RS-485/422 LAN Converter

LNX-003(Rev2)

User's Manual

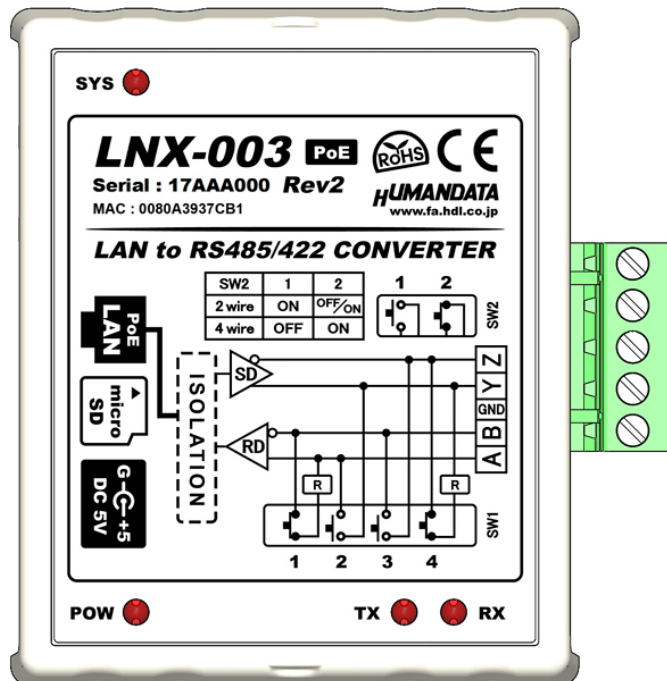## Ver. 1.1

HuMANDATA LTD.

Table of Contents

● Precautions

	1	This product uses ordinary off-the-shelf electronic components, and is therefore inappropriate for use in applications that require special quality or reliability and are expected to protect human lives or prevent accidents, such as safety mechanisms in fields including space, aeronautics, medicine, and nuclear power.
Do Not	2	Do not be used underwater or in high-humidity environments.
	3	Do not be used in the presence of corrosive gases, combustible gases, or other flammable gases.
	4	Do not turn on power when circuit board surface is in contact with other metal.
	5	Do not apply voltage higher than rated voltage.

	6	This manual may be revised in the future without notice owing to improvements.
	7	All efforts have been made to produce the best manual possible, but if users notice an error or other problem, we ask that they notify us.
Attention	8	Item 7 notwithstanding, HuMANDATA cannot be held liable for the consequences arising from use of this product.
	9	HuMANDATA cannot be held liable for consequences arising from using this product in a way different from the uses described herein, or from uses not shown herein.
	10	This manual, circuit diagrams, sample circuits, and other content may not be copied, reproduced, or distributed without permission.
	11	If the product emits smoke, catches fire, or becomes unusually hot, cut the power immediately.
	12	Do not install the control cables or communication cables together with the main circuit lines or power cables. In such an environment, it may result in malfunction due to noise.
	13	Be careful of static electricity.

● Revision History

Date	Revision	Description
Oct. 25, 2016	v1.0	Initial release
Oct. 24, 2024	v1.1	Correct: typo

● Introduction

Thank you for purchasing our product LAN to RS-485/422 Converter LNX-003.

LNX-003 is a LAN converter which makes it possible to use RS-485/422 devices via Ethernet local area network.

LNX-003 has obtained the CE marking. (except for PoE function)

## 1. Product Configuration

The following lists the product configuration of the LNX-003.

LAN to RS-485/422 Converter (LNX-003)	1
microSD card with USB adapter	1
AC adapter (DC5V)	1
Driver & Application CD	1

2. Product Summary

LNX-003 is a LAN converter which makes it possible to use RS-485/422 devices via Ethernet local area network. RS-485/422 side is isolated and the LAN interface is also isolated, so LNX-003 consists of double isolation.

Tunneling mode is available by connecting with LNX-001 (USB to LAN converter) or LNX-003. In that case, connecting with devices in other RS-485/422 network is possible. And by using TCP/UDP or Telnet, direct control from PC is also available.
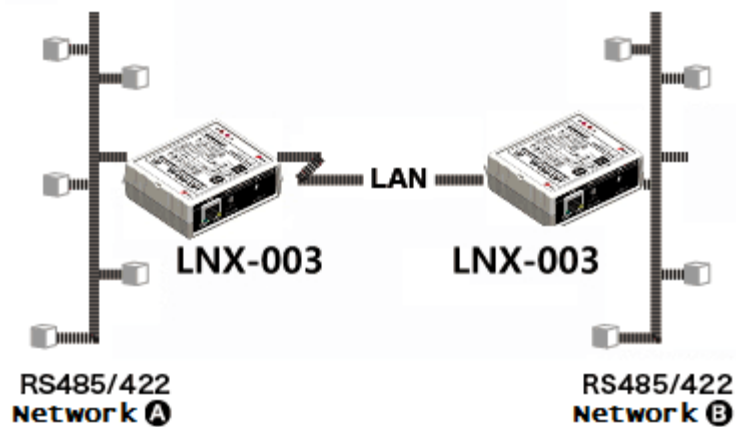
LNX-003 supports PoE function as a standard model, making it possible to be powered via LAN cable (PoE compatible HUB or other is required). It can also be operated from AC adapter.

Network setting can be set by a microSD card. Restoring the setting information from a microSD card is very convenient when replacing LNX-003.

