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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. http://www.solvline.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.

■ It is designed to operate without external power supply. (When RS232 side is extended, use external power supply shown in page 4, "6. Power Supply".) However, there is a socket for an adapter to supply power externally.

■ It includes highly-effective surge protector to protect itself from the transient voltage(Max. 15KV) coming along the communication line.

■ Especially, CS-428/9AT includes an automatic opening and closing function 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.
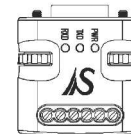
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3. Specifications

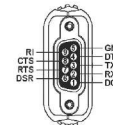| Model	CS-428/9AT-mini2 : DE9 Connector, automatic opening-closing function termination resistor
Communication type	Asynchronous serial communication
Transmission speed	Maximum 921.6Kbps
Distance	Maximum 1.2Km (Refer to chart-transmission distance per transmission speed)
Connector	RS232 side : RS422/RS485 side DE9 Female : Terminal Block
Dip Switch	RS422/485 Termination Resistor RS485 Echo-Mode
Power	w/o External Power : RS232 TXD, RTS, DTR signal w/ External Power : Voltage: 9~12VDC Polarity: Indepedent
Circuit protection	15KV-surge protector included.
Operating Temperature	-40℃ ~ 85℃
LED	TXD(Green), RXD(Red), PWR(Red)

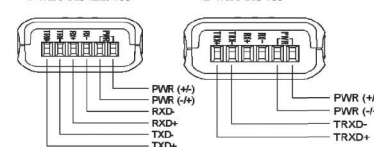※ DCD.DSR and CTS are connected to GND internally

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4. Structure

5. Connector

RS422

GND / DTR / TXD / RXD / DCD
RI / CTS / RTS / DSR

* DCD, CTS, DSR signal lines are not used.

4-wire RS422/485   2-wire RS485

PWR (+/-)
PWR (-/+)
RXD-
RXD+
TXD-
TXD+

PWR (+/-)
PWR (-/+)
TRXD-
TRXD+

* Polarity Independent Power

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6. Power Supply

This unit operates by the power from TXD, RTS and DTR signal generated from the computer or the RS232 port of the equipment when no external power is supplied. When TXD, RTS and DTR signals connected to the DE9 connector can not supply enough power, an external power source is required. You can recognize whether the power is being supplied or not, by cheking the power LED on the converter. The power source part of the converter includes a high volume 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 (within 0.1 second) until this condenser is filled with enough power. Please wait for a second before starting 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 red LED light is turned on when power is supplied.
Supply an external power when power LED is off or dim.

7. Termination Resistor

When a communication error occurs due to high data rate or long cable runs, enable the termination resistors to solve the problem.
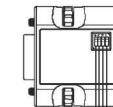
■ Enabling Termination Resistor

* Termination resistor configuring are controlled by switches.
* Refer to '8. Operating Mode' to know how to set the switch.

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8. Configuring Mode

This product allow user to select different operating modes to be applied for various fields. Use the 4 dip switches on the bottom of the product to set the desired operating modes before using.

■ Switch Configuration

DIP SW	OFF	ON
1	RS422 OR 4-wire RS485	2-wire RS485
2	When using 2-wire RS485 mode	
	Non-Echo Mode	Echo Mode
3	When using RS422/RS485 4-wire mode	
	Disable Termination Resistor	Enable Termination Resistor
4	When using 2-wire RS485 mode	
	Disable Termination Resistor	Enable Termination Resistor

After setting the switches, insert the line into the terminal block and fix them with a screw driver. Connect the DE9 connector to the RS232 port of the computer or serial device.

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9. Configuration for RS422/485 4-wire

This connection is used for 1:1 (Point to Point) or 1:N (Multi-Drop) full-duplex communication.(Max. 10 units)

■ Host and terminal configuring switch for the host and the terminal.

* When using RS422/485 4-wire interface, both point to point and multi-drop mode are automatically supported.

