

# RS-232 / RS-485 INTERFACE CONVERTER



## FCC INFORMATION

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- ◆ Reorient or relocate the receiving antenna;
- ◆ Increase the separation between the equipment and receiver;
- ◆ Connect the equipment into an outlet on a circuit different from that which the receiver is connected;
- ◆ Consult the dealer or an experienced radio/television technician for help.

## ROHS

This product is RoHS compliant.

## SJ/T 11364-2006

The following contains information that relates to China.

部件名称	有毒有害物质或元素					
	铅	汞	镉	六价铬	多溴联苯	多溴二苯醚
电器部件	●	○	○	○	○	○
机构部件	○	○	○	○	○	○

○: 表示该有毒有害物质在该部件所有均质材料中的含量均在SJ/T 11363-2006规定的限量要求之下。

●: 表示符合欧盟的豁免条款, 但该有毒有害物质至少在该部件的某一均质材料中的含量超出SJ/T 11363-2006的限量要求。

×: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出SJ/T 11363-2006的限量要求。



# IC485S /IC485SI USER MANUAL

## Online Registration

International	<a href="http://support.aten.com">http://support.aten.com</a>
North America	<a href="http://www.aten-usa.com/product_registration">http://www.aten-usa.com/product_registration</a>

## Telephone Support

International		886-2-8692-6959
China		86-10-5255-0110
Japan		81-3-5323-7178
Korea		82-2-467-6789
North America	ATEN TECH	1-888-999-ATEN
	ATEN NJ	1-732-356-1703
United Kingdom		44-8448-158923

## Technical Support

- ◆ For international online technical support – including troubleshooting, documentation, and software updates:  
**<http://support.aten.com>**
- ◆ For North American technical support:

Email		ATEN TECH	<a href="mailto:support@aten-usa.com">support@aten-usa.com</a>
		ATEN NJ	<a href="mailto:sales@aten.com">sales@aten.com</a>
Online	Technical Support	ATEN TECH	<a href="http://www.aten-usa.com/support">http://www.aten-usa.com/support</a>
		ATEN NJ	<a href="http://support.aten.com">http://support.aten.com</a>
	Troubleshooting Documentation Software Updates	ATEN TECH	<a href="http://www.aten-usa.com">http://www.aten-usa.com</a>
		ATEN NJ	<a href="http://www.aten.com">http://www.aten.com</a>
Telephone	ATEN TECH	1-888-999-ATEN	
	ATEN NJ	1-732-356-1703	

## PACKAGE CONTENTS

The RS232 / RS485 Interface Converter package contains the following items:

- ◆ IC-485S or IC-485SI Interface Converter
- ◆ 1 Power Adapter (DC 9V; 300mA)
- ◆ 1 User Manual\*

Check to make sure that all the components are present and that nothing got damaged in shipping. If you encounter a problem, contact your dealer.

Read this manual thoroughly and follow the installation and operation procedures carefully to prevent any damage to the unit, and/or any of the devices connected to it.

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\* Features may have been added to the IC485S /IC485SI since this manual was printed. Please visit our website to download the most up-to-date version of the manual.

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## OVERVIEW

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Although RS-232 serial ports are found on almost every computer, because of their slow transmission speeds, limited range, and limited networking capabilities, they are not an effective solution for industrial strength long distance communications systems.

Systems based on the RS-485 standard, however, utilize different voltage lines for the data and control signals, so they are not subject to the RS-232 limitations.

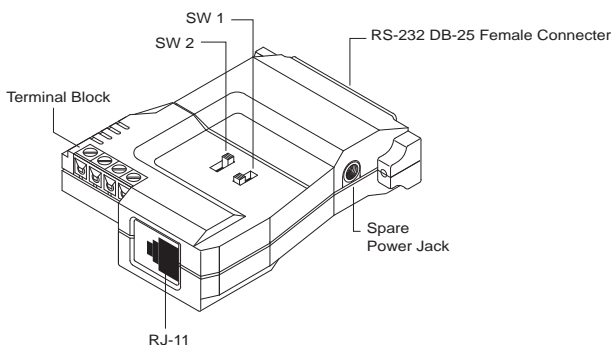
The IC-485S / IC-485SI is a bidirectional converter that transparently converts RS-232 signals to RS-485 signals (and vice versa). The IC-485S / IC-485SI provides Point-to-Point; Multidrop; and Simplex operations over distances of up to 1200 m (4000 ft.), thus permitting the creation of reliable long distance data communications systems using standard computer hardware.

