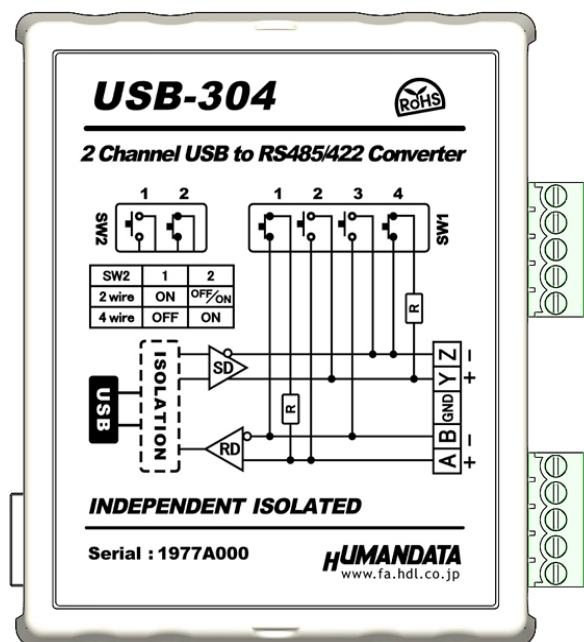




**2 Channel**  
**USB to RS485/422 Converter**  
**USB-304**  
**User's Manual**  
**Ver. 1.1**





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## ● Precautions

|                                                                                                             |    |                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------------------------------------------------------------------------------------|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <p><b>Do Not</b></p>      | 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. |
|                                                                                                             | 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.                                                                                                                                                                                                                                                                                 |
|  <p><b>Attention</b></p> | 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.                                                                                                                                                                                      |
|                                                                                                             | 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

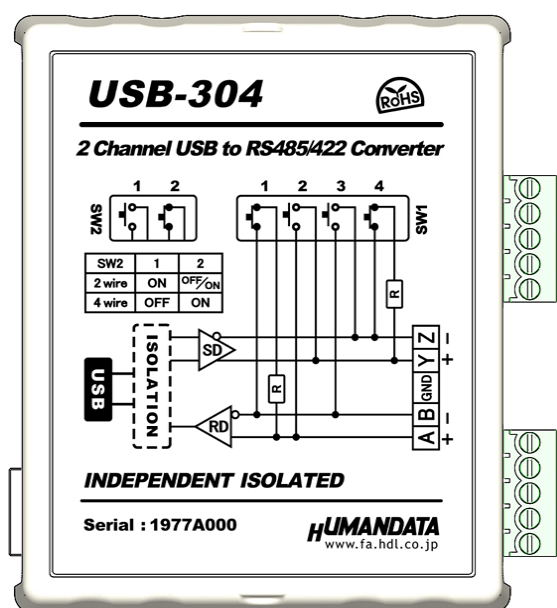
| Date          | Revision | Description     |
|---------------|----------|-----------------|
| Nov. 17, 2017 | v1.0     | Initial release |
| Sep. 30, 2024 | v1.1     | Correct: typo   |

## ● Introduction

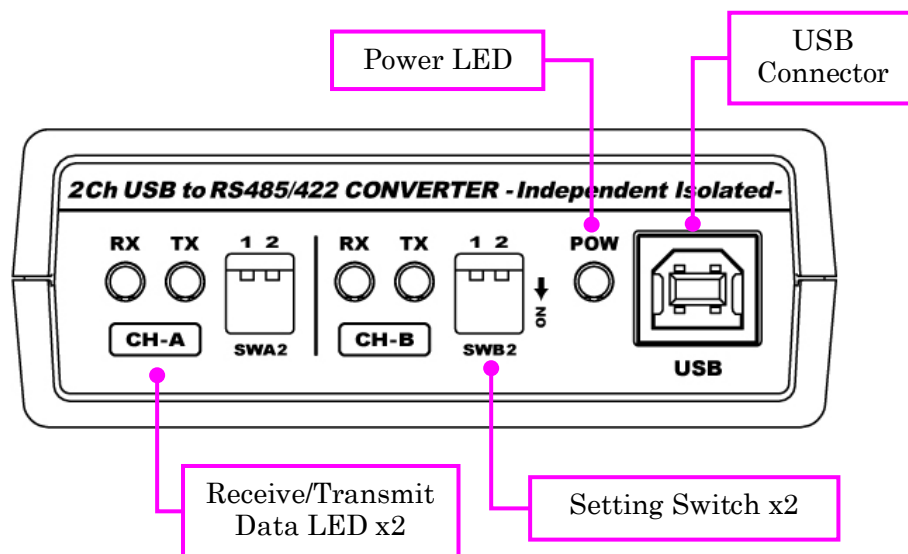
Thank you very much for purchasing our product of USB-304.

