How to use AKM-RSM-100 in the network of **RS-422 and RS-485**

~ Information 003: Connection image in RS-422 and in RS-485 ~

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Akiyama Manufacturing

*Note: The "Information xxx" is the document which provides information about the important item that we can't do description easily in FAQ in many questions which we got from the customers.

[Trademark]

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We made the table of contents because this document had much page.

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[Introduction]

Serial Port Monitor and Analyzer (Model: AKM-RSM-100) (From now on, it will be described as "AKM-RSM-100".) is the application software which is actuated on Windows OS.
If serial port is recognized as COM1~COM32 on Windows, even the network of RS-422 and RS-485 can be used.

We will describe it here about the way of connecting AKM-RSM-100 by using some system configuration examples of the network of RS-422 and RS-485.

We obtained much USB-RS422/RS485 conversion cable. Then, we made an experiment device by using them.

*Note: The general specification of USB-RS422/RS485 conversion cable to be used is the following.
(a) FTDI chip is being used.
(b) It has mechanism of the automatic direction control of the driver and receiver.
*Note: Because the communications line of the experiment device was short, this verification was carried out without terminator.

This document describes the result of the actuation verification with our experiment device.
Please let me know it to Akiyama Manufacturing if you found something error in the contents of this document.

[Precaution] (Please be sure to read this.)

(1) Before purchasing AKM-RSM-100, confirm that AKM-RSM-100 is surely actuated normally on your system by using the trial edition.

(2) In this document, System Configuration Example and Configuration Image of AKM-RSM-100 are expressed like a Tree Network. **But, the Daisy Chain Network will be actually used typically**.
The figures of this document are examples for the reference.
Make the actual network by the Daisy Chain Network.

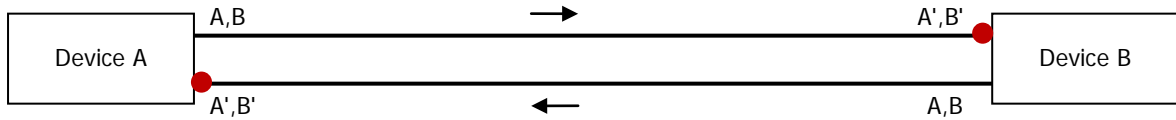Tree Network   **In the actual network...**   **Daisy Chain Network**
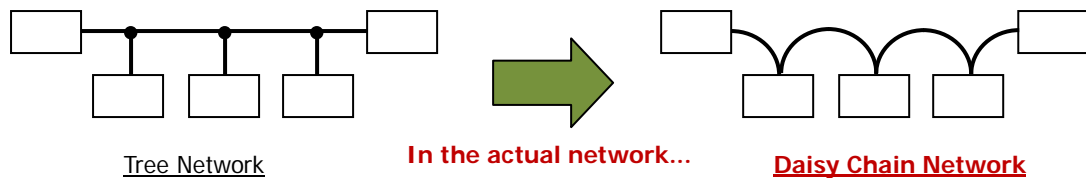
(3) Use **twisted-pair cable** with RS-422 and RS-485.

(4) The typical termination point is shown in this document. But, the kind of the termination isn't shown.
There are multiple kinds as the termination type. Therefore, set up the terminal which was suitable for the configuration of your system.
Then, as for the terminal point as well, fit it to the configuration of your system.

(5) **The AKM-RSM-100 doesn't do the automatic control of the RS (RTS) signal at the time of the communications data transmission.**
Therefore, the USB-RS485 converter connected to PC which AKM-RSM-100 is installed in must have the automatic control mechanism about the communications direction.
For example, confirm the following description in the specifications of the converter.
   - (a) Automatic Control Mode (is available)
   - (b) Automatic control of the transmission data (is available)
   - (c) Direction control is identified automatically
   - (d) Direction control: Adopt the technology which automatically controls the data-flow direction/automatically distinguish and control the data-transmission direction.
   - Etc.

(6) **Be careful about the range of the input voltage and the range of the output voltage of the USB-RS422 /RS485 converter connected to PC which AKM-RSM-100 is installed in.**
   - (a) The output voltage of the target device must be suitable for the input allowable voltage of the USB-RS422 /RS485 converter.
   - (b) The output voltage of the "USB-RS422 /RS485 converter" must be suitable for the input allowable voltage of the target device.
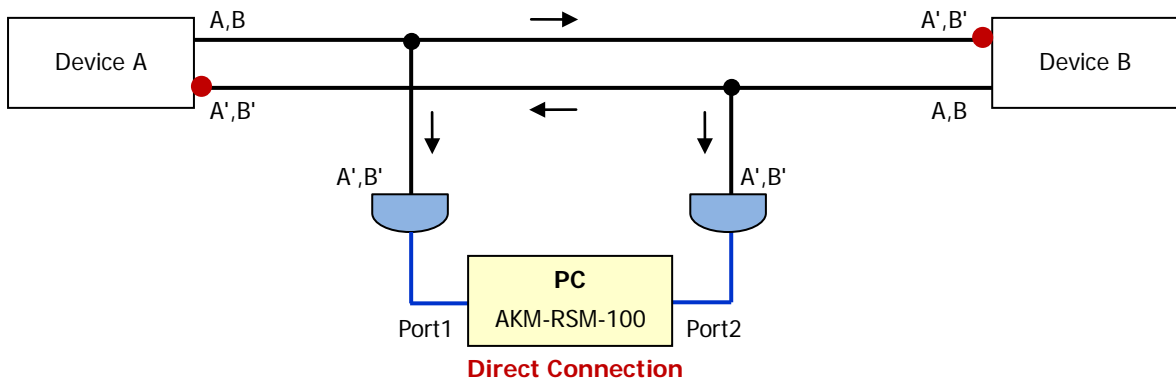
[RS-422]

