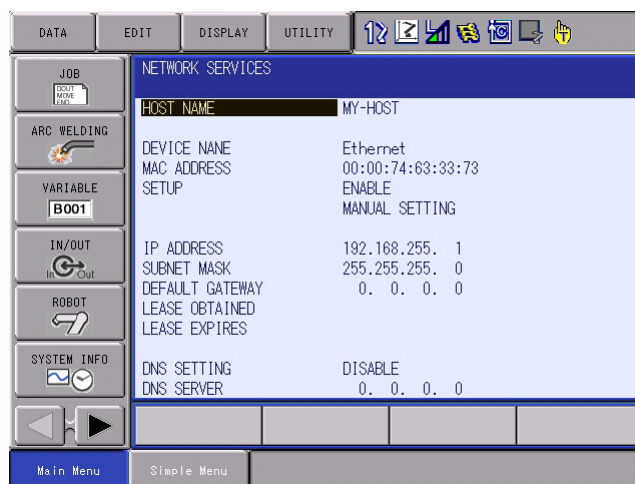
Settings made in the Ethernet communication setting can also be confirmed while in normal operation.

Display and confirm in the following procedures.

1. Set the security mode to the "MANAGEMENT MODE".
2. Select {SYSTEM INFO} under the main menu.
 - The sub menu appears.



3. Select {NETWORK SERVICE}.
 - The NETWORK SERVICES window appears.



| | | |
|-------|-----|----------------------------|
| | 3 | Ethernet Function Settings |
| DX100 | 3.5 | Command Remote Settings |

3.5 Command Remote Settings

Since the Ethernet function applies the data transmission function, it is required to set the command remote available if the Ethernet function is to be used as a host control function.

Refer to "DX100 OPTIONS INSTRUCTIONS FOR DATA TRANSMISSION FUNCTION" for the details of command remote and the setting method to enable it.

DX100

- 4 Specifications
- 4.1 Ethernet Specifications

4 Specifications

4.1 Ethernet Specifications

4.1.1 Ethernet Specifications

| | |
|----------------------------|--|
| Applicable Standard | IEEE 802.3 10Base-T/100Base-TX compliant |
| Baud Rate | 10 Mbps/100 Mbps (Automatically recognized when the power is turned on.) (It is the transmission speed of signals, and not of the actual data. The actual data transfer rate is rather slow, since it depends on the processing speed and the transmission line status inside each communication station.) |

4.1.2 Protocol Version

| | |
|-------------|--|
| IP | IPv4 * IPv6 is not supported. |
| SNTP | Simple Network Time Protocol Version 3 * SNTP Version 4 (RFC2030) is not supported. |

4.1.3 Connector Specifications

Connector CN104 (RJ-45 8-pin modular jack)

4.1.3.1 Pin Assignment

| PIN # | Signal Name | PIN # | Signal Name |
|-------|-------------|-------|-------------|
| 1 | MX1+ | 5 | MX3- |
| 2 | MX1- | 6 | MX2- |
| 3 | MX2+ | 7 | MX4+ |
| 4 | MX3+ | 8 | MX4- |

4.1.3.2 LED Specifications

| LED | Status | Meaning |
|------------------|--------|----------|
| RIGHT (Green) | Lit | Link |
| | Blink | Active |
| LEFT (Yellow) | Lit | 100 MBps |
| | Unlit | 10 MBps |

| | | |
|-------|-----|-------------------------|
| | 4 | Specifications |
| DX100 | 4.1 | Ethernet Specifications |

4.1.4 Cable Specifications

Use the following Ethernet cable.

| Item | Description |
|----------------------|------------------------------|
| Cable Type | Shielded, category 5 or more |
| Maximum Cable Length | 100 m |

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- 4 Specifications
- 4.2 Restrictions

4.2 Restrictions

4.2.1 Restrictions on the Data Transmission Function



Refer to "DX100 OPTIONS INSTRUCTIONS FOR DATA TRANSMISSION FUNCTION" for the details of the data transmission function.

4.2.1.1 Operation with the External Memory Devices

The external memory Devices and the data transmission function (Ethernet function is included.) work exclusively. Therefore, data transmission function cannot be executed when the external memory devices are in processing status, or external memory devices cannot process data when the data transmission function is being executed.

