

# HITACHI Printer

**Model UX2**

## **Communication User's Manual (Common)**

- Before using the printer, thoroughly read this communication user's manual for optimum printer use.
- After reading this communication user's manual, properly keep it for future reference.

To export the product, check the export control-related regulations, such as the Foreign Exchange and Foreign Trade Law and the Export Administration Regulations, and follow the necessary procedures.  
If you have any questions, contact your Hitachi sales representative.

February 2024 (rev. D)

- No part of this manual may be copied or reproduced without permission.
- The contents of this manual are subject to change without notice for improvement.

All Right Reserved, Copyright © 2022, Hitachi Industrial Equipment Systems Co., Ltd

# Contents

1.Communication overview .....	3
1.1 Overview .....	3
1.1.1 Serial communication.....	3
1.1.2 Ethernet communication (Tunnel communication).....	3
1.1.3 Ethernet communication (Modbus communication).....	3
1.1.4 Ethernet communication (OPC-UA communication) .....	3
1.1.5 Ethernet communication (EtherNet / IP communication).....	3
1.2 Configuration diagram .....	4
1.2.1 Serial communication .....	4
1.2.2 Ethernet communication.....	4
1.3 Configuration diagram .....	4
2.Connection preparations .....	5
2.1 Serial communication connection .....	5
2.1.1 USB⇔serial communication conversion cable connection.....	5
2.2 Ethernet communication connection .....	6
2.2.1 Network connection preparations.....	6
2.2.2 IJ Printer preparations .....	6
2.2.3 LAN cable connection .....	7
3. Connection test.....	8
3.1 Procedure for connection test.....	8
4. Setting the communication environment.....	11
4.1 Setting the communication environment.....	11
5. Communication Monitor.....	14
5.1 Communication Monitor Function .....	14

"Ethernet" is a registered trademark of Xerox Corporation, USA.

"Windows" is registered trademarks of Microsoft Corporation, USA, in the USA and other countries.

# 1. Communication overview

## 1.1 Overview

### 1.1.1 Serial communication

The functions described in this document are used to transmit printings and their registration numbers and enter them into the IJ printer with an external device connected to the IJ printer via an RS-232C serial communication line. Connect the USB serial converter to the USB port of the IJ printer and use RS-232C serial communication via the USB serial converter.

### 1.1.2 Ethernet communication (Tunnel communication)

Ethernet communication supports the same contents as RS-232C serial communication. Because it uses the same mode of communications as previous models, if RS-232C serial communication is already employed for the IJ Printer, you can create a communications program for the host device using this asset. Please refer to Communication User's manual (Serial Communication) for details of this function.

### 1.1.3 Ethernet communication (Modbus communication)

This function allows you to change the settings of the IJ printer by transmitting the print contents, print specifications, etc. between the external device and the IJ printer using the LAN environment. Modbus is an industrial multi-vendor network using Ethernet, and its communication specification is adopted as an open standard in various industrial equipment. Messages that the IJ printer voluntarily outputs, such as status output and print content output, do not correspond.

For the Modbus communication, it is necessary to develop a communication program on the external device side.

### 1.1.4 Ethernet communication (OPC-UA communication)

This function allows you to change the settings of the IJ printer by transmitting the print contents, print specifications, etc. between the external device and the IJ printer using the LAN environment. OPC-UA is an industrial multi-vendor network using Ethernet, and its communication specification is adopted as an open standard in various industrial equipment. Messages that the IJ printer voluntarily outputs, such as status output and print content output, do not correspond.

For the OPC-UA communication, it is necessary to develop a communication program on the external device side.

### 1.1.5 Ethernet communication (EtherNet / IP communication)

It is a function to communicate with an IJ Printer via Ethernet from an external device using the network environment.