USB-304 is a 2 channel USB to RS485/RS422 converter that isolated between each RS-485/422 serial port and a USB port. You can use 2 channels of RS-485/422 serial port from a USB port. Those 2 channels are isolated independently from USB side.

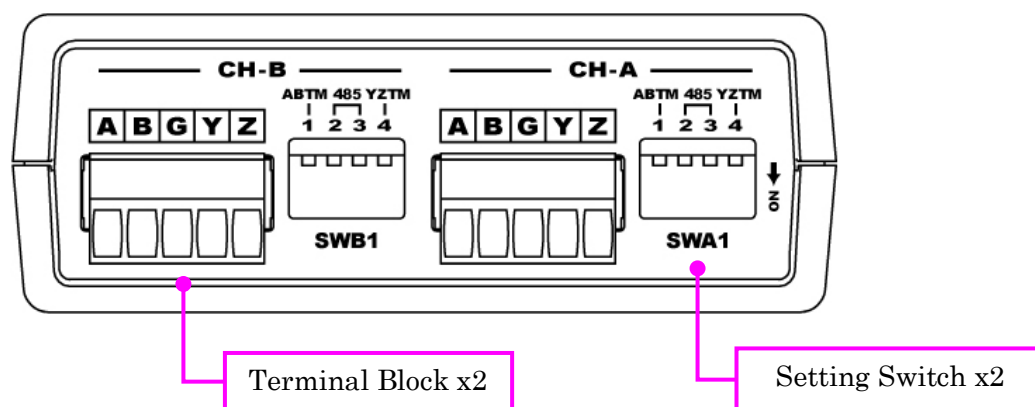
## 1. Overview



TOP side (Block diagram)



Front Side (USB)

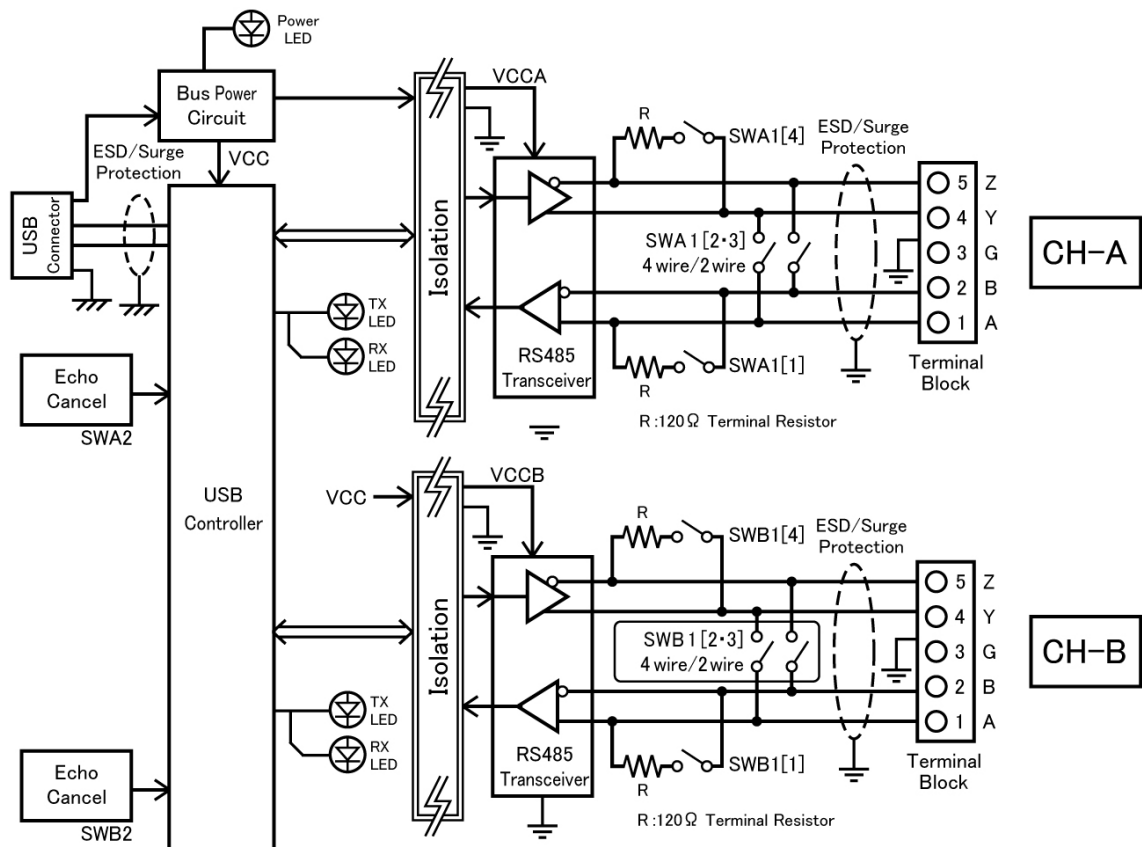


Rear Side (RS-485/422)

## 1.1. Power Supply

USB-304 is powered through a USB port (Bus-powered). No external power supply is required.

