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Serial Communication  
Links the New World!

## 1. Introduction

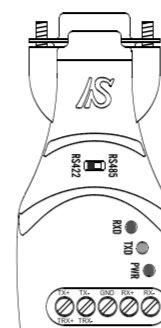
We appreciate to purchase our products. This product is manufactured under strict quality control, and comes with a manufacturer's 5 year limited warranty. The warranty comes in effect from the date of purchase. If there are any difficulties or questions during the use, please contact our Technical Support Department [Tel.82-2-855-0501(Ext. 113), tech@sysbas.com]

## 2. Function

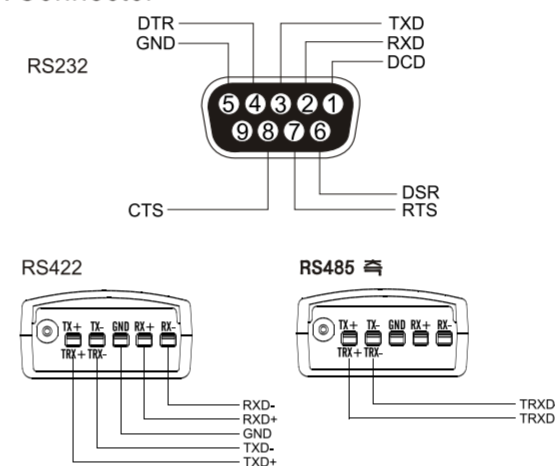
- This is a serial communication interface converter which converts RS232 signals to RS422 or RS485 signals and extends the distance up to maximum 1.2Km. It also allows to be connected to maximum 10 devices by Multi-drop mode as well as Point to Point mode.
- This product implements 2.5KV high performance Isolation protection to protect the device from interruption such a lightning thereby allowing safer and more reliable communication.
- 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-ISO 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.

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## 4. Structure



## 5. Connector



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## 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.

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## 5-Year Warranty



SystemBase Co., Ltd. warrants that the Product(s) shall be free from manufacturing defects in materials and workmanship for a period of five (5) years from the date of delivery provided that the Product was properly installed and used. Defects, malfunctions or failures of the warranted Product caused by damage resulting from acts of God (such as floods, fire, etc.), environmental and atmospheric disturbances, other external forces such as powerline disturbances, host computer malfunction, plugging the board in under power, or incorrect cabling and damage caused by misuse, abuse and unauthorized alteration or repair are not warranted.

The warranty is limited to the repair and/or replacement, at SystemBase's option, of the defective Product during its warranty period. Customer must obtain a Return Material Authorization (RMA) number prior to returning the defective Product to SystemBase for service. Customer agrees to insure the Product or assume the risk of loss or damage in transit, to prepay shipping charges and to use the original shipping container or equivalent. Contact SystemBase Customer Support at tech@sysbas.com for further information. Product repaired or replaced shall be warranted for a period of ninety (90) days or the duration of the initial Product warranty period, whichever is longer.

THE PROVISIONS OF THE WARRANTY ARE IN LIEU OF ANY OTHER WARRANTY, WHETHER EXPRESSED OR IMPLIED, WRITTEN OR ORAL, AND SYSTEMBASE'S LIABILITY ARISING OUT OF THE MANUFACTURE, SALE OR SUPPLYING OF THE PRODUCT AND ITS USE, WHETHER BASED ON WARRANTY, CONTRACT, NEGLIGENCE, PRODUCT LIABILITY OR OTHER WISE, SHALL NOT EXCEED THE ORIGINAL COST OF THE PRODUCT. IN NO EVENT SHALL SYSTEMBASE BE LIABLE FOR UNINTENDED OR CONSEQUENTIAL DAMAGES, INCLUDING, BUT NOT LIMITED TO, LOSS OF PROFITS OR USE DAMAGES ARISING OUT OF THE MANUFACTURE, SALE OR SUPPLYING OF THE PRODUCT.