3. Part Names and Functions

RS-485/422 Side

LAN Side
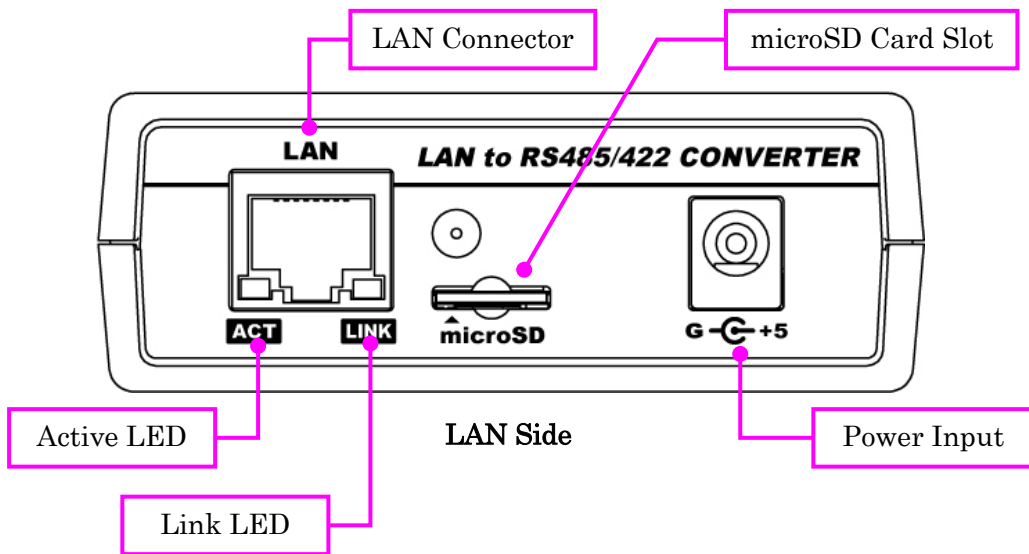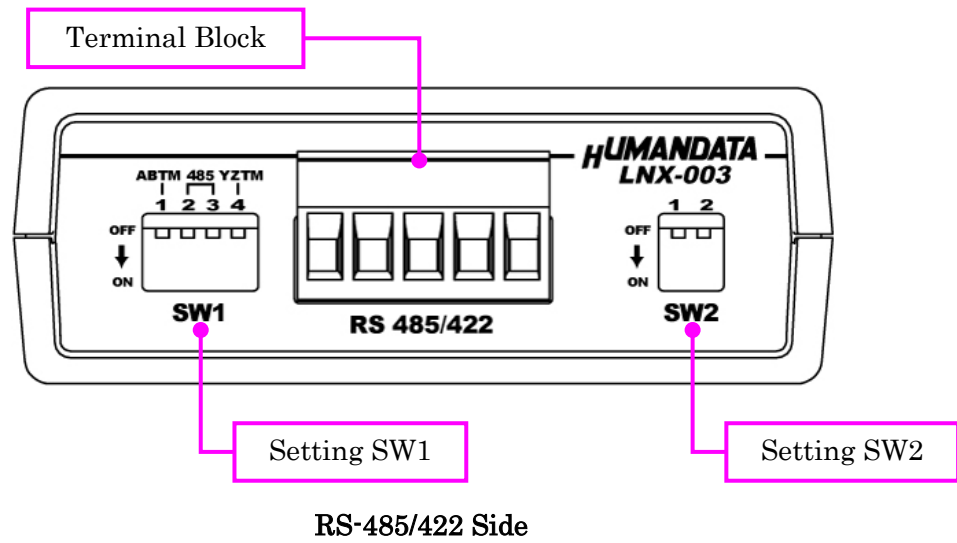
LEDs

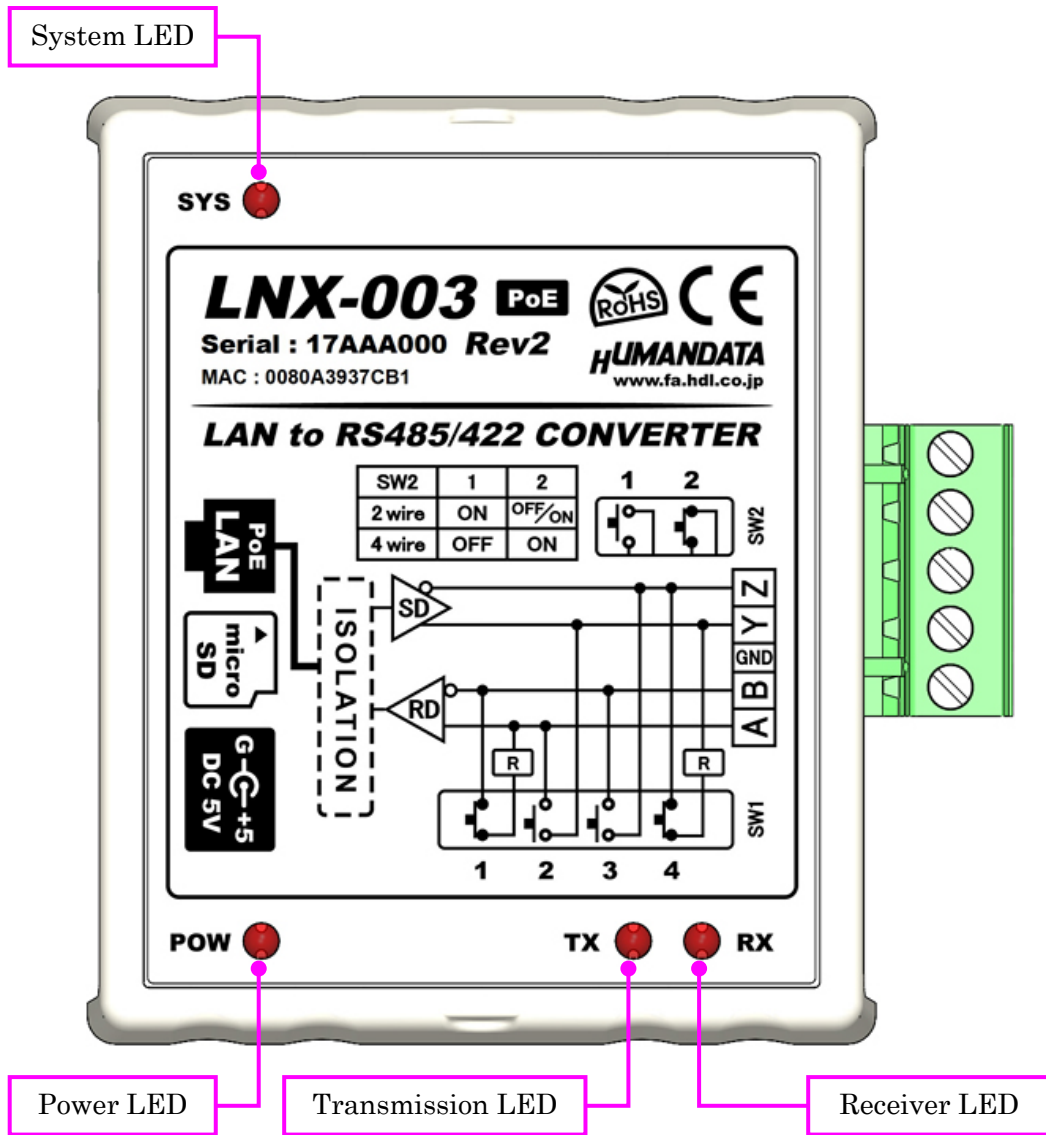|	Name(color)	Function
ACT	Active LED (green)	Turn on during network port communication.
LINK	Link LED (yellow)	Turn on when LNX-003 is powered and LAN cable is connected normally.