* When using RS422 multi-drop mode, output signal line does nothave to be opened and closed on the host side since it is "dedicated" line. On the other hand for terminal side, it always has to open and close the signal line when it sends or receives communication data. This is done automatically by hardware so the application program does not have to control this.

■ Wire Connection

〈Point to Point〉

RS232 장치   RS422

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⟨Multi-Drop⟩

• Host

• Terminal

RX- RX+ TX- TX+

TX- TX+ RX- RX+   TX- TX+ RX- RX+

RS232 장치   RS422 장치   RS422 장치

10. Configuration for RS485 4-wire

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

■ Terminal Switch Configuration

ON 1 2 3 4

* 4-wire RS485 is a bus connection. There is no classification of host or terminal; all devices are considered terminal, so output signal lines must be opened and closed when data is sent or received. This is done automatically by hardware so the application program does not have to control this.

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■ Wire Connection

• Host

• Terminal

RX- RX+ TX- TX+

TX- TX+ RX- RX+   TX- TX+ RX- RX+

RS232 장치   RS485-4선식 장치   RS485-4선식 장치

11. Configuration for RS485 2-wire

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

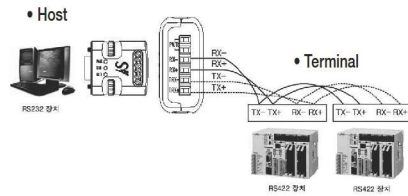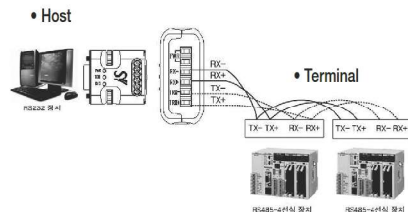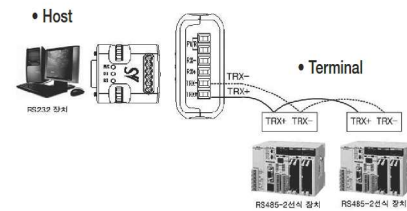■ Terminal Switch Configuration

ON 1 2 3 4

* 2-wire RS485 is a bus connection. There is no classification of host or terminal; all devices are considered terminal, so output signal lines must be opened and closed when data is sent or received. This is done automatically by hardware so the application program does not have to control this.

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■ Wiring

• Host

• Terminal

PWR RX- RX+ TRX- TRX+

TRX- TRX+

TRX+ TRX-   TRX+ TRX-

RS232 장치   RS485-2선식 장치   RS485-2선식 장치

12. Non-echo/Echo Mode Setting

■ Non-Echo/Echo Setting (Set when using 2-wire RS485)

ON 1 2 3 4   ON 1 2 3 4

⟨Non-Echo⟩   ⟨Echo⟩

Echo : Select 2-wire RS485 echo mode. Data from RS232 TXD is sent to another device through RS485 TRX+/TRX- and at the same time received back through RS232 RXD like an echo.

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So data sent through TXD can be checked with data received by RXD.

Non Echo : Select 2-wire RS485 non-echo mode. Data sent through TXD is sent to another device but is not received by RXD. Data sent cannot be checked.

13. Termination Resistor Configuration

■ Setting RS422 or 4-wire RS485 Termination Resistor

* Set 2-wire RS485 termination resistor as well when using long line or high speed.

ON 1 2 3 4   ON 1 2 3 4

⟨Disabled RS422, 4-wire RS485 Termination Resistor⟩   ⟨Enabled RS422, 4-wire RS485 Termination Resistor⟩

■ Setting 2-wire RS485 Termination Resistor

ON 1 2 3 4   ON 1 2 3 4
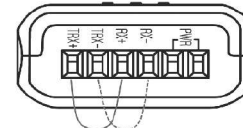
⟨Disabled 2-wire RS485 Termination Resistor⟩   ⟨Enabled 2-wire RS485 Termination Resistor⟩

* Termination resistors have to be installed on receivers of two termination sides. (Beginning and at the End)

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■ Self-test (Loopback Test)

1) Set to RS422 mode.