■ Four-wire, Full-duplex communications, Point-to-Point connection

System Configuration Example:

| Device A | A,B → A',B' | Device B |
| | A',B' ← A,B | |

*Note: A, B, A', and B' may be displayed as TxD+, TxD-, RxD+, and RxD-.

Configuration Image of AKM-RSM-100 #1:

Device A — A,B → A',B' — Device B
Device A — A',B' ← A,B — Device B

A',B'   A',B'

PC
AKM-RSM-100
Port1   Port2
Direct Connection

*Note: A, B, A', and B' may be displayed as TxD+, TxD-, RxD+, and RxD-.

Function Name	Actuation
Line Monitor	**X**
Replay	
Simulation	
Sending Fixed Data Continuously	
Replace	
Sending Manual Data	
Speed Conversion	

※ **X: Available,** [⬛]**: Not available**

[Explanatory notes]
—— : Twisted-pair cable
● : Termination Point
◗ : USB-RS422 Converter
—— : USB Cable

Configuration Image of AKM-RSM-100 #2:

*Note: A, B, A', and B' may be displayed as TxD+, TxD-, RxD+, and RxD-.

Function Name	Actuation
Line Monitor	X
Replay	X
Simulation	X
Sending Fixed Data Continuously	X
Replace	X
Sending Manual Data	X
Speed Conversion	X

[Explanatory notes]
———— : Twisted-pair cable
● : Termination Point
⬭ : USB-RS422 Converter
———— : USB Cable

※ **X: Available,** ▨ **: Not available**

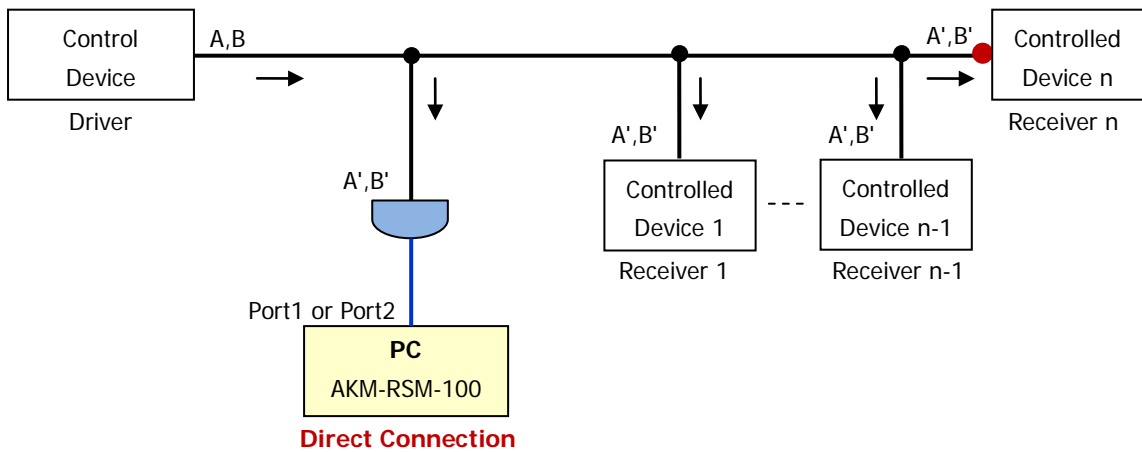*Note: When PC of AKM-RSM-100 freezes, the whole of the system will stop.

■ Two-wire, Multi-Receiver Operation

System Configuration Example:
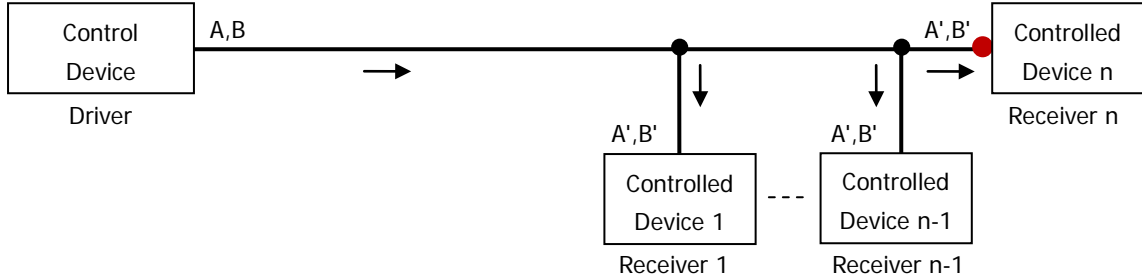
*Note: A, B, A', and B' may be displayed as TxD+, TxD-, RxD+, and RxD-.