System LED

Power LED   Transmission LED   Receiver LED

TOP Side

LEDs

	Name(color)	Function
SYS	System LED (red)	Blink few seconds during reading process. Turn on when system is ready.
POW	Power LED (red)	Turn on when the power is supplied to the LNX-003.
TX	Transmission LED (red)	Turn on when data are transmitted to RS485/422 side.
RX	Reception LED (red)	Turn on when data are received from RS485/422 side.

4. Specifications

4.1. Product Specification

Item	Description	Remarks
Model	LNX-003	
Power	5VDC Supplied by AC adapter or LAN connector (PoE function)	PoE function supports both mode A and B
Current Consumption	Less than 350mA	
Network Interface	IEEE802.3 (10Base-T) IEEE802.3u (100Base-TX) half-duplex / full-duplex (auto detected)	
LAN Connector	RJ45	ESD protection ±11KV isolation over 1500Vrms
Protocol	TCP / UDP / Telnet	ESD protection ±15KV
Interface	RS485/422 (2-wire or 4-wire) isolated from inner circuit (DC3000V)	5.08mm pitch
Connector	5 position Terminal Block (PHOENIX CONTACT)	for setting use SPI mode
Setting Memory Card	microSD card	
Baud Rate	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400 bps	
Data Bits	7 or 8 bits	
Stop Bits	1 or 2 bits	
Parity	Even, Odd, No parity	
LED	POW: Power LED RX: Reception LED TX: Transmission LED SYS: System Status LED LINK (RJ45 Connector): LINK Status ACT (RJ45 Connector): ACT Status	

Item	Description	Remarks
Operating Ambient Temperature	-10 to 55 °C	No condensation permitted. Except AC adapter
Operating Ambient Humidity	30 to 85 % RH	
Storage Ambient Temperature	-20 to 60 °C	
Storage Ambient Humidity	30 to 85 % RH	
Applicable standards	CE	Except for PoE function
Weight	approx. 120 [g]	Only main body
Dimensions	69 x 82.5 x 30 [mm] 2.717" x 3.248" x 1.181"	Without projections
RoHS Compliance	YES	

* There may be cases that these parts and specifications are changed.

* Power saving function (suspend, standby, sleep and others) is not supported.

* Please use the microSD card that comes with the product.

4.2. AC adapter

Item	Description	Remarks
Output	5VDC 2.0A	
Plug	2.1mm inner diameter	Positive Tip
Compatible DC Jack	2.1mm inner diameter	
Operating Ambient Temperature	0 to 40 °C	No condensation permitted
Operating Ambient Humidity	30 to 85 % RH	
Storage Ambient Temperature	-20 to 80 °C	
Storage Ambient Humidity	10 to 95 % RH	
Wire Length	1.6m	
Weight	approx. 70 [g]	
Dimensions	46 x 34 x 25 [mm] 1.811" x 1.339" x 0.984"	Without projections

* There may be cases that this part and specifications are changed.

[CE marking]

LNX-003 have applied the common standard for industrial environment EN61000-6-2 and EN61000-6-4. (except for PoE function)
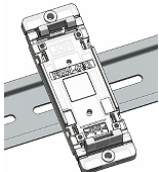
--- Application of the standards ---

EMS: EN61000-6-2

· EN61000-4-2(2009) Electrostatic discharge requirements

· EN61000-4-3(2010) Radiated electromagnetic field requirements

· EN61000-4-4(2010) Electrical fast transient burst requirements

· EN61000-4-5(2006) Surge immunity test requirements

· EN61000-4-6(2009) Conducted radio frequency requirements

EMI: EN61000-6-4

· EN61000-6-4(2007)+A1(2011) Radiated Emissions

· EN61000-6-4(2007)+A1(2011) Conducted Emissions

4.3. Optional Accessories

Model Name	Image	Description
PEN-003		Attachment with clamping screw JAN: 4937920800709
PEN-003-DIN		Attachment for 35mm DIN rail JAN: 4937920800716
PEN-003-MG		Attachment with neodymium magnet JAN: 4937920801201
ACC-005		5P Terminal to RJ45 Convert Adapter JAN: 4937920800730
TB-USB-5		Detachable 5P Terminal Connector: 1757048 (PHOENIX CONTACT) JAN: 4937920800747

4.4. Power Supply

LNX-003 supports PoE function both A and B type as standard, making it possible to be powered via LAN cable (PoE compatible HUB is required).

It also can be powered by the AC adapter.

4.5. RS-485/422 (4-wire)

Item	Specification	Remarks
Comm. System	Full-duplex communication	
Baud Rate	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400 bps	
Number of Connectable Terminals	128	Typical example
Termination Resistor	120 Ω	Configurable by setting switch (SW1) ON/OFF
Transmit Enable Control	Automatically controlled	
Receive Enable Control	Available by setting switch (SW2)	

RS-422 mode can communicate with multiple terminals by using two twist pair cables. Wires of upstream and downstream are separated and simultaneous communication (full-duplex transmission) is available.

4.6. RS-485 (2-wire)

Item	Specification	Remarks
Comm. System	Half-duplex communication	
Baud Rate	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400 bps	
Number of Connectable Terminals	128	Typical example
Termination Resistor	120 Ω	Configurable by setting switch (SW1) ON/OFF
Transmit-Receive Switching	Automatically controlled	
Echo Cancellation	Available by setting switch (SW2)	

RS-485 mode can communicate with multiple terminals by using a twist pair cable.

5. Interface Terminal

Terminal block is detachable. Do not remove it while the power is supplied.

| Pin Number	Signal	Signal and Polarity
1	A	RD+
2	B	RD-
3	GND	GND
4	Y	SD+
5	Z	SD-

① ② ③ ④ ⑤
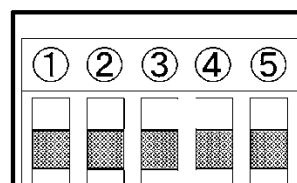
The GND(Ground) pin is recommended to be wired.

