1. Introduction

This product is manufactured under strict quality control, and comes with 5 years limited warranty.
The warranty comes in effect from the date of purchase.
If there are any difficulties or questions during the use, please contact our Technical Support Department.
[tech@sysbas.com]

2. Function

- This is a serial communication interface converter which converts RS232 signals to RS422 or RS485 signals and extends the distance up to 1.2km. It also allows to be connected to maximum 10 devices by multi-drop mode as well as point to point mode.
- It is designed to operate without external power supply. (When RS232 side is extended, please use external power supply shown in page 4, "6. Power Supply".) However, there is a socket for an adapter to supply power externally.
- This Product implements 3kV high performance Isolation protection to protect device from interruption such a lightening thereby allowing safer and more reliable communication.
- It includes highly-effective surge protector to protect itself from the transient voltage(Max. 30kV) coming along the communication line.

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- Especially, CS-428/9AT includes automatic opening and closing of output data so that opening and closing consent operations in multi-drop mode are automatically performed by hardware, making it easy to apply to any installation without software operation.

3. Specifications

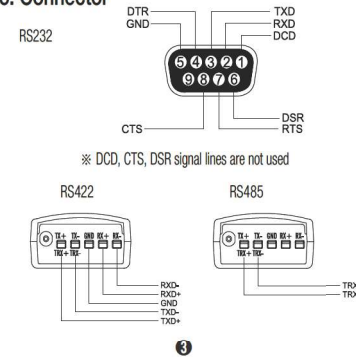| Model	CS-428/9AT-ISO v2.0 : (DB9, Automatic-opening-closing function, Terminal resistor)
Communication Type	Asynchronous serial communication
Maximum Speed	921.6Kbps
Distance	Maximum 1.2km (*Refer to chart-transmission speed per transmission speed)
Connector	RS232 : DB9 Female RS422/485 : Terminal Block
Slide Switch	RS422/485 Selection
Power	No external power - Port Powered using TXD, RTS, DTR ; External power Adapter - Voltage DC 9~12V/ 300mA - Polarity-Independent
Terminal resistor	120Ω(RS422/485 Internal Jumper selection)
Circuit protection	Meet to IEC 61000-4-2 Level 4, IEC 61000-4-4 IEC 61000-4-5 3kV Isolation Protection
Operating Temperature	-40 ~ 85ºC
Humidity	5~95% Non-condensing
LEDs	TXD(Green), RXD(Red), PWR(Red)

※ DCD, DSR, CTS pins are connected to GND

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4. Structure

5. Connector

RS232

DTR
GND
TXD
RXD
DCD
CTS
DSR
RTS

※ DCD, CTS, DSR signal lines are not used

RS422   RS485

RXD-
RXD+
GND
TXD-
TXD+

TRXD-
TRXD+

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6. Power Supply

The unit operates from power from TXD, RTS and DTR signals generated by PC or RS232 port equipment. If no external power is supplied, the TXD, RTS and DTR signals connected to the terminal block cannot provide sufficient power and the external power source is required. By checking the power LED on the converter, you can know whether the power is being supplied or not. The power source part of the converter has a high volume capacitor to supply stable power to the converter circuit using TXD, RTS and DTR signals. Therefore, it may not operate for a very short period of time(within 0.1 seconds) until it is filled with enough power. Therefore, when the TXD, RTS, and DTR signals are directly controlled by the application program, after turning on the TXD, RTS, and DTR signals, please wait a while before using them.

7. Terminal Resistor

When a communication error occurs due to noises on the lines, install the terminal resistor(s) to solve the problem.

- Terminal resistor installation
  - Open the case, connect the jumper inside and then install the terminal resistors.
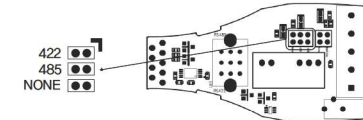   Please Refer to '8. Installing method for details.

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8. Installation

Users can select operating mode to apply to various installation environments. To set the appropriate operating mode, please set the slide switch on the converter surface.

- The 422/485 slide switch selects the signal interface type
  - If set to 422, it converts RS232 to RS422(default)
  - If set to 485, it converts RS232 to RS485

If the slide switch is set according to its intended use, insert RS422 circuit(4 lines), or RS485(2 lines) into the hole of RS422/485 circuit board of converter and tighten with a screw driver.
Then connect the DB9 connector side to PC or RS232 port of the equipment. It may not be necessary to connect the GND pin depending on the installation environment.

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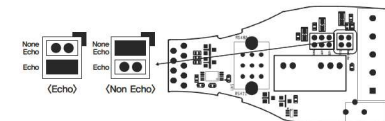- Setting Terminal Resistor-JP1, RT

422
485
NONE

422 : Install RS422 terminal resistor.
485 : Install RS485 terminal resistor.
NONE : Not install any terminal resistor. (default)

※ When communication error occurs due to high speed or distance. please install both terminal resistors to solve the problem

- Setting RS485 Comm. Mode-JP2, 485_MODE

None Echo   None Echo
〈Echo〉   〈Non Echo〉

Echo   : Select RS485 echo mode. Data from TXD of RS232 port are transmitted to the other device through TRX+/TRX- of RS485 port, and go back to RXD of RS232 port at the same time. So the data transmitted can be checked in the TX side.
Non Echo : Select RS485 non echo mode. Data are transmitted to the other device only. (default)

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■ **Converter Self Test**

1) Set the switch to RS422 mode.

2) Connect CS-428/9AT-PRO2 to RS232 port. And wire them as show below.

3) Download a test program, TestView from SystemBase website at https://www.sysbas.com/en/

4) Install the test utility
If you need more information about TestView, please refer to TestView manual.

