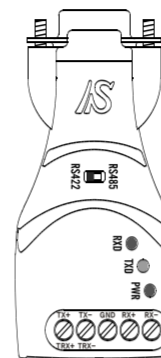## 1. Introduction

We appreciate to purchase our products. This product is manufactured under strict quality control, and comes with a manufacturer's 5 year 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 [Tel.82-2-855-0501(Ext. 113), tech@sysbas.com]
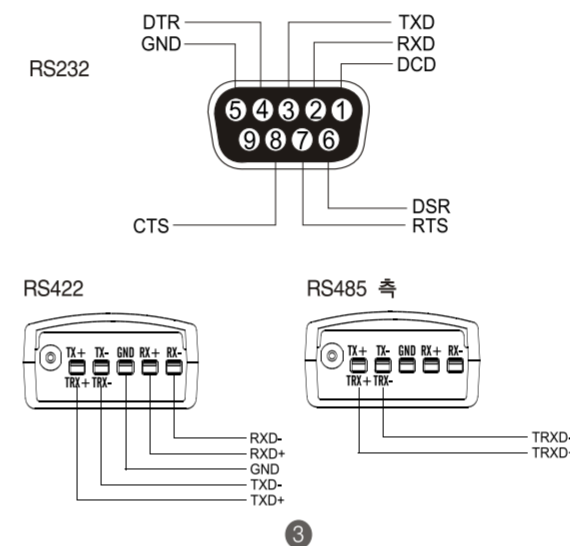
2. Function

■ This is a serial communication interface converter which converts RS232 signals to RS422 or RS485 signals and extends the distance up to maximum 1.2Km. It also allows to be connected to maximum 10devices by Multi-drop mode as well as Point to Point mode.
■ It is designed to be operated without any external power supply, when it is connected to PC or to RS232 connector of various system. But a connector for the external power (not included in the product package) is also equipped for the case that an external power supply should be used.
■ It includes highly-effective Surge Protector to protect itself from the transient voltage(Max. 15,000 volt) coming along the communication line.
■ Especially, CS-428/9AT PRO includes an automatic RTS opening and closing function (RTS auto-toggling) for the output data so that the opening and closing consent work in the Multi-Drop mode is automatically made by the hardware, which makes you apply easily under any installing environment without any software operation.

❶

4. Structure

5. Connector

DTR
GND
RS232
TXD
RXD
DCD

CTS
DSR
RTS

5 4 3 2 1
9 8 7 6

RS422   RS485

TX+ TX- GND RX+ RX-
TRX+ TRX-

TX+ TX- GND RX+ RX-
TRX+ TRX-

RXD-
RXD+
GND
TXD-
TXD+

TRXD-
TRXD+

❸

8. Installing Method

A user can select an operating mode in order to be applied for the various installing environments. Please set the Slide Switch on the converter surface to meet the purpose.

■ 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.

❺

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3. Specifications

Model	CS-428/9AT PRO : DB9 Connector, Automatic opening-closing function terminal resistor
Communication type	Asynchronous serial communication
Transmission speed	Max. 115.2Kbps
Distance	Maximum 1.2Km (Refer to chart-transmission distance per transmission speed)
Connector	RS232 side : DB9 Female RS422/RS485 side : Terminal Block
Slide switch	422/485 : RS422/RS485 selection
Power	w/o Power Adapter : RS232 TXD, RTS, DTR signal w/ Power Adapter : Voltage - DC 7~12V Polarity - Independent
Terminal resistor	RS422/485 common jumper : JP2 jumper connects or disconnects terminal resistor.
Circuit protection	15,000 volt-surge protector included.
LEDs	TXD(Green), RXD(Red), PWR(Red)

※ DCD, DSR, CTS pins are selectively connected to GND.