## SWITCH CONFIGURATION

The IC-485S / IC-485SI's operating mode parameters are set with two slide switches:

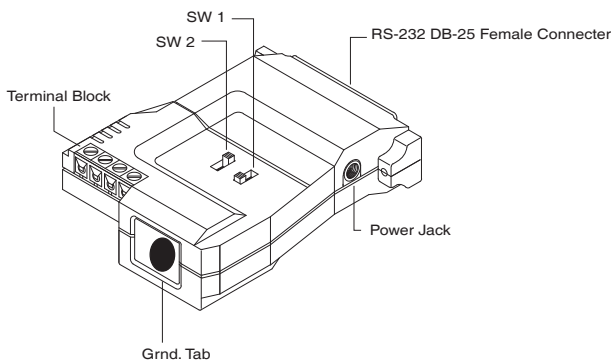
- ◆ SW1 sets the Device Mode
- ◆ SW2 sets the Transmitting and Receiving Mode

## IC-485S SWITCH SETTINGS



Position	Setting	
	SW1	SW2
1	DCE	TxO, RxON
2	DTE	TxRTS, RxRTS
3	Monitor	TxRTS, RxON

## IC-485SI SWITCH SETTING



Position	Setting	
	SW1	SW2
1	DCE	TxO, RxON
2	DTE	TxRTS, Rx $\overline{\text{RTS}}$
3	X	TxRTS, RxON

## TERMINOLOGY

Explanations of the SW1 and SW2 terms are given in the table below:

Term	Explanation
DCE	Data Communications Equipment; if the IC-485S / IC-485SI is going to be plugged into a DTE device, the IC-485S / IC-485SI must be set to DCE.
DTE	Data Terminating Equipment; if the IC-485S / IC-485SI is going to be plugged into a DCE device,, the IC-485S / IC-485SI must be set to DTE.
TxON,, RxON	This setting is used in Point-to-Point operations,, in which the unit is always in Transmitting and Receiving Mode.
TxRTS, Rx $\overline{\text{RTS}}$	This setting is used in Multidrop operations, in which the unit is in Transmitting Mode when the RTS signal is high, and is in Receiving Mode when the RTS signal is low.
TxRTS, RxON	This setting is used in Multidrop Full Duplex operations to monitor the RS-485 line signals. Receiving Mode is always ON. Transmitting mode only occurs when the RTS signal is high.



## OPERATING MODES

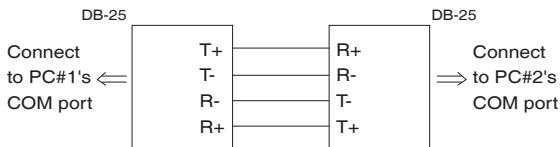
The IC-485S / IC-485SI supports four operating modes: Point-to-Point; Multidrop; Simplex; and Monitor (IC-485S only). Point-to-Point and Multidrop can be configured for Full or Half Duplex. Each of the operating modes is explained in the sections that follow.

### POINT-TO-POINT

A Point-to-Point configuration is one in which two devices, located at two different places are linked for communication by a pair of IC-485S or IC-485SI units. There are two configurations: Point-to-Point Full Duplex, and Point-to-Point Half Duplex.

#### 1. Point-to-Point Full Duplex

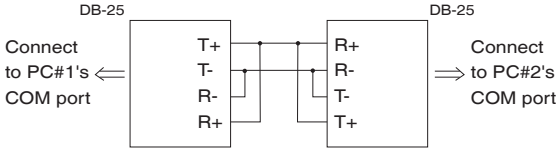
- ◆ Point-to-Point Full Duplex uses reverse four wire cabling as shown in the diagram below:



- ◆ For both IC-485S / IC-485SI units, set SW1 to DCE or DTE depending on what type of device the IC-485S / IC-485SI will plug into (if it will plug into a DCE device, configure it for DTE, and vice versa).
- ◆ For both IC-485S / IC-485SI units, set SW2 to TxON, RxON.

## 2. Point-to-Point 2 Wire Half Duplex

- ◆ Point-to-Point Half Duplex uses straight through four wire cabling, as shown in the diagram below:



- ◆ For both IC-485S / IC-485SI units, set SW1 to DCE or DTE depending on what type of device the IC-485S / IC-485SI will plug into (if it will plug into a DCE device, configure it for DTE, and vice versa).
- ◆ For both IC-485S / IC-485SI units, set SW2 to TxRTS, RxRTS.

Note: The RTS signal is controlled by an external software command. The IC-485S / IC-485SI has no capability to control this signal by itself

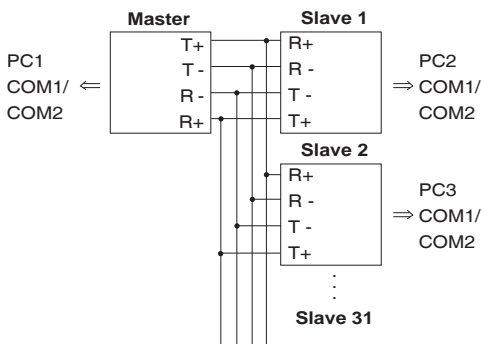
## MULTIDROP

A Multidrop configuration is one in which more than two devices are linked for communication using several IC-485S / IC-485SI units.