## 1.2. Block Diagram



Between USB and each RS-485/422 serial port are isolated.

## 2. Specifications

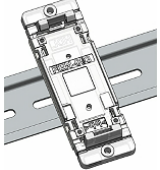
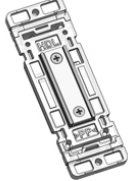
| Item                          | Description                                                       | Remarks                                                |
|-------------------------------|-------------------------------------------------------------------|--------------------------------------------------------|
| Model                         | USB-304                                                           |                                                        |
| Power                         | 5VDC<br>Supplied through a USB port(Bus-powered)                  | No external power supply required                      |
| Current Consumption           | Less than 200 mA                                                  |                                                        |
| Number of RS-485/422 Port     | 2                                                                 |                                                        |
| I/O Interface                 | RS-485/422<br>(2-wire or 4-wire)                                  | ESD protection $\pm 15\text{KV}$                       |
| HOST interface                | USB 2.0 Compliant<br>(Support HiSpeed)                            | USB 1.1 compatible<br>ESD protection $\pm 11\text{KV}$ |
| USB connector                 | Standard Type B Female                                            |                                                        |
| Isolation Method              | Bus isolation                                                     |                                                        |
| Isolation Protection          | Over 2000VDC                                                      | Designed value                                         |
| Processor                     | FT2232H                                                           | FTDI                                                   |
| USB Driver                    | Virtual COM port driver                                           |                                                        |
| Baud Rate                     | 300bps to 6M/8M/12Mbps                                            | Support custom baud rate                               |
| Data Bits                     | 7 or 8 bit                                                        |                                                        |
| Stop Bits                     | 1 or 2 bit                                                        |                                                        |
| Parity                        | Even, Odd, No-parity                                              |                                                        |
| FIFO RX Buffer Size           | 4096 bytes/Ch                                                     |                                                        |
| FIFO TX Buffer Size           | 4096 bytes/Ch                                                     |                                                        |
| LED                           | POW: USB bus power<br>RX: Receive data x2<br>TX: Transmit data x2 |                                                        |
| RS-485/422 Connector          | 5pin detachable screw terminal<br>(PHOENIX CONTACT)               | 3.5mm pitch                                            |
| Supports OS                   | Windows 10/8.1/8/7/Vista/XP                                       |                                                        |
| Operating Ambient Temperature | -20 to 60 °C (-4 to 140 °F)                                       | No condensation permitted                              |
| Operating Ambient Humidity    | 30 to 85%RH                                                       |                                                        |

|                                    |                                                   |                           |
|------------------------------------|---------------------------------------------------|---------------------------|
| <b>Storage Ambient Temperature</b> | -20 to +60 °C (-4 to 140 °F)                      | No condensation permitted |
| <b>Storage Ambient Humidity</b>    | 30 to 85%RH                                       |                           |
| <b>Weight</b>                      | Approx. 100 [g]                                   | Only main body            |
| <b>Dimensions</b>                  | 69 x 82.5 x 30 [mm]<br>(2.717" x 3.248" x 1.181") | Without projections       |

\* There is a case to be changed to the parts of the compatibility

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

## 2.1. Optional Accessories

| Model Name         | Image                                                                               | Description                                                                               |
|--------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| <b>PEN-003</b>     |   | Attachment with clamping screw<br>JAN: 4937920800709                                      |
| <b>PEN-003-DIN</b> |  | Attachment for 35mm DIN rail<br>JAN: 4937920800716                                        |
| <b>PEN-003-MG</b>  |  | Attachment with neodymium magnet<br>JAN: 4937920801201                                    |
| <b>TB35-USB-5</b>  |  | Detachable 5P(3.5mm pitch)Terminal Connector :<br>1840395 (Phoenix)<br>JAN: 4937920801287 |

## 2.2. RS-485/422(4 wire) Mode

| Item                            | Specification                              | Remarks                                           |
|---------------------------------|--------------------------------------------|---------------------------------------------------|
| Comm. Method                    | Full-duplex transmission                   |                                                   |
| Baud Rate                       | 300bps to 6M/8M/12Mbps                     | Custom baud rate is supported *                   |
| Number of Connectable Terminals | 128                                        | Typical example                                   |
| Terminal Resistor               | 120 $\Omega$                               | Configurable by setting switch (SWA1/SWB1) ON/OFF |
| Transmit Enable Control         | Automatically controlled by USB controller |                                                   |
| Receive Enable Control          | Available by setting switch (SWA2/SWB2)    |                                                   |

RS-485 or 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.