Configuration Image of AKM-RSM-100 #1:

*Note: A, B, A', and B' may be displayed as TxD+, TxD-, RxD+, and RxD-.

Function Name	Actuation
Line Monitor	**X**
Replay	
Simulation	
Sending Fixed Data Continuously	
Replace	
Sending Manual Data	
Speed Conversion	

※ **X: Available,** : Not available

[Explanatory notes]
——— : Twisted-pair cable
● : Termination Point
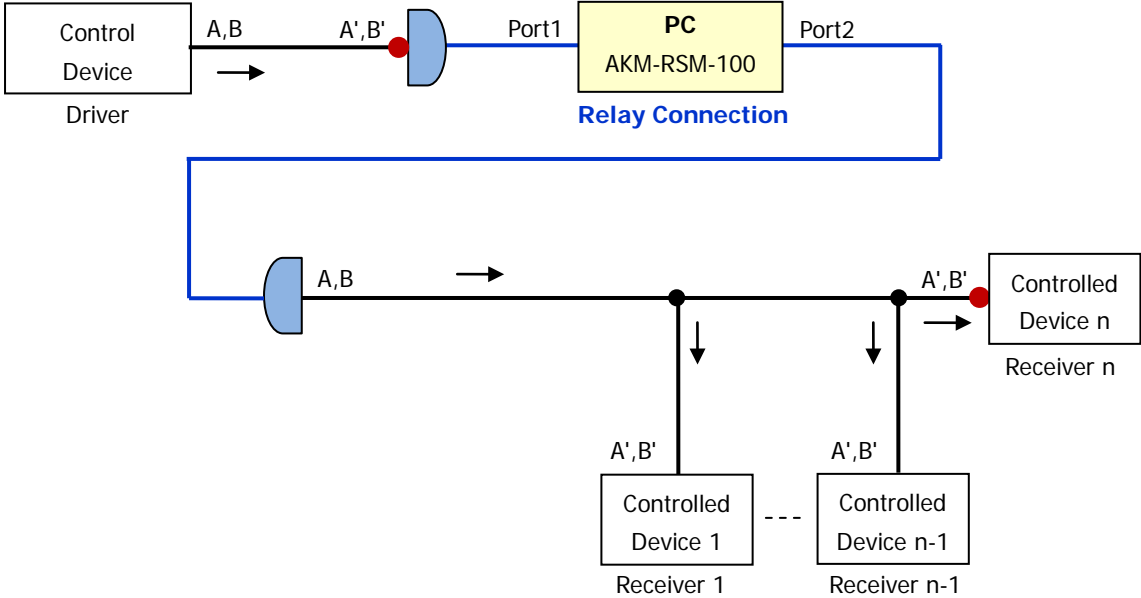: USB-RS422 Converter
——— : USB Cable

*Note: Controlled devices are 9 maximums (when AKM-RSM-100 is used).
*Note: Communications data from the Control Device (Driver) can be monitored in either Port1 or Port2.
*Note: Connect either Port1 or Port2 with PC of AKM-RSM-100.
        Refer to "Use to collection of the Log Information" in Chapter 3 of User's Manual.

Configuration Image of AKM-RSM-100 #2:

*Note: A, B, A', and B' may be displayed as TxD+, TxD-, RxD+, and RxD-.

Function Name	Actuation
Line Monitor	X
Replay	X
Simulation	⟋
Sending Fixed Data Continuously	X
Replace	X
Sending Manual Data	X
Speed Conversion	X

※ **X: Available,** ⟋ **: Not available**

[Explanatory notes]
⎯ : Twisted-pair cable
● : Termination Point
⌓ : USB-RS422 Converter
⎯ : USB Cable

*Note: Controlled devices are 10 maximums (when AKM-RSM-100 is used).
*Note: The Simulation function can be actuated only as the Control Device.
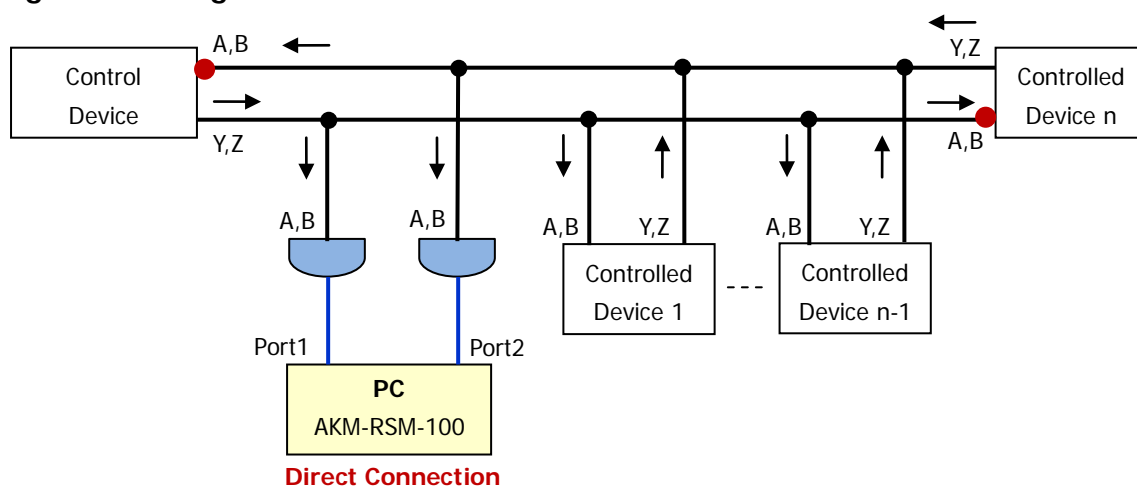*Note: When PC of AKM-RSM-100 freezes, the whole of the system will stop.