6. Setting Switch
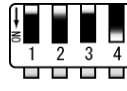
SW1 and SW2 can change the operating mode and echo cancelling.
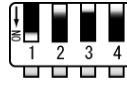
6.1. RS-485/422 (4-wire) Mode

SW2
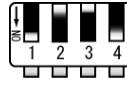
	1	2
4-wire	OFF	ON

* Please refer to Section 6.3

SW1

	1	2	3	4
No termination	OFF	OFF	OFF	OFF

Default Setting

SW1

	1	2	3	4
Transmit Side termination	OFF	OFF	OFF	ON

SW1

	1	2	3	4
Receive Side termination	ON	OFF	OFF	OFF

SW1

	1	2	3	4
Both Sides termination	ON	OFF	OFF	ON

6.2. RS-485 (2-wire) Mode

● Enable the echo cancelling

SW2

	1	2	
2-wire	ON	OFF	

* Please refer to Section 6.3

SW1

	1	2	3	4	
No termination	OFF	ON	ON	OFF	

SW1

	1	2	3	4	
Termination Enable	ON	ON	ON	OFF	

● Disable the echo cancelling

SW2

	1	2	
RS-485	ON	ON	

6.3. Setting Switch (SW2) Function

SW2-1	DE (transmit enable) Control
OFF	Always Enable
ON	Enable only Transmission

SW2-2	Echo Control
OFF	Echo Cancelling Enable (no echo)
ON	Echo Cancelling Disable (echo enable)

7. Connection examples

[Tunneling mode between two LNX-003]
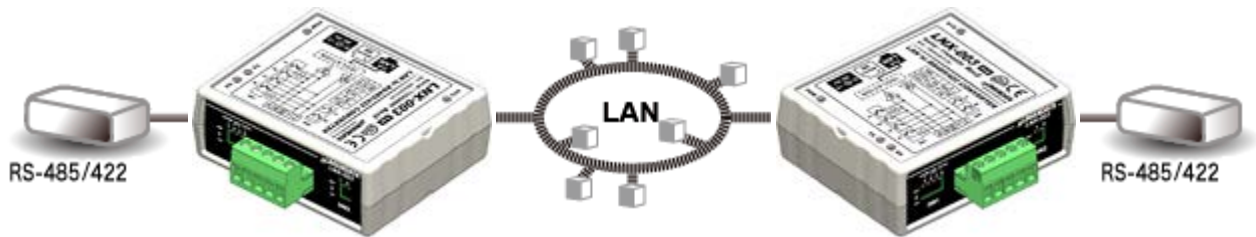
Direct communication between two LNX-003 without PCs offers you to connect separated a RS-485/422 networks. By using cross cable, one to one connection is also available.

[Tunneling mode between LNX-001 and LNX-003]
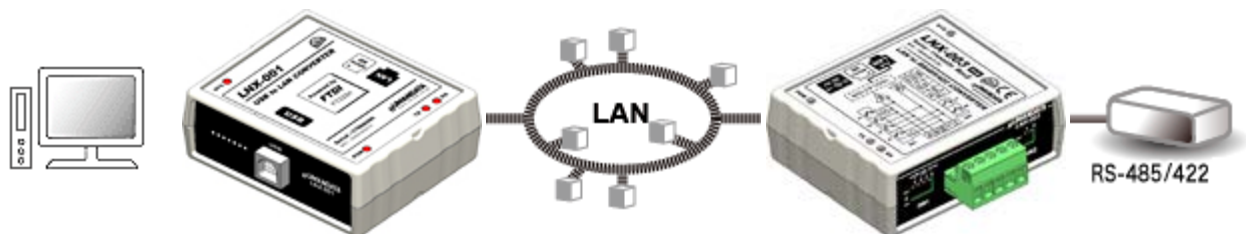
LNX-001 offers you to control as USB interface via the LAN. By connecting this with LNX-003 in tunneling mode, virtual COM port and D2XX-API by FTDI is available.

Technical knowledge about the network is not needed.

[LNX-003 single operation]

Communication with RS-485/422 devices via Ethernet local area network is available.

* Please use a cross cable to connect LNX-003 without using a hub.
  (LNX-003 does not have a function for AutoMDI/MDI-X.)

8. Setting Tool

Setting tool supports to save and read network setting by a microSD card. This tool does not require installation.