❷

6. Power Supply

It is operated with the power of TXD, RTS and DTR signal generated from the PC or the RS232 port of the equipment when no external power is supplied from outside. In case of application program, or when it is not possible to keep the TXD, RTS and DTR signal connected to Jumper at "ON" status then power should be supplied from outside by using the power source adapter. You can recognize whether the power is being supplied or not, by checking the power LED on the converter. The power source part of the converter has a high volumed condenser to supply stable power to the converter circuit by using TXD, RTS and DTR signal. Therefore it may not work for a very short period of time(within 0.1 second) until the condenser is filled with enough power. So wait for a second before start to use converter after turning on the TXD, RTS and DTR signal when TXD, RTS and DTR signal is controlled directly in the application program.
The LED display is turned on and steady when power is supplied to converter. Apply an external power supply when you have no power LED turned on.
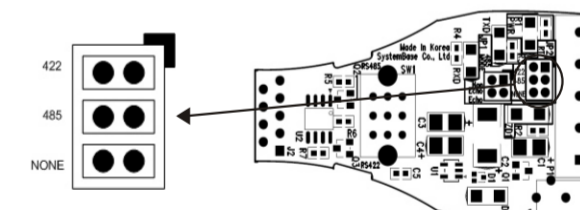
7. Terminal Resistor

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.

❹

■ Setting Terminal Resistor-JP2, RT

422
485
NONE

422 : Install RS422 Terminal Resistor.
485 : Install RS485 Terminal Resistor.
NONE : Not Install any Terminal Resistor.

※ When communication error occurs due to high speed or distance, please install both Terminal Resistors to solve the problem

■ Setting RS485 Comm. Mode-JP1, 485_MODE

None Echo
Echo
〈Echo〉

None Echo
Echo
〈Non Echo〉
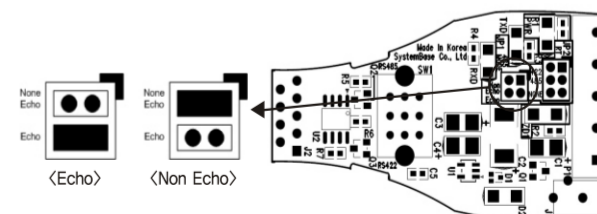
Echo : Select RS485 Echo mode. Data from TXD of RS232 port are transmitted to the other device through TRX+/TRX- of RS 485 port, and go back to RXD of RS232 port at the same time. So the data transmitted can be checked in the TX side.

Non Echo : Select RS485 Non Echo mode. Data are transmitted to the other device only.

❻

■ Converter Self Test

1) Set to RS422 Mode
2) Connect CS-428/9AT PRO to RS232 port. And connect like below figure.

3) Download Test Program, TestView in our homepage (www.sysbas.com)
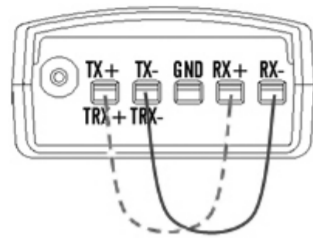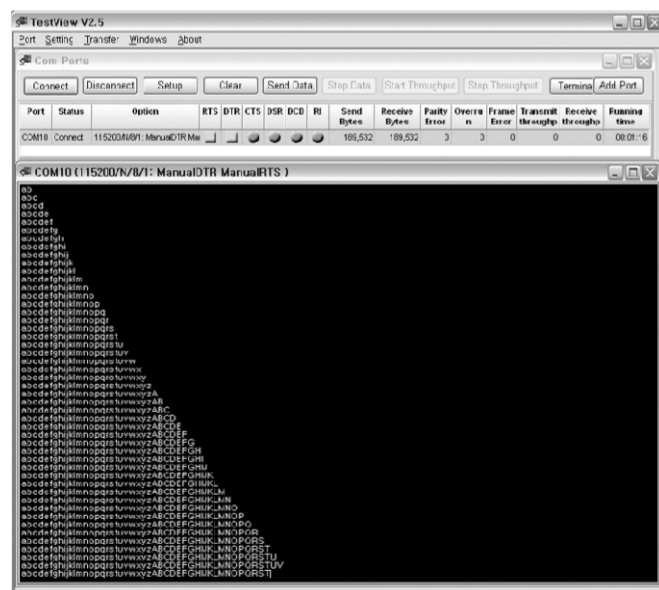4) Install Test Program
If you need more information about TestView, please refer TestView Manual.
5) Open the serial port(RS232) in TestView and run Send Date.
6) If you see like below picture, your converter has no problem.