One of the devices that one of the IC-485S / IC-485SIs connects to is designated as the *Master* device. All the remaining devices that the rest of the IC-485S / IC-485SIs connect to are designated as *Slave* devices. There are two configurations: Multidrop Full Duplex, and Multidrop Half Duplex.

### 1. Multidrop 4 Wire Full Duplex

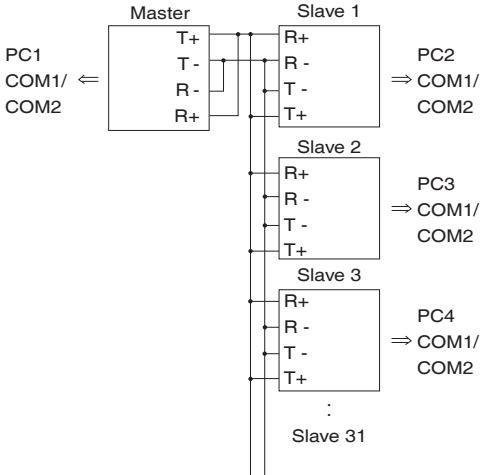
- ◆ Multidrop Full Duplex uses reverse four wire cabling to link all the connected IC-485S / IC-485SI units:



- ◆ For all IC-485S / IC-485SI units, set SW1 to DCE or DTE depending on what type of device the IC-485S / IC-485SI will plug into (if it will plug into a DCE device, configure it for DTE, and vice versa).
- ◆ For the Master unit, set SW2 to TxON, RxON.
- ◆ For all Slave units, set SW2 to TxRTS, RxON.

## 2. Multidrop Half Duplex

- ◆ Multidrop Half Duplex uses straight-through four wire cabling, to link all the connected IC-485S / IC-485SI units:



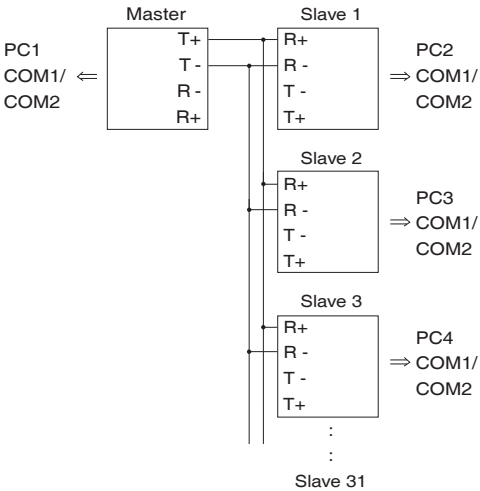
- ◆ For all IC-485S / IC-485SI units, set SW1 to DCE or DTE depending on what type of device the IC-485S / IC-485SI will plug into (if it will plug into a DCE device, configure it for DTE, and vice versa).
- ◆ For all IC-485S / IC-485SI units set SW2 to TxRTS, RxRTS.

Note: The RTS signal is controlled by an external software command. The IC-485S / IC-485SI has no capability to control this signal by itself.

## SIMPLEX

A Simplex configuration is one in which more than two devices are linked for communication using several IC-485S / IC-485SI units in a manner similar to Multidrop. The difference is that in a Simplex configuration, the Master device can only talk, and the Slave devices can only listen.

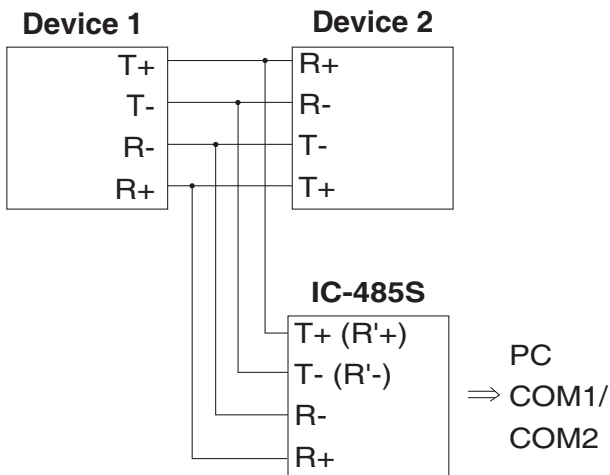
- ◆ Simplex uses reverse two wire cabling to link all the connected IC-485S / IC-485SI units, as shown in the figure below:



- ◆ For all IC-485S / IC-485SI units, set SW1 to DCE or DTE depending on what type of device the IC-485S / IC-485SI will plug into (if it will plug into a DCE device, configure it for DTE, and vice versa).
- ◆ For all of the units (Master and Slave), set SW2 to TxON, RxON.