4.2.1.2 Remote Mode

With the remote mode, the data transmission function switches the external access wait state and the external access state. The host control function becomes available and the external access enters in a wait status when the remote is turned ON. When the remote is turned OFF, the external access is enabled and the DCI or stand-alone functions become available. The host control function and the DCI/stand-alone functions cannot be used simultaneously since the remote ON status and the remote OFF status work exclusively.

4.2.1.3 Concurrent Communication

Communication with more than one station is not available with the data transmission function.

4.2.2 Restrictions on Setting the IP Address

The Ethernet function does not support the local IP address "10.0.0.xx". (xx is a decimal number from 0 to 255)

Do not set it for the IP address "10.0.0.xx".

4.2.3 Restrictions on Communication Port

The Ethernet function occupies 10000 to 10008 of the UDP ports. Therefore, do not transmit the packets that use the UDP ports occupied by the Ethernet function to the DX100 and the host computer which are executing the Ethernet communications.

| | | |
|-------|-----|------------------------|
| | 5 | Troubleshooting |
| DX100 | 5.1 | Cable Connection Check |

5 Troubleshooting

In case of communication failure, try the following check items.

5.1 Cable Connection Check

- Check that the cable is securely connected to the CN104 connector on the YCP01 board.
 - Check that the LED of the CN104 (green LED on the right) is lit or blinks.
- Check that the cable connector of the hub side is properly connected.
 - Check that the power supply for the hub is ON.
- Check the cable type.
 - In case of connecting the cable to the hub which cannot auto-detect MDI/MDI-X connection, check if the cable used is a straight cable.
 - In case of directly connecting the DX100 and host computer, check if the cable used is a crossing cable.
- Check the baud rates of the hub and the host computer.

DX100 automatically recognizes 10/100 Mbps when the power is turned on.

Consequently, changing communication speed after turning on the power causes normal communication to be impossible.

Before starting DX100, confirm that the other end of the cable connection (HUB or host computer) is normally operating.

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5 Troubleshooting
5.2 Connection Check with Lower Protocol

5.2 Connection Check with Lower Protocol

In the TCP/IP network, it is possible to check if the IP packets are transmitted to the destinations using a ping command from a host computer.

Start the command prompt in the Windows 2000/XP, then input the IP address after entering "ping". If the communication is successfully done, the window displays as follows:

```
C:\>ping 192.168.255.1
```

Pinging 192.168.255.1 with 32 bytes of data:

Reply from 192.168.255.1: bytes=32 time<10ms TTL=255

Reply from 192.168.255.1: bytes=32 time<10ms TTL=255

Reply from 192.168.255.1: bytes=32 time<10ms TTL=255

Reply from 192.168.255.1: bytes=32 time<10ms TTL=255

Ping statistics for 192.168.255.1:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Minimum = 0ms, Maximum = 0ms, Average = 0ms

```
C:\>
```

| | | |
|-------|-----|-------------------------------|
| DX100 | 5 | Troubleshooting |
| | 5.3 | Connection Check with MOTOCOM |

In case of a communication failure, the window displays as shown below. In this case, check the cable connections, network settings of the host computer, the Ethernet communication settings of the DX100 once again.

```
C:\>ping 192.168.255.1
```

Pinging 192.168.255.1 with 32 bytes of data:

Request timed out.

Request timed out.

Request timed out.

Request timed out.

Ping statistics for 192.168.255.1:

Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

Approximate round trip times in milli-seconds:

Minimum = 0ms, Maximum = 0ms, Average = 0ms

```
C:\>
```

5.3 Connection Check with MOTOCOM

The Ethernet communication settings are completed when the connection check with lower protocol is finished. For the further connection check, use the MOTOCOM referring to "DX100 OPTIONS INSTRUCTIONS FOR DATA TRANSMISSION FUNCTION" and "MOTOCOM32 OPERATION MANUAL".

DX100 OPTIONS INSTRUCTIONS

FOR ETHERNET FUNCTION

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Specifications are subject to change without notice
for ongoing product modifications and improvements.