■ You must run Loopback in RS422 mode

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. 10units).
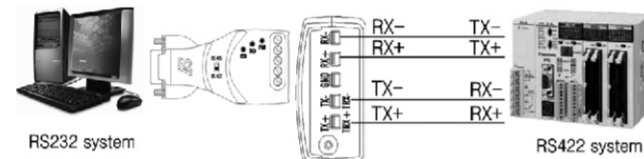
■ Slide Switch of Host & Terminal Side

RS422 [switch] RS485

* As the RS422 interface type, CS-428/9AT PRO automatically supports both Point to Point mode and Multi-Drop mode.
* In RS422 Multi-Drop mode, the CS-428/9AT PRO of host side need not open or close the output signal line because it may always transfer communication data to terminal side; however, that of terminal side must open or close the output signal line when it sends or receives communication data. But in this product, all operation is controlled by hardware circuit, therefore no operation is required by application program.

■ The Wire Connection of CS-428/9AT PRO

〈Point to Point〉

〈Multi-Drop〉

• Host Side

• Terminal 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. 10units).

■ Slide Switch of Terminal Side

RS422 [switch] RS485

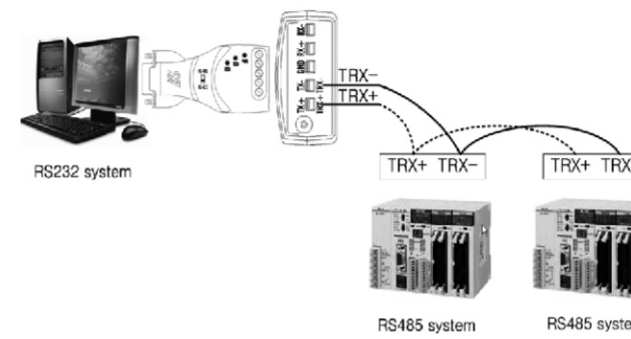* Basically, as the RS485 interface type, both the host

side and the terminal side are regarded as just terminals, it is required to open or close the output signal line to send or receive communication data. But in this product, all operation is controlled by hardware circuit, therefore no operation is required by application program.

* In case of RS485 setting, both Echo and Non-Echo mode are Supported.

■ The Wire Connection of CS-428/9AT PRO

* 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

〈Annex〉

■ Transmission Distance per Transmission Speed

RS422, Without External Power Adapter

speed (baud rate) \ distance (m)	200	300	500	800	1000	1200
9600	O	O	O	O	O	O
19200	O	O	O	O	O	O
38400	O	O	O	O	O	O
57600	O	O	O	O	O	O
115200	O	O	O	O	O	×

RS422, Without External Power Adapter

speed (baud rate) \ distance (m)	200	300	500	800	1000	1200
9600	O	O	O	O	O	O
19200	O	O	O	O	O	O
38400	O	O	O	O	O	O
57600	O	O	O	O	O	O
115200	O	O	×	×	×	×

RS485, Non-Echo Mode, Without External Power Adapter

speed (baud rate) \ distance (m)	200	300	500	800	1000	1200
9600	O	O	O	O	O	O
19200	O	O	O	O	O	O
38400	O	O	O	O	O	O
57600	O	O	O	O	O	O
115200	O	O	O	O	O	O

RS485, Non-Echo Mode, Without External Power Adapter

speed (baud rate) \ distance (m)	200	300	500	800	1000	1200
9600	O	O	O	O	O	O
19200	O	O	O	O	O	O
38400	O	O	O	O	O	O
57600	O	O	O	O	O	O
115200	O	O	O	×	×	×

RS485, Echo Mode, Without External Power Adapter

speed (baud rate) \ distance (m)	200	300	500	800	1000	1200
9600	O	O	O	O	O	O
19200	O	O	O	O	O	O
38400	O	O	O	O	O	O
57600	O	O	O	O	×	×
115200	O	O	O	×	×	×

RS485, Echo Mode, Without External Power Adapter

speed (baud rate) \ distance (m)	200	300	500	800	1000	1200
9600	O	O	O	O	O	O
19200	O	O	O	O	O	O
38400	O	O	O	×	×	×
57600	O	O	O	×	×	×
115200	O	O	×	×	×	×

* Above chart is the test result in the laboratory of SystemBase Co., Ltd. This result can be changed according to communication line quality and communication circumstances.