2) Connect CS-428/9AT mini2 to RS232 port and wire them as show below.

TRX+ TRX- RX+ RX- PWR

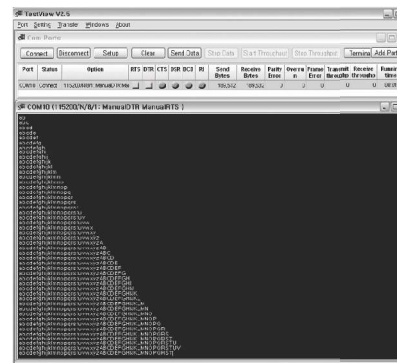3) Download a test program, TestView from our technical support website at http://www.solvline.com

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

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

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

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■ You can perform loopback in RS422 mode

■ Transmission distance per transmission speed

RS422, 4-wire RS485 without external power adapter

speed(baud rate) \ distance(m)	100	200	300	500	800	1,000	1,200
9,600	O	O	O	O	O	O	O
19,200	O	O	O	O	O	O	O
38,400	O	O	O	O	O	O	O
57,600	O	O	O	O	O	O	O
115,200	O	O	O	O	O	O	O
230,400	O	O	O	O	O	O	X
460,800	O	O	O	X	X	X	X
921,600	O	O	O	X	X	X	X

RS422, 4-wire RS485 with external power adapter

speed(baud rate) \ distance(m)	100	200	300	500	800	1,000	1,200
9,600	O	O	O	O	O	O	O
19,200	O	O	O	O	O	O	O
38,400	O	O	O	O	O	O	O
57,600	O	O	O	O	O	O	O
115,200	O	O	O	O	O	O	O
230,400	O	O	O	O	O	O	X
460,800	O	O	O	X	X	X	X
921,600	O	O	O	X	X	X	X

2-wire RS485 non-echo mode without external power adapter

speed(baud rate) \ distance(m)	100	200	300	500	800	1,000	1,200
9,600	O	O	O	O	O	O	O
19,200	O	O	O	O	O	O	O
38,400	O	O	O	O	O	O	O
57,600	O	O	O	O	O	O	X
115,200	O	O	O	O	O	X	X
230,400	O	O	O	O	X	X	X
460,800	O	O	O	X	X	X	X
921,600	O	O	O	X	X	X	X

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2-wire RS485 non-echo mode with external power adapter

speed(baud rate) \ distance(m)	100	200	300	500	800	1,000	1,200
9,600	O	O	O	O	O	O	O
19,200	O	O	O	O	O	O	O
38,400	O	O	O	O	O	O	O
57,600	O	O	O	O	O	O	X
115,200	O	O	O	O	O	X	X
230,400	O	O	O	O	X	X	X
460,800	O	O	O	X	X	X	X
921,600	O	O	O	X	X	X	X

2-wire RS485 echo mode without external power adapter

speed(baud rate) \ distance(m)	100	200	300	500	800	1,000	1,200
9,600	O	O	O	O	O	O	O
19,200	O	O	O	O	O	O	O
38,400	O	O	O	O	O	O	O
57,600	O	O	O	O	O	O	X
115,200	O	O	O	O	O	X	X
230,400	O	O	O	O	X	X	X
460,800	O	O	X	X	X	X	X
921,600	O	O	X	X	X	X	X

2-wire RS485 echo mode with external power adapter

speed(baud rate) \ distance(m)	100	200	300	500	800	1,000	1,200
9,600	O	O	O	O	O	O	O
19,200	O	O	O	O	O	O	O
38,400	O	O	O	O	O	O	O
57,600	O	O	O	O	O	O	X
115,200	O	O	O	O	O	X	X
230,400	O	O	O	O	X	X	X
460,800	O	O	X	X	X	X	X
921,600	O	O	X	X	X	X	X

* Above charts are the test result from SystemBase Co., Ltd. These result can change according to communication line quality and communication circumstances.

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