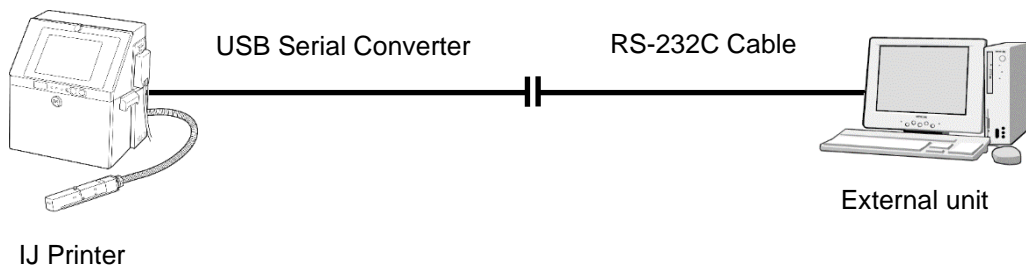
EtherNet/IP is an industrial multi-vendor network using Ethernet, and its communication specification is adopted as an open standard in various industrial equipment.

EtherNet/IP communication has two communication functions: "Message communication (Explicit communication)" that communicates at an arbitrary timing and "Cyclic communication (Implicit communication)" that communicates at a fixed cycle.

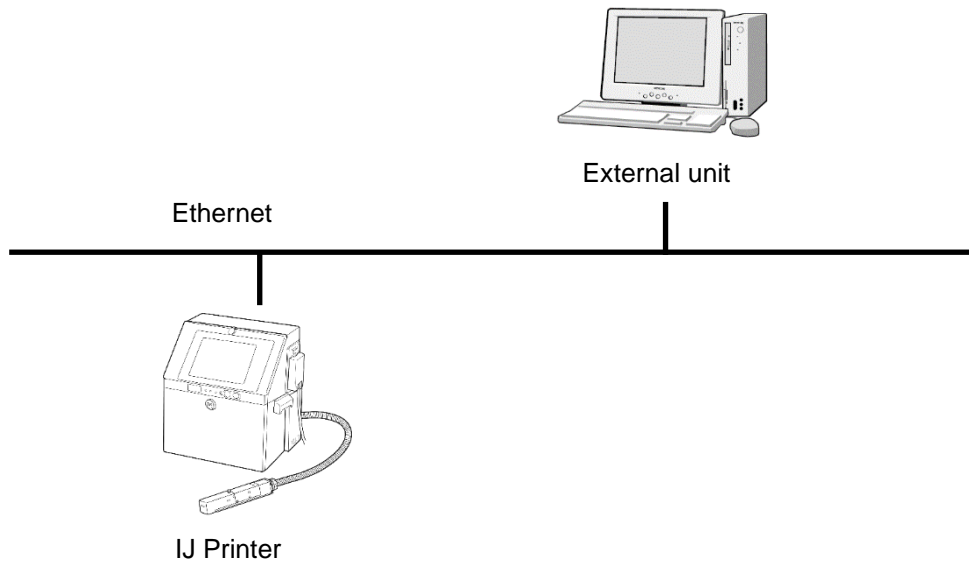
For the EtherNet/IP communication, it is necessary to develop a communication program on the external device side.

## 1.2 Configuration diagram

### 1.2.1 Serial communication



### 1.2.2 Ethernet communication



#### Standard specifications

Item	Specifications
Ethernet standards	IEEE802.3, 10BASE-T, 100BASE-T
Protocol	TCP/IP
Connection cable	Category 5 UTP or STP cable

## 1.3 Configuration diagram

- The time from when the signal is transmitted from an external unit to when the IJ Printer receives the signal cannot be strictly defined in the same way as with serial communications.