This is a screenshot from version 3.5

8.1. Access Flow of microSD card

Access to the microSD card is done immediately after power input. When TX/RX LED is turn on, do not detach the microSD card. Please detach it after confirming TX/RX LED is turn off.
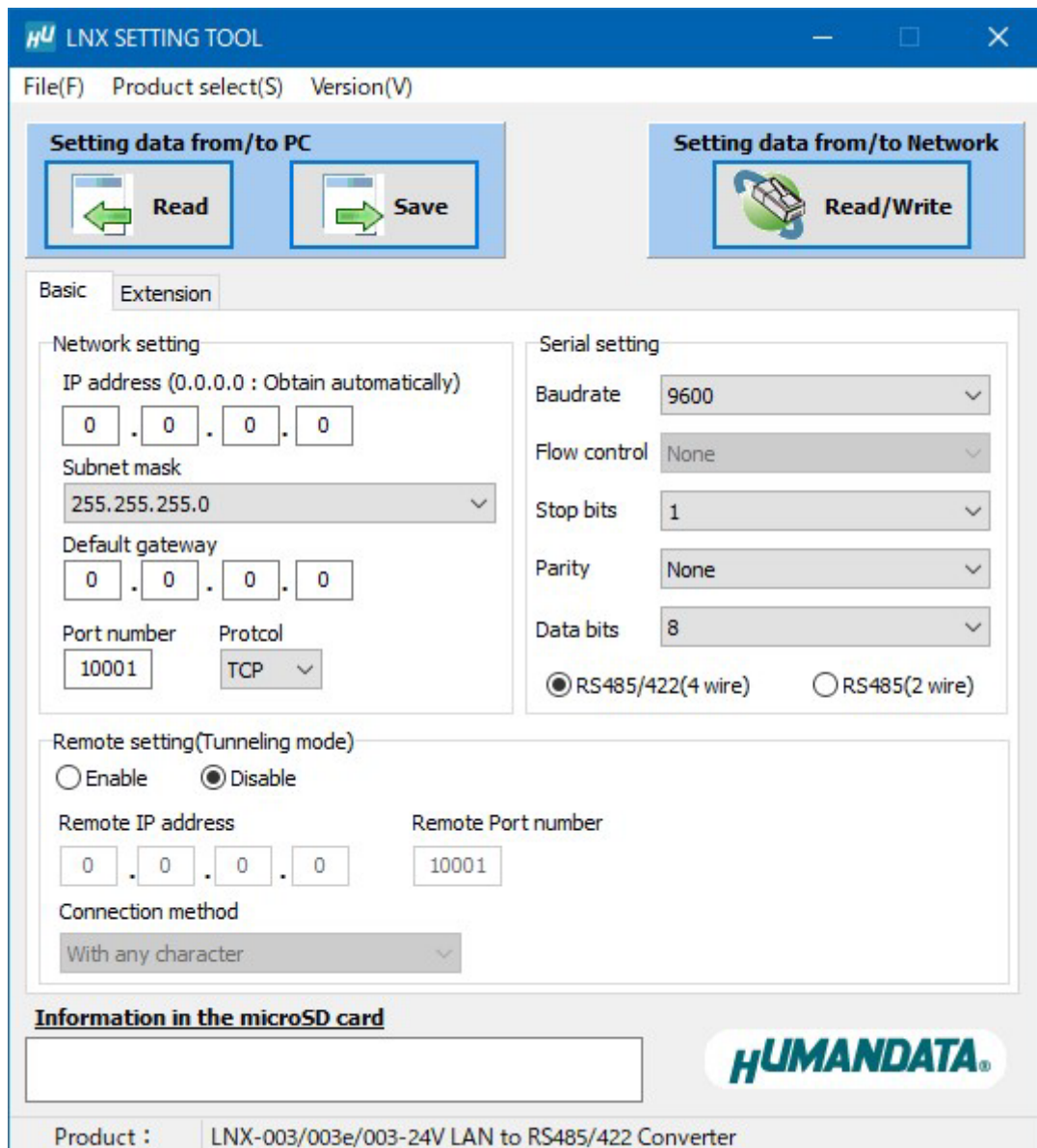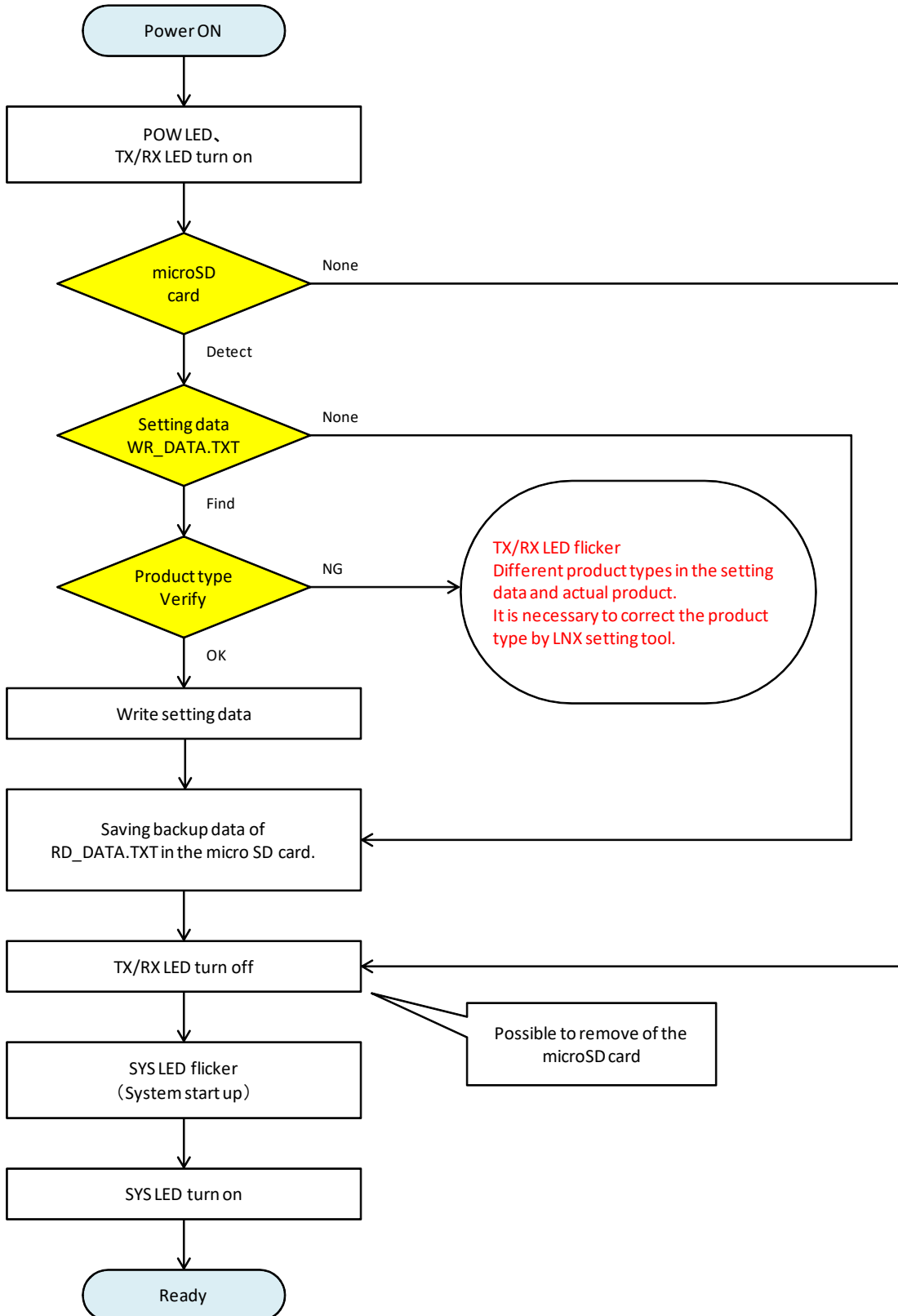
```
                    ┌──────────────┐
                    │  Power ON    │
                    └──────┬───────┘
                           │
              ┌────────────────────────┐
              │ POW LED、               │
              │ TX/RX LED turn on       │
              └────────────┬───────────┘
                           │
                      ◇ microSD ◇ ──── None ─────────────┐
                      ◇  card   ◇                        │
                           │ Detect                      │
                      ◇ Setting data ◇ ── None ──────┐   │
                      ◇ WR_DATA.TXT  ◇               │   │
                           │ Find                    │   │
                      ◇ Product type ◇ ── NG ──► TX/RX LED flicker
                      ◇    Verify    ◇              Different product types in the setting
                           │ OK                     data and actual product.
              ┌────────────────────────┐            It is necessary to correct the product
              │  Write setting data    │            type by LNX setting tool.
              └────────────┬───────────┘               │   │
              ┌────────────────────────┐               │   │
              │ Saving backup data of  │◄──────────────┘   │
              │ RD_DATA.TXT in the micro SD card. │         │
              └────────────┬───────────┘                   │
              ┌────────────────────────┐                   │
              │  TX/RX LED turn off     │◄──────────────────┘
              └────────────┬───────────┘ ◄── Possible to remove of the microSD card
              ┌────────────────────────┐
              │  SYS LED flicker        │
              │  （System start up）    │
              └────────────┬───────────┘
              ┌────────────────────────┐
              │  SYS LED turn on        │
              └────────────┬───────────┘
                    ┌──────────────┐
                    │   Ready      │
                    └──────────────┘
```
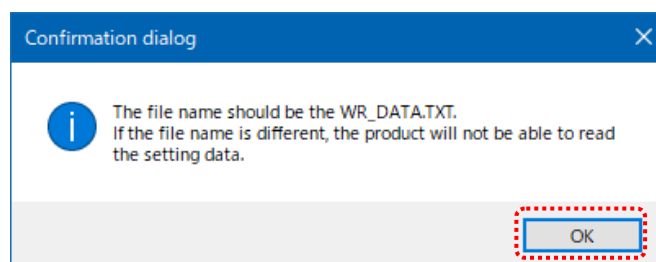
8.2. Write Setting Data