[RS-485]

■ Four-wire, Full-duplex communications, Point-to-Multipoint connection

System Configuration Example:
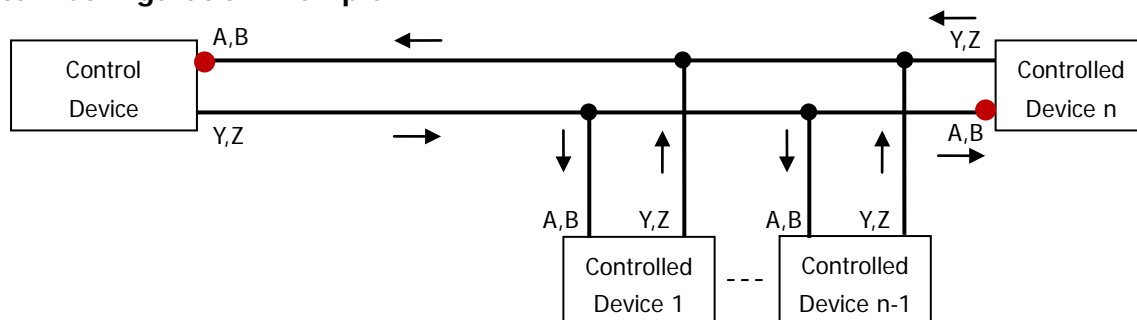
*Note: A, B, Y, and Z may be displayed as RxD+, RxD-, TxD+, and TxD-.

Configuration Image of AKM-RSM-100 #1:

Direct Connection

*Note: A, B, Y, and Z may be displayed as RxD+, RxD-, TxD+, and TxD-.

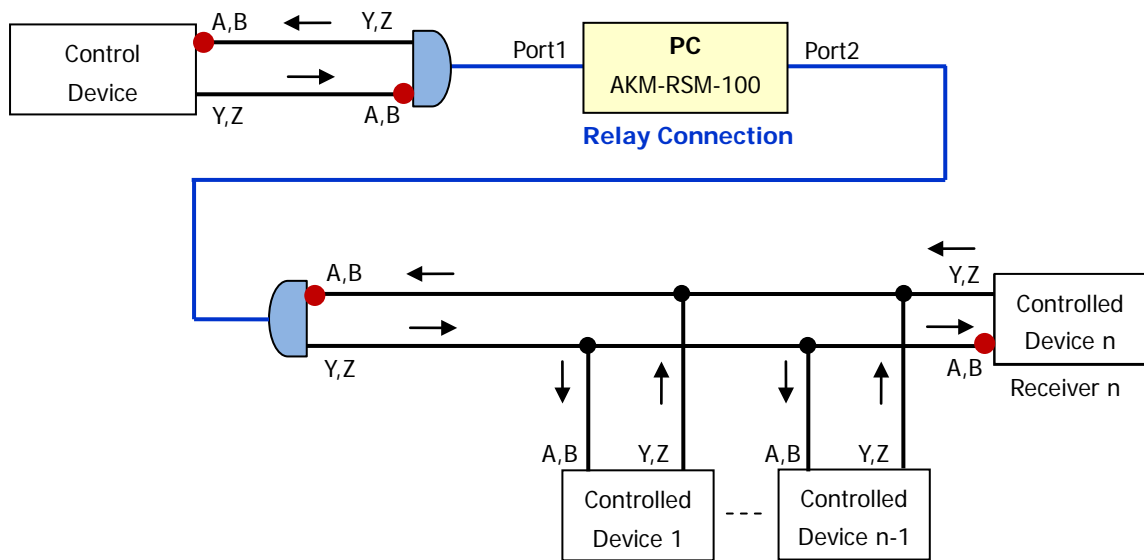| Function Name	Actuation
Line Monitor	**X**
Replay	
Simulation	
Sending Fixed Data Continuously	
Replace	
Sending Manual Data	
Speed Conversion	

※ **X: Available,** : Not available

[Explanatory notes]
—— : Twisted-pair cable
● : Termination Point
⬭ : USB-RS485 Converter
—— : USB Cable

*Note: Controlled devices are 31 maximums (when AKM-RSM-100 is used).
*Note: Communications data from the Control Device can be monitored in Port1. And, Communications data from the Controlled Device (1~n) can be monitored in Port2.

Configuration Image of AKM-RSM-100 #2:

*Note: A, B, Y, and Z may be displayed as RxD+, RxD-, TxD+, and TxD-.

