



CS-428/9 AT-mini

RS232 to RS422/485 Converter



User's Manual

Version 1.0

English

Serial Communication Experts
SystemBase
Since 1987



16F, Daerung Post Tower-1, 212-8, Guro-dong,
Seoul, Korea Tel. 82-2-855-0501/Fax. 82-2-855-0580
www.sysbas.com / marketing@sysbas.com

1. Introduction

We appreciate your good choice for our products. These products have been delivered to the customers after thorough quality control and testing. You will take a free maintenance service for 5 years from the date of your purchase. If there are any difficulties or questions during the use, please contact our Technical Supporting Department for the technical consulting service [Tel.82-2-855-0501(Ext. 113), tech@sysbas.com]

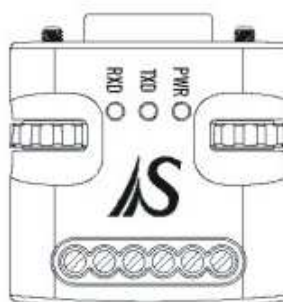
2. Function

- 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 32 devices 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 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.

3. Specifications

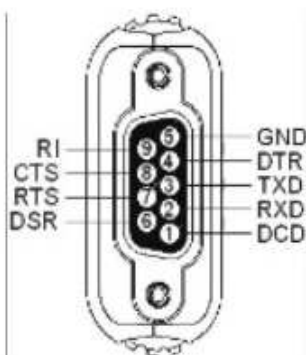
Model	CS-428/9AT-mini : DB9 Connector, Automatic opening-closing function Termination resistor
Communication type	Asynchronous serial communication
Transmission speed	Maximum 115.2Kbps
Distance	Maximum 1.2Km (Refer to chart-transmission distance per transmission speed)
Connector	RS232 side : DB9 Female RS422/RS485 side : Terminal Block
RS422/485 Termination resistor RS485 Echo-mode	Controlled by dip switch
Power	w/o Power Adapter : RS232 TXD, RTS, DTR signal w/ Power Adapter : Voltage - DC 7~12V Polarity - Independent
Internal connection	DCD, DSR, CTS pins are selectively connected to GND.
Circuit protection	15,000 volt-surge protector included.
LEDs	TXD, RXD, PWR

4. Structure



5. Connector

RS232



RS422 or 4-Wire RS485

2-Wire RS485



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



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

* Power is independent of polarity

6. Power supply

It is operated with the power of TXD, RTS or 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 or 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 includes a high volumed condenser to supply stable power to the converter circuit by using TXD, RTS or DTR signal. Therefore it may not work for a very short period (within 0.1 second) until this condenser is filled with enough power. So wait for a second before starting to use converter after turning on the TXD, RTS or DTR signal when TXD, RTS or DTR signal is controlled directly in the application program.

The LED display is turned on when power is supplied to converter. Apply an external power supply when you have no way to make power LED turned on.

7. Termination resistor

When a communication error occurs due to high data rate or long cable runs install the Termination resistors to solve the problem.

■ Termination resistor installation

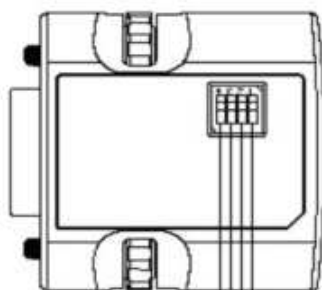
- Termination resistor controlled by dip switch

Refer to '8. Operation Mode Configuration' to know
How to select dip switch

8. Operating Mode Configuration

This product allow user to select different operating modes to be applied to different install environments. Use the 4 dip switches on the product to set desired operating modes before using.

■ Dip Switch Setup



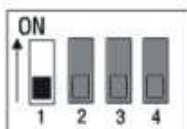
DIP SW	OFF	ON
1	RS422 OR 4-Wire RS485	2-Wire RS485
2	When using 2-Wire RS485 mode	
	Non-Echo Mode	Echo Mode
3	When using RS422 OR 4-Wire RS485 mode	
	Not Select Termination Resistor	Select Termination Resistor
4	When using 2-Wire RS485 mode	
	Not Select Termination Resistor	Select Termination Resistor

After setting the dip switches, push the lines into converter's line holes and fix it with a screw driver. Connect the DB9 Connector to PC or device's RS232 port

9. RS422 Connection

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

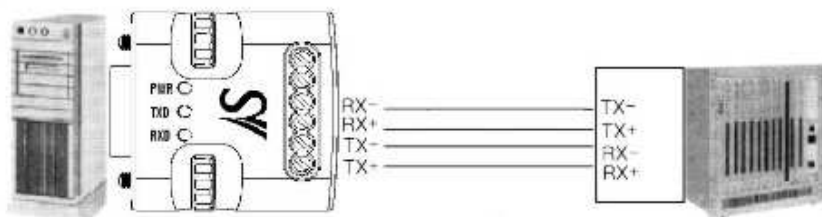
■ Host and Terminal Switch Configuration



- * When using RS422 interface, both Point to Point and Multi-Drop mode are automatically supported.
- * When using RS422 Multi-Drop mode, output signal line does not have to be opened and closed on the host side since it is always capable of communicating. On the other hand, terminal side 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>

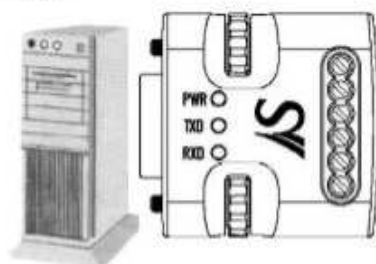


RS232 Device

RS422 Device

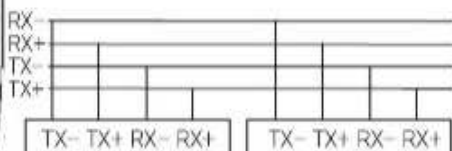
<Multi-Drop>

• Host



RS232 Device

• Terminal



RS422 Device

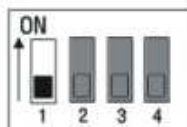


RS422 Device

10. 4-Wire RS485 Connection

This connection is used for 1:N (Multi-Drop) full-Duplex communication(Max 32 Units).