1. Open Setting Tool for LNX series (LNX SETTING TOOL Ver*.*).
2. Select "LNX-003/LNX-003e LAN to RS485/422 Converter", and click "OK".
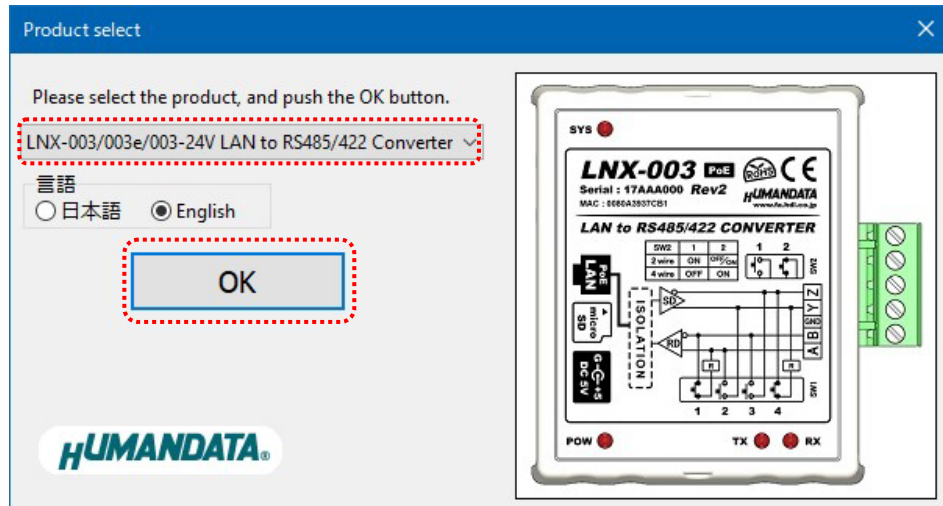
3. Enter the setting such as network or serial.
4. Insert a microSD card to PC (A USB adapter is included with the product)
5. Click "Save data".
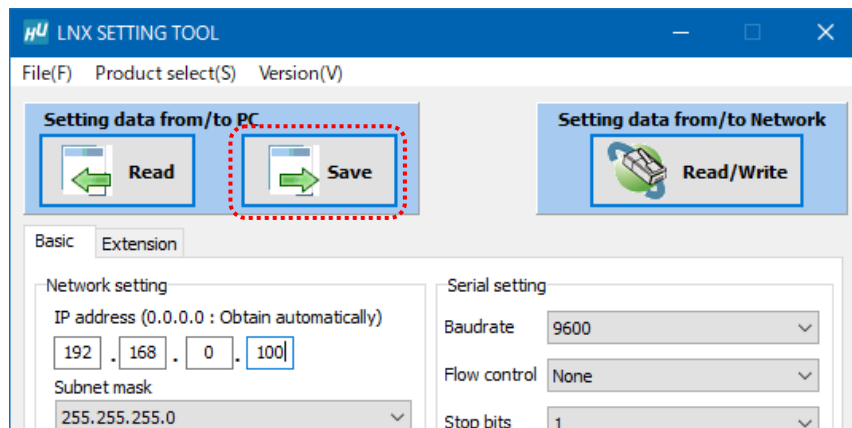
6. Click "OK" in the confirmation dialog.

7. Specify the microSD card as saving destination. Please do not change the file name from "WR_DATA.TXT".

8. Remove the microSD card from PC and insert it to the product. Please confirm that the product power is turned off.

9. When the product is powered on, the setting data is configured to it automatically. After the data is stored in the product, microSD card is not needed any more. The start-up time can be shortened if the microSD card is removed from the product.
Please be careful not to detach the microSD card before TX/RX LED is light off.
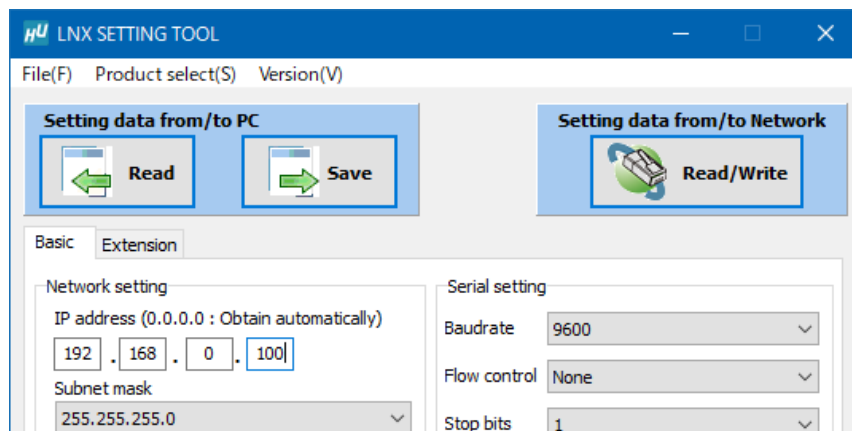