Function Name	Actuation
Line Monitor	X
Replay	X
Simulation	X
Sending Fixed Data Continuously	X
Replace	X
Sending Manual Data	X
Speed Conversion	X

※ **X: Available,** ▨ : Not available

[Explanatory notes]
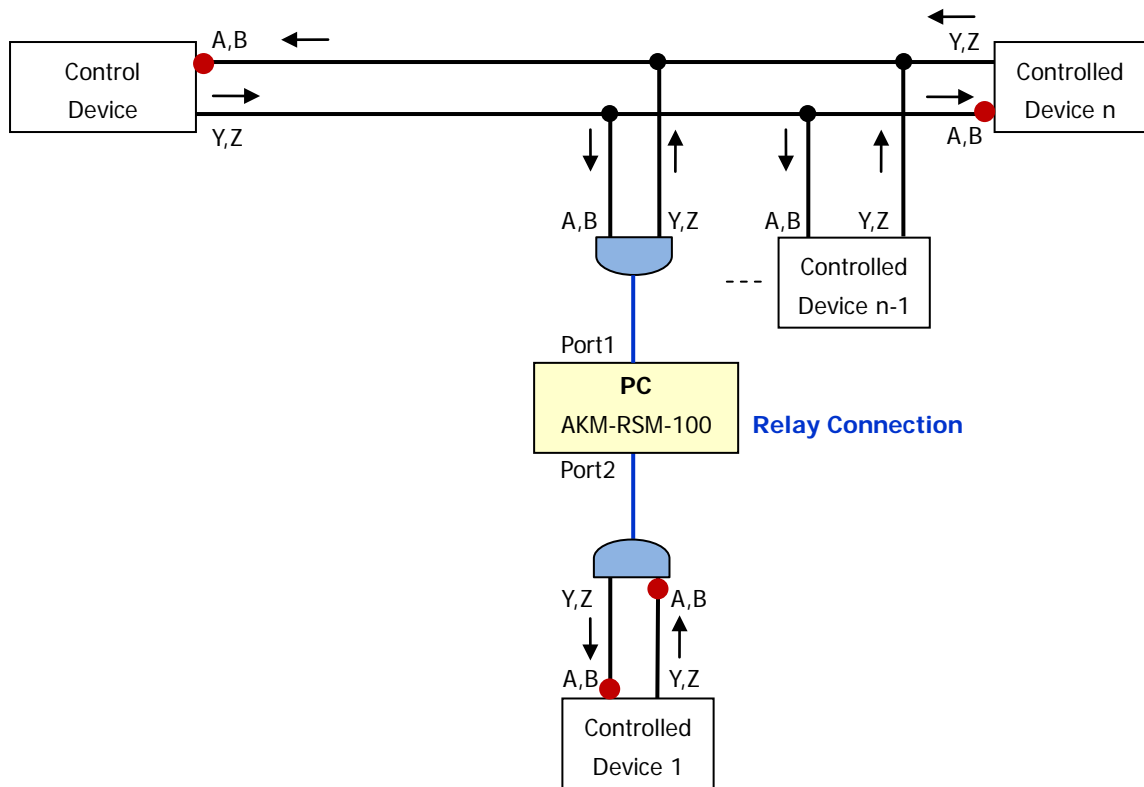━━ : Twisted-pair cable
● : Termination Point
⌓ : USB-RS485 Converter
━━ : USB Cable

*Note: Controlled devices are 32 maximums.

*Note: When PC of AKM-RSM-100 freezes, the whole of the system will stop.

*Note: Communications data from the Control Device can be monitored in Port1. And, Communications data from the Controlled Device (1~n) can be monitored in Port2.

Configuration Image of AKM-RSM-100 #3:

*Note: A, B, Y, and Z may be displayed as RxD+, RxD-, TxD+, and TxD-.

Function Name	Actuation
Line Monitor	X
Replay	X
Simulation	X
Sending Fixed Data Continuously	X'
Replace	X
Sending Manual Data	X'
Speed Conversion	X

[Explanatory notes]

——— : Twisted-pair cable

● : Termination Point
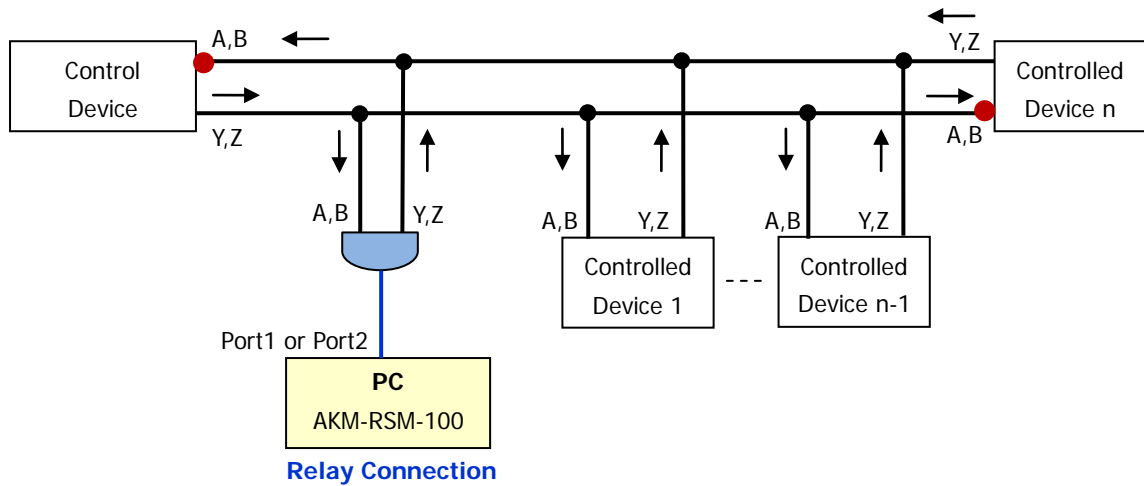
: USB-RS485 Converter