\* When baud rates are more than 6Mbps, only 8 Mbps or 12 Mbps are supported.

## 2.3. RS-485(2 wire) Mode

| Item                            | Specification                              | Remarks                                           |
|---------------------------------|--------------------------------------------|---------------------------------------------------|
| Comm. Method                    | Half-duplex transmission                   |                                                   |
| Baud Rate                       | 300bps to 6Mbps                            | Custom baud rate is supported                     |
| Number of Connectable Terminals | 128                                        | Typical example                                   |
| Terminal Resistor               | 120 $\Omega$                               | Configurable by setting switch (SWA1/SWB1) ON/OFF |
| Transmit-Receive Switching      | Automatically controlled by USB controller |                                                   |
| Echo Cancellation               | Available by setting switch (SWA2/SWB2)    |                                                   |

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



## 4. Setting Switch

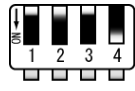
USB-304 can change operating mode by setting, switching echo cancelling and terminal resistor.

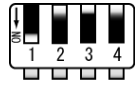
### 4.1. RS-485/422(4 wire)

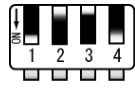
| SWA2/SWB2     |     |    |  | <div style="background-color: blue; color: white; padding: 5px; text-align: center;"> <b>Factory<br/>Setting</b> </div> |
|---------------|-----|----|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
|               | 1   | 2  |                                                                                   |                                                                                                                         |
| <b>4 wire</b> | OFF | ON |                                                                                   |                                                                                                                         |

\* Please refer to Section 4.3

| SWA1/SWB1             |     |     |     |     |  |
|-----------------------|-----|-----|-----|-----|-------------------------------------------------------------------------------------|
|                       | 1   | 2   | 3   | 4   |                                                                                     |
| <b>No termination</b> | OFF | OFF | OFF | OFF |                                                                                     |

| SWA1/SWB1                 |     |     |     |    |  |
|---------------------------|-----|-----|-----|----|---------------------------------------------------------------------------------------|
|                           | 1   | 2   | 3   | 4  |                                                                                       |
| Transmit Side termination | OFF | OFF | OFF | ON |                                                                                       |

| SWA1/SWB1                |    |     |     |     |  |
|--------------------------|----|-----|-----|-----|---------------------------------------------------------------------------------------|
|                          | 1  | 2   | 3   | 4   |                                                                                       |
| Receive Side termination | ON | OFF | OFF | OFF |                                                                                       |

| SWA1/SWB1              |    |     |     |    |  |
|------------------------|----|-----|-----|----|---------------------------------------------------------------------------------------|
|                        | 1  | 2   | 3   | 4  |                                                                                       |
| Both Sides termination | ON | OFF | OFF | ON |                                                                                       |

## 4.2. RS-485(2 wire)

- Echo Cancelling Enable (no echo)

SWA2/SWB2

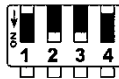
|        | 1  | 2   |
|--------|----|-----|
| 2 wire | ON | OFF |



\* Please refer to Section 4.3

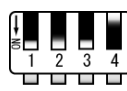
SWA1/SWB1

|                | 1   | 2  | 3  | 4   |
|----------------|-----|----|----|-----|
| No termination | OFF | ON | ON | OFF |



SWA1/SWB1

|                    | 1  | 2  | 3  | 4   |
|--------------------|----|----|----|-----|
| Termination Enable | ON | ON | ON | OFF |



- Echo Cancelling Disable (echo enable)

SWA2/SWB2

|        | 1  | 2  |
|--------|----|----|
| 2 wire | ON | ON |



## 4.3. Setting Switch (SWA2/SWB2) Function

| SWA2-1/SWB2-1 | DE (Transmit enable) Control |
|---------------|------------------------------|
| OFF           | Always Enable                |
| ON            | Enable in Transmission       |

| SWA2-2/SWB2-2 | Echo Control                          |
|---------------|---------------------------------------|
| OFF           | Echo Cancelling Enable (no echo)      |
| ON            | Echo Cancelling Disable (echo enable) |

## 5. Additional Documentation and User Support

The following documents and other supports are available at

<https://www.hdl.co.jp/en/faspc/USB/usb-304>

- Device Driver
- Outline Drawing
- ... and more.

## 6. Warranty and Compensation

Please refer to the following URL for the warranty.

<https://www.fa.hdl.co.jp/en/fa-warranty.html>

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# **2 Channel USB to RS485/422 Converter**

USB-304

## **User's Manual**

**Ver. 1.1 .....Sep. 30, 2024**

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