Help Hotline : Technical supports are available to all our customers for assistance in installation and operation.  
[+82-2-855-0501 (EXT. 113)]  
e-mail: tech@sysbas.com

## 3. Specifications

Model	CS-428/9AT-ISO v2.0: Automatic opening-closing function Terminal resistor, Serial port power
Communication type	Asynchronous serial communication
Transmission speed	Max. 230.4Kbps
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	Power Adapter : Voltage - DC 7~12V, 300mA Polarity - Independent Serial port power (TXD, RTS, DTR)
Terminal resistor	RS422/485 Terminal register : dip switch select proper terminal resistor switch.
Circuit protection	15,000 volt-surge protector included. 2.5KV Isolation protector
LEDs	TXD(Green), RXD(Red), PWR(Red)

\* DCD, DSR, CTS pins are connected to GND

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## 6. Power Supply

The product's power supply can work by using the RS232's signal line, not using the external power supply. The signal line used for occurring the power supply is TXD, RTS, DTR. When you use the signal line without the external power supply, I recommend you use the all signal line TXD, RTS, DTR. When you use the external adaptor, you'll use DC 7~12V, and if you use over DC 12V, the converter is shocked much, so please be careful. The polarity of the power supply is not related with adaptor, so you can use the adaptor without +, - division. If the converter switch LED is turned on, you know that the power supply is turned on. While the power supply is supplied for adaptor, the power supply LED is always on, and when the power supply is turned on, the communication is possible.

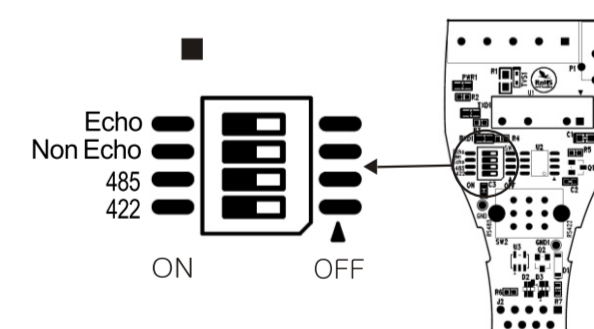
## 7. Terminal Resistor

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 product case and set the dip-switch.
  - Install method of dip-switch is referred '8. Installing Method'.

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- Install method of the termination resistor



- 422 ON : Set RS 422 terminal register.
- 485 ON : Set RS 485 terminal register.
- Non Echo ON : Use RS 485 Non Echo mode.
- Echo ON : Use RS 485 Echo mode.

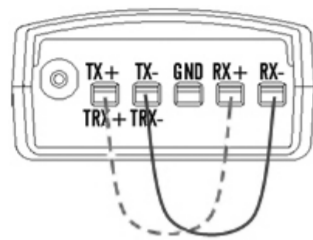
- ⚠ Don't set Non Echo and Echo simultaneously
- \* When communication error occurs due to high speed or distance, please install both Terminal Resistors to solve the problem

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 to checked transmitted data in the TX side.

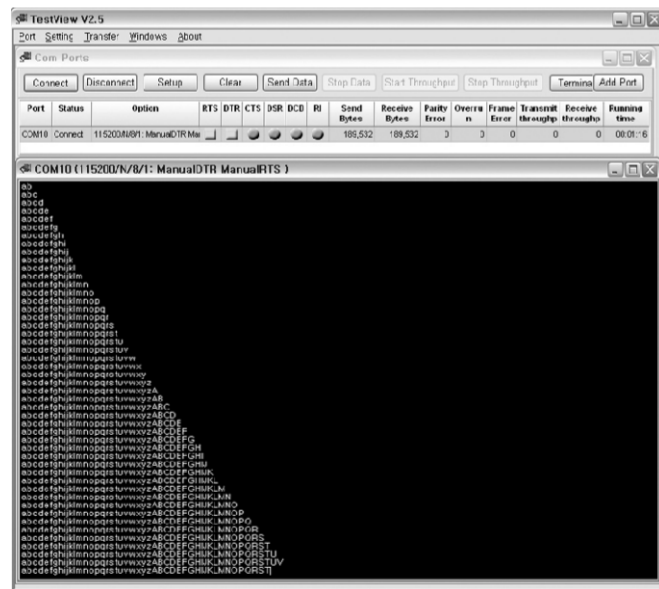
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■ Converter Self Test

- 1) Set to RS422 Mode
- 2) Connect CS-428/9AT ISO 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).