——— : USB Cable

※ **X: Available,** [ ] **:** Not available,

X'**:** Available, but communications data must not conflict.

*Note: Controlled devices are 32 maximums.

*Note: When PC of AKM-RSM-100 freezes, Controlled Device 1 can't be controlled.

*Note: Communications data from the Control Device can be monitored in Port1. And, Communications data from the Controlled Device 1 can be monitored in Port2.

Configuration Image of AKM-RSM-100 #4:

Relay Connection

*Note: A, B, Y, and Z may be displayed as RxD+, RxD-, TxD+, and TxD-.

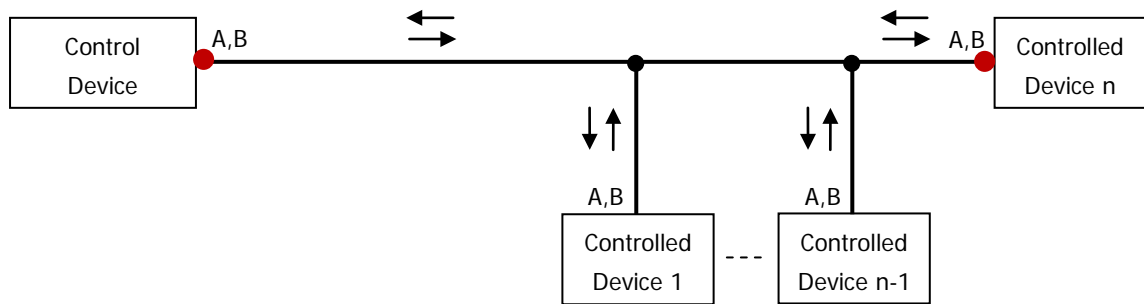| Function Name	Actuation
Line Monitor	▨
Replay	▨
Simulation	X
Sending Fixed Data Continuously	X'
Replace	▨
Sending Manual Data	X'
Speed Conversion	▨

[Explanatory notes]

—— : Twisted-pair cable
● : Termination Point
⬯ : USB-RS485 Converter
—— : USB Cable

※ **X: Available,** ▨ **:** Not available,

X'**:** Available, but communications data must not conflict.

*Note: Controlled devices are 31 maximums (when AKM-RSM-100 is used).

*Note: The Simulation function can be actuated only as the Controlled Device.

*Note: Connect either Port1 or Port2 with PC of AKM-RSM-100.

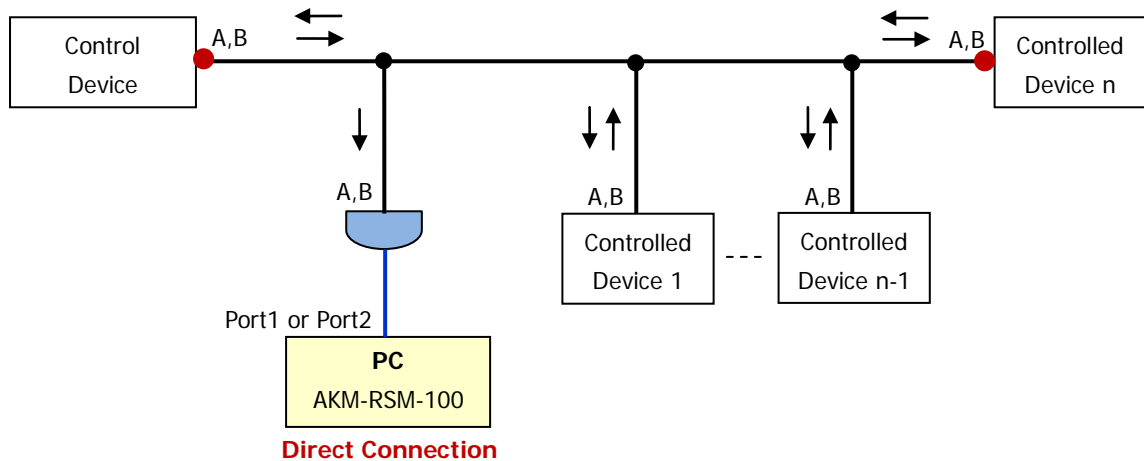Refer to "Use as the Simple Terminal" in Chapter 4 of User's Manual.

■ Two-wire, Half-duplex communications, Point-to-Multipoint connection

System Configuration Example:

*Note: A and B may be displayed as T/R+ and T/R-.