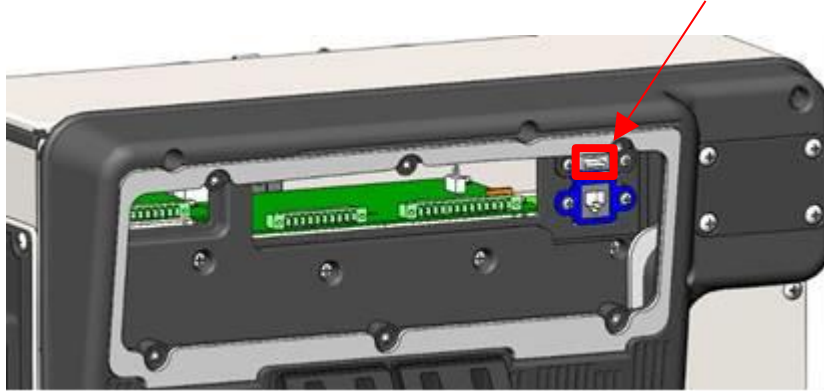
# 2.Connection preparations

## 2.1 Serial communication connection

Connect the external communication and the IJ printer by RS-232C serial communication.  
To connect to serial communication, a USB⇔serial communication conversion cable is required.

### 2.1.1 USB⇔serial communication conversion cable connection

USB⇔Serial communication conversion cable connection port



【Notes on replacement】

- Be sure to turn off the main power when replacing.
- Connect the connectors securely.

## 2.2 Ethernet communication connection

- If connecting the IJ Printer with external unit, use a LAN connection cable.

### 2.2.1 Network connection preparations

#### (1) Connect to inter-office LAN

No.	Task	Remarks
1	You should obtain the IP address from the Information Systems Department of your company.	
2	You should consult with the Information Systems Department of your company concerning network settings such as gateway.	

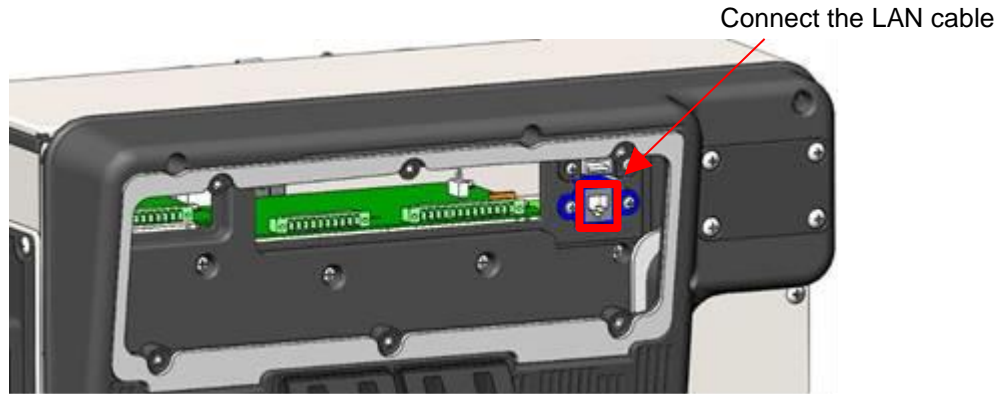
#### (2) Connect from outside the office

No.	Task	Remarks
1	Make a contract with the provider and get unchanging IP address.	
2	To establish a connection through telephone line, contracts provided by external providers is required. If not using the telephone line, mobile environment is required. Also, a router for mobile card is necessary.	
3	Follow the manual offered by the provider for network setup procedure.	

### 2.2.2 IJ Printer preparations

No.	Task	Remarks
1	Connect the IJ Printer to the Ethernet (computer or hub, etc.) with a LAN cable.	
2	Conduct a connection test if necessary.	
3	Set the communication environment on the IJ Printer's screen.	

## 2.2.3 LAN cable connection



### 【Notes on replacement】

- Be sure to turn off the main power when replacing.
- Connect the connectors securely.

### ■Glossary

Terminology	Explanation
IP address (Internet protocol address)	The IP address is a 32-bit ID number allotted to equipment connected to the Internet. The 32-bit number of the IP address is usually divided into four 8-bit segments for display. The IP address consists of a "network address" that identifies the network and a "host address" that identifies the individual pieces of equipment connected in the network.
Subnet mask	The subnet mask is a 32-bit number that defines what bits of the IP addresses are used for the network address. The network address segment of the IP address is determined by calculating the logical AND of the IP address and subnet mask.
Default gateway	The default gateway is equipment such as a router that functions as the "gateway" to the network. When there is communication between different networks and there is no unique path for the equipment to be accessed, the default gateway is used to connect them.
Port number	The port No. is the sub-address that specifies one of several programs running on equipment specified by the IP address. Port numbers 502 or 1024-65535 are used as the sub-address.
MAC address	It is a number registered to identify the device on the network. The MAC address consists of 12 digits like 01-23-45-67-89-AB.