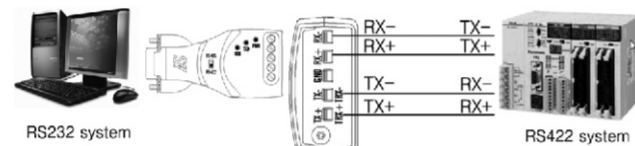
■ Slide Switch of Host & Terminal Side



- \* As the RS422 interface type, CS-428/9AT ISO automatically supports both Point to Point mode and Multi-Drop mode.
- \* In RS422 Multi-Drop mode, the CS-428/9AT ISO 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.

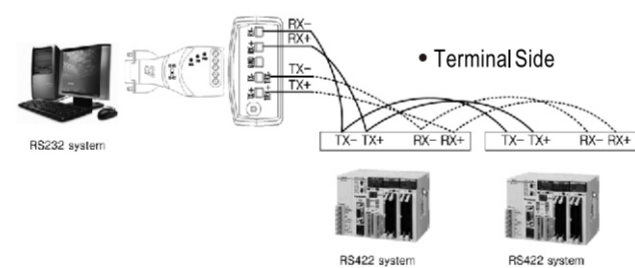
■ The Wire Connection of CS-428/9AT-ISO

< Point to Point >



< Multi-Drop >

• Host Side



\* 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

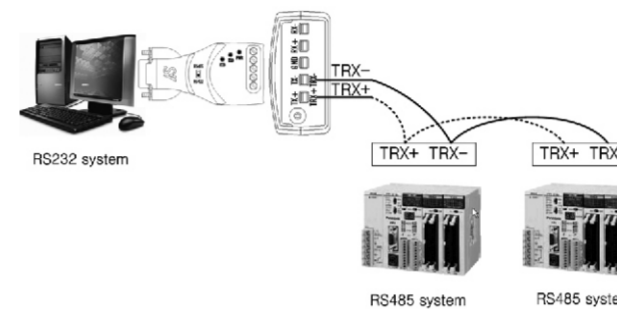


- \* Basically, as the RS485 interface type, both the host

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 ISO



\* Check and confirm if the power LED is turned on during the operation

< Annex >

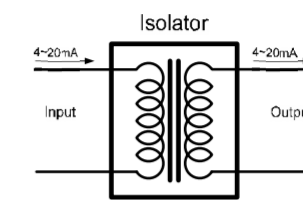
■ EIA RS232, RS485, RS422 Specification

EIA RS232 Specification Summary					
Parameter	Conditions	Min	Max	Units	
Driver Output Voltage Open Circuit			25	V	
Driver Output Voltage Loaded	$3K\Omega \leq R_L \leq 7K\Omega$	5	15	V	
Driver Output Resistance, Power Off	$-2V \leq V_O \leq 2V$		300	$\Omega$	
Driver Output Short-Circuit Current			500	mA	
Driver Output Slew Rate			30	V/us	
Maximum Load Capacitance			2500	pF	
Receiver Input Resistance	$3V \leq V_{IN} \leq 25V$	3000	7000	$\Omega$	
Receiver Input Threshold					
Output = Mark		-3		V	
Output = Space			3	V	
EIA RS485 Specification Summary					
Parameter	Conditions	Min	Max	Units	
Driver Output Voltage Open Circuit			$\pm 1.5$	$\pm 6$	V
Driver Output Voltage Loaded	$R_{LOAD} = 54 \Omega$	$\pm 1.5$	$\pm 5$	V	
Driver Output Short-Circuit Current	Per output to +12V or -7V		$\pm 250$	mA	
Driver Output Rise Time	$R_{LOAD} = 54 \Omega, C_{LOAD} = 50pF$		30	%	
Driver Common Mode Voltage	$R_{LOAD} = 54 \Omega$	-1	3	V	
Receiver Sensitivity	$-7 \leq V_{CM} \leq +12$		$\pm 200$	mV	
Receiver Common-Mode Voltage		-7	+12	V	
Range					
Receiver Input Resistance			12K	$\Omega$	
EIA RS422 Specification Summary					
Parameter	Conditions	Min	Max	Units	
Driver Output Voltage Open Circuit			$\pm 10$	V	