■ Terminal Switch Configuration

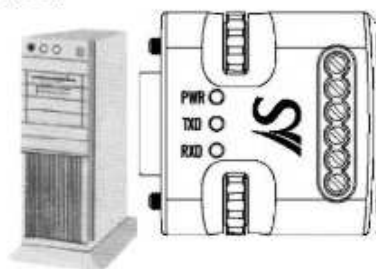


* 4-Wire RS485 is basically a bus connection. So output signal lines must be opened and closed on data communications.

This is done automatically by hardware so the application program does not have to control this.

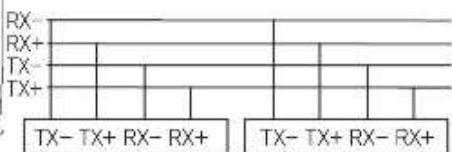
<Multi-Drop>

• Host



RS232 Device

• Terminal

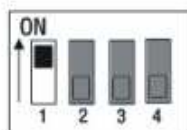


4-Wire RS485 Device 4-Wire RS485 Device

11. 2-Wire RS485 Connection

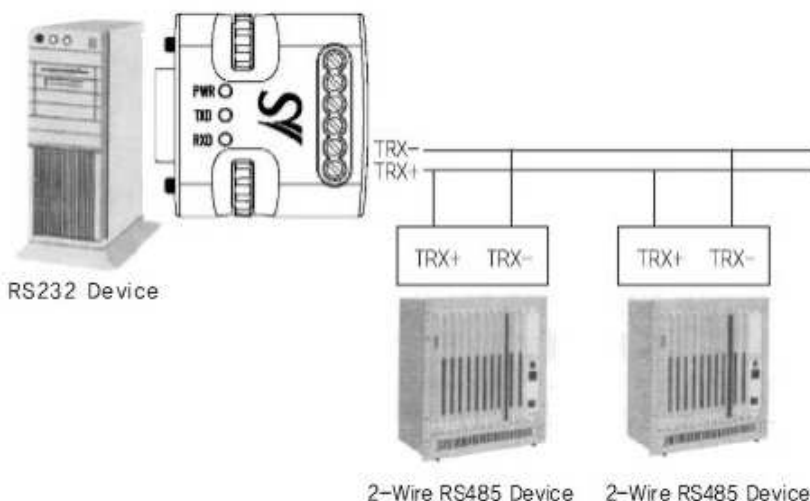
This connection is used for N:N Half-Duplex communication (Max 32 Units).

■ Terminal Switch Configuration



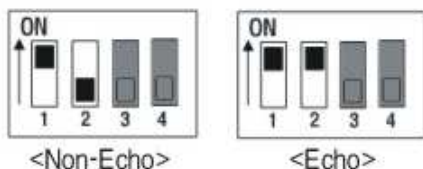
- * 2-Wire RS485 is basically a bus connection. There is no classification of host or terminal; all devices are considered terminal, so output signal lines must be opened and closed on data communications. This is done automatically by hardware so the application program does not have to control this.

■ Wire Connection



12. Non-Echo/Echo Mode Setting

■ Non-Echo/Echo Setting (Apply when Using 2-Wire RS485)



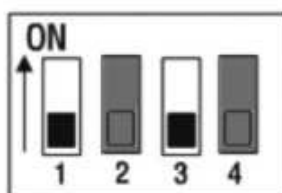
Echo : Select 2-Wire RS485 Echo Mode. Data from RS232 TXD is sent to another device through RS485 TRX+/TRX- and at the same time received back through RS232 RXD like an echo. So data sent through TXD can be checked with data received by RXD.

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.

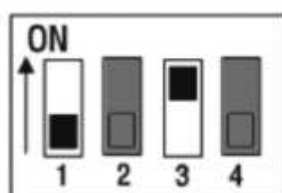
13. Termination Resistor Configuration

■ Setting RS422, 4-Wire RS485 Termination Resistor

(*Set 2-Wire RS485 Termination Resistor as well When using long line or high speed)

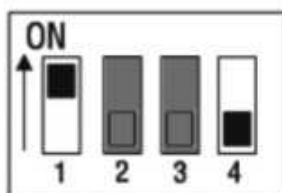


<Not select RS422,
4-Wire RS485
Termination Resistor>

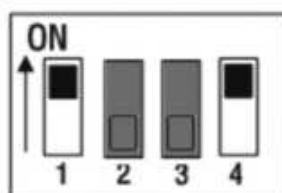


<Select RS422,
4-Wire RS485
Termination Resistor>

■ Setting 2-Wire RS485 Termination Resistor



<Not select
2-Wire RS485
Termination Resistor>



<select
2-Wire RS485
Termination Resistor>

Tip) Termination resistors have to be installed on receivers of two termination sides (Beginning and End)

〈Annex〉

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

(% indicates % of Bit Width)

■ Transmission distansmission speed

RS422, 4-Wire RS485, without external power adapter

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

RS422, 4-Wire RS485, with external power adapter

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

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

2-Wire RS485, Non-Echo, mode, without external power adapter

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

2-Wire RS485, Non-Echo, mode, with external power adapter

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

2-Wire RS485 Echo mode without external power adapter

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

2-Wire RS485 Echo mode with external power adapter

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

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 (EXT. 113)]