Configuration Image of AKM-RSM-100 #1:

Direct Connection

*Note: A and B may be displayed as T/R+ and T/R-.

Function Name	Actuation
Line Monitor	**X**
Replay	
Simulation	
Sending Fixed Data Continuously	
Replace	
Sending Manual Data	
Speed Conversion	

※ **X: Available,** ▨ **: Not available**

[Explanatory notes]
— : Twisted-pair cable
● : Termination Point
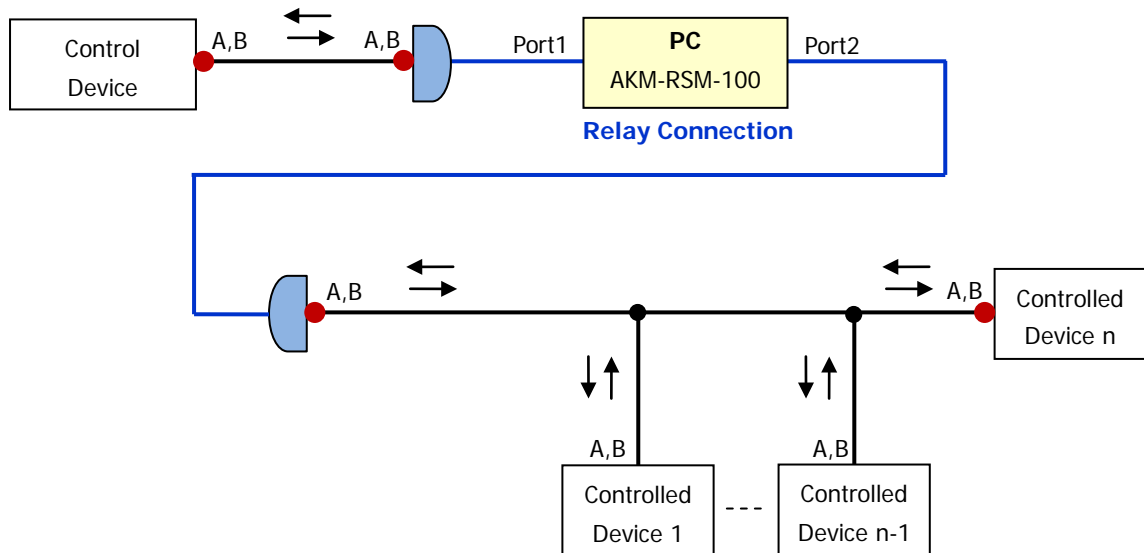⬭ : USB-RS485 Converter
— : USB Cable

*Note: Controlled devices are 31 maximums (when AKM-RSM-100 is used).
*Note: Mixed communications data from the Control Device and from the Controlled Devices can be
      monitored in either Port1 or Port2.
*Note: Connect either Port1 or Port2 with PC of AKM-RSM-100.
      Refer to "Use to collection of the Log Information" in Chapter 3 of User's Manual.

Configuration Image of AKM-RSM-100 #2:

*Note: A and B may be displayed as T/R+ and T/R-.

Function Name	Actuation
Line Monitor	X
Replay	X
Simulation	X
Sending Fixed Data Continuously	X'
Replace	X
Sending Manual Data	X'
Speed Conversion	X

[Explanatory notes]
——— : Twisted-pair cable
● : Termination Point
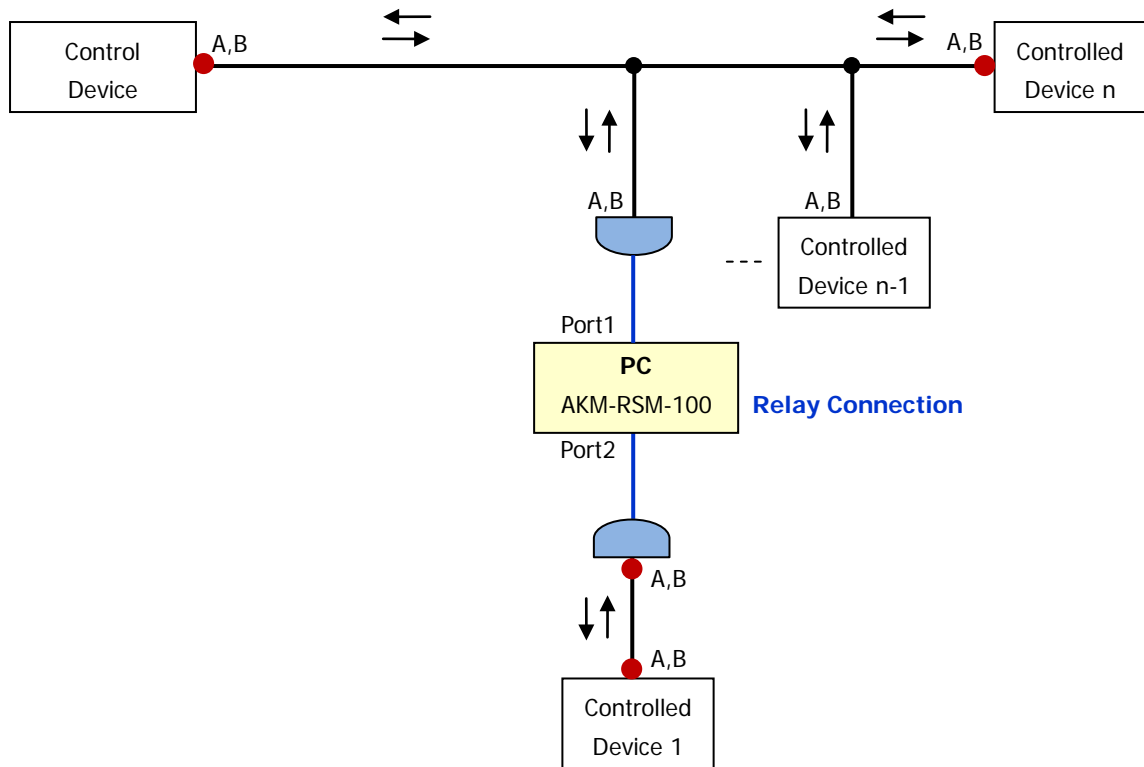⬭ : USB-RS485 Converter
——— : USB Cable