Driver Output Voltage Loaded	$R_L = 100 \Omega$	$\pm 2$		V	
Driver Output Resistance	A to B		100	$\Omega$	
Driver Output Short-Circuit Current	Per output to Common		$\pm 150$	mA	
Driver Output Rise Time	$R_L = 100 \Omega$		10	%	
Driver Common Mode Voltage	$R_L = 100 \Omega$	$\pm 3$		V	
Receiver Sensitivity	$V_{CM} \leq \pm 7$		$\pm 200$	mV	
Receiver CommonMode Voltage Range		-7	+7	V	
Receiver Input Resistance			4000	$\Omega$	
Differential Receiver Voltage	Operational:		$\pm 10$	V	
	Withstand:		$\pm 12$	V	

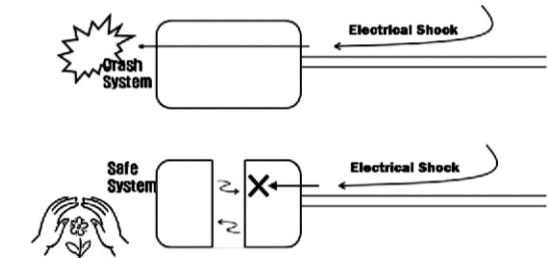
(% indicates %of Bit Width)

■ What is Isolation?

Isolator is needed to isolate communication device from the communication lines in serial communication. An Isolator electrically separates and blocks input and output signals as in the picture below



When electrical shock caused by power or ground is passed on to the system, the whole system can be damaged. However, the internal system can be protected using Isolation technique. Furthermore, isolation can settle problems caused by signal distortion and signal line impedance matching.



■ Transmission Distance per Transmission Speed

RS 422 (NP: with port power, P: with power adaptor)							
distance	100m	200m	500m	800m	1000m	1200m	
speed	NP	NP	NP	NP	NP	NP	P
9600bps	o	o	o	o	o	o	x
19200bps	o	o	o	o	o	x	x
38400bps	o	o	o	x	x	x	x
57600bps	o	o	x	x	x	x	x
115200bps	o	o	x	x	x	x	x
230400bps	o	x	x	x	x	x	x
RS 485, Non-Echo Mode (NP: with port power, P: with power adaptor)							
distance	100m	200m	500m	800m	1000m	1200m	
speed	NP	NP	NP	NP	NP	NP	P
9600bps	o	o	o	o	o	o	x
19200bps	o	o	o	o	x	x	x
38400bps	o	o	o	x	x	x	x
57600bps	o	o	x	x	x	x	x
115200bps	o	o	x	x	x	x	x
230400bps	o	x	x	x	x	x	x
RS 485, Echo Mode (NP: with port power, P: with power adaptor)							
distance	100m	200m	500m	800m	1000m	1200m	
speed	NP	NP	NP	NP	NP	NP	P
9600bps	o	o	o	o	x	x	x
19200bps	o	o	o	x	x	x	x
38400bps	o	o	x	x	x	x	x
57600bps	o	o	x	x	x	x	x
115200bps	o	o	x	x	x	x	x
230400bps	x	x	x	x	x	x	x

\* 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. If you set terminal register, distance could be extended