



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 OTHERWISE, 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]



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, of 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. 15KV) coming from the communication line.
- 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.

3. Specifications

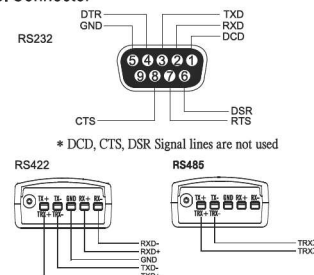
Model	CS-428/9AT-ISO v2.0 ; Automatic opening-closing function, Terminal resistor, Powered by serial port
Communication type	Asynchronous serial communication
Transmission speed	Max. 230.4Kbps
Distance	Maximum 1.2Km (Refer to chart-transmission distance per transmission speed)
Connector	RS232 side : DE9 Female RS422/RS485 side Terminal Block
Slide switch	422/485 : RS422/RS485 selection
Power	Power Adapter: Voltage-DC 9~12V, 300mA Polarity -Independent Serial port power (TXD, RTS, DTR)
Terminal resistor	RS422/485 Terminal resistor: DIP switch select proper terminal resistor switch.
Circuit protection	15KV-surge protector included. 2.5KV Isolation protector
LEDs	TXD(Green), RXD(Red), PWR(Red)

* DCD, DSR, CTS pins are connected to GND

4. Structure



5. Connector



6. Power Supply

The product receives its power from the RS232 signal line without using external power. The signal lines used for the power are TXD, RTS, DTR. When you use the signal lines without the external power supply. I recommend you to use the all the signal lines TXD, RTS, DTR. When you use an external adapter, use DC 9~12V, and if you use over DC 12V, the converter will break. The polarity of the power supply is independent, so you can use the adapter without acknowledging +, -. If the converter switch LED is turned on, you know that power is supplied. While the power is supplied from the adapter and power LED is always on, communication will be stable

7. Terminal Resistor

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

■ Enabling Terminal Resistor

- Open the product case and set the dip-switch.
- Please refer to '8. Installation' to set the DIP switch.

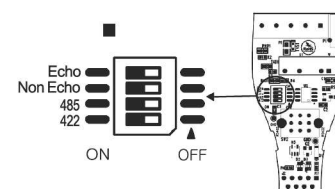
8. Installation

A user can select an operating mode in order to be applied for various fields. Please set the slide switch on top of the converter

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

If the slide switch is set according to its intended use, RS422 (4 lines), or RS485(2 lines) wires into the terminal block and tighten them with a screw driver.
Then connect the DE9 connector side to the PC or RS232 port of the equipment. It may not be necessary to connect the GND pin depending on the installation environment.

■ Enabling terminal resistors



- 422 ON : Enable RS422 terminal resistor.
- 485 ON : Enable RS485 terminal resistor.
- Non Echo ON : Use RS485 in Non Echo mode.
- Echo ON : Use RS485 in Echo mode.

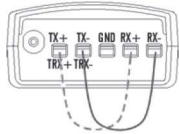
⚠ Don't Enable Non Echo and Echo at the same time.

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

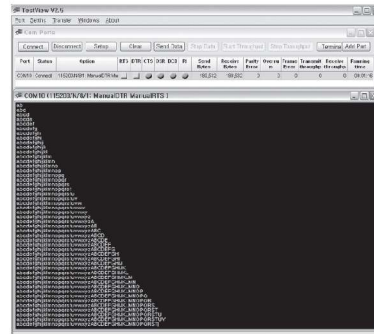
Echo Mode : Data from TXD of RS232 port are transmitted to the other device through TRX+/TRX- in RS485 port, and echo back to RXD in RS232 port at the same time to check the transmitted data.

■ Converter Self Test

- 1) Set the switch to RS422 Mode.
- 2) Connect CS-428/9AT ISO to RS232 port and wire them as shown below.



- 3) Download a test program, TestView from our technical support website at <http://www.solvine.com>
- 4) Install the test utility
If you need more information about TestView, please refer 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

9. Wiring for RS422

This wire connection is used when using 1:1(Point to Point) and 1:N (Multi-Drop) full-duplex communication (Max. 10units).

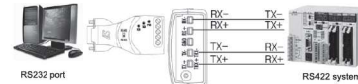
■ Slide Switch of configuration for host and terminal

RS422 ☒ RS485

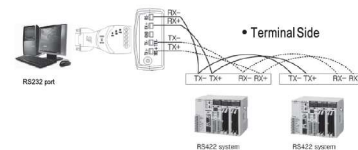
- * As the RS422 interface type, CS-428/9AT ISO automatically supports both Point to Point mode and Multi-Drop mode.
- * In RS422 Multi-Drop mode, the CS-428/9AT ISO of host side need not open or close the output signal line because it may always transfer communication data to terminal side; however, 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.