※ **X: Available,** ⬜ **: Not available,**
   X'**:** Available, but communications data must not conflict.

*Note: Controlled devices are 32 maximums.
*Note: When PC of AKM-RSM-100 freezes, the whole of the system will stop.
*Note: Communications data from the Control Device can be monitored in Port1. And, Communications data
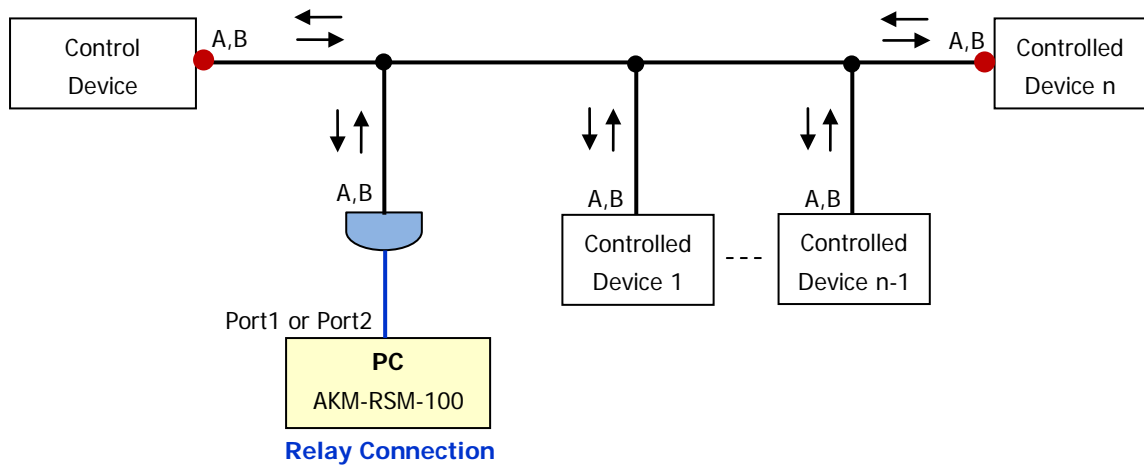   from the Controlled Device (1~n) can be monitored in Port2.

Configuration Image of AKM-RSM-100 #3:

*Note: A and B may be displayed as T/R+ and T/R-.

Function Name	Actuation
Line Monitor	X
Replay	X
Simulation	X
Sending Fixed Data Continuously	X'
Replace	X
Sending Manual Data	X'
Speed Conversion	X

※ **X: Available,** ▨ **:** Not available,

X'**:** Available, but communications data must not conflict.

[Explanatory notes]
── : Twisted-pair cable
● : Termination Point
▬ : USB-RS485 Converter
── : USB Cable

*Note: Controlled devices are 32 maximums.
*Note: When PC of AKM-RSM-100 freezes, Controlled Device 1 can't be controlled.
*Note: Mixed communications data from the Control Device and Controlled Devices (2~n) can be monitored in Port1. And, Communications data from the Controlled Device 1 can be monitored in Port2.

Configuration Image of AKM-RSM-100 #4:

Relay Connection

*Note: A and B may be displayed as T/R+ and T/R-.

Function Name	Actuation
Line Monitor	X
Replay	
Simulation	X
Sending Fixed Data Continuously	X'
Replace	
Sending Manual Data	X'
Speed Conversion	

[Explanatory notes]
──── : Twisted-pair cable
● : Termination Point
◡ : USB-RS485 Converter
──── : USB Cable

※ **X: Available**, ▨ : Not available,
　　X': Available, but communications data must not conflict.

*Note: Controlled devices are 31 maximums (when AKM-RSM-100 is used).
*Note: Mixed communications data from the Control Device and from the Controlled Devices can be
　　　 monitored in either Port1 or Port2.
*Note: Connect either Port1 or Port2 with PC of AKM-RSM-100.
　　　 Refer to "Use as the Simple Terminal" in Chapter 4 of User's Manual.

--- End ---