8.3. Read Setting Data

1. After confirming the power off, insert the microSD card to the product.

2. When the product is powered on, the setting data will be reserved to the microSD card automatically. The data file name is "RD_DATA.TXT".
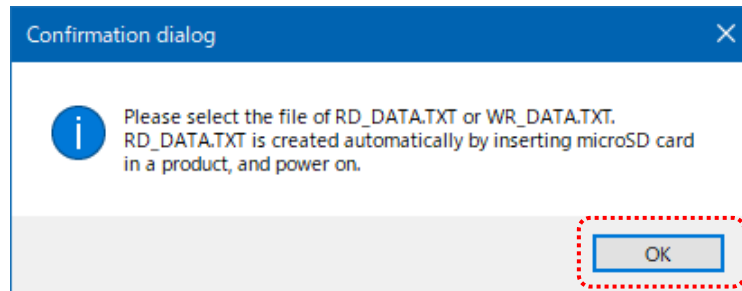Please be careful not to detach the microSD card before TX/RX LED is light off.
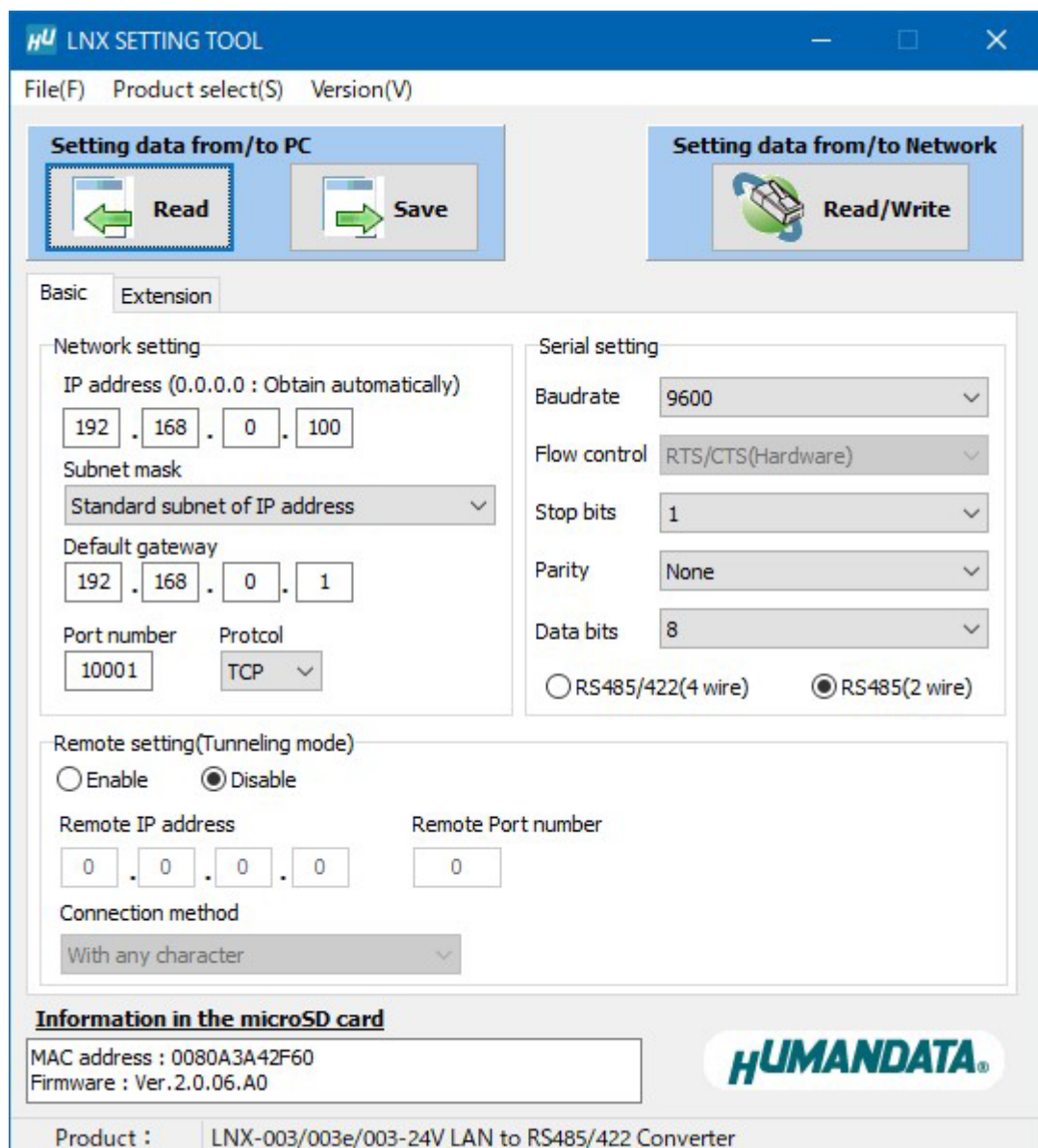* If there is the same file name in the microSD card, the data will be overwritten.