### 3. Connection test

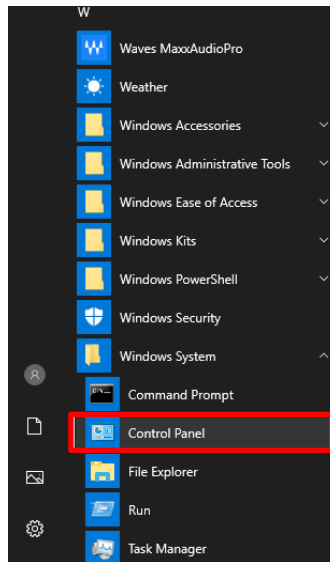
Directly connect the IJ Printer to a PC and check the connection.

#### 3.1 Procedure for connection test

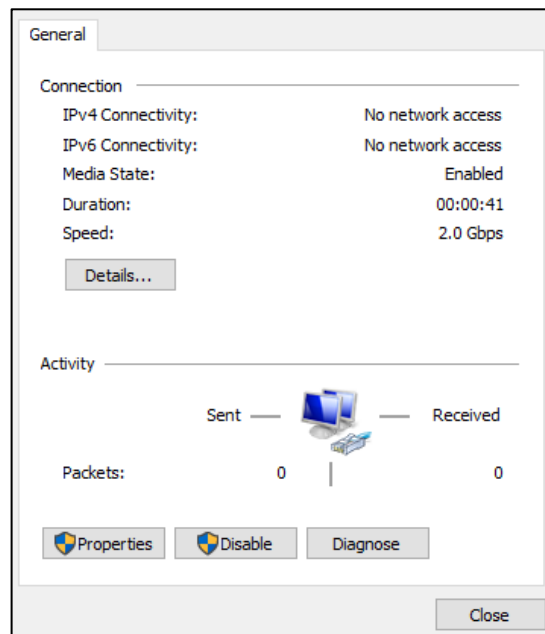
1 Directly connect the IJ Printer to the PC with a LAN cable.

2 Set the network settings of external unit by steps 2 to 5.

Click the Start menu, and double-click [Windows System] > [Control Panel] > [View network status and tasks] > [Change adapter settings] > [Ethernet].  
The following window is then displayed.