5) Open the serial port(RS232) in TestView. And click, send data "button"

6) If you see similar screen as below.
your converter has no problem.

■ **You can perform loopback in RS422 mode**

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9. The Wire Connection for RS422

This wire connection is used when using 1:1(point to point) and 1:N (multi-drop) full-duplex communication(Max. 10 units).

■ **Slide Switch of Host & Terminal Side**

RS422 ▮ RS485

* As the RS422 interface type, CS-428/9AT-PRO2 automatically supports both point to point mode and multi-drop mode.
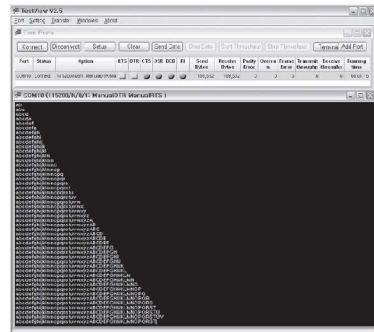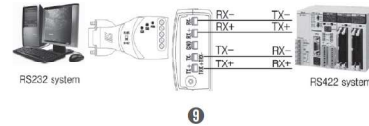* Under RS422 multi-drop mode, CS-428/9AT-ISO2 on the host side can always send communication data to the terminal side, so there is no need to open or close the output signal line. But when transmitting and receiving communication data, the output signal shall be opened or closed on the terminal side.
However, in this product, all operations are controlled by the hardware circuit, so no operation is required in the application program.

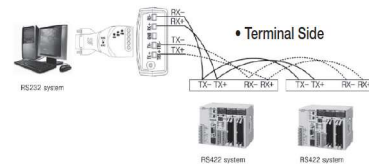■ **The Wire Connection of CS-428/9AT-ISO2**

〈Point to Point〉

〈Multi-Drop〉

• Host Side

* DCD, DSR, CTS pins are selectively connected to GND inside of converter.
* Check and confirm if the power LED is turned on during the operation

10. The Wire Connection for RS485

This wire connection is used when trying N:N half-duplex communication(Max. 10 units).
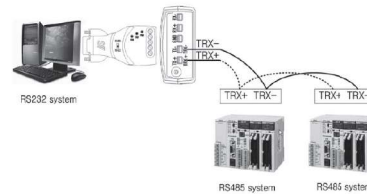
■ **Slide Switch of Terminal Side**

RS422 ▮ RS485

* Basically, RS485 interface type, which is considered to be only a terminal on both the host side and the terminal side, requires the output signal line to be opened or closed to transmit or receive data. However, in this product, all operations are

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controlled by the hardware circuit, so no operation is required in the application program.
* For RS485 setup, both echo and non-eco modes are supported.

■ **The Wire Connection of CS-428/9AT-ISO2**

* DCD, DSR, CTS pins are selectively connected to GND inside of conberter.
* Check and confirm if the power LED is turned on during the operation

〈Appendix〉

■ **Transmission Distance per Transmission Speed**

RS422, Without External Power Adapter

speed (band rate) \ distance(m)	100	300	600	900	1,000	1,200
9,600	O	O	O	O	O	O
19,200	O	O	O	O	O	O
38,400	O	O	O	O	O	O
57,600	O	O	O	O	O	O
115,200	O	O	O	O	O	O
230,400	O	O	O	O	O	X
460,800	O	O	O	X	X	X
921,600	O	X	X	X	X	X

RS422, With External Power Adapter

speed (band rate) \ distance(m)	100	300	600	900	1,000	1,200
9,600	O	O	O	O	O	O
19,200	O	O	O	O	O	O
38,400	O	O	O	O	O	O
57,600	O	O	O	O	O	O
115,200	O	O	O	O	O	O
230,400	O	O	O	O	O	X
460,800	O	O	O	X	X	X
921,600	O	O	X	X	X	X

RS485, Non-Echo Mode, Without External Power Adapter

speed (band rate) \ distance(m)	100	300	600	900	1,000	1,200
9,600	O	O	O	O	O	O
19,200	O	O	O	O	O	O
38,400	O	O	O	O	O	O
57,600	O	O	O	O	O	O
115,200	O	O	O	O	O	O
230,400	O	O	O	X	X	X
460,800	O	O	X	X	X	X
921,600	O	X	X	X	X	X

RS485, Non-Echo Mode, With External Power Adapter

speed (band rate) \ distance(m)	100	300	600	900	1,000	1,200
9,600	O	O	O	O	O	O
19,200	O	O	O	O	O	O
38,400	O	O	O	O	O	O
57,600	O	O	O	O	O	O
115,200	O	O	O	O	O	O
230,400	O	O	O	X	X	X
460,800	O	O	X	X	X	X
921,600	O	O	X	X	X	X

RS485, Echo Mode, Without External Power Adapter

speed (band rate) \ distance(m)	100	300	600	900	1,000	1,200
9,600	O	O	O	O	O	O
19,200	O	O	O	O	O	O
38,400	O	O	O	O	O	O
57,600	O	O	O	O	O	O
115,200	O	O	O	O	O	O
230,400	O	O	O	X	X	X
460,800	O	O	X	X	X	X
921,600	X	X	X	X	X	X

RS485, Echo Mode, With External Power Adapter

speed (band rate) \ distance(m)	100	300	600	900	1,000	1,200
9,600	O	O	O	O	O	O
19,200	O	O	O	O	O	O
38,400	O	O	O	O	O	O
57,600	O	O	O	O	O	O
115,200	O	O	O	O	O	O
230,400	O	O	O	X	X	X
460,800	O	O	X	X	X	X
921,600	O	O	X	X	X	X

* Above the chart is the test results of the SystemBase laboratory. These results may vary depending on the quality of the communication line and the communication situation.