## MONITOR IIX-485S ONLY!

With Monitor Mode, the RS-485S can be wired to the lines of an RS-485 or RS-422 device to monitor the line signals. In this configuration, the RS-485S changes the functions of T+ and T- to R'+ and R'- respectively.



- ◆ Set SW1 to Monitor.
- ◆ Set SW2 to TxRTS, RxON

Note: 1. The RTS must be Low in Monitor Mode.

2. The R+ and R- signals are converted and linked to the RS-232 port, DB-25 pin 3. The R'+ and R'- (T+ and T-) signals are converted and linked to the RS-232 port, DB-25 pin 2.

## INSTALLATION

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1. Set each IC-485S / IC-485SI's configuration switches according to the information provided in the Switch Configuration and Operating Modes sections.
2. Plug the IC-485S / IC-485SI's DB-25 female connector into the computer's RS-232C port.
3. Connect the IC-485S / IC-485SI units to each other:
  - ◆ Use two or four wire twisted pair cable in a reverse or straight through configuration according to the information provided in the Switch Configuration and Operating Modes sections.
  - ◆ For the IC-485S, you may use either the RJ-11 telephone socket, or wire directly to the Terminal Block (See the Terminal Block section for pin assignment details).
  - ◆ For the IC-485SI, you must ground the device by connecting a grounding wire from the Grounding Tab to the grounding source.

Note: 1. When tightening the terminal connector screws it is recommended to use a Phillips PH1 Screwdriver.

2. Over-tightening the terminal connector screws may result in damage to your IC-485S or IC-485SI and difficulty loosening the screws.

4. Power on the computers. The units are now ready for operation.

## APPENDIX

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### THE TERMINAL BLOCK

The four screw terminal block has different pin assignments depending on the operating mode:

- ◆ In DCE/DTE mode, terminals 1 (+V) and 2 (-V) are configured to transmit data (the transmitter); while terminals 3 (-V) and 4 (+V) are configured to receive data (the receiver).
- ◆ In Monitor mode (IC-485S only), terminals 1 and 2 are, respectively, the positive and negative of receiver 1; while terminals 3 and 4 are, respectively, the positive and negative of receiver 2.

Pin	DCE/DTE	Monitor
1	Transmitter +V	Receiver 1 +V
2	Transmitter -V	Receiver 1 -V
3	Receiver -V	Receiver 2 -V
4	Receiver +V	Receiver 2 +V



## DCE / DTE CONNECTION TABLE

Because of the polarity of the communication signals, a DTE configured device must connect to a DCE configured device. The shaded area in the figure below is an example of a DTE to DCE connection:

Device's Connector Pin #				Cable		IC-485ASI	
DCE DB-9	DTE DB-9	DCE DB-25	DTE DB-25	25/25 or 9/25 pin		DCE DB-25	DTE DB-25
2	3	3	2	Tx	Rx	2	3
3	2	2	3	Rx	Tx	3	2
8	7	5	4	RTS	CTS	4	5
7	8	4	5	CTS	RTS	5	4
4	6	20	6	DSR	DTR	6	20
6	4	6	20	DTR	DSR	20	6
5	5	7	7	GND		7	7

## SELF TEST

To test the internal circuit of the interface converter, connect a dumb terminal to the unit and do the following:

1. Set SW1 to DCE (if the dumb terminal is configured for DCE).
2. Set SW2 to TxON, RxON.
3. Connect a wire from pin 1 (Tx+) to pin 4 (Rx+)
4. Connect a wire from pin 2 (Tx-) to pin 3 (Rx-)
5. Set the terminal to full duplex and enter data.

If the data displays on the screen, the internal circuit is operational.

## TROUBLESHOOTING

<b>Problem</b>	<b>Action</b>
Data Transmission Failure	Check that the power adapter is plugged in and working properly.
	Check that the IC-485S / IC-485SI units are securely plugged into the computers' serial ports.
	Check that the cables are properly set up and properly connected.
	Check that SW1 and SW2 are set properly.
Data Loss or Error	Check that the Data Rate and Data Format are the same for all devices.

## LIMITED WARRANTY

IN NO EVENT SHALL THE DIRECT VENDOR'S LIABILITY EXCEED THE PRICE PAID FOR THE PRODUCT FROM THE DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM THE USE OF THE PRODUCT, DISK OR ITS DOCUMENTATION.

The direct vendor makes no warranty or representation, expressed, implied, or statutory with respect to the contents or use of this documentation, and specially disclaims its quality, performance, merchantability, or fitness for any particular purpose.

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