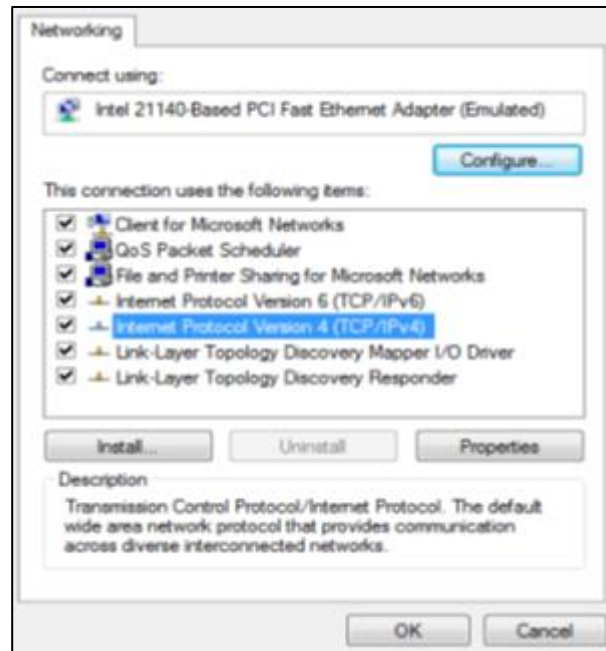


3 Click [Properties].

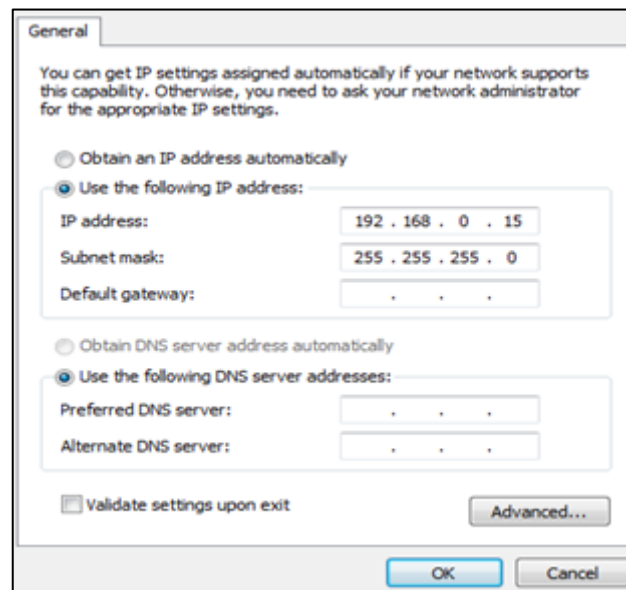


(Example using Windows 10 OS)

4 Click [Internet Protocol Version 4 (TCP/IPv4)].



5 Select [Use the following IP address], and enter an IP address other than 192.168.0.1 and 192.168.0.255 (the example shown in the figure uses 192.168.0.15) and then enter 255.255.255.0 in the Subnet mask field. Click [OK].



- 6 Follow the steps below to confirm that the network connection is properly established. The following steps describe procedures for Windows 10.

```
ca. Command Prompt
Microsoft Windows [Version 10.0.17763.168]
(c) 2018 Microsoft Corporation. All rights reserved.
C:\Users\ijp>
```

Select [Start Menu] > [Windows System] > [Command prompt] to open the Command Prompt window.

```
ca. Command Prompt
Microsoft Windows [Version 10.0.17763.168]
(c) 2018 Microsoft Corporation. All rights reserved.
C:\Users\ijp>ping 192.168.0.1
```

Type the following command:  
Ping 192.168.0.1

Note:  
This command is not case sensitive.

```
ca. Command Prompt
Microsoft Windows [Version 10.0.17763.168]
(c) 2018 Microsoft Corporation. All rights reserved.
C:\Users\ijp>ping 192.168.0.1

Pinging 192.168.0.1 with 32 bytes of data:
Reply from 192.168.0.1: bytes=32 time<1ms TTL=64
Reply from 192.168.0.1: bytes=32 time<1ms TTL=64
Reply from 192.168.0.1: bytes=32 time<1ms TTL=64
Reply from 192.168.0.1: bytes=32 time<1ms TTL=64

Ping statistics for 192.168.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\Users\ijp>_
```

Byte=32 time=24 ..in four consecutive lines\*1 then external unit settings are completed.

\*1:  
In default, the ping command returns the response for four times. For details of the ping command, type the following command: ping/help

```
ca. Command Prompt
Microsoft Windows [Version 10.0.17763.168]
(c) 2018 Microsoft Corporation. All rights reserved.
C:\Users\ijp>ping 192.168.0.1

Pinging 192.168.0.1 with 32 bytes of data:
General failure.
General failure.
General failure.
General failure.

Ping statistics for 192.168.0.1:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\Users\ijp>_
```

If "Destination host unreachable." response is returned for the ping command, it means communication has not been established between the IJ Printer and external unit. Re-check the following:

[Check points]  
\* Have the communication settings of the IJ Printer been changed?  
\* Are the network settings of the external unit correct?