3. Insert a microSD card to PC (A USB adapter is included with the product)

4. Start the setting tool and click "Reading data"

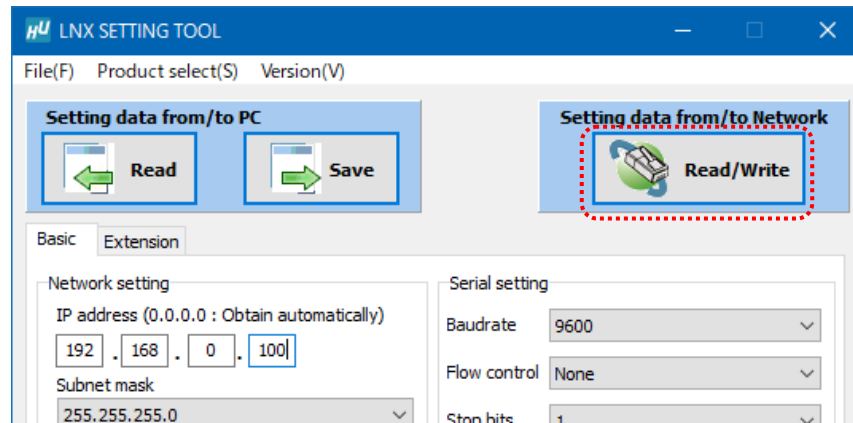5. Click "OK" in the confirmation dialog.

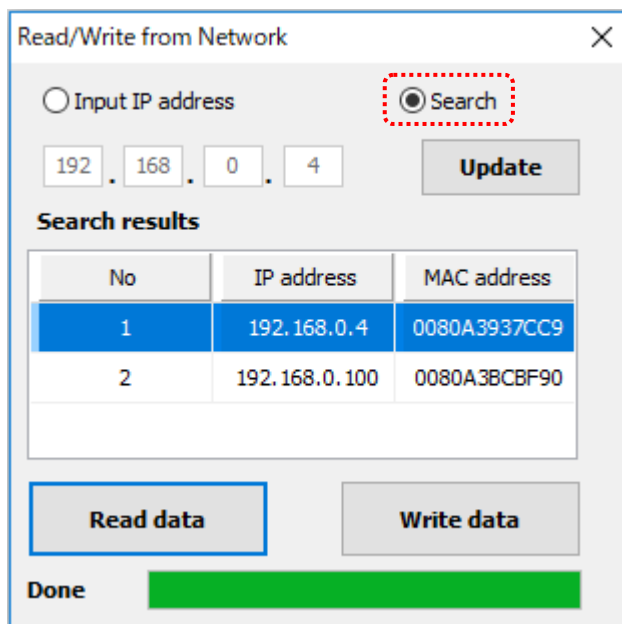6. Open the "RD_DATA.TXT" in the microSD card.
7. Setting data is loaded.

8.4. Write or Read setting data over the network

1. Enter the setting such as network or serial and click "Network".
   * Please confirm that microSD card is not inserted in a product.

2. Enter an IP address manually or click "Search". When some products are found, please select a number from a list.

3. Click "Read data" or "Write data"
    * Even if some devices will be listed in the list and occur process time out. In this case, please change the PCs' network setting to the same network segment as the product or using microSD card.

8.5. Setting Example

[Tunneling mode between LNX-003]
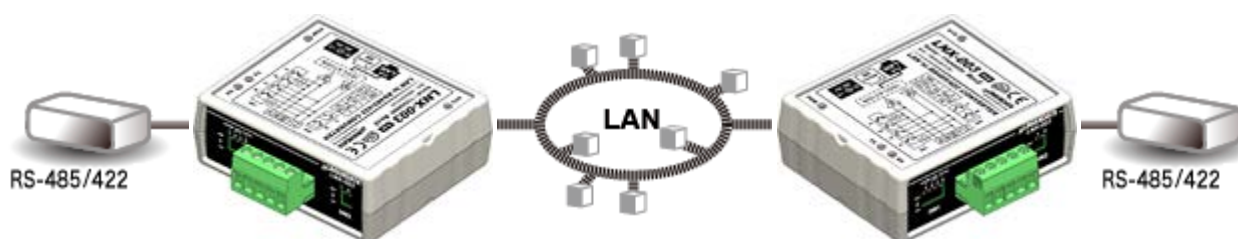
	LNX-003 Side	
	Network Setting	
192.168.0.100	IP Address	192.168.0.101
255.255.255.0	Subnet Mask	255.255.255.0
0.0.0.0	Default Gateway	0.0.0.0
10005	Port Number	10005
TCP	Protocol	TCP
192.168.0.101	Remote IP Address	192.168.0.100
10005	Remote Port Number	10005
	Serial Communication	
230400	Baudrate	230400
None	Flow Control	None
1	Stop Bits	1
None	Parity	None
8	Data Bits	8

[LNX-003 single operation]
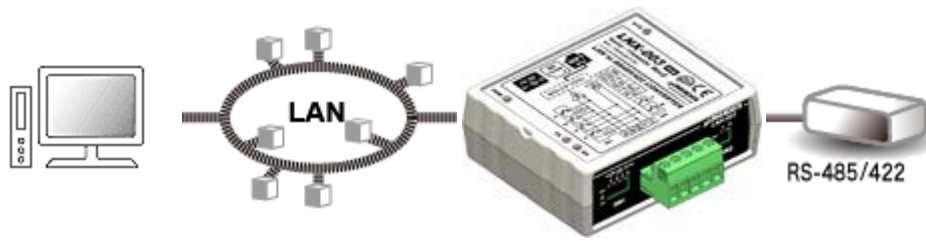
LNX-003 Side

Network Setting	
192.168.0.100	IP Address
255.255.255.0	Subnet Mask
0.0.0.0	Default Gateway
10005	Port Number
TCP	Protocol
0.0.0.0	Remote IP Address
0	Remote Port Number
Serial Communication	
230400	Baudrate
RTS/CTS (hard ware)	Flow Control
1	Stop Bits
None	Parity
8	Data Bits

9. Virtual COM Port

You can use the software that maps Virtual COM ports on a PC platform. It redirects application data destined to an attached device via the PC's local serial (COM) port. Rather than going out the local port, the data is transmitted across the Ethernet network using TCP/IP. LNX-003 attached to the network receives the data and transfers it from its own serial port to the attached equipment. Please refer to the "LNX series virtual COM port User's Manual" that are stored on the product supplied CD for details.

10. Additional Documentation and User Support

The following documents and other supports are available at
https://www.hdl.co.jp/en/faspc/LNX/lnx-003/

- LNX SETTING TOOL
- Outline drawing
  … and more.

11. Attachment Documentations

- Outline drawing of the LNX-003
- Outline drawing of the AC Adapter

12. Warranty and compensation

Please refer to the following URL for the warranty.
https://www.fa.hdl.co.jp/en/fa-warranty.html

RS-485/422 LAN Converter

LNX-003 Rev2

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HuMANDATA LTD.