■ Wiring 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. Wiring for RS485

This wire connection is used when trying N:N half-duplex communication(Max. 10units).

■ Slide Switch of Terminal Side

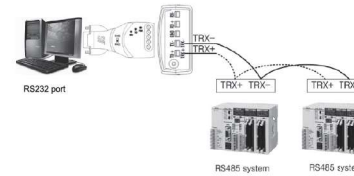
RS422 ☐ RS485

- * In the RS485 interface, both the host

and the terminal sides 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 the application program.

- * For RS485 setting, both echo and non-Echo mode are supported.

■ Wiring CS-428/9AT ISO



* Check if the power LED is on during the operation

(Appendix)

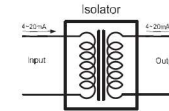
■ TIA/EIA/RS-232, RS485, RS422 specification

EIA RS232 Specification Summary					
Parameter	Conditions	Min	Max	Units	
Driver Output Voltage Open Circuit			25	V	
Driver Output Voltage Loaded	3KΩ ≤ R _L ≤ 7 KΩ	5	15	V	
Driver Output Resistance, Power Off	-2V ≤ V _O ≤ 2V		300	Ω	
Driver Output Short-Circuit Current			500	mA	
Driver Output Slew Rate			30	V/μs	
Maximum Load Capacitance			2500	pF	
Receiver Input Resistance	3V ≤ V _{IN} ≤ 25V	3000	7000	Ω	
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		±1.5	±6	V	
Driver Output Voltage Loaded	R _L = 100 Ω	±1.5	±5	V	
Driver Output Short-Circuit Current	Per output to +12V or -7V		±250	mA	
Driver Output Rise Time	R _L = 54 Ω C _{LOAD} = 50pF		80	%	
Driver Common Mode Voltage	R _L = 54 Ω	-1	3	V	
Receiver Sensitivity	-7 ≤ V _{CM} ≤ +12		±200	mV	
Receiver Common-Mode Voltage Range		-7	+12	V	
Receiver Input Resistance			12K	Ω	
EIA RS422 Specification Summary					
Parameter	Conditions	Min	Max	Units	
Driver Output Voltage Open Circuit			±10	V	
Driver Output Voltage Loaded	R _L = 100 Ω		±8	V	
Driver Output Resistance	A to B		100	Ω	
Driver Output Short-Circuit Current	Per output to Common		±150	mA	
Driver Output Rise Time	R _L = 100 Ω		10	%	
Driver Common Mode Voltage	R _L = 100 Ω		±3	V	
Receiver Sensitivity	V _{CM} ≤ ±7		±200	mV	
Receiver Common-Mode Voltage Range		-7	+7	V	
Receiver Input Resistance			4000	Ω	
Differential Receiver Voltage	Operational: Withstand:		±10 ±12	V	

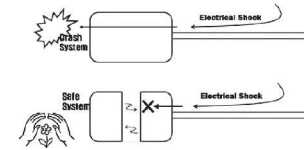
(% indicates % of Bit Width)

■ What is an isolation?

Isolator is used to electrically 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 onto the system, the whole system can be damaged. However, the PC or the serial device can be protected using isolation device. Furthermore, isolation can settle problems caused by signal distortion and signal line impedance matching.



■ Transmission Distance per Transmission Speed

RS 422 (NP: Powered by serial port signal lines, P: Powered by an adaptor)

distance speed	100m NP P	200m NP P	500m NP P	800m NP P	1000m NP P	1200m NP P
9600bps	○	○	○	○	○	○
19200bps	○	○	○	○	○	○
38400bps	○	○	○	○	○	○
57600bps	○	○	○	○	○	○
115200bps	○	○	○	○	○	○
230400bps	○	○	○	○	○	○

RS 485, Non-Echo Mode

distance speed	100m NP P	200m NP P	500m NP P	800m NP P	1000m NP P	1200m NP P
9600bps	○	○	○	○	○	○
19200bps	○	○	○	○	○	○
38400bps	○	○	○	○	○	○
57600bps	○	○	○	○	○	○
115200bps	○	○	○	○	○	○
230400bps	○	○	○	○	○	○

RS 485, Echo Mode

distance speed	100m NP P	200m NP P	500m NP P	800m NP P	1000m NP P	1200m NP P
9600bps	○	○	○	○	○	○
19200bps	○	○	○	○	○	○
38400bps	○	○	○	○	○	○
57600bps	○	○	○	○	○	○
115200bps	○	○	○	○	○	○
230400bps	○	○	○	○	○	○

* 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