# 4. Setting the communication environment

## 4.1 Setting the communication environment

### (1) Overview

Setting item of Serial communication

Function	Description		Default
State at power-up	Comm. port is OFF	Offline mode when the power is turned on.	Comm. Port is OFF
	Comm. port is ON	Online mode when the power is turned on.	
	OFF fixed	Always offline mode and you cannot change to the online mode.	
Communication and signal error	Warning	An external communication error and external signal error are considered to be "Warning."	Warning
	Fault	An external communication error and external signal error are considered to be "Fault". The printer does not print even if the product target detector is turned ON.	
Baud rate	Sets the baud rate at which communication is established with the outside. Eleven different settings are selectable: 150 300 600 1,200, 2,400 4,800 9,600 19,200 38,400 57,600 or 115,200 bps.		4800bps
Data format	<ul style="list-style-type: none"> <li>Sets the data length, parity bit, and stop bits for communication with the outside.</li> <li>The following settings are available.               <ol style="list-style-type: none"> <li>Data length: 7 or 8 bits</li> <li>Parity bit: none, odd, or even</li> <li>Stop bits: 1 bit or 2 bits</li> </ol> </li> </ul>		Data length: 8 bits Parity bit: none Stop bits: 1 bit
Number of comm. bytes	<ul style="list-style-type: none"> <li>Sets the number of character code bytes for communication with the outside.</li> <li>A setting of 1 byte or 2 bytes can be selected.</li> </ul>		1 byte
BCC code handling	Setup can be performed so that no communication error occurs even if BCC code attached data is received.		Disable
Communication mode	Overwrite-protected	No new data will be received until the previously received data is printed.	Overwrite-protected
	Overwrite-enabled	New data is received even if the previously received data has not been printed. The newly received data overwrites the old data.	
Print message Transfer ACK	t=fixed	The time from receiving the print description from an external device to sending ACK becomes nearly fixed regardless of the transmission volume.	t=async.
	t=async	The system will be ready to print immediately after returning ACK.	
Print spec. transfer Char. height	2 digits	Uses 2-digit data for character height setting ([00] to [99]) transmission.	2 digits
	3 digits	Uses 3-digit data for transmission.	

### Setting item of LAN communication

Function	Description	Default			
LAN Function	No use	LAN function cannot be used.			
	Tunnel communication	Tunnel communication function can be used			
	Tunnel communication (Output)	Only communication of Special communication function A can be used as Tunnel communication function.			
	Modbus communication	Modbus communication function can be used			
	OPC-UA communication	OPC-UA communication function can be used.			
	EtherNet/IP communication	EtherNet/IP communication function can be used.			
IP address	Sets IJ Printer's IP address. *192.168.251.0 to 192.168.255.255 cannot be set to the IP address of the IJ printer.	192.	168.	0.	1
Subnet mask	Sets IJ Printer's Subnet address.	255.	255.	255.	0
Default gateway	Sets IJ Printer's Default gateway. *192.168.251.0 to 192.168.255.255 cannot be set to the default gateway.	0.	0.	0.	0.
Port No	Sets IJ Printer's Port No. * Tunnel communication: 1024 to 59999 can be set to Port No. * Modbus communication 502 and 1024 to 59999 can be set to Port No. * Port No. is fixed to 4840 for OPC-UA Communication * Port No. is fixed to 44818 for Ethernet/IP Communication	1024			
MAC address	Displays IJ Printer's MAC address. *It is a number registered to identify the device on the network. The MAC address consists of 12 digits like 01-23-45-67-89-AB and cannot be changed.	Device-specific and cannot be changed			

## (2) Operating procedure

**1** Press **Communication environment setup** from the setup menu.

The "Communication environment setup" screen appears.

Communication environment setup(1/2) Comms OFF Stop 00:00 2024/01/01

State at power-up : Comm. port is OFF Communication and signal error : Warn. Fault

<LAN communication>

LAN function : No use Port No. : 1024

IP address : 192 . 168 . 0 . 1 Subnet mask : 255 . 255 . 255 . 0

Default gateway : 0 . 0 . 0 . 0 MAC Address : A4 97 BB 30 00 20

<Transmission condition by port>

Target port : USB Baud rate (bps) : 4800

<Data format>

Data length : 7 bits 8 bits Parity bit : Disable

Stop bits : 1 bit 2 bits

HOME Control Back Prev. Next

Change the on-line or off-line

Setting item of LAN communication

**2** Press **Next**.

The second screen appears.

Communication environment setup(2/2) Comms OFF Stop 00:00 2024/01/01

<Standard communication>

Number of comm. bytes : 1 byte 2 bytes BCC code handling : Disable Enable

Communication mode : overwrite-protected overwrite-enabled Print message transfer ACK : t=fixed t=async.

Print spec transfer char height : 2 digits 3 digits

<Buffer function>

Buffer function : Disable Enable Buffer repeat count : 1 (1 - 9999)


Empty Buffer Fault : Disable Enable Timing of Fault : Print Start Print Complete

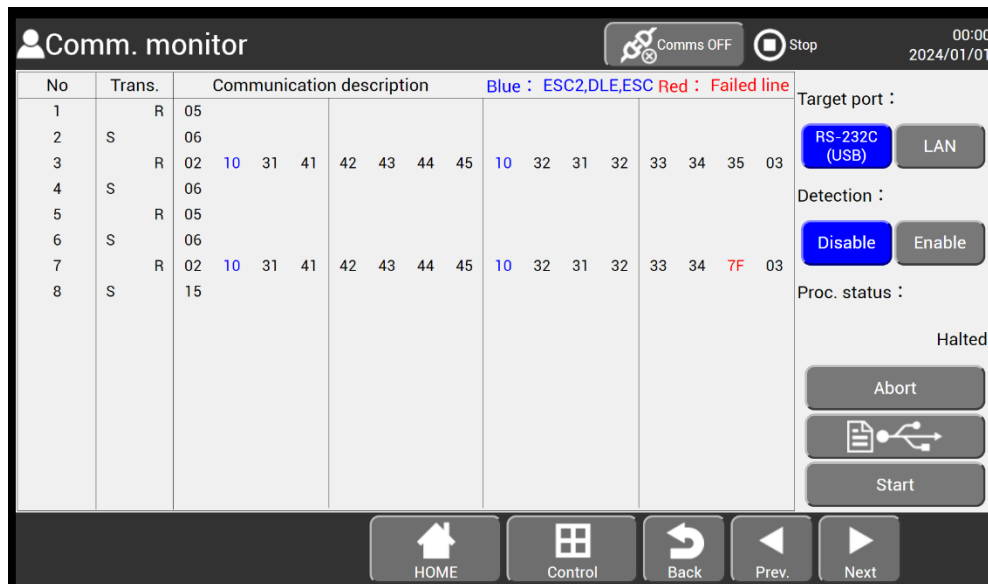
Data Number at Fault : 2 (0 - 9)

HOME Control Back Prev. Next OK

# 5. Communication Monitor

## 5.1 Communication Monitor Function

- The contents of Serial communications, Tunnel communications, Modbus communications between the external device and IJ printer are displayed.
- Up to 3,000 bytes of data can be acquired at a time.
- When you press the **Start**, the system erases monitored data and acquires new data.
- When you press the USB output button , the communication description which is displayed on screen can be output to USB memory.




【Notes on communication monitor】

- During monitoring, the response performance of the external communication of the IJ printer may deteriorate. When using the communication monitor, please use it with a margin in the communication timing.


### (1) Screen display

Item	Description
Trans.	External device → IJ printer : R (Receive) IJ printer → External device : S (Send)
Communication description	Sended/received data are displayed in hexadecimal notation. Sixteen bytes of data are displayed per line.
Proc. status	The current status is indicated (monitoring or interrupted).

## (2) Function

Item	Description
Start	Starts exercising the communication monitor function. Erases the monitored information.
Abort	Aborts the execution of the communication monitor function.
Target port	This switches the target port. ● RS-232C(USB): Monitor serial communication. ● LAN: Monitor Tunnel communication or Modbus communication.
Error detection	This switches over whether the system is to detect error-ridden locations. ● Disable: The system will not detect error-ridden locations. The system will memorize up to bytes 3,000 of data transmitted and received. ● Enable: The system will display error-ridden locations in red. The system will memorize up to transmitted and received data up to the location where an error was detected.
Prev./Next	Used to switch to another screen when the amount of information to be displayed is too large to fit on a single screen.
USB output 	The Communication description which is displayed on screen can be output to USB memory.
Back	Returns you to the setting menu.

## (3) Explanation of USB output function.

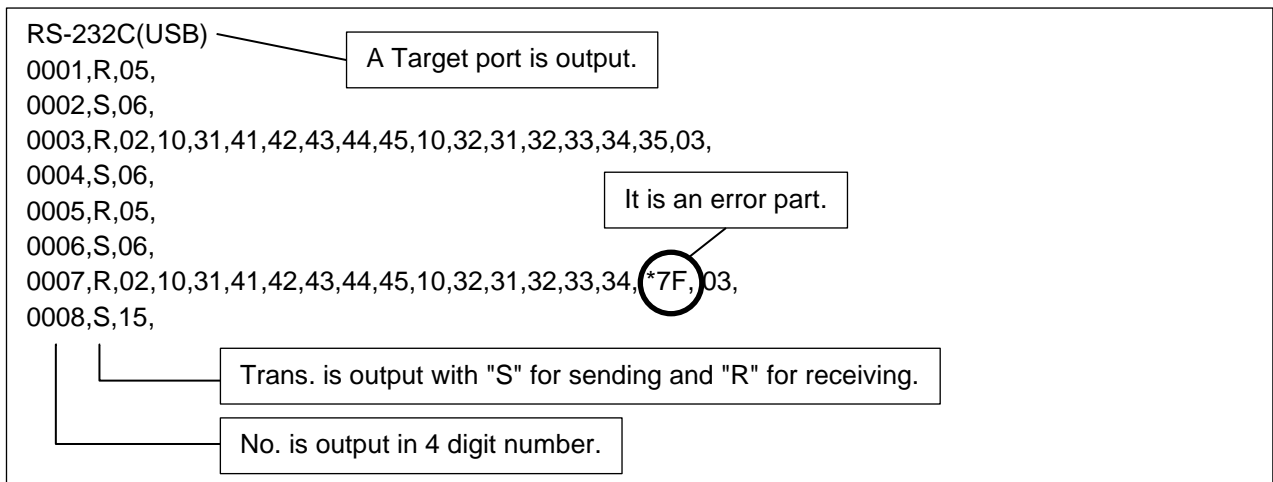
- When you press the USB output button  , the Communication description which is displayed on screen can be output to a USB memory.
- The Communication description which is displayed on screen can be output to a USB memory when "Comm. monitor" screen is displayed AND Comm. monitor is in "Halted" status.
- The Communication description is output in a Text file format.
- Explanation of file composition and file name.
  - `UX2CLOG` folder is automatically created right below the USB memory.
  - The Communication description is output in the name of `LOG_Serial number_YYMMDDhhmmss.txt` right below the `UX2CLOG` folder.

<ul style="list-style-type: none"> <li>■ USB Memory</li> <li>■ <code>UX2CLOG</code> ¥ <code>LOG_Serial number_YYMMDDhhmmss.txt</code></li> </ul>	<p>YYMMDDhhmmss stands for Year, Month, Date, Hour, Minute and Second.</p>
--	--



- Explanation of content of output.
  - A Target port is output in the lead, such as "RS-232C(USB)" for the RS-232C(USB) port and "LAN" for the LAN port.
  - Compositions of the Text file are output in the order of No., Trans, and Communication description. (No.: 4 digit number; Trans.: "S" for sending and "R" for receiving.)
  - An asterisk (\*) is output in front of the error part when an error was detected.



(Example of output text file)



● Explanation of content of notes.

- The data is NOT output by pressing the USB output button  if the Communication description does NOT Exist.
- The data is NOT output by pressing the USB output button  when the Line monitor is in operation.
- <USB Memory Error> is displayed when the USB memory is NOT installed on the IJP.
- <USB Memory Error> is displayed when the USB memory runs out of its capacity.
- The data is overwritten if the same file name already exists in the USB memory.
- Use a USB memory that does not contain any files.
- Do NOT remove the USB memory when the USB data output is in process.